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[redacted]

TOD STAINLESS
COST MATL.
BRKD. FROM

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Dot Matrix Serial Number Engraving

We would like to purchase one dot matrix serial number engraver in 1991 and 3 more units in 1992. Within the last year and a half several single pin dot matrix machines have come onto the market that can engrave a respectible serial number onto a receiver while being computer controlled.

BATF is impressed with this method because it is computer controlled, looks good, can be chemically raised after being filed off, and it is inexpensive. Colt and Ruger are already using this method. Smith & Wesson is looking at using it.

It is versatile. Because it is a dot matrix it can print custom serial numbers, serial number range changes, new serial number ranges, and graphics (pictures). This unit can run 11-87s, 1100s, 870s, 7400, and 7600 back to back without changing heads, machines, or fixture. Then it can serialize 700s, SEVENs, and XPs changing only the fixture. It can also be used to customize "dinner" guns without the cost of a new Roll Mark Head.

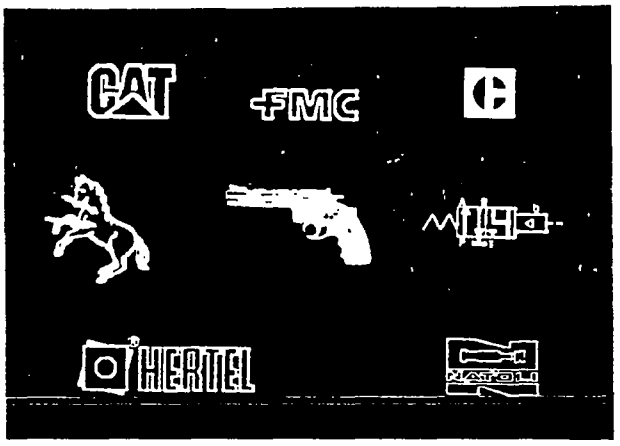
It is computer controlled. This will enable Remington to better control the generation of serial numbers and serial number ranges. Simply put, unless some one tries real hard, it will be almost impossible to create a duplicate serial number or over run a range. This also means that at end of range, no one has to order a new stamp.

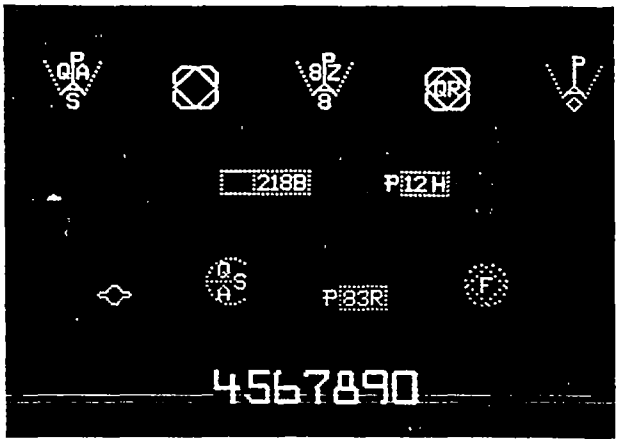
The price per unit is in the $23,000 range.

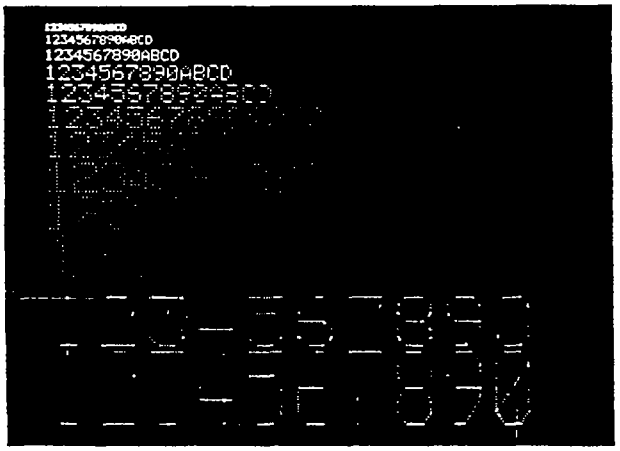
Mark W Courage 8/22/91

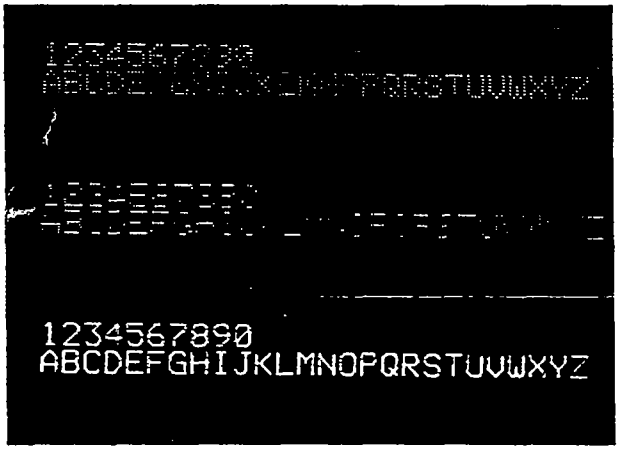
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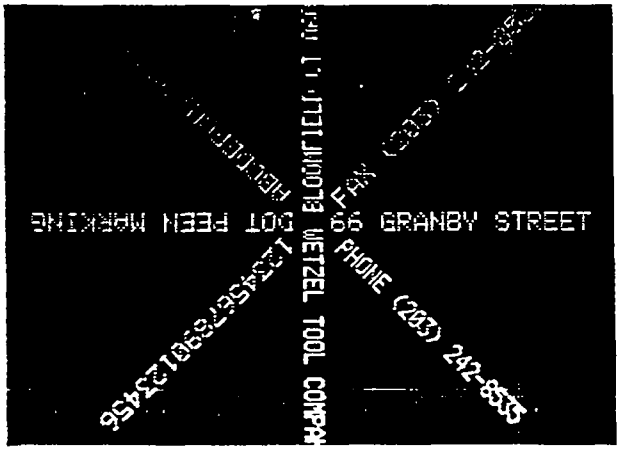
SOME TYPICAL APPLICATIONS

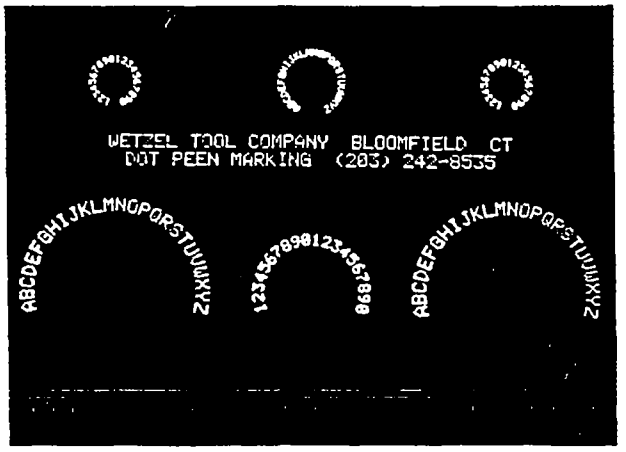












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PROJECT JUSTIFICATION DATA

FOR

MODEL 700 ADL SS (STAINLESS SYNTHETIC)

	ITEM	RESPONSIBILITY
1.	**PRODUCT SPECIFICATIONS:**	MARKETING/TECHNICAL
	a) calibers/gauges b) barrel lengths c) finishes d) wood/synthetics e) other features	
2.	**MARKETING STRATEGIES:**	MARKETING
	a) estimated volumes - incremental 1st & 3rd year - replacement 1st & 3rd year b) estimated sales price - net pricing 1st & 3rd year c) competitive offerings & pricing	
3.	**RESEARCH DEVELOPMENT COSTS:**	TECHNICAL
	a) development cost estimate b) manpower estimate c) timing estimate	
4.	**MANUFACTURING DEVELOPMENT COSTS:**	TECHNICAL
	a) project estimate - capital estimate - operations estimate b) manpower estimate c) timing estimate	
5.	**COST ANALYSIS:**	BUSINESS SERVICES
	a) factory cost estimate b) internal rate of return c) machine capabilities	

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PRODUCT SPECIFICATIONS

FOR

MODEL 700 ADL SS (STAINLESS SYNTHETIC)

This proposal is meant to fill a void in Remington's centerfire product line. Specifications for this offering include:

Barrel:	Configuration will be the same as the magnum Material is to be stainless steel Finish is to be rotoblasted.
Barrel Bracket:	This part is to be stainless steel
Receiver:	Configuration will be standard Material is to be stainless steel Finish is to be rotoblasted
Bolt Assembly:	The following components will be made from stainless steel - o Bolt Handle o Bolt Body o Bolt Head o Bolt Assembly Pin Finish is to be rotoblasted
Firing Pin Assembly:	The Bolt Plug will be made from stainless steel - all other components will be add-used
Trigger Guard:	This component is to be stainless steel Finish is to be rotoblasted
Take-down Screws:	These components are to be made from stainless steel
Bolt Stop:	This component is to be electroless nickel plated
Fire Control Assy:	Several components in the fire control assembly will be plated for corrosion resistance
Stock:	The stock is to be a molded synthetic
Calibers:	25-06 REM, 270 WIN, 280 REM, 7MM REM MAG, 300 WIN MAG, 338 WIN MAG and 30-06

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M/700 SS TRIGGER ASS'Y TOLERANCE STUDY

PARTS	DIMENSIONS	PLATED	UNPLATED	12-3 700 SS	91 700
HOUSING / SEAR PIN (SEAR PIN NOT PLATED) (SEAR PIN = BOLT STOP PIN)	MIN HOLE	.1244	.1250	.0006 INT	.0000
	MAX PIN	.1250	.1250		
	MAX HOLE	.1254	.1260	.0006 CLR	.0012 CLR
	MIN PIN	.1248	.1248		
HOUSING / TRIGGER PIVOT PIN (TRIG. PIVOT PIN NOT PLATED)	MIN HOLE	.1231	.1237	.0019 INT	.0013 INT
	MAX PIN	.1250	.1250		
	MAX HOLE	.1241	.1247	.0007 INT	.0001 INT
	MIN PIN	.1248	.1248		
HOUSING / SAFETY PIVOT PIN	MIN HOLE	.1244	.1250	.0012 INT	.0000
	MAX PIN	.1256	.1250		
	MAX HOLE	.1254	.1260	.0018 CLR	.0030 CLR
	MIN PIN	.1236	.1230		
TRIGGER / TRIG. PIVOT PIN	MIN HOLE	.1248	.1254	.0002 INT	.0004 CLR
	MAX PIN	.1250	.1250		
	MAX HOLE	.1258	.1264	.0010 CLR	.0016 CLR
	MIN PIN	.1248	.1248		
SAFETY / SAFETY PIVOT PIN	MIN HOLE	.1248	.1254	.0008 INT	.0004 CLR
	MAX PIN	.1256	.1250		
	MAX HOLE	.1256	.1262	.0020 CLR	.0032 CLR
	MIN PIN	.1236	.1230		
SEAR / SEAR PIN	MIN HOLE	.1255	.1255	.0005 CLR	.0005 CLR
	MAX PIN	.1250	.1250		
	MAX HOLE	.1265	.1265	.0017 CLR	.0027 CLR
	MIN PIN	.1248	.1248		
HOUSING / SEAR	MIN WIDTH (B-14631)	.1734	.1740	.0008 CLR	.0020 CLR
	MIN WIDTH (C-21655)	.1724	.1730	.0002 INT	.0010 CLR
	MAX TRIGGER	.1726	.1720		
	MAX WIDTH (B-14631)	.1754	.1760	.0068 CLR	.0080 CLR
	MAX WIDTH (C-21655)	.1744	.1750	.0058 CLR	.0070 CLR
	MIN TRIGGER	.1686	.1680		

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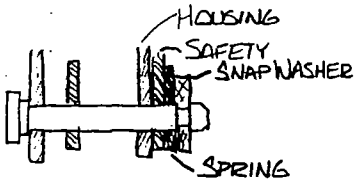
M/700SS TRIGGER ASSY TOLERANCE STUDY

PARTS	DIMENSIONS	PLATED	UNPLATED	12-3 700SS	91 700
HOUSING/ CONNECTOR	MIN WIDTH B-H1631	.1734	.1740	.0003 CLR	.0015 CLR
	MIN WIDTH C-21655	.1724	.1730	.0007 INT	.0005 CLR
	MAX CONN.	.1731	.1725		
	MAX WIDTH B-H1631	.1754	.1760	.0128 CLR	.0140 CLR
	MAX WIDTH C-21655	.1744	.1750	.0118 CLR	.0130 CLR
	MIN CONN.	.1626	.1620		

TRIGGER/ CONNECTOR NO ISSUE – ALL TRIGGERS FILED TO FIT

SAFETY PIVOT PIN LENGTH

M/700 WORST CASE = .0040 CLR
BEST CASE = .0270 CLR



WORST CASE

MIN PIN = .432 − (2 x .0003) = .4314
MAX HOUSING = (2 x .064) + (2 x .0003) + .176 = .3046
MAX SAFETY = .082 + (2 x .0003) = .0826
MAX SPRING = .021 + (2 x .0003) = .0216
MAX SNAPWASHER = .021 + (2 x .0003) = .0216
.4304

S = .4314 − .4304 = .0010 CLR

BEST CASE

MAX PIN = .436 − (2 x .0003) = .4354
MIN HOUSING = (2 x .060) + (2 x .0003) + .173 = .2936
MIN SAFETY = (2 x .0003) + .078 = .0786
MIN SPRING = .019 + (2 x .0003) = .0196
MIN SNAPWASHER = .019 + (2 x .0003) = .0196
.4114

S = .4354 − .4114 = .0240 CLR

BOLT STOP RELEASE/ SAFETY PIVOT PIN

MAX THICK	.033 + 2x.0003	= .0336	.0330	.0064 CLR	.0070 CLR
MIN HEAD	.040 + .0003 − .0003	= .0400	.0400		
MIN THICK	.028 + 2x.0003	= .0286	.0280	.0164 CLR	.0170 CLR
MAX HEAD	.045 + .0003 − .0003	= .0450	.0450		

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S/N	Keeper	Caliber
C6671712		
C6671714		
C6671715		
C6671716		
C6671717		
C6671718	Ron Shearer	25-06
C6671719	Neil Oldridge	25-06
C6671720		
C6678174		
C6678175		
C6678176		
C6678177		
C6678178		
C6678179	Custom Shop	
C6678180		
C6678181		
C6678182		
C6678184		
C6678185	Dick Butler	
C6678186		
C6678187		
C6678188		
C6678189		
C6678190	Custom Shop	
C6678191		
C6678192		
C6678193		
C6678194		
C6678195		
C6678196		
C6678197		
C6678198		
C6678199	John Balio	7mm Rem Mag
C6678200		
C6678201		

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SIX ENTERPRISES
320-D Turtle Creek Court
SAN JOSE, CALIFORNIA 95125

TO

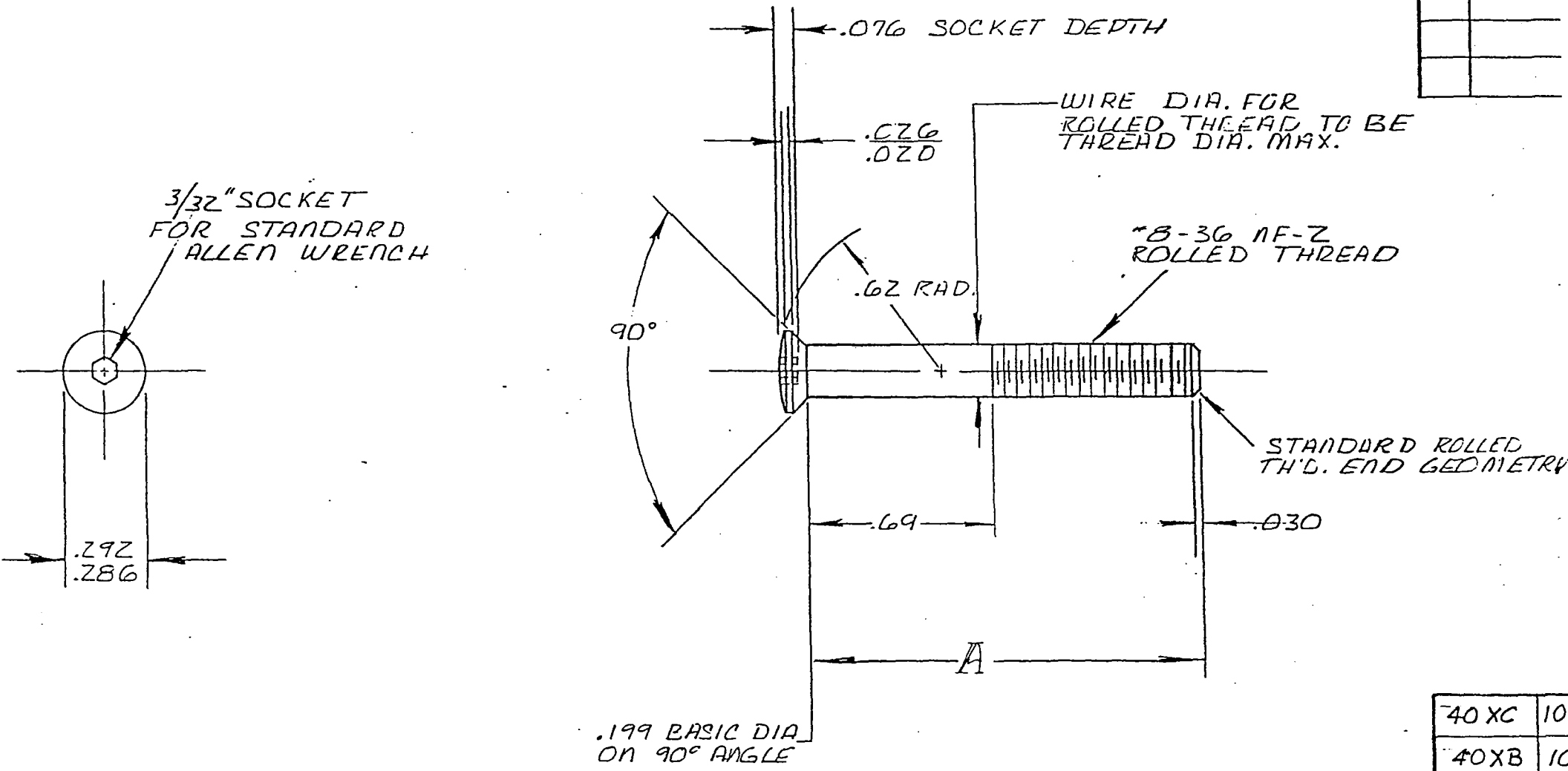
REMINGTON ARMS COMPANY INC.
14 Hoefler Ave.
Ilion, N.Y. 13357
ATTN: JIM RONKAINEN
Research Engineer

THIS DRAWING OR INFORMATION IS PROPRIETARY INFORMATION TO THE REMINGTON ARMS COMPANY, INC.

UNLESS OTHERWISE SPECIFIED:
1 PLACE (.1) — TOLERANCE ± .015
2 PLACE (.01) — TOLERANCE ± .010
3 PLACE (.001) — TOLERANCE ± .005
& ON FRACTIONAL DIMENSIONS ± 1/64
& ON ANGULAR DIMENSIONS ± 00°–30'
FINISHES ARE DESIGNATED BY ROOT MEAN SQUARE (R.M.S.) MICRO-INCH ROUGHNESS VALUES AND ARE THE MAXIMUM ROUGHNESS ACCEPTABLE. UNLESS OTHERWISE SPECIFIED.
FINISH ROUGHNESS TO BE $\sqrt{125}$ OR BETTER.

MATERIAL
HEAT TREAT CYANIDE
HARDNESS 15N 88-92
COLOR NITRE BLACK
HEAT TREAT AND COLOR TO BE DONE BY REMINGTON

REV.	



40 XC	10
40XB	10
7 LWT	10
M 700 ADL	10
MODEL	PA
DES. BY DATE FORD	
TITLE SC	
NUMBER	

.015 .000 IM	BLANK NUMBER
21	104245
20	104246

AUTHORIZED
7-2-91
Process Engineering

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ANDY BASCZUK

hyd. ram set to max F dies can withstand (NFT/robot)

can adj length of heat zone, might help (try 1" more heat)

check length of formed section

run calcs V of dies, check to see we're short of material

DON PARVIS

- heat to 2200F
- increase heated length (taps ~~on~~ change on coils, ~~taps~~)
- backoff kW, increase soak time
- check T setting with optical pyrometer
- will call back on 8/19

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NEED ESTIMATE OF:

"ENGG' TIME

~~SUPPORT TIME~~

ENVIRONMENTAL TESTING COST

ESTIMATE FOR PASSIVATION

- FACILITY
- PER PART COST

- try faconwsting 416
  - look at competition's stainless alloys
* - take sample of bbl matl from OD → PICK SAMPLE (BROWNING, RUGER)
    - use SEM to identify alloy

- developing upset process conditions
  - macro etch for flow lines in hub
  - samples for 30-06
* - ~~for~~ check if 17 REM barrel is magnum

* for FRED

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FORGING OF STAINLESS STEEL AND HEAT-RESISTING ALLOYS

CONTENTS

Forging of Stainless Steel 113
Forging of Heat-Resisting Alloys 119
Forging of Refractory Metals 126

Forging of Stainless Steel

BASED ON forging pressure and load requirements, stainless steels are considerably more difficult to forge than carbon or low-alloy steels, primarily because of the greater strength of stainless steels at elevated temperatures and limitations on the maximum temperatures at which stainless steels can be forged without incurring microstructural damage. Considerable variation in forging load requirements and forgeability exists among stainless steels of different types and compositions; the most difficult alloys to forge are those with the greatest strength at elevated temperatures.

Forging Methods

Open-die, closed-die, upset and roll forging, and ring rolling are among the methods used for forging stainless steel. As in the forging of other metals, two of these methods are sometimes used in sequence to produce a desired shape.

Open-die forging (hand forging) is often used for small quantities for which the cost of closed dies cannot be justified. The minimum quantity that warrants the use of closed dies varies considerably, depending mainly on the size and shape of the forging, but it is often between three and ten pieces, and may be as many as 100 pieces for simple shapes. Open-die forging is also used to make preforms, which are completed by other methods — for example, in closed dies.

Closed-die forging is applied extensively to stainless steel, to produce blocker-type, conventional and close-tolerance forgings. Selection from the above closed-die types invariably depends on quantity and cost of the finished part. For basic information on these types, see the article on Closed-Die Forging, beginning on page 49.

Upset forging is sometimes the only forging process, and is usually the best, when a large amount of stock is wanted in a specific location of the workpiece. For many applications, hot upset forging is employed as a preforming operation to reduce the number of operations or to save metal, or both, when the forgings are to be completed in closed dies.

In hot upset forging of stainless steel, the same rules apply as for carbon or alloy steel; that is, the unsupported length should never be more than 2½ times the diameter (or, for a square, the distance across flats) for single-blow upsetting. Beyond this length, the unsupported stock may buckle or bend, forcing metal to one side and preventing the formation of a concentric forging. Exceeding this limitation also causes grain flow to be erratic and nonuniform around the axis of the forging, and encourages splitting of the upset on its outside edges. The size of an upset produced in one blow also should not exceed 2½ diameters (or, for a square, 2½ times the distance across flats). This varies to some extent, depending on the thickness of the upset. For extremely thin upsets, maximum size may be only two diameters, or even less. Without reheating and multiple blows, it is not possible to produce an upset in stainless steel as thin, or with corner radii as small, as can be produced when a more forgeable metal such as carbon steel is being upset (see the article "Hot Upset Forging", which begins on page 69).

Roll forging can be used to forge specific products, like tapered shafts; it is also used as a stock-gathering operation prior to forging in closed dies. (For details of the process, see the article "Roll Forging", beginning on page 95.)

Ring rolling is used to produce some ringlike parts from stainless steel at lower cost than by closed-die forging. Techniques are essentially the same as for ring rolling of carbon or alloy steel (see the article "Ring Rolling", which begins on page 105). More power is required to roll stainless steel, and it is more difficult to fill corners. A large ring mill capable of rolling carbon steel rings with a face height of 80 in. can roll stainless steel rings up to about 50 in. high.

Because stainless steel is more costly than carbon or alloy steel, the saving from using ring rolling is proportionately greater for stainless.

Forgeability

Stainless steels of the 300 and 400 series can be forged into any of the hypothetical parts in Fig. 1. However, forging stainless steel into shapes equivalent to part 3 in severity may be prohibited by shortened die life (20 to 35% of that obtained in forging such a shape from carbon or low-alloy steel) and the resulting high

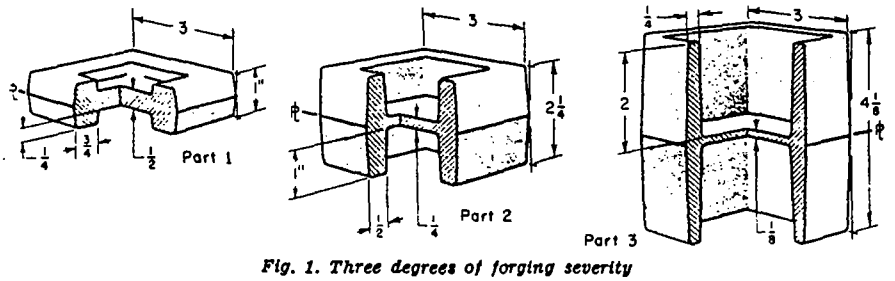


Fig. 1. Three degrees of forging severity

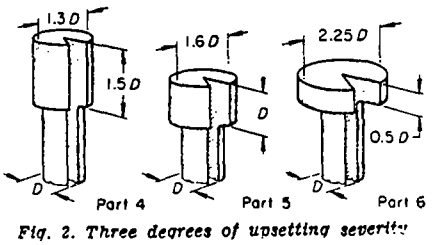


Fig. 2. Three degrees of upsetting severity

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cost. For any given shape, die life is shorter in forging stainless than in forging carbon or low-alloy steel.

Forgings of mild severity, such as part 1 in Fig. 1, can be produced economically from any stainless steel with a single heating and about five blows. Forgings approximating the severity of part 2 can be produced from any stainless steel with a single heating and about ten blows. For any type of stainless steel, die life in forging part 1 will be about twice that in forging part 2.

Part 3 represents maximum severity for forging all stainless steels and especially those with high strength at elevated temperature — namely, types 309, 310, 314, 316, 317, 321 and 347. Straight-chromium types 403, 405, 410, 416, 420, 430, 431 and 440 are the easiest to forge into a severe shape such as part 3 (although type 440, because of its high carbon content, would be the least practical). Types 201, 301, 302, 303 and 304 are intermediate between the two previous groups.

One forge shop has reported that part 3 would be practical and economical to produce in the higher-strength alloys if the center web were increased from ⅛ to ¼ in., and if all fillets and radii were increased in size. It could then be forged with 15 to 20 blows and one reheating, dividing the number of blows about equally between the first heat and the reheat.

Hot Upsetting. Forgings of severity represented by hypothetical parts 4, 5 and 6 in Fig. 2 can be hot upset in one blow from any stainless steel. However, conditions are similar to those encountered in hot die forging. First, with a stainless steel, die wear in upsetting part 6 will be several times as great as in upsetting part 4. Second, die wear for forming any shape will increase as the elevated-temperature strength of the alloy increases. For this reason, type 410, with about the lowest strength at high temperature, would be the most economical stainless steel for forming any of the parts, particularly part 6. Conversely, type 310 would be the least economical.

Upset Reduction vs Forging Pressure. The effect of percentage of upset reduction (upset height versus original height) on forging pressure for low-carbon steel and for type 304 stainless steel at various temperatures is shown in Fig. 3: (*a*) temperature has a marked effect on the pressure required for any given percentage of upset, and (*b*) at any given forging temperature and percentage of upset, type 304 stainless requires at least twice the pressure required for 1020 steel.

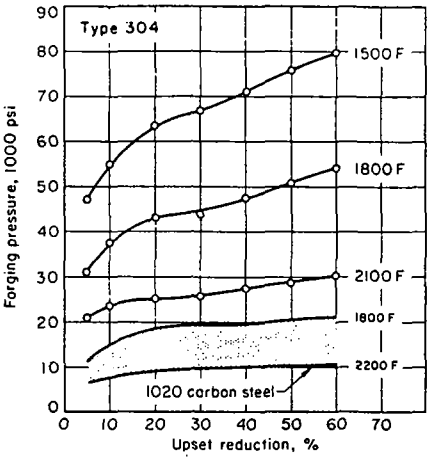


Fig. 3. Effect of upset reduction on forging pressure for various temperatures (From "Forging Materials and Practices", by A. M. Sabroff, F. W. Boulger and H. J. Henning, Reinhold Book Corp., 1968)

The effects of temperature on forging pressure are further emphasized in Fig. 4(a). These data, based on an upset reduction of 10%, show that at 1400 F, type 304 stainless steel requires only half as much pressure as A-286 (an iron-base heat-resisting alloy), although the curves for forging pressure for the two metals converge at 2000 F. However, at a forging temperature of 2000 F, the pressure required for a 10% upset reduction on type 304 is more than twice that required for a carbon steel (1020) and about 60% more than for 4340 alloy steel. Differences in forgeability, based on percentage of upset reduction and forging pressure for type 304 stainless, 1020 and 4340 at the same temperature (1800 F), are plotted in Fig. 4(b).

Austenitic Stainless Steels

The austenitic stainless steels are more difficult to forge than the straight-chromium types, but are less susceptible to surface defects. Most of the austenitic steels can be forged over a wide range of temperatures above 1700 F and, because they do not undergo major phase transformation at elevated temperature, they may be forged at higher temperatures than the martensitic types (Fig. 9). Exceptions are the lower-carbon or higher-chromium alloys, including types 309, 310 and 314; at temperatures above 2000 F, these steels, depending on their composition, may form appreciable amounts of delta ferrite, which adversely affects forgeability. Thus, the range of forging temperatures is more restricted for these types, as shown in Fig. 9.

Equally important restrictions in forging the austenitic steels apply to the finishing temperatures. All but the stabilized types (321, 347, 348) and the extra-low-carbon types should be finished at temperatures above the sensitizing range (1500 to 900 F approximately) and cooled rapidly from 1600 F to a black heat. The highly alloyed grades, such as 309, 310 and 314, also are limited as to finishing temperature, because of their susceptibility at lower temperatures to hot tearing and sigma formation. A final annealing by cooling rapidly from about 1950 F is generally advised for nonstabilized austenitic stainless steel forgings to retain the chromium carbides in solid solution.

A typical procedure for hammer forging one of the more difficult-to-forge austenitic steels (type 310) is given in the example that follows.

Example 120. Forging a Ringlike Part From Type 310 Steel (Fig. 5).

The ringlike part shown in Fig. 5 was forged in a 3000-lb steam hammer by upsetting a piece of round bar and completing the shape in one blocking and one finishing impression. Because of its small size and symmetrical shape, the workpiece could be handled rapidly and completed without reheating. The effect of forging severity, however, is reflected in the short die life. Die life and other forging details are given in the table with Fig. 5.

The stabilized or extra-low-carbon steels, which are not susceptible to sensitization, are sometimes strain hardened by small reductions at temperatures well below the forging temperature. Strain hardening is usually accomplished at 1000 to 1200 F (referred to as "warm working" or "hot-cold working"). When minimum hardness is required, forgings are solution annealed.

Either sulfur or selenium may be added to austenitic stainless steel to improve machinability. Selenium, however, is preferred, because harmful stringers are less likely to exist. Type 321, stabilized with titanium, also may contain stringers of segregate that, when the steel is forged, will open up as surface ruptures. Type 347, stabilized with columbium, is less susceptible to stringer segregation and is the stabilized grade usually specified for forgings.

When heating the austenitic steels, it is especially desirable that a slightly oxidizing furnace atmosphere be maintained; a carburizing atmosphere or an excessively oxidizing atmosphere will impair corrosion resistance, either by harmful carbon pickup or by chromium depletion. In types 309 and 310, chromium depletion can be especially severe.

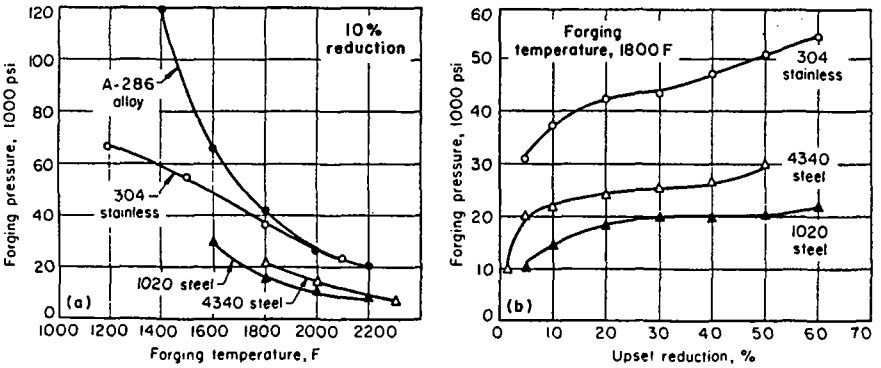


Fig. 4. Forging pressure required for upsetting, as affected by (a) *forging temperature and* (b) *percentage of upset reduction* (From "A Study of Forging Variables", by H. J. Henning, A. M. Sabroff, and F. W. Boulger, U. S. Air Force Report ML-TDR-64-95, 1964)

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Martensitic Stainless Steels

Martensitic stainless steels have high hardenability, to the extent that they are generally air hardening. Thus, precautions must be taken in cooling forgings of martensitic steels, especially those with high carbon content, to prevent cracking. Generally, the martensitic alloys are cooled slowly to about 1100 F, either by burying in an insulating medium or by temperature equalizing in a furnace. Direct water sprays, such as might be employed to cool dies, should be avoided, because they would cause cracking of the forging.

Frequently, forgings of the martensitic steels are tempered after being forged, to soften them for machining. They are later quench hardened and tempered.

Maximum forging temperatures for these steels are low enough to avoid the formation of delta ferrite. If delta ferrite stringers are present at forging temperatures, cracking is likely to occur. Formation of delta ferrite usually occurs at temperatures between 2000 and 2300 F. Care must be exercised not to exceed this temperature during forging and to avoid rapid metal movement that might result in local overheating. Surface decarburization, which promotes ferrite formation, must be minimized.

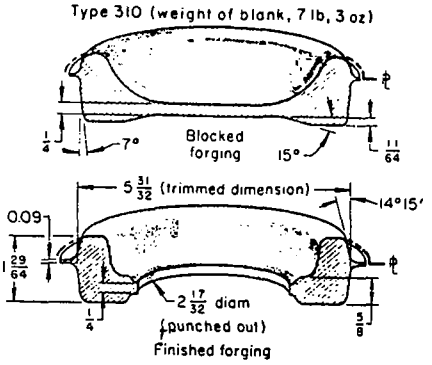
The delta ferrite formation temperature decreases with increasing chromium content, and small amounts of delta ferrite reduce forgeability significantly. As the delta ferrite increases above about 15%, forgeability improves gradually until the structure becomes entirely ferritic. Finishing temperatures are limited by the allotropic transformation, which begins near 1500 F. However, forging of these steels is usually stopped at about 1700 F, because the metal is difficult to deform at lower temperatures.

Either sulfur or selenium may be added to type 416 to improve machinability. These elements can cause forging problems, particularly when they form surface stringers that open up and form cracks. This can sometimes be overcome by adjusting forging temperature or procedure. With sulfur additions, it may be impossible to eliminate all cracking of this type. For this reason, selenium additions are preferred.

Ferritic Stainless Steels

The ferritic straight-chromium stainless steels exhibit virtually no increase in hardness on quenching. They will work harden during forging, to a degree that depends on temperature and amount of metal flow. Cooling from forging temperature is not critical.

The ferritic steels have a broad range of forgeability, restricted somewhat at higher temperature because of grain growth and structural weakness, but closely restricted in finishing temperature only for type 405. Type 405 requires special consideration, because of grain-boundary weakness resulting from the development of a small amount of austenite. The other ferritic steels are commonly finished at any temperature down to 1300 F. For type 446, the final 10% reduction should be made below 1600 F to achieve grain refinement and room-temperature ductility. Annealing after forging is recommended for ferritic steels.



Sequence of Operations

1 — Upset on flat portion of die to approximately 4½ in. in diameter. 2 — Forge in blocker impression. 3 — Forge in finisher impression. 4 — Hot trim (1650 to 1700 F) and punch-out center. 5 — Air cool. 6 — Clean (shot blast).

Processing Conditions

Blank preparation	Cold sawing
Stock size	3½-in. diam
Blank weight	7 lb, 3 oz
Heating method	Gas-fired, slot-front box furnace
Heating time	1 hr
Atmosphere	Slightly oxidizing
Die material	6G at 388 to 429 Bhn(a)
Die life, total	507 to 2067 forgings(b)
Die lubricant	Graphite-oil
Production rate	50 forgings per hour(c)

(a) Inserts at this hardness were used in die blocks of the same material, but softer (341 to 375 Bhn). (b) Average life was 1004 forgings. Life to rework and total life were the same, because worn die inserts were not reworked. (c) Based on a 50-min working hour.

Fig. 5. Typical procedure for forging a ringlike part from an austenitic stainless steel (Example 120)

Precipitation-Hardening Stainless Steels

The semiaustenitic and martensitic precipitation-hardening stainless steels can be heat treated to high hardness through a combination of martensite transformation and precipitation. They are the most difficult to forge, and will crack if temperature schedules are not accurately maintained. The forging range is narrow, and the steel must be reheated if the temperature falls below 1800 F. They have the least plasticity (greatest stiffness) at forging temperature of any of the classes and are subject to grain growth and delta ferrite formation. Heavier equipment and a greater number of blows are required to achieve metal flow equivalent to that of the other types.

During trimming, the forgings must be kept hot enough to prevent the formation of flash-line cracks. To avoid these cracks, it is often necessary to reheat the forgings slightly between the finish-forging and trimming operations. Cooling, especially the cooling of the martensitic grades, must be controlled to avoid cracking.

A typical procedure for forging a long, slender part from 17-4 PH is given in the example that follows.

Example 121. Forging a Long, Slender Part From 17-4 PH (Fig. 6)

The 46-in.-long slender part shown in Fig. 6 was forged from a relatively short (15⅝ in.) piece of stock in six operations in two steam hammers. Because this type of steel requires forging within a narrow temperature range (see Fig. 9), reheating was required prior to finishing. Sequence of operations and processing details are given in the table with Fig. 6.

Forging Equipment

In general, stainless steels are forged with the same types of hammers, presses, upsetters and rolling machines as are used for forging carbon and alloy steels. For descriptions of these machines, see the articles "Hammers and Presses for Forging" (page 1), "Hot Upset Forging" (page 69), "Roll Forging" (page 95), and "Ring Rolling" (page 105), in this volume.

Hammers. Simple, board-type gravity drop hammers are not extensively used for forging stainless steel, because of their low capacity, and because greater control is obtained in other types of equipment.

Power drop hammers (steam or air) are extensively used for open-die forgings, as well as for all types of large and small closed-die forgings. Longer die life is usually obtained in hammers than in hydraulic presses, because in a hammer the hot workpiece is in contact with the dies (particularly the upper die) for a shorter length of time. Hammers cost less than presses of equivalent capacity, and are generally more flexible than presses in the variety of jobs they can do.

Presses. Mechanical presses are extensively used for small forgings; they are used less often for forgings weighing as much as 100 lb each and seldom for forgings weighing over 150 lb. Mechanical presses cost more than hammers of equivalent capacity, but they require less operator skill and can produce forgings at a higher rate than hammers.

Hydraulic presses can be used for all steps in forging stainless steel. However, they are more often used to complete intricate forgings after preforming in other types of equipment.

Die life is usually shorter in a hydraulic press than in a hammer, because in a press the work metal contacts the dies for a longer time. However, there is less danger of locally overheating the metal in hydraulic presses, because their action is slower than that of hammers.

Dies

In most applications, dies designed for forging a given shape from carbon or alloy steel can be used for forging the same shape from stainless steel. However, because of the greater force used for forging stainless steel, more strength is required in the die. Thus, the die cannot be resunk as many times for forging stainless steel, because it may break. When a die is initially designed for forging stainless steel, a thicker die block is ordinarily used, to obtain a greater number of resinkings and thus a longer total life.

Die practice for forging of stainless steel varies considerably among differ-

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ent plants, depending on whether forging is done in hammers or presses, and on the number of forgings produced from other metals in proportion to the number forged from stainless steel.

Multiple-cavity dies for small forgings (under about 25 lb) are more commonly used in hammers and less commonly in presses. If multiple-cavity dies are used, the cavities are usually separate inserts, because some cavities have longer life than others. By this practice, individual inserts can be changed as required.

Larger forgings usually are produced in single-cavity dies, regardless of whether a hammer or a press is used.

In forge plants where carbon and alloy steels comprise the major portion of the metals forged, the usual practice is to use the same die system (single-cavity vs multiple-cavity) for stainless steel, accepting the fact that die life will be shorter. This approach is generally more economical than using a separate die practice for a relatively small tonnage of forgings.

Practice is likely to be entirely different in shops where most forgings produced are from stainless steel or some other difficult-to-forge metal (such as heat-resisting alloys). For example, in one plant where mechanical presses are used almost exclusively, almost all dies are of the single-cavity design. Tolerances are always close, so practice is the same regardless of the quantity to be produced. A die is made with a finishing cavity, and after it is worn to the extent that it can no longer produce forgings to specified tolerances, the cavity is recut for a semifinishing or blocker cavity. When it can no longer be used as a blocker die, its useful life is over since resinking would result in a thin die block.

Die Materials. In shops where die practice is the same for stainless steel as for carbon and alloy steels, die materials are also the same (see Table 8, page 28, in the article on Dies and Die Materials in this volume). In shops where special consideration is given to dies for stainless, small dies (for forgings weighing less than 20 lb) are made solid from hot work tool steel, such as H11, H12 or H13. For larger dies, regardless of whether they are single or multiple impression, common practice is to make the body of the block from a conventional die block steel such as 6G or 6F2 (see Table 7, page 28, in the article on Dies and Die Materials in this volume). Inserts are of H11, H12 or H13 hot work tool steel (or sometimes H26, where it has proved a better choice).

Gripper dies and heading tools used for hot upsetting of stainless steel are made from one of the hot work tool steels. Small tools are machined from solid tool steel; larger tools are made by inserting hot work tool steels into bodies of a lower-alloy steel such as 6G or 6F2.

Roll dies for roll forging are usually of the same material as is used for roll forging of carbon or alloy steels. A typical die steel composition is: 0.75 C, 0.70 Mn, 0.35 Si, 0.90 Cr, 0.30 Mo.

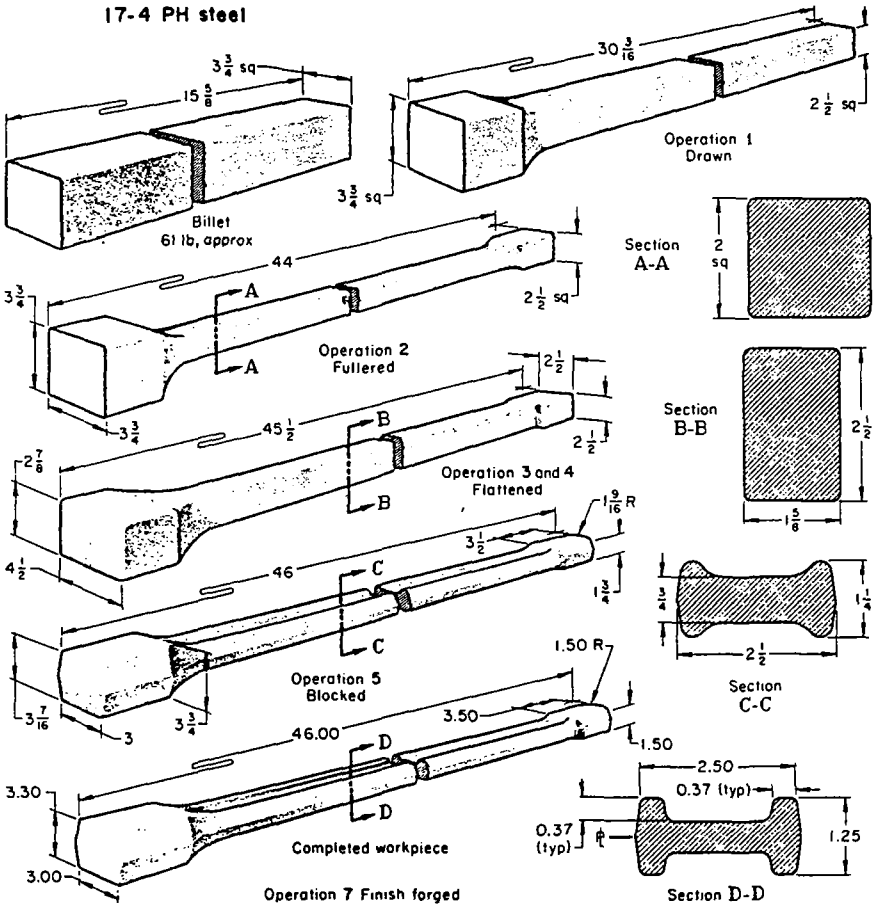
Rolls made expressly for ring rolling of stainless steel are usually made from one of the hot work tool steels rather than from 1055, 4150, 4350, or one of the low-alloy die-block steels, which are most commonly used for rolling rings of carbon or alloy steel.

Die hardness depends mainly on the severity of the forging and on whether a hammer or a press is used. Die wear decreases rapidly as die hardness increases, but some wear resistance must always be sacrificed to avoid breaking the dies.

Most solid dies (without inserts) made from steels like 6G and 6F2 for use in a hammer are in the hardness range of 341 to 375 Bhn. This range is suitable for forgings as severe as part 3 in Fig. 1. If severity is no greater than that of part 1 in Fig. 1, die hardness may be safely increased to the next level (388 to 429 Bhn). If forging is done in a press, the dies can be safely operated at higher hardness for the same degree of forging severity. For instance, dies for forgings of maximum severity would be 388 to 429 Bhn and dies for minimum severity would be 444 to 477 Bhn.

Inserts or solid dies made from hot work tool steel are usually heat treated to Rockwell C 40 to 47 for use in hammers. For forgings of maximum severity (part 3 in Fig. 1), hardness near the low end of this range is used, whereas for minimum severity (part 1 in Fig. 1), die hardness will be near the high end of the range. Adjustment in die hardness for different degrees of forging severity is usually needed also for forging in presses, although a higher hardness range (usually, Rockwell C 47 to 55) can be safely used.

Hardness of gripper-die inserts for upset forging is usually Rockwell C 44



Sequence of Operations

1 — Draw to 2½-in. square. 2 — Fuller to 2-in. square. 3 — Flatten center to width of finisher die. 4 — Turn 90° and flatten head. 5 — Block. 6 — Reheat. 7 — Finish forge.

Processing Details

Blank preparation	Cold sawing
Stock size (round-corner square)	3¾ in.
Blank weight	61 lb
Heating method	Gas-fired, slot-front box furnace
Heating temperature	2150 F
Heating time	1 hr for first heating, 1½ hr for reheating
Atmosphere	Slightly oxidizing
Forging equipment	Steam hammer(a)
Die material	6G at 341 to 375 Bhn
Die life, per resinking	509 to 747 forgings(b)
Die lubricant	Graphite-oil(c)
Production rate, forgings per hour(d):	
Draw, fuller and block	12
Finish forge	30

(a) 5000-lb hammer for draw operation; 20,000-lb hammer for remainder of operations. (b) Average was 628 forgings; no dies completely worn out to date. (c) Each workpiece swabbed before starting and again halfway through finish forging. (d) Based on 40-min working hour.

Fig. 6. Typical procedure for forging a long, slender part from a precipitation-hardening stainless steel (Example 121)

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to 48; and for the heading tools, hardness is Rockwell C 48 to 52.

Roll-forging dies are usually heat treated to Rockwell C 50 to 55. Rolls for ring rolling, when made from hot work tool steel, are usually operated in the hardness range of Rockwell C 40 to 50.

Die Life. Because of the differences in forgeability among stainless steels, die life will vary considerably, depending on the composition of the metal being forged, and the composition and hardness of the die material. Other conditions being equal, the forging of types 309, 310, 314, and the precipitation-hardening alloys results in the shortest die life, and longest die life is obtained when forging lower-carbon ferritic and martensitic steels. Die life in forging type 304 is usually intermediate. However, die life in forging any stainless steel is short compared with the die life obtained in forging the same shape from carbon or alloy steel.

Example 122. Die Life in Upset Forging of Type 304 vs 4340 vs 9310 (Fig. 7)

The 4-in. upset shown in Fig. 7 was, at different times, produced from three different metals in the same 6-in. upsetter and in the same gripper dies (H12 hot work tool steel at Rockwell C 44). From the bar chart in Fig. 7, the effect of work-metal composition on die life is obvious. Die life for upsetting type 304 stainless steel was less than one-fifth the die life for upsetting the low-carbon alloy steel (9310), and less than one-third that for upsetting 4340.

The severity of the forging has a major influence on die life for any given composition. The effect of severity alone is shown in the next example.

Example 123. Effect of Forging Severity on Die Life (Fig. 8)

The effect of the forging shape (severity) on die life for forging type 431 stainless steel is shown in Fig. 8. When forging to the relatively mild severity of shape A, the range of life for five dies was 6000 to 10,000 forgings, with an average of 8000. When forging severity was increased to that of shape B, the life of three dies ranged from approximately 700 to 2200 forgings, with an average of 1400.

Both shapes A and B were forged in the same hammer. Tool material and hardness were also the same for both shapes (6G die-block steel at 341 to 375 Bhn).

Heating for Forging

Recommended forging and finishing temperatures for most of the standard stainless steels are indicated in Fig. 9, which represents temperatures used in a number of different forge plants. The crosshatched bars show temperature ranges that have been used in some plants, but on which there is not general agreement. Open bars represent the generally accepted ranges.

The thermal conductivity of stainless steels is lower than that of carbon or low-alloy steels. Therefore, stainless steels take longer to reach the forging temperature. However, they should not be soaked at forging temperature, but should be forged as soon as possible after reaching it. The exact time required for heating stock of a given thickness to the established forging temperature depends on the type of furnace used. Time and stock-thickness relationships for three types of furnaces are shown in Fig. 10.

Forging stock of large cross section (for example, more than 6 in.) is often preheated at 1500 to 1700 F, to minimize the time required in the high-temperature furnace. However, preheating is not a requirement, and in many forge shops cold stock is placed directly in a high-temperature furnace.

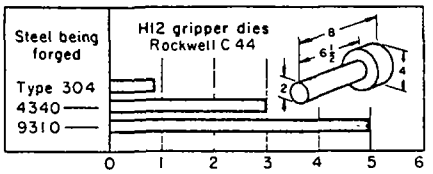


Fig. 7. Effect of steel being forged on life of gripper dies in upsetting (Example 122)

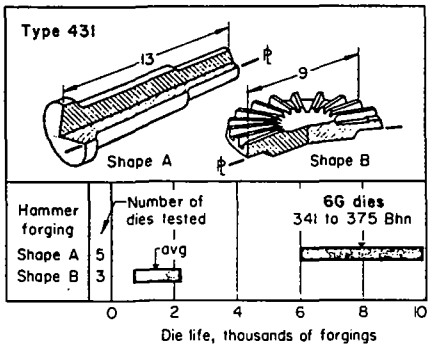
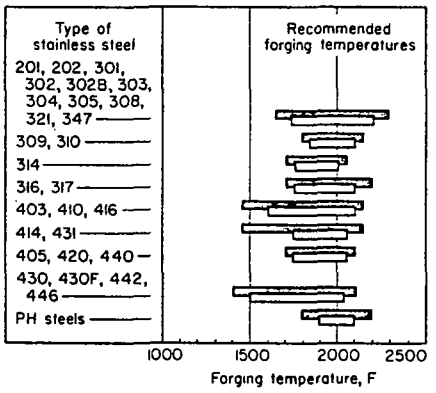


Fig. 8. Effect of severity of forging on die life (Example 123)



Crosshatched bars show temperature ranges that have been recommended by some plants, but on which there is not general agreement. Open bars indicate generally accepted ranges.

Fig. 9. Recommended forging and finishing temperatures for stainless steel

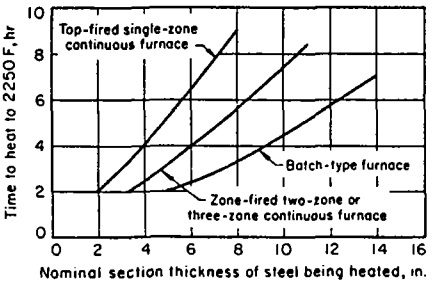


Fig. 10. Effect of section thickness on time for heating stainless steel in various types of furnaces (From "The Making, Shaping and Treating of Steel", 8th Edition, United States Steel Corp., 1964, p 617)

Equipment. Gas-fired and electrically heated furnaces are used with equal success for heating the stock. Gas-fired furnaces are more widely used, because heating costs are usually lower. The gas employed should be essentially free from hydrogen sulfide and other sulfur-bearing contaminants. Oil-fired furnaces are widely used for heating the series 400 stainless steels and the 18-8 varieties, but because of the danger of contamination from sulfur in the oil they are considered unsafe for heating the high-nickel grades.

Although not absolutely necessary, heating of stainless steel is preferably done in a protective atmosphere. When gas heating is used, an acceptable protective atmosphere can usually be obtained by adjusting the fuel-to-air ratio. When the furnace is heated by electricity, the protective atmosphere (if used) must be separately generated.

Induction heating is most often used to heat local portions of the stock for upsetting.

Temperature control, within ±10°, is achieved by various types of instruments. A recording instrument is preferred, because it enables the operator to observe the behavior of the furnace throughout the heating cycle.

It is recommended that the temperature of the pieces of forging stock be checked occasionally by an optical or probe-type pyrometer, as they are removed from the furnace. This practice not only provides a check on the accuracy of the furnace controls, but also insures that the stock is reaching furnace temperature.

Heating of Dies

Dies are always heated for forging stainless steel. Large dies are heated in ovens; small dies, by burners of various designs. Embedded elements, such as are used for heating forming dies, are not used for heating forging dies.

There is no close agreement among forge shops on the maximum die temperature that should be maintained, although it is generally agreed that 300 F should be the minimum temperature; a range of 300 to 400 F is common. Dies are sometimes heated to 600 F.

Die temperature is determined by means of temperature-sensitive crayons or surface pyrometers.

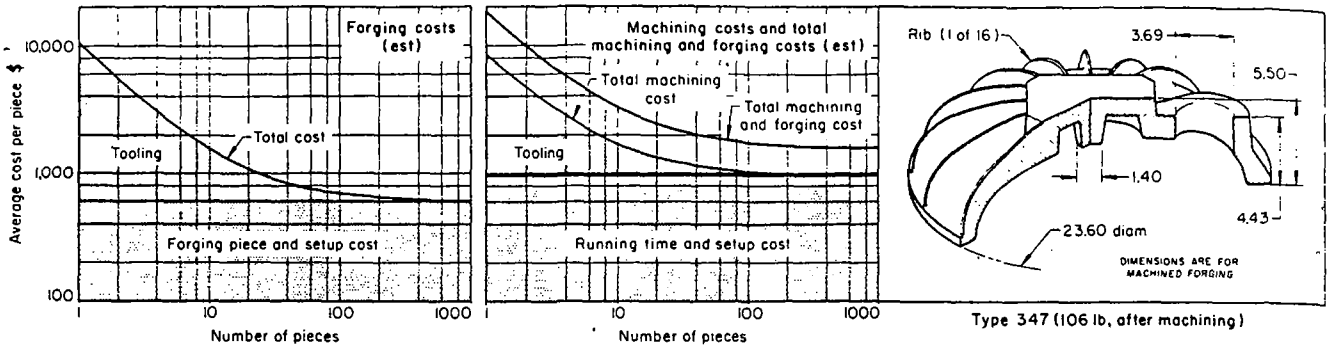
Die Lubrication

Dies should be lubricated before each blow. For forging in shallow impressions, a spray of colloidal graphite in kerosine or in low-viscosity mineral oil is usually adequate. Ordinarily, dies are sprayed manually, but in press forging, automatic sprays timed with the press stroke are sometimes used. For deeper cavities, however, it is often necessary either to use a supplemental spray (usually manual) to reach the deep areas of the cavity or to swab the cavity with a conventional forging oil. (Forging oils are usually mixtures of oil and graphite; the oil should be free of lead and sulfur. Often they are purchased as greases and are then diluted with mineral oil to the desired viscos-

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Forging Cost — Unit One		Machining Cost — Unit One		Total Cost — Unit One	
Die cost	$ 9,890	Tooling cost	$7,422	Forging cost	$10,494
Forging piece cost (including setup)	604	Running and setup cost	973	Machining cost	8,395
Forging cost, unit one	$10,494	Machining cost, unit one	$8,395	Total cost, unit one	$18,889

Fig. 11. Effect of quantity on per-piece cost of a forged and machined dome (Example 124)

ity.) Any volatile lubricant should be used sparingly. With even a slight excess, vapor explosions are likely, and greater amounts can cause explosions that will eject the workpiece, possibly injuring personnel.

Glass is sometimes used as a lubricant in press forging, being applied either by dipping the heated forging in molten glass or by sprinkling it with glass frit. Glass is an excellent lubricant, but its viscosity must be compatible with the forging temperature used. For best results, the viscosity of the glass should be maintained at 100 centipoises. Thus, when different forging temperatures are used, a variety of glass compositions must be stocked. Another disadvantage of glass is that it will accumulate in deep cavities, solidify, and impair metal flow. Therefore, the use of glass is generally confined to making shallow forgings that require maximum lateral flow.

Trimming

When production quantities justify the cost of tools, forgings are trimmed in dies. Hot trimming is preferred for all types of stainless steel, because less power is required and because there is less danger of cracking than in cold trimming. The precipitation-hardening stainless steels *must* be hot trimmed to prevent flash-line cracks, which can penetrate the forging.

Frequently, it is practical to hot trim immediately after the forging operation, before the workpiece temperature falls below a red heat. Less often, forgings are reheated to 1650 to 1750 F and then trimmed.

Tool Materials. Punches for hot trimming of closed-die forgings are often made of 6G or 6F2 die block steel at 388 to 429 Bhn, and the blades are made of a high-alloy tool steel, such as D2, at Rockwell C 58 to 60 (for compositions of tool steels, see Table 7, page 28, in the article on Dies and Die Materials). In some forge shops, both punches and blades for hot trimming are made of a carbon or low-alloy steel (usually with less than 0.30% C) and then are hard faced, generally with a cobalt-base alloy (a typical composition is: 1.10 C, 30 Cr, 3 Ni, 4.50 W, remainder Co).

Upset forgings can be hot trimmed in a final pass in the upsetter, or in a separate press. For trimming in the upsetter, H11 tool steel at Rockwell C 46 to 50 has performed successfully on a variety of forgings with a normal flash thickness. For trimming of heavy flash in the upsetter, H21 at Rockwell C 50 to 52 is recommended. Tools for hot trimming in a separate press usually are made of a 0.30%-C carbon or low-alloy steel, and are hard faced with a cobalt-base alloy (typical composition: 1.10 C, 30 Cr, 3 Ni, 4.50 W, rem Co).

Cleaning

Stainless steels do not form as much scale as carbon or alloy steels, especially when a protective atmosphere is provided during heating. However, the scale that does form is tightly adherent, hard and abrasive. It must be removed prior to machining, or tool life will be severely impaired.

Mechanical or chemical methods, or a combination of both, can be used to remove scale. Abrasive blast cleaning is an efficient method, and is applicable to forgings of various sizes and shapes, in large or small quantities. When surfaces will not be machined or passivated, blasting must be done only with silica sand; the use of steel grit or shot will contaminate the surfaces and impair corrosion resistance.

Abrasive blast cleaning is usually followed by acid pickling. The forgings are then thoroughly washed in water.

Table 1. Cycle for Sodium Hydride (Reducing) Descaling of Annealed Stainless Steel Forgings

Operation sequence	Bath composition	Bath temperature, F	Treatment time, min
Descale	1.5 to 2.0% NaH	750 to 800	20
Quench	Water (circulated in tank)	Cold	1 to 3
Acid clean	10% H_2SO_4	145	20
Acid brighten	10% HNO_3 - 2% HF	145	30
Rinse	Water (high-pressure spray)	Ambient	2
Rinse	Water	175	1 to 2

Barrel finishing (tumbling) is sometimes used for descaling. Acid pickling is recommended after tumbling.

Wire brushing is sometimes used for removing scale from a few forgings. Brushes with stainless steel wire must be used unless the forgings will be machined or passivated.

Salt bath descaling followed by acid cleaning and brightening is an efficient method of removing scale. A typical procedure is detailed in Table 1.

For further information on scale removal, see the articles in Volume 2 of this Handbook on Cleaning and Finishing of Stainless Steel, page 599; Abrasive Blast Cleaning, page 364; and Salt Bath Descaling, page 356.

Effect of Quantity on Cost

In all forging operations that require elaborate tooling, the cost of the first forging is high. Cost per forging then decreases as quantity increases, because the cost of dies and other tools is amortized over a number of forgings. The magnitude of the effect of quantity on cost, however, may vary considerably, depending largely on the forgeability of the metal. Because of the generally poor die life in forging stainless steel, the effect of quantity on cost is less than for a more forgeable metal.

The example that follows gives cost estimates for the production of a rocket-engine component in various quantities by closed-die forging and machining.

Example 124. Effect of Quantity on Cost of Domes Forged From Type 347 (Fig. 11)

Rocket-fuel injector domes (Fig. 11) had been produced as weldments. However, because extensive weld testing and weld repair were necessary, closed-die forging was investigated as an alternative method.

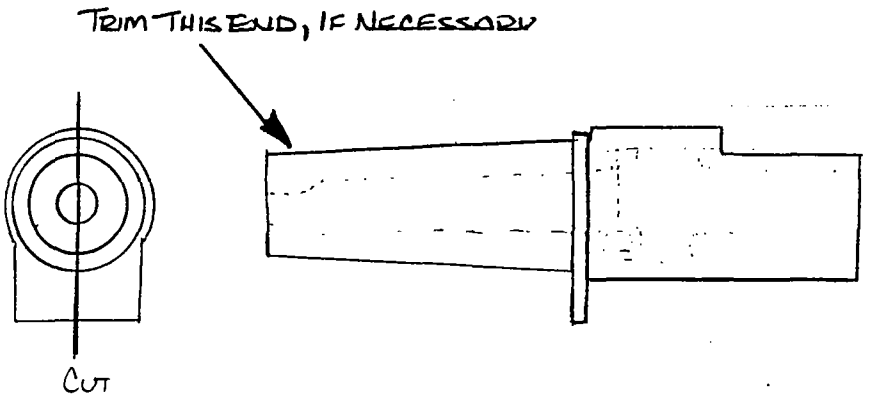
The unit-one cost analysis for producing the domes as machined forgings is given in the table with Fig. 11. The charts in Fig. 11 show the effect of quantity on average forging, machining, and total costs per piece. Comparison showed that forgings would cost less than the weldments in quantities of more than six.

Cost of the machined forging was based on the use of either a 25,000 or a 35,000-lb hammer. Forging procedure would have been upsetting (pancaking), blocking, trimming, and punching out the bore. Machining procedure would have consisted of straddle milling the ribs, machining the inner contours, turning the mating surfaces, and drilling and reaming of attachment holes.

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PLEASE CUT THE ACTION ON THE WIRE EDM ON ℄. IF IT IS NECESSARY TO TRIM THE LENGTH OF THE PART TO FIT IN THE MACHINE, TRIM THE BARREL END OF THE ACTION.

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FIRE CONTROL TESTING

- DRY CYCLE
- CORROSION
- ENDURANCE GUNS
- CATALOG SAMPLES

GALLING TESTING

- BOLTS W/ SS HEADS
- BOLTS W/ STD. HEADS

} SIDE BY SIDE TESTING
- NEED WAY TO MEASURE GALLING

UPSET BARREL TESTING

- STD CONTOUR
- MAG CONTOUR
- CHECK GRAIN FLOW
- DO ULTIMATE STRENGTH TESTING
- DO ENDURANCE TESTING TO CHECK FOR FATIGUE

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DETAILS, TEST PROCESS RECORD

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DO NOT SCALE THIS DRAWING! WORK TO FIGURES UNLESS OTHERWISE NOTED. TOLERANCES ON DECIMAL DIMENSIONS ARE ±.005 & ON FRACTIONAL DIMENSIONS ± 1/64 & ON ANGULAR DIMENSIONS ±00°30'

FINISHES ARE DESIGNATED BY ROOT MEAN SQUARE (R.M.S.) MICRO-INCH ROUGHNESS VALUES AND ARE THE MAXIMUM ROUGHNESS ACCEPTABLE. UNLESS OTHERWISE SPECIFIED, FINISH ROUGHNESS TO BE 125 OR BETTER.

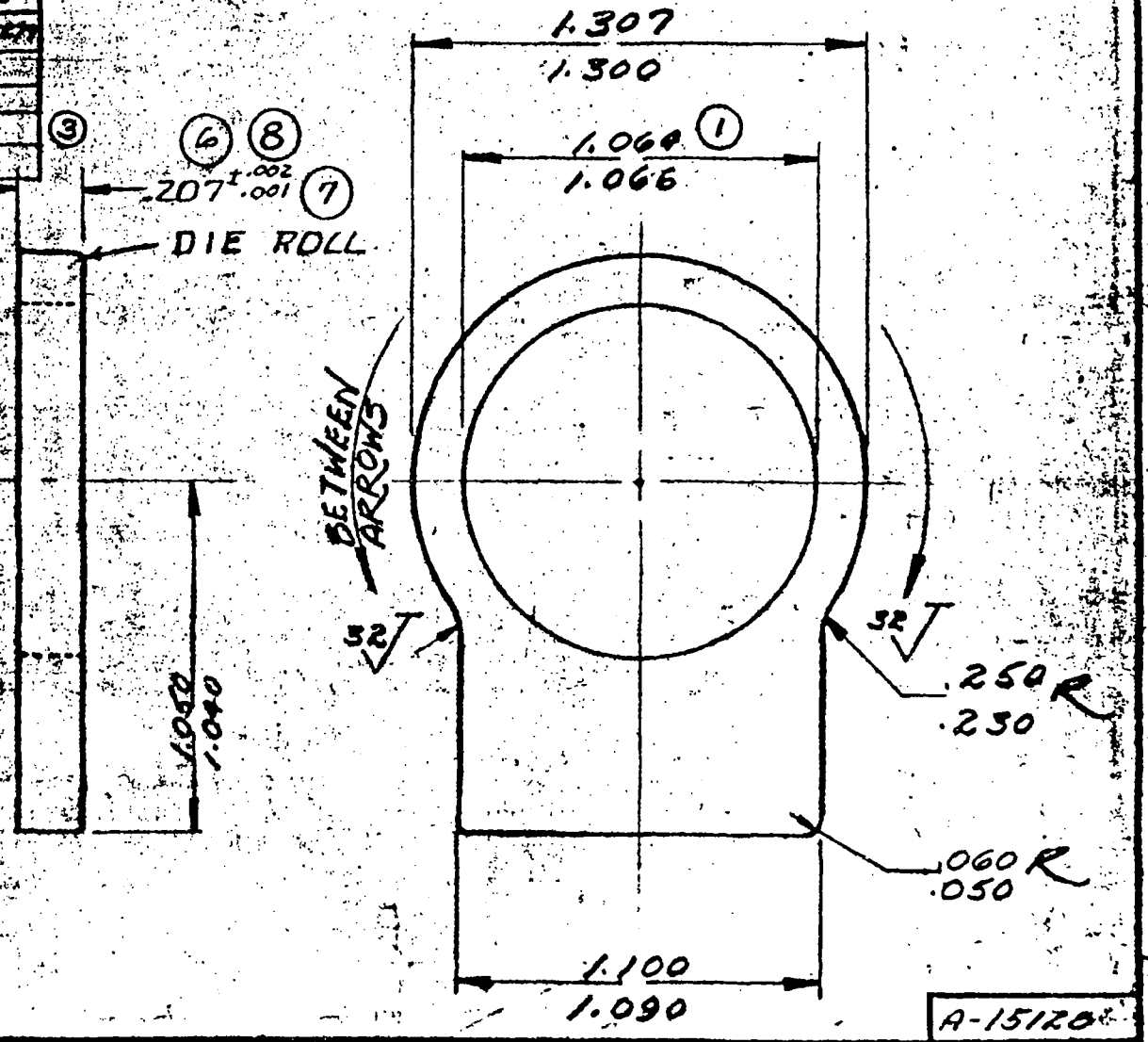
RECOMMENDED MATERIAL AND HEAT TREAT

MATERIAL A151 8630 or 4130

HEAT TREAT ... DAC 74/84

HARDNESS ...

HEAT TREAT AND COLOR TO BE DONE BY REMINGTON



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1

SUMMARY OF INTENTIONAL GUN ABUSE TEST

DATA

By C. Stephens

Date 19 July 91

FIREARM: Make Remington Model 700

Grade _____ Gauge _____ Serial Number C6624494

Origin _____

Test Number Assigned _____

Comments Stainless

HISTORY: Condition _____

Previous Rounds Fired 500+

Headspace at Test —

Test Date 19 July 91

ABUSIVE LOAD USED: Powder Type 4198

Powder Weight 53.5 gn

Case Make and Type Rem

Total Bullet Weight 175gn

Total Shot Weight _____

Estimated Pressure 120 Kpsi

ADDITIONAL COMMENTS: Cracked Stock, Locked up Bolt.

CONFIDENTIAL

M/700 SS STOCK MAT'L

6/27 91

	ZYNITE	ARYLON (30% glass)	POLYPROPYLENE (glass)
S.G.	1.51 - 1.39 (ST / 415HP)	1.44	1.04 - 1.22
E_F	1000 - 525 kpsi	1.220 kpsi	812 kpsi

$$\Delta \text{WEIGHT} = \frac{1.45 - 1.13}{1.45} = 22\% \text{ WEIGHT REDUCTION BY MAT'L CHANGE ALONE}$$

$W_{AS} = 2.25$ lbs $\qquad W_{PP} = 1.75$ lbs

⇒ .5 lb WEIGHT REDUCTION ON SYNTHETIC STOCK

JR 7/17 91

QTY: 20
CHARGE # 481152

NOTE:
1. MEASURE 24 3/16 FROM END OPPOSITE TAPER

CONFIDENTIAL

CONFIDENTIAL

EM-6670-7 PT.-RI-11/89

DU PONT

E. I. DU PONT DE NEMOURS & CO., (INC.)

PURCHASE ORDER

LRI

PURCHASE ORDER NO. | ALT NO.

RELEASE NUMBER

100 OLD WILSON BRIDGE RD. SUITE 212
WORTHINGTON, OHIO 43085-2261

REMINGTON ARMS CO., INC.
HOEFLER AVE., ILION, NY 13357

ISSUED BY

SITE NO | TAX CODE | DIRECT ALL INQUIRIES

DATE OF ORDER

REQUIRED SHIP DATE | PROMISED SHIP DATE

TERMS OF PAYMENT

F.O.B. DEST. (DEL'D) SHIP PT. | FREIGHT TERMS (If Ship Pt. Show City & State) | PREPAID | PREPAID ADDED | OTHER (SEE BELOW) | COLLECT* | FREIGHT TERMS

VENDOR CODE

PAYEE CODE

SHIP TO

E. I. DU PONT DE NEMOURS & COMPANY
c/o REMINGTON ARMS CO., INC.
HOEFLER AVENUE
ILION, NY 13357
ORDER NO. LRI-

SHIP VIA:

PAGE OF

RECEIPTS / FREIGHT / INVOICE	SHIPMENT NUMBER 1	2	3
DATE RECEIVED			
CHECKED BY			
DATE SHIPPED			
VIA			
PRO. NO. or CAR NO.			
F. B. WGT.			
FREIGHT CHARGES			
NO. AND/OR KIND PKGS.			
DATE RECEIVED			
AMOUNT			
CHECK NO.			
DATE			

TO RECORD ADDITIONAL SHIPMENTS SEE REVERSE SIDE

ITEM	QUANTITY	UNIT	DESCRIPTION (NOUN, ADJECTIVE, MANUF. NAME & NO.)	PRICE	QUANTITY RECEIVED 1	2	3
A	50		TRIGGER HOUSINGS				
B	50		SAFETY ASSEMBLYES				
C	50		SAFETY DETENT WASHERS				
D	50		SAFETY PIVOT PINS				
E	53		SAFETY DETENT SPRINGS				
F	50		BOLT STOP RELEASES				
G	50		BOLT STOPS				
H	50		TRIGGERS				

PLATE ALL OF THE ITEMS LISTED ABOVE WITH .0003" THICK HIGH PHOSPHORUS ELECTROLESS NICKEL BASE PLATE AFTERWARD TO PREVENT HYDROGEN EMBRITTLEMENT

N.Y. SALES & USE TAX EXEMPTION CERTIFICATE
ACCOUNT IDENTIFICATION #06-0507970C ☐ TAX ☐ EXEMPT

CONFIRMING TO: BY: DATE:

REQUISITIONED BY	EXTENSION	REQUISITION APPROVED BY	DATE	AUTH. LEVEL	DATE DELIVERY REQ'D	ESTIMATED WEIGHT	ESTIMATED COST
JIM RONKAINEN	559		7/22/91		7-26-91	10 lbs	

ITEM NO.	GENERAL LEDGER ACCOUNT/SUB ACCOUNTS	DETAIL ACCOUNTING	AMOUNT
	1118-481152		

DELIVERY SPOT #

LAST ORDER NO. OR SUGGESTED VENDOR & ADDRESS
H.M. QUACKENBUSH
PHIL JANKOWICZ
866-3000

REASON VENDOR SELECTED ☐ LOWEST PRICE ☐ BETTER QUALITY ☐ REQUIRED DESIGN ☐ ONLY KNOWN SOURCE ☐ CONTRACT/P.A. ☐

ORDER APPROVED BY | ORDER EXECUTED BY | D220744 REQUISITION NO.

NO. 6 REQUISITIONER'S COPY

CONFIDENTIAL

EM-6670-7 PT.-RI-11/89

DUPONT

E. I. DU PONT DE NEMOURS & CO., (INC.)

PURCHASE ORDER

LRI

PURCHASE ORDER NO. | ALT NO.

RELEASE NUMBER

SITE NO. | TAX CODE | DIRECT ALL INQUIRIES

DATE OF ORDER

☐ 100 OLD WILSON BRIDGE RD. SUITE 212
WORTHINGTON, OHIO 43085-2261

☐ REMINGTON ARMS CO., INC.
HOEFLER AVE., ILION, NY 13357

☐

ISSUED BY

PAGE OF

TERMS OF PAYMENT | REQUIRED SHIP DATE | PROMISED SHIP DATE

F. O. B. ☐ DEST. (DEL'D) ☐ SHIP PT. | FREIGHT TERMS | (If Ship Pt. Show City & State) | ☐ PREPAID ☐ PREPAID ADDED ☐ OTHER (SEE BELOW) ☐ COLLECT* | FREIGHT TERMS

VENDOR CODE

PAYEE CODE

SHIP TO

E. I. DU PONT DE NEMOURS & COMPANY
c/o REMINGTON ARMS CO., INC.
HOEFLER AVENUE
ILION, NY 13357
ORDER NO. LRI-

SHIP VIA:

		SHIPMENT NUMBER 1	2	3
RECEIPTS	DATE RECEIVED			
	CHECKED BY			
FREIGHT	DATE SHIPPED			
	VIA			
	PRO. NO. or CAR NO.			
	F. B. WGT.			
	FREIGHT CHARGES			
	NO. AND/OR KIND PKGS.			
INVOICE	DATE RECEIVED			
	AMOUNT			
	CHECK NO.			
	DATE			

TO RECORD ADDITIONAL SHIPMENTS SEE REVERSE SIDE

ITEM	QUANTITY	UNIT	DESCRIPTION (NOUN, ADJECTIVE, MANUF. NAME & NO.)	PRICE	QUANTITY RECEIVED 1	2	3
A	2	EA.	SIX ENTERPRISES P/N 700LAS STOCK 700 LONG ACTION ADL STD CALIBERS				
B	2	EA	SIX ENTERPRISES P/N [redacted] 700LAM 700 LONG ACTION ADL MAGNUM CALIBERS				

N.Y. SALES & USE TAX EXEMPTION CERTIFICATE
ACCOUNT IDENTIFICATION #06-0507970C ☐ TAX ☐ EXEMPT

CONFIRMING TO: | BY: | DATE:

REQUISITIONED BY	EXTENSION	REQUISITION APPROVED BY	DATE	AUTH. LEVEL	DATE DELIVERY REQ'D	ESTIMATED WEIGHT	ESTIMATED COST
JIM RONKAINEN	559	[signature]	7/29/91	1, 0	7-29-91	10 lbs	$400

ITEM NO.	GENERAL LEDGER ACCOUNT/SUB ACCOUNTS	DETAIL ACCOUNTING	AMOUNT
A+B	1118-481152		

5Z-4A
DELIVERY SPOT #

LAST ORDER NO. OR SUGGESTED VENDOR & ADDRESS
SIX ENTERPRISES
(408) 999-0201

REASON VENDOR SELECTED: ☐ LOWEST PRICE ☐ BETTER QUALITY ☐ REQUIRED DESIGN ☐ ONLY KNOWN SOURCE ☐ CONTRACT/P.A. ☐

ORDER APPROVED BY | ORDER EXECUTED BY

D220743
REQUISITION NO.

NO. 6 REQUISITIONER'S COPY

CONFIDENTIAL

THIS MAY BE SENT TO VENDOR AS A PURCHASE ORDER

PURCHASING TO COMPLETE SHADED AREA

CONSIDER MINORITY VENDORS (TEMPO)

DUPONT

E. I. DU PONT DE NEMOURS & CO. (INC.)

PURCHASE ORDER

LRI

100 OLD WILSON BRIDGE RD. SUITE 212
WORTHINGTON, OHIO 43085-2361

REMINGTON ARMS CO., INC.
HOEFLER AVE., ILION, NY 13357

SITE NO. | TAX CODE | DIRECT ALL INQUIRIES | DATE OF ORDER | ISSUED BY

TERMS OF PAYMENT | REQUIRED SHIP DATE | PROMISED SHIP DATE

F.O.B. DEST. (DEL'D) SHIP PT. | PREPAID | PREPAID ADDED | OTHER (SEE BELOW) | COLLECT*

FREIGHT TERMS (If Ship Pt. Show City & State) FREIGHT TERMS

* If COLLECT, Mail Freight Bill To:
FMIS
BOX 8964
WILMINGTON, DE 19899

VENDOR CODE

PAYEE CODE

SHIP TO
E. I. DU PONT DE NEMOURS & COMPANY
c/o REMINGTON ARMS CO., INC.
HOEFLER AVENUE
ILION, NY 13357
ORDER NO. LRI-

SHIP VIA:

INSTRUCTIONS TO VENDOR

PLEASE ENTER OUR ORDER AS SPECIFIED BELOW SUBJECT TO CONDITIONS AND INSTRUCTIONS LISTED ON BOTH THE FACE AND REVERSE SIDE OF THIS PURCHASE ORDER.

1. IF PRICE, TERMS, REQUIRED SHIPPING DATE OR OTHER CONDITIONS AND INSTRUCTIONS ARE NOT ACCEPTABLE IMMEDIATELY ADVISE INDIVIDUAL INDICATED BY RED ARROW ABOVE.
2. FURNISH COMPLETE SHIPPING INFORMATION AND INCLUDE 2 COPIES OF PACKING LIST WITH EACH SHIPMENT. SHOW PURCHASE ORDER NUMBER ON EACH PACKAGE, PACKING LIST, BILL OF LADING, INVOICE AND ALL CORRESPONDENCE.
3. ... MAIL YOUR INVOICE TO ADDRESS INDICATED BELOW:
   REMINGTON ARMS CO., INC.
   ACCOUNTS PAYABLE DIVISION
   P.O. BOX 179
   ILION, NY 13357
4. DO NOT INSURE U.P.S. OR PARCEL POST. DO NOT DECLARE AIR EXPRESS AND AIR FREIGHT IN EXCESS OF $50.00. IF LOWER CHARGES RESULT TO DUPONT, DECLARED VALUE SHALL NOT EXCEED LOWEST AMOUNT IN APPLICABLE TARIFF.

ITEM	QUANTITY	UNIT	DESCRIPTION (NOUN, ADJECTIVE, MANUF. NAME & NO.)	PRICE
A	50		TRIGGER HOUSINGS	
B	50		SAFETY ASSEMBLIES	
C	50		SAFETY DETENT WASHERS	
D	50		SAFETY PIVOT PINS	
E	53		SAFETY DETENT SPRINGS	
F	50		BOLT STOP RELEASES	
G	50		BOLT STOPS	
H	50		TRIGGERS	

PLATE ALL OF THE ITEMS LISTED ABOVE WITH .0003" THICK HIGH PHOSPHORUS ELECTROLESS NICKEL. BAKE PARTS AFTERWARD TO PREVENT HYDROGEN EMBRITTLEMENT.

DO NOT WRITE BEYOND THIS LINE

N.Y. SALES & USE TAX EXEMPTION CERTIFICATE
ACCOUNT IDENTIFICATION #06-0507970C ☐ TAX ☐ EXEMPT

CONFIRMING TO: BY: DATE:

REQUISITIONED BY	EXTENSION	REQUISITION APPROVED BY	DATE	AUTH. LEVEL	DATE DELIVERY REQ'D	ESTIMATED WEIGHT	ESTIMATED COST
JIM RONKAINEN	559	J.C. Munson	7/22/91	1500	7-26-91	10 lbs	

ITEM NO.	GENERAL LEDGER ACCOUNT/SUB ACCOUNTS	DETAIL ACCOUNTING	AMOUNT
	1118-481152		

DELIVERY SPOT #

LAST ORDER NO. OR SUGGESTED VENDOR & ADDRESS
H.M. QUACKENBUSH
PHIL JANKOWICZ
866-3000

REASON VENDOR SELECTED ☐ LOWEST PRICE ☐ BETTER QUALITY ☐ REQUIRED DESIGN ☐ ONLY KNOWN SOURCE ☐ CONTRACT/P.A.

ORDER APPROVED BY | ORDER EXECUTED BY | D220744 REQUISITION NO.

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136407

CONFIDENTIAL

CT 100 DICK JACKSON

Remington Arms Company, Inc.
PRODUCT CONSIGNMENT TRANSACTION
NEW CONSIGNMENT or TRANSFER

PCT# N0160

Date: 7/9/91

Requested By: Jay M Bunting

Transaction Type (check one) ✓ New Consignment ___ Transfer

~~ATTN~~: ~~Tim McCormick~~ ~~Custom Shop~~ X28

cc. BOB ORF
DICK JACKSON

CONSIGNEE:

Name: LYON'S INC

Street: 715 ORANGE STREET

City: WILMINGTON State: DE

Phone: (302) 654-6146 Zip: 19801

SHIP TO ADDRESS:

Name: LYON'S INC

Street: 715 ORANGE STREET

City: WILMINGTON State: DE

Phone: (302) 654-6146 Zip: 19801

Consignment Termination Date: ___

FFL NO. ON FILE

check RAMAC W/Brad

Order No. (RAMAC)	Model	Gauge/ Caliber	Barrel Length	Serial Number
5913	700 CLASSIC	222 REM		
9700	700 VS	22-250 REM		
5277	1187 SS	12ga	28"	
5012	870 MM	12ga	18"	
9792	522 VIPER	22		PENDING
9714	700 SS	7mm REM MAG		
5250	1187 NWTF	12ga	21"	Shipped 8/8/91
5291	1187 (RESTYLE)	12ga	26"	(HI GLOSS)
9873	1187 (RESTYLE)	12ga	28"	(SATIN)
5057	870 (RESTYLE)	12ga	26"	(HI GLOSS)
5063	870 (RESTYLE)	12ga	28"	(SATIN)

APPROVALS: Jay M Bunting

Regional Mgr./Marketing Mgr.

Dir. Market. & Sales

REMARKS:

1992 CATALOG PHOTOGRAPHY SAMPLES,

MUST ~~ARRIVE~~ BY 8/1

TRANSFERS ONLY:

From:
Account Name: ___
Account No. ___
Signature: ___

To:
Account Name: RECEIVED
Account No. JUL 11 1991
Signature: THELMA GARRETT

Note: Both signatures required for transfers.
Transfers permitted between Remington employees only.

BARBER - PRESALE R 0136407

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136408

CONFIDENTIAL

Form PCT 100

Remington Arms Company, Inc.
PRODUCT CONSIGNMENT TRANSACTION
NEW CONSIGNMENT or TRANSFER

PCT#

Date: 7/9/91

Requested By: Jay MBut

Transaction Type (check one) ✓ New Consignment ___ Transfer

ATTN: Tim McConnie ~~Custom Shop~~

cc. BOB ORF
Dick Jackson

CONSIGNEE:

Name: LYON'S INC

Street: 715 ORANGE ST

City: WILMINGTON State: DE

Phone: ( ) Zip: 19801

SHIP TO ADDRESS:

Name: LYONS INC

Street: 715 ORANGE ST

City: WILMINGTON State: DE

Phone: (302) 654-6146 Zip: 19801

Consignment Termination Date: ___

FFL NO. ___

Order No. (RAMAC)	Model	Gauge/ Caliber	Barrel Length	Serial Number
5604	552	22		(RESTYLE HIGLOSS WOOD & BLUE)
5622	572	22		(RESTYLE HIGLOSS WOOD & BLUE)

APPROVALS: Jay MBut

Regional Mgr./Marketing Mgr.

Dir. Market. & Sales

REMARKS:
1992 CATALOG PHOTOGRAPHY SAMPLES.
~~Please Return By 8/1~~

TRANSFERS ONLY:

From:
Account Name: ___
Account No. ___
Signature: ___

To:
Account Name: ___
Account No. ___
Signature: ___

Note: Both signatures required for transfers.
Transfers permitted between Remington employees only.

CONFIDENTIAL

Six ENTERPRISES
320 - D Turtle Creek Ct.
San Jose, CA 95125
(408) 999 - 0201 * FAX (408) 999 - 0216

Nº 1161

SOLD TO
REMINGTON ARMS COMPANY INC.
14 Hoefler Ave.
Ilion, NY 13357
ATTN: JIM RONKAINEN
Research Engineer

SHIPPED TO

DATE	SHIPPER NO.	CUSTOMERS NO.	TERMS
7-23-91		TRT 70844	

SALESMAN	CHECKED BY	CARTONS PACKAGES	TOTAL WEIGHT	SHIPPED VIA
Cindy Six		1	12 lbs.	UPS 2-DAY

QUANTITY ORDERED	QUANTITY SHIPPED	QUANTITY BACK ORD.	DESCRIPTION
2	2	0	700LAS - Samples 700 Remington ADL Standard Stock (Noryl)
2	2	0	700LAM - Samples 700 Remington ADL Magnum Stock (Noryl)

☐ ORDER COMPLETE
☐ BALANCE TO FOLLOW

THE ABOVE MERCHANDISE RECEIVED IN GOOD CONDITION ——►

RECEIVED BY

PLEASE NOTIFY US IMMEDIATELY IF ERROR IS FOUND IN SHIPMENT

CONFIDENTIAL

EM-6795

COPY DISTRIBUTION:
1. SHIP W/ITEM (PACKING LIST)
2. A/P (LOCAL)
3. STORES
4. REGIONAL PUR.
5. SITE SUSPENSE

E. I. DU PONT DE NEMOURS & COMPANY

MATERIAL EXCEPTIONS & RETURNS

(Covered by P. O. No.)

LOCAL CONTROL # M28312
P. O. # LPI92436
ROM/ROC # _____
PKG. LIST # _____
FREIGHT/B # _____
DATE REC'D. _____

DATE: 8-5-91

REC'D FROM/RETURN TO (VENDOR) H.M.QUACKENBUSH

REASON FOR RETURN ☐ DAMAGED ☐ OVERAGE ☐ SHORTAGE ☐ NOT AS ORDERED ☐ PACKING LIST DISCREPANCY ☒ OFF-PLANT SHIPMENT ☐ OTHER

SITE RECEIVING

MATERIAL ORDERED

ITEM/STORES #	QUANTITY	DESCRIPTION	UNIT PRICE (FROM P.O.)

MATERIAL RECEIVED AND/OR MATERIAL TO BE RETURNED — OR MATERIAL TO BE SHIPPED OFF SITE

ITEM/STORES #	QUANTITY	DESCRIPTION	QTY. TO SHIP	BY PURCH'G UNIT PRICE FOR ROM
	1	M700 ADL TRIGGER GUARD	1	
	4	SLING STUD SWIVEL SCREWS	4	

USING AREA

MATERIAL _____ ACCEPTABLE (Is — Is Not) ☐ AS SUBSTITUTE ☐ AS OVERAGE ☐ AS ADDITIONAL ITEM ☐ ORIGINAL ITEM _____ REQUIRED (Is — Is Not)

JAMES W. ROUKAINEN
REQUISITIONER OR REC'G. SUPERVISOR

SITE APPROVAL

DISPOSITION

Date 8-5-91

Basis for .0003 nickel plate per order

☐ RETURN FOR CREDIT ONLY (SITE ROM REQUIRED) ☐ RETURN FOR REPLACEMENT ONLY ☐ RETURN FOR CREDIT AND REPLACEMENT (SITE ROM REQUIRED) ☒ OFF PLANT SHIPMENT ☐ REPAIR AND RETURN ☐ OTHER

PURCHASING ONLY

SHIP TO H.M. QUACKENBUSH
STREET AND NO. N. PROSPECT ST.
CITY AND STATE HERKIMER, NY
ATTENTION OF PHIL JANKOWISE

CHARGE TO _____
STREET AND NO. _____
CITY AND STATE _____

AUTHORIZED BY: _____ LETTER/VERBAL, DATE: _____

MARK PACKAGE _____ RETURN VIA COURIER

ROUTE VIA COURIER PPD. CHGS. _____ F.O.B. _____ CASH TERMS _____

☐ PREPAID ☐ COLLECT ☐ CHARGE TRANSPORTATION TO _____

REMARKS: (If applicable, show restocking charge here)

(SIGNATURE OF CARRIER/VENDOR REPR. IF MATERIAL PICKED UP AT SITE W/O B/L)

☐ FORMAL ALTERATION WILL BE ISSUED

☐ CONSIDER THIS DOCUMENT AS AN INFORMAL ALTERATION

SITE

CHARGE CODE _____
WEIGHT _____
B/L # _____
PP/CHARGE _____

(PURCHASING AUTHORIZATION)

(REVIEWED) PLANT PURCHASING

CONFIDENTIAL

Call for pickup

MCP, PATENTED, SPEEDISET® MOORE BUSINESS FORMS, INC. L

8/6/91

PACKING LIST 103888

H. M. QUACKENBUSH, INC.

220 PROSPECT ST. HERKIMER, N. Y. 13350

866-3000/733-7212

Customer Order # LRI-92436 Date 8/7/91 HMQ # 77722

Shipped To M-28312
Remington Arms Company
Ilion, NY

Shipped Via ~~Pick-up~~

	Electroless nickel plate .0003" thk. w/
	high phosphotous & neat treat:
1 only	M/700 ADL Trigger guard
4 pcs.	Sling stud swivel screws

Signed James W. Ronbaron

CONFIDENTIAL

RD-5707
Rev. 3/89

DATE 8-8-91

Nº 001171

REMINGTON ARMS COMPANY, INC.
ILION, NEW YORK

COMPANY FIREARM & AMMUNITION WITHDRAWAL

SECTION 1

DESTINATION: JAY BUNTING - MKTG.
REMINGTON ARMS CO. INC.
1007 MARKET ST.
WILMINGTON, DE 19898

PURPOSE OF:
___FIELD TEST
_X_MARKETING
___RESEARCH
___OPERATIONS
___LITIGATION

LOANING DEPT: R&D

RETURN DATE: 8-31-91

LOANED TO: J. RONKAINEN
EMP. NO.: 9097-0475

(1 DAY) APPROVED BY: Robert J. Ehrlich
(OVER 1 DAY) APPROVED BY:

ITEM #	QTY.	MDL. NO.	SERIAL #	RAMAC NO. or DESCRIPTION	RETURN YES	RETURN NO
1	1	A-BOLT	45072NM787	BROWNING A-BOLT STAINLESS	X	
2						
3				M-ORDER M-22735		
4						
5						
6						
7						
8						
9						
10						

RECEIVED BY (SIGN)	DATE	CHECK OUT BY SEC. OFF	DATE

COMPLETE SECION 2 FOR FIREARMS NOT BEING RETURNED TO ILION WITH THIS RECEIPT.

SECTION 2

PROPERTY TURNED OVER TO:		LOCATION	DATE
ITEM NOS. NOT RETURNED		PURPOSE OF:	
	RECEIVED BY: (SIGN)		DATE

SECTION 3

PROPERTY RETURNED TO ILION BY:	DATE
CHECK IN BY SECURITY OFFICER	DATE

TO SECURITY OFFICER

CONFIDENTIAL

EM-6795

COPY DISTRIBUTION:
1. SHIP W/ITEM (PACKING LIST)
2. A/P (LOCAL)
3. STORES
4. REGIONAL PUR.
5. SITE SUSPENSE

E. I. DU PONT DE NEMOURS & COMPANY

MATERIAL EXCEPTIONS & RETURNS

(Covered by P. O. No.)

M-22735
LOCAL CONTROL #
P. O. #
ROM/ROC #
PKG. LIST #
FREIGHT/B #
DATE REC'D.

DATE: 8-8-91

REC'D FROM/RETURN TO (VENDOR) JAY BUNTING - REMINGTON ARMS

REASON FOR RETURN ☐ DAMAGED ☐ OVERAGE ☐ SHORTAGE ☐ NOT AS ORDERED ☐ PACKING LIST DISCREPANCY ☒ OFF-PLANT SHIPMENT ☐ OTHER

SITE RECEIVING

MATERIAL ORDERED

ITEM/STORES #	QUANTITY	DESCRIPTION	UNIT PRICE (FROM P.O.)

MATERIAL RECEIVED AND/OR MATERIAL TO BE RETURNED — OR MATERIAL TO BE SHIPPED OFF SITE

ITEM/STORES #	QUANTITY	DESCRIPTION	QTY. TO SHIP	BY PURCH'G UNIT PRICE FOR ROM
	1	BROWNING A-BOLT STAINLESS STALKER		
		S/N 450TZNM757		

USING AREA

MATERIAL _____ ACCEPTABLE (Is — Is Not)
☐ AS SUBSTITUTE ☐ AS OVERAGE ☐ AS ADDITIONAL ITEM
☐ ORIGINAL ITEM _____ REQUIRED (Is — Is Not)

JAMES W. ROUKAINEN
REQUISITIONER OR REC'G. SUPERVISOR

SITE APPROVAL

PURCHASING ONLY

DISPOSITION

Basis MARKETING EVALUATION - GUN TO BE RETURNED Date 8-8-91

☐ RETURN FOR CREDIT ONLY (SITE ROM REQUIRED) ☐ RETURN FOR REPLACEMENT ONLY ☐ RETURN FOR CREDIT AND REPLACEMENT (SITE ROM REQUIRED) ☒ OFF PLANT SHIPMENT ☐ REPAIR AND RETURN ☐ OTHER

SHIP TO REMINGTON ARMS. CO. INC. CHARGE TO 1118-481152
STREET AND NO. 1007 MARKET ST. B-6220A STREET AND NO.
CITY AND STATE WILMINGTON, DE 19898 CITY AND STATE
ATTENTION OF JAY BUNTING AUTHORIZED BY: LETTER/VERBAL; DATE:
MARK PACKAGE
ROUTE VIA NEXT DAY AIR PPD. CHGS. F.O.B. CASH TERMS
☒ PREPAID ☐ COLLECT ☐ CHARGE TRANSPORTATION TO 1118-481152

REMARKS: (If applicable, show restocking charge here)

(SIGNATURE OF CARRIER/VENDOR REPR. IF MATERIAL PICKED UP AT SITE W/O B/L)

☐ FORMAL ALTERATION WILL BE ISSUED
☐ CONSIDER THIS DOCUMENT AS AN INFORMAL ALTERATION

SITE

CHARGE CODE
WEIGHT
B/L #
PP/CHARGE

(PURCHASING AUTHORIZATION)

(REVIEWED) PLANT PURCHASING

CONFIDENTIAL

8/9/91

70SS

BARREL – ROUR COLOR } DONT MATCH
" – " FINISH } EA. OTHER

Jay likes receiver finish – can we put it on barrel too?
will try

CONFIDENTIAL

EM-6670-7 PT.-RI-11/89

DUPONT

E. I. DU PONT DE NEMOURS & CO., (INC.)

PURCHASE ORDER

LRI 93973

PURCHASE ORDER NO. | ALT NO.

RELEASE NUMBER

SITE NO. | TAX CODE | DIRECT ALL INQUIRIES

☐ 100 OLD WILSON BRIDGE RD. SUITE 212 WORTHINGTON, OHIO 43085-2261
☐ REMINGTON ARMS CO., INC. HOEFLER AVE., ILION, NY 13357
☐

ISSUED BY

DATE OF ORDER

TERMS OF PAYMENT | REQUIRED SHIP DATE | PROMISED SHIP DATE

PAGE OF

F.O.B. ☐ DEST. (DEL'D) ☐ SHIP PT. | FREIGHT TERMS | (If Ship Pt. Show City & State) | ☐ PREPAID ☐ PREPAID ADDED ☐ OTHER (SEE BELOW) ☐ COLLECT* | FREIGHT TERMS

VENDOR CODE

PAYEE CODE

SHIP TO

E. I. DU PONT DE NEMOURS & COMPANY
c/o REMINGTON ARMS CO., INC.
HOEFLER AVENUE
ILION, NY 13357
ORDER NO. LRI-

SHIP VIA:

RECEIPTS	SHIPMENT NUMBER 1	2	3
DATE RECEIVED			
CHECKED BY			

FREIGHT			
DATE SHIPPED			
VIA			
PRO. NO. or CAR NO.			
F.B. WGT.			
FREIGHT CHARGES			
NO. AND/OR KIND PKGS.			

INVOICE			
DATE RECEIVED			
AMOUNT			
CHECK NO.			
DATE			

TO RECORD ADDITIONAL SHIPMENTS SEE REVERSE SIDE

ITEM	QUANTITY	UNIT	DESCRIPTION (NOUN, ADJECTIVE, MANUF, NAME & NO.)	PRICE	QUANTITY RECEIVED 1	2	3
A	50	M	700 ADL TRIGGER GUARDS TO BE PLATED WITH .0003" THICK HIGH PHOSPHORUS ELECTROLESS NICKEL				

N.Y. SALES & USE TAX EXEMPTION CERTIFICATE
ACCOUNT IDENTIFICATION #06-0507970C ☐ TAX ☐ EXEMPT

CONFIRMING TO: | BY: | DATE:

REQUISITIONED BY	EXTENSION	REQUISITION APPROVED BY	DATE	AUTH. LEVEL	DATE DELIVERY REQ'D	ESTIMATED WEIGHT	ESTIMATED COST
J. RONKAINEN	559		9/30/91	1500	10-2-91	5 lbs	$100

ITEM NO.	GENERAL LEDGER ACCOUNT/SUB ACCOUNTS	DETAIL ACCOUNTING	AMOUNT
A	1118-481167		100%

COURIER PICKUP *DELIVER
DELIVERY SPOT #
LAST ORDER NO. OR SUGGESTED VENDOR & ADDRESS
H.M. QUACKENBUSH
HERKIMER, NY

REASON VENDOR SELECTED: ☐ LOWEST PRICE ☐ BETTER QUALITY ☐ REQUIRED DESIGN ☐ ONLY KNOWN SOURCE ☐ CONTRACT/P.A. ☐

ORDER APPROVED BY | ORDER EXECUTED BY | D217513 REQUISITION NO.

NO. 3 COPY FOR PLANT

DU PONT

PURCHASE ORDER

E. I. DU PONT DE NEMOURS & CO., (INC.)

SHIPMENT NUMBER

CONFIDENTIAL

RECEIPTS
DATE RECEIVED
CHECKED BY

DATE SHIPPED

FREIGHT
VIA
PRO NO. OR CAR NO.
F.B. WGT.
FREIGHT CHARGES
NO. AND/OR KIND PKGS.

INVOICE
DATE RECEIVED
AMOUNT
CHECK NO.
DATE

E. I. DU PONT DE NEMOURS & COMPANY
c/o REMINGTON ARMS CO., INC.
HOEFLER AVENUE
ILION, NY 13357

ORDER NO. LRI-

ITEM	QUANTITY	4	5	6	7	8	9	10	11

QUANTITY RECEIVED

NY SALES & USE TAX EXEMPTION CERTIFICATE
ACCOUNT IDENTIFICATION #06-050797OC

TAX ☐ EXEMPT ☐

DATE
BY
CONSIGNED TO

PURCHASED BY | EXTENSION | REQUISITION APPROVED BY | DATE | AUTH. LEVEL | DATE DELIVERY REQ'D | ESTIMATED WEIGHT | ESTIMATED COST

GENERAL LEDGER ACCOUNTS/SUB ACCOUNTS | DETAIL ACCOUNTING | AMOUNT

DELIVERY SPECS

LAST ORDER NO. OR SUGGESTED VENDOR & ADDRESS

ORDER APPROVED BY | ORDER EXECUTED BY

☐ LOWEST PRICE ☐ BETTER QUALITY ☐ REQUIRED DESIGN
☐ ONLY KNOWN SOURCE ☐ CONTRACT P.A. ☐

D21751 3

CONFIDENTIAL

cc: Glen Sietsema
Hal Munson
Gary Barnes

October 2, 1991

TO: John Simpson
FROM: Jim Ronkainen JR

SUBJECT: Surface Finish Specifications - M/700 SS Raw Material

Glen Sietsema and I compared the surface finish of the ground sample provided by Cartech to the surface finish of the turned and polished material we currently use for M/700 receivers. We felt that the finish on the ground sample was equal or better than that on the current material. Polishing the receiver material after grinding would really just be "gilding the lily". Since the material isn't polished, it isn't necessary to box it.

Glen and I will look at the restricted tolerances on the lengths of the receiver and barrel. Could you find out from Cartech what they consider to be a non-restricted tolerance on the length of the bars? Please let me know what you find out.

CONFIDENTIAL

MCP, PATENTED, SPECIALISTS IN BUSINESS FORMS, INC.

7/24/91

PACKING LIST 103501

H. M. QUACKENBUSH, INC.

220 PROSPECT ST. HERKIMER, N. Y. 13350

866-3000/733-7212

Customer Order # LRI-92424 Date 8-6-91 HMQ # 77464

Shipped To M-28279
Remington Arms Company
Ilion, NY

Shipped Via ~~Our delivery~~;

	Electroless nickel plate .0003" thk. w/ high phosphorous & heat treat:
50 pcs.	Trigger housings
50 pcs.	Safety assemblies
50 pcs.	Safety detent washers
50 pcs.	Safety pivot pins
53 pcs.	Safety detent springs
50 pcs.	Bolt stop releases
50 pcs.	Bolt stops
50 pcs.	Triggers

Signed Tim Nelson

CONFIDENTIAL

MCP. PATENTED, SPEEDISET® MOORE BUSINESS FORMS, INC. L

8/15/91

PACKING LIST 104213

H. M. QUACKENBUSH, INC.

220 PROSPECT ST. HERKIMER, N. Y. 13350

866-3000/733-7212

Customer Order # LRI-92458 Date 8-14-91 HMQ # 77946

Shipped To M-28332
Remington Arms Company
Ilion, NY

Shipped Via Pick-up

51 pcs.	M/700 Trigger connectors - Electroless nickel plate .0003" thk. [Hi-phos]

Signed James W. Quackenbush

CONFIDENTIAL

Remington.

DUPONT

cc: John Simpson

REMINGTON ARMS COMPANY, INC.

SPORTING ARMS-AMMUNITION-TARGETS-TRAPS

ILION, NEW YORK 13357

TELEPHONE (315) 894-9961

October 17, 1991

Lee Six
Six Enterprises
320D Turtle Creek Court
San Jose, CA 95125

RE: Preliminary Checkering Pattern for M/700 Stock (PP)

Dear Lee:

Enclosed are two prints of the proposed checkering pattern we would like to put on the M/700 polypropylene stocks (ADL configuration). Even though the position of the checkering is shown to have a default tolerance of +/- .005, there is flexibility to adjust the position to suit the molding process. The checkering I have shown on the drawing is 16 lines per inch. I feel this will give us better points on the checkering and a better surface to grip.

I also have a question about the barrel groove. What tooling would be required to give a M/700 Mountain Rifle barrel contour for the barrel groove? Could you please let me know?

If you have any questions, please call me.

Yours truly,

Jim Ronkainen

Jim Ronkainen
Research Engineer

Enclosure

CONFIDENTIAL

October 28, 1991

TO: Fred Martin
Hal Munson
Gary Barnes
Fred Schmidt

FROM: Jim Ronkainen

SUBJECT: M/700 SS Drawing Package

I have attached one copy of the drawing package for the M/700 SS for you to review. Please review the drawings for accuracy, spelling, clarity, material, heat treat, and anything else you can think of. Please mark any and all comments you have on the drawings and return them to me by 11/4/91. I will update the drawings to reflect your findings (where appropriate) and transmit the complete package by 11/8/91.

If you have any questions, please feel free to contact me anytime.

Jim Ronkainen

Remington.

DUPONT

CONFIDENTIAL

1/

FACSIMILE TRANSMISSION COVER SHEET

DATE: 10/16/91

ADDRESSEE NAME: Bill Coleman / Ken Sanders / Hal Munson

DEPARTMENT:

LOCATION: Elion

FAX #:

SENDER NAME: Jay Buttz

DEPARTMENT:

LOCATION:

DUCOM BILLING #:

TOTAL: 2 **PAGES (Including Cover Sheet)**

MESSAGE:

New Competitive Stainless Steel M70 from USRAC feature a detachable clip and synthetic stock. More reason to differentiate Remington's M700SS.

Remington FAX: (302) 774-5776
Alternate: (302) 774-7179 or (302) 774-0257

E. I. du Pont de Nemours & Co. (Inc.) • Wilmington, Delaware 19898

CONFIDENTIAL

********** Start of message **********

To : Jay Bunting
From : Mark Isenhart
Date : 10/15/91 Time : 13:22

SUBJECT: MOSSBERG / USRA NEW PRODUCTS

ED,

PER MY CONVERSATION TODAY WITH TOM BODENHEIMER BUYER FOR POINT I RECIEVED THE FOLLOWING COMPETITIVE INFORMATION:

MOSSBERG AND USRA S NEW PROGRAMS FOR 1992 ARE OUT AND IN EFFECT GUNS SHIPPED NOW ARE SHIPPED WITH 1992 TERMS AND PRICES.

NEW FOR USRA S IS A MODEL 70 SYNTHETIC STOCK SS BARREL DETCH CLIP ALSO SAME GUN IN BLUE FINISH. MODEL 70SSDBM MSP 384 STAINLESS STEEL

MODEL 70DBM MSP 361 BLUE

NEW FROM MOSSBERG: O TURKEY GUNS WITH RIFLED SIGHTS 12GA. 3.5" CAMO

O 12GA 3" MOSSBERG CAMO WITH RS FOUR CHOKE TUBES

CAMO SLING MSP $194.00

O NEW CAMO PATTERN MOSSYOAK.

HOPE TO GET MORE DETAIL WED OCT.16 WHEN I GO IN TO SEE TOM.

MARK

********** End of message **********

CONFIDENTIAL

Remington
DUPONT

cc: John Simpson
Gary Barnes

REMINGTON ARMS COMPANY, INC.

SPORTING ARMS-AMMUNITION-TARGETS-TRAPS

ILION, NEW YORK 13357

TELEPHONE (315) 894-9961

November 11, 1991

Lee Six
Six Enterprises
320D Turtle Creek Court
San Jose, CA 95125

RE: Drawings for M/700 SS Mountain Rifle Barrel Contour

Dear Lee:

Enclosed are three copies of drawing D-TS-7573 showing the barrel diameters at selected points referenced to the rear face of the recoil lug. Please use these dimensions to make the insert for the barrel groove for the M/700 SS Long Action (your P/N LAMT). If you have any questions about anything, please call me at (315) 894-9961 x559.

Yours truly,

Jim

Jim Ronkainen

Enclosure

STANDARD FORMS INC 215-825-8364

CONFIDENTIAL

EM-6795

COPY DISTRIBUTION:
1. SHIP W/ITEM (PACKING LIST)
2. A/P (LOCAL)
3. STORES
4. REGIONAL PUR.
5. SITE SUSPENSE

E. I. DU PONT DE NEMOURS & COMPANY

MATERIAL EXCEPTIONS & RETURNS

(Covered by P. O. No.)

LOCAL CONTROL # [illegible]

P. O. # [illegible]

ROM/ROC # _____

PKG. LIST # _____

FREIGHT/B # _____

DATE REC'D. _____

DATE: 10-31-91

REC'D FROM/RETURN TO (VENDOR) H. M. QUACKENBUSH

REASON FOR RETURN ☐ DAMAGED ☐ OVERAGE ☐ SHORTAGE ☐ NOT AS ORDERED ☐ PACKING LIST DISCREPANCY ☒ OFF-PLANT SHIPMENT ☐ OTHER

SITE RECEIVING

MATERIAL ORDERED

ITEM/STORES #	QUANTITY	DESCRIPTION	UNIT PRICE (FROM P.O.)

MATERIAL RECEIVED AND/OR MATERIAL TO BE RETURNED — OR MATERIAL TO BE SHIPPED OFF SITE

ITEM/STORES #	QUANTITY	DESCRIPTION	QTY. TO SHIP	BY PURCH'G UNIT PRICE FOR ROM
	50	1/4-28 HEX HEAD GUARD SCREWS FOR PLATING	50	
	50	8-36 HEX HEAD GUARD SCREWS W/ .0003 THICK	50	
	50	M 700 ADL TRIGGER GUARDS HI-PHOS E. NI.	30	

USING AREA

MATERIAL _____ ACCEPTABLE (Is — Is Not) ☐ AS SUBSTITUTE ☐ AS OVERAGE ☐ AS ADDITIONAL ITEM ☐ ORIGINAL ITEM _____ REQUIRED (Is — Is Not) J. W. RONKAINEN

REQUISITIONER OR REC'G. SUPERVISOR

SITE APPROVAL

PURCHASING ONLY

DISPOSITION Date [illegible]

Basis [illegible]

☐ RETURN FOR CREDIT ONLY (SITE ROM REQUIRED) ☐ RETURN FOR REPLACEMENT ONLY ☐ RETURN FOR CREDIT AND REPLACEMENT (SITE ROM REQUIRED) ☒ OFF PLANT SHIPMENT ☐ REPAIR AND RETURN ☐ OTHER

SHIP TO H. M. QUACKENBUSH — CHARGE TO _____

STREET AND NO. N. PROSPECT ST. — STREET AND NO. _____

CITY AND STATE HERKIMER, NY 13350 — CITY AND STATE _____

ATTENTION OF PHIL JANKOWIAK — AUTHORIZED BY: _____ LETTER/VERBAL, DATE: _____

MARK PACKAGE _____

ROUTE VIA OUR COURIER — PPD. CHGS. _____ F.O.B. _____ CASH TERMS _____

☐ PREPAID ☐ COLLECT ☐ CHARGE TRANSPORTATION TO _____

REMARKS: (If applicable, show restocking charge here)

(SIGNATURE OF CARRIER/VENDOR REPR. IF MATERIAL PICKED UP AT SITE W/O B/L)

☐ FORMAL ALTERATION WILL BE ISSUED

☐ CONSIDER THIS DOCUMENT AS AN INFORMAL ALTERATION

(PURCHASING AUTHORIZATION)

(REVIEWED) PLANT PURCHASING

SITE

CHARGE CODE _____

WEIGHT _____

B/L # _____

PP/ :HARGE _____

CONFIDENTIAL

Barrel Contour (24" unless otherwise noted)	Weight (lbs)	C.G. (in. from hub)	Weight Savings
Magnum	2.91	9.24	
KS Magnum	2.73	9.44	0.18
Magnum, Last taper to muzzle	2.87	9.04	0.04
Magnum, Next last taper MR muz	2.74	8.59	0.17
Magnum, Next last taper to muz	2.74	8.55	0.17
M/700 Standard	2.60	9.36	
M/700 KS Standard	2.27	9.03	0.33
M/700 MR	2.05	8.22	0.55
M/700 MR 22"	1.93	7.46	0.67

BARBER - PRESALE R 0136426

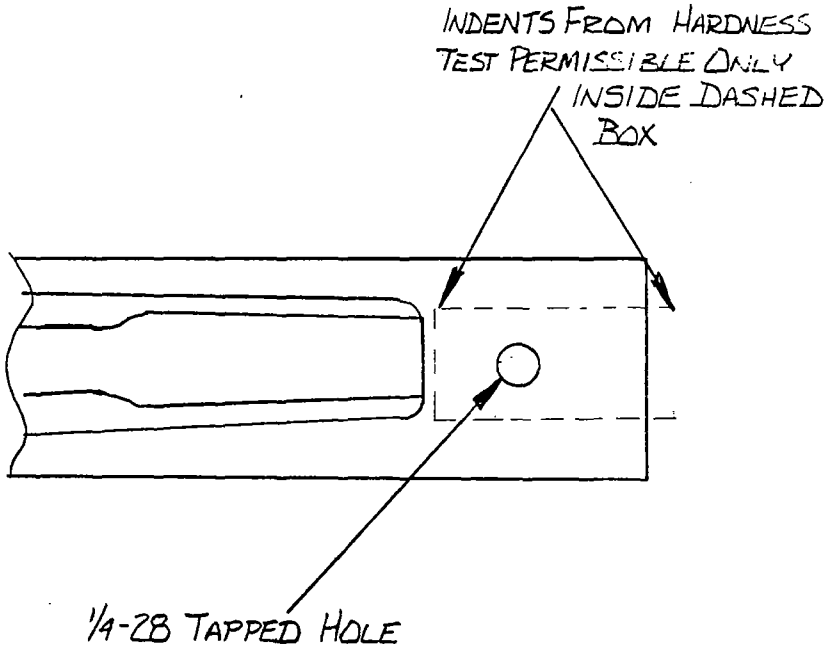
CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136426

CONFIDENTIAL

HARDNESS TESTING ON STAINLESS RECEIVERS

The hardness of the stainless steel receivers may only be checked in the area shown in the sketch below. Indent marks anywhere else on the part are unacceptable.



CONFIDENTIAL

C.A.C

MCP, PATENTED, SPEEDISET® MOORE BUSINESS FORMS, INC. L

9/30/91

PACKING LIST 107634

H. M. QUACKENBUSH, INC.

220 PROSPECT ST. HERKIMER, N. Y. 13350

888-3000/733-7212

Customer Order # M-28441 Date 10/4/91 HMQ # 79007

Shipped To Remington Arms Company
Ilion, NY

Shipped Via ~~Our~~ delivery

50 pcs.	M/700 ADL Trigger guards - High phoshorous electroless nickel plate .0003" thk.

Signed James A. Barbaman

EM-6670-7 PL-RI-11/89

DUPONT

E. I. DU PONT DE NEMOURS & CO., (INC.)

PURCHASE ORDER

LRI 71286

100 OLD WILSON BRIDGE RD. SUITE 212
WORTHINGTON, OHIO 43085-2261

☑ REMINGTON ARMS CO., INC.
HOEFLER AVE., ILION, NY 13357

☐

ISSUED BY: JOHN SIMPSON

SITE NO. | TAX CODE N | DIRECT ALL INQUIRIES

DATE OF ORDER 11/15/91

TERMS OF PAYMENT Net 30

REQUIRED SHIP DATE | PROMISED SHIP DATE NOV 18

F.O.B. ☐ DEST. (DELD) ☑ SHIP PT. ROCHESTER — FREIGHT TERMS (If Ship Pt Show City & State)

☐ PREPAID ☑ PREPAID ADDED ☐ OTHER (SEE BELOW) ☐ COLLECT* — FREIGHT TERMS

VENDOR CODE

PAYEE CODE

CARTECH
145 METRO PARK
ROCHESTER, N.Y. 14692-3020

SHIP TO
E. I. DU PONT DE NEMOURS & COMPANY
c/o REMINGTON ARMS CO., INC.
HOEFLER AVENUE
ILION, NY 13357
ORDER NO. LRI-

SHIP VIA:

PAGE OF

RECEIPTS	SHIPMENT NUMBER 1	2	3
DATE RECEIVED			
CHECKED BY			
FREIGHT: DATE SHIPPED	CONFIDENTIAL		
VIA			
PRO. NO. or CAR NO.			
P.S. WGT.			
FREIGHT CHARGES			
NO. AND/OR KIND PKGS.			
INVOICE: DATE RECEIVED			
AMOUNT			
CHECK NO.			
DATE			

TO RECORD ADDITIONAL SHIPMENTS SEE REVERSE SIDE

ITEM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
A	2		BARS .750 DIAMETER x 12" LONG 416 PROJECT 70 STAINLESS STEEL. MATERIAL SHALL BE ROD (PREFERRED) OR (COLD DRAWN ANNEALED. GROUND TREATED IS ACCEPTABLE IF THE OTHER TWO MATERIAL FORMS ARE UNAVAILABLE	$187.16	

N.Y. SALES & USE TAX EXEMPTION CERTIFICATE
ACCOUNT IDENTIFICATION #06-0507970C ☐ TAX ☑ EXEMPT

CONFIRMING TO: ALICE BYAR BY: JOHN SIMPSON DATE: 11/15/91

REQUISITIONED BY	EXTENSION	REQUISITION APPROVED BY	DATE	AUTH. LEVEL	DATE DELIVERY REQ'D	ESTIMATED WEIGHT	ESTIMATED COST
J.W. RONKAINEN	559	[signature]	11/15/91	1520	11/20/91	40 lbs.	$200

ITEM NO.	GENERAL LEDGER ACCOUNT/SUB ACCOUNTS	DETAIL ACCOUNTING	AMOUNT
	1118-481167	1310	100%

52-4A

DELIVERY SPOT *

LAST ORDER NO. OR SUGGESTED VENDOR & ADDRESS
CARTECH
800-462-4244
ALICE

REASON VENDOR SELECTED: ☐ LOWEST PRICE ☐ BETTER QUALITY ☐ REQUIRED DESIGN ☐ ONLY KNOWN SOURCE ☐ CONTRACT/P.A.

ORDER APPROVED BY [signature] ORDER EXECUTED BY

D217523
REQUISITION NO.

NO. 6 REQUISITIONER'S COPY

G-88

DON'T SAY IT - WRITE IT

CONFIDENTIAL

To: R. BOUCK

Date: 12/2/91

From: J. RONKAINEN

DICK,

FOR NOW, PLEASE USE

MAT'L CODE	BLK #	PART NAME
~~1214~~ 1223	97541, 97542	BARREL BLANK
1227	97539	BOLT BODY BLANK
1228	97540	RECEIVER BLANK

Jim

"THINK SAFETY IN ADVANCE,
YOU MAY NOT GET A SECOND CHANCE"

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136430

BARBER - PRESALE R 0136430

CONFIDENTIAL

EM-6670-7 PT.-RI-11/89

DUPONT

E. I. DU PONT DE NEMOURS & CO., (INC.)

PURCHASE ORDER

LRI 71286

PURCHASE ORDER NO. | ALT NO.

RELEASE NUMBER

PAGE OF

100 OLD WILSON BRIDGE RD. SUITE 212
WORTHINGTON, OHIO 43085-2261

☑ REMINGTON ARMS CO., INC.
HOEFLER AVE., ILION, NY 13357

☐

ISSUED BY: JOHN SIMPSON

DIRECT ALL INQUIRIES

SITE NO. | TAX CODE N

DATE OF ORDER 11/15/91

TERMS OF PAYMENT Net 30

REQUIRED SHIP DATE | PROMISED SHIP DATE NOV 18

F.O.B. ☐ DEST. (DEL'D) ☑ SHIP PT. ROCHESTER (If Ship Pt. Show City & State)

FREIGHT TERMS

☐ PREPAID ☑ PREPAID ADDED ☐ COLLECT* ☐ OTHER (SEE BELOW)

FREIGHT TERMS

11-19-91
DPG
WBS
1 Pkg.

VENDOR CODE

PAYEE CODE

CARTECH
145 METRO PARK
ROCHESTER, N.Y. 14692-3020

SHIP TO

E. I. DU PONT DE NEMOURS & COMPANY
c/o REMINGTON ARMS CO., INC.
HOEFLER AVENUE
ILION, NY 13357
ORDER NO. LRI-

SHIP VIA:

ITEM	QUANTITY	UNIT	DESCRIPTION (NOUN, ADJECTIVE, MANUF. NAME & NO.)	PRICE	
A	2		BARS .750 DIAMETER X 12' LONG 416 PROJECT 70 STAINLESS STEEL. MATERIAL SHALL BE GROUND ANNEALED (PREFERRED) OR COLD DRAWN ANNEALED. GROUND CONDITION IS ACCEPTABLE IF THE OTHER TWO MATERIAL SIZES ARE UNAVAILABLE.	$1.87 lb.	2 Bars

N.Y. SALES & USE TAX EXEMPTION CERTIFICATE
ACCOUNT IDENTIFICATION #06-0507970C ☐ TAX ☑ EXEMPT

CONFIRMING TO: Alice Barr BY: John Simpson DATE: 11/15/91

REQUISITIONED BY	EXTENSION	REQUISITION APPROVED BY	DATE	AUTH. LEVEL	DATE DELIVERY REQ'D	ESTIMATED WEIGHT	ESTIMATED COST
J.W. RONKAINEN	559	P.K. Herman	11/15/91	1500	11/20/91	40 lbs.	$200

ITEM NO.	GENERAL LEDGER ACCOUNT/SUB ACCOUNTS	DETAIL ACCOUNTING	AMOUNT
	1118-481167	1310	100%

5Z-4A

DELIVERY SPOT

LAST ORDER NO. OR SUGGESTED VENDOR & ADDRESS
CARTECH
800-462-4244
ALICE

REASON VENDOR SELECTED: ☐ LOWEST PRICE ☐ BETTER QUALITY ☐ REQUIRED DESIGN ☐ ONLY KNOWN SOURCE ☐ CONTRACT/P.A. ☐

ORDER APPROVED BY

ORDER EXECUTED BY

D217523

REQUISITION NO.



CONFIDENTIAL

NOTICE
PLEASE PICK UP THIS ORDER
IN RECEIVING

E- -6670-7 PT.-RI-11/89

DU PONT

E. I. DU PONT DE NEMOURS & CO., (INC.)

CONFIDENTIAL

PURCHASE ORDER

LRI 71286

PURCHASE ORDER NO. | ALT NO.

RELEASE NUMBER

PAGE OF

SITE NO. | TAX CODE N | DIRECT ALL INQUIRIES

100 OLD WILSON BRIDGE RD. SUITE 212
WORTHINGTON, OHIO 43085-2261

☑ REMINGTON ARMS CO., INC.
HOEFLER AVE., ILION, NY 13357

☐

ISSUED BY JOHN SIMPSON

DATE OF ORDER 11/15/91

TERMS OF PAYMENT Nd. 30

REQUIRED SHIP DATE | PROMISED SHIP DATE NOV 18

F.O.B. ☐ DEST. (DEL'D) ☑ SHIP PT. ROCHESTER (If Ship Pt. Show City & State)

FREIGHT TERMS

☐ PREPAID ☑ PREPAID ADDED ☐ OTHER (SEE BELOW) ☐ COLLECT*

FREIGHT TERMS

11-19-91
Opy
UPS
1 Pkg.

VENDOR CODE

PAYEE CODE

CARTECH
145 METRO PARK
ROCHESTER, N.Y. 14692-3020

SHIP TO
E. I. DU PONT DE NEMOURS & COMPANY
c/o REMINGTON ARMS CO., INC.
HOEFLER AVENUE
ILION, NY 13357
ORDER NO. LRI-

SHIP VIA:

ITEM	QUANTITY	UNIT	DESCRIPTION (NOUN, ADJECTIVE, MANUF. NAME & NO.)	PRICE	
A	2	BARS	.750 DIAMETER X 12' LONG 416 PROJECT 70 STAINLESS STEEL. MATERIAL CAN BE GROUND ANNEALED (PREFERRED) OR COLD DRAWN ANNEALED. GROUND TREATMENTS ACCEPTABLE IF THE OTHER TWO MATERIAL TREATMENTS ARE UNAVAILABLE.	$1.87 lb.	2 Bars

NY. SALES & USE TAX EXEMPTION CERTIFICATE
ACCOUNT IDENTIFICATION #06-0507970C ☐ TAX ☑ EXEMPT

CONFIRMING TO: ALICE BARR BY: JOHN SIMPSON DATE: 11/15/91

REQUISITIONED BY	EXTENSION	REQUISITION APPROVED BY	DATE	AUTH. LEVEL	DATE DELIVERY REQ'D	ESTIMATED WEIGHT	ESTIMATED COST
J.W. RONKAINEN	559	[signature]	11/15/91	1	11/20/91	40 lbs.	$ 200

ITEM NO.	GENERAL LEDGER ACCOUNT/SUB ACCOUNTS	DETAIL ACCOUNTING	AMOUNT
	1118-481167	1310	100%

5Z-4A
DELIVERY SPOT

LAST ORDER NO. OR SUGGESTED VENDOR & ADDRESS
CARTECH
800-462-4244
ALICE

REASON VENDOR SELECTED ☐ LOWEST PRICE ☐ BETTER QUALITY ☐ REQUIRED DESIGN ☐ ONLY KNOWN SOURCE ☐ CONTRACT/P.A.

ORDER APPROVED BY [signature] ORDER EXECUTED BY [signature]

D217523
REQUISITION NO.

CONFIDENTIAL

Larry Cadman | 216 372-8511

RICHARD J. SERNULKA
SERVICE ENGINEER

1-800-321 0153

Ajax Magnethermic Corporation
Induction Heating and Melting Equipment
WORLD HDQRS • WARREN, OHIO 44483, U.S.A. | PHONE (216) 372-8511
CABLE: MAGNETHERM • TELEX 098-2482 | FAX (216) 372-8044

GREG GAY

PAUL STURM

DON PARVIS - local rep.

ROCHESTER, NY

(716) 235-1488

DON NOWARSKI - METALLURGIST

(216) 372-8511

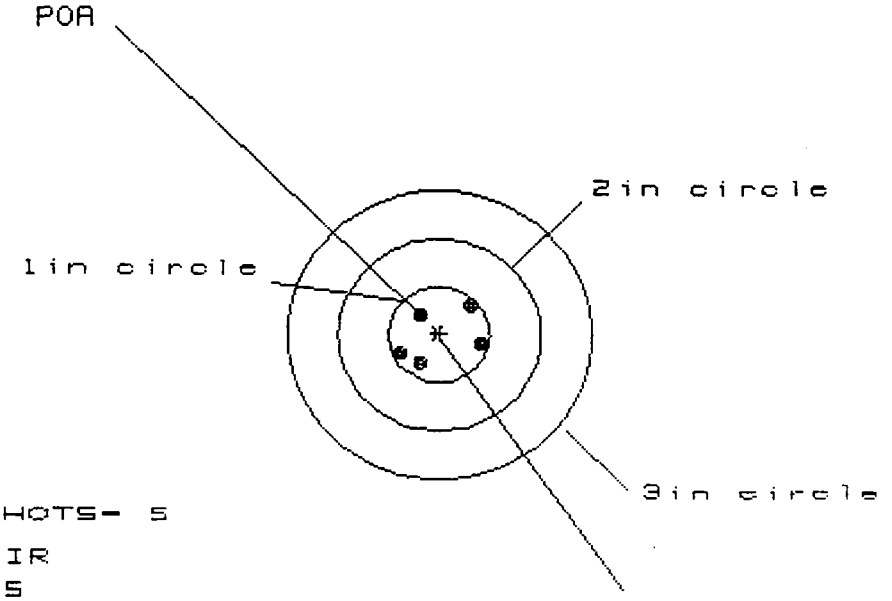
CONFIDENTIAL

M/700 sls

CONFIDENTIAL

16 Jul 1991 FILE:/PATTERNING/CENTERFIRE_PATT/70855

CENTERFIRE PATTERNS # 1



OF SHOTS= 5

IN CIR
1in = 5
2in = 5
3in = 5

CENTROID *

HS= .813
VS= .633
GS= .971

AVG. G.S. = 1.30

M-700 STAINLESS STEEL
C6624494 .280 REM.

PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.390	.479	.368
MINIMUM X	:	-.423	-.334	-.184
MAXIMUM Y	:	.346	.311	.263
MINIMUM Y	:	-.287	-.201	-.249
CENTROID X	:	-.012	-.101	.010
CENTROID Y	:	-.011	-.097	-.049
POA TO CENTROID in.	:	.016	.140	.050
MIN RADIUS	:	.277	.214	.310
MEAN RADIUS	:	.396	.344	.333
MAX RADIUS	:	.498	.480	.368
HORIZONTAL SPREAD	:	.813	.813	.552
VERTICAL SPREAD	:	.633	.512	.512
EXTREME SPREAD	:	.971	.832	.618
NUMBER IN ONE INCH CIRCLE	=		5	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

Ammo: .280 REM.
140GR. P.S.P.
LOT- E 11I B2507
INDEX- R-280 R3

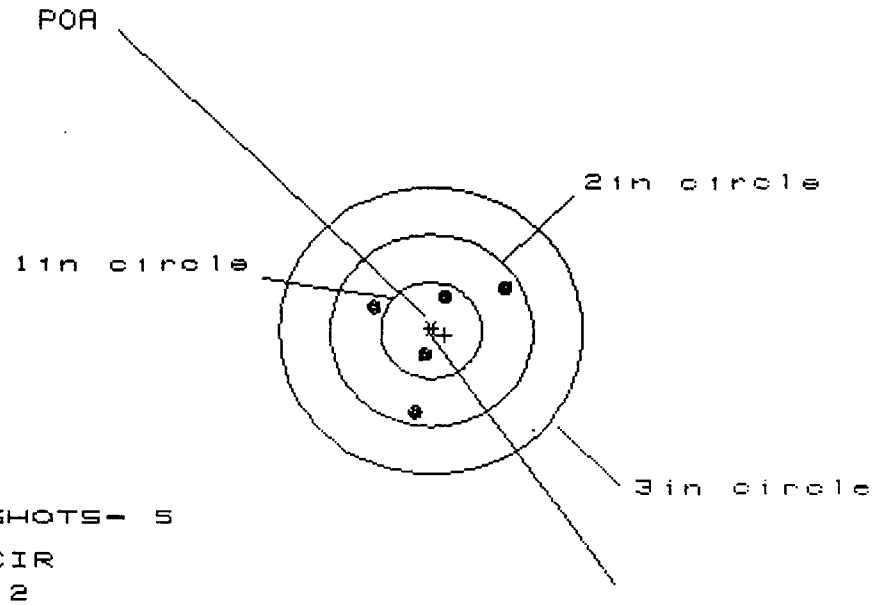
SCOPE:
LYMAN- ALL AMERICAN
20X-

BENCH RESTED
100 YDS.

CONFIDENTIAL

16 Jul 1991 FILE:/PATTERNING/CENTERFIRE_PATT/70055

CENTERFIRE PATTERNS # 2



OF SHOTS= 5

IN CIR
1in = 2
2in = 5
3in = 5

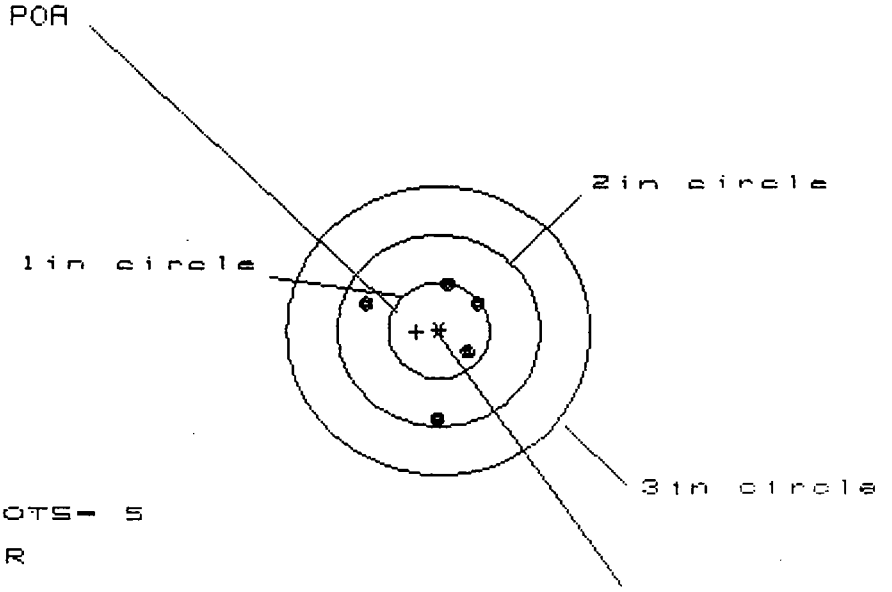
HS= 1.303
VS= 1.315
GS= 1.563

PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.713	.277	.293
MINIMUM X	:	-.590	-.412	-.396
MAXIMUM Y	:	.473	.428	.186
MINIMUM Y	:	-.842	-.724	-.323
CENTROID X	:	-.133	-.311	-.327
CENTROID Y	:	.048	-.070	.172
POA TO CENTROID in.	:	.141	.319	.369
MIN RADIUS	:	.219	.120	.339
MEAN RADIUS	:	.579	.479	.368
MAX RADIUS	:	.855	.726	.419
HORIZONTAL SPREAD	:	1.303	.689	.689
VERTICAL SPREAD	:	1.315	1.152	.509
EXTREME SPREAD	:	1.563	1.194	.691
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

CONFIDENTIAL

16 Jul 1991 FILE:/PATTERNING/CENTERFIRE_PATT/?0055

CENTERFIRE PATTERNS # 3



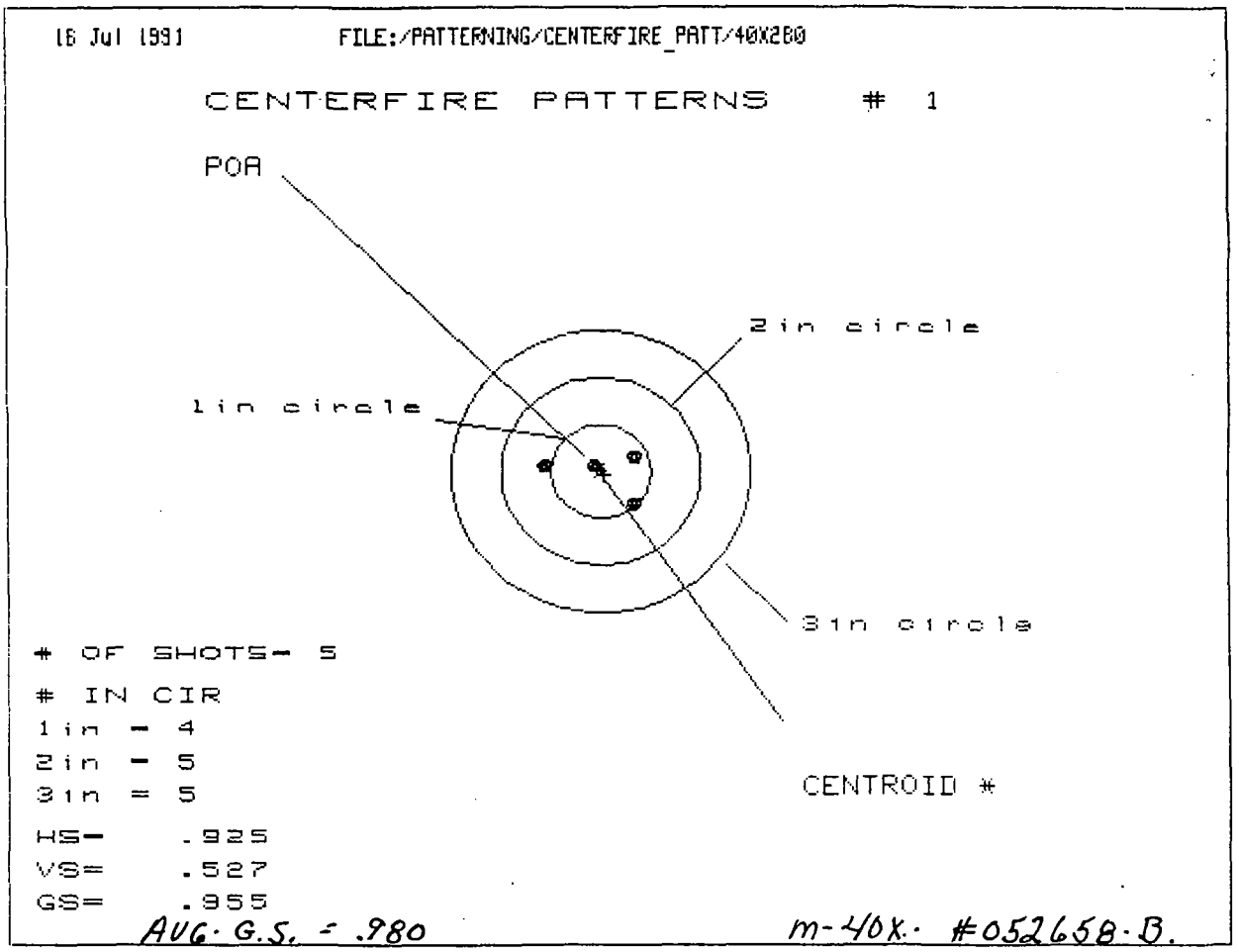
OF SHOTS= 5

IN CIR
1in = 3
2in = 5
3in = 5

HS= 1.038
VS= 1.352
GS= 1.359

PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.347	.337	.104
MINIMUM X	:	-.691	-.700	-.145
MAXIMUM Y	:	.482	.264	.297
MINIMUM Y	:	-.870	-.432	-.399
CENTROID X	:	.219	.228	.462
CENTROID Y	:	.014	.232	.199
POA TO CENTROID in.	:	.220	.325	.503
MIN RADIUS	:	.356	.279	.145
MEAN RADIUS	:	.586	.461	.292
MAX RADIUS	:	.871	.707	.401
HORIZONTAL SPREAD	:	1.038	1.038	.249
VERTICAL SPREAD	:	1.352	.696	.696
EXTREME SPREAD	:	1.359	1.110	.720
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

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AVG. G.S. = .980

M-40X. #052658.B.

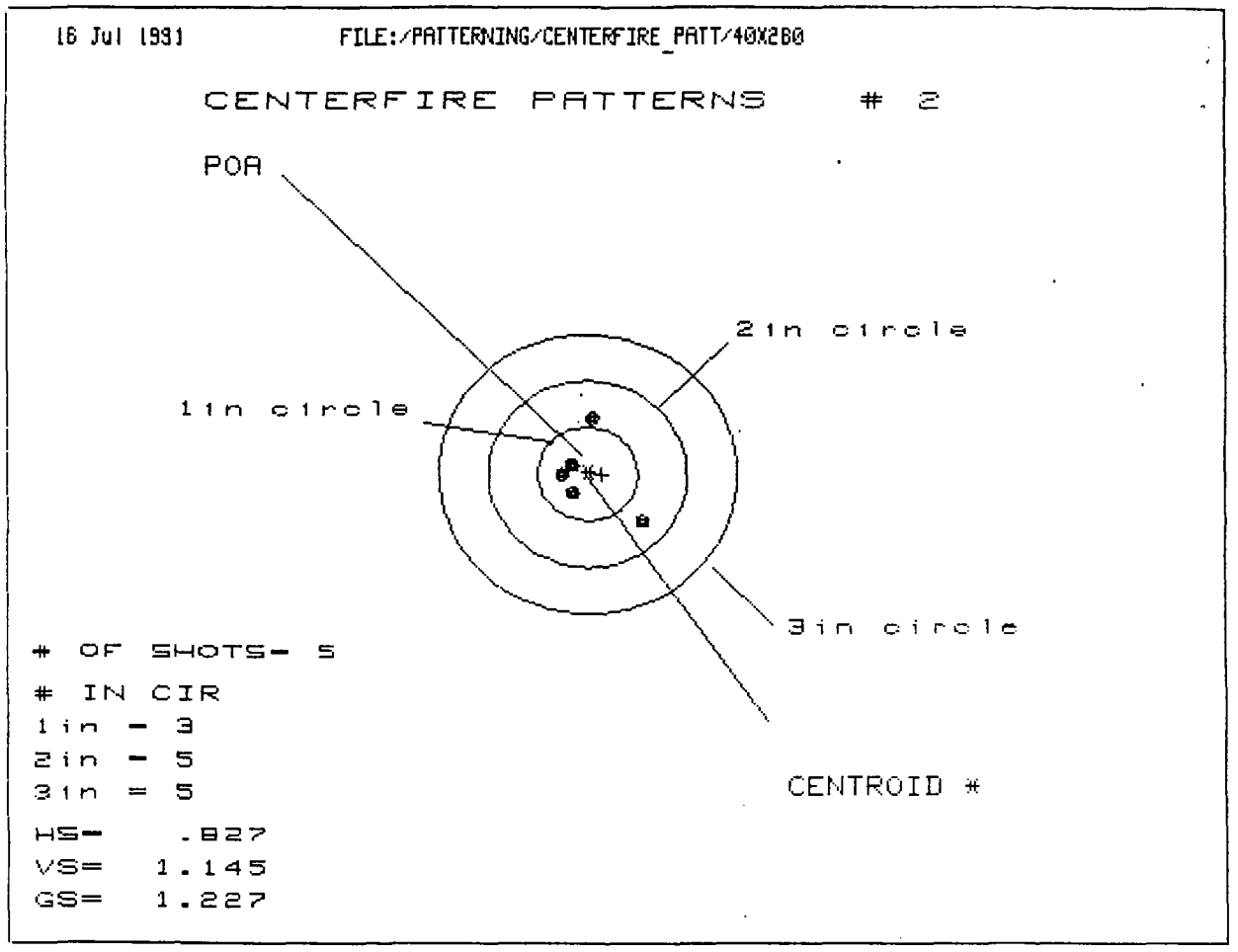
TO QUALIFY .280 REM. AMMO.

140 GR. P.S.P.
LOT. EIII B2507
INDEX. R280R3
SCOPE: LYMAN
SUPER TARGET SPOT
20X

BENCH RESTED
100 YDS.

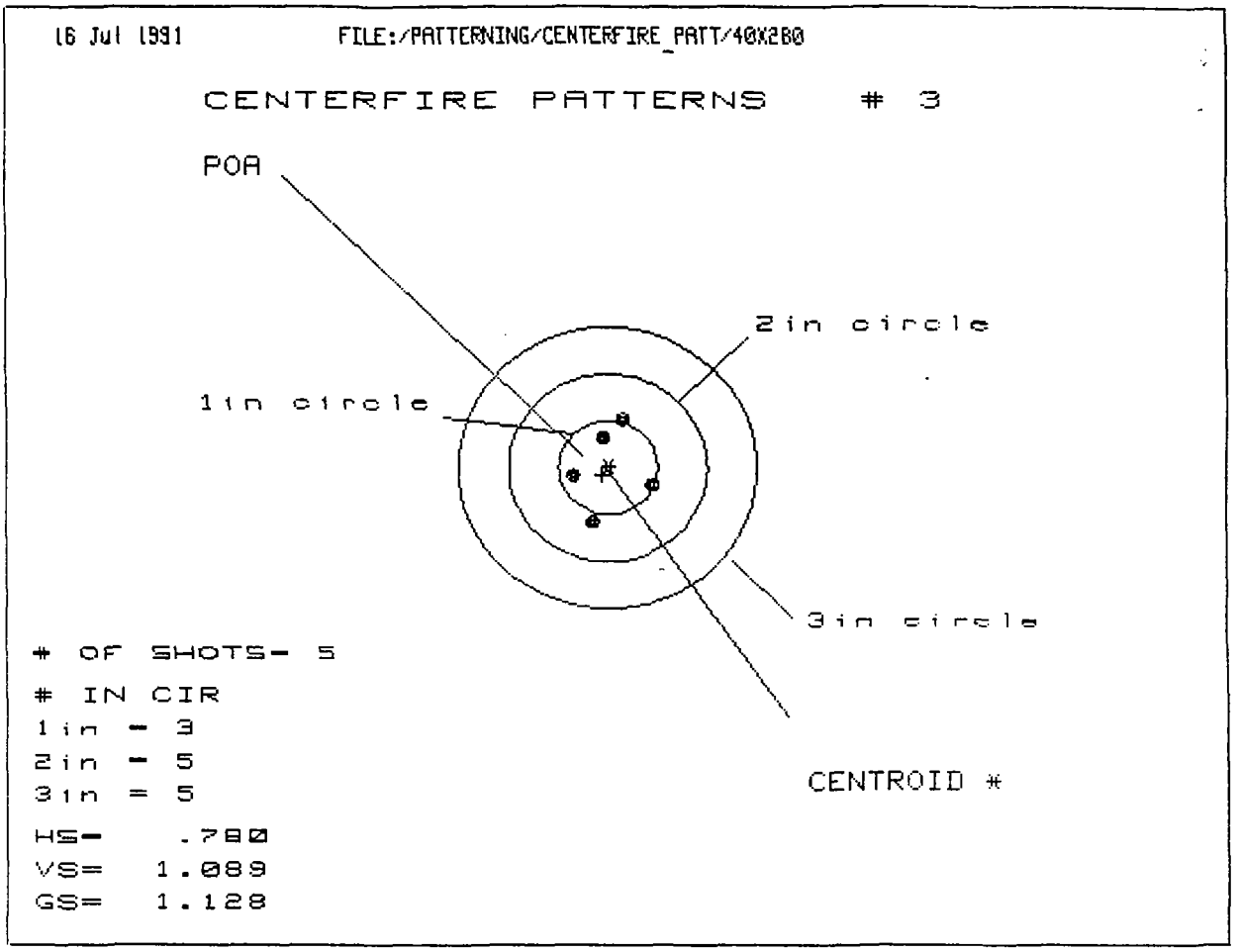
PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.356	.214	.266
MINIMUM X	:	-.569	-.189	-.137
MAXIMUM Y	:	.172	.185	.071
MINIMUM Y	:	-.355	-.342	-.052
CENTROID X	:	-.031	.111	.059
CENTROID Y	:	.038	.025	.139
POA TO CENTROID in.	:	.049	.114	.151
MIN RADIUS	:	.068	.199	.130
MEAN RADIUS	:	.318	.265	.184
MAX RADIUS	:	.571	.375	.275
HORIZONTAL SPREAD	:	.925	.403	.403
VERTICAL SPREAD	:	.527	.527	.123
EXTREME SPREAD	:	.955	.551	.421
NUMBER IN ONE INCH CIRCLE	=		4	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

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PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.531	.221	.087
MINIMUM X	:	-.296	-.164	-.090
MAXIMUM Y	:	.594	.457	.136
MINIMUM Y	:	-.551	-.331	-.179
CENTROID X	:	-.140	-.272	-.346
CENTROID Y	:	.003	.140	-.012
POA TO CENTROID in.	:	.140	.306	.347
MIN RADIUS	:	.227	.073	.099
MEAN RADIUS	:	.426	.277	.145
MAX RADIUS	:	.765	.508	.199
HORIZONTAL SPREAD	:	.827	.385	.177
VERTICAL SPREAD	:	1.145	.788	.315
EXTREME SPREAD	:	1.227	.815	.326
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

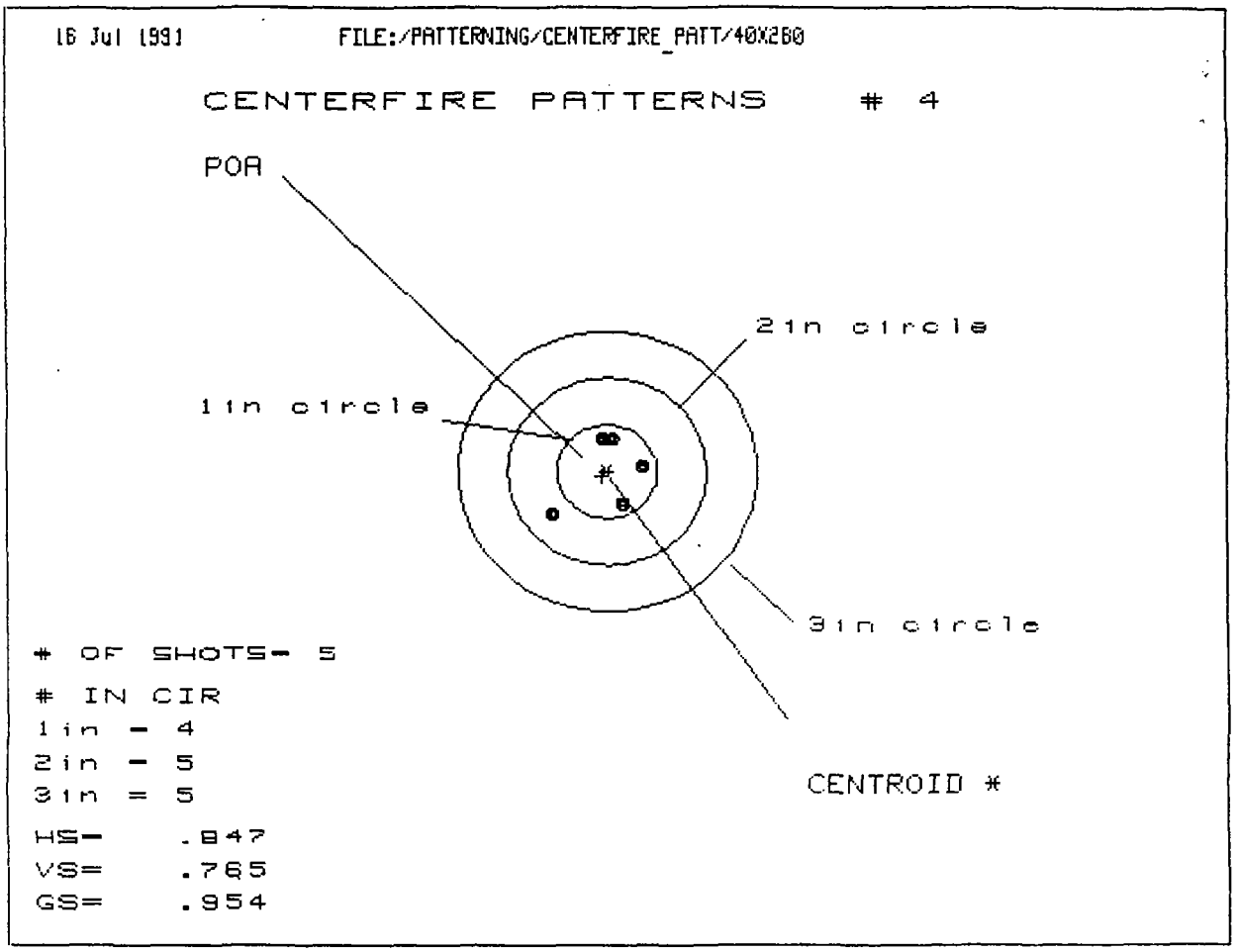
CONFIDENTIAL



PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.413	.372	.402
MINIMUM X	:	-.367	-.408	-.378
MAXIMUM Y	:	.535	.396	.281
MINIMUM Y	:	-.554	-.345	-.213
CENTROID X	:	.060	.101	.071
CENTROID Y	:	.080	.219	.087
POA TO CENTROID in.	:	.100	.241	.112
MIN RADIUS	:	.288	.159	.282
MEAN RADIUS	:	.450	.382	.374
MAX RADIUS	:	.578	.507	.455
HORIZONTAL SPREAD	:	.780	.780	.780
VERTICAL SPREAD	:	1.089	.741	.494
EXTREME SPREAD	:	1.128	.793	.793
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

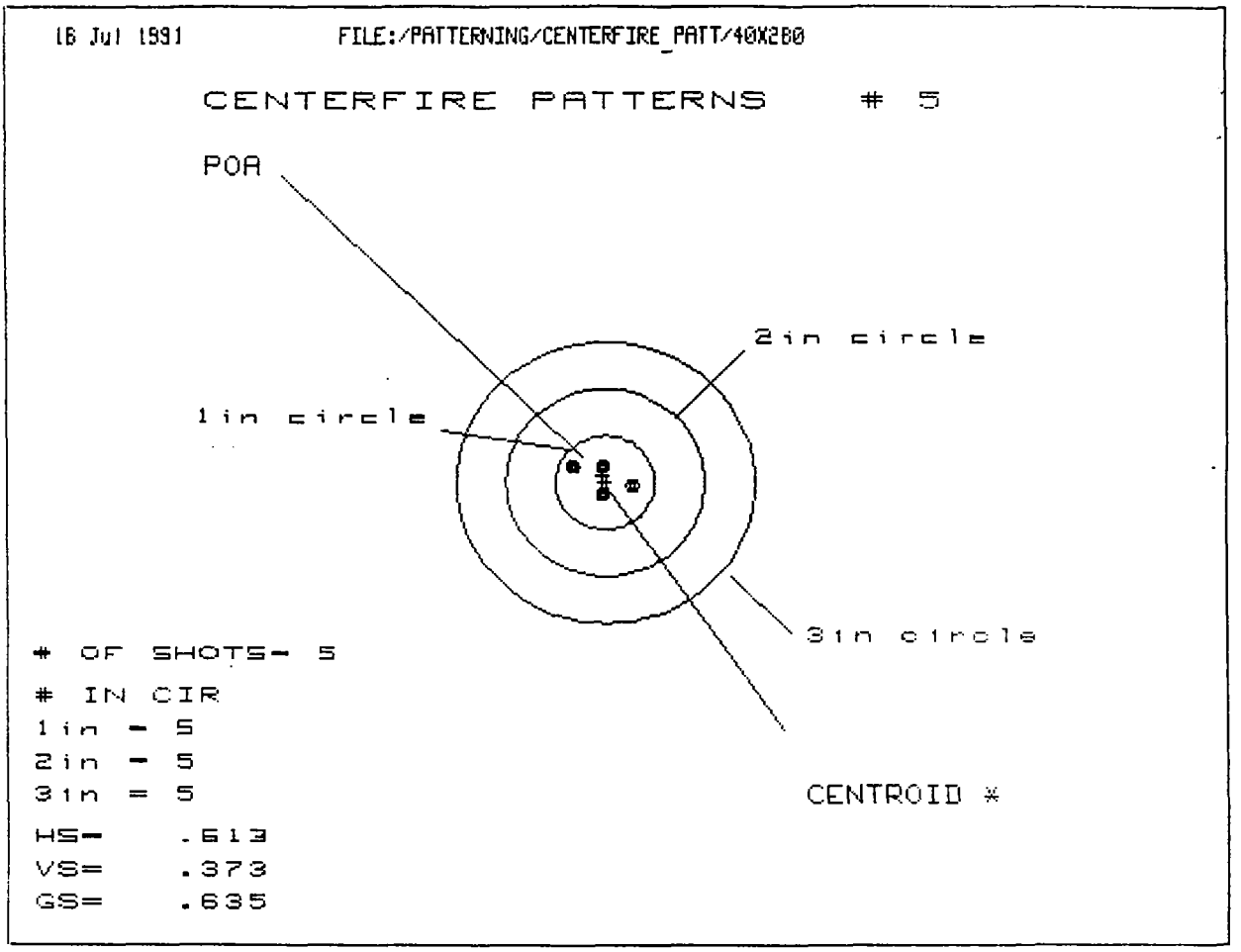
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PATTERN #	:	4		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.345	.219	.241
MINIMUM X	:	-.502	-.163	-.141
MAXIMUM Y	:	.362	.261	.110
MINIMUM Y	:	-.403	-.454	-.216
CENTROID X	:	.051	.177	.155
CENTROID Y	:	.047	.148	.299
POA TO CENTROID in.	:	.070	.231	.337
MIN RADIUS	:	.346	.228	.146
MEAN RADIUS	:	.423	.320	.216
MAX RADIUS	:	.644	.459	.324
HORIZONTAL SPREAD	:	.847	.382	.382
VERTICAL SPREAD	:	.765	.715	.326
EXTREME SPREAD	:	.954	.751	.502
NUMBER IN ONE INCH CIRCLE	=		4	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

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PATTERN #	:	5		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.289	.208	.002
MINIMUM X	:	-.324	-.071	-.001
MAXIMUM Y	:	.201	.238	.246
MINIMUM Y	:	-.172	-.135	-.127
CENTROID X	:	.030	.111	.041
CENTROID Y	:	-.073	-.110	-.118
POA TO CENTROID in.	:	.079	.156	.125
MIN RADIUS	:	.164	.145	.119
MEAN RADIUS	:	.237	.188	.164
MAX RADIUS	:	.357	.248	.246
HORIZONTAL SPREAD	:	.613	.279	.003
VERTICAL SPREAD	:	.373	.373	.373
EXTREME SPREAD	:	.635	.373	.373
NUMBER IN ONE INCH CIRCLE	=		5	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

CONFIDENTIAL

cc: Fred Martin

July 8, 1991

TO: Hal Munson
Ken Soucy
Bill Coleman
Jay Bunting

FROM: Jim Ronkainen JR

SUBJECT: Specifications for the M/700 SS ADL

Based on discussions at the last Product Team Meeting, I propose the following specifications for the M/700 SS. Please let me know if I have omitted anything.

Barreled Action:
- o Manufactured from stainless steel, finish non-reflective, i.e. blasted or brushed. Barrel contour to be standard (ADL/BDL).

Bolt Assembly:
- o Manufactured from stainless steel in all available areas. Metal finish to match that of the barreled action.

Fire Control:
- o Components to be electroless nickel plated for corrosion resistance.

Magazine:
- o Blind magazine with corrosion resistant components.

Stock:
- o Stock to be injection molded synthetic. Styling similar to the McMillan Mountain Rifle stock with a blind magazine and functional checkering is preferred. Stock will have corrosion resistant sling swivel studs that match the finish of the action. The stock will weigh less than the M/700 AS stock.

Sights:
- o Clean barrel (no sights or tapped holes for sights).

Muzzle Brake:
- o Perhaps offer a muzzle brake on custom shop offerings and extend to standard production if demand warrants in the second year of production.

Calibers:

7mm Rem Mag	30-06 SPRG
300 Win Mag	280 Rem
338 Win Mag	270 Win
	25-06 Rem

Note: 375 H&H and 416 Rem Mag are possible custom shop offerings in a M/700 SS.

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June 21, 1991

TO: Hal Munson
Ken Soucy
Bill Coleman

FROM: Jim Ronkainen JR

SUBJECT: Preliminary Specifications for the M/700 SS ADL

Based on discussions with Paul Spenard and Jay Bunting, I propose the following specifications for the M/700 SS. If possible, let's meet this afternoon to discuss these specifications and forward our results to Jay as our proposal for this product.

Barreled Action:
- o Manufactured from stainless steel, finish non-reflective, i.e. blasted or brushed.

Bolt Assembly:
- o Manufactured from stainless steel in all available areas. Metal finish to match that of the barreled action.

Fire Control:
- o Components to be electroless nickel plated for corrosion resistance.

Magazine:
- o Blind magazine with corrosion resistant components.

Stock:
- o Stock to be all synthetic. Styling similar to the McMillan Mountain Rifle stock with a blind magazine and functional checkering is preferred. Stock will have corrosion resistant sling swivel studs that match the finish of the action.

Sights:
- o Clean barrel (no sights or tapped holes for sights).

Muzzle Brake:
- o Start with a muzzle brake on custom shop offerings and extend to standard production if demand warrants.

Calibers:

7mm Rem Mag	30-06 SPRG
300 Win Mag	280 Rem
338 Win Mag	270 Win

Note: 375 H&H and 416 Rem Mag are possible custom shop offerings in a M/700 SS.

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ORGANIZATION OF INFORMATION 4/5/91
FOR M/700 SS PROGRAM

ISSUES & INFO

- o Stuff I Have
  - 416 for prototype receivers
  - 416 for prototype bolt bodies
  - 416 and 17-4 bolt handles
  - 416 bolt plug blanks
  - 416 barrel bracket samples
  - Gall-tough bolt head blanks
- o Stuff I Need
  - 416 to start upset barrel process development
  - Rifle ATO leader to head up process development
  - Purchasing to oversee quoting process for purchased parts
  - Metallurgy support for corrosion protection, heat treat, braze and flux selection
  - PM support to look at trigger and safety button material
- o Testing To Be Done
  - salt spray testing on fire controls and gun
  - ultimate strength of action
  - galling of bolt on receiver
  - accuracy
  - endurance life of SS barrel
  - drop testing for fire control
- o Process Development
  - upset barrel process
  - GFM process for SS barrels
  - metal finishing process
  - SS PM safety button
  - SS PM trigger
  - plating of fire controls
- o Quotes From Vendors
  - 1.375 dia turned and polished 416 for receivers
  - 1.032 dia 416 for upset barrels
  - .750 dia 416 for bolt bodies
  - 416 barrel bracket blanks
  - 416 bolt head blanks from Parker and Harper
  - 416 bolt plug blanks
  - 416 and 17-4 bolt handle blanks
  - 416 bolt stop blanks
  - 416 bolt stop pins
  - 416 sear pivot pins
  - stainless front guard screw
  - stainless rear guard screw
- o Capital Expenditures
  - heat treat furnace?
  - cutters/inserts for SS
  - passivation facilities for SS
  - tooling for PM trigger and safety button?

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- Documentation
  - develop full SS drawing package
  - use owner's manual from M/700
- Design
  - galling of bolt head on receiver
  - effective corrosion protection for fire control
  - heat treat for equivalent ultimate strength of M/700
- To Do

TEAM MEMBERS

- R&D
- Model/NC Shop
- Marketing
- Test Lab
- Metallurgy
- Purchasing
- Service
- Rifle ATO
- Planning
- Production
- Field Sales

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S/S PROGRAM

Overall

- salt spray test gun
- ultimate strength test SS action
- test for galling of the bolt on the receiver

Receiver

HAVE: - material on hand for prototype parts (barrel cutoffs)

NEED: ✓ quotes for 1.375 dia turn/polish 416 from supplier
- to fix surface finish problem on bolt clearance hole
- to evaluate on site vs. off site heat treat
- to evaluate heat treat for strength

TEST: - galling of bolt head on locking lugs
- ultimate strength of receiver

Barrel

HAVE: - sample BDL contour barrels turned from varmints

NEED: - to buy material for upset process development (1.031 dia)
✓ quotes for barrel material for production
- to develop GFM process

TEST: - accuracy
- endurance
- ultimate strength

Bolt

HAVE: - bolt heads from vendor on order (416)
- bolt handles received from vendor (3/25/91)

NEED: - material for bolt body (.712 dia)
✓ quotes for bolt body material
✓ quotes for bolt heads from Parker and Harper

TEST: - ultimate strength
- test for galling of bolt head on locking lugs of receiver

Firing Pin

HAVE: - samples of bolt plugs on hand
- what do we use for firing pin head?
- firing pin spring stays the same
- firing pin stays the same

NEED: ✓ quotes for bolt plugs from vendor
- decision on firing pin head to use
- to determine heat treat for bolt plug

Barrel Brackets

HAVE: - in process through the model shop/NC shop

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NEED: 4 quotes for barrel bracket blanks
- feasibility of stamping from .206 thick material

Trigger Assembly
HAVE: - trigger assemblies Roger tested

NEED: - to plate the springs?
- to plate the screws?
- to change material of trigger and safety button to SS?

TEST: - salt spray test trigger assemblies for corrosion resistance

Bolt Stop
HAVE: - plated samples

NEED: - stainless parts
4 quotes for parts

Bolt Stop Pin
NEED: - parts
- quotes

Front Guard Screw
NEED: - SS parts
- quotes for stainless

Rear Guard Screw
NEED: - SS parts
4 quotes for stainless

Magazine
- use detachable box

Stock Assembly
- use M/700 AS stock assembly
- use SS swivel studs?

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ORGANIZATION OF INFORMATION 4/5/91
FOR M/700 SS PROGRAM

ISSUES & INFO

- Stuff I Have
  - 416 for prototype receivers
  - 416 for prototype bolt bodies
  - 416 and 17-4 bolt handles
  - 416 bolt plug blanks
  - 416 barrel bracket samples
  - Gall-tough bolt head blanks

- Stuff I Need
  - 416 to start upset barrel process development
  - Rifle ATO leader to head up process development
  - Purchasing to oversee quoting process for purchased parts
  - Metallurgy support for corrosion protection, heat treat, braze and flux selection
  - PM support to look at trigger and safety button material

- Testing To Be Done
  - salt spray testing on fire controls and gun
  - ultimate strength of action
  - galling of bolt on receiver
  - accuracy
  - endurance life of SS barrel
  - drop testing for fire control

- Process Development
  - upset barrel process
  - GFM process for SS barrels
  - metal finishing process
  - SS PM safety button
  - SS PM trigger
  - plating of fire controls

- Quotes From Vendors
  - 1.375 dia turned and polished 416 for receivers
  - 1.032 dia 416 for upset barrels
  - .750 dia 416 for bolt bodies
  - 416 barrel bracket blanks
  - 416 bolt head blanks from Parker and Harper
  - 416 bolt plug blanks
  - 416 and 17-4 bolt handle blanks
  - 416 bolt stop blanks
  - 416 bolt stop pins
  - 416 sear pivot pins
  - stainless front guard screw
  - stainless rear guard screw

- Capital Expenditures
  - heat treat furnace?
  - cutters/inserts for SS
  - passivation facilities for SS
  - tooling for PM trigger and safety button?



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- Documentation
  - develop full SS drawing package
  - use owner's manual from M/700
- Design
  - galling of bolt head on receiver
  - effective corrosion protection for fire control
  - heat treat for equivalent ultimate strength of M/700
- To Do

TEAM MEMBERS

- R&D
- Model/NC Shop
- Marketing
- Test Lab
- Metallurgy
- Purchasing
- Service
- Rifle ATO
- Planning
- Production
- Field Sales

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M/700 SS

ISSUES & INFO

STUFF I HAVE

PROCESS DEVELOPMENT

DOCUMENTATION

STUFF I NEED

QUOTES FROM VENDORS

DESIGN

TESTING TO BE DONE

CAPITAL

TO DO

TEAM MEMBERS

R&D

METALLURGY

RIFLE ATO

TEST LAB

PLANNING

MODEL/NC SHOP

PURCHASING

PRODUCTION

MARKETING

SERVICE

FIELD SALES

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S/S PROGRAM

Overall
- salt spray test gun
- ultimate strength test SS action
- test for galling of the bolt on the receiver

Receiver
HAVE: - material on hand for prototype parts (barrel cutoffs)

NEED: - quotes for 1.375 dia turn/polish 416 from supplier
- to fix surface finish problem on bolt clearance hole
- to evaluate on site vs. off site heat treat
- to evaluate heat treat for strength

TEST: - galling of bolt head on locking lugs
- ultimate strength of receiver

Barrel
HAVE: - sample BDL contour barrels turned from varmints

NEED: - to buy material for upset process development (1.031 dia)
- quotes for barrel material for production
- to develop GFM process

TEST: - accuracy
- endurance
- ultimate strength

Bolt
HAVE: - bolt heads from vendor on order (416)
- bolt handles received from vendor (3/25/91)

NEED: - material for bolt body (.712 dia)
- quotes for bolt body material
- quotes for bolt heads from Parker and Harper

TEST: - ultimate strength
- test for galling of bolt head on locking lugs of receiver

Firing Pin
- have samples of bolt plugs on hand
- firing pin stays the same
- what do we use for firing pin head?
- firing pin spring stays the same

- need quotes for bolt plugs from vendor
- need decision on firing pin head to use
- need to determine heat treat for bolt plug

Barrel Brackets
HAVE: - in process through the model shop/NC shop

NEED: - quotes for barrel bracket blanks
- feasibility of stamping from .206 thick material

Trigger Assembly

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HAVE: - trigger assemblies Roger tested

NEED: - to plate the springs?
- to plate the screws?
- to change material of trigger and safety button to SS?

TEST: - salt spray test trigger assemblies for corrosion resistance

Bolt Stop
HAVE: - plated samples

NEED: - stainless parts
- quotes for parts

Bolt Stop Pin
NEED: - parts
- quotes

Front Guard Screw
NEED: - SS parts
- quotes for stainless

Rear Guard Screw
NEED: - SS parts
- quotes for stainless

Magazine
- use detachable box

Stock Assembly
- use M/700 AS stock assembly
- use SS swivel studs?

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4/8 91

strength (min.) multiple calibers (SS upsetting has caused grain structure problems)

2 ea cal.

2 ea { .30-06, .270, .280, 7mm Rem Mag, 300 Win Mag } Not Both, 300 WBY Mag, .338 Win Mag

accuracy & endurance

2 ea cal. { 4000 rds endurance all

1 ea. cal to 10,000 rds

environmental testing – TESTLAB oversight, Chem & Met does test

x

dry cycle 2 guns

drop test. use guns for strength testing

~25 guns

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BARBER - PRESALE R 0136456

Part Name	Type Dwg	Design Time	Draft Time	Dwg Size	Comments
BARREL ASSEMBLY COMPLETE	H			B	New
Barrel Assembly	H			B	New
Marking	H			D	May be able to add use
Barrel	H			D	New, 2 drawings, magnum and standard
Barrel Bracket	H			B	New
Receiver	CAD			E	New, 2 drawings, long and short action
Bolt Assembly	H			D	New
Bolt Body Assembly	H			D	New
Bolt Body	H			C	New
Bolt Body Brazing Slug	H			A	Flux change
Bolt Head	H			C	New
Bolt Head Blank	H			C	New
Bolt Pin	H			A	New
Ejector Washer	H			B	Add use
Bolt Handle	H			D	New
Bolt Handle Blank	H			D	New
Bolt Handle Brazing Shim	H			C	Add use, needs new flux
Ejector	H			A	Add use
Ejector Blank	H			A	Add use
Ejector Pin	H			A	Add use
Ejector Spring	H			A	Add use
Extractor	H			C	Add use
Extractor Rivet	H			C	Add use
Firing Pin Assembly	H			B	New
Bolt Plug	H			C	New
Bolt Plug Blank	H			C	New
Firing Pin	H			C	Add use
Firing Pin Blank	H			C	Add use
Firing Pin Cross Pin	H			B	Add use
Firing Pin Head	H			C	Add use or use custom shop
Firing Pin Head Blank	H			B	Add use or use custom shop
Main Spring	H			A	Add use
Bolt Stop	H			B	New
Bolt Stop Blank	H			B	New
Bolt Stop Pin	H			C	New or add use?
Bolt Stop Spring	H			B	Add use
Front Guard Screw	H			B	Use M/700 AS style guard screw
Front Guard Screw Blank	H				New
Rear Guard Screw	H			B	Use M/700 AS style guard screw
Rear Guard Screw Blank	H				New
Receiver Plug Screw	H			B	New
Receiver Plug Screw Blank	H			B	New

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BARBER - PRESALE R 0136456

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BARBER - PRESALE R 0136457

Sear Pin	H			C	Add use
STOCK ASSEMBLY	H			B	New, use M/700 AS with stainless studs
TRIGGER ASSEMBLY	H			D	New?
Bolt Stop Release	H			A	Plate
Bolt Stop Release Blank	H			C	Add use
Safety Assembly	H			B	New
Safety	H			C	Plate
Safety Button	H			C	Add use or new? Plate or SS?
Safety Detent Ball	H			B	Add use
Safety Detent Spring	H			B	Plate
Safety Pivot Pin	H			B	New or add use?
Safety Pivot Pin Blank	H			B	New or add use?
Safety Washer	CAD			A	New or add use? Plate?
Sear Safety Cam	H			C	Add use
Sear Safety Cam Blank	H			C	Add use
Sear Spring	H			A	Add use
Trigger	H			C	New or add use? New SS PM?
Trigger Blank	H			C	New?
Trigger Screw, Front	H			B	New or add use? Plate?
Trigger Screw, Front Blank	H			B	New or add use?
Trigger Connector	H			C	New or add use? Plate or leave as is?
Trigger Connector Blank A	H			C	Add use?
Trigger Connector Blank B	H			C	Add use?
Trigger Engagement Screw	H			B	New or add use? Plate?
Trigger Engage. Screw Blank	H			B	New or add use?
TRIGGER HOUSING ASSEMBLY	H			C	New for plating?
Trigger Housing Rivet	H			B	Add use
Trigger Housing Spacer, Frt.	H			B	Add use
Housing Spacer Blank, Front	H			B	Add use
Trigger Housing Spacer, Rear	H			B	Add use
Housing Spacer Blank, Rear	H			B	Add use
Trigger Side Plate, Right	H			C	Add use
Side Plate Blank	H			C	Add use
Trigger Side Plate, Left	H			C	Add use
Side Plate Blank	H			C	Add use
Trigger Pin	H			C	Add use
Trigger Spring	H			A	Add use (plate?)
Trigger Stop Screw	H			A	Add use (plate?)
Trigger Stop Screw Blank	H			A	Add use
TRIGGER GUARD ASSEMBLY				B	New, will use box magazine design

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BARBER - PRESALE R 0136457

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Ilion Research Division — PARTS LIST #156

Date: ~~06/19/90~~ 09/27/90

~~MODEL 700 RIFLE — "CLASSIC" FOR 1991~~ M/700 S/S
~~BOLT ACTION REPEATER CENTERFIRE~~
~~7mm Weatherby Magnum~~

Sheet 1 of 3

(Dotted line (——) indicates same part number

DWG. NO.	PART NAME	7mm Weatherby MAGNUM PART NUMBERS	MAT'L
	Caliber 7mm Weatherby Magnum RAMAC	5909	
	BAG ASSEMBLY COMPLETE	1721	
	Firearm Safety Booklet Rev. 6/89	1410	
	Instruction Book (RD 5461 Rev. 288)	3391	
	Polybag 7x10x.0015	1452	
	Product Owners Card	1426	
	Remington Authorized Gunsmith (Form RD 6860 Rev. 789)	3413	
	CARTON ASSEMBLY	1443	
	Hang Tag (RD 6961)	3451	
	Hang Tag Label & Box End Label	993002	
	BARREL ASSEMBLY COMPLETE		
B-31535	7mm Weatherby Magnum	94790	
	BARREL ASSEMBLY (Marking D-15360)		
D-33450	7mm Weatherby Magnum	94789	
	BARREL		
D-24550	7mm Weatherby Magnum	94788	416R
B-14810	Barrel Bracket (Blk. A-15128)	14810	416R
E-33225	Receiver (Blk. B-31495)	33225	416R
D-33270	Bolt Assembly	33273	
D-33255	Bolt Body Assembly	33257	
C-20200	Bolt Body	20200	416R
A-18493	Bolt Body Brazing Slug	18493	?
D-15706	Bolt Head (Blk. C-32820)	15706	NITRONIC60
A-18758	Bolt Pin	18758	?
B-17011	Ejector Washer	17011	?
D-26330	Bolt Handle (Blk. D-91562)	26330	?
C-20185	Bolt Handle Brazing Shim	20186	?
A-17017	Ejector (Blk. A-13974)	17017	N/C
A-94555	Ejector Pin	94555	N/C
A-17019	Ejector Spring	17019	N/C
C-15709	Extractor	15709	N/C
C-27340	Extractor Rivet	27341	N/C?

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Ilion Research Division

m/700 s/s

Date: MODEL 700 RIFLE - ~~"CLASSIC" FOR 1991~~
~~06/19/90~~ BOLT ACTION REPEATER CENTERFIRE
09/27/90 ~~7mm WEATHERBY MAGNUM~~

Sheet 2 of 3 (Dotted line (——) indicates same part number

DWG. NO.	PART NAME	7mm Weatherby MAGNUM PART NUMBERS	MAT'L	
B-22040	FIRING PIN ASSEMBLY	22040		
C-17012	Bolt Plug (Blk. C-19894)	17012	416R	
C-22020	Firing Pin (Blk. C-28805)	22020	N/C	
B-17022	Firing Pin Cross Pin	17022	N/C	
C-23320	Firing Pin Head (Blk. B-27975)	23320	CUSTOM SHOP	
A-17029	Main Spring	17029	N/C	
B-17013	Bolt Stop (Blk. B-90492)	17013	PLATE OR S/S	
C-24475	Bolt Stop Pin	24475	S/S?	
B-15224	Bolt Stop Spring	15224	N/C	
C-22035	Front Guard Screw (Blk. C-28810)	~~22035~~	S/S	94652 BUT S/S
C-16430	Magazine (Blk. C-91933)	16430	PLATE S/S?	
C-90952	Magazine Follower (Blk.C-90340)	90952	N/C (304)	
A-15677	Magazine Spring	15677	N/C	
A-26355	Rear Guard Screw (A-91908)	~~26355~~	S/S	96015 BUT S/S
B-17034	Receiver Plug Screw (4) (Blk. B-91913)	17034	S/S	
C-24475	Sear Pin	24476	S/S?	
~~C-34590~~	STOCK ASSEMBLY	~~34592~~		
A-91556	Recoil Pad	91556		
C-25410	Recoil Pad Screw (2) (Blk. C-91916)	25410		
B-15651	Stock Reinforcing Screw (2)	15651	B-103750	ARYLON STOCK
E-34355	Stock (Check.Pat.D-91546)(Blk.19752)	34357		103750 LONG
A-15358	Swivel Screw Front	15358		103751 SHORT
A-15358	Swivel Screw Rear	15358		103755 MAG
~~B-94241~~	Swivel Screw Washer (2)	94241		
D-26345	TRIGGER ASSEMBLY	26345		
C-15478	Bolt Stop Release (Blk. C-91917)	15478	PLATE OR S/S?	
B-92297	Safety Assembly	92297		
C-92212	Safety	92212	PLATE OR S/S	
C-14578	Safety Button	14578	S/S? (304)	
B-23220	Safety Detent Ball	23222	N/C	
B-15368	Safety Detent Spring	15368	N/C	
B-17043	Safety Pivot Pin (Blk. B-91918)	17043	?	
A-17044	Safety Washer	17044	N/C	
C-15666	Sear Safety Cam (Blk. C-91919)	15666	N/C	
A-17047	Sear Spring	17047	N/C	
C-15280	Trigger (Blk. C-91912)	15280	S/S? 304	
B-17053	Trigger Screw, Front (Blk. B-91920)	17053	N/C	

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Date:
~~06/19/90~~
09/27/90

~~MODEL 700 RIFLE - "CLASSIC" FOR 1991~~
m/100 s/s
~~BOLT ACTION REPEATER CENTERFIRE~~
~~7mm WEATHERBY MAGNUM~~

Sheet 3 of 3

(Dotted line (——) indicates same part number

DWG. NO.	PART NAME	7mm Weatherby MAGNUM PART NUMBERS	MAT'L
C-19461	Trigger Connector (Blk. C-91921) (Blk. C-91937)	19461	PLATE?
B-91128	Trigger Engagement Screw(Blk. B-91922)	91128	?
C-26655	TRIGGER HOUSING ASSEMBLY	26655	
B-14632	Trigger Housing Rivet (4)	14632	PLATE OR S/S
B-14630	Trigger Housing Spacer, Front (Blk. B-91923)	14630	PLATE OR S/S
B-14631	Trigger Housing Spacer, Rear (Blk. B-91924)	14631	PLATE OR S/S
C-30780	Trigger Side Plate, Right (Blk. C-32785)	30780	PLATE OR S/S
C-30780	Trigger Side Plate, Left	30781	PLATE OR S/S
C-24475	Trigger Pin	24477	?
A-15400	Trigger Spring	15400	N/C
A-15481	Trigger Stop Screw (Blk. A-91926)	15481	?
B-26370	TRIGGER GUARD ASSEMBLY	26371	
	THE ABOVE PART NUMBER IS FOR ARMS SERVICE ONLY		
B-31490	Trigger Guard Sub-Assembly	31491	
C-19800	Floor Plate (Blk. 91942)	19800	N/C
A-16453	Floor Plate Pivot Pin	16453	N/C
D-26375	Trigger Guard (Blk. 34315)	26376	N/C
B-15291	Floor Plate Latch (Blk. 91759)	15291	S/S?
A-16451	Floor Plate Latch Pin (Blk. 91943)	16451	N/C
A-16452	Floor Plate Latch Spring	16452	N/C

DULL GRAY POWDER COAT, COULD ALSO BE QUICKCLIP

Research Division — PARTS LIST #125

Supersedes Previous Model 700 A.S. Parts List #117

MODEL 700 A.S.(ARYLON STOCK)
BOLT ACTION CENTERFIRE RIFLE

Date:
09/26/89 For 1989
11/20/89 Same as M-700 BDL
Except as Shown

Sheet 1 of 2

Dotted line (----) indicates same part number

DWG. No.	PART NAME	Short Action 22-250 243 308	Long Action 270 280 30-06	Magnum 7MM Rem Mag. 300 Weatherby Mag.
		PART NUMBERS		
	Caliber	RAMAC No.		
	22-250	9685		
	243	9687		
	308	9693		
	270		9689	
	280		9697	
	30-06		9691	
	7mm Rem.Mag.			9695
	300 Weatherby Mag.			9699
	BAG ASSEMBLY COMPLETE	1721	- - -	- - -
	Firearm Safety Booklet Rev. 6/89	1410	- - -	- - -
	Instruction Book (RD 5461 Rev. 288)	3391	- - -	- - -
	Polybag 7x10x.0015	1452	- - -	- - -
	Product Owners Card	1426	- - -	- - -
	Remington Authorized Gunsmith (Form RD 6860 Rev. 789)	3413	- - -	- - -
	CARTON ASSEMBLY	1443	- - -	- - -
	Hang Tag (RD 6961)	3451	- - -	- - -
	Hang Tag Label & Box End Label	993002	- - -	- - -
	BARREL ASSEMBLY COMPLETE			
ALL NEW DWG. B-103120	22-250	103129		
"	243	103120		
"	308	103121		
"	270		103122	
"	280		103123	
"	30-06		103124	
"	7MM Rem. Mag.			103125
"	300 Weatherby Mag.			103130
	BARREL ASSEMBLY			
NEW DWG. B-103090	22-250	103096		
"	243	103090		
"	308	103091		
"	270		103093	
NEW DWG. B-103090	280		103094	
"	30-06		103095	
"	7MM Rem. Mag.			103092
"	300 Weatherby Mag.			103097

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BARBER - PRESALE R 0136461

Research Division

MODEL 700 A.S.(ARYLON STOCK)
BOLT ACTION CENTERFIRE RIFLE

Date:

09/26/89 For 1989
11/20/89 Same as M-700 BDL
Except as Shown

Sheet 2 of 2

Dotted line (----) indicates same part number

DWG. No.	PART NAME	Short Action 22-250 243 308	Long Action 270 280 30-06	Magnum 7MM Rem Mag. 300 Weatherby Mag.
		PART NUMBERS		
	Barrel			
D-26285	22-250	94533		
"	243	94103		
"	308	94104		
"	270		94105	
"	280		94106	
"	30-06		94107	
D-24550	7MM Rem Mag			94108
"	300 Weatherby Mag.			94611
E-33226	Receiver 22-250, 243, 308	94102		
E-33225	Receiver 270, 280, 30-06, 7MM Rem Mag		94071	---
"	300 Weatherby Mag.			94071
	BOLT ASSEMBLY			
D-28710	22-250, 243, 308	94098		
"	270, 280, 30-06		94097	
D-33270	7mm Rem. Mag.			94100
"	300 Weatherby Mag.			94100
~~C-15373~~	Front Sight	94084	---	
~~C-15719~~	Front Sight (Alternate)	94083	---	
~~B-14659~~	Front Sight Magnum			94095
~~B-15635~~	Front Sight Ramp	94096	---	---
~~B-103145~~	REAR SIGHT ASSEMBLY	103146	---	103147
~~C-93905~~	Rear Sight Aperture (Blk. C-93906)	94333	---	---
~~C-103530~~	Rear Sight Base (Blk. 94023)	103531	---	
~~C-91595~~	Rear Sight Base Magnum (Blk.C-32530)			94080
~~C-93905~~	Rear Sight Slide (Blank 93907)	94335	---	---
B-22040	FIRING PIN ASSEMBLY	94093	94094	---
C-17012	Bolt Plug	94091	---	---
~~C-15363~~	FRONT SIGHT HOOD	94090	---	---
B-103750	STOCK ASSEMBLY	103751	103750	103755
	STAINLESS SWIVEL STUDS?			
B-26370	TRIGGER GUARD ASSEMBLY	94535	94089	---
	THE ABOVE PART NUMBER IS FOR ARMS SERVICE ONLY			
B-31490	Trigger Guard Sub Assembly	94534	94088	---
D-19800	Floor Plate Long Action & Magnum		94087	---
D-16434	Floor Plate Short Action	94536		
D-26375	Trigger Guard	26378	26377	---
B-96010	Trigger Guard Screw, Front (Blk. 94651)	94652	---	---
B-96010	Trigger Guard Screw, Rear (Blk. 96218)	96015	---	---

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Ilion Research Division — PARTS LIST #156

Date: 06/19/90

MODEL 700 RIFLE – "CLASSIC" FOR 1991
BOLT ACTION REPEATER CENTERFIRE
7mm Weatherby Magnum

Sheet 1 of 3

(Dotted line (——) indicates same part number

		DWG. NO.	PART NAME	7mm Weatherby MAGNUM PART NUMBERS	R&D DES. TIME	DWG TIME	COMMENTS
			Caliber 7mm Weatherby Magnum RAMAC	5909			
			BAG ASSEMBLY COMPLETE	1721			
			Firearm Safety Booklet Rev. 6/89	1410			
			Instruction Book (RD 5461 Rev. 288)	3391			
			Polybag 7x10x.0015	1452			
			Product Owners Card	1426			
			Remington Authorized Gunsmith (Form RD 6860 Rev. 789)	3413			
			CARTON ASSEMBLY	1443			
			Hang Tag (RD 6961)	3451			
			Hang Tag Label & Box End Label	993002			
			BARREL ASSEMBLY COMPLETE				
NEW	A/U?	B-31535	7mm Weatherby Magnum	94790	O	2	
			BARREL ASSEMBLY (Marking D-15360)				
NEW	A/U?	D-33450 H	7mm Weatherby Magnum	94789	O	2	
			BARREL				
NEW		D-24550 H	7mm Weatherby Magnum	94788	—	8	MAGNUM & STD CONTOURS
NEW		B-14810 H	Barrel Bracket (Blk. A-15128)	14810	O	3	CHANGE MATL
NEW		E-33225 C	Receiver (Blk. B-31485)	33225	O	4	ON CAD, LONG/SHORT, CHANGE MATL
NEW	A/U	D-33270 H	Bolt Assembly	33273	O	4	
NEW	A/U	D-33255 H	Bolt Body Assembly	33257	—	4	
NEW		C-20200 H	Bolt Body	20200	—	2	
NEW	A/U?	A-18493 H	Bolt Body Brazing Slug	18493	—	1	
NEW	A/U	C-15706 H	Bolt Head (Blk. C-32820) H	15706	—	6	
NEW	A/U	A-18758 H	Bolt Pin	18758	—	1	
	A/U	B-17011 H	Ejector Washer	17011	O	1	
NEW		D-26330 H	Bolt Handle (Blk. D-91562) H	26330	O	6	
NEW	A/U	C-20185 H	Bolt Handle Brazing Shim	20186	—	2	
	A/U	A-17017 H	Ejector (Blk. A-13974) H	17017	O	1	
	A/U	A-94555 H	Ejector Pin	94555	O	1	
	A/U	A-17019 H	Ejector Spring	17019	O	1	
	A/U	C-15709 H	Extractor	15709	O	1	
	A/U	C-27340 H	Extractor Rivet	27341	O	1	
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Date: 06/19/90

MODEL 700 RIFLE - "CLASSIC" FOR 1991
BOLT ACTION REPEATER CENTERFIRE
7mm WEATHERBY MAGNUM

Sheet 2 of 3

(Dotted line (——) indicates same part number

	DWG. NO.	PART NAME	7mm Weatherby MAGNUM PART NUMBERS	DES.	DWG.	COMMENT
NEW OR A/U?	B-22040 H	FIRING PIN ASSEMBLY	22040	0	1	
NEW?	C-17012 H	Bolt Plug (Blk. C-19894) H NEW	17012	0	4	TRACE?
A/U	C-22020 H	Firing Pin (Blk. C-28805) H	22020	0	1	
A/U	B-17022 H	Firing Pin Cross Pin	17022	0	1	
NEW OR A/U?	C-23320 H	Firing Pin Head (Blk. B-27975) H	23320	0	1	USE CUSTOM SHOP
A/U	A-17029 H	Main Spring	17029	6	1	
NEW	B-17013 H	Bolt Stop (Blk. B-90492) H	17013		2	
NEW OR A/U?	C-24475 H	Bolt Stop Pin.	24475	—	3	
A/U	B-15224 H	Bolt Stop Spring	15224	0	1	
NEW	C-22035 H	Front Guard Screw (Blk. C-28810) H	22035	1	2	
NEW?	C-16430	Magazine (Blk. C-91933)	16430	COULD BE BOX MAGAZINE		
	C-90952	Magazine Follower (Blk.C-90340)	90952			
	A-15677	Magazine Spring	15677			
NEW	A-26355 H	Rear Guard Screw (A-91908) H	26355	1	2	
NEW	B-17034 H	Receiver Plug Screw (4) (Blk. B-91913) H	17034	0	2	
A/U	C-24475 H	Sear Pin	24476	0	1	
USE AS STOCK W/SS STUDS	C-34590	STOCK ASSEMBLY	34592	5	4	
	A-91556	Recoil Pad	91556			
	C-25410	Recoil Pad Screw (2) (Blk. C-91916)	25410			
	B-15651	Stock Reinforcing Screw (2)	15651			
	E-34355	Stock (Check.Pat.D-91546)(Blk.19752)	34357			
	A-15358	Swivel Screw Front	15358			
	A-15358	Swivel Screw Rear	15358			
	B-94241	Swivel Screw Washer (2)	94241			
NEW OR A/U?	D-26345 H	TRIGGER ASSEMBLY	26345	—	2	
NEW OR A/U?	C-15478 H	Bolt Stop Release (Blk. C-91917) H	15478	—	3	PLATE OR STAMP?
NEW OR A/U?	B-92297 H	Safety Assembly	92297	—	2	PLATE? NI OR HARD CHROME?
A/U	C-92212 H	Safety	92212	—	1	STAMP?
NEW OR A/U?	C-14578 H	Safety Button	14578		1	PLATE AND/OR CHANGE MAT'L
NEW OR A/U?	B-23220 C	Safety Detent Ball	23222	0	1	PLATE?
NEW OR A/U?	B-15368 H	Safety Detent Spring	15368	0	1	PLATE?
NEW OR A/U?	B-17043 H	Safety Pivot Pin (Blk. B-91918) H	17043	—	2	PLATE OR CHANGE MAT'L OR NOTHING
NEW OR A/U?	B-17044 C	Safety Washer	17044	0	1	PLATE
A/U	C-15666 H	Sear Safety Cam (Blk. C-91919) H	15666	0	1	ADD USE
A/U	A-17047 H	Sear Spring	17047	0	1	ADD USE
NEW	C-15280 H	Trigger (Blk. C-91912) H	15280	—	4	CHANGE TO S/S? PREFERED FOR FITTING CONNECTOR
A/U	B-17053 H	Trigger Screw, Front (Blk. B-91920) H	17053	0	1	PLATE?
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Date: 06/19/90

MODEL 700 RIFLE - "CLASSIC" FOR 1991
BOLT ACTION REPEATER CENTERFIRE
7mm WEATHERBY MAGNUM

Sheet 3 of 3 (Dotted line (——) indicates same part number

DWG. NO.	PART NAME	7mm Weatherby MAGNUM PART NUMBERS	DES	DWG	COMMENTS
NEW? A|U C-19461 H	Trigger Connector (Blk. C-91921) H (Blk. C-91937) H	19461	0	1	PLATE?
A|U B-91128 H	Trigger Engagement Screw (Blk. B-91922) H	91128	0	1	ADD USE
NEW C-26655 H	TRIGGER HOUSING ASSEMBLY	26655	—	4	PLATE
A|U B-14632 H	Trigger Housing Rivet (4)	14632	0	1	ADD USE
NEW? A|U? B-14630 H	Trigger Housing Spacer, Front (Blk. B-91923) H	14630	0	1	
NEW? A|U? B-14631 H	Trigger Housing Spacer, Rear (Blk. B-91924) H	14631	0	1	
A|U C-30780 H	Trigger Side Plate, Right (Blk. C-32785) H	30780	0	1	
A|U C-30780 H	Trigger Side Plate, Left	30781	0	1	
NEW? A|U? C-24475 H	Trigger Pin	24477	0	1	
A|U A-15400 H	Trigger Spring	15400	0	1	
A|U A-15481 H	Trigger Stop Screw (Blk. A-91926) H	15481	0	1	
				14	
NEW? A|U B-26370	TRIGGER GUARD ASSEMBLY	26371			
	THE ABOVE PART NUMBER IS FOR ARMS SERVICE ONLY				
NEW? A|U B-31490	Trigger Guard Sub-Assembly	31491			
D-19800	Floor Plate (Blk. D-91942)	19800			
A-16453	Floor Plate Pivot Pin	16453			
D-26375	Trigger Guard (Blk. 34315)	26376			
B-15291	Floor Plate Latch (Blk. 91759)	15291			
A-16451	Floor Plate Latch Pin (Blk. 91943)	16451			
A-16452	Floor Plate Latch Spring	16452			

COULD BE NEW BOX MAGAZINE IF NOT, DWGS WITH FINISH SPECS MUST BE NEW FOR "NATURAL" FINISH.

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BARBER - PRESALE R 0136466

Part Name	Type Dwg	Design Time	Draft Time	Comments
BARREL ASSEMBLY COMPLETE	H			New?
Barrel Assembly	H			New?
Marking	H			New?
Barrel	H			New, 2 drawings, magnum and standard
Barrel Bracket	H			New, CAN THIS BE STAMPED?
Receiver	CAD			New, 2 drawings, long and short action
Bolt Assembly	H			New
Bolt Body Assembly	H			New
Bolt Body	H			New
Bolt Body Brazing Slug	H			New?, NEW FLUX
Bolt Head	H			New?, YES 416
Bolt Head Blank	H			New
Bolt Pin	H			New?, YES
Ejector Washer	H			Add use
Bolt Handle	H			New? YES
Bolt Handle Blank	H			New YES
Bolt Handle Brazing Shim	H			New? NEW FLUX
Ejector	H			Add use
Ejector Blank	H			Add use
Ejector Pin	H			Add use
Ejector Spring	H			Add use
Extractor	H			Add use
Extractor Rivet	H			Add use
Firing Pin Assembly	H			New? YES
Bolt Plug	H			New, 416
Bolt Plug Blank	H			New, 416
Firing Pin	H			Add use
Firing Pin Blank	H			Add use
Firing Pin Cross Pin	H			Add use
Firing Pin Head	H			Add use or use custom shop
Firing Pin Head Blank	H			Add use or use custom shop
Main Spring	H			Add use
Bolt Stop	H			New ~~Plate or~~ new material, get quotes
Bolt Stop Blank	H			New YES
Bolt Stop Pin	H			~~New or~~ add use? IF NEW, HARDENED TO EQUIVALENT STRENGTH
Bolt Stop Spring	H			Add use
Front Guard Screw	H			Use M/700 AS style guard screw (ALLEN HEAD)
Front Guard Screw Blank	H			New S/S
Rear Guard Screw	H			Use M/700 AS style guard screw (ALLEN HEAD)
Rear Guard Screw Blank	H			New S/S
Receiver Plug Screw	H			New
Receiver Plug Screw Blank	H			New } GET QUOTES

NEW, 1 PC DESIGN?

BARBER - PRESALE R 0136466

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BARBER - PRESALE R 0136467

BARBER - PRESALE R 0136467_0237455

Sear Pin	H			Add use
STOCK ASSEMBLY	H			New, use M/700 AS with stainless studs STOCK MATL
TRIGGER ASSEMBLY	H			New
Bolt Stop Release	H			New Plate ~~or stainless~~
Bolt Stop Release Blank	H			~~New?~~ No
Safety Assembly	H			New PLATE ASSY - CHECK W/PM FOR BEST IMPREGNATION FOR PLATING
Safety	H			Add use ~~or new?~~ Plate ~~or new material~~
Safety Button	H			Add use or new? Plate or SS?
Safety Detent Ball	H			Add use PLATE?
Safety Detent Spring	H			~~New?~~ Plate?
Safety Pivot Pin	H			New ~~or add use?~~
Safety Pivot Pin Blank	H			~~New or~~ add use?
Safety Washer	CAD			~~New or~~ add use? Plate?
Sear Safety Cam	H			Add use
Sear Safety Cam Blank	H			Add use
Sear Spring	H			Add use PLATED?
Trigger	H			New or add use? ~~New SS PM?~~
Trigger Blank	H			New? NEW SS PM OR BETTER IMPREGNATION
Trigger Screw, Front	H			New or add use? Plate?
Trigger Screw, Front Blank	H			~~New or~~ add use?
Trigger Connector	H			New or add use? Plate or leave as is?
Trigger Connector Blank A	H			Add use?
Trigger Connector Blank B	H			Add use?
Trigger Engagement Screw	H			~~New or~~ add use? Plate?
Trigger Engage. Screw Blank	H			~~New or~~ add use?
TRIGGER HOUSING ASSEMBLY	H			New for plating
Trigger Housing Rivet	H			Add use
Trigger Housing Spacer, Frt.	H			Add use
Housing Spacer Blank, Front	H			Add use CHECK IMPREGNATION
Trigger Housing Spacer, Rear	H			Add use
Housing Spacer Blank, Rear	H			Add use CHECK IMPREGNATION
Trigger Side Plate, Right	H			Add use
Side Plate Blank	H			Add use
Trigger Side Plate, Left	H			Add use
Side Plate Blank	H			Add use
Trigger Pin	H			Add use
Trigger Spring	H			Add use (plate?)
Trigger Stop Screw	H			Add use (plate?)
Trigger Stop Screw Blank	H			Add use
TRIGGER GUARD ASSEMBLY				New, will use box magazine design

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M/700 Barrel Process

1. Cut off
2. Upset
3. Heat treat & super sheen
4. Barnes drills
5. New Britain tracer lathes or Monarch lathes for turn
6. Ream
7. GFM
8. Cutoff

8a. Stress relieve for magnum, varmint, and S/S barrels

9. New Britain chuckers for hubbing and chambering
10. Crowning
11. Centerless polish
12. Spin polish
13. Put on action
14. Drill sight holes
15. Magnaflux

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BALTO. SPECIALTY STEELS
BILL DAVIDSON (800) 638-1452

NITRONIC 60

σ_y = 50 ksi
σ_{ult} = 100 ksi

BEHAVES LIKE 304, BUT WORK HARDENS FASTER

STRENGTH INCREASED BY COLD WORKING

ALTECH - HAS USED COLD DRAWN NITRONIC 60

2½ RD σ_y = 142 ksi
σ_E = 160 ksi Ar

ALTECH
DUNKIRK, NY (800) 456-1989

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416, 416Se

Chemical Composition. 416. AISI and UNS: Nominal. 0.15 C max, 1.25 Mn max, 0.060 P max, 0.150 S min, 1.00 Si max, 12.00 to 14.00 Cr, 0.60 Mo max (optional). **416Se. AISI and UNS:** Nominal. 0.15 C max, 1.25 Mn max, 0.060 P max, 0.060 S max, 1.00 Si max, 12.00 to 14.00 Cr, 0.15 Se min

Similar Steels (U.S. and/or Foreign). 416. UNS S41600; ASME SA194; ASTM A194, A314, A473, A581, A582; FED QQ-W-423; MIL SPEC MIL-S-862; SAE J405 (51416); (W. Ger.) DIN 1.4005; (Fr.) AFNOR Z 12 CF 13; (Ital.) UNI X 12 CrS 13; (Swed.) SS_{14} 2380; (U.K.) B.S. 416 S 21. **416Se.** UNS S41623; AMS 5610; ASME SA194; ASTM A194, A314, A473, A511, A581, A582; MIL SPEC MIL-S-862; SAE J405 (51416 Se)

Characteristics. Another version of type 410, where S (type 416) or Se (type 416Se) has been added to improve machinability. Popular selection for machining in screw machines or turret lathes. Capable of hardening to 42 HRC or slightly higher. Can be tempered to wide range of strength and impact resistance. Deep hardening. Oil quenching recommended. Can be martempered. Tempering in the 700 to 1050 °F (370 to 565 °C) range lowers impact resistance. Can be full, process, or isothermal annealed. Good nonseizing and nongalling properties. Good corrosion resistance. Susceptible to stress corrosion cracking in corrosive environments, when stress is above threshold level for that particular environment. Magnetic in all conditions. Resists oxidation up to 1400 °F (760 °C)

Forging. Not recommended for forging operations requiring severe deformation. Sulfur or selenium, added to enhance machinability, tends to create hot shortness. When forged, start at 2100 to 2300 °F (1150 to 1260 °C). Do not forge below 1600 to 1800 °F (870 to 980 °C)

Recommended Heat Treating Practice

Normalizing. Do not normalize

Annealing. Can be process, isothermal, or full annealed:

- *Process anneal* in the subcritical temperature range of 1200 to 1400 °F (650 to 760 °C) for hardness of 86 to 92 HRB. Use clean, rectified bath or a suitable atmosphere for the temperature range. Soaking and softening time depend on section size of the work. Air cool
- *Isothermal anneal* by heating to 1525 to 1625 °F (830 to 885 °C). Cool slowly to 1325 °F (720 °C). Hold for 2 hr. Hardness, approximately 85 HRB
- *Full anneal* at 1525 to 1625 °F (830 to 885 °C). Avoid decarburization or carburization. Can use atmospheric protection in the form of a vacuum, the inert gases argon or helium (both expensive), or nitrogen. All should have dew point below −60 °F (−51 °C). Exothermic- or endothermic-generated atmospheres can be used, providing carbon potential of the gas matches carbon content of the steel. Cool slowly at a rate not faster than 30 to 40 °F (17 to 22 °C) per hour to 1100 °F (595 °C), after which cooling rate has no effect on final hardness. Annealed hardness, 75 to 85 HRB. Full annealing is expensive and time consuming. Should not be used except as required for subsequent severe forming

Hardening. Same atmospheric protection rules for annealing apply to hardening. Parts must be completely clean and free of oil and shop contamination. Thermal conductivity is significantly lower than that of carbon and alloy steels. High thermal gradients and high stresses during rapid heating may cause warpage and cracking in delicate or intricate parts. Preheat to 1400 to 1450 °F (760 to 790 °C), only long enough to equalize temperature in all sections. Extremely delicate or intricate parts would benefit from an additional prior preheat at 1000 °F (540 °C). Austenitize at 1700 to 1850 °F (925 to 1010 °C). Use upper end of range for larger sections or where maximum corrosion resistance and strength are required. If tempering temperature is above 1050 °F (565 °C), use low side of the austenitizing range. It enhances ductility and impact resistance. Soaking time of 30 to 60 min is adequate for sections up to ½ in. (13 mm). Allow an additional 30 min for each additional inch or fraction thereof. Double soaking time after full or process annealing. Increase by about 50% if process annealed above 1250 °F (675 °C). Oil quench. Martempering in hot oil or salt is suitable because of high hardenability. As-quenched hardness, approximately 375 to 415 HB

Tempering. Temper at 400 to 1400 °F (205 to 760 °C). Temper at 400 to 700 °F (205 to 370 °C) for hardness of approximately 35 to 45 HRC. Temper at 1050 to 1125 °F (565 to 605 °C) for a hardness of approximately 25 to 31 HRC. Tempering at 700 to 1050 °F (370 to 565 °C) not recommended for parts requiring high toughness and optimum corrosion resistance. It causes marked dip in impact resistance and lower stress corrosion cracking resistance. Double tempering beneficial. Cool to room temperature between tempers

Stabilizing. To transform essentially all retained austenite, use stabilizing or subzero treatment at −105 to −320 °F (−76 to −195 °C). Temper immediately to temper the new martensite and avoid cracking

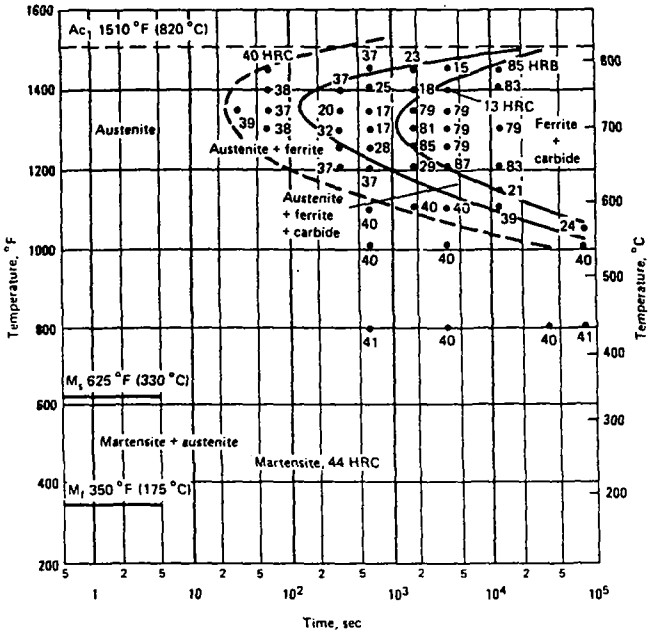
Nitriding. Can be nitrided to case depth of about 0.008 in. (0.203 mm) in about 48 hr. See 410 for further information

Recommended Processing Sequence

- Forge
- Anneal
- Rough machine
- Stress relieve
- Finish machine
- Preheat
- Austenitize
- Quench
- Stabilize (optional)
- Temper
- Final grind to size
- Nitride (if required)

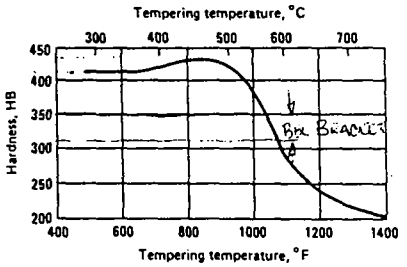
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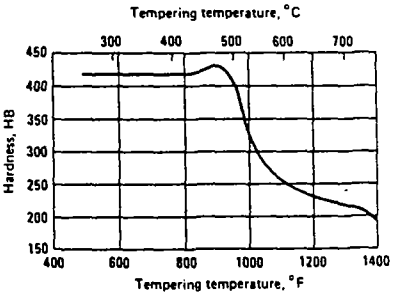


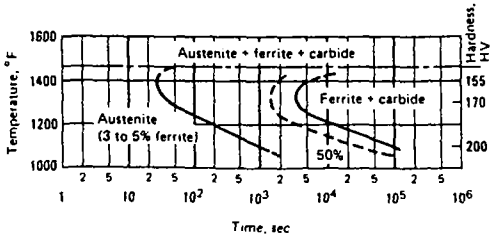
416: Isothermal Transformation Diagram. Free-machining steel. Composition: 0.10 C, 0.94 Mn, 0.025 P, 0.350 S, 0.44 Si, 0.31 Ni, 12.40 Cr, 0.44 Mo. Austenitized at 1650 °F (900 °C). (Source: Republic Steel)

416: Hardness Versus Tempering Temperature. Composition: 0.11 C, 0.87 Mn, 0.018 P, 0.360 S, 0.42 Si, 13.06 Cr, 0.33 Ni, 0.09 Mn. Heat treated at 1800 °F (980 °C), ½ hr. Oil quenched at 150 to 200 °F (66 to 94 °C). Double stress relieved at 350 °F (175 °C), 15 min. Water quenched. Tempered 2 hr. Heat treated, 0.550-in. (14-mm) round. Tested, 0.505-in. (12.8-mm) round. (Source: Republic Steel)



416: Hardness Versus Tempering Temperature. Composition: 0.11 C, 0.87 Mn, 0.018 P, 0.360 S, 0.42 Si, 13.06 Cr, 0.33 Ni, 0.09 Mo. Heat treated at 1700 °F (925 °C), ½ hr. Oil quenched at 150 to 200 °F (66 to 94 °C). Double stress relieved at 350 °F (175 °C), 15 min. Water quenched. Tempered 2 hr. Heat treated. 0.550-in. (14-mm) round. Tested, 0.505-in. (12.8-mm) round. (Source: Republic Steel)





416: Partial Isothermal Transformation Diagram. Free-machining steel. Composition: 0.12 C, 0.79 Mn, 0.017 P, 0.190 S, 0.74 Si, 0.25 Ni, 12.82 Cr, 0.05 Mo, 0.037 N, 0.08 Zr. Austenitized at 1800 °F (980 °C). Grain size, 7 to 9. (Source: *Atlas of Isothermal Transformation and Cooling Transformation Diagrams*, American Society for Metals, 1977)

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Increase time by about 50%, if process annealed above 1250 °F (675 °C). Quench in oil or air. Oil preferred, because it guarantees maximum corrosion resistance and ductility. Martempering in hot oil or salt is practicable because of high hardenability. As-quenched hardness, approximately 375 to 415 HB

Tempering. Temper at 400 to 1300 °F (205 to 705 °C). Temper at 400 to 700 °F (205 to 370 °C) for a hardness of approximately 38 to 47 HRC. Temper at 1050 to 1125 °F (565 to 605 °C) for a hardness of approximately 25 to 31 HRC. Tempering at 700 to 1050 °F (370 to 565 °C) not recommended for parts requiring high toughness and optimum corrosion resistance. Causes a marked dip in impact resistance and lowered stress corrosion cracking resistance. Double tempering beneficial. Cool to room temperature between tempers

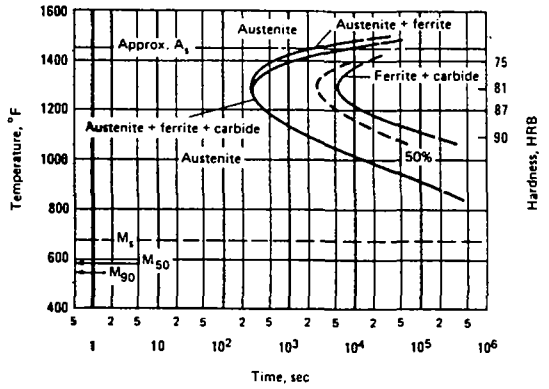
Stabilizing. To transform essentially all retained austenite, use stabilizing or subzero treatment of −105 to −320 °F (−76 to −195 °C). Temper immediately to temper the new martensite and avoid cracking

Nitriding. Not recommended for severe corrosive environment. Nitrided case impairs resistance to corrosion in most media. Maximum case obtainable is about 0.008 in. (0.203 mm) in 48 hr. Before nitriding, parts should be quenched and tempered, with tempering at least 25 °F (14 °C) higher than the nitriding temperature. All sharp corners should be replaced with radii of not less than 1/16 in. (1.588 mm). The film of oxide that protects stainless alloys from oxidation and corrosion must be removed. This may be accomplished by wet blasting, pickling, chemical reduction in a reducing atmosphere, submersion in molten salts, or by one of several proprietary processes. If doubt exists that complete and uniform depassivation has occurred, further reduction of the oxide may be accomplished in a furnace by reducing hydrogen atmosphere or suitable proprietary agent. After depassivation, avoid contamination of surface by finger or hand marking. Single stage nitriding usually adequate at 975 to 1025 °F (525 to 550 °C) for 20 to 48 hr, depending on case depth required. Hardness above 1000 HK can be expected for several thousandths of an inch before hardness gradient blends into core

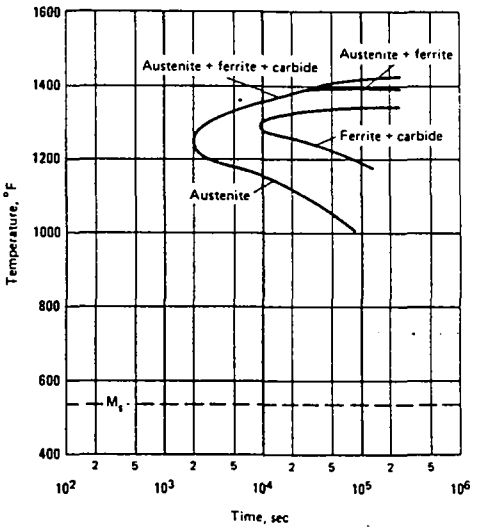
Recommended Processing Sequence

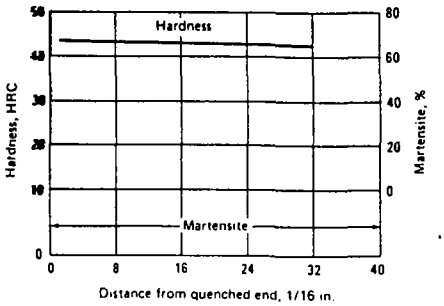
- Forge
- Anneal
- Rough machine
- Stress relieve
- Finish machine
- Preheat
- Austenitize
- Quench
- Stabilize (optional)
- Temper
- Final grind to size
- Nitride (if required)

410: Isothermal Transformation Diagram. Composition: 0.11 C, 0.44 Mn, 0.37 Si, 0.16 Ni, 12.18 Cr. Austenitized at 1800 °F (980 °C). Grain size, 6 to 7. (Source: *Atlas of Isothermal Transformation and Cooling Transformation Diagrams*, American Society for Metals, 1977)



410: Isothermal Transformation Diagram. Modified 410. Composition: 0.22 C, 0.54 Mn, 0.64 Ni, 12.46 Cr, 0.99 Mo, 0.29 V. Austenitized at 1850 °F (1010 °C). Grain size, 4 to 5. (Source: *Atlas of Isothermal Transformation and Cooling Transformation Diagrams*, American Society for Metals, 1977)



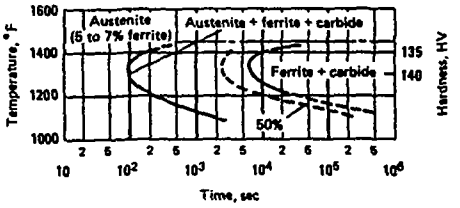


410: End-Quench Hardenability. (Source: *Atlas of Isothermal Transformation and Cooling Transformation Diagrams*, American Society for Metals, 1977)

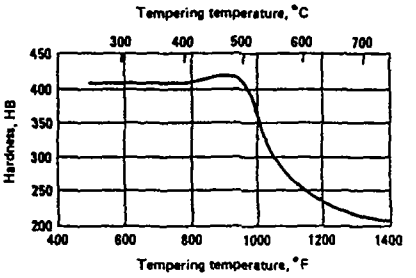
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403: Partial Isothermal Transformation Diagram. Modified turbine grade. Composition: 0.074 C, 0.39 Mn, 0.034 P, 0.010 S, 0.27 Si, 0.30 Ni, 12.22 Cr, 0.52 Mn, 0.039 N. Austenitized at 1950 °F (1065 °C). Grain size, 6 to 8. (Source: *Atlas of Isothermal Transformation and Cooling Transformation Diagrams*, American Society for Metals, 1977)



403: Hardness Versus Tempering Temperature. Composition: 0.115 C, 0.45 Mn, 0.014 P, 0.012 S, 0.45 Si, 12.18 Cr, 0.63 Ni, 0.08 Mo. Heat treated at 1700 °F (925 °C), ½ hr. Oil quenched at 150 to 200 °F (66 to 94 °C). Double stress relieved at 350 °F (175 °C), 15 min. Water quenched. Tempered 1 hr. Heat treated, 0.550-in. (14-mm) round. Tested, 0.505-in. (12.8-mm) round. (Source: Republic Steel)



410

Chemical Composition. AISI and UNS: Nominal. 0.15 C max, 1.00 Mn max, 0.040 P max, 0.030 S max, 1.00 Si max, 11.50 to 13.50 Cr

Similar Steels (U.S. and/or Foreign). UNS S41000; AMS 5504, 5505, 5591, 5613, 5776, 5821; ASME SA194 (6), SA240, SA268, SA479; ASTM A176, A193, A194, A240, A276, A314, A473, A479, A493, A511, A580; FED QQ-S-763, QQ-W-423; MIL SPEC MIL-S-862; SAE J405 (51410), J412 (51410); (W. Ger.) DIN 1.4006; (Fr.) AFNOR Z 10 C 13, Z 10 C 14, Z 12 C 13; (Ital.) UNI X 12 Cr 13, X 10 Cr 13, X 12 Cr 13 KG, X 12 Cr 13 KW; (Jap.) JIS SUS 410; (Swed.) SS_{14} 2302; (U.K.) B.S. 410 S 21, En. 56 A, ANC 1 Grade A, 3 S. 61, S. 141

Characteristics. General purpose, heat treatable stainless steel. Corrosion resistant and heat resistant. Capable of hardening to 42 HRC or slightly higher. Can be tempered to wide range of strength and impact resistance. Can be quenched in oil or air. Oil quenching guarantees maximum corrosion resistance. High alloy content causes sluggish transformation and high hardenability. For these reasons, maximum hardness is obtainable by air quenching in the center of sections up to approximately 12 in. (305 mm) thick. Can be martempered with ease. Can be full, process, or isothermal annealed. Has good corrosion resistance. Susceptible to stress corrosion cracking in corrosive environments, when stress is above threshold level for that particular environment. Magnetic in all conditions. Fair machinability. Resists oxidation up to 1500 °F (815 °C)

Forging. Start forging at 2000 to 2200 °F (1095 to 1205 °C). Do not forge below 1600 to 1700 °F (870 to 925 °C)

Recommended Heat Treating Practice

Normalizing. Do not normalize

Annealing. Can be process, isothermal, or full annealed:

- *Process anneal* in subcritical temperature range of 1200 to 1400 °F (650 to 760 °C). Use clean, rectified salt bath or an atmosphere suited to this temperature range. Soaking time dependent on size of work. Air cool. Hardness, 86 to 92 HRB
- *Isothermal anneal* by heating at 1525 to 1625 °F (830 to 885 °C). Cool slowly to 1300 °F (705 °C). Hold for 6 hr. Hardness, approximately 85 HRB
- *Full anneal* at 1525 to 1625 °F (830 to 885 °C). Avoid decarburization or carburization. Can use atmospheric protection in the form of a vacuum, the inert gases argon or helium (both expensive), or nitrogen. All should have dew point below −60 °F (−51 °C). Exothermic- or endothermic-generated atmospheres can be used, providing carbon potential of the gas matches carbon content of the steel. Cool slowly at a rate not faster than 30 to 40 °F (17 to 23 °C) per hour to 1100 °F (595 °C). After this, cooling rate has no effect on final hardness. Annealed hardness, 75 to 85 HRB. Full annealing is expensive and time consuming. Should not be used except as required for subsequent severe forming

Hardening. Atmospheric protection rules for annealing apply to hardening. Parts must be completely clean and free of oil and shop contamination. Thermal conductivity is significantly lower than that of carbon and alloy steels. High thermal gradients and high stresses during rapid heating may cause warpage and cracking in delicate or intricate parts. Preheat at 1400 to 1450 °F (760 to 790 °C), only long enough to equalize temperature in all sections. Extremely delicate or intricate parts would bene-fit from an additional prior preheat of 1000 °F (540 °C). Austenitize at 1700 to 1850 °F (925 to 1010 °C). Use upper end of range for larger sections or when maximum corrosion resistance and strength are required. If tempering temperature exceeds 1050 °F (565 °C), use the low side of the austenitizing range. It enhances ductility and impact resistance. Soaking time of 30 to 60 min is adequate for sections up to ½ in. (13 mm). Allow an additional 30 min for each additional inch or fraction thereof. Double soaking time if parts have been full or isothermal annealed.

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Increase time by about 50%, if process annealed above 1250 °F (675 °C). Quench in oil or air. Oil preferred, because it guarantees maximum corrosion resistance and ductility. Martempering in hot oil or salt is practicable because of high hardenability. As-quenched hardness, approximately 375 to 415 HB

Tempering. Temper at 400 to 1300 °F (205 to 705 °C). Temper at 400 to 700 °F (205 to 370 °C) for a hardness of approximately 38 to 47 HRC. Temper at 1050 to 1125 °F (565 to 605 °C) for a hardness of approximately 25 to 31 HRC. Tempering at 700 to 1050 °F (370 to 565 °C) not recommended for parts requiring high toughness and optimum corrosion resistance. Causes a marked dip in impact resistance and lowered stress corrosion cracking resistance. Double tempering beneficial. Cool to room temperature between tempers

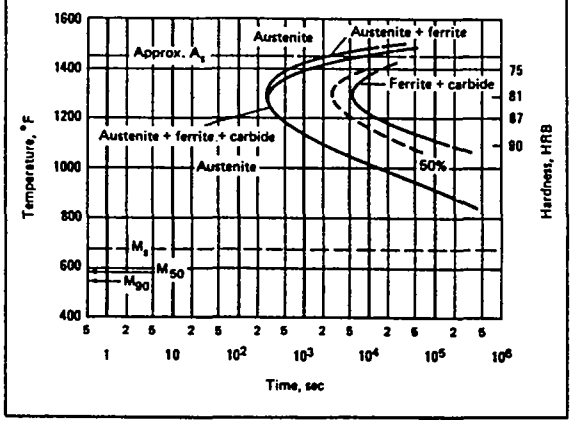
Stabilizing. To transform essentially all retained austenite, use stabilizing or subzero treatment of −105 to −320 °F (−76 to −195 °C). Temper immediately to temper the new martensite and avoid cracking

Nitriding. Not recommended for severe corrosive environment. Nitrided case impairs resistance to corrosion in most media. Maximum case obtainable is about 0.008 in. (0.203 mm) in 48 hr. Before nitriding, parts should be quenched and tempered, with tempering at least 25 °F (14 °C) higher than the nitriding temperature. All sharp corners should be replaced with radii of not less than 1/16 in. (1.588 mm). The film of oxide that protects stainless alloys from oxidation and corrosion must be removed. This may be accomplished by wet blasting, pickling, chemical reduction in a reducing atmosphere, submersion in molten salts, or by one of several proprietary processes. If doubt exists that complete and uniform depassivation has occurred, further reduction of the oxide may be accomplished in a furnace by reducing hydrogen atmosphere or suitable proprietary agent. After depassivation, avoid contamination of surface by finger or hand marking. Single stage nitriding usually adequate at 975 to 1025 °F (525 to 550 °C) for 20 to 48 hr, depending on case depth required. Hardness above 1000 HK can be expected for several thousandths of an inch before hardness gradient blends into core

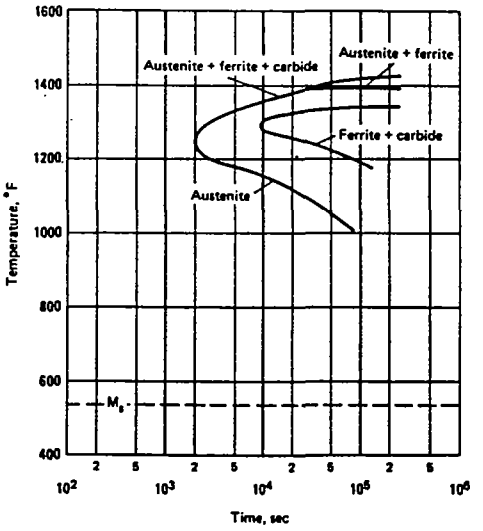
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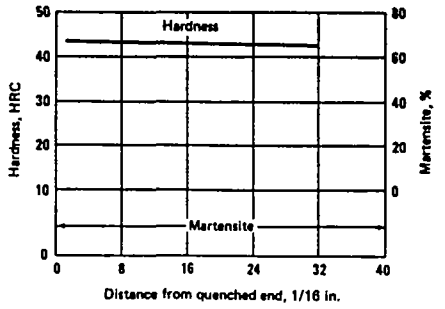
- Forge
- Anneal
- Rough machine
- Stress relieve
- Finish machine
- Preheat
- Austenitize
- Quench
- Stabilize (optional)
- Temper
- Final grind to size
- Nitride (if required)

410: Isothermal Transformation Diagram. Composition: 0.11 C, 0.44 Mn, 0.37 Si, 0.16 Ni, 12.18 Cr. Austenitized at 1800 °F (980 °C). Grain size, 6 to 7. (Source: *Atlas of Isothermal Transformation and Cooling Transformation Diagrams,* American Society for Metals, 1977)



410: Isothermal Transformation Diagram. Modified 410. Composition: 0.22 C, 0.54 Mn, 0.64 Ni, 12.46 Cr, 0.99 Mo, 0.29 V. Austenitized at 1850 °F (1010 °C). Grain size, 4 to 5. (Source: *Atlas of Isothermal Transformation and Cooling Transformation Diagrams,* American Society for Metals, 1977)



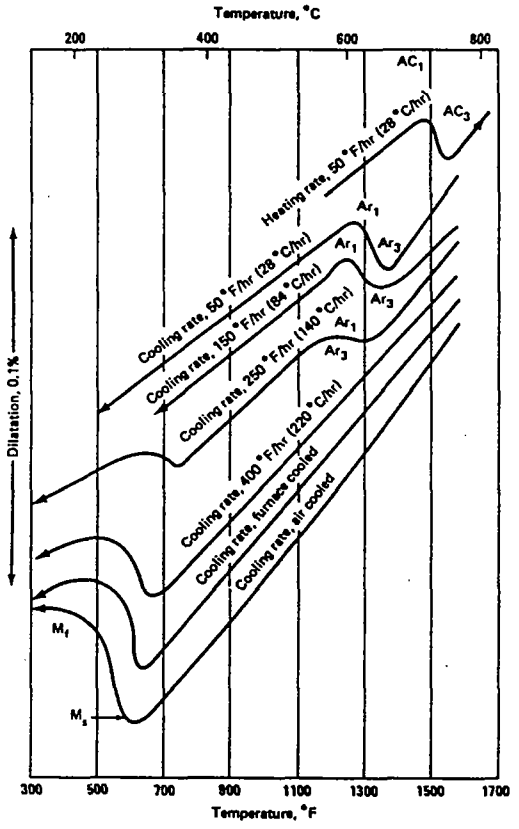


410: End-Quench Hardenability. (Source: *Atlas of Isothermal Transformation and Cooling Transformation Diagrams,* American Society for Metals, 1977)

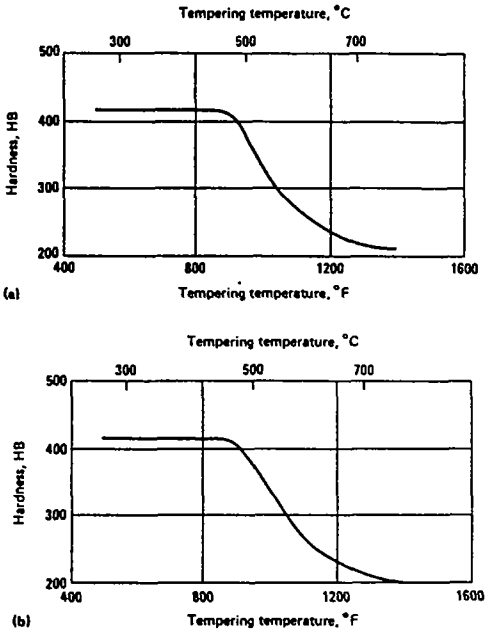
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410: Dilatometric Curve. Effects of cooling rates on transformation of a chromium stainless steel. Composition: 0.098 C, 0.41 Mn, 0.023 P, 0.010 S, 0.62 Si, 0.30 Ni, 12.30 Cr, 0.03 Mo, 0.21 Cu. Region of Ar_3 to Ar_1 transformation is for slowly cooled dilatometer tests. Ferrite and carbide formation occurs through this range, on slow cooling. Continuation of cooling curves through transformation of austenite to martensite, starting at M_s point and finishing at M_f point. Note the large amount of expansion typical of the martensite reaction. (Source: Republic Steel)



410: Hardness Versus Tempering Temperature. (a) Quenched from 1700 °F (925 °C). (b) Quenched from 1850 °F (1010 °C). (Source: *Metals Handbook,* 8th ed., Vol. 2, American Society for Metals, 1964)



410: Microstructures



(a) Kalling's reagent, 100X. Stainless-steel in as-forged condition. Hot worked structure is banded delta ferrite (horizontal, light) in martensite matrix. (b) Vilella's reagent, 100X. Stainless steel, as-forged. Hot worked structure consists of larger, more elongated banded delta ferrite than (a), in martensite matrix. (c) Vilella's reagent, 100X. Forging. Hardened by: holding 1 hr at 1800 °F (980 °C); air quenched; tempered 2 hr at 1050 °F (565 °C); and air cooled. Tempered martensite and carbide. (Source: *Metals Handbook,* 8th ed., Vol 7, American Society for Metals, 1972)

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CARPENTER TECHNOLOGY CORPORATION

CarTech

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Jim Konkainew

☐ As requested For your: ☐ Action ☐ Info ☐ Approval ☐

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CARPENTER TECHNOLOGY CORPORATION
CARPENTER STEEL DIVISION
CarTech

ALLOY DATA

Gall-Tough™ Stainless

(U.S. Patent No. 4,814,140)
(UNS S20161)

Type Analysis

Carbon	0.15% max.	Chromium	15.00/18.00%
Manganese	4.00/6.00%	Nickel	4.00/6.00%
Phosphorus	0.040% max.	Nitrogen	0.08/0.20%
Sulfur	0.040% max.	Iron	Balance
Silicon	3.00/4.00%		

Description

Gall-Tough™ stainless is a high-silicon, high-manganese, nitrogen strengthened, austenitic stainless alloy which possesses superior self-mated galling and metal-to-metal wear resistance.

This alloy displays [illegible] strength and high temperature [illegible]ation resistance than Type [illegible] stainless with comparable corrosion resistance, depending on the environment.

Galling and Metal-to-Metal Resistance

When compared to other standard stainless steels, the self-mated galling resistance and metal-to-metal wear resistance of Gall-Tough stainless are outstanding. Optimum galling resistance is obtained when both mating components are made of Gall-Tough stainless.

Galling and Wear Test Properties—Various Alloys
Galling test involves rotating a compressively loaded 1/2" (12.7 mm) diameter button against a block counterclockwise 360°, clockwise 360°, and counterclockwise 360° and determining the highest stress at which visible galling damage does not occur. Metal-to-metal wear tests were conducted for 40,000 cycles using crossed metal cylinders per ASTM G83.

Alloy	Galling Test		Wear Test	
	Threshold Galling Stress		Avg. Total Volume Loss, mm³	
	ksi	MPa	100 rpm	400 rpm
Gall-Tough Stainless	15*	103*	5	4
Type 440C (HRC 56)	2	14	9.5	5.5
Type 304	< 1**	7**	29	25
Type 430	< 1**	7**	230	172

*Testing at higher stress not performed
**Galled at lowest stress evaluated

Applications

Gall-Tough stainless may be considered for applications in which parts are in relative motion under load without lubricants.

Potential applications include:

- Chain link conveyer belts and other components in food and drug processing industries
- Bolts, nuts and other fasteners
- Fittings for pumps and valves
- Luggage carousels in air terminals

The information and data presented herein are typical or average values and are not a guarantee of minimum values. Applications specifically suggested for material described herein are made solely for the purpose of illustration and without representation as to their fitness for any particular purpose. Each user bears full responsibility for making his own determination as to the suitability of the material for his own particular purpose.

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

Gall-Tough™ Stainless

Corrosion Resistance

Gall-Tough stainless is resistant to atmospheric corrosion. Its resistance to some acids and corrosive environments is comparable to that of Type 304 stainless and superior to that of Type 430 stainless.

Intergranular corrosion resistance may be impaired if the material is heated between 800/1650°F (427/899°C) or cooled slowly that range.

For increased corrosion resis from this alloy, surfaces must of scale and foreign particles finished parts should be passiv

Typical Corrosion Properties—Gall-Tough Stainless
Annealed condition

Environment	Time of Test	Average Corrosion Rate (mpy)		
		Gall-Tough Stainless	Type 304	Type 430
5 w/o H_2SO_4—RT	1-48h period	18	12	1300
50 w/o acetic acid—boiling	"	0	0	8
1 w/o HCl—RT	"	34	7	246
5 w/o formic acid—176°F (80°C)	"	41	0	694
65 w/o HNO_3—boiling	5-48h periods	82	59	46
5 w/o NaCl fog—95°F (35°C)	200 h	10-40% rusted	occasional rust spots	5-10% rusted

Scaling

The safe scaling temperature for continuous service is 1800°F (982°C).

Physical Properties

Specific gravity 7.65
Density
lb/cu in 0.276
kg/cu m 7650
Mean specific heat
Btu/lb•°F (126-216°F) 0.123
J/kg•K (52-102°C) 514.5

Electrical resistivity (RT)
ohms c/mf 431
microhm-mm 716

Mean coefficient of thermal expansion

Test Temperature		10^{-6}/°F	10^{-6}/K
77°F to	25°C to		
212	100	9.60	17.28
302	150	9.66	17.38
392	200	9.74	17.54
482	250	9.85	17.73
572	300	9.93	17.87
662	350	10.01	18.02
752	400	10.13	18.24
842	450	10.23	18.41
932	500	10.29	18.53
1022	550	10.36	18.65
1112	600	10.46	18.83
1202	650	10.54	18.98
1292	700	10.63	19.14

Thermal conductivity

Test Temperature		Btu-in/ft²•h•°F	W/m•K
°F	°C		
122	50	84.72	12.22
212	100	93.56	13.49
392	200	106.25	15.33
572	300	118.10	17.03
752	400	128.93	18.60

Modulus of elasticity (E)
ksi x 10^3 ..... 24.8
MPa x 10^3 ..... 171.1

Heat Treatment

Annealing
Heat to 1900/2000°F (1038/1093°C) and quench in water. Typically, hardness as annealed is Rockwell B95.

Hardening
Gall-Tough stainless cannot be hardened by heat treatment; however, this material can be hardened through cold work.

Workability

Hot Working
Gall-Tough stainless can be readily forged, hot rolled, hot headed and upset.

For hot working, heat uniformly to 2100/2300°F (1149/1260°C). Preheating to an intermediate temperature is not required. Do not forge below 1700°F (927°C). Forgings can be air cooled without danger of cracking.

For maximum corrosion resistance, annealing after hot working is required.

Cold Working
Gall-Tough stainless is readily cold worked by conventional methods.

Cold working causes martensitic transformation in Gall-Tough stainless, resulting in a significant increase in magnetic permeability.

Because of its metastability, Gall-Tough stainless is characterized by a high tensile strength in both annealed and cold worked conditions.

Machinability
Gall-Tough stainless machines at about 50% of the rates used for Type 304 stainless. Its machinability is similar to that of other nitrogen-strengthened alloys, like 22Cr-13Ni-5Mn stainless. A rigid setup, heavy positive feeds, and ample coolant flow are recommended.

Welding
Gall-Tough stainless can be satisfactorily welded by the shielded fusion and resistance welding processes. Oxyacetylene welding is not recommended since carbon pickup in the weld may occur.

When a filler metal is required, consider AWS E/ER240 welding consumables which should provide welds with strength approaching that of the base metal. If high weld strength is not necessary, then consider E/ER308.

Resistance to intergranular corrosion can be restored by a postweld annealing treatment.

Typical Mechanical Properties

Typical Room Temperature Mechanical Properties—Gall-Tough Stainless
Annealed bar and wire

Section Size	0.2% Yield Strength		Ultimate Tensile Strength		% Elongation in 4D	% Reduction of Area	Rockwell B Hardness
	ksi	MPa	ksi	MPa			
1" (25.4 mm) rd.	53	365	145	1000	59	64	93
.250" (6.35 mm) rd.	66	455	156	1076	70	73	93

Typical Elevated Temperature Tensile Properties—Gall-Tough Stainless
Annealed 1" (25.4 mm) diameter bar

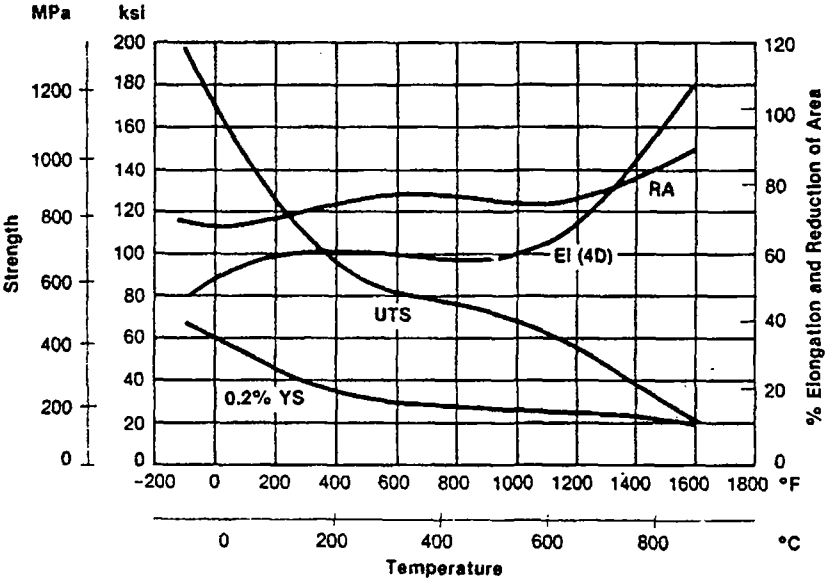
Test Temperature		0.2% Yield Strength		Ultimate Tensile Strength		% Elongation in 4D	% Reduction of Area
°F	°C	ksi	MPa	ksi	MPa		
Room Temp		53	365	145	1000	59	64
400	254	30	207	81	559	63	76
800	427	27	186	77	531	57	78
1200	649	25	172	59	407	58	70
1600	871	19	131	20	138	109	90

Typical Mechanical Properties
Continued

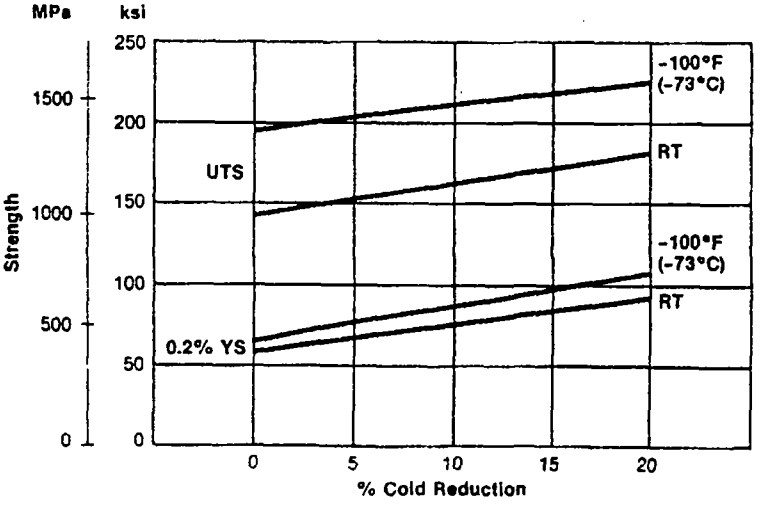
Typical Room Temperature and Cryogenic Mechanical Properties—Gall-Tough Stainless
Annealed and cold drawn bar

Percent Cold Work	Test Temperature °F	Test Temperature °C	0.2% Yield Strength ksi	0.2% Yield Strength MPa	Ultimate Tensile Strength ksi	Ultimate Tensile Strength MPa	% Elongation in 4D	% Reduction of Area	Charpy V-Notch Impact Strength ft-lb	Charpy V-Notch Impact Strength J
0	Room Temp		55	379	142	979	59	59	240	325
0	-100	-73	65	448	195	1344	47	68	240	325
10	Room Temp		75	517	160	1103	45	54	90-165	122-224
10	-100	-73	85	586	209	1441	41	60	152-240	206-325
20	Room Temp		89	614	181	1248	35	50	101-240	137-325
20	-100	-73	107	738	223	1538	36	64	85-109	115-148

Effect of Temperature on Tensile Properties—Gall-Tough Stainless

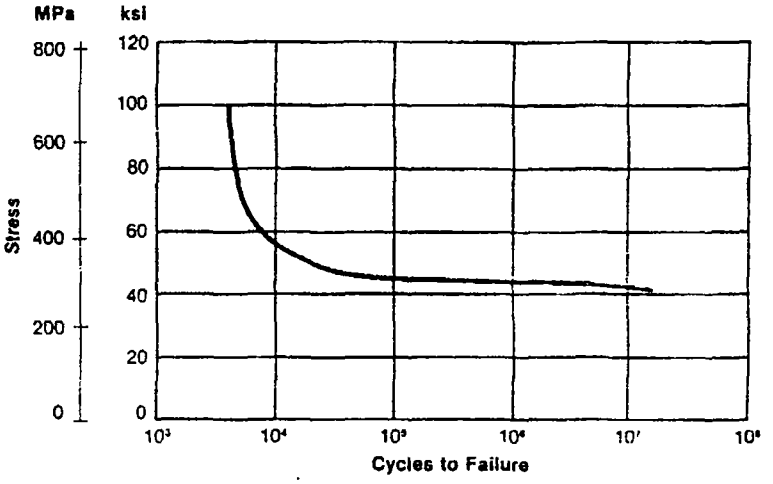


Effect of Cold Reduction on Tensile Properties—Gall-Tough Stainless
Bar product at room temperature and -100°F (-73°C)



Typical Mechanical Properties
Continued

Fatigue Data—Gall-Tough Stainless
Typically, the rotating beam fatigue strength of annealed Gall-Tough stainless is 42.5 ksi (293 MPa) for 10^7 cycles.



Forms Available

Bar
Wire
Strip
Billet
Sheet

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VESTSHELL VERMONT INC.

MANUFACTURERS OF FERROUS INVESTMENT CASTINGS

FACSIMILE TRANSMITTAL
802-524-5782

MESSAGE NO.: 1453 TO: REMINGTON ARMS

DATE: 10-4-1990

FROM: Chip Thibault ATTN: MIKE KEENEY

NUMBER OF PAGES: 5 COPIES TO:

RE: YOUR REQUEST FOR QUOTING THE BOLT HANDLE P/N 91562 IN A STAINLESS STEEL MATERIAL.

- WE THOUGHT BEST TO SUPPLY YOU WITH THE ATTACHED INFO. REGARDING THE VARIOUS TYPES OF STAINLESS AND THEIR MECHANICAL PROPERTIES. THIS WILL ALLOW YOU TO MATCH THESE PROPERTIES WITH REMINGTONS SPACIFIC NEEDS.
- ANOTHER POINT OF CONCERN IS THE SHRINK FACTOR ASSOCIATED WITH THE DIFFERENT TYPES OF STEEL. IN COMPARISON TO THE CURRENT MATERIAL BEING USED THE %'S OF DIMENSIONAL CHANGES ARE AS FOLLOWS:

MATERIAL	LENGTH	HEAVEY SECTION / HEAD
17-4PH	+.1%	+.3%
300 SERIES	-.5%	-.4%
400 SERIES	-.1%	.0%

- PLEASE ADVISE TYPE OF STEEL THAT WILL BEST SUIT YOUR NEEDS AND WE WILL QUOTE THE SAME.

REGARDS,
Chip

R.D. #2 BOX 13
TOWN INDUSTRIAL PARK
ST. ALBANS, VERMONT 05478

TELEPHONE: (802) 524-6721 FAX: (802) 524-5782

Typical Ferrous Alloys for Investment Castings

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ATT: MIKE KENNEY

	Alloy	Applicable Specifications	Typical Chemical Analysis														Minimum Mechanical Properties			
																	Strength in PSI		% Elong.	Hardness
			C	Mn	Si	Cr	Ni	Mo	S	P	Co	Cu	V	W			Tensile	Yield		
CARBON STEELS AND LOW ALLOY STEELS	1020	MIL-S-81591, QQ-S-681, ASTM-A-27	.19	.50	.45				.03	.03							65,000	40,000	35%	HRB 76
	1040	MIL-S-81591,	.37	.65	.50				.04	.04							100,000	90,000	10%	HRB 95
	1050	MIL-S-81591, QQ-S-681	.49	.75	.45				.04	.04							125,000	100,000	10%	HRC 26
	W.C.B.	ASTM-A-216	.30	1.00	.60	.40	.50	.25		.04	.02	.50	.03				70,000-95,000	36,000	22%	HRB 87
	WC6	ASTM-A-217	.20	.70	.60	1.25	.50	.55	.04	.04		.50		.10			70,000-95,000	40,000	20%	HRB 87
	4130	AMS 6336D, SAE/AISI, MIL-S-22141	.28	.55	.34	1.00		.23	.03	.03							150,000	125,000	7%	HRC 36
	4140	MIL-S-22141, AMS 6338C	.40	.90	.25	.95	.25	.17	.03	.03		.30					180,000	160,000	5%	HRC 46
	4330	AMS-6328B, AMS-6329C,	.33	.80	.75	.80	1.80	.35	.02	.02		.35					180,000	160,000	5%	HRC 43
	4340	MIL-S-22141, AISI/SAE,	.40	.70	.25	.80	1.80	.25	.02								200,000	180,000	5%	HRC 43
	6150	MIL-S-22141, AISI/SAE	.50	.75	.29	.95			.04	.03			.15				190,000	170,000	4%	HRC 41
	8620	MIL-S-22141, AISI/SAE	.20	.80	.25	.50	.55	.20	.04	.03							105,000	85,000	10%	HRB 97
	9310	AISI/SAE	.10	.50	.25	1.20	3.25	.10	.02	.02							—	—	—	
	52100	MIL-S-22141, AISI/SAE,	1.00	.30	.25	1.50			.02	.02							—	—	—	HRB 100
	8640	MIL-S-22141	.40	.95	.60	.50	.55	.20	.04	.04							180,000	145,000	5%	HRC 40

	Alloy	Applicable Specifications	Typical Chemical Analysis														Minimum Mechanical Properties			
																	Strength in PSI		% Elong.	Hardness
			C	Mn	Si	Cr	Ni	Mo	S	P	Co	Cu	Cb + Ta				Tensile	Yield		
AUSTENITIC STAINLESS STEEL	302	AMS 5356, MIL-S-81591	.15	1.50	1.00	18.00	9.00		.03								70,000	30,000	30%	HRB 88
	303	QQ-S-764B, AMS 5341B, MIL-S-81591, ASTM-A-296 CF-16F,	.12	1.50	1.00	18.50	9.50	.60	.25	.04		.50					70,000	30,000	30%	HRB 88
	304	AMS 5370B, MIL-S-81591, ASTM-A-296 CF-8, ASTM-A-351 CF-8	.05	1.70	1.00	19.00	10.00		.03	.04							70,000	30,000	35%	HRB 88
	304L	ASTM-A-296 CF-3, ASTM-A-351 CF-3,	.03	1.50	2.00	19.00	10.00		.04	.04							70,000	30,000	35%	HRB 88
	310	AMS 5366C, MIL-S-20150, ASTM-A-296 TYPE CK-20, ASTM-A-351 TYPE CK-20,	.18	2.00	1.00	25.00	20.00		.03	.04							70,000	30,000	30%	HRB 88
	316	ASTM-A-351 CF-8M, ASTM-A-296 CF-8M,	.07	1.50	1.50	18.50	10.50	2.25	.03	.03							70,000	30,000	30%	HRB 88
	316L	ASTM-A-296 CF-3M, ASTM-A-351 CF-3M,	.03	1.50	1.00	19.00	11.00	2.25	.03	.03							70,000	30,000	30%	HRB 88
	347	AMS 5362G, ASTM-A-296 TYPE CF-8C, ASTM-A-351 TYPE CF-8C,	.07	.90	1.00	18.50	11.00	.50	.03			.50	1.00				70,000	30,000	30%	HRB 88

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MARTENSITIC STAINLESS STEEL

Alloy	Applicable Specifications	Typical Chemical Analysis														Minimum Mechanical Properties			
																Strength in PSI		% Elong.	Hardness
		C	Mn	Si	Cr	Ni	Mo	S	P	Co	Cu	Sn	Zr	Se	W	Tensile	Yield		
410	AMS 5350F, MIL S-81591, ASTM-A-296 CA-15, ASTM-A-217 CA-15,	.12	1.00	.80	11.90	.50	.50	.03		.02	.50	.05				95,000-115,000	75,000	18%	HRB 94 to 115
416	AMS5349B, MIL-S-81591	.12	1.25	1.00	13.00	.50	.50	.25			.50	.05	.50			90,000	65,000	8%	HRB 90 to 115
420	MIL-S-22216, ASTM-A-296 CA-40	.30	1.00	1.00	13.00				.04							100,000	70,000	15%	HRB 95
420F	AMS 5620 F TYPE 1 (composition only)	.35	1.25	1.00	13.00	.50	.60	.03	.06					.25		—	—	—	HRC 50
430	AISI/SAE	.12	.50	.80	16.00			.03	.03							—	—	—	—
440C	AMS-5352C, MIL-S-22216	1.00	1.00	1.00	17.00	.75	.50	.03	.04		.50					—	—	—	HRC 30
436 (Greek Ascoloy)	AMS 5354D	.18	1.00	1.00	13.00	1.90	.50	.03	.04		.50				3.00	145,000	115,000	10%	HRC 35

PRECIPITATION HARDENING STEELS

Alloy	Applicable Specifications	Typical Chemical Analysis													Minimum Mechanical Properties			
															Strength in PSI		% Elong.	Hardness
		C	Mn	Si	Cr	Ni	Mo	S	P	Co	Cu	N	Sn	Cb + Ta	Tensile	Yield		
15-5-PH	AMS 5357	.05	.60	.75	15.00	4.70		.02			2.90	.05	.02	.20	180,000	160,000	6%	HRC 40
17-4-PH	AMS 5343, AMS 5344, AMS 4342B, AMS 5355D, ASTM-A-747 CB7CU-1 MIL-S-81591,	.06	.70	.75	16.00	4.20		.02			3.10	.05	.02	.25	180,000	160,000	6%	HRC 40
25-5-PH	SAE/AISI	.04	1.00	1.00	26.00	5.25	2.15	.04	.04		3.00				—	—	—	—
S-45000	ASTM-A-564	.05	1.00	1.00	15.00	6.00	.70	.03	.03		1.50		.02	8XC	180,000	170,000	6%	HRC 39

TOOL STEELS

Alloy	Applicable Specifications	Typical Chemical Analysis													Minimum Mechanical Properties			
															Strength in PSI		% Elong.	Hardness
		C	Mn	Si	Cr	Ni	Mo	S	P	Co	Cu	V	W		Tensile	Yield		
A-2	ASTM-A-597, SAE/AISI	1.00	.60	.30	5.00		1.00					.40			—	—	—	HRB 61
A-6	AISI/SAE TYPE A-6	.70	2.00	.40	1.10		1.20											HRC 60
H-11	QQ-T-570 TYPE H-11 ASTM-A-597 TYPE CH-11	.35	.30	.95	5.00		1.50					.40			—	—	—	HRC 53
M-2	SAE/AISI TYPE M-2, QQ-T590 TYPE M-2,	.80	.30	.35	4.00		5.00					2.00	6.00		—	—	—	HRC 63
O-1	AISI/SAE	.90	1.20	.30	.50							.20	.50		—	—	—	HRC 50
D-2	SAE/AISI, ASTM-A-597 TYPE D-2	1.50	.35	.40	11.50		.80	.02	.02			.10			—	—	—	HRC 61
S-IMPACTO		.10	.50	.30	1.50	3.50			.02			.02			—	—	—	—

NICKEL & COBALT BASE ALLOYS

Alloy	Applicable Specifications	Typical Chemical Analysis														Minimum Mechanical Properties			
																Strength in PSI		% Elong.	Hardness
		C	Mn	Si	Cr	Ni	Mo	S	P	Co	Cu	W	Fe	Al	V	Tensile	Yield		
HAST. C	AMS-5388C (HASTALLOY C)	.15	1.00	1.00	16.50	Bal.	17.00	.03	.03	2.5		4.50	6.00		.40	—	—	—	HRC 21
MONEL S	QQ-N-288 TYPE D,	.25	1.50	4.00		60.00					29.00		2.50	.50		—	—	—	HBN 300
STAR J #1	HAYNES STELLITE (STAR-J-METAL)	2.50	1.00	1.00	32.00	2.00				Bal.		17.00	3.00			—	—	—	HRC 53
#6	AMS 5387A,	1.25	.40	.60	29.00	3.00	1.50	.04	.04	Bal.		5.00	2.00			—	—	—	HRC 37
#21	AMS 5385, ASTM-A-567 GRADE 1	.25	1.00	1.00	20.00	3.20	5.50	.04	.04	Bal.			3.00						HRC 34

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Questions about how we will go about making a M/700 SS

1. Can we make an upset SS barrel? Yes, just needs process dev work.
2. Do we have heat treating facilities to anneal SS barrels after upsetting? Pete Cross to check into this
3. Will we require new cutters for the tracer lathes and chuckers?
4. Will magnafluxing be sufficient to tell us when barrels are defective or will we need to use die penetrant testing? WORKING ON NEW METHODS (3D & DC MAGNAFLUX)
5. Will we buy heat treating equipment capable of heat treating the receivers and bolts? START OUT VENDED, BUY IF NECESSARY ATMOSPHERE FURNACE W/OIL QUENCH
6. How many of the parts in the fire control will be plated? Does this include the springs and screws? FRED/DICK FOR FILES
7. Is the current brazing material used for the bolt body and handle compatible with 416R SS? MAY NEED TO CHANGE FLUX
8. What heat treat is needed for the receiver, equivalent strength or equivalent ~~ductility~~ toughness? FRACTURE MECHANICS used here. Use data from literature to do calcs
9. Is there a natural powder coat for aluminum?
10. How do we specify the degree of shot blast for the metal finish?
11. If we stay with a carbon steel (8640) bolt head, what type of corrosion protection is necessary/sufficient to protect it? black oxide, passivate, lube. 8640 will passivate due to chrome
12. Will we need to passivate the barreled actions? yes, dilute acid, may want to add inhibitors to passivating baths
13. Is there a problem with hydrogen embrittlement when plating springs? Is this a time dependent effect? BAKING AFTER PLATING
14. Is there any advantage to switching to a SS powdermetal for the trigger and safety button? impregnation may be caused - change impregnating resin
15. What can be done (inexpensively) to prevent galling? carburize or nitride head to give it a "case"
16. Is hard chrome plating, similar to that on the sear, better or worse than electroless nickel at preventing corrosion? depends on type of chrome
17. Are there any inherent problems with stamping SS? depends on thickness

FIND OUT MAT'L RUGER & BROWNING GUNS — AFTER ULT. STR. TEST

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G-88

DON'T SAY IT - WRITE IT

To: MIKE KEENEY

From: JIM RONKAINEN

Date: 2/11/91

cc: DICK JACKSON

MIKE,

COULD YOU PLEASE ORDER 50 M/700 BOLT HANDLES (P/N 26330), 25 CAST WITH 416 S/S AND 25 CAST WITH 17-4PH. THERE SHOULD BE NO NEED TO ALTER ANY TOOLING TO ACCOUNT FOR DIFFERENT SHRINKAGES OF THE MATERIALS. PLEASE CHARGE 481152.

THANKS,

Jim

"SAFETY APPLIED IS INJURY DENIED!"

Forms From Farnsworth 1-800-961-1966

Stainless Rifles

Handgun manufacturers have been using stainless steel for 25 years. As we enter the 1990s, rifle manufacturers—and riflemen—are finally waking up to the advantages of stainless.

By Rick Jamison

One of the best-shooting outfits to come along in years is the stainless-steel rifle. I'm not only talking about stainless-steel barrels, but the entire barreled action—receiver, bolt, barrel, etc.

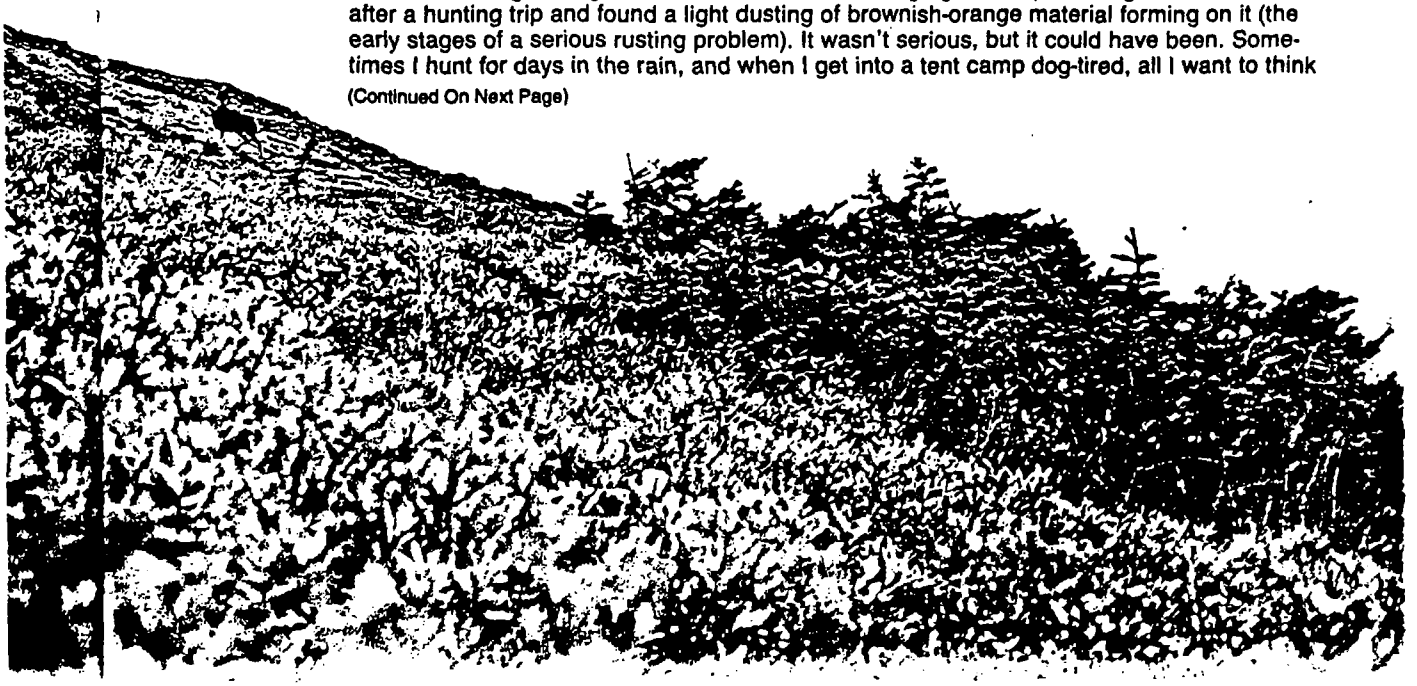
Stainless handguns caught on about 25 years ago with the introduction of the Smith & Wesson Model 60 Chiefs Special. It didn't take long for all the major manufacturers to start producing stainless-steel handguns.

Why stainless rifles didn't follow suit is a mystery to me. One reason may be tradition. The firearms industry is agonizingly slow to change. The same held true with synthetic stocks. Their advantages were clearly demonstrated not only in benchrest competition but on custom hunting rifles in the early 1970s. Even though they are functionally superior to wood stocks, it took more than a decade before the major manufacturers woke up to the potential of synthetics. Of course, there are some economic factors involved. Retooling to handle stainless is expensive, and the manufacturers can't be blamed for not investing until they know the investment will be a profitable venture.

Stainless-steel rifles have major advantages over those made from carbon steel. The obvious one is corrosion resistance. I'm probably the world's worst when it comes to putting a gun away without cleaning it. Gun cleaning is not something I enjoy. My grandfather would probably turn over in his grave if he heard me say that, but today's powders, primers, and rust-inhibiting lubricants have spoiled me.

Sometimes I get caught because of it. It wasn't long ago that I pulled a gun out of a case after a hunting trip and found a light dusting of brownish-orange material forming on it (the early stages of a serious rusting problem). It wasn't serious, but it could have been. Sometimes I hunt for days in the rain, and when I get into a tent camp dog-tired, all I want to think

(Continued On Next Page)



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about is food and a warm bed – not cleaning a rifle. Stainless buys me that time, though it doesn't absolve me of the responsibility to clean a rifle before it corrodes. Contrary to what some believe, *stainless steel will rust; it's just not as* likely or as quick to corrode as carbon steel.

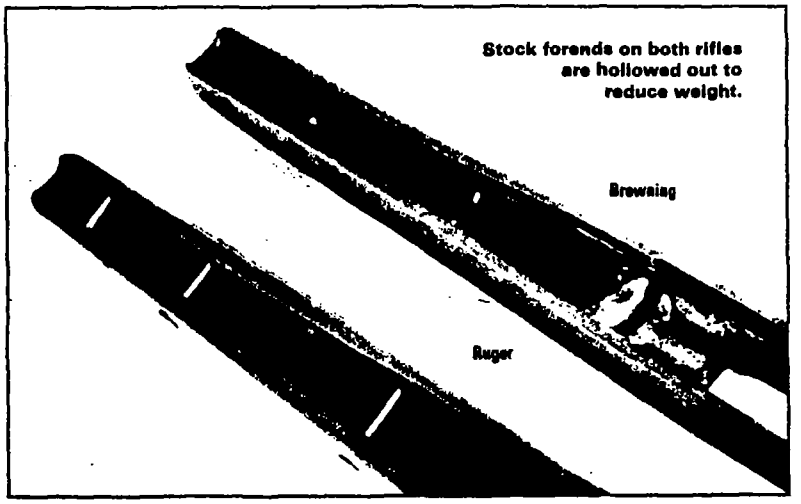
While stainless has the advantage of being resistant to rusting, it's also resistant to blueing since most blueings are rusting processes. For years, a rifle barrel "in the white" was totally unacceptable, and a lot of time and money have been spent on research and development around processes for coloring stainless steel – with varying levels of success.

To blued steel gun traditionalists, the idea of carrying a stainless rifle at one time seemed like driving a car without paint. However, after years of acceptance of "unfinished" handguns, "bare" stainless steel is now not only acceptable but in vogue.

While handgun manufacturers were busy turning out stainless sidearms 20 years ago, the rifle manufacturers stood by the traditional blued finish. However, there were stainless-barreled rifles. The latter was at one time offered for the "hotter" high-velocity cartridges by Remington – the belted magnums and the .17 Remington. At one time, Winchester also offered stainless barrels on its Model 70 .220 Swift and the .264 Winchester Magnum. Some Model 70s in .300 Winchester Magnum were later sold with stainless barrels, although they weren't advertised or marked as being stainless.

While Remington left their barrels "in the white" or unfinished, Winchester colored its barrels with the DuLite 3-0 process, and consequently, some of the stainless Winchester barrels aren't immediately recognizable.

The main reason Winchester chambered the hotter cartridges in stainless barrels was for erosion resistance. According to Winchester, stainless steel provides an appreciable reduction in throat erosion. Remington's Dick Dietz, on the other hand, says that one reason they dropped stainless barrels in hunting rifles is because there is no significant difference in barrel wear.



Stock forends on both rifles are hollowed out to reduce weight.

"Sometimes I hunt for days in the rain, and when I get into a tent camp dog-tired, all I want to think about is food and a warm bed—not cleaning a rifle. Stainless buys me that time."

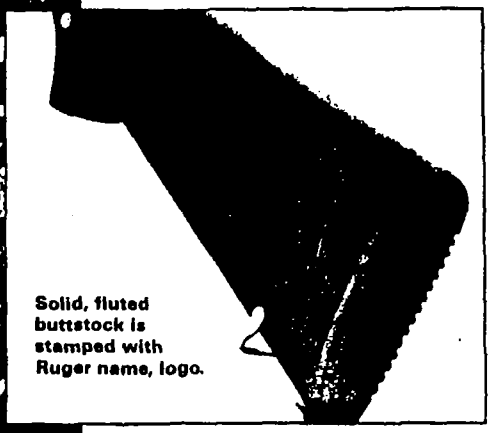
I have been under the assumption that stainless does increase barrel life significantly because nearly all benchrest shooters use stainless barrels, and some say that not only can target accuracy be maintained much longer in a stainless barrel, but stainless barrels shoot better on the average.

One shooter I knew, the late C.W. Wade, who lived in Kansas prairie dog country and fired thousands of rounds of ammunition a year, kept detailed records on the number of rounds fired in each of his rifles. According to him, a conventional .22-250 Remington barrel from the Remington factory lasts about 3000 rounds before it shows considerable throat wear and starts throwing "flyers." He said his custom stainless-barreled rifles, on the other hand, are good for nearly *twice* that many rounds.

I decided to ask several industry members about the wearing qualities of stain-



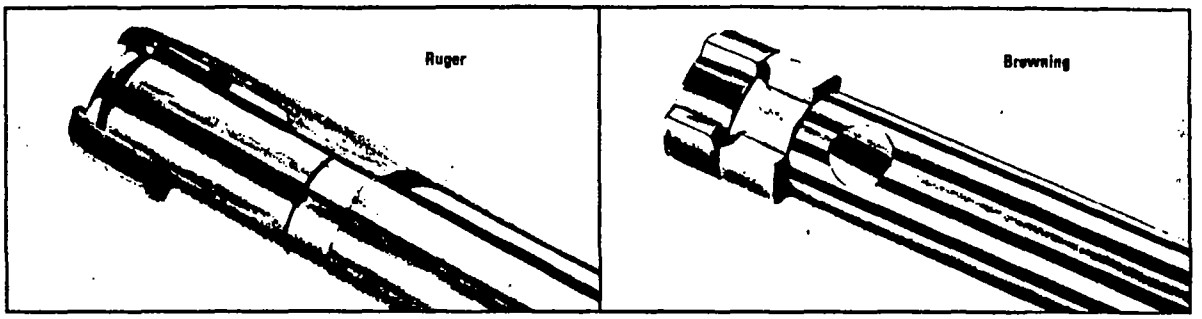
Author believes Ruger's stainless centerfire rifle will be a hit with hunters.



Solid, fluted buttstock is stamped with Ruger name, logo.

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Ruger's stainless bolt uses Mauser-type claw extractor; Browning's carbon steel bolt lugs are pinned to stainless bolt body.

less steel. Wes Harris of McMillan rifles says a stainless barrel doesn't offer appreciably longer wear insofar as hunting accuracy. However, he says a stainless barrel will maintain target accuracy much longer. He also indicated that a stainless barrel would generally shoot a little better than a conventional barrel.

Melvin Forbes of Ultra Light Arms said that he used to shoot a lot of smallbore competition and that a conventional barrel would last about four seasons while a stainless barrel would go five. He was convinced that a stainless barrel would give longer life. In this instance, he was dealing with .22 rimfire ammunition, however.

Like Harris, Forbes indicated a stainless barrel generally shot better. He also said that is was a little easier to get a good finish on the rifling with a stainless barrel but that it would scratch much easier than a barrel of conventional steel. Forbes indicated a stainless barrel is more likely to be worn or scratched by a cleaning rod. Harris indicated that a stainless barrel is less susceptible to pitting than a conventional steel barrel.

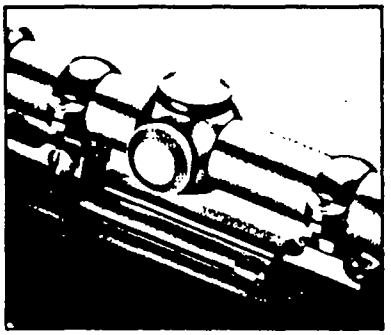
Even though the people at Remington say stainless barrels don't last longer, they still supply stainless barrels on their match rifles (Models 40-XB, 40-XBBR, 40-XC, and 40-XB Varmint Special).

If you are looking for just a stainless barrel, there are lots of options from custom barrelmakers. Nearly all of them handle stainless—that alone attests to the popularity of stainless-steel barrels.

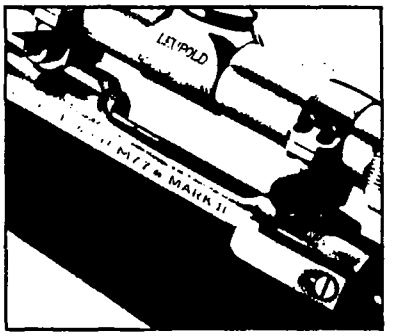
Aside from the positive qualities of stainless steel, there are some negatives, although the negatives aren't something for most shooters to worry about. First is the problem of galling when it comes to stainless rubbing against stainless. McMillan's custom rifle company maintains close tolerances between parts. They say they recently found that they must plate the bolt bodies with electroless nickel to prevent the galling common with stainless actions. Conventional steel on stainless isn't a problem, and if tolerances aren't tight, galling isn't such a problem. A drastically different steel hardness between the two parts is reportedly another way to get around the galling problem of stainless on stainless.

To my knowledge, Ruger was really the first to introduce a stainless long gun (actually a carbine) nearly a decade ago. It was the stainless Mini-14, a miniaturized version of the government-issue M-14 service rifle. The introduction of this carbine was immediately followed by the announcement of various silver-colored riflescopes to match the stainless. Weaver was one of the first to announce such a scope. The silver-colored barreled action and silver-colored scope and mounts made for a striking package.

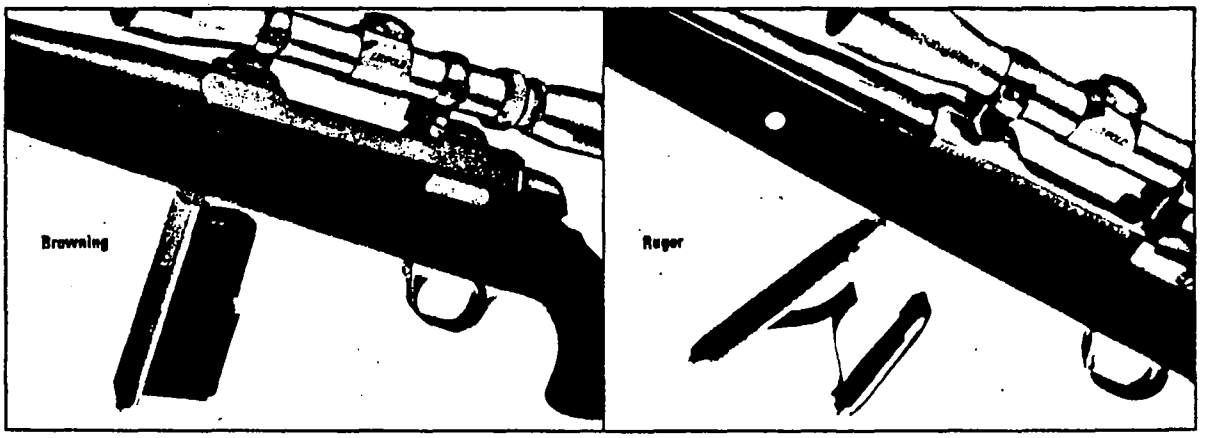
However, it was Browning that made the bold move of introducing a stainless rifle for conservative bolt-action users. The new Browning rifle, introduced two years ago, has an entirely stainless barrel and action, and is complete with a



Stainless Stalker accepts standard scope bases, rings from various makers.

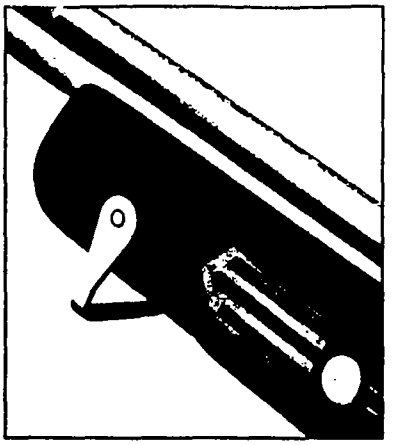


Ruger All-Weather features patented M77-style integral scope-mount system.



The Browning has a hinged floorplate and detachable box magazine; the Ruger floorplate carries a magazine follower/spring.

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Ruger uses permanently attached sling swivels; Browning uses QD swivels.

good-looking synthetic stock. The rifle is aptly dubbed the "Stainless Stalker." Browning's stainless offering is a snazzy, practical version of its excellent bolt rifle, the A-Bolt. The Stainless Stalker was an immediate success.

Ruger has recently introduced a stainless version of their centerfire bolt-action Model 77 Mark II, originally offered in .223 Remington. Ruger's rifle also has a synthetic stock that's entirely different from conventional synthetic stocks.

I have used both the Browning Stainless Stalker A-Bolt and the Ruger Model 77 Mark II rifles and while I like them both, they are entirely different rifles in nearly every respect.

Ruger Model 77
.243 Winchester Performance
Stainless Mark II Model 77
22-Inch Barrel
Leupold 3-9X Scope, Ruger Mounts

Bullet	Powder (Type)	Powder (Grs.)	Velocity (fps)	Group Size (Inches)
Sierra 60-grain hollowpoint	AA 2520	42.5	3617	1.8
Nosler 70-grain Solid Base hollowpoint	H414	48.5	3551	1.6
Hornady 70-grain SX	W760	47.0	3427	(Bullets disintegrated on firing)
Speer 75-grain hollowpoint	RL 15	36.7	3049	1.5
Speer 90-grain FMJ	AA 3100	42.0	2902	2.5
Nosler 95-grain Partition	H4350	43.0	2905	2.0
Hornady 100-grain boattail softpoint	IMR-7828	47.5	2929	1.6
Remington 80-grain pointed softpoint	Factory load		3063	1.9
Winchester Supreme 100-grain boattail softpoint	Factory load		2851	1.7

NOTES: Velocity was clocked with an Oehler Model 33 chronograph at 10 feet from the gun's muzzle and is an average for 10 shots. Group size is an average of three five-shot strings at 100 yards.

Browning A-Bolt
7mm Remington Magnum Performance
Stainless Stalker A-Bolt
26-Inch Barrel
Leupold 3-9X Scope, Leupold Mounts

Ammunition	Velocity (fps)	Group Size (Inches)
Hornady Custom 139-grain BTSP InterLock	3145	1.5
Federal Premium 140-grain Nosler Partition	3264	1.8
Remington 140-grain pointed softpoint	3160	1.3
PMC 140-grain pointed softpoint	3237	2.8
Remington 150-grain Core-Lokt pointed softpoint	3098	2.2
Winchester Super-X 150-grain pointed softpoint	3076	2.6
Hornady Custom 154-grain softpoint InterLock	3041	1.4
Winchester Supreme 160-grain Silvertip boattail	2947	2.1
Hornady Custom 162-grain boattail softpoint	2982	2.4
Federal Premium 165-grain boattail softpoint	3095	1.4
Hornady Custom 175-grain softpoint InterLock	2842	1.7
PMC 175-grain pointed softpoint	2956	1.7
Remington 175-grain Core-Lokt pointed softpoint	2921	1.7
Federal Hi-Shok 175-grain softpoint	2702	1.2
Winchester Super-X 175-grain Power-Point softpoint	2817	2.3

NOTES: Velocity is an average of 10 shots and was clocked at 10 feet from the gun's muzzle with an Oehler Model 33 chronograph. Group size is an average of three five-shot groups fired at 100 yards.

Ruger Model 77 Mark II

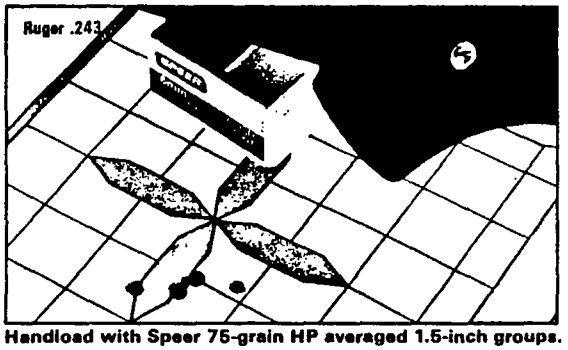
The Mark II stainless centerfire is modeled after the Model 77/22 stainless rimfire rifle. The centerfire rifle has the same molded, solid synthetic stock with the Ruger logo and the pistol grip and forend panels. The buttstock is quite thin in cross section and the stock is not stiff. With the barreled action removed, you can take the butt in one hand and the forend in the other and twist the stock. The forend is hollow with a cross partition about halfway down the forend which adds rigidity. I think you could drive over this stock and do little appreciable damage.

The Ruger stock is precisely molded and has a smooth finish. The stock looks unusual. The black stock, green insert panels, and silver-colored pins and swivels make for a striking rifle. The sling attachments are cross pinned at butt and forend.

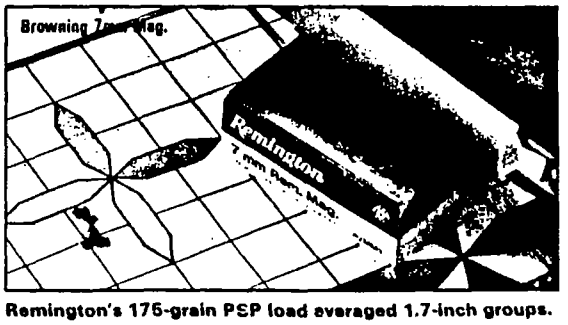
Aside from a blued steel magazine box, follower spring, a few pins, two buttpad screws and the floorplate, the Ruger is either stainless or synthetic. The floorplate is a cast aluminum alloy.

Browning Stainless Stalker

The Stainless Stalker wears a much more conventional-looking synthetic stock than the Ruger. However, the Browning stock is molded and the forend is hollow with a cross partition like the Ruger's. Both stocks are quite functional and both are black, the color being infused into the stock material rather than



Handload with Speer 75-grain HP averaged 1.5-inch groups.

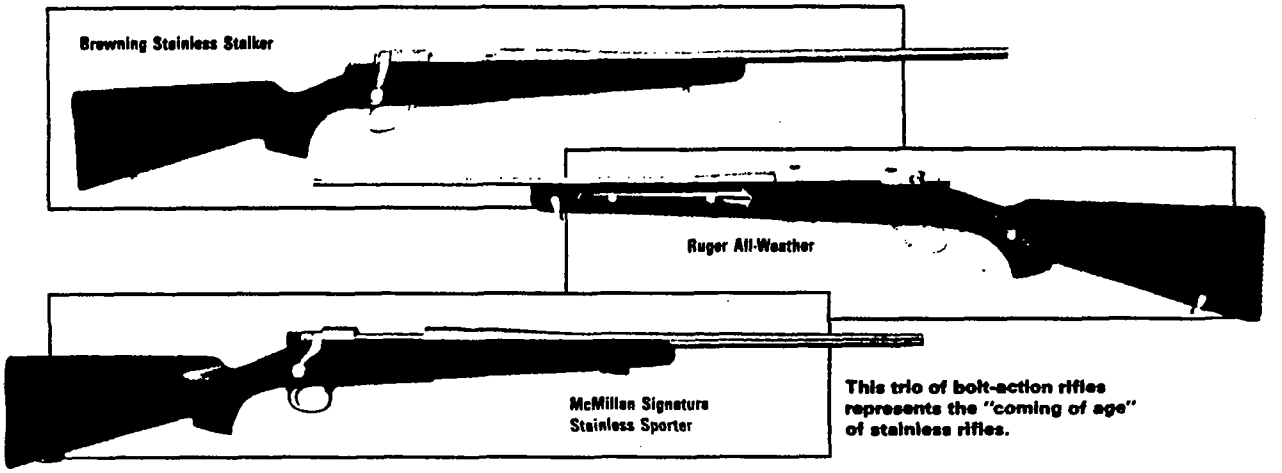


Remington's 175-grain PSP load averaged 1.7-inch groups.

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This trio of bolt-action rifles represents the "coming of age" of stainless rifles.

being a coating.

Most of the Browning's barreled action is stainless—the barrel, receiver, bolt body, and recoil lug. The exceptions are the bolthead (locking lugs), bolt shroud, safety selector, trigger and housing, bolt retainer, and floorplate. The floorplate on the Browning is a white chrome-plated cast aluminum alloy, similar to the Ruger's.

McMillan

Besides Ruger and Browning, McMillan makes a stainless rifle on a small scale.

McMillan also offers a stainless bolt action called the "Classic Stainless Sporter." It's available in most standard calibers (no wildcats) with 22-, 24-, or 26-inch barrels. The rifle is a basic two-lug design and comes with a black synthetic stock as standard. The rifles are furnished with Shilen triggers and one-inch rings and bases. The price is $1950.

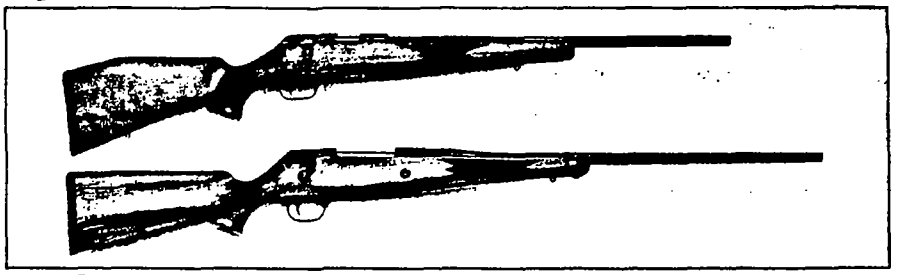
Other options available (at additional cost) include wood stocks, camo stock patterns, and muzzle brakes.

Expect a waiting period between ordering and receiving a McMillan rifle. The company is reporting an eight-week waiting period, but I ordered a rifle in March and had not received it by October as this article was going to press. Obviously, production hasn't caught up with the demand for the rifle.

McMillan guarantees that each rifle will shoot a one-half inch three-shot group at 100 yards. /m.

NOTE: All load data should be used with caution. Always start with reduced loads first and make sure they are safe in each of your guns before proceeding to the highest loads listed. Since *Shooting Times* has no control over your choice of components, guns, or actual loadings, neither *Shooting Times* nor the various firearms and components manufacturers assume any responsibility for the use of this data.

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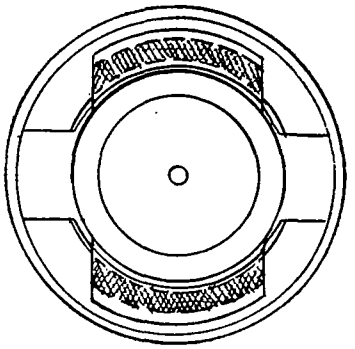
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M/700 BOLT BEARING AREA

JWR. M700 BOLT MIN



▨ BEARING AREA

MIN BEARING AREA = .0417 in^2/LUG = .0833 in^2 TOTAL

BOLT - MIN O.D., MAX CHAMFER ON LUGS, MIN LUG WIDTH
RECEIVER - MAX I.D, MAX CHAMFER ON LUGS

P_{PROOF} = 100000 psi

D_{MAG} = .535 in
D_{STD} = .475 in

STANDARD

$F = PA$

$= 100000\left(\frac{.475^2)\pi}{4}\right) = 17720$ lbs

MAGNUM

$= 100000\ \frac{\pi(.535)^2}{4}$

$= 22480$ lbs

CONTACT STRESS

$P = \frac{F}{A} = \frac{17720}{.0833} = 212725$ psi

$P = \frac{22480}{.0833} = 269870$ psi

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M/700 Bolt Lug Bearing Area

Nominal

.044 in^2/lug .0440297 in^2

.088 in^2 total

Worst Case

.043 in^2/lug .0430698 in^2

.086 in^2 total

Braze 2050°F

H.T. 1600°F

Draw 650–800°F (147 ksi / 200 ksi)

Head	RC 37–46		EC40	σ_y = 179–152 ksi
Body	RC 37–42	(134 / 143 ksi) (136 / 140 ksi)	C-1137	σ_y = 55–58 ksi

300°F 650°F

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WORST CASE

AREA = .041667 in^2

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G-88

DON'T SAY IT - WRITE IT

To: MIKE KEENEY Date: 10/19/90

From: JIM RONKAINEN

MIKE,

PLEASE HAVE VESTSHELL QUOTE THE M/700 BOLT HANDLE IN 416 S/S INSTEAD OF 304 S/S. 416 ISN'T AS GUMMY AS 304 AND SHOULD BROACH BETTER. SORRY ABOUT THE CHANGE.

THANKS,

Jim

"SAFETY APPLIED IS INJURY DENIED!"

Forms From Farnsworth 1-800-441-1555

BALTC:
ARMCO SPECIALTY STEEL(*) 563-5500

(800) 922-4480

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CARPENTER
(800) 527-6600

GALL TUFF S/S

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9/17/90

ATTENDEES: Kerry Taylor, Dale Christie, John Balio, Hal Munson, Gary Cioch, Roger Hatfield, Ed Zucker, Terry Douglas, Dick Stafford

cc: Fred Martin, Fred Schmidt, Jim Hutton, Ron Farrington, Steve Morris

FROM: Jim Ronkainen JR

M/700 S/S MEETING MINUTES, 9/14/90

Our future meetings will include Ron Farrington and Steve Morris.

FIRST CUT AT PRODUCT DEFINITION

Stainless Steel:	Barrel Receiver Barrel Bracket
Plated Parts: (or S/S)	Fire Control Components Bolt Assembly Bolt Plug
Synthetic:	Stock
Unknowns:	Magazine Box Trigger Guard Sights
Unchanged:	Anything not mentioned above

Concerns:

- plating the bolt assembly and the bolt plug because of possible buildup on the threads
- leaving the trigger guard bright. If there is a clear powder coat, it will not cover any porosity in the casting
- matte (blasted) finish for the barrel/receiver is preferred by production (and everyone else)
- standard barrel contour is preferred by production

SHOW AND TELL GUN

- ready for the next product team meeting (10/17)
- need the barrel contour turned down from varmint to standard contour. This may be done on current process equipment, although the chamber could be lost. The Custom Shop or possibly the R&D Model Shop are alternatives
- need additional parts to make the gun look like the assumed product definition

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PRODUCT QUESTIONS

- need product definition and marketing plan from marketing
- need to test corrosion resistance of 416R S/S and plated parts
- strength of M/700 S/S

PROCESS QUESTIONS

- need product definition, marketing plan, and volumes
- how will the 416R process, especially for deep hole drilling and broaching
- can we upset 416R barrels
- how to heat treat 416R
- why not make all parts S/S
- when are high spot economics needed

NEXT STEP

- get product definition and marketing plan (Fini)
- answer questions about heat treating, upsetting, and corrosion resistance of 416R (Hatfield/Schmidt)
- why not all stainless steel?
  Plating may be easier to develop than S/S bolt and fire control from a material qualification standpoint (Hutton, 9/14/90)
- make show and tell guns for next product team meeting (Martin/Ronkainen)
- test plating for corrosion protection and feasability (Schmidt/Hatfield/Martin/Ronkainen)

9/17/90 **CONFIDENTIAL**

ATTENDEES: Kerry Taylor
Dale Christie
John Balio
Hal Munson
Gary Savage
Roger Hatfield
Ed Zucker
Terry Douglas
Dick Stafford

cc: Fred Martin
Fred Schmidt
Jim Hutton
Ron Farrington
Steve Morris

corrected Dairy Clerk's name

FROM: Jim Ronkainen JR

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9/14 90

HUTTON –
- WHY A PLATED BOLT INSTEAD OF S/S?
- " " " F.C. " " " ? } EASIER THAT'S ALL

FINI –
- PRODUCT DEFN.
- MARKETING PLAN, VOLUMES

HAVE M/700 S/S FOR PRODUCT TEAM MTG.

ECONOMICS
— TRY FOR NOVEMBER PRODUCT TEAM MTG.

CLP – great for corrosion

ROGER
- HEAT TREAT
- DEFETTING BARRELS

$ 1.37E 4116R S/S FOR RECEIVERS

· BROACH DESIGN CHANGE – 1 YR LEAD TIME ON TOOL FOR S/S

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AGENDA 700 S/S 9/14/90

1. What we're trying to do and why
2. Have we missed anybody that should be here? FARRINGTON {planning / purchasing
3. What a M/700 S/S looks like
   - S/S Parts
     - Barrel
     - Receiver
     - Barrel Bracket
   - Plated Parts
     - Fire Control Components
     - Bolt Assembly } threads are a concern after plating
     - Bolt Plug
   - Synthetic
     - Stock
   - Unknowns
     - Magazine Box
     - Trigger Plate — color
     - Sights?
   - Unchanged
     - Firing Pin Assy (EX Bourpuo).
     - All springs
     - Extractor
     - Ejector
     - Anything not mentioned above
4. The show and tell gun — may have more barrels from SWS
   - Parts we have
     - S/S Barreled Actions (7mm08, maybe .308) — first early on maybe check on BROWNING/RUGER
       - need to be turned down to std. bbl contour — stress relieve — mill finished turned barrel
   - Parts we need
     - Fire Control components for plating
     - Bolts for plating
     - Bolt Plugs for plating
     - Synthetic stock (700 AS short action)
     - QuickClip
5. Product questions
   - Does it have a box magazine?
   - What are the calibers for first introduction?
   - Can we protect the 416R S/S from corrosion?
   - What is the barrel contour?
   - Can the ~~Fire Control~~ Trigger Housing be plated as an assembly?
   - Will the barrels use 5R rifling or conventional?
   - Does gun have sights?
6. Process questions
   - Can we make S/S receivers? broaching? tap hole drilling
   - Can we make S/S barrels?
   - Can we plate the Trigger Housing assembled?
   - Will the plating match the S/S?
   - Lead times for machinery, material, etc.?
   - Volumes?
   - Calibers?
7. What is the next step?
   - can we upset 416 barrels? defn.
   - FINI — matrix plan, product spec for m/700 s/s
   - s/s in mtn rifle contour isn't listed

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AGENDA 9/14/90

1. What we're trying to do and why

2. Have we missed anybody that should be here?

3. What a M/700 S/S looks like
   - S/S Parts
     - Barrel
     - Receiver
     - Barrel Bracket
   - Plated Parts
     - Fire Control Components
     - Bolt
     - Bolt Plug
   - Synthetic
     - Stock
   - Unknowns
     - Magazine Box
     - Trigger Plate
     - Sights
   - Unchanged
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     - All springs
     - Extractor
     - Ejector
     - Anything not mentioned above

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   - Parts we have
     - S/S Barreled Actions (7mm08, maybe .308)
       - need to be turned down to std. bbl contour
   - Parts we need
     - Fire Control components for plating
     - Bolts for plating
     - Bolt Plugs for plating
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   - What is the barrel contour?
   - Can the fire control be plated as an assembly?
   - Will the barrels use 5R rifling or conventional?

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   - Can we make S/S receivers?
   - Can we make S/S barrels?
   - Can we plate the Trigger Housing assembled?
   - Will the plating match the S/S?
   - Lead times for machinery, material, etc.?
   - Volumes?
   - Calibers?

7. What is the next step?

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AGENDA M/700 S/S 9/14/90

1. What we're trying to do and why

2. Have we missed anybody that should be here?

3. What a M/700 S/S looks like
   - S/S Parts
     - Barrel
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     - Bolt Plug
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   - Parts we need
     - Fire Control components for plating
     - Bolts for plating
     - Bolt Plugs for plating
     - Synthetic stock (700 AS short action)
     - QuickClip

5. Product questions
   - Does it have a box magazine?
   - What are the calibers for first introduction?
   - Can we protect the 416R S/S from corrosion?
   - What is the barrel contour?
   - Can the Trigger Housing be plated as an assembly?
   - Will the barrels use 5R rifling or conventional?
   - Does the gun have sights?

6. Process questions
   - Can we make S/S receivers?
   - Can we make S/S barrels?
   - Can we plate the Trigger Housing assembled?
   - Will the plating match the S/S?
   - Lead times for machinery, material, etc.?
   - Volumes?
   - Calibers?

7. What is the next step?

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m/700 s/s

9/14 90

QUESTIONS

	WHO
- corrosion protection of the S/S parts: passivate or plate?	R&D, ME
- use Quick Clip or keep current magazine?	R&D, MKTG
- what will the first calibers be for introduction?	MKTG
- what barrel contour, mountain or std? (affects stock)	MKTG.
- can fire control be plated as an assy? PM parts?	R&D, MCT
- should S/S include SR rifling?	MKTG. R&
- can material run on current equipment?	PROD ENG
- lead times, volumes?	MKTG, PROD

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Research Division — PARTS LIST #125

Supersedes Previous Model 700 A.S. Parts List #117

MODEL 700 A.S.(ARYLON STOCK)
BOLT ACTION CENTERFIRE RIFLE

Date:
09/26/89 For 1989
11/20/89 Same as M-700 BDL
Except as Shown

Sheet 1 of 2

Dotted line (----) indicates same part number

DWG. No.	PART NAME	Short Action 22-250 243 308	Long Action 270 280 30-06	Magnum 7MM Rem Mag. 300 Weatherby Mag.
		PART NUMBERS		
	Caliber	RAMAC No.		
	22-250	9685		
	243	9687		
	308	9693		
	270		9689	
	280		9697	
	30-06		9691	
	7mm Rem.Mag.			9695
	300 Weatherby Mag.			9699
	BAG ASSEMBLY COMPLETE	1721	- - -	- - -
	Firearm Safety Booklet Rev. 6/89	1410	- - -	- - -
	Instruction Book (RD 5461 Rev. 288)	3391	- - -	- - -
	Polybag 7x10x.0015	1452	- - -	- - -
	Product Owners Card	1426	- - -	- - -
	Remington Authorized Gunsmith (Form RD 6860 Rev. 789)	3413	- - -	- - -
	CARTON ASSEMBLY	1443	- - -	- - -
	Hang Tag (RD 6961)	3451	- - -	- - -
	Hang Tag Label & Box End Label	993002	- - -	- - -
	BARREL ASSEMBLY COMPLETE			
B-103120	22-250	103129		
"	243	103120		
"	308	103121		
"	270		103122	
"	280		103123	
"	30-06		103124	
"	7MM Rem. Mag.			103125
"	300 Weatherby Mag.			103130
	BARREL ASSEMBLY			
B-103090	22-250	103096		
"	243	103090		
"	308	103091		
"	270		103093	
B-103090	280		103094	
"	30-06		103095	
"	7MM Rem. Mag.			103092
"	300 Weatherby Mag.			103097

Research Division

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MODEL 700 A.S.(ARYLON STOCK)
Date: BOLT ACTION CENTERFIRE RIFLE

09/26/89 For 1989
11/20/89 Same as M-700 BDL
Except as Shown

Sheet 2 of 2

Dotted line (----) indicates same part number

DWG. No.	PART NAME	Short Action 22-250 243 308	Long Action 270 280 30-06	Magnum 7MM Rem Mag. 300 Weatherby Mag.
		PART NUMBERS		
	Barrel			
D-26285	22-250	94533		
"	243	94103		
"	308	94104		
"	270		94105	
"	280		94106	
"	30-06		94107	
D-24550	7MM Rem Mag			94108
"	300 Weatherby Mag.			94611
E-33226	Receiver 22-250, 243, 308	94102		
E-33225	Receiver 270, 280, 30-06, 7MM Rem Mag		94071	---
"	300 Weatherby Mag.			94071
	BOLT ASSEMBLY			
D-28710	22-250, 243, 308	94098		
"	270, 280, 30-06		94097	
D-33270	7mm Rem. Mag.			94100
"	300 Weatherby Mag.			94100
C-15373	Front Sight	94084	---	
C-15719	Front Sight (Alternate)	94083	---	
B-14659	Front Sight Magnum			94095
B-15635	Front Sight Ramp	94096	---	---
B-103145	REAR SIGHT ASSEMBLY	103146	---	103147
C-93905	Rear Sight Aperture (Blk. C-93906)	94333	---	---
C-103530	Rear Sight Base (Blk. 94023)	103531	---	
C-91595	Rear Sight Base Magnum (Blk.C-32530)			94080
C-93905	Rear Sight Slide (Blank 93907)	94335	---	---
B-22040	FIRING PIN ASSEMBLY	94093	94094	---
C-17012	Bolt Plug	94091	---	---
C-15363	FRONT SIGHT HOOD	94090	---	---
B-103750	STOCK ASSEMBLY	103751	103750	103755
B-26370	TRIGGER GUARD ASSEMBLY	94535	94089	---
	THE ABOVE PART NUMBER IS FOR ARMS SERVICE ONLY			
B-31490	Trigger Guard Sub Assembly	94534	94088	---
C-19800	Floor Plate Long Action & Magnum		94087	---
C-16434	Floor Plate Short Action	94536		
D-26375	Trigger Guard	26378	26377	---
B-96010	Trigger Guard Screw, Front (Blk. 94651)	94652	---	---
B-96010	Trigger Guard Screw, Rear (Blk. 96218)	96015	---	---

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CONVERSION OF M/700 TO S/S

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M/700 S/S WITH CLIP

- CURRENTLY MAKE S/S BARRELS
- HAVE MADE S/S RECEIVERS
- CAN MAKE S/S BARREL BRACKET
- S/S BOLT IS A QUESTION
- CLEAR ANODIZE TRIGGER GUARD
- S/S BOTTOM ON QUICK CLIP (WHOLE THING S/S?)
- PLATE THE FIRE CONTROL

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PARTS TO CHANGE TO S/S

BARREL
BARREL BRACKET
RECEIVER
BOLT HEAD
BOLT HANDLE
BOLT BODY
BOLT PLUG
FIRING PIN HEAD
BOLT PIN
GUARD SCREWS
RECEIVER PLUG SCREWS
SAFETY BUTTON
TRIGGER?
SIGHTS?

PARTS TO BE PLATED

BOLT STOP RELEASE
FIRE CONTROL

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S/S M/700

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S/S 416R BBL — ELECTROLESS Ni A BOLT — PLATED ELECTROLESS Ni FIRE CONTROL (MAYBE AS AN ASS'Y) — S/S 416R RECEIVER

ELECTROLESS NICKEL, 416R

2 Stage Intro & not important, not our decision

Testing
salt-fog for corrosion

machines better according to plant

6000 lbs Crucible
20000 lbs Cartech
} 416R steel for barrels & receivers

~10 lbs/bbl for SWS M/24
introduce S/S 700 with or without 5R rifling?

Problems to check out

- plating parts as housing & individual parts (.0005 MAX)
  - 60 sets of parts, 2 groups of 30 (fire control) (bright, clean)
  - 20-25 bolts, 2 lots of 10 (long, short, how does brazing work out) bolt plugs
- stopping corrosion on 416R
  - passivate or plate

MEETING W/ HUTTON, SCHMIDT, MARTIN, & RONKAINEN

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Product Team

S.S. M/700

- Need to compare to Ruger, Browning
- No Sights
- Synthetic Mountain Rifle of Stock is available but Standard contour is ok to save cost.
- 15000 1st year - all incremental
- Evaluate economics
- 30-06, 7mm - mag; 300 Win, .280
- Go to clip across BDL
- Question of pre-empting NBOR
- To determine: - Bronk -
  - S.S. Bolt Head -
  - Trigger [redacted] assy -
  - Clip feature - regardless of S.S.
  - Cost
  - Mat'l Lead time

Hi-Gloss Finish through buffing

- Leave W'burn as is for now, - start S/K on Hi-gloss

LWT Barrel on 870/11-87

Make the conversion to put O/A contour on all barrels, no matter - across the line

for-end contour change.

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BALTIMORE
SPECIALTY STEELS
CORPORATION

WILLIAM J. DAVISON
PRODUCT SUPERVISOR

P.O. Box 1697
Baltimore, MD 21203

301/563-5700
FAX: 301/563-5512

A SUBSIDIARY OF ARMCO INC.

Armco NITRONIC 50 Stainless Steel

OUTPERFORMS TYPES 316, 316L, 317 AND 317L

- **Superior corrosion resistance**
- **Almost double the yield strength**
- **Exceptionally low magnetic permeability**
- **Outstanding cryogenic properties**

Applications Potential

Outstanding corrosion resistance gives Armco's NITRONIC 50 Stainless Steel the leading edge for applications where Types 316, 316L, 317 and 317L are only marginal. It's an effective alloy for the petroleum, petrochemical, chemical, fertilizer, nuclear fuel recycling, pulp and paper, textile, food processing and marine industries.

Components using the combination of excellent corrosion resistance and high strength currently include pumps, valves and fittings, fasteners, cables, chains, screens and wire cloth, marine hardware, boat and pump shafting, heat exchanger parts, springs and photographic equipment.

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ARMCO NITRONIC 50 STAINLESS STEEL BAR AND WIRE

(UNS-S20910, XM-19)

Product Data Bulletin No. S-38

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16-17	Welding
18	Machinability

The information and data in this product data bulletin are accurate to the best of our knowledge and belief, but are intended for general information only. Applications suggested for the materials are described only to help readers make their own evaluations and decisions, and are neither guarantees nor to be construed as express or implied warranties of suitability for these or other applications.

Data referring to mechanical properties and chemical analyses are the result of tests performed on specimens obtained from specific locations of the products in accordance with prescribed sampling procedures; any warranty thereof is limited to the values obtained at such locations and by such procedures. There is no warranty with respect to values of the materials at other locations.

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Armco NITRONIC 50 Stainless Steel Product Description

Armco NITRONIC 50 Stainless Steel provides a combination of corrosion resistance and strength not found in any other commercial material available in its price range. This austenitic stainless steel has corrosion resistance greater than that provided by Types 316, 316L, 317, and 317L, plus approximately twice the yield strength at room temperature. In addition, Armco NITRONIC 50 Stainless Steel has very good mechanical properties at both elevated and sub-zero temperatures. And, unlike many austenitic stainless steels, NITRONIC 50 does not become magnetic when cold worked or cooled to sub-zero temperatures. High Strength (HS) NITRONIC 50 Stainless Steel has a yield strength about three to four times that of Type 316 stainless steel.

Composition

	%
Carbon	0.06 max
Manganese	4.00/6.00
Phosphorus	0.040 max
Sulfur	0.030 max
Silicon	1.00 max
Chromium	20.50/23.50
Nickel	11.50/13.50
Molybdenum	1.50/3.00
Nitrogen	0.20/0.40
Columbium	0.10/0.30
Vanadium	0.10/0.30

Specifications

NITRONIC 50 bar, wire, sheet, plate, forgings and forging billets are covered by the following specifications. It is suggested the issuing agency be contacted for the latest revision of the specification.

Armco NITRONIC 50 Stainless Steel is listed as Grade XM-19 (UNS S20910) in:

ASTM A314—Bar and Billet

ASTM A240 — Plate, Sheet and Strip for Fusion Welded Unfired Pressure Vessels

ASTM A412 — Plate, Sheet and Strip

ASTM A479 — Bars and Shapes for Use in Boilers and Other Pressure Vessels

ASTM A276 — Bars and Shapes

ASTM A580 — Wire

ASTM A182 — Forged or Rolled Pipe Flanges, Forged Fittings and Valves

ASTM A193 — Bolting (Grade B8R)

ASTM A194 — Nuts (Grade 8R)

ASTM A249 — Welded Superheater, Heat-Exchanger and Condenser Tubes

ASTM A269 — Seamless and Welded Tubing for General Service

ASTM A312 — Seamless and Welded Pipe

ASTM A351 and A743—Castings (Grade CG6MMN)

ASTM A403 — Wrought Piping, Fittings

ASTM A358 — Electric Fusion Welded Pipe

AMS 5764 — Bars, Forgings and Extrusions

ASME Design Allowables Listed in Table UHA-23 of Section VIII Division 1

ASME Design Values Listed in Section III Division 1 Appendicies

NACE MR-01-75 Annealed and High Strength (HS) Conditions Acceptable to a Hardness of Rockwell C35 Max.

In valves and chokes, NITRONIC 50 Stainless Steel may be used for valve shafts, stems and pins in the cold-worked condition provided this cold working is preceded by an anneal.

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Other specification coverage is pending. It is suggested that Armco be contacted for information concerning additional coverage.

Annealing Temperature

Armco NITRONIC 50 Stainless Steel can be supplied annealed at 1950 F to 2050 F (1066 C to 1121 C). For most applications, the 1950 F (1066 C) condition should be selected, as it provides a higher level of mechanical properties along with excellent corrosion resistance. When as-welded material is to be used in strongly corrosive media, the 2050 F (1121 C) condition should be specified in order to minimize the possibility of intergranular attack.

Metric Practice

The values shown in this bulletin were established in U.S. customary units. The metric equivalents of U.S. customary units shown may be approximate. Conversion to the metric system, known as the International System of Units (SI), has been accomplished in accordance with the American Iron and Steel Institute Metric Practice Guide, 1978.

The newton (N) has been adopted by the SI as the metric standard unit of force as discussed in the AISI Metric Practice Guide. The term for force per unit of area (stress) is the newton per square metre (N/m^2). Since this can be a large number, the prefix mega is used to indicate 1,000,000 units and the term meganewton per square metre (MN/m^2) is used. The unit (N/m^2) has been designated a pascal (Pa). The relationship between the U.S. and the SI units for stress is: 1000 pounds/in^2 (psi) = 1 kip/in^2 (ksi) = 6.8948 meganewtons/m^2 (MN/m^2) = 6.8948 megapascals (MPa). Other units are discussed in the Metric Practice Guide.

Mechanical Properties

Table 1
Minimum Properties Acceptable for Material Specification
Annealed Bars

Condition	UTS psi (MPa)	0.2% YS psi (MPa)	Elongation % in 2" (50.8 mm)	Reduction of Area %
Annealed 1950 F (1066 C) to 2050 F (1121 C) and water quenched (up to 144 in^2 [929.0 cm^2])	100,000 (690)	55,000 (379)	35	55
Over 144 in^2 (929.0 cm^2) to 324 in^2 (2091 cm^2)	95,000 (655)	50,000 (345)	30	45

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Table 2
Typical Room Temperature Properties*
1" (25.4 mm) Diameter Bar

	Tensile Properties						Torsional Properties	
Condition	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elong. % in 2" (50.8 mm)	Red. of Area %	Hardness Rockwell	Impact Charpy V-Notch ft-lbs (J)	0.2% Tortional YS ksi (MPa)	Modulus of Rupture ksi (MPa)
Annealed 2050 F (1121 C) plus water quench	120 (827)	60 (414)	50	70	B98	170 (230)	44.5 (307)	114.5 (789)
Annealed 1950 F (1066 C) plus water quench	125 (862)	65 (448)	45	65	C23	130 (176)	55 (379)	120 (827)

*Average of duplicate tests.

Table 3
Typical Short-Time Elevated Temperature Tensile Properties*

Condition	Test Temperature F (C)	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % in 2" (50.8 mm)	Reduction of Area %
Annealed 1950 F (1066 C) Bars 3/4 to 1-1/4" (19.1 to 31.8 mm) Diameter	75 (24)	124 (855)	78 (538)	40.5	67.5
	200 (93)	112 (772)	66 (455)	40.5	67.5
	400 (204)	102 (703)	58 (400)	37.5	67
	600 (316)	98 (676)	54 (372)	37.5	64
	800 (427)	94 (648)	50 (345)	39.5	63
	1000 (538)	89 (614)	48 (331)	36.5	62.5
	1200 (649)	80 (552)	44 (303)	36.5	63
	1350 (732)	68 (469)	42 (290)	42.5	71.5
	1500 (816)	50 (345)	32 (221)	59.5	85
Annealed 2050 F (1121 C) Bars 1" to 1-1/2" (25.4 to 38.1 mm) Diameter	75 (24)	117 (807)	60 (414)	45	71
	200 (93)	107 (738)	50 (338)	43.5	70.5
	400 (204)	96 (662)	38 (262)	43.5	69.5
	600 (316)	92 (634)	35 (241)	42.5	67.5
	800 (427)	89 (614)	34 (234)	43.5	66
	1000 (538)	84 (579)	32 (221)	41	66.5
	1200 (649)	74 (510)	31 (214)	38	64
	1350 (732)	66 (455)	31 (214)	37	61.5
	1500 (816)	52 (359)	30 (207)	41	61

*Average of triplicate tests from each of three heats.

Table 4
Typical Stress-Rupture Strength*

Condition	Test Temp. F (C)	Stress for Failure, ksi (MPa)		
		100 Hours	1,000 Hours	10,000 Hours (estimated)
Annealed 1950 F (1066 C) Bars 3/4" to 1-1/4" (19.1 - 31.8 mm) Diameter	1000 (538)	91 (627)	88 (607)	72 (496)
	1100 (593)	72 (496)	62 (427)	47 (324)
	1200 (649)	55 (379)	38 (262)	22 (152)
	1350 (732)	21 (145)	12 (82.7)	6 (41.4)
	1500 (816)	10 (69.0)	3.7 (25.5)	1.3 (9.0)
Annealed 2050 F (1121 C) Bars 1" to 1-1/2" (25.4 - 38.1 mm) Diameter	1000 (538)	—	—	—
	1100 (593)	65 (448)	54 (372)	43 (296)
	1200 (649)	50 (345)	41 (283)	32.5 (224)
	1350 (732)	29 (200)	15 (103)	8.5 (58.6)
	1500 (816)	13 (89.6)	6.5 (44.8)	3.5 (24.1)

*Average of tests from three heats.

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Table 5
Typical Creep Strength*
1" (25.4 mm) Diameter Bar

Condition	Test Temp F (C)	Stress for min Creep Rate, ksi (MPa)	
		.0001% per Hour	.00001% per Hour
Annealed 2050 F (1121 C)	1100 (593)	41 (283)	34.5 (238)
	1200 (649)	22 (152)	16 (110)

*Tests from one heat.

Table 6
Typical Mechanical Properties*
Cold Drawn Wire

Cold Reduction %	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % in 4 x D	Reduction of Area %
15	165 (1138)	143 (986)	23	56
30	194 (1338)	174 (1200)	15	49
45	216 (1489)	196 (1351)	11	45
60	234 (1613)	216 (1489)	9	42
75	246 (1696)	234 (1613)	8	39

*Average of duplicate tests.
Starting size: 1/4" (6.35 mm) dia rod annealed at 2050 F (1121 C).

In common with other NITRONIC alloys, NITRONIC 50 Stainless Steel, when cold reduced 60% or more without in-process anneals, will embrittle very rapidly when exposed at temperatures in the range of 800 to 1000 F (426 to 538 C). Therefore, springs made of NITRONIC 50 Stainless Steel should not be given the low-temperature, *stress-relief treatment commonly used for austenitic* stainless steels.

Table 7
Typical Sub-Zero Mechanical Properties*
1" (25.4 mm) Diameter Bar — Annealed 2050 F (1121 C)

Test Temp. F (C)	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % in 2" (50.8 mm)	Reduction of Area %
-100 (-73)	146 (1007)	85 (586)	49.5	65
-320 (-196)	226 (1558)	128 (883)	41	51

*Average of duplicate tests

Table 8
Typical Impact Strength
1" (25.4 mm) Diameter Bar — Annealed 2050 F (1121 C)

Test Temp. F (C)	Impact — Charpy V-Notch, ft-lbs (J)	
	Annealed	Simulated HAZ*
75 (24)	170 (230)	170 (230)
-100 (-73)	115 (156)	115 (156)
-320 (-196)	50 (68)	50 (68)

*Heat treated at 1250 F (677 C) for 1 hour to simulate the heat-affected zone of heavy weldments.
Average of duplicate tests.

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Table 9
Effect of Cold Reduction on Mechanical Properties of Bars

Diameter Bar in. (mm)	Cold Reduction %	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % 2" (50.8 mm) or 4 x D	Red. of Area %	Hardness Rockwell	Charpy Impact, ft-lbs (J) Test Temperature, F (C) 80 (27)	-40 (-40)	-110 (-79)
750 (19 05)	0	116.6 (804)	57.6 (397)	47.0	70.6	B91	232 (314)	—	—
750 (19.05)	13	142.5 (982)	126.0 (869)	31.0	67.0	C30	116 (157)	—	—
		141.1 (973)	122.5 (844)	31.0	65.7		115 (156)	—	—
650 (16.51)	28	157.6 (1086)	153.4 (1058)	21.0	63.8	C34	98 (133)	74 (100)	—
		156.0 (1076)	150.6 (1036)	24.0	63.6		91 (123)	54 (73)	—
.750 (19.05)	46	185.9 (1282)	183.8 (1268)	18.0	57.9	C36	54 (73)	48 (65)	38 (51)
		183.1 (1263)	180.6 (1245)	16.0	57.8		53 (71)	43 (58)	39 (53)

High Strength (HS) Bar Properties

Armco NITRONIC 50 Stainless Steel bars also are available in a high-strength condition attained by special processing techniques. The superior strength of NITRONIC 50 HS Stainless Steel produced by hot rolling is size-dependent, approaching that of annealed bars with sizes over 3" (76.2 mm) diameter. Because its high strength is produced by mill processing, hot forging, welding or brazing operations cannot be performed on this material without loss of strength. High-strength bars produced by rotary forging—special practice may have somewhat reduced resistance to corrosion and sulfide stress cracking.

Table 10
Minimum Room Temperature Tensile Properties of High-Strength (HS) Bars (Hot Rolled Unannealed)

Size in (mm)	UTS ksi (MPa)	0.2%YS ksi (MPa)	Elongation or 4 X D	Reduction of Area %	Hardness Brinell	Charpy V-Notch ft-lbs (J)
3/4 to 1-1/4 (17.5 to 31.8)	145 (1000)	130 (896)	18	45	283	80 (108)
Over 1-1/4 to 2 incl. (31.8 to 50.8)	135 (931)	105 (724)	20	50	260	100 (135)
*Over 2 to 2-1/2 (50.8 to 63.5)	120 (827)	95 (655)	20	50	220	100 (135)
Over 2-1/2 to 3 incl.	115 (793)	75 (517)	25	50	210	100 (135)

Table 11
Torsional Properties of High-Strength (HS) Bars (Hot Rolled Unannealed) 1-1/4" to 2" (31.7 to 50.8 mm) Diameter, Inclusive*

	Prop. Limit ksi (MPa)	0.2% YS ksi (MPa)	Modulus of Rupture ksi (MPa)
Typical	65 (448)	100 (690)	140 (965)
Minimum	50 (345)	70 (483)	120 (827)

*Average of duplicate tests. Properties of material over 2" (50.8 mm) are somewhat lower. Please inquire.

Table 12
Minimum Properties Acceptable for Material Specification High-Strength Bars (Produced by Rotary Forging Special Practice)

	2½" (63.5 mm) to 6" incl. (152.4 mm)	Over 6" (152.4 mm) to 8½" incl. (215.9 mm)	Over 8½" (215.9 mm) to 9½" incl. (241.3 mm)
UTS, psi (MPa) min.	130,000 (896)	125,000 (862)	120,000 (827)
0.2% YS, psi (MPa) min	110,000 (758)	90,000 (621)	90,000 (621)
Elong. % in 2" (50.8 mm) min	15	20	20
Red. of Area % min	45	50	50
Charpy V-Notch, ft-lbs (J)	100 (135)	100 (135)	100 (135)

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Table 13
Typical Short-Time Elevated Temperature Tensile Properties of High-Strength (HS) Bars* (Hot Rolled Unannealed)

Test Temperature F (C)	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % in 2" (50.8 mm)	Reduction of Area, %
75 (24)	150 (1034)	126 (869)	29	64
200 (93)	135 (931)	112 (772)	28	65
400 (204)	124 (855)	101 (696)	27	63.5
600 (316)	117 (807)	93 (641)	27.5	61
800 (427)	111 (765)	86 (593)	28.5	61
1000 (538)	103 (710)	80 (552)	27	60.5
1100 (593)	99 (683)	77 (531)	26	59.5

*Bars 1" to 2" (25.4 to 50.8 mm) diameter.
Average of triplicate tests from each of three heats.

Table 14
Typical Stress-Rupture Strength of 1" (25.4 mm) Diameter High-Strength (HS) Bars* (Hot Rolled Unannealed)

Test Temp. F (C)	Stress for Failure, ksi (MPa)		
	100 Hours	1,000 Hours	10,000 Hours (est.)
1000 (538)	98 (676)	95 (655)	78 (538)
1100 (593)	85 (586)	66 (455)	51 (352)

*Average of tests from two heats.
NITRONIC 50 high-strength (HS) bars are not recommended for prolonged use at temperatures above 1100 F (593 C).

Table 15
Typical Sub-Zero Impact Strength of High-Strength (HS) Bars* (Hot Rolled Unannealed)

Test Temp., F (C)	Charpy V-Notch Impact, ft-lbs (J)		
	1" (25.4 mm) dia.	1-1/2" (38.1 mm) dia.	2" (50.8 mm) dia.
80 (27)	126 (171)	150 (203)	148 (201)
-75 (-60)	114 (155)	131 (178)	131 (178)
-200 (-129)	48 (65)	62 (84)	61 (83)
-320 (-196)	31 (42)	41 (56)	36 (49)

*Average of duplicate tests from two heats of each bar size.

Table 16
Typical Cryogenic Mechanical Properties of High-Strength (HS) 2" (50.8mm) Bar

Temperature F (C)	0.2% YS ksi (MPa)	UTS ksi (MPa)	Elongation % in 2" (50.8 mm)	Reduction in Area %
Room	115.5 (796)	142.5 (983)	40.0	65.0
-100 (-73)	136.6 (942)	169.9 (1171)	35.5	66.5
-200 (-129)	152.4 (1051)	189.7 (1308)	28.0	61.0
-250 (-157)	166.9 (1151)	200.4 (1382)	25.5	63.5
-320 (-196)	192.9 (1330)	241.3 (1664)	28.5	*

*Piece broke from specimen, making accurate determination of final diameter impossible.

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Fatigue Strength

Table 17
Rotating Beam Fatigue Tests

Condition	Bar Size	Fatigue Strength at 10^8 Reversals of Stress ksi(MPa)	
		Tested in Air*	Tested in Seawater**
Annealed 2050 F (1121 C)	1" dia (25.4 mm)	42 (290)	22(152)
Annealed 1950 F (1066 C)	1" dia (25.4 mm)	47 (324)	–
High-Strength (HS) Bars (Hot Rolled Unannealed)	1" dia (25.4 mm)	68 (469)	18 (124)
	2-1/2" dia (63.5 mm)	58 (400)	15 (103)
	4" dia (102 mm)	44 (303)	15 (103)

*R. R. Moore specimens tested at room temperature.
**McAdam specimens tested in ambient temperature seawater (11-31 C) at LaQue Corrosion Laboratory, Wrightsville Beach, N.C.
Tests from one heat for each size and condition.

Shear Strength

The shear strength of NITRONIC 50 Stainless Steel in double shear has been determined following Boeing Aircraft Co. D2-2860, Procedures for Mechanical Testing of Aircraft Structural Fasteners. The results, determined from a typical heat, are as shown.

Table 18
Shear Strength

Condition	UTS ksi (MPa)	Double Shear ksi (MPa)	Shear/Tensile Ratio, %
Annealed 1950 F (1066 C)	126 (869)	86.8 (598)	69
Annealed 2050 F (1121 C)	113 (779)	78.5 (541)	69.5

Average of duplicate tests.

Elastic Properties

The elastic properties of annealed NITRONIC 50 at room temperature are as shown.

Table 19
Elastic Properties

Modulus of Elasticity in Tension (E) psi (MPa)	Modulus of Elasticity in Torsion (G) psi (MPa)	Poisson's Ratio
28.9×10^6 (199×10^3)	10.8×10^6 (74,500)	0.312

Average of duplicate tests

Notch Sensitivity

Tensile tests were performed at room temperature using notched specimens with a stress-concentration factor of $K_t = 1.3$. The following data at right show Armco NITRONIC 50 Stainless Steel is not notch sensitive.

Table 20
Elastic Properties at Elevated Temperatures*

Temperature F (C)	Young's Modulus in Tension psi	(MPa)	Poisson's Ratio
72 (22)	28.9×10^6	(199×10^3)	0.312
200 (93)	27.8×10^6	(192×10^3)	0.307
300 (149)	27.0×10^6	(186×10^3)	0.303
400 (204)	26.1×10^6	(180×10^3)	0.299
500 (260)	25.3×10^6	(174×10^3)	0.295
600 (315)	24.6×10^6	(170×10^3)	0.291
700 (371)	24.0×10^6	(165×10^3)	0.288

*Tests performed on sheet samples in the longitudinal direction using strain gages.

Table 21
Notch Sensitivity

Condition	UTS — Smooth, ksi (MPa)	UTS — Notched, ksi (MPa)
Annealed 2050 F (1121 C)	114.5 (790)	155 (1069)
Annealed 1950 F (1066 C)	120.5 (830)	—
High-Strength (HS) Bars	151 (1041)	196.5 (1354)

Average of duplicate tests

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Galling and Wear Resistance

The galling resistance of Armco NITRONIC 50 Stainless Steel is similar to Type 316 or just slightly better.

Metal-to-metal wear tests demonstrate the superiority of NITRONIC 50 over alloy K-500 despite the higher hardness of the latter. Comparative wear data are shown.

For applications requiring superior galling, wear and cavitation resistance coupled with good corrosion resistance, Armco NITRONIC 60 Stainless Steel should be considered.

Table 22
Weight Loss of Couple* mg/1000 cycles

Alloy (Rockwell Hardness) versus	Alloy K-500 (C34)	NITRONIC 50 (C28)	Type 316	NITRONIC 60 (B95)
Type 316 (B91)	33 78	10.37	12.51 (B91)	4.29
17-4 PH (C43)	34.08	12 55	18.50 (B91)	5.46
Cobalt Alloy 6B (C48)	18 78	3.26	5.77 (B72)	1.85
Type 431 (C42)	26.40	6 73	5.03 (B72)	3.01
Ti-6Al-4V (C36)	17 19	6 27	6.31 (B72)	4.32
Alloy K-500 (C34)	30 65	34.98	33.78 (B91)	22.87
NITRONIC 50 (C28)	34.98	9.37	10.37 (B72)	4.00
NITRONIC 60 (B95)	22.87	4 00	4.29 (B91)	2.79

*Test Conditions Taber Met-Abrader machine, 500" Ø crossed (90°) cylinders, dry, 16-lb load, 105 RPM, room temperature, 120 grit surface finish, 10,000 cycles, degreased, duplicates, weight loss corrected for density differences

Table 23
Cavitation Resistance of Annealed NITRONIC 50 Stainless Steel

Alloy	Weight Loss mg*
NITRONIC 50	30
Type 316	100

*Data provided by outside laboratory per ASTM G32 Test Method.

Physical Properties

Density at 75 F (24 C)
7.88 gm/cm³
.285 lbs/in³

Electrical Resistivity at 70 F (21 C) — 82 microhm-cm

Magnetic Permeability

Armco NITRONIC 50 Stainless Steel does not become magnetic when severely cold worked. This characteristic makes the alloy useful for applications requiring a combination of excellent corrosion resistance and low magnetic permeability.

The magnetic permeability of Armco NITRONIC 50 Stainless Steel remains very low at cryogenic temperatures, but not as low as Armco NITRONIC 33 and NITRONIC 40 Stainless Steels. The magnetic susceptibility data in Table 25 were obtained on mill-annealed sheet samples using the Curie Force Method.

Note that the magnetic susceptibility of Armco NITRONIC 50 Stainless Steel exhibits a cusp at approximately −400 F (−240 C). This phenomenon, which also occurs with Armco NITRONIC 33 and NITRONIC 40 Stainless Steels, is dependent on temperature but not on field strength. Unlike the AISI 300 series stainless steels, most Armco NITRONIC Alloys show no supermagnetism.

Table 24
Wire*

Condition	Typical Magnetic Permeability at Field Strength of 50 Oer. (3978 A/m)	100 Oer. (7957 A/m)	200 Oer. (15,914 A/m)
Annealed	1.004	1.004	1.004
Cold Drawn 27%	1 004	1.004	1.003
Cold Drawn 56%	1.004	1.004	1 004
Cold Drawn 75%	1.004	1.004	1.004

* Average of duplicate tests.

Table 25

Temperature F (C)	Magnetic Mass Susceptibility, χ, 10^{-6} cm³ g⁻¹	Typical Magnetic Permeability, μ
72 (22)	21.5	1.0021
−9 (−23)	22.5	1.0022
−99 (−73)	25	1.0025
−189 (−123)	28.5	1.0028
−279 (−173)	35.5	1.0035
−369 (−223)	54	1.0053
−400 (−240)	74	1.0073
−432 (−258)	61	1.0060

Reference: *Advances in croyogenic Engineering Materials,* Vol. 26 (1980), pp. 37-47.

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Coefficient of Thermal Expansion

Table 26

Coefficient of Thermal Expansion
Annealed Material*

Temperature Range F (C)	Coefficient of Thermal Expansion microinches/in/°F. (μm/m•K)	
70-200 (21-93)	9.0	(16.2)
70-400 (21-204)	9.2	(16.6)
70-600 (21-316)	9.6	(17.3)
70-800 (21-427)	9.9	(17.8)
70-1000 (21-538)	10.2	(18.4)
70-1200 (21-649)	10.5	(18.9)
70-1400 (21-760)	10.8	(19.4)
70-1600 (21-871)	11.1	(20.0)

*Average of duplicate tests.

Table 27

Thermal Contraction

Temperature F (C)	Contraction Parts Per Million (ppm)	Mean Expansion Coefficient Between T and 75 F (24 C)	
		ppm/°F	ppm/°C
-41 (-41)	948	8.17	14.61
-51 (-46)	1016	8.06	14.53
-60 (-51)	1074	7.95	14.34
-80 (-62)	1237	7.98	14.40
-100 (-73)	1398	7.99	14.43
-125 (-87)	1560	7.80	14.07
-150 (-101)	1723	7.66	13.80
-178 (-117)	1951	7.71	13.84
-200 (-129)	2079	7.56	13.60
-225 (-143)	2231	7.44	13.37
-260 (-162)	2333	6.96	12.55
-320 (-196)	2542	6.44	11.56

Thermal Conductivity

Table 28

Temperature F (C)	Thermal Conductivity* BTU/hr/ft²/in/°F (W/m•K)	
70 (21)	—	—
300 (149)	108	(15.6)
600 (316)	124	(17.9)
900 (482)	141	(20.3)
1200 (649)	160	(23.0)
1500 (816)	175	(25.2)

*Average of duplicate tests.

Corrosion Resistance

Armco NITRONIC 50 Stainless Steel provides outstanding corrosion resistance — superior to Types 316, 316L, 317 and 317L in many media. For many applications the 1950 F (1066 C) annealed condition provides adequate corrosion resistance and a higher strength level. In very corrosive media or where material is to be used in the as-welded condition, the 2050 F (1121 C) annealed condition should be specified. High-Strength (HS) NITRONIC 50 bars are useful for applications such as shafting and bolting, but do not quite exhibit the corrosion resistance of the annealed conditions in all environments.

Typical corrosion rates obtained from laboratory tests on NITRONIC 50 Stainless Steel in its several conditions are shown in Table 29 along with comparable data for Types 316, 316L, 317 and 317L stainless steels.

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Table 29
Laboratory Corrosion Test Data

Test Medium	Corrosion Rates in Inches per Year (IPY) Unless Otherwise Indicated[1]				
	NITRONIC 50 Bar Annealed 1950 F (1066 C)	NITRONIC 50 Bar Annealed 2050 F (1121 C)	NITRONIC 50 High-Strength (HS) Bar[3]	Types 316 & 316L Annealed Bar	Types 317 & 317L Annealed Bar
10% $FeCl_3$, 25 C — plain[2]	<.001 g/in²	<.001 g/in²	<.001 g/in²	.011 g/in²	—
10% $FeCl_3$, 25 C — creviced[2]	<.001 g/in²	<.001 g/in²	< 001 g/in²	.186 g/in²	—
1% H_2SO_4, 80 C	<.001	<.001	<.001	0.002	<.001
2% H_2SO_4, 80 C	<.001	<.001	<.001	0.011	<.001
5% H_2SO_4, 80 C	<.001	<.001	<.001	0.060	0.036
10% H_2SO_4, 80 C	—	0.028	—	0.10	0.049
20% H_2SO_4, 80 C	—	0.133	—	0.48	0.155
1% H_2SO_4, Boiling	—	0.027	—	—	0.013
2% H_2SO_4, Boiling	—	0.064	—	0.12	0.027
5% H_2SO_4, Boiling	.194	0.131	0.296	0.26	0.093
10% H_2SO_4, Boiling	—	0.356	—	0.73	0.465
20% H_2SO_4, Boiling	—	1.64	—	2.20	1.30
1% HCl, 35 C	<.001	<.001	<.001	0.012	0.002
2% HCl, 35 C	0.024	<.001	0.027	0.021	0.023
1% HCl, 80 C	—	<.001	0.239	—	0.148
2% HCl, 80 C	—	0.439	0.452	—	0.263
65% HNO_3, Boiling	0.010	0.007	—	0.012	0.012
70% H_3PO_4, Boiling	0.203	0.154	—	0.202	0.201
33% Acetic Acid, Boiling	<.001	<.001	<.001	<.001	<.001
20% Formic Acid, Boiling	—	<.001	—	0.027	—
40% Formic Acid, Boiling	—	0.032	—	0.034	—
10% HNO_3 + 1% HF, 35 C	—	0.007	—	0.064	—
10% HNO_3 + 1% HF, 80 C	—	0.069	—	0.442	—

[1]Immersion tests performed on 5/8" dia. x 5/8" (15.9 x 15.9 mm) long machined cylinders. Results are average of five 48-hour periods. Specimens tested at 35 C and 80 C were intentionally activated for third, fourth, and fifth periods. Where both active and passive conditions occurred, only active rates are shown.

[2]Exposure for 50 hours with rubber bands on some specimens to produce crevices.

[3]Corrosion rates for hot rolled bars. For other mill products, contact Armco.

Table 30
Laboratory Corrosion Test Data*
Cast NITRONIC 50

Test Medium	NITRONIC 50 As-Cast	NITRONIC 50 Cast + Annealed 2050 F (1121 C)
10% $FeCl_3$ — Uncreviced 50 hrs., Room Temperature	—	<.001 g/in²
10% $FeCl_3$ — Crevices 50 hrs., Room Temperature	—	.029 g/in²
5% H_2SO_4, 80 C	95 MPY	81 MPY
5% H_2SO_4, Boiling	—	418 MPY
1% HCl, 35 C	<1 MPY	<1 MPY
70% H_3PO_4, Boiling	—	83 MPY

* All tests performed on 5/8" (15.9 mm) diameter x 5/8" (15.9 mm) long machined cylinders. Except for the ferric chloride tests, all results are the average of five 48-hour periods. Specimens tested at 35 C and at 80 C were intentionally activated for the third, fourth, and fifth periods. Where both active and passive periods occurred, only active rates are shown

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Intergranular Attack

The resistance of Armco NITRONIC 50 Stainless Steel to intergranular attack is excellent even when sensitized at 1250 F (675 C) for one hour to simulate the heat-affected zone of heavy weldments. Material annealed at 1950 F (1066 C) has very good resistance to intergranular attack for most applications. However, when thick sections of Armco NITRONIC 50 Stainless Steel are used in the as-welded condition in certain strongly corrosive media, the 2050 F (1121 C) condition gives optimum corrosion resistance. This is illustrated by Table 32.

Stress-Corrosion Cracking Resistance

In common with most stainless steels, under certain conditions, Armco NITRONIC 50 Stainless Steel may stress-corrosion crack in hot chloride environments. When tested in boiling 42% $MgCl_2$ solution, a very accelerated test, NITRONIC 50 Stainless Steel is between types 304 and 316 stainless steels in resistance to cracking. There is little difference in susceptibility to cracking whether in the annealed, high-strength (HS), or cold-drawn conditions. This is illustrated by the comparative data in Table 33 using the direct-loaded tensile-type test method (described in detail in ASTM STP 425, September 1967). Note that this is a severe test, especially at these temperatures. For marine applications, the following better reflects the resistance of NITRONIC 50 Stainless Steel:

Table 31
Intergranular Corrosion Resistance of Cast NITRONIC 50

Huey Test, IPM		
Annealed*	Sensitized**	% Ferrite
0.0005	0.0006	Nil
0.0004	0.0015	4

*2050 F (1121 C) - 1/2-Hour - Water Quenched
**2050 F (1121 C) - 1/2-Hour - Water Quenched + 1250 F (677 C) -1/2-Hour - Air Cooled.
Even sensitized cast NITRONIC 50 Stainless Steel has an acceptable intergranular corrosion rate less than 0.0020 IPM with up to 4% ferrite present.

Table 32
Intergranular Attack Resistance of NITRONIC 50 Bar per ASTM A262

Condition	Practice B Ferric Sulfate	Practice E Copper-Copper Sulfate
Annealed 1950 F (1066 C)	0.0010 IPM	Passed
Annealed 1950 F (1066 C) + 1250 F (677 C) – 1 hr. – A.C.	0.0038 IPM	Passed
Annealed 2050 F (1121 C)	0.0009 IPM	Passed
Annealed 2050 F (1121 C) + 1250 F (677 C) – 1 hr. – A.C.	0.0022IPM	Passed
High-Strength (Bar Mill)	0.0031 IPM	Passed
High-Strength (PRF)		
Edge	0.0013IPM	Passed
Intermediate	0.0012 IPM	Passed
Center	0.0011 IPM	Passed

Table 33
Boiling $MgCl_2$

Alloy	Condition	Time to Failure, Hours Under Stress of		
		75 ksi (517 MPa)	50 ksi (345 MPa)	25 ksi (172 MPa)
Type 304	Annealed	0.2	0.3	0.8
Type 316	Annealed	0.8	2.5	7.0
NITRONIC 50	Annealed	0.4	1.2	5.0
NITRONIC 50	High-Strength	1.2	1.5	6.0
NITRONIC 50	Cold Drawn	1.2	2.6	3.3

U-bend-type stress corrosion test specimens of NITRONIC 50 in the following metallurgical conditions have been exposed to marine atmosphere on the 80' lot at Kure Beach, N.C.

(1) Mill Annealed 1950 F (1063 C)

(2) Mill Annealed & Sensitized 1250 F (675 C)

(3) Cold Rolled 44% (160 ksi yield strength)

Tests were begun on June 3, 1970. No failure occurred after 15 years exposure.

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Sulfide Stress Cracking

Both laboratory tests and field service experience show that Armco NITRONIC 50 Stainless Steel has excellent resistance to sulfide stress cracking in all conditions. NITRONIC 50 Stainless Steel in both the annealed and high-strength *(hot-rolled) conditions* has been included in the 1988 revision of NACE Standard MR-01-75, "Sulfide Stress Cracking Resistant Material for Oil Field Equipment," at hardness levels up to RC35 maximum. The cold-worked condition to RC35 maximum also is acceptable in valves and chokes for valve shafts, stems and pins, provided this cold working is preceded by an anneal.

Table 34 illustrates the resistance of Armco NITRONIC 50 Stainless Steel to cracking in laboratory tests in synthetic sour-well solution (5% NaCl + ½% acetic acid, saturated with H_2S). Comparable data are included for Armco 17-4 PH Stainless Steel, which is considered acceptable by NACE for use in sour-well service in the two heat-*treated conditions shown.*

Table 34
Resistance to Sulfide Stress Cracking[1]

Alloy	Condition	Hardness Rockwell	0.2% YS ksi (MPa)	Time to Failure, hr., Under Stress, ksi (MPa)						
				150 (1034)	140 (965)	125 (862)	100 (690)	75 (517)	50 (345)	25 (172)
NITRONIC 50	Annealed 1950 F (1066 C)	C22	67 (448)	—	—	—	>1000	>1000	>1000	—
NITRONIC 50	High-Strength (HS)[3] 1" (25.4 mm) dia.	C33	135 (931)	—	204	320	>1000	>1000	—	—
NITRONIC 50	High-Strength (HS)[3] 1" (25.4 mm) dia.	C35	146 (1007)	—	358	—	—	—	—	—
NITRONIC 50	High-Strength (HS)[3] 1" (25.4 mm) dia.	C36	144 (993)	170[2]	>1000	>1000	>1000	—	—	—
NITRONIC 50	Cold Drawn 3/8" (9.5 mm) dia.	C41	160 (1103)	>1000	—	—	>1000	—	—	—
17-4 PH	H 1150+ 1150	C32.5	110 (758) est.	—	—	—	—	9.5	16	225
17-4 PH	H 1150-M	C29	85 (586)	—	—	—	—	13.5	29	850

[1] Longitudinal tensile specimens tested according to NACE TM 01-77

[2] Ductile creep failure.

[3] For hot rolled bars only.

NITRONIC 50 Stainless Steel spring temper wire coiled into a spring was exposed to the NACE solution at room temperature under the following conditions:

Table 35

Condition	Wire UTS ksi (MPa)	Applied Stress ksi (MPa)	Hrs to Failure
Cold Drawn Wire Wound *into a Helical Spring*	282 (1944)	100 (689)	>1584(discontinued)

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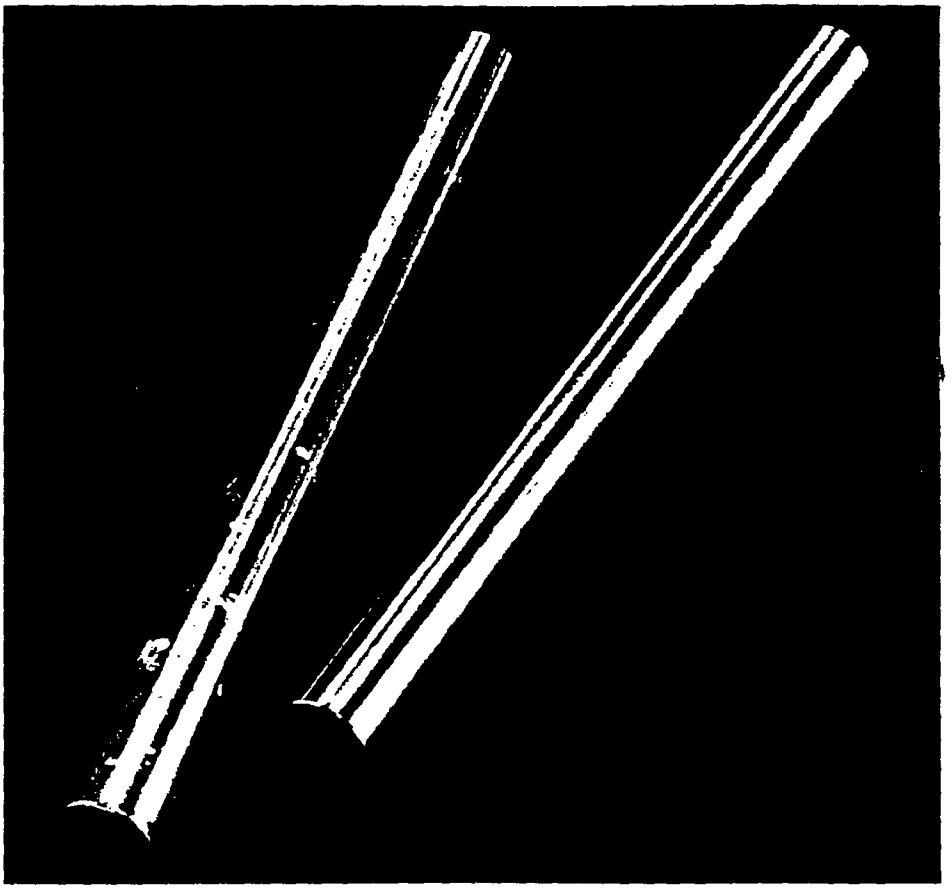
Seawater Resistance

Here is how NITRONIC 50 High-Strength (HS) shafting and Alloy 400 (Ni-Cu) looked after 18 months' exposure in quiet seawater off the coast of North Carolina. The test was conducted without zinc anodes to establish the relative corrosion resistance of NITRONIC 50 High-Strength (HS) shafting. Had zinc anodes been used or a bronze propeller fitted to these bars, no crevice corrosion should have occurred. The photograph was taken after barnacles and other forms of marine life were cleared from the test bars.

Before exposure, all specimens were polished tc 120 grit finish, degreased and passivated. They were then clamped into pepper-wood racks and exposed fully immersed in seawater. NITRONIC 50 high-strength (HS) shafting showed no crevice attack under the wooden blocks after the 18 months. One bar of NITRONIC 50 high-strength (HS) shafting remained perfect, while the other showed a few areas of very light crevice attack, <.001" (0.025 mm) deep under marine attachments. Both samples of Alloy 400 suffered shallow crevice attack .001"-.003" (0.025-0.076 mm) deep under the area in contact with the wooden rack, and also under numerous attached barnacles.

Type 316 stainless steel tested similarly for nine months suffered random pitting and crevice corrosion under the area in contact with the wooden rack and also under marine attachments, while NITRONIC 50 again remained in perfect condition. These specimens are shown in the photograph.





These two bars are immersed in quiet seawater for nine months. Bright shiny bar at right is Armco NITRONIC 50 stainless steel, and at left is Type 316 stainless steel showing considerable pitting and crevice corrosion.

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Salt Fog — Marine Environment

No change was apparent in NITRONIC 50 Stainless Steel in any condition after exposure to 5% NaCl fog at 35 C for 500 hours, or after exposure to marine atmospheres on the 800-foot (24.4m) lot at Kure Beach, North Carolina, for 7½ years. Similar exposure to marine atmospheres produces light staining on Type 316 stainless steel.

Food Handling

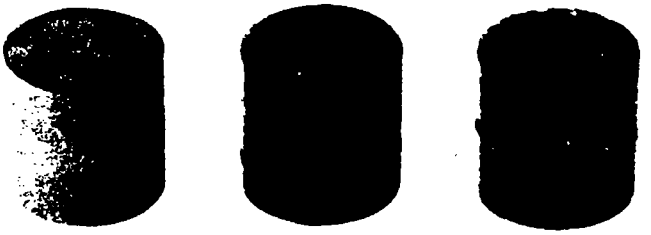
Armco NITRONIC 50 Stainless Steel is considered suitable for food contact use. The National Sanitation Foundation includes Armco NITRONIC 50 Stainless Steel in their "List of Acceptable Materials for Food Contact Surfaces."

Polythionic Acid Resistance

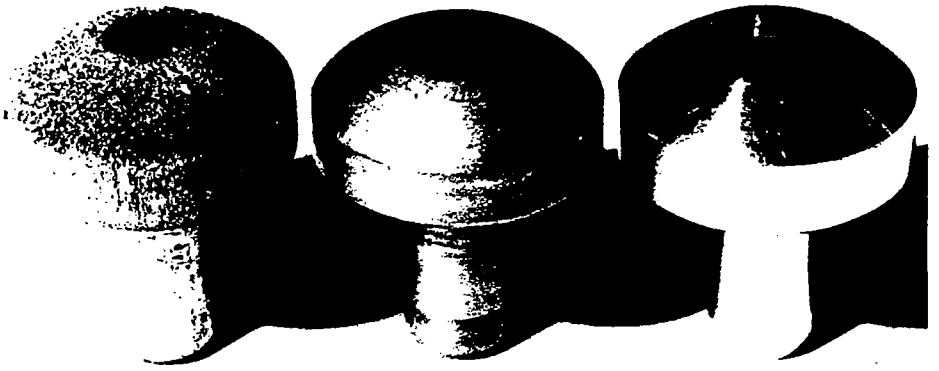
Polythionic acids are of the general formula $H_2S_xO_6$, where x is usually 3, 4 or 5. These acids can form readily in petroleum refinery units, particularly desulfurizers, during shutdown.

Stressed U-bend specimens of NITRONIC 50 stainless, in both the annealed condition and after sensitizing at 1250 F (677 C) for 1 hour, showed no trace of cracking after exposure to polythionic acids for 500 hours at room temperature.

Pitting Resistance



These pieces of bar were all exposed to 10% ferric chloride solution for 50 hours at room temperature. A rubber band was placed around each to promote crevice corrosion which sometimes occurs in areas where the surface is shielded from oxygen. From left to right, they are Armco NITRONIC 50 Stainless Steel, Type 316 stainless steel and Type 304 stainless steel. Only Armco NITRONIC 50 stainless is still bright and shiny. The Type 316 and Type 304 stainless steels are badly pitted and show severe crevice corrosion in the area where the rubber bands were placed.



Type 304 Type 316 NITRONIC 50

Urea Production

Ammonium carbamate — an intermediate produced during the manufacture of urea — is extremely corrosive to process equipment. Pump parts in the process are subjected to a combination of severe corrosive attack, high temperatures and cyclical operating pressures ranging up to 3000 psi. Some parts made of Type 316L stainless steel have shown surface attack in just a few months.

A manufacturer of special valves tested three stainless steels in ammonium carbamate. As shown in the photograph, Type 304 stainless steel became severely etched in two weeks and Type 316 stainless steel showed some corrosive attack in all exposed areas after six weeks. Armco NITRONIC 50 Stainless Steel remained unaffected after six weeks' exposure to this aggressive medium.

Armco NITRONIC 50 Stainless Steel is presently being specified for the blocks, plungers and related parts of reciprocating pumps when service requires handling ammonium carbamate or other corrosive materials.

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Fabrication

Although Armco NITRONIC 50 Stainless Steel is considerably stronger than the conventional 300 series stainless steels, the same fabricating equipment and techniques can be used.

Forging

NITRONIC 50 Stainless Steel is readily forged like Type 316 stainless steel, except that it requires more power and the temperature is 2150 F to 2250 F (1177 C to 1232 C).

Annealing

Like other austenitic stainless steels, NITRONIC 50 must be rapidly cooled. In-process anneals to facilitate cold forming should be done at 2050 F (1066 C). Please note Page 3.

Table 36

Nominal Composition and Typical Mechanical Properties of Several Austenitic All-Weld-Metal Deposits

Alloy Type	Nominal Composition, Weight %						Typical Mechanical Properties		
	C	Mn	Cr	Ni	Others		UTS ksi (MPa)	0.2% YS ksi (MPa)	Elong. %
AWS 308L	0.04 max	1.0 2.5	19.5 22.0	9.0 11.0	—		85 (586)	55 (379)	45
AWS 309	0.15 max	1.0 2.5	22.0 25.0	12.0 14.0	—		90 (621)	55 (379)	40
AWS 312	0.15 max	1.0 2.5	28.0 32.0	8.0 10.5	—		110 (758)	80 (552)	30
					Mo	N			
Armco NITRONIC 50W (AWS E 209)	0.05 max	4.0 7.0	20.5 24.0	9.5 12.0	1.5 3.0	.10 .30	110 (758)	85 (586)	20
					Fe	Cb			
INCONEL 182	0.10 max	5.0 9.5	13.0 17.0	Bal.	6.0 10.0	1.0 2.5	85 (586)	55 (379)	40

Welding

In addition to the improved mechanical properties and corrosion resistance, Armco NITRONIC 50 Stainless Steel can be welded successfully by using any of the conventional welding processes that are normally employed with the austenitic stainless steels.

Armco NITRONIC 50 Stainless is readily arc welded in all forms. As with most austenitic stainless steels, good weld joint properties can be obtained without the necessity of preheat or post-weld annealing. Good shielding of the molten weld puddle is important to prevent any absorption of nitrogen from the atmosphere that could result in porosity.

Autogenous, high-power density joining processes such as electron beam (EB) and laser welding should be used with caution due to the low FN potential of the base metal (FN approximately 2). Field reports also indicate the possibility of severe outgassing during EB welding in a vacuum atmosphere. Under vacuum conditions, this outgassing is to be expected for liquid weld metal containing a high nitrogen level.

Filler Metals

Filler metal, when added to the joint, should be Armco NITRONIC 50W (AWS E/ER 209), a matching filler metal composition that provides comparable strength and corrosion resistance to the base metal. However, sound weld joints may also be obtained using the conventional austenitic stainless steel fillers such as Types 308L and 309. When using these more common filler metal compositions, allowances should be made for the strength and corrosion differences.

Nominal compositions and representative mechanical properties are shown for the more common electrode filler rods in Table 36. The weld metal alloys are listed generally in the order of (a) increasing alloy content, (b) increasing strength level, (c) increasing corrosion resistance and (d) increasing cost.

These data show that the highest strength levels with good tensile ductility and alloy elements that impart good corrosion resistance are provided by the Armco NITRONIC 50W Electrode. In some specific applications where the high strength

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levels or superior corrosion resistance in the weld deposits are not required, other filler metals can be used to advantage because of reduced costs and/or ready availability.

The matching weld filler (NITRONIC 50W, AWS E/ER 209) for Armco NITRONIC 50 Stainless Steel is similar to many of the regular austenitic stainless steel filler metals in that a small percentage of the magnetic ferrite phase has been introduced to assure sound weld deposits. The small quantity of the second phase usually produces a magnetic permeability value of approximately 1.2 in shielded metal-arc weld deposits. This corresponds to a ferrite number (FN) of approximately 6.

Highly overalloyed Ni base fillers are suggested for applications requiring high resistance to pitting media or very low as-deposited magnetic permeability.

GTA Weld Joints

Gas tungsten arc weld joints have been fused successfully in several flat-rolled thicknesses of Armco NITRONIC 50 Stainless Steel. Mechanical property values similar to those of the base metal have been obtained in the as-welded condition.

The corrosion resistance of GTA welded joints has been evaluated using the standard Huey test (ASTM A 262, Practice C) for detecting intergranular attack in stainless steels. Laboratory test experience shows that welds made using the NITRONIC 50W Stainless Steel filler metal exhibit the same resistance to intergranular attack as the base metal.

Table 37

Typical Mechanical Properties
Armco NITRONIC 50 Stainless Plate Weld Joints

Weld Process	Weld Filler	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elong. % in 2"	Red. in Area, %	Failure Location
Shielded Metal Arc (SMA)	NITRONIC 50W	113 (779)	76 (524)	20	36	Weld Metal
Gas Metal Arc (GMA) Spray	NITRONIC 50W	112 (772)	77 (531)	21	30	Weld Metal

Heavy Section Weld Joint Properties

The mechanical properties of welds in 1-1/4" (32.1 mm) thick plate have been determined using two weld processes that are normally employed in heavy section welding, namely, (a) shielded metal arc (SMA) or stick electrode welding and (b) gas metal arc (GMA) or MIG welding with the spray mode. Typical test values that can be expected from tensile samples cut transverse to the weld centerline are shown in Table 37.

Heat input is important in obtaining the most satisfactory weld joint. Narrow stringer beads rather that a wide "weave" technique should be used for highest weld ductility. Good shielding of the molten puddle is important to eliminate additional nitrogen from the atmosphere that could cause porosity. Both stringer beads and adequate shielding are normal factors in good stainless steel welding practice.

Resistance Welding

Although no direct resistance welding experience has been obtained with Armco NITRONIC 50 Stainless Steel, the similarity of the alloy to Armco NITRONIC 40 Stainless Steel suggests a good response to resistance spot welding and cross-wire welding techniques. The welding schedules outlined in the fabricating bulletin, "Welding Armco Stainless Steels," can be used as a guide to produce sound, high-strength joints in both annealed and cold-reduced sheet. Average shear strength data for spot welded joints in Armco NITRONIC 40 Stainless Steel appear in the Product Data Bulletin, "Armco NITRONIC 40 Stainless Steel Sheet and Strip." Armco NITRONIC 50 Stainless Steel is expected to perform in a similar manner.

For more specific suggestions and for NITRONIC 50W filler metal sources, contact Baltimore Specialty Steels Corporation.

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Machinability

Armco NITRONIC 50 Stainless Steel has machining characteristics similar to other austenitic stainless steels. It is suggested that *coated carbides* be considered when machining all NITRONIC alloys, since higher cutting rates may be realized. NITRONIC 50 Stainless Steel is more susceptible to cold work hardening than types 304 and 316 stainless steels. Also, the alloy has higher strength. Machining tests show the alloy to machine at approximately 21% of the cutting rate for B1112. This means NITRONIC 50 Stainless Steel can be machined at approximately 1/2 the cutting rate (SFM) used for Type 304 or 316 stainless steels, based on using high-speed tool steels. For that reason, as stated above, *coated carbides* are recommended for best results.

Because of the high strength of NITRONIC 50 Stainless Steel, more rigid tool and work holders than used for Types 304 and 316 stainless steels should be used. Care should be taken not to allow tools to slide over the alloy. Positive cutting action should be initiated as soon as possible. The alloy provides a good surface finish.

Table 38

Machinability*

AISI B 1112	Type 304	Armco NITRONIC 50
100%	45%	21%

*1" ø (25.4 mm)—annealed—R_B 95
Five-hour form tool life using high-speed tools
Data based on duplicate tests

Table 39

Recommended Machining Rates for NITRONIC 50

Machining Operation	Cutting Rates, SFM
Automatic Screw Machine	40-65
Heavy duty Single or Multiple Spindle and Turret Lathe	40-65
High Speed Tools. Rates may be increased 15-30% with High-Cobalt or Cast Alloys	
Automatic Screw Machine (Swiss Type)	40-65
Cast Alloy or Carbide Tools	
Single Point Turning	
Carbide Tools	
Roughing	90-140
Finishing	120-190
High Cobalt or Cast Alloy Tools	
Roughing	50-65
Finishing	50-75
High-Speed Steel Tools	
Roughing	30-45
Finishing	50-60
Milling (When using end mills, use two-fluted type and shorten it 25%)	20-40
Reaming	
Smooth Finish	15-40
Work Sizing	40-60
High-speed steel reamers. Greatly increased rates obtainable with carbide tooling.	
Threading and Tapping	10-25
Drilling	30-50
High-Speed Drills	

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Castings

Armco NITRONIC 50 Stainless Steel may be readily cast by all conventional techniques. Castings should be annealed at 2050F (1121 C) for 1/2-hour and water quenched in order to attain a high level of corrosion resistance. Cast NITRONIC 50 Stainless Steel is listed as Grade CG6MMN in ASTM A 351/351M and A 743.

Table 40

Typical Room Temperature and Short-Time Elevated Temperature Properties of Cast NITRONIC 50 Stainless Steel (CG6MMN) Annealed*

Text Temperature F (C)	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation % in 2" (50.8 mm)	Reduction %
75 (24)	93 (641)	50 (345)	48	46
200 (93)	84 (579)	39 (269)	47	57
400 (204)	74 (510)	30 (207)	50	54
600 (316)	67 (462)	27 (186)	49	48
800 (427)	65 (448)	27 (186)	47	55
1000 (538)	60 (414)	25 (172)	46	51
1200 (649)	54 (372)	24 (166)	43	55

*Average of three heats, two tests per heat. Data supplied by Wisconsin Centrifugal, Inc.

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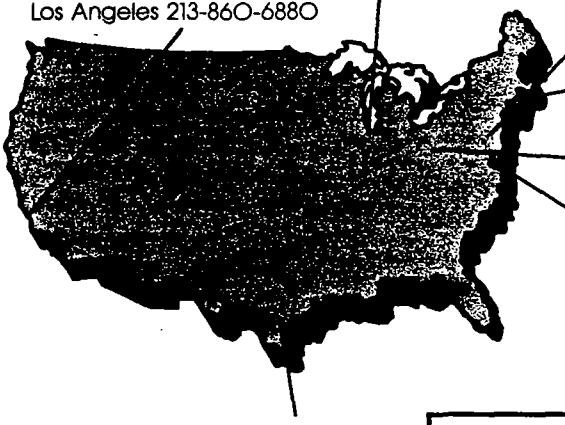
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FROM: PAUL CALLAHAN
- MARKETING

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There are 6 messages for you; do you want them now? .Y

Message number 12-1115 (0670)
Entered on 10/12/90 at 13:31 --- Printed on 10/17/90 at 11:39.
To: ALL REMINGTON PERSONNEL From: PAUL CALLAHAN (ID 0527)

SUBJECT: ALASKAN DEALER INPUT

TO:999

SEVERAL PRODUCT SUGGESTIONS AND COMMENTS RESULTED FROM DEALER CALLS IN ALASKA LAST WEEK WORTHY OF BEING SHARED.
FOREMOST IS THE FACT THAT WE ARE MISSING THIS MARKET BY NOT HAVING A STAINLESS BOLT ACTION RIFLE TO COMPETE WITH THE BROWNING A BOLT STAINLESS.GREAT NORTHERN GUNS SOLD 100 THIS YEAR AND CAN'T GET ENOUGH OF THE LARGER CALIBERS SUCH AS 338.BOONDOCKS SPORTING GOODS PRESOLD 35 UNITS AND HAS A WAITING LIST FOR MORE.DOWN UNDER GUNS IN FAIRBANKS SOLD 15. THE SUCCESS OF THE STAINLESS A BOLT HAS IMPACTED DEALER AND CONSUMER SALES OF OUR 700.

NEXT,DEALERS WOULD LIKE TO SEE THE BOLT LOCK RETURNED ON OUR 700.OUR PRESENT DESIGN ALLOWS THE BOLT HANDLE TO COME UP IF CAUGHT ON AN OBJECT SUCH AS A BRANCH,ETC.THEY WOULD ALSO LIKE TO SEE A THREE POSITION SAFETY ON ALL OUR BOLT ACTION RIFLES.GREAT NORTHERN HAS RED'S GUNSMITHING ADD TO A 700 FOR $150.

NEXT,THE PRECEIVED VALUE OF OUR KS CUSTOM SHOP RIFLES IS HARD FOR THE DEALER TO EXPLAIN TO THE CONSUMER.WE NEED MORE PRODUCT INFORMATION SO THE DEALER CAN TELL THE CONSUMER MORE THAN JUST THE FACT THAT IT IS LABOR INTENSIVE TO FIT THE BARRELED ACTION TO THE KEVLAR STOCK.THE CUSTOMER IN ALASKA FEELS $902 SELL PRICE SHOULD BE $695 SINCE THEY DO NOT SEE THE BENEFITS FOR AN ADDITIONAL $300.DEALERS FEEL WE NEED CHECKERING ON THE SYNTHETIC STOCKS,INCLUDING KS'S.THE ALASKAN BIG GAME HUNTER WILL PAY A PREMIUM IF THE PRECEIVED VALUE IS APPARENT.THE NAME PACIFIC RESEARCH WAS MENTIONED FREQUENTLY AS A SOURCE FOR SYNTHETIC RIFLE STOCKS.NO COMMENT SINCE I AM NOT FAMILIAR WITH THIS SOURCE.

GETTING BACK TO COMPETITION WITH BROWNING STAINLESS,DEALERS ARE NOT SUGGESTING THAT WE HAVE A 100% STAINLESS BARRELED ACTION,BUT ARE SUGGESTING THAT WE HAVE AN IMPERVIOUS FINISH THAT WILL TAKE ALL THE WEATHER CONDITIONS THAT THE ALASKAN ENVIROMENT OFFERS.THEY ARE NOT TALKING PARKERISED,OR SPECIAL PURPOSE FINISH,THAT WE PRESENTLY OFFER.THEIR IDEAL WOULD BE A DULL STAINLESS FINISH ON THE METAL WITH A DARK,EVEN BLACK SYNTHETIC STOCK.THIS COMBINATION OF COLORS CATCH THE EYE OF THE CONSUMER ACCORDING TO THE 4 MAN SALES STAFF OF GREAT NORTHERN GUNS.CALIBER CHOICES 270 THROUGH 416 REMINGTON.
IF WE CAN OFFER WHAT THE CONSUMER WANTS IN A STAINLESS BOLT ACTION, SYNTHETIC RIFLE,THE SAME TECHNOLOGY CAN BE APPLIED TO THE MODEL 870 SO THAT WE COULD HAVE WHAT THEY CALL A BOAT SHOTGUN WHICH IS VERY POPULAR WITH THE FISHING FLEET IN THE NORTHWEST AND ALASKA.OUR PRESENT FINISH ON FIELD 870'S IS SUBJECT TO DETERIORIZATION FROM SALT WATER AND GAME FLUIDS.

A COMMENT ON THE SP 10 MAG SHOTGUN WAS THAT THE PRICE WAS TOO HIGH AND CONSUMER RESISTANCE BECAUSE OF THE PRICE HAS BEEN EVIDENT THIS SELLING SEASON.

THE ABOVE COMMENTS APPLY TO OTHER THAN THE ALASKAN MARKET AND PRODUCT IMPLEMENTATION WILL MATERIALLY ADD TO OUR BUSINESS GROWTH IN THE FUTURE.PROVIDING WE ARE NOT OUT OF SYNC WITH THESE MARKETS THAT WE SERVICE.

THE ALASKAN DEALERS ARE NOT BACKWARDS ABOUT BEING FORWARD AND I GUESS THIS IS WHY THEY REFER TO IT AS "THE GREAT LAND".THANKS FOR YOUR EAR.

---------- End of Message ----------

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Dock
Weigh
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STRAP BD	CD TUBES
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BRLP WRAP	PL SPOOL
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TUBE IN BX	SPECIAL

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		4/15/91

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STAINLESS STEEL

PART NAME Bolt Assem. NO. STEEL 416 MODEL 700

FURNACE	TEMP.	TIME	LOAD SIZE 6	PAN NO.

Harden			
Draw			
Rd.			
35	Body	Head	
36			
37	X	II	
38		III	
39		I	
40			
41			
42			
43	II		
44	IIII		
45			
46	X		
47			
48			
49			
50			
51			
52			
53			
54			
55			

COMPUTATION

Rc. 37-46

Body + Head

INSPECTED
HARDENED
MAY 23 1991
INSPECTED

SIGNED P. J. Cross DATE 5-23-91

RD-6755

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	Weight (lbs)	Parts/ton	HT?	Passivate
Long Barreled Action	3.38	593		X
Long Action Receiver	0.95	2105	X	
Barrel Bracket	0.05	40000	X	
Bolt Body Assembly	0.60	3333	X	X
Bolt Plug	0.11	18182	X?	X

Annual Volume = 10000 units

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3 percent. Imagine what a variation that size would represent if a centerfire round like a .30-06 was involved.

So far, that CCI Maxi-Mag has given me the best results of any ammo tested in the Marlin. Its extreme weight spread was only .3 grain and that explains a lot.

If you'll weigh some of your ammo and shoot only the rounds which weigh within a quarter grain of the average — plus or minus — I'll bet your rifle will group better. Unfortunately, that means the culled rounds will have to be retained for close-range use only.

Whether the factories don't take quite as much trouble manufacturing .22 WRM ammo as they do the Long Rifle rounds or whether their technology just hasn't improved enough, I can't say. So far, though, I've never found any .22 WRM ammunition as accurate as the average Long Rifle lots.

Al Miller

QPQ for Stainless Steel

In response to "Looking for Blue Finish for Stainless" in *Rifle* No. 134's "Aiming for Answers," I would like to share a few comments.

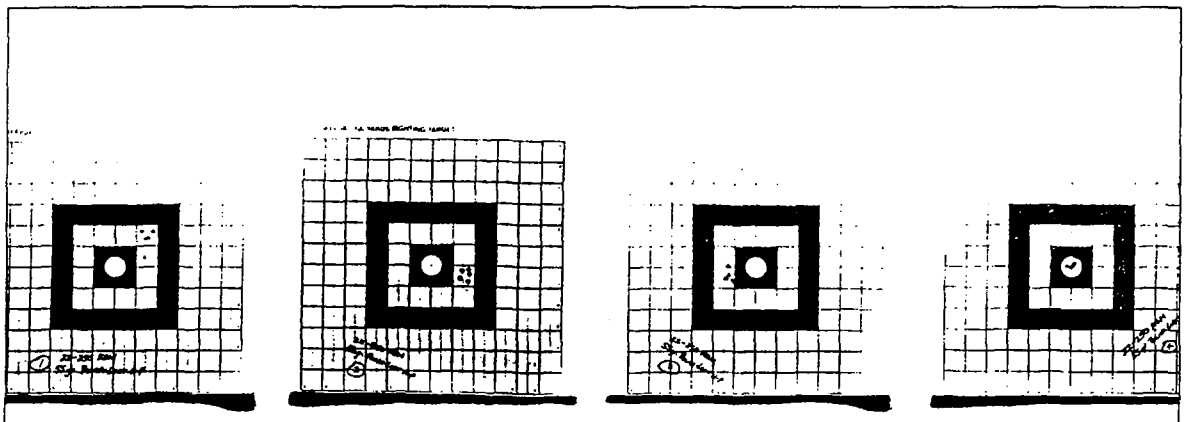
There is a blue finish available for stainless steel. The treatment is not like the ordinary low temperature, chemical blueing or parkerizing process, but a saltbath nitriding process done at 1,075 degrees Fahrenheit (580 degrees Centigrade) then followed by an oxidative quenching in another saltbath at 680 F. (360 C.) which imparts a dull blue-black finish on the steel surface. Further polishing of the workpiece with subsequent immersing (still refers to quenching) into the same oxidation bath will give the workpiece a nice, hard, durable, wear and corrosive resistant, non-reflective, deep blue-black finish superior to any blackening/blueing process. This process was invented by the German company, Degussa AG, and the name which aptly describes the process is called QPQ — quench, polish, quench.

QPQ is a trademark of Degussa AG, and the North American licensee of this process is Kolene Corp. of Detroit, Michigan. As far as I know, Peter Stahl of Germany is doing QPQ finishing for the slide assembly of the Omega multi-caliber pistol. The Spanish armsmaker, Diarm, is also doing QPQ for shotgun barrels.

The original concept of QPQ was to enable the industry to use cheap, ordinary steel as opposed to expensive stainless steel with no loss in corrosion resistance, and also to replace chrome plating so that the polution of heavy metal waste is eliminated. The motive of doing QPQ on stainless steel from a corrosion-resistance point of view (other than the coloring effect) is a little bit bizarre. QPQ can increase the scuffing load limit of 18/8 stainless steel gears from 90Nm to 460Nm, in other words, the galling resistance is greatly improved.

According to my experience in this field, the reasons for the unpopularity of this process are: Cost: saltbath furnaces and salts are very expensive as compared with that of chemical blueing; skill: as QPQ is a heat treatment process, more knowledge is needed in the understanding and maintenance of the saltbaths which are essential to achieve a nice finish; safety: European safety regulation (esp. Germany's) forbids the treatment of long, hollow workpieces in saltbaths, fearing that the hot salt melts will shoot out and injure the operator; treatment temperature: saltbath nitriding is done at 1,075 F.; there is a danger of distortion

(Continued on page 48)



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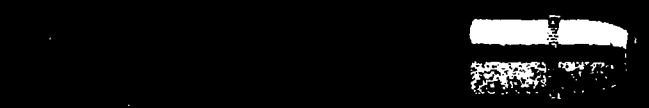
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AMERICAN RIFLEMAN – Most issues available, in 1930s and 1940s at $6.00 each; 1950s at $5.00 each; 1960s at $4.00 each; to date at $3.50 each. (None in 1920s).

POSTAGE & HANDLING – U.S. & Canada: 1-3 magazines, $1.00 ea.; 4-6 magazines, .75¢ each; over 7, 50¢ each. Foreign Parcel Post: 1-10 mags. $1.00 ea.; over 10, 50¢ ea.

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(Continued from page 17)

for long and cold worked barrels.

My limited experience with the QPQ process on stainless steel up to now is the treatment of golf club heads of materials AISI 431 and 17-4 PH (remember the .44 Automag). Later, I will do some QPQ work on medium carbon steel compensators and stainless steel slides for the Hong Kong IPSC shooters.

There are numerous technical manuals (in German, English and Chinese languages) available on the QPQ process. Anyone who wishes to have more information on this interesting subject is welcome to contact me through Wolfe Publishing Co.

C.L., Hong Kong

Saga of the Arisaka

You will recall my letter pertaining to the use of Japanese rifles during World War I, and after the war by Finland.

Permit me to add to this some additional information that may be of interest to your readers and collectors.

During World War I tremendous numbers of Model 97 Japanese rifles were captured by the Imperial and Royal Austro-Hungarian troops on the Russian front. These rifles were captured together with Japanese-made ammunition and bayonets. As the war progressed, arms factories of the Austro-Hungarian Empire could not keep up with the demands of the front. In 1918 the small arms situation became critical and the Austro-Hungarian General Staff granted permission for the Austro-Hungarian troops to be equipped with captured Italian and Japanese rifles. According to Austro-Hungarian records, several regiments were equipped with these Japanese rifles, but only one can be identified with certainty. It was "X MARSCHBATALION of the 14 REGIMENT LINZ." Soldiers were issued captured Japanese-made ammunition with these rifles. To prevent confusion, Japanese boxes of ammunition were stamped with the following words in German: "6.5mm M97 JAPANISCHE REPETIERGEWEHR." Booklets printed in German were also issued describing the use of these Japanese rifles. An original Japanese bayonet and sling were issued with each rifle.

After the war ended, Czechoslovakia found on her territory large numbers

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BARBER - PRESALE R 0136544

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Table 2 Grinding, polishing, and buffing of stainless steel sheet and strip

Operation	Abrasive grit size	Type of wheel	Lubricant	Compound	Wheel speed m/s	Wheel speed sfm	Finish produced
1 Roughing(a)	80(b)	Neoprene serrated(c)	Water-soluble oil	···	20.4-25.5	4 000-5 000	Rough ground
2 Polishing(d)	100(b)	Neoprene serrated(c)	Water-soluble oil	···	20.4-25.5	4 000-5 000	No. 3
3 Polishing(e)	120 or 150(b)	Neoprene serrated(c)	Oil and kerosine	···	20.4-25.5	4 000-5 000	Base for No. 4
4 Polishing(f)	180(b)	Neoprene serrated(c)	Oil and kerosine	···	20.4-25.5	4 000-5 000	No. 4
5 Polishing(g)	220 or 240(b)	Neoprene serrated(c)	Oil and kerosine	···	20.4-25.5	4 000-5 000	Base for No. 7 or 8
6 Hard buffing(h)	···	Bias or pocket buff	···	Alumina, hard buffing	40.8-51.0	8 000-10 000	No. 7
7 Color buffing(j)	···	Loose-disk or Canton flannel buff	···	Alumina and/or chromium oxide, color buffing	15.3-30.6	3 000-6 000	No. 8
Special surface conditioning operations							
Tampico brushing(k)	···	Tampico brush	···	Powdered pumice and oil	5.1-7.7	1 000-1 500	No.6
Butler finishing(k)	···	Bias or pocket buff	···	Proprietary greaseless bar	25.5 max	5 000 max	Butler
Wire brushing(k)	···	Stainless steel wire brush	···	···	25.5 max	5 000 max	Wire brushed
Cleaning(m)	···	Canton flannel cloth (hand operation)	···	Whiting, precipitated chalk, or dehydrated lime	···	···	···

(a) Follows grinding with 36- to 60-mesh abrasive, in preparing a welded area or as the initial operation on heavy-gage sheets or plates. (b) Coated abrasive belt. (c) Contact wheel. (d) May be used as initial operation for light-gage sheets. (e) Used only long enough to develop a uniform finish. (f) Follows operation 3 for production of a No. 4 finish. (g) Should continue long enough to remove all grit lines from previous operations and to develop considerable reflectivity. (h) Should continue long enough to develop a mirror finish. (j) Relatively short operation, for development of maximum color and reflectivity. (k) Used after operation 4. (m) Required for removing any film of lubricant remaining after polishing or buffing. Work may be vapor degreased, alternatively to being hand-wiped with materials listed in table

Electropolishing

Electropolishing is used primarily to produce a very smooth, bright, easily cleaned surface with maximum corrosion resistance. It removes the surface layer of a metal by anodic treatment in an acid bath. The process is discussed in the article in this Volume on electropolishing, where examples of applications involving stainless steel are cited.

Electropolishing is applicable to all stainless steel grades, hot or cold finished, cast or wrought. The amount of metal removed is subject to close control, depending on the desired result. The resulting surfaces have a bright, passive finish. The process is most frequently applied to cold finished surfaces, because they yield a smoother finish than can conventionally be obtained on hot finished surfaces. As in electroplating, the results depend on the contour and shape of the part. The end-grain surfaces of the free-machining stainless grades, such as types 303 and 416, will appear frosty after electropolishing due to removal of the sulfide inclusions.

Electropolishing can be used as a preliminary brightening operation before final buffing, particularly on drawn parts with burrs, sharp radii, or recessed areas, and it serves to reduce the amount of buffing required. Electropolishing is applied to decorative automotive parts and accessories, conveyor systems for food handling equipment, animal cages, and pharmacy equipment. It provides an economical finish on many parts that are difficult or impossible to finish by conventional polishing, such as items made from wire.

In contrast to mechanical finishing methods, electropolishing may make inclusions in the material more visible. Some types of inclusions are dissolved out, whereas others remain in relief. Electropolishing has been used as a surface inspection technique to reveal residual foreign material, such as embedded scale and particles of iron, carbide precipitation, and weld defects. The surface obtained by electropolishing is directly related to the original surface quality — the process cannot be used to remove digs, gouges, scratches, and the like.

Chemical Polishing

Chemical polishing is another method for providing a smooth and bright surface on stainless steel. Unlike electropolishing, chemical polishing can be done without the use of electricity and without racking of individual parts. Thus, chemical polishing offers significant savings in capital investment and labor. In addition, chemical polishing offers a greater degree of freedom in polishing items with blind holes and other recessed areas. However, it does not produce the high specular reflectivity (brightness) obtained with electropolishing.

Proprietary products for chemical polishing are available in the market. Generally, they are based on combinations of phosphoric acid, nitric acid, sulfuric acid, hydrochloric acid, organic acids, and special surfactants and stabilizers to promote a high degree of brightness and long bath life. Unlike the nitric and hydrofluoric acid mixtures which are used in chemical cleaning, the proprietary chemical bright dips do not cause severe attack on the grain boundaries or intergranular corrosion.

Passivation

During handling and processing operations such as forming, machining, tumbling, and lapping, particles of iron or tool steel may be embedded in or smeared on the surfaces of stainless steel components. If allowed to remain, these particles may corrode and produce rust spots on the stainless steel. To

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prevent this condition, semifinished or finished parts are given a passivation treatment. This treatment, which consists of immersing stainless steel parts in a solution of nitric acid, or of nitric acid plus oxidizing salts, dissolves the embedded or smeared iron and restores the original corrosion-resistant surface. Passivation of machined parts made of free-machining austenitic or low-chromium grades must be done carefully. If the parts become etched when immersed in the standard solution, passivation can be accomplished by increasing the nitric acid content of the solution to 50% nitric acid (HNO_3) or by adding 4 to 6 wt % sodium dichromate ($Na_2Cr_2O_7$). The passivating treatment provides the incidental benefit of revealing components that were inadvertently made of the wrong material. For example, carbon steel and Monel can be readily detected because they are severely attacked during the operation, and vigorous etching occurs.

It generally is considered good practice to passivate parts after forming, machining, grinding, or lapping, although, in some applications, experience may prove it to be unnecessary. When the need for passivation is in doubt, the question may be resolved by testing. For example, passivated and nonpassivated parts may be subjected to 100% humidity at 38 °C (100 °F) and compared for the presence of rust spots at the end of exposure time. Intermittent wetting and drying over a 24-h period also may be used as an evaluation test. Another simple test consists of wetting the surface with a copper sulfate solution. Free iron, if present, plates out the copper from the solution, and the surface develops a copper cast or color. Several sensitive tests for the presence of iron on stainless steel surfaces are given in ASTM Standard A-380.

Passivating either should not be employed or may be omitted in some specific cases. For example, nitrided or carburized stainless steel should not be passivated, because the treatment severely corrodes the case. Machined or ground parts that are to be plated or electropolished need not be passivated, because any iron contamination will be removed by these operations. Parts that are to be soldered or brazed should be passivated before, but not after, these operations have been performed, because the passivating solution may attack the solder or bronze metal. Also, parts should not be passivated after assembly, because removal of the acid may be quite difficult.

Prior Cleaning. Flux or slag from welding or high-temperature brazing should be removed by chipping, brushing with a stainless steel wire brush, grinding, polishing with an iron-free abrasive, or sand blasting. Machining, forming, or grinding oils must be removed in order for passivation to be effective. Cleaning should begin with solvent cleaning, which should be followed by alkaline soak cleaning and thorough water rinsing. Best results are obtained in passivation when the parts to be treated are as clean as they would have to be for plating.

When large parts or bulky vessels are to be cleaned, it may be necessary to apply cleaning liquids by means of pressure spray; exterior surfaces may be cleaned by immersion or swabbing.

Solutions. Listed below are several typical solutions used to passivate the various types of stainless steel, together with their operating temperatures and exposure times.

- **Solution A**

  For series 200, 300, and 400 grades containing 17% chromium or more, except free-machining grades and polished surfaces:

70% nitric acid (HNO_3)	20 to 40 vol %
Water	rem
Operating temperature	Up to 60 °C (140 °F)
Contact time	30 to 60 min

- **Solution B**

  For free-machining grades, polished surfaces, and series 400 containing less than 17% chromium:

70% nitric acid (HNO_3)	20 vol %
Sodium dichromate ($Na_2Cr_2O \cdot 2H_2O$)	4 to 6 wt %
Water	rem
Operating temperature	Room temperature or 50 °C (120 °F)
Contact time	30 min

These solutions also may be used to remove lead, copper, cadmium, or zinc applied to stainless steel wire for cold heading, wiredrawing, or spring winding.

Control of passivating solutions consists mainly of replenishing the nitric acid, sodium dichromate (if used), and water that are lost as a result of drag-out. Because the amount of iron dissolved is extremely small compared with the area of surface processed, the solution remains effective for a long time. However, its acid content should be measured periodically by means of a hydrometer or by simple volumetric determination. Frequency of these measurements would depend on the volume of work processed and the size of the tank. A solution is discarded only if it becomes seriously contaminated. If the solution is used to remove metallic lubricants, such as lead, copper, or cadmium, and if the volume of this work is high, the life of the passivating solution is shortened appreciably.

Precautions. The usual precautions for working near strong oxidizing agents must be observed. For their protection, operating personnel should wear rubber aprons, gloves, and eyeshields or goggles.

Thorough rinsing of recessed parts must precede air blow-off in order to avoid the dispersal of acid solutions.

Handling equipment for parts preferably should be constructed of stainless steel or plastic. Monel baskets or containers must not be used.

Etching

Stainless steels may be etched by dry or wet methods. The dry methods include sand blasting and other dry surface marking methods; the wet methods use acid solutions.

Dry Etching. Areas to be etched are marked off by cut stencils, metal templates, or adhesive materials. Edges of the masking material must be held in close contact with the metal to ensure sharp, well-defined border lines. Etching is performed by means of sand blasting, grinding wheels, tampico polishing wheels, or stainless steel wire brushes.

Wet Etching. Although etching solutions must be strongly acid to act on stainless steels, they must be varied in composition and strength to suit the corrosion resistance of a specific alloy. Stop-off materials must be sufficiently acid-resistant to prevent undercutting. To ensure uniformity of acid attack, metal surfaces must be uniformly clean before being etched.

Assuming that suitable solution strengths and treatment times are determined by experimentation, the following acid solutions may be used to etch the straight-chromium types (except hardenable grades in the hardened condition) and chromium-nickel types of stainless steel:

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xc Jim Ronkian

28 June, 1991

TO: Fred Schmidt

FROM: Glen Sietsema

RE: Stainless Steel 700 Barrel - Chemical Evaluation

Fallowing are the chemical analysis results of stainless steel barrels. Sliver samples were provided by Jim Ronkainen. These results do not include microstructural analysis so it is possible any of these could be free machining steels.

1. Remington M-700 Varmint
   AISI 416

2. Ruger M/77 MKII
   AISI 416

3. Browning A Bolt Mag. Barrel
   AISI 416

4. Ruger Barrel
   Unknown:
   Cr in 416 range, no Mn detected

5. Mag Barrel (No manufacturer given)
   AISI 416

6. Browning .270 WIN
   AISI 416

Enclosed are copies of the EDS analysis

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WINDOW 1 : 1.43 - 2.72 Kev
WINDOW 2 : 5.06 - 7.40 Kev

300 sec. acquisition time

Lines of Interest	Intensity (cts/sec)	2-sigma error (relative)	Standard spectrum	K-ratio
C. KA	3.01	0.0861		
S KA	3.85	0.0854		
Cr KA	190.43	0.0054		
Mn KA	13.50	0.0398		
Fe KA	815.88	0.0024		

CHI-SQUARED: 1.6920

16-Apr-1991 14:08:03 H-720 VARIANT (2)

Accelerating voltage 25.0 KeV

Beam - sample incidence angle 90.0 degrees

Xray emergence angle 35.0 degrees

Xray - window incidence angle 0.0 degrees

STANDARDLESS EDS ANALYSIS
(ZAF CORRECTIONS VIA MAGIC V)

ELEMENT & LINE	WEIGHT PERCENT	ATOMIC PERCENT*	PRECISION 2 SIGMA	K-RATIO**	ITER
Si KA	0.49	0.95	0.03	0.0020	
S KA	0.34	0.58	0.02	0.0022	
Cr KA	12.93	13.55	0.07	0.1584	
Mn KA	1.23	1.23	0.05	0.0125	
Fe KA	85.12	83.69	0.20	0.8249	
C *	0.00	0.00			2
TOTAL	100.01				

* DETERMINED BY DIFFERENCE

**NOTE: K-RATIO = K-RATIO x R
where R = reference(standard)/reference(sample)

NORMALIZATION FACTOR: 0.992

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WINDOW 1 : 1.49 - 2.71 keV
WINDOW 2 : 5.18 - 7.40 keV

220 sec. acquisition at =

Lines of Interest	Intensity (cts/sec)	2-sigma error (relative)	Standard spectrum	K-ratio
Ti KA	6.34	0.0473		
V KA	5.26	0.0703		
Cr KA	173.10	0.0057		
Mn KA	4.61	0.1034		
Fe KA	725.82	0.0025		

CHI-SQUARED: 1.7682

18-Apr-1991 14:44:43 RUBER M-77 (1)

Accelerating voltage 25.0 KeV

Beam - sample incidence angle 90.0 degrees

Xray emergence angle 35.0 degrees

Xray - window incidence angle 0.0 degrees

STANDARDLESS EDS ANALYSIS
(ZAF CORRECTIONS VIA MABIC V)

ELEMENT & LINE	WEIGHT PERCENT	ATOMIC PERCENT*	PRECISION 2 SIGMA	K-RATIO**	ITER
Si KA	1.25	2.42	0.05	0.0052	
S KA	0.50	0.85	0.03	0.0033	
Cr KA	13.07	13.69	0.27	0.1618	
Mn KA	0.47	0.47	0.04	0.0048	
Fe KA	84.71	82.57	2.21	0.8249	
C *	0.00	0.00			3
TOTAL	100.00				

* DETERMINED BY DIFFERENCE

**NOTE: K-RATIO = K-RATIO x R
where R = reference(standard)/reference(sample)

NORMALIZATION FACTOR: 0.984

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WINDOW 1 : [illegible] - [illegible] keV
WINDOW 2 : 5.03 - 7.48 keV

200 sec. acquisition time

Lines of Interest	Intensity (cts/sec)	2-sigma error (relative)	Standard spectrum	K-ratio
Si KA	4.07	0.0772		
S KA	3.64	0.0951		
Cr KA	177.02	0.0056		
Mn KA	11.12	0.0460		
Fe KA	777.95	0.0024		

CHI-SQUARED: 1.7048

18-Apr-1991 15:04:03 BROWNING (3)

Accelerating voltage	25.0 KeV
Beam - sample incidence angle	90.0 degrees
Xray emergence angle	35.0 degrees
Xray - window incidence angle	0.0 degrees

STANDARDLESS EDS ANALYSIS
(ZAF CORRECTIONS VIA MAGIC V)

ELEMENT & LINE	WEIGHT PERCENT	ATOMIC PERCENT*	PRECISION 2 SIGMA	K-RATIO**	ITER
Si KA	0.69	1.35	0.04	0.0028	
S KA	0.34	0.58	0.03	0.0022	
Cr KA	12.54	13.22	0.07	0.1552	
Mn KA	1.07	1.06	0.05	0.0109	
Fe KA	85.37	83.79	0.21	0.8289	
C *	0.00	0.00			2
TOTAL	100.01				

* DETERMINED BY DIFFERENCE

**NOTE: K-RATIO = K-RATIO x R
where R = reference(standard)/reference(sample)

NORMALIZATION FACTOR: 0.990

2.32	932.	S KA1, S KA2, Mo LA1, Mo LA2, Pb MA1, Pb MA2
5.41	32773.	Cr KA1, Cr KA2
5.94	4764.	Cr KB1, Cr KB3
6.40	130782.	Fe KA1, Fe KA2
7.05	16743.	Fe KB1, Fe KB3

GAUSSIAN DECONVOLUTION

SAMPLE: RUGER 22L

WINDOW 1 : 1.49 - 2.72 kev
WINDOW 2 : 5.08 - 7.40 kev

200 sec. acquisition time

Line of Interest	Intensity (cts/sec)	2-sigma error (relative)	Standard specimen	K-ratio
KA	5.93	0.0565		
KA	3.73	0.1029		
KA	191.56	0.0052		
KA	823.89	0.0023		

CHI-SQUARED: 2.3988

25.0 KeV

16-Apr-1991 15:26:02 RUGER 22L (4)

Accelerating voltage	25.0 KeV
Beam - sample incidence angle	90.0 degrees
Xray emergence angle	35.0 degrees
Xray - window incidence angle	0.0 degrees

STANDARDLESS EDS ANALYSIS
(ZAF CORRECTIONS VIA MAGIC V)

ELEMENT & LINE	WEIGHT PERCENT	ATOMIC PERCENT*	PRECISION 2 SIGMA	K-RATIO**	ITER
Si KA	0.96	1.85	0.05	0.0039	
S KA	0.33	0.56	0.03	0.0021	
Cr KA	12.69	13.55	0.07	0.1597	
Fe KA	85.83	84.03	0.20	0.8342	
C *	0.00	0.00			3
TOTAL	100.01				

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WINDOW 1 : 1.45 - 2.72 kev
WINDOW 2 : 5.05 - 7.40 kev

200 sec. acquisition time

Lines of Interest	Intensity (cts/sec)	2-sigma error (relative)	Standard spectrum	K-ratio
Ti KA	3.94	0.0823		
KA	6.99	0.0541		
Cr KA	163.11	0.0058		
Mn KA	10.07	0.0492		
Fe KA	713.61	0.0025		

CHI-SQUARED: 1.2217

19-Apr-1991 08:12:20 MAB BARREL

Accelerating voltage 25.0 KeV

Beam - sample incidence angle 90.0 degrees

Xray emergence angle 35.0 degrees

Xray - window incidence angle 0.0 degrees

STANDARDLESS EDS ANALYSIS
(ZAF CORRECTIONS VIA MAGIC V)

ELEMENT & LINE	WEIGHT PERCENT	ATOMIC PERCENT*	PRECISION 2 SIGMA	K-RATIO**	ITER
Si KA	0.72	1.41	0.05	0.0030	
S KA	0.71	1.20	0.03	0.0046	
Cr KA	12.55	13.20	0.07	0.1554	
Mn KA	1.05	1.04	0.05	0.0107	
Fe KA	84.97	83.15	0.21	0.8263	
C *	0.00	0.00			3
TOTAL	100.00				

* DETERMINED BY DIFFERENCE

**NOTE: K-RATIO = K-RATIO x R
where R = reference(standard)/reference(sample)

NORMALIZATION FACTOR: 0.987

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WINDOW 1 : 1.49 - 2.72 KeV
WINDOW 2 : 5.08 - 7.40 KeV

200 sec. acquisition time

Lines of interest	Intensity (cts/sec)	2-sigma error (relative)	Stancart spectrum	K-ratio
Si KA	4.98	0.0690		
S KA	4.17	0.0836		
Cr KA	178.58	0.0056		
Mn KA	11.88	0.0434		
Fe KA	787.04	0.0024		

CHI-SQUARED: 1.9672

19-Apr-1991 08:28:51 BROWNIG .270 WIN

Accelerating voltage 25.0 KeV

Beam - sample incidence angle 90.0 degrees

Xray emergence angle 35.0 degrees

Xray - window incidence angle 0.0 degrees

STANDARDLESS EDS ANALYSIS
(ZAF CORRECTIONS VIA MAGIC V)

ELEMENT & LINE	WEIGHT PERCENT	ATOMIC PERCENT*	PRECISION 2 SIGMA	K-RATIO**	ITER
Si KA	0.83	1.62	0.05	0.0034	
S KA	0.38	0.65	0.03	0.0025	
Cr KA	12.48	13.14	0.07	0.1546	
Mn KA	1.12	1.12	0.04	0.0115	
Fe KA	85.18	83.47	0.21	0.8280	
C *	0.00	0.00			3
TOTAL	99.99				

* DETERMINED BY DIFFERENCE

**NOTE: K-RATIO = K-RATIO x R
where R = reference(standard)/reference(sample)

NORMALIZATION FACTOR: 0.989

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cc: Hal Munson
Fred Martin

July 2, 1991

TO: John Simpson
FROM: Jim Ronkainen JR

SUBJECT: Stocks for the M/700 SS

We are looking for an injection molded synthetic stock shaped like the M/700 Mountain Rifle stock without a floorplate (ADL style) to use on the M/700 SS. The M/700 AS stock supplied by Lee Six is the correct shape and is available in an ADL configuration, but some changes are necessary before we could purchase the stock from him.

Based on feedback from the field, the M/700 AS stock molded from Arylon is too heavy. This fact, coupled with the fact that the supply of Arylon is finite (~2500 lbs on hand) and its production is discontinued, means we will need to find a new material for our stock. Possible candidates for replacing Arylon include polypropylene (PP) and recycled PET. Switching to either material would require the slides for the stock mold to be modified to account for the difference in shrink rate between PP/PET and Arylon.

Another request from marketing for the M/700 SS stock is to include functional checkering on the fore end and grip of the stock. The M/700 AS stock has a smooth surface in both areas and can be quite slippery if the gun is wet.

Could you please request a quote and timing from Lee Six for:

1. Modification of the slides for the stock tooling to use polypropylene and/or PET.

2. Adding checkering to the fore end and grip of the stock mold.

3. Price quotes for 5000, 10000, and 15000 stocks from the modified mold.

Thanks for your help with this.

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G-88

DON'T SAY IT - WRITE IT

To: _____ Date: _____

From: _____

ADL vs. BDL

-tooling cost

* ADL & BDL stocks - Six shares bigger cost of tooling if both are purchased

* Quoted 6-8 months ago; 80-20 cost split
  - 80 → Ron
  - 20 → Six

"THINK SAFETY IN ADVANCE,
YOU MAY NOT GET A SECOND CHANCE"

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G-88

DON'T SAY IT - WRITE IT

To: _____

From: _____

Date: 7/1/91

?? DRING INCREASE NO PROBLEM

AS WEIGHT 1.5-2.5 lbs

~~2.25~~ 2-2.25 lbs avg.

ADL Synthetic Kit Gun

ADL Is PREFERRED

"THINK SAFETY IN ADVANCE,
YOU MAY NOT GET A SECOND CHANCE"

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G-86 *DON'T SAY IT - WRITE IT*

Date: 7/1/91

To: _____

From: _____ (404) 999-0201 LEE Six

PP is ok } same shrink rate, different than Anylon
PET is possible }

late '90 - Anylon set aside 5000 lbs, half gone
ADL instead of BDL — no problem, already make it - leaves a witness line
CHECKERING - insert, EDM CHECKERING } 3-4 MONTHS - can remove w/ 2nd any operation
$8000 to add checkering }
SLIDES - $11000 ARKLON → PP - PP & PET harder to fix
NEW BBL CONTOUR $1800 - $2000

"THINK SAFETY IN ADVANCE,
YOU MAY NOT GET A SECOND CHANCE"

To: Jim Rotkewicz

DON'T SAY IT - WRITE IT

CC: W. H. Coleman II
F. E. Schmidt
K. W. Soucy

TO: R. Jackson/ G. Barnes 12/19/90

FROM: R. L. Hatfield

TOPIC - M/700 FIRE CONTROL SALT SPRAY CORROSION TESTS

Corrosion tests have been conducted on seven different rust preventative coatings. The purpose of the testing was to identify the best rust preventative for model 700 fire control assemblies.

The following rust preventatives were tested; Rust Pel 45, Procor 18N, Rem Oil, Steel Gaurd, 12 % solution of Steel Gaurd in stoddard solvent, kerosene and electroless nickel. The tests were run on model 700 fire control assemblies and parts of assemblies. There were eight sets of test parts. The sets contained two each of the following parts; complete assemblies, trigger plate assemblies, connectors, triggers and safety arms.

The eight groups were degreased, six groups were dipped in the oils and allowed to drip dry for 24 hours. The electroless nickel parts and control group were tested dry. The parts were placed in the salt spray chamber and tested to ASTM B 287. The parts were inspected at the following intervals; 1, 2, 3, 4, 6, 8, 24, 48, 72, 96, 120 and 144 hours.

The test yielded the following results:

Group 1 - Rust Pel 45

PART NAME	HOURS
- assembly 1	8-24
- assembly 2	48-72
- T.P. assem. 1	8-24
- T.P. assem. 2	48-72
- connector 1	8-24
- connector 2	-----
- trigger 1	8-24
- trigger 2	8-24
- safety 1	8-24
- safety 2	72-96

Group 2 - Procor 18N

PART NAME	HOURS
- assembly 1	8-24
- assembly 2	48-72
- T.P. assem. 1	48-72
- T.P. assem. 2	48-72
- connector 1	8-24
- connector 2	-----
- trigger 1	8-24
- trigger 2	8-24
- safety 1	72-96
- safety 2	-----

Group 3 - Rem Oil

PART NAME	HOURS
- assembly 1	8-24
- assembly 2	48-72
- T.P. assem. 1	96-120
- T.P. assem. 2	-----
- connector 1	48-72
- connector 2	48-72
- trigger 1	48-72
- trigger 2	48-72
- safety 1	48-72
- safety 2	-----

Group 4 - Stoddard solvent with 12% Steel Guard

PART NAME	HOURS
- assembly 1	4
- assembly 2	4
- T.P. assem. 1	4
- T.P. assem. 2	4
- connector 1	4
- connector 2	4
- trigger 1	4
- trigger 2	4
- safety 1	4
- safety 2	4

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Group 5 - Kerosene

PART NAME	HOURS
- assembly 1	2
- assembly 2	2
- T.P. assem. 1	2
- T.P. assem. 2	2
- connector 1	2
- connector 2	2
- trigger 1	2
- trigger 2	2
- safety 1	2
- safety 2	2

Group 6 - Steel Gaurd

PART NAME	HOURS
- assembly 1	4
- assembly 2	4
- T.P. assem. 1	4
- T.P. assem. 2	4
- connector 1	4
- connector 2	96-120
- trigger 1	4
- trigger 2	4
- safety 1	4
- safety 2	4

Group 7 - control

PART NAME	HOURS
- assembly 1	2
- assembly 2	2
- T.P. assem. 1	2
- T.P. assem. 2	2
- connector 1	2
- connector 2	2
- trigger 1	2
- trigger 2	2
- safety 1	2
- safety 2	2

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Group 8 - Electroless Nickel

PART NAME	HOURS
- assembly 1	8-24
- assembly 2	8-24
- T.P. assem. 1	8-24
- T.P. assem. 2	24-48
- connector 1	24-48
- connector 2	24-48
- trigger 1	8-24
- trigger 2	8-24
- safety 1	24-48
- safety 2	24-48

NOTE - Parts without a time reported are still in test.

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CARPENTER TECHNOLOGY CORPORATION

READING, PENNSYLVANIA 19603

CarTech

Here is the literature you requested...
THANKS FOR INQUIRING

We sincerely hope the attached literature meets your needs. It is representative of the wealth of printed material available from Carpenter for our full line of specialty steels.

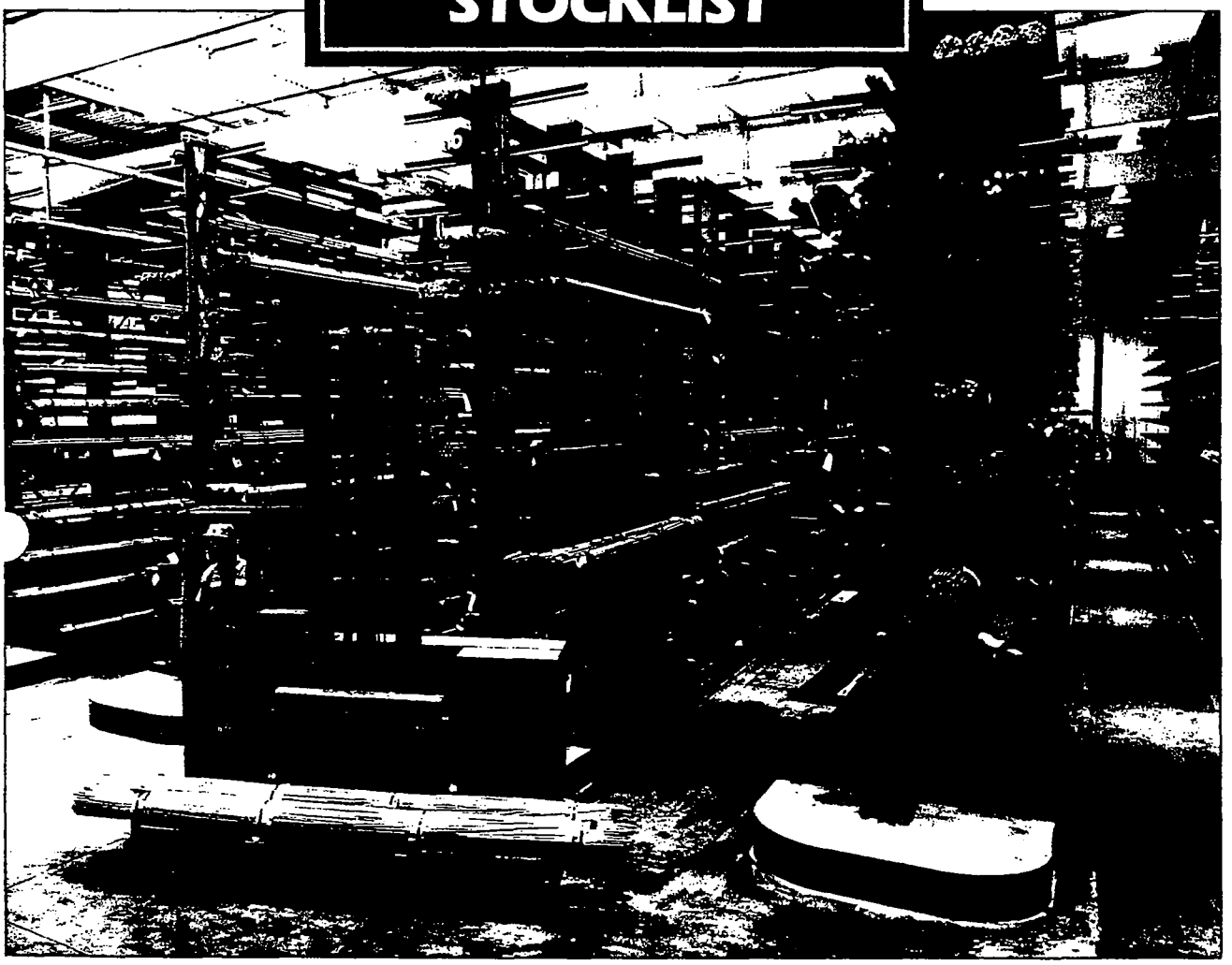
If you would like further information . . . if you wish to discuss this subject with a Carpenter representative . . . or need fast delivery of Carpenter steels . . . please get in touch with us at the address listed below.

Your Carpenter Service Center

145 Metro Park
P. O. Box 23020
Rochester, NY 14692-3020
Telephone: (716) 475-9120
In Central & Western NY: 800-462-4244
In Northern & Western PA: 800-828-9018

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Carpenter STAINLESS STEEL AND SPECIALTY METAL STOCKLIST



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FROM READY INVENTORIES . . . We serve your needs for specialty metals through our nationwide network of company-operated service centers. Each of our service centers stocks a complete range of Carpenter grades in a variety of shapes, sizes, forms, finishes, and conditions.

WITH FULL SUPPORT SERVICES . . . For order processing and technical assistance, every service center is staffed with a team of sales and service professionals. They're ready to discuss your needs for specialty metals and offer many other types of helpful support.

AND FAST ORDER PROCESSING . . . Our ability to serve your specific requirements is also enhanced by our capabilities for custom cutting, packaging, and rapid shipping using our own trucks or dependable local carriers.

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ABBREVIATIONS

ABQ	—	Air Bag Quality
ACW	—	Annealed, Cold Worked
ADD	—	Annealed, Deep Draw Quality
ANL	—	Annealed
BHG QUAL	—	Bushing Quality
BRG QUAL	—	Bearing Quality
CD	—	Cold Drawn
CF	—	Cold Finished
ESR	—	Electroslag Remelted
FC	—	Free Cut
GRD	—	Ground
GP	—	Ground & Polished
HF	—	Hot Finished
IMP QUAL	—	Implant Quality
MACH	—	Machined
OAG	—	Overaged
PAY	—	Pay Pack
PG	—	Precision Ground
RT	—	Rough Turned
SA	—	Solution Annealed
SAA	—	Solution Annealed & Aged
SH	—	Strain Hardened
SHQ	—	Shafting Quality
SOL QUAL	—	Solenoid Quality
SP	—	Spool
SPA	—	Spheroidized Annealed
SR	—	Stress Relieved
ST	—	Smooth Turned
TMP	—	Tempered
TR	—	Treated
UNL	—	Unannealed

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Stainless Steels
Rounds

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Size	Type	Cond.
1/16	303 Project 70®	CD ANL
.065	303 Project 70	CD ANL
.069	303 Project 70	CD ANL
.0781	Consumet® 316L Mod	GP SH
.084	303 Project 70	CD ANL
3/32	416 Project 70	CD ANL
	416 Project 70	GRD TR
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
	304L Project 70	CD ANL
.102	Custom 455®	CD ANL
.105	416 Project 70	CD TR
.109	440C	GRD SPA
7/64	416 Project 70	CD ANL
	303 Project 70	CD ANL
1/8	420	CD ANL
	Consumet 316L Mod	GP SH
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	CD ANL
	303 Project 70	GP ANL
	303 Project 70	GRD ACW
	20Cb-3®	GRD ANL
	15Cr-5Ni	GRD SA
	440C BRG Qual	GRD ANL
	203 Project 70	CD ANL
	304L Project 70	CD ANL
.1275	440C	HF ANL
9/64	416 Project 70	CD ANL
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
.156	316 Project 70	GP ANL
5/32	416 Project 70	CD ANL
	416 Project 70	GRD TR
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
	440C BRG Qual	GRD ANL
	304L Project 70	CD ANL
.159	303 Project 70	CD ANL
.161	416 Project 70	CD TR
.164	416 Project 70	CD TR
11/64	416 Project 70	CD ANL
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
3/16	410	CD ANL
	420	CD ANL
	Greek Ascoloy	GRD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	CD ANL
	303 Project 70	GP ANL
	303 Project 70	GRD ACW
	20Cb-3	GRD ANL
	15Cr-5Ni	GRD SA
	416 BQ	CD ANL
	440C BRG Qual	GRD ANL
	203 Project 70	CD ANL
	304L Project 70	CD ANL
	431	GRD ANL
.191	303 Project 70	CD ANL
	440C	GRD ANL
.192	416 Project 70	CD TR
	303	CD ANL
.193	303 Project 70	CD ANL
.203	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
13/64	416 Project 70	CD ANL
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
.2056	440C	GP ANL
.2187	430F SOL Qual	CD ANL
	Consumet 440C BRG Qual	GRD ANL
	203 Project 70	GRD ACW
7/32	410	GRD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
	440C BRG Qual	GRD ANL
15/64	416 Project 70	CD ANL
	303 Project 70	CD ANL
.235	Consumet 440C BRG Qual	GRD ANL
.236	410	GRD TR
1/4	410	CD ANL
	420	CD ANL
	Custom 455	GRD SA
	304L	CD ANL
	No. 5-F	CD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	316 Project 70	GRD ACW
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Se	GRD ANL
	303 Project 70	CD ANL
	303 Project 70	GP ANL
	303 Project 70	GRD ACW
	303 Project 70	PG ANL
	20Cb-3	GRD ANL
	430F SOL Qual	CD ANL
	PH 13-8 Mo*	GRD SA
	15Cr-5Ni	GRD SA
	416 BQ	GP ANL
	440C BRG Qual	GRD ANL
	303 Al Mod®	PG ANL
	203 Project 70	CD ANL
	321 Project 70	CD ANL
	304L Project 70	CD ANL
	Greek Ascoloy	GRD ANL
.2515	Consumet 316L Mod	GP SH
.259	316 Project 70	CD ANL
.260	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
17/64	416 Project 70	CD ANL
	303 Project 70	CD ANL
	440C BRG Qual	GRD ANL
.281	Consumet 440C BRG Qual	GRD ANL
9/32	Greek Ascoloy	GRD ANL
	No. 5-F	CD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
	440C BRG Qual	GRD ANL
	430F SOL Qual	PG ANL
	430FR SOL Qual	GRD ANL
.284	Custom 450®	CD SAA
.294	316 Project 70	CD ANL

*PH 13-8 Mo is a registered trademark of Armco, Inc.

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Stainless Steels/Rounds

Size	Type	Cond.
.299	420F	CD ANL
.3105	303 Al Mod	GRD ANL
5/16	410	CD ANL
	420	CD ANL
	440A	GRD ANL
	304	GP ANL
	Greek Ascoloy	GRD ANL
	Consumet 316L Mod	PG SH
	182FM Project 70	GRD ANL
	No. 5-F	CD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Se	CD ANL
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
	20Cb-3	GRD ANL
	Maniflex® FM	CD ANL
	PH 13-8 Mo	GRD SA
	430FR SOL Qual	GRD ANL
	15Cr-5Ni	GRD SA
	440C BRG Qual	GRD ANL
	203 Project 70	CD ANL
	321 Project 70	CD ANL
	304L Project 70	CD ANL
.3149	316LS IMP QU	PG SH
.317	303 Project 70	CD ANL
.3175	303 Project 70	CD ANL
.318	416 Project 70	GRD TR
.3195	416 Project 70	GRD TR
.322	PH 13-8 Mo	GRD SA
21/64	416 Project 70	CD ANL
	440C BRG Qual	GRD ANL
.334	430FR SOL Qual	GRD ANL
.3433	416 Project 70	PG TR
11/32	No. 5-F	CD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
	440C BRG Qual	GRD ANL
.346	416 Project 70	GRD TR
.359	316 Project 70	CD ANL
.3593	303 Project 70	GRD ACW
3/8	410	CD ANL
	410	GRD ANL
	420	CD ANL
	440F Se	GRD ANL
	440F Se	PG ANL
	Custom 455	GRD SA
	304L	CD ANL
	Greek Ascoloy	GRD ANL
	321	CD ANL
	347	CD ANL
	182FM Project 70	GRD ANL
	No. 5-F	CD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	316 Project 70	GP ANL
	316 Project 70	GP SH
	304 Project 70	CD ANL
	304 Project 70	GRD ACW
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	CD ANL
	303 Project 70	GP ANL
	303 Project 70	GRD ACW
	20Cb-3	GRD ANL
	430F SOL Qual	PG ANL
	PH 13-8 Mo	GRD SA
	430FR SOL Qual	GRD ANL
	22Cr-13Ni-5Mn	GP SH
	15Cr-5Ni	GRD SA
	416 BQ	CD ANL
	440C BRG Qual	GRD ANL
	Consumet 440C BRG Qual	GRD ANL
	303 Al Mod	CD ANL
	303 Al Mod	GRD ACW
	203 Project 70	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
.378	303 Project 70	GRD ANL
.379	416 Project 70	CD ANL
.380	15Cr-5Ni	GRD SA
.3805	303 Project 70	CD ANL
.384	316 Project 70	CD ANL
.385	PH 13-8 Mo	GRD SA
25/64	303 Project 70	GRD ACW
	440C BRG Qual	GRD ANL
	416 Project 70	CD ANL
	Consumet 440C BRG Qual	GRD ANL
.394	416 Project 70	PG TR
.397	430FR SOL Qual	GRD ANL
.3995	303 Project 70	GRD ANL
.406	303	CD ANL
13/32	416 Project 70	CD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
	316 Nuclear Qual	CD ANL
	440C BRG Qual	GRD ANL
.407	430FR SOL Qual	GRD ANL
7/16	410	CD ANL
	420	CD ANL
	304L	CD ANL
	Greek Ascoloy	GRD ANL
	321	CD ANL
	347	CD ANL
	416	GRD TR
	No. 5-F	CD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	316 Project 70	GRD ACW
	304 Project 70	CD ANL
	304 Project 70	GRD ACW
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	CD ANL
	303 Project 70	GP ANL
	303 Project 70	GRD ACW
	20Cb-3	GRD ANL
	430F SOL Qual	GRD ANL
	PH 13-8 Mo	GRD SA
	430FR SOL Qual	GRD ANL
	15Cr-5Ni	GRD SA
	21Cr-6Ni-9Mn	GRD SA
	416 BQ	CD ANL
	440C BRG Qual	GRD ANL
	303 Al Mod	CD ANL
	203 Project 70	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
.447	PH 13-8 Mo	GRD SA
.448	430FR SOL Qual	PG ANL
.453	440F Se	GRD ANL
29/64	303 Project 70	CD ANL
	Consumet 440C BRG Qual	GRD ANL
.468	182FM Project 70	PG ANL
	No. 5-F	PG ANL

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Stainless Steels/Rounds

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Size	Type	Cond.
15/32	431	CD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
	440C BRG Qual	GRD ANL
	420F	CD ANL
	316 Project 70	GRD SH
.4755	430FR SOL Qual	GRD ANL
.499	303 Project 70	PG ANL
1/2	410	CD ANL
	410	GRD ANL
	420	CD ANL
	440F Se	GRD ANL
	Custom 455	GRD SA
	304L	CD ANL
	304	GP ANL
	Greek Ascoloy	GRD ANL
	316	GP ANL
	316	GP SH
	321	CD ANL
	347	CD ANL
	No. 5-F	CD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	316 Project 70	GRD ACW
	316 Project 70	GRD SH
	304 Project 70	CD ANL
	304 Project 70	GRD ACW
	304 Project 70	PG ANL
	630 Project 70 (17Cr-4Ni)	GP SAA
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	CD ANL
	303 Project 70	GP ANL
	303 Project 70	GRD ACW
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	PH 13-8 Mo	GRD SA
	410 SHQ	GRD TR
	430FR SOL Qual	GRD ANL
	430FR SOL Qual	PG ANL
	22Cr-13Ni-5Mn	GP SH
	15Cr-5Ni	GRD SA
	21Cr-6Ni-9Mn	GRD SA
	416 BQ	CD ANL
	416 BQ	GP ANL
	440C BRG Qual	GRD ANL
	Consumet 440C BRG Qual	GRD ANL
	303 Al Mod	CD ANL
	Custom 630 (17Cr-4Ni)	PG SAA
	203 Project 70	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
	304L Project 70	GRD ACW
	316L Project 70	CD ANL
.501	430FR SOL Qual	GRD ANL
.504	430FR SOL Qual	GRD ANL
.506	416 Project 70	CD ANL
	303 Project 70	GRD ANL
.510	PH 13-8 Mo	GRD SA
33/64	303 Project 70	GRD ACW
	440C BRG Qual	GRD ANL
	440C	GRD ANL
.522	430FR SOL Qual	GRD ANL
.531	Consumet 440C BRG Qual	GRD ANL
.5312	630 Project 70 (17Cr-4Ni)	GRD SA
17/32	No. 5-F	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ACW
	316 Nuclear Qual	GRD ANL
	316 Nuclear Qual	GRD SH
	440C BRG Qual	GRD ANL
.5468	431	GRD ANL
9/16	410	GRD ANL
	420	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	347	GRD ANL
	No. 5-F	GRD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	316 Project 70	GRD ACW
	316 Project 70	GRD SH
	304 Project 70	CD ANL
	304 Project 70	GRD ACW
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	410 SHQ	GRD TR
	430FR SOL Qual	GRD ANL
	15Cr-5Ni	GRD SA
	316 Nuclear Qual	GRD ANL
	21Cr-6Ni-9Mn	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	CD ANL
	304L Project 70	GRD ACW
.5635	316 Project 70	PG ANL
.5725	PH 13-8 Mo	GRD SA
.591	Consumet 440C BRG Qual	GRD ANL
.593	Consumet 440C BRG Qual	GRD ANL
19/32	416 Project 70	GRD ANL
	303 Project 70	GRD ACW
	303 Project 70	CD ANL
.603	303 Project 70	GRD ANL
.623	410 SHQ	GRD TR
5/8	410	GRD ANL
	420	GRD ANL
	304L	GRD ANL
	304	GP ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	347	GRD ANL
	182FM Project 70	GRD ANL
	182FM Project 70	PG ANL
	No. 5-F	GRD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	316 Project 70	GRD ACW
	316 Project 70	GRD SH
	304 Project 70	CD ANL
	304 Project 70	GRD ACW
	630 Project 70 (17Cr-4Ni)	GP SAA
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	PG SA
	303	GRD SH
	303 Project 70	CD ANL
	303 Project 70	GP ANL
	303 Project 70	GRD ACW
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	410 SHQ	GRD TR
	430FR SOL Qual	GRD ANL
	15Cr-5Ni	GRD SA
	316 Nuclear Qual	GRD ANL
	416 BQ	GP ANL
	440C BRG Qual	GRD ANL
	203 Project 70	CD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	CD ANL
	304L Project 70	GRD ACW
	22Cr-13Ni-5Mn IMP QU	GRD SH
.628	304 Project 70	GRD ACW
.631	304 Project 70	GRD ACW

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Stainless Steels/Rounds

Size	Type	Cond.
.632	303 Project 70	GRD ANL
.635	Custom 455	GRD SA
	PH 13-8 Mo	GRD SA
.639	416 Project 70	CD TR
41/64	416 Project 70	GRD ANL
	440C BRG Qual	GRD ANL
21/32	416 Project 70	GRD ANL
	303 Project 70	GRD ACW
	440C BRG Qual	GRD ANL
	Consumet 440C BRG Qual	GRD ANL
	440A	GRD ANL
.670	430FR SOL Qual	GRD ANL
.675	430FR SOL Qual	PG ANL
.682	Custom 455	GRD SA
11/16	410	GRD ANL
	420	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	347	GRD ANL
	No. 5-F	GRD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	316 Project 70	GRD ACW
	316 Project 70	GRD SH
	304 Project 70	CD ANL
	304 Project 70	GRD ACW
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303	CD ANL
	303 Se	GRD ANL
	303 Project 70	CD ANL
	303 Project 70	GRD ACW
	20Cb-3	GRD ANL
	15Cr-5Ni	GRD SA
	316 Nuclear Qual	GRD ANL
	21Cr-6Ni-9Mn	GRD SA
	440C BRG Qual	GRD ANL
	303 Al Mod	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	CD ANL
	304L Project 70	GRD ACW
	309 ABQ™	GRD ANL
.709	Consumet 316L Mod	GRD SH
23/32	416 Project 70	GRD ANL
	440C BRG Qual	GRD ANL
	Consumet 440C BRG Qual	GRD ANL
.749	303 Project 70	GP ANL
3/4	410	GRD ANL
	420	GRD ANL
	443	GRD ANL
	Custom 455	GRD SA
	304L	GRD ACW
	304L	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	182FM Project 70	GRD ANL
	No. 5-F	GRD ANL
	416 Project 70	CD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	316 Project 70	GP SH
	316 Project 70	GRD ACW
	316 Project 70	GRD SH
	304 Project 70	CD ANL
	304 Project 70	GRD ACW
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Se	GRD ANL
	303 Project 70	CD ANL
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	PH 13-8 Mo	GRD SA
	410 SHQ	GRD TR
	410 SHQ	HF TR
	430FR SOL Qual	GRD ANL
	22Cr-13Ni-5Mn	GP SH
	15Cr-5Ni	GRD SA
	316 Nuclear Qual	GRD ANL
	416 BQ	GRD TR
	440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GP SAA
	Custom 630 (17Cr-4Ni)	GRD SAA
	203 Project 70	CD ANL
	203 Project 70	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	CD ANL
	304L Project 70	GRD ACW
.751	316 Project 70	PG ANL
.760	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
49/64	416 Project 70	GRD TR
	440C BRG Qual	GRD ANL
.7812	416 Project 70	GRD ANL
25/32	440C BRG Qual	GRD ANL
13/16	410	GRD ANL
	420	GRD ANL
	304L	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	No. 5-F	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD SH
	304 Project 70	GRD ACW
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Se	GRD ANL
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	303 Project 70	CD ANL
.826	No. 5-F	GRD ANL
.827	416 Project 70	GRD TR
.843	416 Project 70	GRD ANL
27/32	416 Project 70	GRD ANL
7/8	410	GRD ANL
	420	GRD ANL
	440A	GRD ANL
	440F	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	182FM Project 70	GRD ANL
	No. 5-F	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	CD ANL
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Se	GRD ANL
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	PH 13-8 Mo	GRD SA
	410 SHQ	GRD TR
	15Cr-5Ni	GRD SA
	21Cr-6Ni-9Mn	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GP SAA
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
.877	Custom 450	GRD SA
.885	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA

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Stainless Steels/Rounds

Size	Type	Cond.
.886	416 Project 70	GRD ANL
.906	Consumet 440C BRG Qual	GRD ANL
15/16	410	GRD ANL
	420	GRD ANL
	440F Se	GRD ANL
	Greek Ascoloy	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	316 Project 70	GRD SH
	304 Project 70	GRD ACW
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	15Cr-5Ni	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	Consumet 440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
.9778	430F SOL Qual	PG ANL
.987	416 Project 70	PG ANL
1	410	GRD ANL
	410	GRD TR
	431	GRD ANL
	420	GRD ANL
	Custom 455	GRD SA
	304L	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	416	PG ANL
	182FM Project 70	GRD ANL
	No. 5-F	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GP SH
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GP SAA
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303	CD ANL
	303 Se	GRD ANL
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	430F SOL Qual	GRD ANL
	PH 13-8 Mo	GRD SA
	430FR SOL Qual	GRD ANL
	22Cr-13Ni-5Mn	GP SH
	15Cr-5Ni	GRD SA
	316 Nuclear Qual	GRD ANL
	21Cr-6Ni-9Mn	GRD SA
	440C BRG Qual	GRD ANL
	Consumet 440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GRD SAA
	203 Project 70	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	316L Project 70	PG ANL
1.005	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
1.010	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
1.0156	316 Project 70	GRD ACW
1-1/16	410	GRD ANL
	440F	GRD ANL
	No. 5-F	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
	440C BRG Qual	GRD ANL
	Consumet 440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
1-1/8	410	GRD ANL
	420	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	347	GRD ANL
	182FM Project 70	GRD ANL
	No. 5-F	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GRD SAA
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
1.128	316	GP ANL
1.135	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
1-3/16	410	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GRD SAA
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	15Cr-5Ni	GRD ANL
1-7/32	440C BRG Qual	GRD ANL
1-1/4	410	GRD ANL
	410	RT ANL
	431	GRD ANL
	420	GRD ANL
	Custom 455	GRD SA
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	347	GRD ANL
	182FM Project 70	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GP SH
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL

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Stainless Steels/Rounds

Size	Type	Cond.
	630 Project 70 (17Cr-4Ni)	GP SAA
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	430F SOL Qual	GRD ANL
	PH 13-8 Mo	GRD SA
	410 SHQ	GRD TR
	15Cr-5Ni	GRD SA
	316 Nuclear Qual	GRD ANL
	21Cr-6Ni-9Mn	GRD SA
	440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GP SAA
	203 Project 70	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
1.255	Custom 630 (17Cr-4Ni)	GRD SAA
1.260	PH 13-8 Mo	GRD SA
1-17/64	416 Project 70	GRD TR
1.270	Custom 630 (17Cr-4Ni)	GRD SAA
1.281	430FR SOL Qual	GRD ANL
1-5/16	410	GRD ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
1-11/32	440C BRG Qual	GRD ANL
1-3/8	410	GRD ANL
	420	GRD ANL
	420F	GRD ANL
	Custom 455	GRD SA
	304L	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	347	GRD ANL
	182FM Project 70	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	316 Project 70	GRD SH
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	410 SHQ	GRD TR
	410 SHQ	HF TR
	15Cr-5Ni	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
1.378	316	GP ANL
1.385	15Cr-5Ni	GRD SA
1.407	Consumet 440C BRG Qual	GRD ANL
1-7/16	420	GRD ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	15Cr-5Ni	GRD SA
	440C BRG Qual	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	316L Project 70	GRD ANL
1-1/2	410	GRD ANL
	420	GRD ANL
	440F Se	GRD ANL
	Custom 455	GRD SA
	316	GRD ANL
	321	GRD ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GP SAA
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	PH 13-8 Mo	GRD SA
	22Cr-13Ni-5Mn	GP SH
	15Cr-5Ni	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GRD SAA
	203 Project 70	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	Greek Ascoloy	GRD ANL
1.503	316	GP ANL
1.510	15Cr-5Ni	GRD SA
1.531	316 Project 70	ST ANL
1-9/16	321	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	430FR SOL Qual	GRD ANL
	15Cr-5Ni	GRD SA
	440C BRG Qual	GRD ANL
	Consumet 440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
1-5/8	410	GRD ANL
	420	GRD ANL
	420F	GRD ANL
	304L	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL

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Stainless Steels/Rounds

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Size	Type	Cond.
	430F SOL Qual	GRD ANL
	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
	21Cr-6Ni-9Mn	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD
		ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
1-11/16	416	PG ANL
	416 Project 70	GRD ANL
	316 Project 70	GRD
		ACW
	316 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	440C BRG Qual	GRD ANL
	304L Project 70	GRD
		ACW
	316L Project 70	GRD ANL
1-3/4	410	GRD ANL
	431	GRD ANL
	420	GRD ANL
	Custom 455	GRD SA
	304L	GRD ANL
	321	GRD ANL
	347	GRD ANL
	182FM Project 70	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD
		ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD
		ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GP SAA
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	PH 13-8 Mo	GRD SA
	430FR SOL Qual	GRD ANL
	15Cr-5Ni	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD
		ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	316L Project 70	PG ANL
	Greek Ascoloy	GRD ANL
1.755	Custom 630 (17Cr-4Ni)	GRD SAA
1-13/16	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD
		ACW
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	304L Project 70	GRD
		ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	440C BRG Qual	GRD ANL
	304L Project 70	GRD
		ACW
	316L Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
	21Cr-6Ni-9Mn	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD
		ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	Greek Ascoloy	GRD ANL
1-15/16	304	GRD ANL
	416	PG ANL
	416 Project 70	GRD ANL
	316 Project 70	GRD
		ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD
		ACW
	304 Project 70	GRD ANL
	303 Project 70	GRD ANL
	440C BRG Qual	GRD ANL
	304L Project 70	GRD
		ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	PH 13-8 Mo	GRD SA
2	410	GRD ANL
	420	GRD ANL
	420F	GRD ANL
	Custom 455	GRD SA
	304L	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD
		ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD
		ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GP SAA
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	304L Project 70	GRD
		ACW
	316L Project 70	GRD ANL
1-7/8	410	GRD ANL
	420	GRD ANL
	304L	GRD ANL
	321	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD
		ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD
		ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
	21Cr-6Ni-9Mn	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD
		ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	PH 13-8 Mo	GRD SA
2	410	GRD ANL
	420	GRD ANL
	420F	GRD ANL
	Custom 455	GRD SA
	304L	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD
		ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD
		ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GP SAA
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	PH 13-8 Mo	GRD SA
	410 SHQ	GRD TR
	410 SHQ	ST TR
	15Cr-5Ni	GRD SA
	21Cr-6Ni-9Mn	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GRD SAA
	203 Project 70	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD
		ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
2.0156	416 Project 70	GRD TR
2.032	316L	ST ANL
2-1/16	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD
		ACW
	316 Project 70	GRD ANL
	303 Project 70	GRD ANL
2-1/8	410	GRD ANL
	420	GRD ANL
	321	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD
		ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD
		ACW
	304 Project 70	GRD ANL
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GRD SA
	Custom 630 (17Cr-4Ni)	GRD SAA
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD
		ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
2-3/16	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD
		ACW
	304 Project 70	GRD ANL
	303 Project 70	GRD ANL
	304L Project 70	GRD
		ACW

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

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Stainless Steels/Rounds

Size	Type	Cond.
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
2-1/4	410	GRD ANL
	420	GRD ANL
	420F	GRD ANL
	304L	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ACW
	316 Project 70	GRD ANL
	304 Project 70	GRD ACW
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	430F SOL Qual	GRD ANL
	PH 13-8 Mo	GRD SA
	410 SHQ	RT TR
	15Cr-5Ni	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
2.255	Custom 630 (17Cr-4Ni)	GRD SAA
2-5/16	416 Project 70	GRD ANL
	303 Project 70	GRD ANL
2-3/8	410	GRD ANL
	420	GRD ANL
	316L	GRD ANL
	321	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
2-7/16	316 Project 70	GRD ANL
	303 Project 70	GRD ANL
	316L Project 70	GRD ANL
2-1/2	410	GRD ANL
	420	GRD ANL
	Custom 455	GRD SA
	304L	GRD ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	PH 13-8 Mo	GRD SA
	410 SHQ	GRD TR
	410 SHQ	RT TR
	15Cr-5Ni	GRD SA
	21Cr-6Ni-9Mn	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GP SAA
	Custom 630 (17Cr-4Ni)	GRD SAA
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ACW
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
2-9/16	316 Project 70	ST ANL
	303 Project 70	GRD ANL
	Custom 450	GRD ANL
2-5/8	410	GRD ANL
	321	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	15Cr-5Ni	GRD SA
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
2-11/16	303 Project 70	GRD ANL
2-3/4	410	GRD ANL
	420	GRD ANL
	321	GRD ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	PH 13-8 Mo	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	Greek Ascoloy	GRD ANL
2-7/8	321	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
3	410	GRD ANL
	420F	GRD ANL
	Custom 455	GRD SA
	321	GRD ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	GRD SA
	PH 13-8 Mo	RT SA
	410 SHQ	RT TR
	15Cr-5Ni	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GRD SAA
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	Greek Ascoloy	GRD ANL
3.093	316 Project 70	GRD ANL
3-1/8	410	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	440C BRG Qual	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

Stainless Steels/Rounds

CONFIDENTIAL

Size	Type	Cond.
3-1/4	410	GRD ANL
	420	RT ANL
	Greek Ascoloy	GRD ANL
	321	GRD ANL
	636	HF TR
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	316 Project 70	ST ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	RT SA
	410 SHQ	GRD TR
	410 SHQ	RT TR
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	15Cr-5Ni	GRD ANL
3-3/8	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	416 BQ	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
3-1/2	410	GRD ANL
	321	GRD ANL
	636	HF TR
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	630 Project 70 (17Cr-4Ni)	GRD SAA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	Custom 450	RT SA
	PH 13-8 Mo	GRD SA
	PH 13-8 Mo	RT SA
	410 SHQ	RT TR
	15Cr-5Ni	GRD SA
	440C BRG Qual	GRD ANL
	Custom 630 (17Cr-4Ni)	GRD SAA
	321 Project 70	GRD ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	Greek Ascoloy	GRD ANL
3-5/8	416 Project 70	GRD ANL
	316 Project 70	GRD ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	GRD SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	416 BQ	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	410	GRD ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	316 Project 70	RT ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	RT SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	410 SHQ	RT TR
	440C BRG Qual	GRD ANL
	321 Project 70	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
3.870	PH 13-8 Mo	GRD SA
4	410	RT ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	RT SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	PH 13-8 Mo	GRD SA
	410 SHQ	RT TR
	15Cr-5Ni	GRD SA
	416 BQ	GRD ANL
	440C BRG Qual	GRD ANL
	440C BRG Qual	RT ANL
	347 Project 70	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
	Greek Ascoloy	GRD ANL
4-3/16	420	GRD ANL
4-1/4	410	RT ANL
	416 Project 70	GRD ANL
	316 Project 70	GRD ANL
	316 Project 70	ST ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	RT SA
	303 Project 70	RT ANL
	20Cb-3	GRD ANL
	410 SHQ	RT TR
	440C BRG Qual	RT ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
4-3/8	303 Project 70	GRD ANL
4-1/2	410	RT ANL
	347	GRD ANL
	416 Project 70	GRD ANL
	416 Project 70	GRD TR
	316 Project 70	GRD ANL
	316 Project 70	RT ANL
	304 Project 70	GRD ANL
	630 Project 70 (17Cr-4Ni)	RT SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	410 SHQ	RT TR
	410 SHQ	ST TR
	416 BQ	PG ANL
	440C BRG Qual	RT ANL
	Custom 630 (17Cr-4Ni)	GRD SAA
	347 Project 70	GRD ANL
	304L Project 70	GRD ANL
	316L Project 70	GRD ANL
4-3/4	420	RT ANL
	416 Project 70	GRD ANL
	316 Project 70	RT ANL
	304 Project 70	GRD ANL
	304 Project 70	RT ANL
	630 Project 70 (17Cr-4Ni)	RT SA
	303 Project 70	GRD ANL
	20Cb-3	GRD ANL
	410 SHQ	RT TR
	440C BRG Qual	RT ANL
	304L Project 70	GRD ANL
5	410	RT ANL
	416 Project 70	RT ANL
	316 Project 70	RT ANL
	304 Project 70	RT ANL
	303 Project 70	RT ANL
	20Cb-3	GRD ANL
	410 SHQ	RT TR
	416 BQ	RT ANL
	440C BRG Qual	RT ANL
	Custom 630 (17Cr-4Ni)	RT SA
5-1/4	420	RT ANL
	316 Project 70	RT ANL
	304 Project 70	RT ANL
	303 Project 70	RT ANL
5-1/2	420	RT ANL
	416 Project 70	GRD ANL
	416 Project 70	RT ANL
	316 Project 70	RT ANL
	304 Project 70	RT ANL
	303 Project 70	RT ANL
	410 SHQ	RT TR
	440C BRG Qual	RT ANL
	Custom 630 (17Cr-4Ni)	RT SA
	Custom 630 (17Cr-4Ni)	RT SAA
5-9/16	416 BQ	RT ANL
5-3/4	416	HF ANL
	410 SHQ	RT TR
6	416 Project 70	RT ANL
	316 Project 70	RT ANL
	304 Project 70	RT ANL
	303 Project 70	RT ANL
	Custom 450	RT SAA
	410 SHQ	RT TR
	Custom 630 (17Cr-4Ni)	RT SA
6-1/2	410	RT ANL
	316 Project 70	RT ANL
	304 Project 70	RT ANL
	303 Project 70	RT ANL
	440C	RT ANL

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Stainless Steels/Rounds

Size	Type	Cond.
	410 SHQ	RT TR
	Custom 630 (17Cr-4Ni)	RT SAA
6-9/16	316 Project 70	RT ANL
6-3/4	416	HF ANL
7	420	RT ANL
	303 Project 70	RT ANL
	Custom 450	RT SA
7-1/2	410 SHQ	RT TR
8	410	RT ANL
	303 Project 70	RT ANL
8-1/16	316 Project 70	RT ANL
8-1/2	316 Project 70	RT ANL
11	420	RT ANL

Stainless Steels Hexagons

Size	Type	Cond.
1/8	416 Project 70	CD ANL
3/16	416 Project 70	CD ANL
	303 Project 70	CD ANL
.245	303	CD ANL
1/4	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	303 Project 70	CD ANL
	316 Nuclear Qual	CD SH
	416 BQ	CD ANL
5/16	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	303 Project 70	CD ANL
	203 Project 70	CD ANL
11/32	303 Project 70	CD ANL
3/8	347	CD ANL
	No. 5-F	CD ANL
	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	316 Project 70	CD SH
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	416 BQ	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
7/16	321	CD ANL
	347	CD ANL
	No. 5-F	CD ANL
	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	303 Al Mod	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
1/2	304L	CD ANL
	321	CD ANL
	347	CD ANL
	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	316 Project 70	CD SH
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	CD SAA
	303 Project 70	CD ANL
	316 Nuclear Qual	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
9/16	304L	CD ANL
	321	CD ANL
	347	CD ANL
	No. 5-F	CD ANL
	416 Project 70	CD ANL
	316 Project 70	CD ANL
	316 Project 70	CD SH
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	CD SAA
	303 Project 70	CD ANL
	22Cr-13Ni-5Mn	CD ANL
	316 Nuclear Qual	CD ANL
	416 BQ	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
.619	303	CD ANL
5/8	316	CD ANL
	321	CD ANL
	347	CD ANL
	No. 5-F	CD ANL
	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	CD SAA
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	316 Nuclear Qual	CD ANL
	416 BQ	CD ANL
	303 Al Mod	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
11/16	321	CD ANL
	347	CD ANL
	416 Project 70	CD ANL
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	CD SAA
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	316 Nuclear Qual	CD ANL
	203 Project 70	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
3/4	321	CD ANL
	347	CD ANL
	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	CD SAA
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	316 Nuclear Qual	CD ANL
	416 BQ	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
13/16	321	CD ANL
	347	CD ANL
	416 Project 70	CD ANL
	316 Project 70	CD ANL
	316 Project 70	CD SH
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	316 Nuclear Qual	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
7/8	347	CD ANL
	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	316 Project 70	CD SH
	304 Project 70	CD ANL

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Stainless Steels / Hexagons

Size	Type	Cond.
	630 Project 70 (17Cr-4Ni)	CD SAA
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
15/16	347	CD ANL
	416 Project 70	CD ANL
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
1	321	CD ANL
	347	CD ANL
	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303	CD ANL
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	416 BQ	CD ANL
	Custom 630 (17Cr-4Ni)	CD SAA
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
1.058	303	CD ANL
1-1/16	416 Project 70	CD ANL
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	316 Nuclear Qual	CD ANL
	304L Project 70	CD ANL
1-1/8	321	CD ANL
	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	316 Nuclear Qual	CD ANL
	416 BQ	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
1-3/16	416 Project 70	CD ANL
	316 Project 70	CD ANL
	303 Project 70	CD ANL
	304L Project 70	CD ANL
1-1/4	321	CD ANL
	347	CD ANL
	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	321 Project 70	CD ANL
	347 Project 70	CD ANL
	304L Project 70	CD ANL
1-5/16	416 Project 70	CD ANL
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	304L Project 70	CD ANL
1-3/8	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	316 Project 70	CD SH
	304 Project 70	CD ANL
	630 Project 70 (17Cr-4Ni)	CD SAA
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	416 BQ	CD ANL
	321 Project 70	CD ANL
	304L Project 70	CD ANL
1-7/16	304 Project 70	CD ANL
	303 Project 70	CD ANL
	304L Project 70	CD ANL
1-1/2	321	CD ANL
	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	316 Nuclear Qual	CD ANL
	321 Project 70	CD ANL
	304L Project 70	CD ANL
1-9/16	304 Project 70	CD ANL
	303 Project 70	CD ANL
	304L Project 70	CD ANL
1-5/8	416 Project 70	CD ANL
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	316 Nuclear Qual	CD ANL
	416 BQ	CD ANL
	304L Project 70	CD ANL
1-11/16	316 Project 70	CD ANL
	303 Project 70	CD ANL
	304L Project 70	CD ANL
1-3/4	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	20Cb-3	CD ANL
	416 BQ	CD ANL
	304L Project 70	CD ANL
1-13/16	303 Project 70	CD ANL
	304L Project 70	CD ANL
1-7/8	416 Project 70	CD ANL
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	316 Nuclear Qual	CD ANL
	304L Project 70	CD ANL
1-15/16	304L Project 70	CD ANL
2	416 Project 70	CD ANL
	416 Project 70	CD TR
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	303 Project 70	CD ANL
	316 Nuclear Qual	CD ANL
	304L Project 70	CD ANL
2-1/8	316 Project 70	CD ANL
	304 Project 70	CD ANL
	316 Nuclear Qual	CD ANL
	304L Project 70	CD ANL
2-1/4	416 Project 70	CD ANL
	316 Project 70	CD ANL
	303 Project 70	CD ANL
	304L Project 70	CD ANL
2-5/16	304L Project 70	CD ANL
2-3/8	316 Project 70	CD ANL
	303 Project 70	CD ANL
	304L Project 70	CD ANL
2.406	316 Project 70	CD ANL
2-1/2	416 Project 70	CD ANL
	316 Project 70	CD ANL
	304 Project 70	CD ANL
	416 BQ	CD ANL
	304L Project 70	CD ANL
2-5/8	316 Project 70	CD ANL
	303 Project 70	CD ANL
2-3/4	416 Project 70	CD ANL
	316 Project 70	CD ANL
	416 BQ	CD ANL

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

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Stainless Steels Squares

Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
3/4	416 Project 70	CF ANL	1-1/8	316 Project 70	CF ANL	1-3/4	416 Project 70	CF ANL
	316 Project 70	CF ANL		303 Project 70	CF ANL		316 Project 70	CF ANL
	304 Project 70	CF ANL					303 Project 70	CF ANL
	303 Project 70	CF ANL	1-1/4	416 Project 70	CF ANL			
7/8	416 Project 70	CF ANL		316 Project 70	CF ANL	2	416 Project 70	CF ANL
	316 Project 70	CF ANL		304 Project 70	CF ANL		316 Project 70	CF ANL
	316 Project 70	CF SH		303 Project 70	CF ANL		303 Project 70	CF ANL
	303 Project 70	CF ANL						
						2-1/4	303 Project 70	CF ANL
1	416 Project 70	CF ANL	1-1/2	416 Project 70	CF ANL			
	316 Project 70	CF ANL		316 Project 70	CF ANL	2-1/2	316 Project 70	CF ANL
	316 Project 70	CF SH		304 Project 70	CF ANL		304 Project 70	CF ANL
	304 Project 70	CF ANL		303 Project 70	CF ANL		303 Project 70	CF ANL
	303 Project 70	CF ANL		20Cb-3	CF ANL			

Stainless Steels Flats

Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
3/16 X 2-1/2	304 Project 70	HF ANL	1/2 X 1-1/2	416 Project 70	CF ANL	13/16 X 2	316 Project 70	CF ANL
				303 Project 70	CF ANL			
1/4 X 1-1/2	303 Project 70	CF ANL		PH 13-8 Mo	HF SA	7/8 X 1-1/2	316 Project 70	CF SH
1/4 X 2	416 Project 70	CF ANL	1/2 X 1-3/4	303 Project 70	CF ANL	1 X 1-1/4	316 Project 70	CF ANL
	304 Project 70	CF ANL						
	304 Project 70	HF ANL	1/2 X 2	416 Project 70	CF ANL	1 X 1-1/2	316 Project 70	CF ANL
	303 Project 70	CF ANL		303 Project 70	CF ANL		303 Project 70	CF ANL
.335 X 3	420	HF ANL	1/2 X 3	303 Project 70	CF ANL	1-1/4 X 1-1/2	303 Project 70	CF ANL
3/8 X 1-1/2	304 Project 70	HF ANL	3/4 X 1	416 Project 70	CF ANL			
	303 Project 70	CF ANL		303 Project 70	CF ANL	1-1/2 X 2	303 Project 70	CF ANL
3/8 X 2	304 Project 70	HF ANL	3/4 X 1-1/4	303 Project 70	CF ANL	1-1/2 X 2-1/8	316 Project 70	CF SH
	303 Project 70	CF ANL						
			3/4 X 1-1/2	316 Project 70	CF ANL	1-3/4 X 2	420F	CF ANL
1/2 X 1	416 Project 70	CF ANL		304 Project 70	CF ANL			
	304 Project 70	HF ANL				2 X 2-1/2	316 Project 70	CF SH
	303 Project 70	CF ANL	3/4 X 2	416 Project 70	CF ANL			
				304 Project 70	HF ANL			
1/2 X 1-1/4	416 Project 70	CF ANL		303 Project 70	CF ANL	2 X 3-1/2	303 Project 70	CF ANL

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Stainless Steels
Forging Bars/Rounds

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Size	Type	Cond.
5/8	316	HF UNL
21/32	316 Nuclear Qual	HF UNL
11/16	316	HF UNL
3/4	304	HF UNL
	316	HF UNL
	347	HF UNL
13/16	316 Nuclear Qual	HF UNL
7/8	347	HF UNL
	316 Nuclear Qual	HF UNL
15/16	316 Nuclear Qual	HF UNL
1	316	HF UNL
	316 Nuclear Qual	HF UNL
1-1/8	316	HF ANL
1-1/4	347	HF UNL
1-3/8	316	HF UNL
1-1/2	347	HF UNL
1-5/8	347	HF UNL
1-11/16	416	HF UNL

Stainless Steels
Forging Billets/Round Corner Squares

Size	Type	Cond.
3	304L	HF UNL
	316L	HF UNL
	316	HF UNL
4	410	HF UNL
	304L	HF UNL
	304	HF UNL
	316L	HF UNL
	316	HF UNL
	321	HF UNL
	347	HF UNL
	20Cb-3	HF UNL
	440C BRG Qual	HF ANL
	Custom 630 (17Cr-4Ni)	HF OAG
6	410	HF UNL
	420	HF ANL
	304L	HF UNL
	304	HF UNL
	316L	HF UNL
	316	HF UNL
	321	HF UNL
	347	HF UNL
	416	HF UNL
	20Cb-3	HF UNL
	Pyromet® 355	HF TMP
	440C BRG Qual	HF ANL
	Custom 630 (17Cr-4Ni)	HF OAG
6-3/4	304	HF UNL
8	410	HF UNL
	420	HF ANL
	304L	HF UNL
	304	HF UNL
	316L	HF UNL
	316	HF UNL
	321	HF UNL
	347	HF UNL
	416	HF UNL
	20Cb-3	HF UNL
	440C BRG Qual	HF ANL
	Custom 630 (17Cr-4Ni)	HF OAG
10	410	HF UNL
	420	HF ANL
	304L	HF UNL
	304	HF UNL
	316L	HF UNL
	316	HF UNL
	321	HF UNL
	347	HF UNL
	416	HF UNL
	20Cb-3	HF UNL
	440C BRG Qual	HF ANL
	Custom 630 (17Cr-4Ni)	HF OAG
12	410	HF UNL
	304L	HF UNL
	304	HF UNL
	316L	HF UNL
	316	HF UNL
	321	HF UNL
	347	HF UNL
	416	HF UNL
	Custom 630 (17Cr-4Ni)	HF OAG
14	410	HF UNL
	304	HF UNL
	316L	HF UNL
15	347	HF UNL

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Stainless Steels
Cold Heading Wire

Size	Type	Cond.
.072	302 HQ	CF ANL
.073	No. 10	CF ANL
.0915	410	CF ANL
	302 HQ	CF ANL
.0925	305	CF ANL
.0935	302 HQ	CF ANL
.106	302 HQ	CF ANL
.1095	302 HQ	CF ANL
.1135	430	CF ANL
.1165	305	CF ANL
.117	430	CF ANL
	302 HQ	CF ANL
	302 HQ STARR WIRE®	CF ANL
	410 STARR WIRE	CF ANL
.118	430	CF ANL
	302 HQ STARR WIRE	CF ANL
.119	302 HQ STARR WIRE	CF ANL
.120	410 STARR WIRE	CF ANL
.121	302 HQ	CF ANL
.1225	305	CF ANL
.1235	410	CF ANL
.125	302 HQ STARR WIRE	CF ANL
.128	430 STARR WIRE	CF ANL
.1315	302 HQ	CF ANL
.132	410	CF ANL
.134	302 HQ STARR WIRE	CF ANL
.136	410 STARR WIRE	CF ANL
.138	410 STARR WIRE	CF ANL
.139	302 HQ	CF ANL
	302 HQ STARR WIRE	CF ANL
	410 STARR WIRE	CF ANL
	430 STARR WIRE	CF ANL
.1395	410	CF ANL
	430	CF ANL
	302 HQ	CF ANL
.143	410 STARR WIRE	CF ANL
.1455	410	CF ANL
.146	302 HQ STARR WIRE	CF ANL
.147	302 HQ	CF ANL
.148	305	CF ANL
	430	CF ANL
.1515	430	CF ANL
.1525	410	CF ANL
.1535	305	CF ANL
.155	410	CF ANL
.156	410 STARR WIRE	CF ANL
	430 STARR WIRE	CF ANL
.157	302 HQ STARR WIRE	CF ANL
.1585	410	CF ANL
	430	CF ANL
.162	410 STARR WIRE	CF ANL
.163	302 HQ STARR WIRE	CF ANL
.1645	430	CF ANL
.165	410	CF ANL
	302 HQ	CF ANL
	PH 13-8 Mo	CF OAG
.169	410 STARR WIRE	CF ANL
.170	302 HQ STARR WIRE	CF ANL
.173	410	CF ANL
	302 HQ	CF ANL
.176	302 HQ STARR WIRE	CF ANL
.180	305	CF ANL
	430	CF ANL
	302 HQ	CF ANL
	302 HQ STARR WIRE	CF ANL
	430 STARR WIRE	CF ANL
.1815	410	CF ANL
.1835	430	CF ANL
.1845	410	CF ANL
	302 HQ	CF ANL
.185	302 HQ	CF ANL
	410 STARR WIRE	CF ANL
.1855	305	CF ANL
.186	Custom 630 (17Cr-4Ni)	CF OAG
.188	302 HQ STARR WIRE	CF ANL
	430 STARR WIRE	CF ANL
.191	PH 13-8 Mo	CF OAG
.192	PH 13-8 Mo	CF OAG
.1935	304	CF ANL
.2005	TrimRite®	CF ANL
.2045	302 HQ	CF ANL
.2115	302 HQ	CF ANL
.212	302 HQ STARR WIRE	CF ANL
.2135	430	CF ANL
	302 HQ	CF ANL
.222	302 HQ	CF ANL
.2265	Custom 630 (17Cr-4Ni)	CF OAG
.242	305	CF ANL
	430	CF ANL
.2435	410	CF ANL
	430	CF ANL
	302 HQ	CF ANL
.245	302 HQ	CF ANL
.247	305	CF ANL
.248	430 STARR WIRE	CF ANL
.251	PH 13-8 Mo	CF OAG
.252	430	CF ANL
.253	PH 13-8 Mo	CF OAG
.255	430	CF ANL
.268	302 HQ	CF ANL
.269	302 HQ	CF ANL
.270	302 HQ	CF ANL
.2705	430	CF ANL
.2785	410	CF ANL
	430	CF ANL
.279	302 HQ	CF ANL
.282	PH 13-8 Mo	CF OAG
.290	410	CF ANL
.3045	430	CF ANL
.306	302 HQ	CF ANL

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Stainless Steels / Cold Heading Wire

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Size	Type	Cond.
.308	302 HQ	CF ANL
.3135	PH 13-8 Mo	CF OAG
.314	431	CF ANL
.3275	302 HQ	CF ANL
.330	PH 13-8 Mo	CF OAG
.350	302 HQ STARR WIRE	CF ANL
.3765	431	CF ANL
	PH 13-8 Mo	CF OAG
.454	302 HQ	CF ANL

High Temperature Alloys
Rounds

Size	Type	Cond.
.100	MP35N*	CD ANL
.1094	L-605	GP SH
3/16	Pyromet A286	GRD ANL
.218	Pyromet A286	GRD SAA
.220	Pyromet 718	GRD SH
1/4	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Waspaloy**	GRD SA
	Pyromet 718	GRD ANL
	L-605	GRD ANL
.260	Pyromet A286	GRD SAA
	Pyromet A286	GRD SH
	Waspaloy	GRD SA
	Pyromet 718	GRD SH
.270	Pyromet A286	GRD SA
.312	Pyromet A286	GRD SA
5/16	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Waspaloy	GRD SA
	Pyromet 718	GRD ANL
	MP35N	CD SH
.322	Pyromet 718	GRD SH
3/8	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Waspaloy	GRD SA
	Pyromet 718	GRD ANL
	Pyromet X-750	CD ANL
.385	Pyromet A286	GRD SH
	Pyromet 718	GRD SA
.390	Pyromet A286	GRD SA
.395	Pyromet 718	GRD SA
.421	Pyromet A286	GRD SA
7/16	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Waspaloy	GRD SA
	Pyromet 718	GRD ANL
1/2	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Waspaloy	GRD SA
	Pyromet 718	GRD ANL
	Pyromet X-750	CD ANL
	MP35N	CD SH
.510	Pyromet 718	GRD SH
.535	Pyromet A286	GRD SA
	MP35N	GRD SH
9/16	Pyromet A286	GRD SAA
	Pyromet A286	GRD SA
	Pyromet 718	GRD ANL
5/8	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
	Waspaloy	GRD ANL
.635	Pyromet 718	GRD SA
11/16	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
3/4	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
	Waspaloy	GRD ANL
.774	MP35N	GRD SH
.785	Pyromet A286	GRD SA
13/16	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
	Waspaloy	GRD ANL
7/8	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
	Waspaloy	GRD ANL
.890	Pyromet A286	GRD SA
.900	MP35N	GRD SH
15/16	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Waspaloy	GRD SAA
	Waspaloy	GRD ANL
	Pyromet 718	GRD ANL
1	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
	Waspaloy	GRD ANL
1.010	Pyromet A286	GRD SH
	Pyromet 882	GRD ANL
1-1/16	Pyromet A286	GRD SA
1-1/8	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
1.147	Pyromet 718	GRD SA
1-1/4	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Waspaloy	GRD ANL
	Pyromet 718	GRD ANL
1-3/8	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
1-7/16	Pyromet 718	GRD ANL
1-1/2	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
1-9/16	Pyromet 718	GRD ANL
1.610	Pyromet A286	PG SA
1-5/8	Pyromet A286	GRD SAA

*MP-35N and MP are registered trademarks of SPS Technologies, Inc.

**Waspaloy is a registered trademark of United Technologies, Inc.

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High Temperature Alloys/Rounds

Size	Type	Cond.
	Pyromet 718	GRD ANL
1-11/16	Pyromet 718	GRD ANL
1-3/4	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
1-7/8	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
2	Pyromet A286	GRD SA
	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
	Nimark® 250	GRD SA
2-1/8	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
2-1/4	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
2-3/8	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
2-1/2	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
2-5/8	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
2-3/4	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
3	Pyromet A286	GRD SAA
3-1/4	Pyromet A286	GRD SAA
3-1/2	Pyromet A286	GRD SAA
3-3/4	Pyromet A286	GRD SAA
4	Pyromet A286	GRD SAA
	Pyromet 718	GRD ANL
4-1/4	Pyromet A286	GRD SAA
4-3/8	Pyromet A286	GRD SAA
4-1/2	Pyromet 718	RT SAA
8-3/4	Pyromet 718	RT SAA

High Temperature Alloys Hexagons

Size	Type	Cond.
7/16	Pyromet A286	CD SA
	Pyromet A286	CD SAA

High Temperature Alloys Strip

Size	Type	Cond.
.031 X 8-1/2	Pyromet A286	CF SA
.040 X 8-1/2	Pyromet A286	CF SA
.050 X 8-1/2	Pyromet A286	CF SA
.060 X 1-1/4	Pyromet A286	CF SA
.060 X 8-1/2	Pyromet A286	CF SA
.063 X 8-1/2	Pyromet A286	CF SA
.080 X 8-1/2	Pyromet A286	CF SA
.090 X 8	Pyromet A286	CF SA

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High Temperature Alloys
Forging Bars/Rounds

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Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
1	CCM® Alloy	HF ANL						

High Temperature Alloys
Forging Billets/Rounds

Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
3	Nimark 250-LR	HF UNL		Pyromet 41	HF UNL	8-1/2	Pyromet CTX-1	HF UNL
				Pyromet X-750	HF UNL			
4	Waspaloy	HF UNL	6-1/2	Pyromet 718	RT UNL	9	Pyromet 718	HF UNL
	Pyromet 718	HF UNL		Pyromet CTX-1	HF UNL			
	Pyromet X-750	HF UNL				10	Waspaloy	HF UNL
			8	Pyromet A286	HF UNL		Pyromet 718	HF UNL
6	Pyromet A286	HF UNL		Waspaloy	HF UNL			
	Waspaloy	HF UNL		Pyromet 718	HF UNL	10-1/2	Pyromet CTX-1	HF UNL
	Pyromet 718	HF UNL		Consumet V57	HF UNL		Pyromet CTX-3	
	Pyromet CTX-1	HF UNL		Pyromet CTX-909	HF UNL		Pyromet CTX 909	
	Pyromet CTX-909	HF UNL		Pyromet CTX-3	HF UNL			
	Pyromet CTX-3	HF UNL		Pyromet 41	HF UNL			
	Pyromet 901	HF UNL		Pyromet 901	HF UNL	12	Pyromet 718	HF UNL

High Temperature Alloys
Cold Heading Wire

Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
.073	Pyromet A286	CF SA	.1225	Pyromet A286	CF SA	.155	Pyromet A286	CF SA
.0885	Pyromet A286	CF SA	.123	Pyromet A286	CF SA	.160	Pyromet A286	CF SA
.092	Pyromet A286	CF ANL	.1235	Pyromet A286	CF SA	.161	Pyromet A286	CF SA
.0925	Pyromet A286	CF SA		Pyromet 600	CF ANL	.166	Pyromet A286	CF SA
	Pyromet 600	CF ANL	.1265	Pyromet A286	CF SA	.167	Pyromet A286	CF SA
.093	Pyromet A286	CF SA	.128	Pyromet A286	CF SA	.1675	Pyromet A286	CF SA
.0935	Pyromet A286	CF SA	.1345	Pyromet A286	CF ANL	.168	Pyromet A286	CF SA
.0975	Pyromet A286	CF SA	.141	Pyromet A286	CF SA	.169	Pyromet A286	CF SA
.1025	Pyromet A286	CF SA	.142	Pyromet A286	CF SA	.170	Pyromet A286	CF SA
.108	Pyromet A286	CF SA	.143	Pyromet A286	CF SA	.175	Pyromet A286	CF SA
.116	Pyromet A286	CF SA	.145	Pyromet A286	CF ANL	.178	Pyromet A286	CF SA
.117	Pyromet A286	CF SA	.1545	Pyromet A286	CF SA	.185	Pyromet A286	CF SA
.121	Pyromet A286	CF SA		Pyromet 600	CF ANL			

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High Temperature Alloys Cold Heading Wire

Size	Type	Cond.
.1855	Pyromet A286	CF SA
	Pyromet 600	CF ANL
.186	Pyromet A286	CF SA
.1865	Pyromet A286	CF SA
.187	Pyromet A286	CF SA
.190	Pyromet 882	CF ANL
.191	Pyromet A286	CF ANL
	Pyromet A286	CF SA
	Waspaloy	CF SA
.1915	Pyromet A286	CF ANL
.192	Pyromet A286	CF SA
.1935	Pyromet A286	CF SA
	Pyromet 882	CF ANL
.194	Pyromet A286	CF SA
.195	Pyromet A286	CF SA
.1955	Pyromet A286	CF SA
.197	Pyromet A286	CF SA
.204	Pyromet A286	CF SA
.205	Pyromet A286	CF SA
.209	Pyromet A286	CF SA
.218	Pyromet A286	CF SA
	Waspaloy	CF SA
.219	Waspaloy	CF SA
.223	Pyromet A286	CF SA
.225	Pyromet A286	CF SA
.226	Waspaloy	CF ANL
.227	Pyromet A286	CF SA
.229	Pyromet A286	CF SA
.236	Pyromet A286	CF SA
.237	Pyromet A286	CF SA
.241	Pyromet A286	CF SA
.245	Pyromet A286	CF SA
.246	Pyromet A286	CF SA
.2465	Pyromet A286	CF SA
.247	Pyromet A286	CF SA
.249	Pyromet A286	CF SA
	Waspaloy	CF SA
.250	Waspaloy	CF SA
	Pyromet 882	CF ANL
.251	Pyromet A286	CF SA
	Waspaloy	CF SA
.252	Pyromet A286	CF ANL
	Pyromet A286	CF SA
.253	Pyromet 882	CF ANL
.2535	Pyromet A286	CF SA
.254	Pyromet 882	CF ANL
.257	Pyromet A286	CF ANL
	Pyromet A286	CF SA
	Pyromet 882	CF ANL
.261	Pyromet A286	CF SA
.2635	Pyromet A286	CF SA
.265	Waspaloy	CF ANL
	Waspaloy	CF SA
.266	Waspaloy	CF ANL
	Pyromet 718	CF SA
.267	Pyromet 882	CF ANL
.2675	Pyromet A286	CF SA
.270	Pyromet A286	CF SA
.271	Pyromet A286	CF SA
.278	Pyromet A286	CF SA
	Waspaloy	CF ANL
.279	Pyromet A286	CF ANL
	Pyromet A286	CF SA
.2795	Pyromet A286	CF SA
.280	Pyromet A286	CF SA
	Waspaloy	CF SA
.282	Pyromet A286	CF SA
	Waspaloy	CF ANL
	Waspaloy	CF SA
	Pyromet 882	CF ANL
.285	Waspaloy	CF SA
.286	Pyromet A286	CF SA
.291	Waspaloy	CF ANL
.293	Pyromet A286	CF SA
	Waspaloy	CF SA
.294	Pyromet A286	CF SA
.297	Pyromet A286	CF SA
.300	Pyromet A286	CF SA
.302	Pyromet A286	CF SA
.304	Pyromet A286	CF SA
.305	Pyromet A286	CF SA
.308	Pyromet A286	CF SA
.310	Pyromet A286	CF ANL
	Pyromet A286	CF SA
.312	Pyromet A286	CF SA
	Waspaloy	CF ANL
	Waspaloy	CF SA
	Pyromet 882	CF ANL
.313	Waspaloy	CF ANL
.3135	Pyromet A286	CF SA
.3145	Pyromet 882	CF ANL
.316	Pyromet A286	CF SA
.317	Pyromet A286	CF SA
.3175	Pyromet 882	CF ANL
.3195	Pyromet 882	CF ANL
.320	Pyromet A286	CF SA
.3215	Pyromet 882	CF ANL
.330	Pyromet 882	CF ANL
.331	Pyromet A286	CF SA
.342	Pyromet A286	CF SA
.343	Waspaloy	CF ANL
.345	Pyromet A286	CF SA
	Pyromet 882	CF ANL
.346	Pyromet A286	CF SA
.347	Pyromet A286	CF ANL
.348	Pyromet A286	CF SA
	Waspaloy	CF ANL
	Waspaloy	CF SA
.3485	Pyromet A286	CF SA
.349	Pyromet A286	CF SA
.360	Pyromet A286	CF SA
.3685	Pyromet A286	CF ANL
.369	Pyromet A286	CF SA
.375	Pyromet A286	CF SA
	Waspaloy	CF SA
	Pyromet 882	CF ANL
.3765	Pyromet A286	CF SA
.378	Pyromet A286	CF SA
.379	Pyromet A286	CF SA
.3795	Pyromet 882	CF ANL
.382	Pyromet A286	CF SA
	Pyromet 882	CF ANL
.383	Pyromet A286	CF ANL

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High Temperature Alloys
Cold Heading Wire

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Size	Type	Cond.
.386	Pyromet A286	CF SA
.391	Pyromet A286	CF SA
	Waspaloy	CF ANL
.401	Pyromet A286	CF SA
.4135	Pyromet A286	CF ANL
	Waspaloy	CF ANL
.415	Pyromet A286	CF SA
	Waspaloy	CF SA
.416	Pyromet 882	CF ANL
.420	Pyromet A286	CF SA
	Waspaloy	CF SA
.4205	Pyromet A286	CF SA
.421	Pyromet 882	CF ANL
.437	Pyromet 882	CF ANL
.4385	Pyromet A286	CF SA
.440	Pyromet 882	CF ANL
.442	Pyromet 882	CF ANL
.445	Pyromet 882	CF ANL
.455	Pyromet A286	CF SA
.4665	Waspaloy	CF ANL
.468	Pyromet A286	CF SA
.470	Pyromet A286	CF SA
.490	Pyromet 882	CF ANL
.491	Pyromet A286	CF SA
.493	Pyromet A286	CF SA
.500	Pyromet A286	CF SA
.502	Pyromet A286	CF SA
	Pyromet 882	CF ANL
.505	Pyromet A286	CF SA
.507	Pyromet A286	CF SA
	Pyromet 882	CF ANL
.510	Pyromet 882	CF ANL
.535	Pyromet A286	CF ANL
	Pyromet A286	CF SA
.569	Pyromet 882	CF ANL
.576	Pyromet A286	CF SA
.590	Pyromet A286	CF SA
.625	Pyromet A286	CF SA
.648	Pyromet 882	CF ANL

Electronic Alloys
Rounds

Size	Type	Cond.
1/8	FC Invar "36"®	CD UNL
3/16	FC Invar "36"	CD UNL
1/4	FC Invar "36"	CD UNL
	Kovar®	GRD UNL
5/16	FC Invar "36"	CD UNL
	Kovar	GRD UNL
3/8	FC Invar "36"	CD UNL
	Kovar	GRD UNL
7/16	Kovar	GRD UNL
1/2	FC Invar "36"	CD UNL
	Kovar	GRD ACW
	Kovar	GRD UNL
9/16	Kovar	GRD UNL
5/8	FC Invar "36"	GRD UNL
	Kovar	GRD ACW
	Kovar	GRD UNL
3/4	FC Invar "36"	GRD UNL
	Kovar	GRD UNL
7/8	FC Invar "36"	GRD UNL
	Kovar	GRD UNL
1	FC Invar "36"	GRD UNL
	Kovar	GRD UNL
1-1/8	FC Invar "36"	GRD UNL
	Kovar	GRD UNL
1-1/4	FC Invar "36"	GRD UNL
	Kovar	GRD UNL
1-3/8	FC Invar "36"	GRD UNL
	Kovar	GRD UNL
1-1/2	FC Invar "36"	GRD UNL
	Kovar	GRD UNL
1-5/8	FC Invar "36"	GRD UNL
1-3/4	FC Invar "36"	GRD UNL
2	FC Invar "36"	GRD UNL
	Kovar	GRD UNL
2-3/16	HyMu "80"®	GRD ANL
2-1/4	FC Invar "36"	GRD UNL
2-1/2	FC Invar "36"	GRD UNL
2-3/4	FC Invar "36"	GRD UNL
3	FC Invar "36"	GRD UNL
3-1/2	FC Invar "36"	GRD UNL

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Electronic Alloys Squares

Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
1-7/8	FC Invar "36"	CF UNL						

Electronic Alloys Flats

Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
.251 X 5/8	HyMu "80"	CF ANL						

Electronic Alloys Forging Billets/Round Corner Squares

Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
6	FC Invar "36"	HF UNL						

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Electronic Alloys Strip/Sheet

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Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
.008 X 1.343	Kovar	CF ADD	.020 X13	Kovar	CF ADD	.040 X30	Hipernom	CF ANL
.0095 X .650	Kovar	CF UNL	.020 X30	Hipernom	CF ANL	.0478 X .950	Kovar	CF ANL
.0095 X 1	Kovar	CF UNL	.025 X13	Kovar	CF ADD	.049 X 3/4	Kovar	CF UNL
.010 X13	Kovar	CF ADD	.025 X30	Hipernom	CF ANL	.050 X13	Kovar	CF ADD
.011 X 1.765	Kovar	CF ADD	.030 X 8	Kovar	CF ANL	.050 X30	Hipernom	CF ANL
.015 X .530	Kovar	CF ADD	.030 X13	Kovar	CF ADD	.060 X13	Kovar	CF ADD
.015 X 8	Kovar	CF ANL	.030 X30	Hipernom	CF ANL	.061 X .590	Kovar	CF UNL
.015 X12	Kovar	CF ANL	.040 X 1-1/8	Kovar	CF ADD	.062 X30	Hipernom	CF ANL
.015 X13	Kovar	CF ADD	.040 X 1-3/4	Kovar	CF ADD	.100 X13	Kovar	CF ADD
.015 X30	Hipernom®	CF ANL	.040 X13	Kovar	CF ADD	1/8 X13	Kovar	CF ADD

Nickel-Copper Alloys Rounds

Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
1/4	405	CD SR	.995	400	CD SR	1-7/8	405	CD SR
	400	CD SR					400	CD SR
			1	405	CD SR			
5/16	405	CD SR		400	CD SR	2	405	CD SR
				400	HF SR		400	CD SR
3/8	405	CD SR					400	HF SR
	400	CD SR	1-1/16	405	CD SR			
						2-1/8	405	CD SR
.437	400	CD SR	1-1/8	405	CD SR		400	HF SR
				400	CD SR			
7/16	405	CD SR		400	HF SR	2-1/4	400	CD SR
							400	HF SR
1/2	405	CD SR	1-3/16	405	CD SR			
	400	CD SR				2-3/8	405	CD SR
	400	HF SR	1-1/4	405	CD SR		400	CD SR
				400	CD SR			
9/16	405	CD SR				2-1/2	405	CD SR
			1-3/8	405	CD SR		400	CD SR
5/8	405	CD SR		400	CD SR			
	400	CD SR				2-3/4	400	HF SR
			1-7/16	405	CD SR			
11/16	405	CD SR				3	400	HF SR
			1-1/2	405	CD SR			
3/4	405	CD SR		400	CD SR	3-1/4	400	HF SR
	400	CD SR		400	HF SR			
	400	HF SR				3-1/2	400	HF SR
			1-9/16	405	CD SR			
13/16	405	CD SR				3-3/4	400	HF SR
			1-5/8	405	CD SR			
7/8	405	CD SR		400	CD SR	4	400	HF SR
	400	CD SR		400	HF SR			
	400	HF SR				4-1/4	400	HF SR
			1-3/4	405	CD SR			
15/16	405	CD SR		400	CD SR			
				400	HF SR	4-1/2	400	HF SR

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Nickel-Copper Alloys Hexagons

Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
1/4	405	CD SR	3/4	405	CD SR	1-5/16	405	CD SR
5/16	405	CD SR	7/8	405	CD SR	1-3/8	405	CD SR
3/8	405	CD SR	15/16	400	CD SR	1-1/2	405	CD SR
7/16	405	CD SR	1	405	CD SR	1-5/8	405	CD SR
1/2	405 400	CD SR CD SR	1-1/8	405 400	CD SR CD SR	1-11/16	405	CD SR
9/16	405	CD SR	1-1/4	405	CD SR	1-3/4	405	CD SR
5/8	405	CD SR		400	CD SR	1-7/8	400	CD SR

Nickel-Copper Alloys Wire

Size	Type	Cond.	Size	Type	Cond.	Size	Type	Cond.
.153	400	CF ANL	.568	400	CF ANL			

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Heating Element and Resistance Wire

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Size	Type	Packaging
.00175	Tophet® A	SP
	Evanohm® R	SP
	Alchrome® DK	SP
.002	Tophet A	SP
	Evanohm R	SP
	Alchrome DK	SP
.00225	Tophet A	SP
	Tophet C	SP
	Evanohm R	SP
.0025	Tophet A	SP
	Tophet C	SP
	Evanohm R	SP
	Alchrome DK	SP
.00275	Tophet A	SP
	Tophet C	SP
	Evanohm R	SP
	Alchrome DK	SP
.0031	Tophet A	SP
	Evanohm R	SP
.0035	Tophet A	SP
.004	Tophet A	SP
	Tophet C	SP
	Evanohm R	SP
	CB Cupron®	SP
.0045	Tophet A	SP
	Tophet C	SP
	Evanohm R	SP
.005	Tophet A	SP
	Tophet C	SP
	Evanohm R	SP
	Alchrome DK	SP
	CBX Cupron	SP
.0056	Tophet A	SP
	Tophet C	SP
	Alchrome DK	SP
	CBX Cupron	SP
.0063	Tophet A	SP
	Tophet C	SP
	Evanohm R	SP
	Alchrome DK	SP
	CBX Cupron	SP
.0071	Tophet A	SP
	Tophet C	SP
	Evanohm R	SP
	CBX Cupron	SP
.008	Tophet A	SP
	Tophet C	SP
	Evanohm R	SP
	CBX Cupron	SP
.0089	Tophet A	SP
	Tophet C	SP
.010	Tophet A	PAY
	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
	CBX Cupron	

Size	Type	Packaging
.0113	Tophet A	PAY
	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
	Evanohm R	SP
	CBX Cupron	SP
.0126	Tophet A	PAY
	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
	CBX Cupron	SP
.0142	Tophet A	PAY
	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
	CBX Cupron	SP
.0159	Tophet A	PAY
	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
	CBX Cupron	SP
.0169	Tophet A	PAY
.0179	Tophet A	PAY
	Tophet C	PAY
	Tophet C	SP
	CBX Cupron	SP
.018	Tophet A	SP
.0201	Tophet A	PAY
	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
	CBX Cupron	SP
.0213	Tophet A	PAY
.0226	Tophet A	PAY
	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
	CBX Cupron	SP
.024	Tophet A	PAY
.0253	Tophet A	PAY
	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
.0285	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
	Alchrome DK	SP
	CBX Cupron	SP
.032	Tophet A	PAY
	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
.034	Tophet C	PAY
.036	Tophet A	PAY
	Tophet C	PAY
	Tophet C	SP
	Alchrome DK	SP
	CBX Cupron	SP

Size	Type	Packaging
.038	Tophet A	PAY
	Tophet C	PAY
.040	Tophet A	PAY
	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
	Alchrome DK	SP
	CBX Cupron	SP
.042	Tophet C	PAY
.045	Tophet A	PAY
	Tophet A	SP
	Tophet C	PAY
	Tophet C	SP
	Alchrome DK	SP
	CBX Cupron	SP
.048	Tophet C	PAY
.051	Tophet A	PAY
	Tophet C	PAY
	Tophet C	SP
	Alchrome DK	SP
	CBX Cupron	SP
.054	Tophet C	PAY
.057	Tophet A	PAY
	Tophet C	PAY
	Tophet C	SP
	CBX Cupron	SP
.064	Tophet A	PAY
	Tophet C	PAY
	Tophet C	SP
	CB Cupron	SP
.072	Tophet A	PAY
	Tophet C	PAY
	Tophet C	SP
.081	Tophet A	PAY
	Tophet C	PAY
	Tophet C	SP
.091	Tophet C	PAY
.102	Tophet A	Coil
.114	Tophet A	Coil
.128	Tophet A	Coil
.144	Tophet A	Coil
.162	Tophet A	Coil
.182	Tophet A	Coil
.204	Tophet A	Coil
.229	Tophet A	Coil
.258	Tophet A	Coil
.289	Tophet A	Coil
.325	Tophet A	Coil
.365	Tophet A	Coil

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Heating Element and Resistance Wire

Size	Type	Packaging	Size	Type	Packaging	Size	Type	Packaging
.0056x.0156	CBX Cupron	SP						
.0050x.03125	CBX Cupron	SP						
.0179x.03125	CBX Cupron	SP						

Thermocouple Wire

Size	Type	Packaging	Size	Type	Packaging	Size	Type	Packaging
.032	Cupron JN	SP	.051	Cupron JN	SP			
	Cupron JNX	SP		Cupron JNX	SP			
	Iron JP	SP		Iron JP	SP			
	Iron JPX	SP		Iron JPX	SP			
	Nial® KN	SP		Nial KN	SP			
	Nial KNX	SP		Nial KNX	SP			
	Tophel® KP	SP		Tophel KP	SP			
	Tophel KPX	SP		Tophel KPX	SP			

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Specifications

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The specifications referenced herein are the most requested Military and Technical society specifications for the appropriate types and conditions shown. Carpenter stocks are usually certifiable to the latest appropriate specification revision. Consult your local Carpenter Service Center for verification of material certification to specification requirements.

BAR: ROUNDS—HOT ROLLED ANNEALED FLATS—HOT ROLLED ANNEALED & PICKLED

TYPES 302/304 (UNS S30200/S30400)
- AMS 5639
- ASTM A182
- ASTM A193
- ASTM A194
- ASTM A276
- ASTM A479
- MIL-S-7720
- QQ-S-763

TYPE 303 (UNS S30300)
- AMS 5640
- ASTM A582
- QQ-S-764

TYPE 316 (UNS S31600)
- AMS 5648
- ASTM A182
- ASTM A193
- ASTM A276
- ASTM A320
- ASTM A479
- MIL-S-7720
- QQ-S-763

TYPE 410 (UNS S41000)
- AMS 5613
- ASTM A276
- ASTM A479
- QQ-S-763

TYPE 416 (UNS S41600)
- AMS 5610
- ASTM A194
- ASTM A582
- QQ-S-764

TYPE 420 (UNS S42000)
- AMS 5621
- ASTM A276
- QQ-S-763

TYPE 440C (UNS S44004)
- AMS 5630
- ASTM A276
- QQ-S-763

CUSTOM 630 (17Cr-4Ni) (UNS S17400)
- AMS 5643
- ASTM A564

BAR: ROUNDS, SQUARES, HEXAGONAL & FLATS—COLD FINISHED

TYPE 303 (UNS S30300)
- AMS 5640
- ASTM A582
- MIL-W-52263
- QQ-S-764

TYPE 304 (UNS S30400)
- AMS 5639
- ASTM A194
- ASTM A276
- ASTM A479
- QQ-S-763

TYPE 304L (UNS S30403)
- AMS 5647
- ASTM A276
- ASTM A479
- QQ-S-763

TYPE 316 (UNS S31600)
- AMS 5648
- ASTM A276
- ASTM A479
- QQ-S-763

TYPE 321 (UNS S32100)
- AMS 5645
- ASTM A194
- ASTM A276
- ASTM A479
- QQ-S-763

TYPE 410 (UNS S41000)
- AMS 5613
- ASTM A182
- ASTM A276
- ASTM A479
- QQ-S-763

TYPE 416 (ANNEALED) (UNS S41600)
- AMS 5610
- ASTM A194
- ASTM A582
- MIL-W-52263
- QQ-S-764

TYPE 416 (255/302 BHN TREATED) (UNS S41600)
- ASTM A582
- MIL-W-52263
- QQ-S-764

TYPE 416 (302/352 BHN TREATED) (UNS S41600)
- ASTM A582
- MIL-W-52263
- QQ-S-764

TYPE 420 (UNS S42000)
- AMS 5621
- ASTM A276
- QQ-S-763

TYPE 420F (UNS S42020)
- AMS 5620
- ASTM A582
- QQ-S-764

TYPE 440C (UNS S44004)
- AMS 5630
- ASTM A276
- QQ-S-763

TYPE 440F-Se (UNS S44020)
- AMS 5632
- ASTM A582
- QQ-S-764

CUSTOM 630 (17Cr-4Ni) (UNS S17400)
- AMS 5643
- ASTM A564

NO. 5-F (UNS S41600)
- ASTM A582
- MIL-W-52263
- QQ-S-764

20Cb-3® STAINLESS (UNS N08020)
- ASTM B473

FREE-CUT INVAR 36® (UNS K93602)
- MIL-S-16598

PYROMET ALLOY A-286 (UNS K66286)
- Solution Annealed Ground
- Spec A286-C1A
  - AMS 5731
  - AMS 5736
- Solution Treated Aged Ground
- Spec A286-C2A
  - AMS 5737
  - ASTM A638-87 Grade 660 Type 1
  - ASTM A453-86 Grade 660 Class A
- Solution Treated Aged Ground
- Spec A286-C2A-1
  - ASTM 5732-F
  - ASTM A638-87 Grade 660 Type 2
  - ASTM A453-88A Grade 660 Class B (Two Hardnesses Per Lot)

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Specifications

BAR: ROUNDS, SQUARES, HEXAGONAL & FLATS—COLD FINISHED

PYROMET ALLOY 718 (UNS N07718)
- Annealed Ground
- Spec 718-C1A
  - AMS 5662
  - GE B50TF-15-S13
  - GE B50T69-S6
  - GE C50TF-13-S7 (Cap Of)
  - ASTM B637
  - PWA-S-5662
  - SPS-M-275

GREEK ASCOLOY (AMS 5616) (UNS S41800)
- Annealed Ground
- Spec GRK-C1A
  - AMS 5616
  - PWAS 5616
  - AMS 2303
  - ASTM A565
  - HS 2776

WASPALOY (UNS N07001)
- Solution Annealed Ground
- Spec WASP-C1A
  - AMS 5708E
  - AMS 5709E (Cap Of)

PH13-8 Mo (UNS S13800)
- Solution Annealed Ground
- Spec PH13-8Mo-C1A
  - AMS 5629C
  - AMS 2300
  - HMS 6-1105
  - ST0160 LB0013E
  - ASTM A564-87B
  - DMS 2100B

15Cr-5Ni (UNS S15500)
- Solution Annealed Ground
- Spec 15Cr-5Ni-C1a
  - AMS 5659
  - AMS 2300
  - ASTM A564-876

KOVAR (UNS K94610)
- Unannealed Ground
- Spec KOV-COA
  - ASTM F15-78 (Temper B)
  - MIL-I-23011C (3/29/84)
    - Class 1 (Chemistry, Expansion and Transformation Only)
  - GE 46-134167 Rev. 5 (8/85)
    - (Sizes .250" to .682" only)

FORGING BAR: ROUNDS

TYPES 302/304 (UNS S30200/S30400)
- AMS 5639
- ASTM A182
- ASTM A314
- MIL-S-862
- MIL-S-7720
- QQ-S-763

TYPE 303 (UNS S30300)
- AMS 5640
- ASTM A314
- MIL-S-862

TYPE 304L (UNS S30403)
- AMS 5647
- ASTM A182
- ASTM A314
- MIL-S-862
- QQ-S-763

TYPE 316 (UNS S31600)
- AMS 5648
- ASTM A182
- ASTM A314
- MIL-S-862
- MIL-S-7720
- QQ-S-763

TYPE 316L (UNS S31603)
- AMS 5653
- ASTM A182
- ASTM A314
- MIL-S-862
- QQ-S-763

TYPE 410 (UNS S41000)
- AMS 5613
- ASTM A182
- ASTM A314
- MIL-S-862
- QQ-S-763

TYPE 416 (UNS S41600)
- AMS 5610
- ASTM A314
- MIL-S-862

FORGING BILLETS: ROUND/CORNER SQUARES

TYPES 302/304 (UNS S30200/S30400)
- AMS 5639
- ASTM A182
- ASTM A314
- MIL-S-862
- MIL-S-7720
- QQ-S-763

TYPE 303 (UNS S30300)
- AMS 5640
- ASTM A314
- MIL-S-862

TYPE 304L (UNS S30403)
- AMS 5647
- ASTM A182
- ASTM A314
- MIL-S-862
- QQ-S-763

TYPE 316 (UNS S31600)
- AMS 5648
- ASTM A182
- ASTM A314
- MIL-S-862
- MIL-S-7720
- QQ-S-763

TYPE 316L (UNS S31603)
- AMS 5653
- ASTM A182
- ASTM A314
- MIL-S-862
- QQ-S-763

TYPE 321 (UNS S32100)
- AMS 5645
- ASTM A182
- ASTM A314
- MIL-S-862
- QQ-S-763

TYPE 347 (UNS S34700)
- AMS 5646
- ASTM A182
- ASTM A314
- MIL-S-862
- QQ-S-763

TYPE 410 (UNS S41000)
- AMS 5613
- ASTM A182
- ASTM A314
- MIL-S-862
- QQ-S-763

TYPE 416 (UNS S41600)
- AMS 5610
- ASTM A314
- MIL-S-862

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Specifications

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WIRE: COLD HEADING

TYPE 384 (NO. 10) (UNS S38400) ASTM A493	**TYPE 410 (UNS S41000)** ASTM A493	**TYPE 302HQ (UNS S30430)** ASTM A493
TYPE 305 (UNS S30500) ASTM A493	**TYPE 430 (UNS S43000)** ASTM A493	

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Carpenter Service Centers

ATLANTA
Snapfinger Woods Industrial Park
5355 Morse Drive
Decatur, GA 30035-3810
Telephone: (404) 987-3000
In GA: 800-822-9703
In AL, NC, SC, VA and TN:
800-241-4449
In FL: 800-241-3584

BOSTON
234 Forbes Blvd.
P.O. Box 620
Mansfield, MA 02048-0620
Telephone: (508) 339-5161
In MA: 800-372-2196
In ME, NH, RI: 800-225-2109

CHICAGO
4501 James Place
Melrose Park, IL 60160-1080
Telephone: (708) 681-3500
In Chicago: (312) 379-8000
In IA and IN: 800-323-9284
In IL: 800-942-0211

CINCINNATI
680 Redna Terrace
P.O. Box 15507
Cincinnati, OH 45215-0507
Telephone: (513) 771-0250
In OH: 800-582-4263
In KY: 800-543-1907

CLEVELAND
4901 West 150th Street
Cleveland, OH 44135-3398
Telephone: (216) 267-6700
In OH: 800-362-1439
In Western PA and WV:
800-321-1552

DALLAS
2605 Freewood Drive
P.O. Box 540065
Dallas, TX 75354-0065
Telephone: (214) 352-1771
800-527-5171

DAYTON
2012 Springboro West
Moraine, OH 45439-1648
Telephone: (513) 224-7456
In OH: 800-582-4263

DETROIT
Executive Park East
446 Executive Drive
Troy, MI 48083-7988
Telephone: (313) 588-5300
In MI: 800-451-5844
In OH and IN: 800-521-2182

HARTFORD
277 New Park Avenue
P.O. Box 2419
Hartford, CT 06146-2419
Telephone: (203) 233-7581
In Bridgeport: 336-1105
Remaining CT Areas:
800-842-4311
In VT, MA: 800-243-2318

HOUSTON
610 Lockhaven Drive
Houston, TX 77073-5505
Telephone: (713) 821-0987
In LA: 800-231-0495

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P.O. Box 681338
Indianapolis, IN 46268-7338
Telephone: (317) 297-3300
In IN, KY and IL: 800-331-5533

LOS ANGELES
4423 East District Boulevard
P.O. Box 58880
Los Angeles, CA 90058-0880
Telephone: (213) 587-9131
In CA: 800-522-5077
Outside CA: 800-227-1902

MEMPHIS
3070 Connahbrook Drive
P.O. Box 16620
Memphis, TN 38186-0620
Telephone: (901) 332-8332
In TN: 800-241-9270
In AR and MS: 800-238-2644

MILWAUKEE
4330 West Green Tree Road
P.O. Box 23239
Milwaukee, WI 53223-0239
Telephone: (414) 353-4900
In WI: 800-242-7636

MINNEAPOLIS
2809 Winter Street, N.E.
Minneapolis, MN 55413-2977
Telephone: (612) 331-8440
In MN: 800-462-5337
In IA, ND, SD, NE and WI:
800-328-5535

NEW YORK/NORTH JERSEY
99 Clinton Road
P.O. Box 1267
West Caldwell, NJ 07006-1267
Telephone: (201) 227-5400
In NY: 800-222-0475

PHILADELPHIA
235 New York Drive
Fort Washington, PA 19034-2589
Telephone: (215) 646-7272
Other Areas in PA: 800-562-6700
In NJ, DE, MD and VA:
800-523-8770

ROCHESTER
145 Metro Park
P.O. Box 23020
Rochester, NY 14692-3020
Telephone: (716) 475-9120
In Central & Western NY:
800-462-4244
In Northern and Western PA:
800-828-9018

ST. LOUIS
3942 Laclede Avenue
St. Louis, MO 63108-3273
Telephone: (314) 652-6700
In MO: 800-392-8783
In IL and KS: 800-325-8633

SAN FRANCISCO
2263 National Avenue, Unit A
Hayward, CA 94545-1715
In CA: 800-522-5077
Outside CA: 800-227-1902

SOUTH BEND
1717 North Commerce Drive
South Bend, IN 46628-1594
In IN: 800-521-2182
In MI: 800-451-5844

INTERNATIONAL SERVICE CENTER AND OFFICES

TORONTO, CANADA
Carpenter Technology
(Canada) Ltd.
7464 Tranmere Drive, Unit 2
Mississauga, Ontario, L5S 1K4
Canada
Telephone: (416) 672-9150
In Canada: 800-268-4740
Telex: 06-983506

BRUSSELS, BELGIUM
51, Square Vergote
1040 Brussels, Belgium
Telephone: 32-2-7339632
Telex: 25729

REDDITCH, ENGLAND
Carpenter Technology (UK) Ltd.
6 Royal House
11 Market Place
Redditch, Worcestershire,
B98 8AA, England
Telephone: (0527) 68112 or
(0527) 68113
Telex: 337915

CONFIDENTIAL



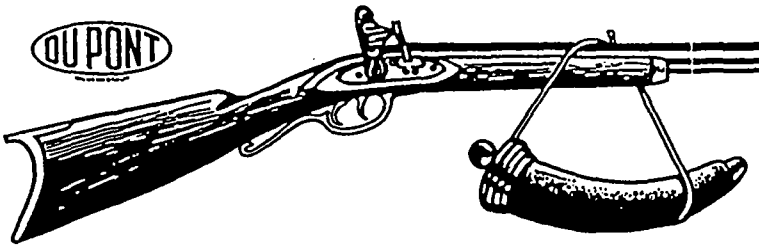
CARPENTER TECHNOLOGY

CARPENTER STEEL DIVISION

READING, PENNSYLVANIA 19612-4662

CarTech®

CONFIDENTIAL



Remington®

DATE: 7/8/91 TIME: 7:30 am EDT

TO: JAY BUNTING

_____ (BLDG./ROOM NO.)

774-8582 (PHONE)

FROM: JIM RONKAINEN

_____ (BLDG./ROOM NO.)

246-1559 (PHONE)

TOTAL NUMBER OF PAGES, INCLUDING THIS SHEET: 2

RECEIPT VERIFICATION CALL REQUIRED? (YES/NO)

COMMENTS: _____

Remington Arms Company, Inc.
Firearms Technical Division
Ilion, New York
Fax (315) 894-9961 Ext. 276

CONFIDENTIAL

CALL 841-6314 upon receipt
FAX (303) 841-8517 6/20/91

PAUL SPENARD

STOCK SPECS
- MOUNTAIN RIFLE STOCK w/ CHECKERING
- ITEM # 112 DESC # SFGRM-7
  111 SFGRM-6
- AUG '88 G&A p.66 has pict of stock
- MR SHAPED STOCK
- MANY BBL CHANNELS MR ≠ STD.
- 13½" length of pull
- has fiberglass, wears very well
- AS seen as clunky
-

SIGHTS
- no sights on long action guns (.30-06 family)
- .338 w/ sights only and even that is marginal
- 700 KS barrel contours, std contour on mags.
- .30-06 family 24" 1 blo
- 24" on mags.
- BDL sights if you use any sights
- .375 ≠ .416 ~~or w~~ w/ sights would be ok
- BBL band front express site (2 leafs) ow/ ½ rib

MUZZLE BRAKE
- magna port doesn't work, KIF does
- use only on .338, superan .375 ≠ .416 (selling flatbed)
- use brake at range, not in field, but too loud
- concerned about noise level

CONFIDENTIAL

ANSWER PRODUCTS – muzzle brakes & recoil

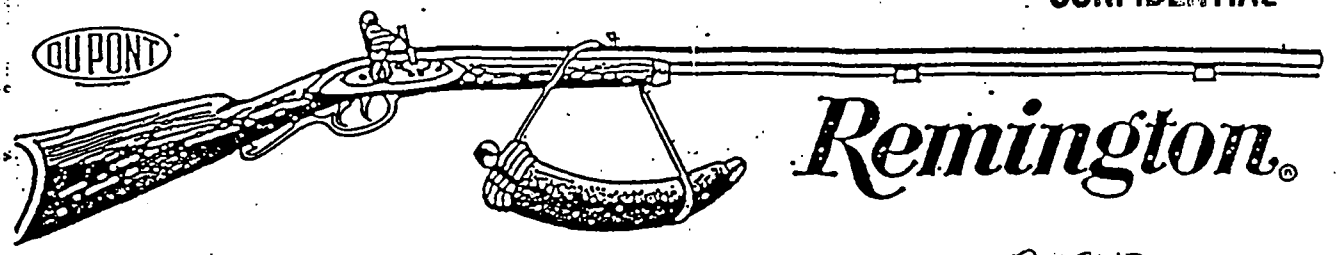
DICK FAXTON – (303) 469-4877
= experienced w/ brakes
– does brakes on 700's
– needs info for polishing to match 700's
– let Paul know if I can get info

sptg clays gun – needed
Ruger's are scarce – no effect on market
– stock is detrimental

don't put SS gun in mass merchants

.375 would sell better than .25-06

CONFIDENTIAL



DATE: 6/21/91 TIME: 11:00a RESEND ~~9:45~~ EDT

TO: PAUL SPENARD
REMINGTON ARMS (BLDG./ROOM NO.)
841-6314 (PHONE)

FROM: JIM RONKAINEN
REMINGTON ARMS R&D (BLDG./ROOM NO.)
(315) 894-9961 x569 (PHONE)

TOTAL NUMBER OF PAGES, INCLUDING THIS SHEET: 3

RECEIPT VERIFICATION CALL REQUIRED? (YES/NO)

COMMENTS: PLEASE CALL 841-6314 UPON RECEIPT

Remington Arms Company, Inc.
Firearms Technical Division
Ilion, New York
Fax (315) 894-9961 Ext. 276

CONFIDENTIAL

June 21, 1991

TO: Paul Spenard
FROM: Jim Ronkainen Jim

SUBJECT: Our Telephone Conversation, 6/20/91

To confirm our telephone conversation on the evening of 6/20/91:

STOCK
- You prefer the McMillan Mountain Rifle stock with checkering. The stock has good form and the checkering is functional.

- You personally have two McMillan stocks of this configuration, one with a floorplate and the other without. The McMillan part numbers for your stocks are:
  Item #111 Desc #SFGRM-6
  Item #112 Desc #SFGRM-7

- The August 1988 issue of GUNS & AMMO has a picture of the McMillan stock on p.66.

- The stock is modeled after the M/700 MR stock with a length of pull of 13.5". The stock has various barrel channels to fit MR or standard contour barrels.

- Your stocks have the FIBERGRAIN finish. It has proven durable in a hunting environment.

- The M/700 AS stock is seen as "clunky". Functionally, the stock is good, but it could be improved aesthetically.

SIGHTS
- Don't put sights on the long action guns (270, 280, 30-06). In the magnum calibers (7mm, 300, 338), only the 338 would be a candidate for sights, and even that is not necessary to sell the gun. Keep the barrel clean (don't drill and tap for sights).

- If the gun is offered in 375 H&H and 416 REM, offer a barrel band front sight and a two leaf express rear sight. A quarter rib would be nice, but not absolutely necessary.

BARRELS
- Consider using the 700 KS barrel contour for the long action calibers, keeping the current barrel contour for the magnums.

- Make all offerings with a 24" barrel (long and magnum actions).

MUZZLE BRAKES
- Magna-Port is effective in stopping muzzle jump but does very little to reduce recoil.

- The KDF brake works very well to reduce recoil, but increases muzzle blast and noise level to the shooter.

- If a muzzle brake was to be offered on the M/700 SS, the 338 would be the only gun where it would really start to become necessary. If the M/700 SS is offered in 375 H&H and 416 REM, a muzzle brake would be a big plus.

- You use a muzzle brake at the range where you use hearing protection, but remove it for hunting situations because the added noise without hearing protection is damaging to your hearing.

- A "quieter" brake would be a very preferable. You are currently having an ANSWER Products quiet muzzle brake fitted to one of your guns.

GENERAL MARKET INFORMATION

- Browning owns the SS market right now. Ruger is not a big player, perhaps because their stock is a detraction from the gun.

- There is no current need to offer the M/700 SS in short action calibers. Most game taken with this type of rifle is large (whitetail/mule deer and larger). An offering in 25-06 in a year or two would be good, but an offering in 375 would probably outsell it.

- Don't put the M/700 SS in mass merchants. Keep it as an offering for gun shops.

If you find anything that needs clarification or is inaccurate, just send me a PROFS note about it and I'll correct it. Thanks for your input!

MODEL 700 CLASSIC
,338 TRIAL & PILOT
87021 1

RD-69-B

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington DUPONT PETERS DUPONT

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"_____

xc: W.H. Coleman, II/File
K.W. Soucy
G.J. Hill
J.R. Snedeker
R.S. Murphy
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 870211
JANUARY 30, 1987

MODEL 700 CLASSIC 338 WIN MAG TRIAL AND PILOT RIFLES
VISUAL, ACCURACY AND FUNCTION

MODEL 700 CLASSIC 338 WIN MAG TRIAL AND PILOT EVALUATION

ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700 Classic, 338 Win Mag caliber rifle, to be acceptable. The Trial and Pilot Evaluation consisted of Visual Inspection, Accuracy, and Function. The eight rifle sample was found to be within Remington Specifications for each phase of the Trial and Pilot Evaluation.

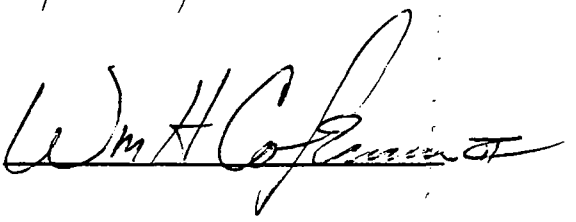
Prepared by: F.L. SUPRY
Date Prepared: 1/30/87

proofread and cleared by:

J.R. SNEDEKER, Research Supervisor
Test, Measurement & Mech. Analysis Lab



W.H. COLEMAN, II
New Products Research Lab Director



REPORT# 870211

WORK ORDER# B-0504-000
DATE: JANUARY 30, 1987

TO: J.R. SNEDEKER

FROM: F.L. SUPRY

TITLE: ACCURACY AND FIELD FUNCTION: MODEL 700 CLASSIC 338 WIN MAG

ABSTRACT:

On January 21, 1987 a request was received to conduct a Visual, Accuracy and Function evaluation of the Model 700 Classic 338 WIN MAG caliber, Trial and Pilot rifles currently in the warehouse. Eight rifles were randomly selected from the warehouse.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

The eight rifle Trial and Pilot Evaluation was found to be acceptable. The following results were obtained:

A. VISUAL:

a. The overall appearance of the rifles was very good.

B. ACCURACY:

a. Average group size = 2.43 inches center to center

C. FUNCTION:

a. No malfunctions occurred.

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

TEST REPORT:

1. ACCURACY:

A. The Remington specification for group size is 3.5 inches, center to center.

B. Three (3) rifles were tested for 100 yard accuracy and the following results were established:

	GROUP NUMBER 1	2	3	AVERAGE
Rifle# B6830009 -	1.65 in.	2.29 in.	2.69 in.	2.21 in.
Rifle# B6833596 -	2.65 in.	3.79 in.	1.81 in.	2.65 in.
Rifle# B6830876 -	2.64 in.	2.79 in.	1.88 in.	2.44 in.

2. FUNCTION:

A. Three rifles were subjected to a 30 round per rifle, Function Test and the following results were obtained:

a. No malfunctions occurred.

TEST PROCEDURE:

1. ACCURACY

A. The following three (3) rifles were used in the 100 yard accuracy test:

B6830009 B6833596 B6830876

B. The accuracy was shot by the Custom Shop, at the R & D 100 yard range.

C. Leupold base and rings were used in conjunction with a Redfield 12X (4-plex) scope.

D. Winchester ammunition; index X3381, code 9WC61, 200 grain soft point, was used for the 100 yard accuracy test.

E. Before shooting the 100 yard accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

TEST PROCEDURE: (continued)

1. ACCURACY (continued)

F. A total of three (3), five (5) shot groups were shot with each rifle. The rifles were cooled between each group, and one (1) "warmer" shot was fired before the next group was shot.

G. The patterns were analyzed for group size, and averages were calculated for each rifle.

2. VISUAL:

A. The visual inspection committee consisted of G.Hill, J. Willoughby (P. E. & C.); F. Supry, and J. Selan (R. & D.).

B. Five (5) rifles were selected, using random number tables, from a sample lot of eight rifles.

C. The rifles used in the Visual Inspection were:

B6833465 B6830372 B6829175 B6833550 B6831373

D. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the Visual Inspection Committee. All comments were recorded, and are included in this report.

3. FUNCTION:

A. The following three rifles were selected for the Function Test:

B6830009 B6833596 B6830876

B. The three rifles were subjected to the loading and firing of 30 rounds of Winchester ammunition (15 rounds of 200 grain, and 15 rounds of 225 grain). Fifteen rounds were fired; 5 at a slow feeding cycle speed, 5 at a medium feeding cycle speed, and 5 at a fast feeding cycle speed. The rifles were allowed to cool and then the procedure repeated with the remaining ammunition type.

C. The following ammunition was used in the function test:

a. X3381 200 grain soft point
b. X3382 225 grain soft point

VISUAL INSPECTION MODEL 700 CLASSIC 338 WIN MAG CALIBER

SERIAL NUMBER	----------COMMENTS----------
B6833465	SMALL NICKS IN RIGHT SIDE OF BBL GROOVE - BURNISH MARK ON THE RECOIL PAD - SLIGHT TURN MARKS ON RIGHT SIDE OF BBL, UNDER THE FRONT SIGHT BASE.
B6830372	ROUGH FILL IN THE BOLT HANDLE SLOT - FLOOR PLATE SLIGHTLY LOOSE - PITS ON THE BOLT PLUG.
B6829175	FIBER THREAD UNDER THE RECOIL PAD - SLIGHT MAR ON THE SIGHT SCREW - INCOMPLETE POLISH ON THE FIRING PIN HEAD - FLOOR PLATE SLIGHTLY LOOSE.
B6833550	SLIGHT BREAKOUT OF STOCK AT THE RAIL ON THE RIGHT SIDE OF THE RECEIVER - RECEIVER SEEMS TO SET TOO DEEP IN THE STOCK - FLOOR PLATE TAKEDOWN SCREW MARRED.
B6831373	NICK ON THE FLOOR PLATE - EXCESSIVE SANDING IN THE BOLT HANDLE SLOT AREA - FIBER THREAD UNDER RECOIL PAD.

IN GENERAL THESE WERE VERY GOOD LOOKING RIFLES. THE CHECKERING WAS CLEAR, AND THE WOOD AND METAL FINISHES WERE EXCELLENT. THE VISUAL INSPECTION COMMITTEE FINDS THE VISUAL INSPECTION OF THE MODEL 700 CLASSIC 338 WIN MAG TO BE ACCEPTABLE.

RD-69-5

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington DUPONT PETERS DUPONT

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"_____

xc: W.H. Coleman, II/File
K.W. Soucy
G.J. Hill
J.R. Snedeker
R.S. Murphy
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 870211
JANUARY 30, 1987

MODEL 700 CLASSIC 338 WIN MAG TRIAL AND PILOT RIFLES
VISUAL, ACCURACY AND FUNCTION

MODEL 700 CLASSIC 338 WIN MAG TRIAL AND PILOT EVALUATION

ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700 Classic, 338 Win Mag caliber rifle, to be acceptable. The Trial and Pilot Evaluation consisted of Visual Inspection, Accuracy, and Function. The eight rifle sample was found to be within Remington Specifications for each phase of the Trial and Pilot Evaluation.

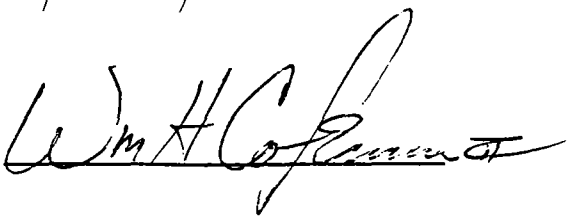
Prepared by: F.L. SUPRY
Date Prepared: 1/30/87

proofread and cleared by:

J.R. SNEDEKER, Research Supervisor
Test, Measurement & Mech. Analysis Lab



W.H. COLEMAN, II
New Products Research Lab Director



REPORT# 870211

WORK ORDER# B-0504-000
DATE: JANUARY 30, 1987

TO: J.R. SNEDEKER

FROM: F.L. SUPRY

TITLE: ACCURACY AND FIELD FUNCTION: MODEL 700 CLASSIC 338 WIN MAG

ABSTRACT:

On January 21, 1987 a request was received to conduct a Visual, Accuracy and Function evaluation of the Model 700 Classic 338 WIN MAG caliber, Trial and Pilot rifles currently in the warehouse. Eight rifles were randomly selected from the warehouse.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

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a. Average group size = 2.43 inches center to center

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TEST REPORT:

1. ACCURACY:

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2. FUNCTION:

A. Three rifles were subjected to a 30 round per rifle, Function Test and the following results were obtained:

a. No malfunctions occurred.

TEST PROCEDURE:

1. ACCURACY

A. The following three (3) rifles were used in the 100 yard accuracy test:

B6830009 B6833596 B6830876

B. The accuracy was shot by the Custom Shop, at the R & D 100 yard range.

C. Leupold base and rings were used in conjunction with a Redfield 12X (4-plex) scope.

D. Winchester ammunition; index X3381, code 9WC61, 200 grain soft point, was used for the 100 yard accuracy test.

E. Before shooting the 100 yard accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

TEST PROCEDURE: (continued)

1. ACCURACY (continued)

F. A total of three (3), five (5) shot groups were shot with each rifle. The rifles were cooled between each group, and one (1) "warmer" shot was fired before the next group was shot.

G. The patterns were analyzed for group size, and averages were calculated for each rifle.

2. VISUAL:

A. The visual inspection committee consisted of G.Hill, J. Willoughby (P. E. & C.); F. Supry, and J. Selan (R. & D.).

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D. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the Visual Inspection Committee. All comments were recorded, and are included in this report.

3. FUNCTION:

A. The following three rifles were selected for the Function Test:

B6830009 B6833596 B6830876

B. The three rifles were subjected to the loading and firing of 30 rounds of Winchester ammunition (15 rounds of 200 grain, and 15 rounds of 225 grain). Fifteen rounds were fired; 5 at a slow feeding cycle speed, 5 at a medium feeding cycle speed, and 5 at a fast feeding cycle speed. The rifles were allowed to cool and then the procedure repeated with the remaining ammunition type.

C. The following ammunition was used in the function test:

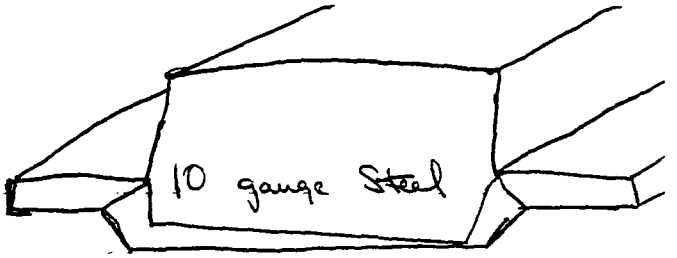
a. X3381 200 grain soft point
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VISUAL INSPECTION MODEL 700 CLASSIC 338 WIN MAG CALIBER

SERIAL NUMBER	----------COMMENTS----------
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86 1292
93 → Equipment Req



20 gauge + Choke tube

870301 7400 (30.06) Martin (2-13) C-1810

BV's 2-WSHOTSHELL - 100 Rounds function - repeat BV's

(.0890 orfice)

870271 BW

F51412 — F50981

F50745

8 R350_85074

Tandl_859

B6830876-

338 Win Mag.

Red Field 12X (4-Plex) Scope

Leupold Base & Rings

Sand Bag Rest - 100 yds.

Ammo.

1st Group - 200 GR Power Point (S.P) LOT-9WC61

2nd Set 3 groups. 225-GR SP. - 25400

2.211
2.645
2.438
7.294 ÷3 = 2.431

TP - 85642

Temp - 8426
- 8425
- 8443
- 8444
- 8505

Temp

Tech

Report No. 870211

RESEARCH TEST & MEASUREMENT LAB WORK REQUEST

	AREA OF TESTING	
____ Developmental	____ Safety Related	____ Litigation
____ Design Acceptance	____ Competitive Evaluation	____ Warehouse Audit
____ Pre-Pilot	____ New Design	____ Cost Reduction
✓ Pilot	____ Design Change	Stake ____
____ Production Acceptance	____ Plant Assistance	____ Other

FIREARM STAT'S.	REPORT REQ'D.	
MODEL: 700 CLASSIC	FORMAL X	DATE REQUESTED: 1/21/87
CAL. or GAGE: .338	TEST RESULTS ONLY ____	DATE NEEDED BY: 1/30/87
BARREL TYPE: ____		REQUESTED BY: ____
PROOFED: YES X NO ____		WORK ORDER NO: B-0504

TEST TYPE

____ Strength Test	____ Ammunition Test	____ Dry Cycle Test	____ Photo/Video
✓ Function Test	____ Environmental Test	____ Measurements	✓ Other VISUAL
✓ Accuracy Test	____ Customer Complaint	____ Endurance Test	____

EXPLAIN IN DETAIL THE REASON FOR THIS TEST:

TRIAL & PILOT OF NEW CALIBER ADDED TO THE MODEL 700 CLASSIC LINE.

VISUAL, ACCURACY & FUNCTION

GUNS REQUIRED: PICKED AT RANDOM FROM WAREHOUSE 1/20/87

B6830372	B6829175	B6833558	B6833596
B6833465	B6831373	B6830876	B6830009

NOTE: NO firearms or parts will be tested in the Labs unless they are accompanied by a Work Request, and both are delivered to the Labs by the designer or engineer. All Work Requests are to be filled out in detail. No Exceptions.

DATE COMPLETED: ____

TEST COMPLETED BY: ____

REPORT DATE: ____

To Custom Shop for 100 yard Accuracy

1/21/87

B68 33596

B68 30876

B68 30009

Please shot 3 6 shot groups for each rifle.

Return targets & Rifles to Fred Supry Ext. 467

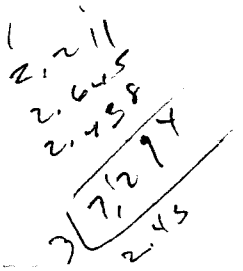
Record all shooting data

Charge WO # B-0504

Thank You,

Fred Supry

Rifles to custom Shop @ 11:30 AM 1/21/87



cc: J. White
Acctg.

TO: DP Christie

ILION RESEARCH DIVISION

FIREARMS WITHDRAWAL ~~AND RETURN~~

DATE 1/20/87

LETTER NO. 2246

QUANTITY 8

RAMAC # 5899

MODEL 700 CAL./GA. 338 WORK ORDER C-0500

SERIAL NOS.

B6220372	B6623596	
B6232465	B6630009	
B6629175		
B6631373		
B6633557		
B6620476		

☒ Will Be ☐ Will Not Be Returned

To be used for: ☒ Testing

☐ Other Trial & Pilot

REMARKS:

Approved

FSupry:sps

cc: J. White
Acctg.

TO: DP Christie

ILION RESEARCH DIVISION

FIREARMS WITHDRAWAL ~~AND~~ RETURN

DATE 1/20/87

LETTER NO. 2246

QUANTITY 8

RAMAC # 5899

MODEL 700 CAL./GA. 338 WORK ORDER C-0500

SERIAL NOS.

[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]		
[illegible]		
[illegible]		
[illegible]		

☒ Will Be ☐ Will Not Be Returned

To be used for: ☒ Testing

☐ Other Trial & Pilot

REMARKS:

Approved [signature]

FSupry:sps

G. J. Hill, J Willoughby, J. Delan, F. Supry

1-27-87

VISUAL INSPECTION MODEL 700 CLASSIC, 338 CAL

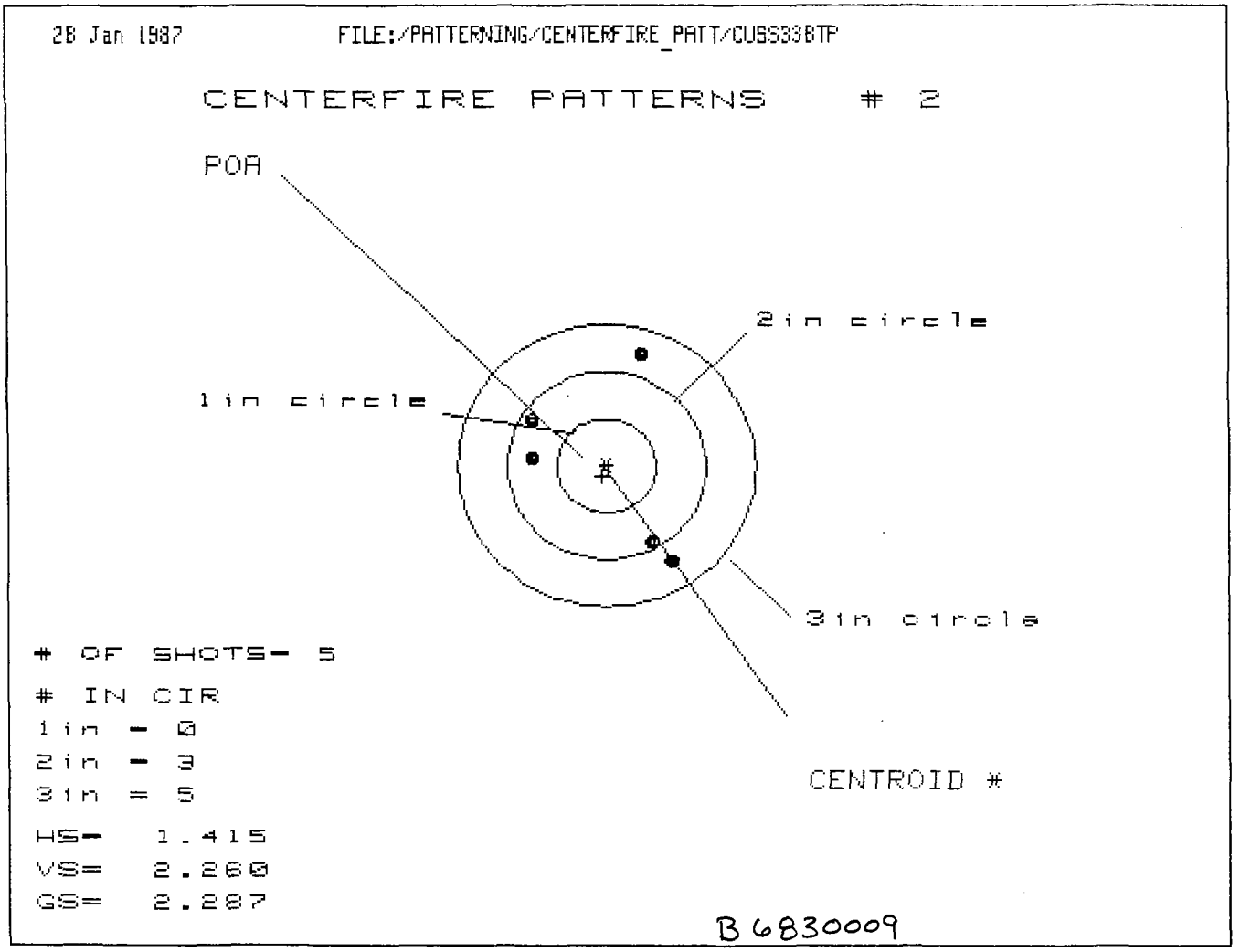
B6833465 - small nicks in right side BBL Groove - burnish mark recoil pad turn mark on right side of bbl under front sight - nick on left side same area

B6830372 - rough fill in bolt handle slot - Pits in bolt plug - Floor plate loose turn marks on bolt,

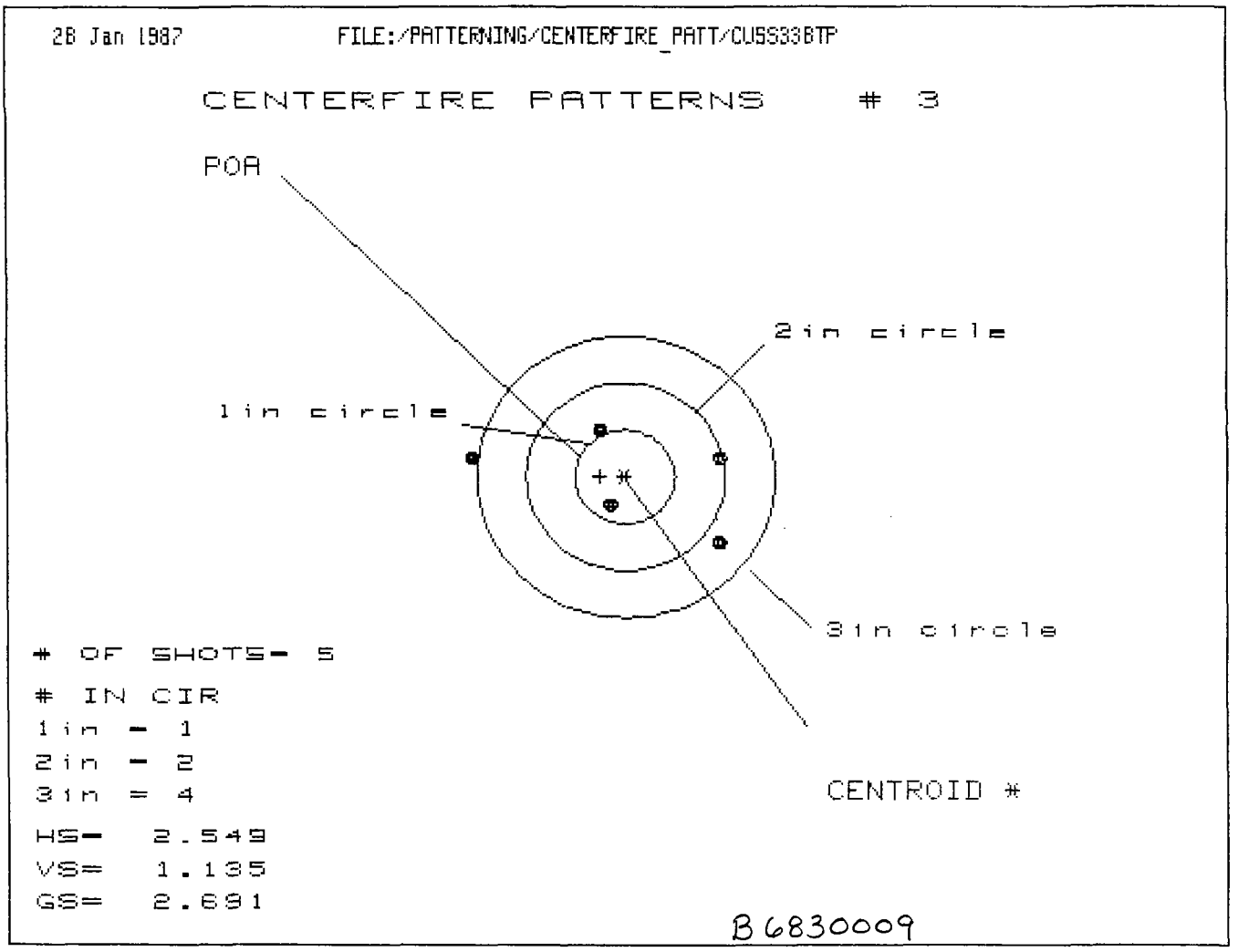
B6829175 - slight scratch left side near rear sight - slight mar of sight screw incomplete polish firing pin head - floor plate ~~loose~~ loose sideways - ding in right side of stock - fiber thread under rear butt pad -

B6833550 - slight breakout of stock @ rail (right side of Rec) - Floor plate takedown slightly damaged from screwdriver - Receiver seems to sit too deep in stock Patch left side of front guard screw - brass filing face of bolt

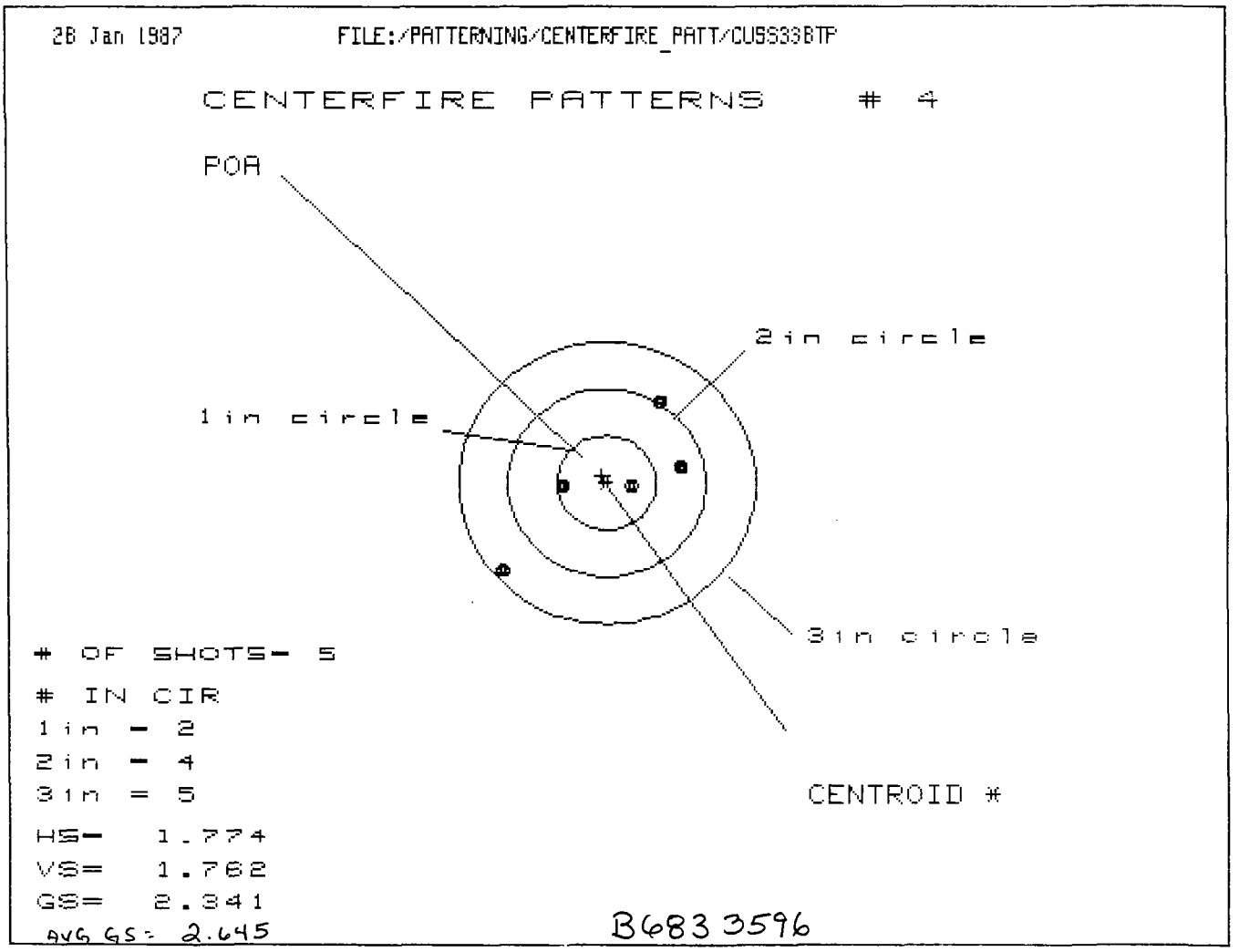
B683 1373 - nick on floor plate - excessive stock sanding in safety slot fiber under butt pad



PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.661	.738	.810
MINIMUM X	:	-.754	-.677	-.431
MAXIMUM Y	:	1.236	.774	.536
MINIMUM Y	:	-1.024	-.715	-.735
CENTROID X	:	.045	-.032	-.278
CENTROID Y	:	.110	-.199	.039
POA TO CENTROID in.	:	.119	.202	.280
MIN RADIUS	:	.713	.751	.427
MEAN RADIUS	:	1.007	.892	.736
MAX RADIUS	:	1.274	1.029	1.093
HORIZONTAL SPREAD	:	1.415	1.415	1.241
VERTICAL SPREAD	:	2.260	1.489	1.271
EXTREME SPREAD	:	2.287	2.054	1.776
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	



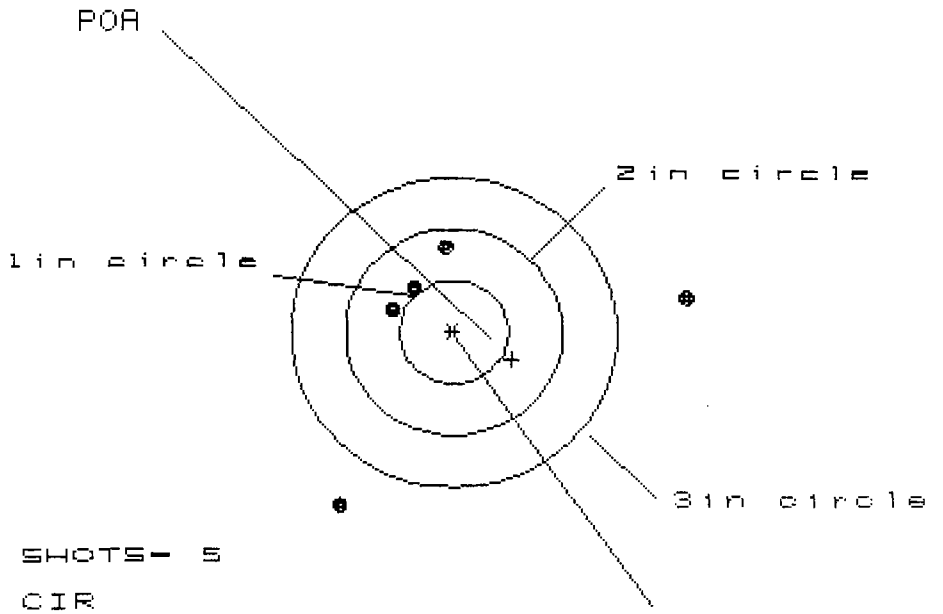
PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.987	.597	.789
MINIMUM X	:	-1.562	-.631	-.439
MAXIMUM Y	:	.457	.518	.312
MINIMUM Y	:	-.678	-.618	-.420
CENTROID X	:	.252	.642	.450
CENTROID Y	:	-.005	-.066	.140
POA TO CENTROID in.	:	.252	.646	.471
MIN RADIUS	:	.314	.583	.538
MEAN RADIUS	:	.922	.730	.627
MAX RADIUS	:	1.581	.845	.796
HORIZONTAL SPREAD	:	2.549	1.228	1.228
VERTICAL SPREAD	:	1.135	1.135	.732
EXTREME SPREAD	:	2.691	1.658	1.256
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		2	
NUMBER IN THREE INCH CIRCLE	=		4	



PATTERN #	:	4		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.737	.478	.560
MINIMUM X	:	-1.037	-.703	-.621
MAXIMUM Y	:	.849	.620	.153
MINIMUM Y	:	-.913	-.292	-.085
CENTROID X	:	.051	.310	.228
CENTROID Y	:	-.073	.156	-.051
POA TO CENTROID in.	:	.089	.347	.234
MIN RADIUS	:	.244	.275	.092
MEAN RADIUS	:	.764	.546	.433
MAX RADIUS	:	1.382	.761	.627
HORIZONTAL SPREAD	:	1.774	1.181	1.181
VERTICAL SPREAD	:	1.762	.912	.238
EXTREME SPREAD	:	2.341	1.315	1.205
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

28 Jan 1987 FILE:/PATTERNING/CENTERFIRE_PATT/CUSS33BTP

CENTERFIRE PATTERNS # 5



OF SHOTS= 5

IN CIR
1in = 0
2in = 3
3in = 3

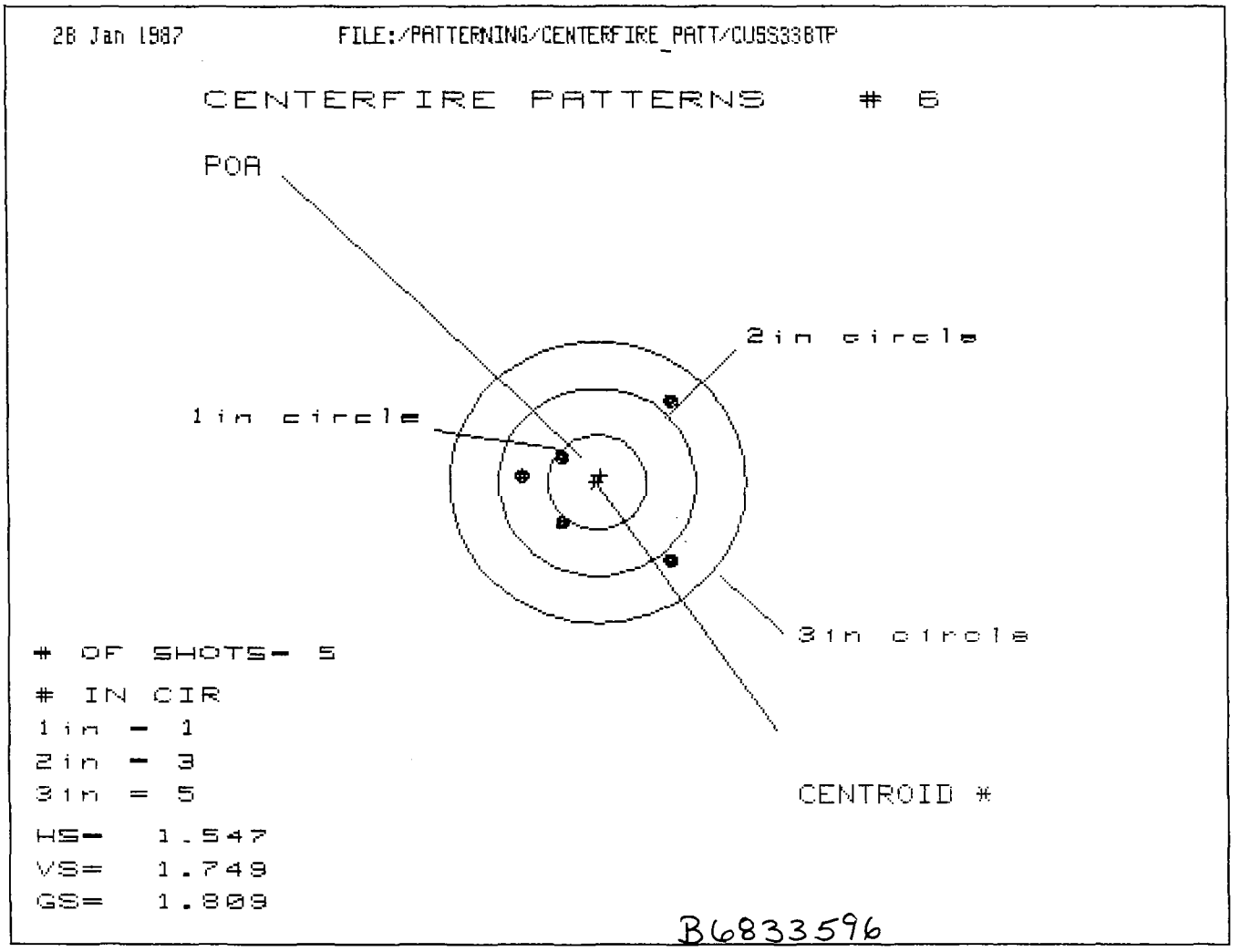
HS= 3.216
VS= 2.498
GS= 3.786

B6833596

PATTERN # : 5

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	2.116	.518	.327
MINIMUM X :	-1.100	-.571	-.263
MAXIMUM Y :	.786	.858	.311
MINIMUM Y :	-1.712	-1.640	-.242
CENTROID X :	-.539	-1.068	-.877
CENTROID Y :	.269	.197	.744
POA TO CENTROID in.:	.602	1.086	1.150
MIN RADIUS :	.572	.313	.095
MEAN RADIUS :	1.235	.886	.301
MAX RADIUS :	2.135	1.737	.452
HORIZONTAL SPREAD :	3.216	1.089	.590
VERTICAL SPREAD :	2.498	2.498	.553
EXTREME SPREAD :	3.786	2.725	.809

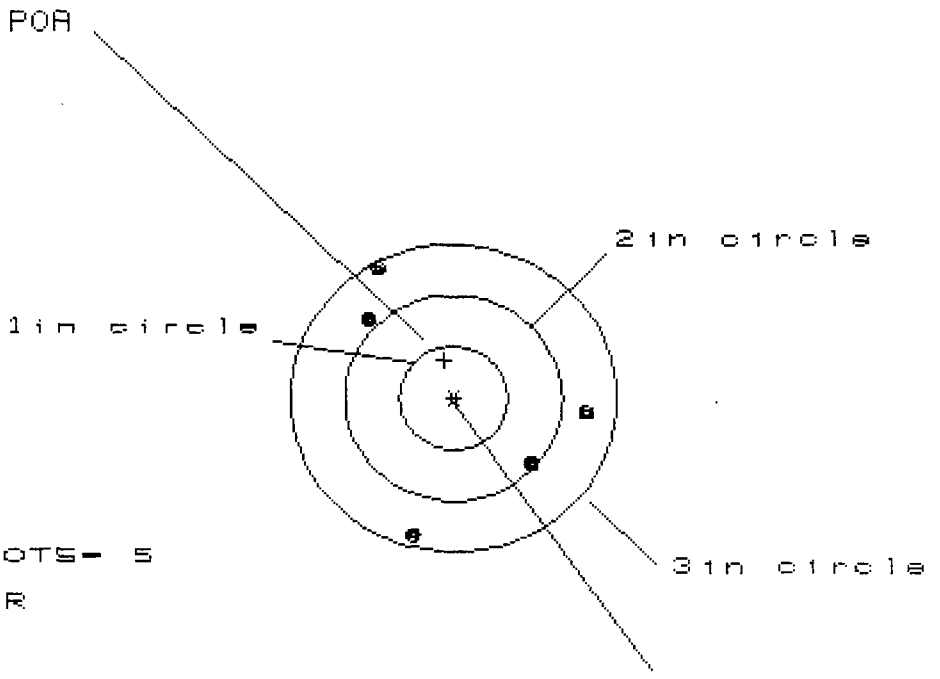
NUMBER IN ONE INCH CIRCLE = 0
NUMBER IN TWO INCH CIRCLE = 3
NUMBER IN THREE INCH CIRCLE = 3



PATTERN #	:	6		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.751	.928	.160
MINIMUM X	:	-.796	-.619	-.309
MAXIMUM Y	:	.913	.510	.307
MINIMUM Y	:	-.836	-.608	-.434
CENTROID X	:	-.039	-.216	-.526
CENTROID Y	:	-.072	-.300	-.097
POA TO CENTROID in.	:	.082	.370	.535
MIN RADIUS	:	.431	.281	.334
MEAN RADIUS	:	.817	.656	.380
MAX RADIUS	:	1.155	1.110	.459
HORIZONTAL SPREAD	:	1.547	1.547	.469
VERTICAL SPREAD	:	1.749	1.118	.741
EXTREME SPREAD	:	1.809	1.809	.741
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	

28 Jan 1987 FILE:/PATTERNING/CENTERFIRE_PATT/CUSS33BTP

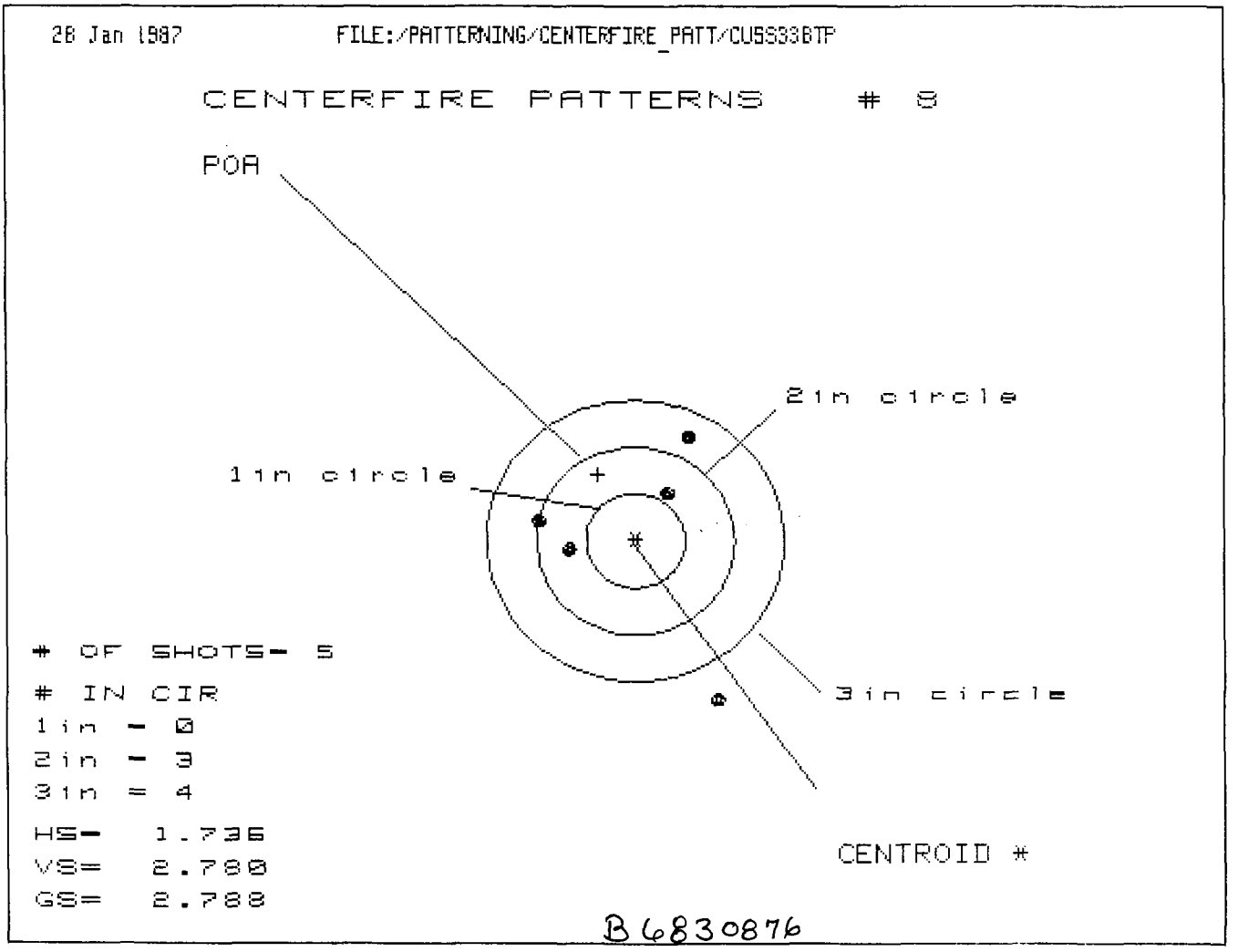
CENTERFIRE PATTERNS # 7



OF SHOTS= 5
IN CIR
1in = 0
2in = 1
3in = 5
HS= 2.037
VS= 2.625
GS= 2.644
Avg GS = 2.438

B 6830876

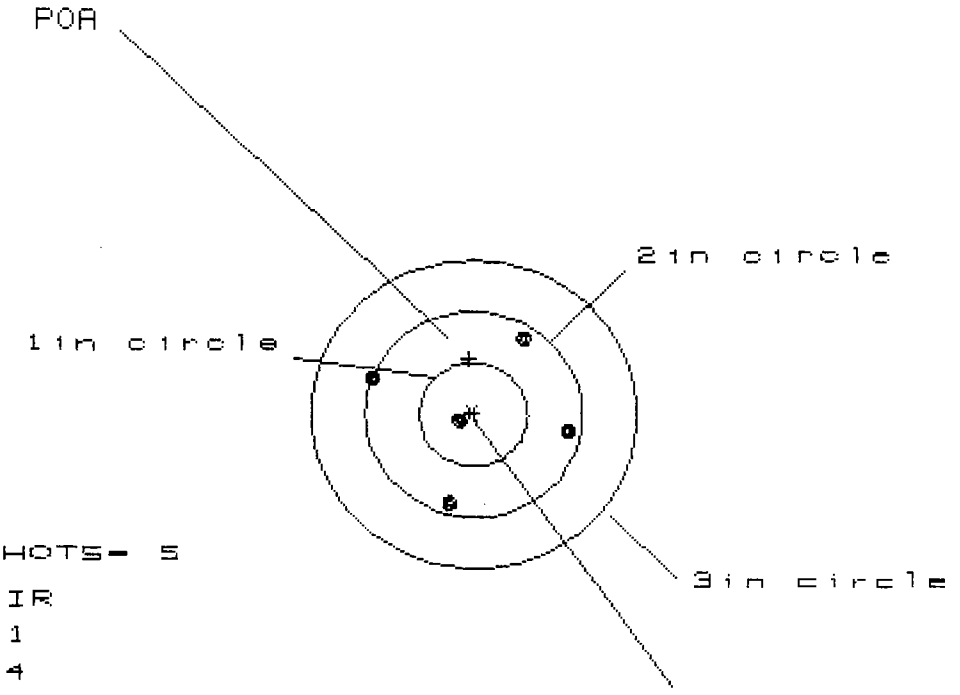
PATTERN #	:	7		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.212	1.032	.838
MINIMUM X	:	-.825	-1.005	-1.199
MAXIMUM Y	:	1.314	1.068	.741
MINIMUM Y	:	-1.311	-.983	-.631
CENTROID X	:	.082	.262	.456
CENTROID Y	:	-.368	-.696	-.369
POA TO CENTROID in.	:	.377	.744	.586
MIN RADIUS	:	.969	.633	.727
MEAN RADIUS	:	1.233	1.074	.994
MAX RADIUS	:	1.498	1.467	1.409
HORIZONTAL SPREAD	:	2.037	2.037	2.037
VERTICAL SPREAD	:	2.625	2.051	1.372
EXTREME SPREAD	:	2.644	2.207	2.207
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		1	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	8		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.784	.771	.746
MINIMUM X	:	-.952	-.756	-.499
MAXIMUM Y	:	1.107	.689	.288
MINIMUM Y	:	-1.673	-.530	-.300
CENTROID X	:	.371	.175	-.082
CENTROID Y	:	-.705	-.287	-.517
POA TO CENTROID in.	:	.797	.336	.523
MIN RADIUS	:	.559	.492	.388
MEAN RADIUS	:	1.067	.761	.562
MAX RADIUS	:	1.847	1.034	.799
HORIZONTAL SPREAD	:	1.736	1.528	1.245
VERTICAL SPREAD	:	2.780	1.219	.588
EXTREME SPREAD	:	2.788	1.776	1.275
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		4	

28 Jan 1987 FILE:/PATTERNING/CENTERFIRE_PATT/CUSS338TP

CENTERFIRE PATTERNS # 9

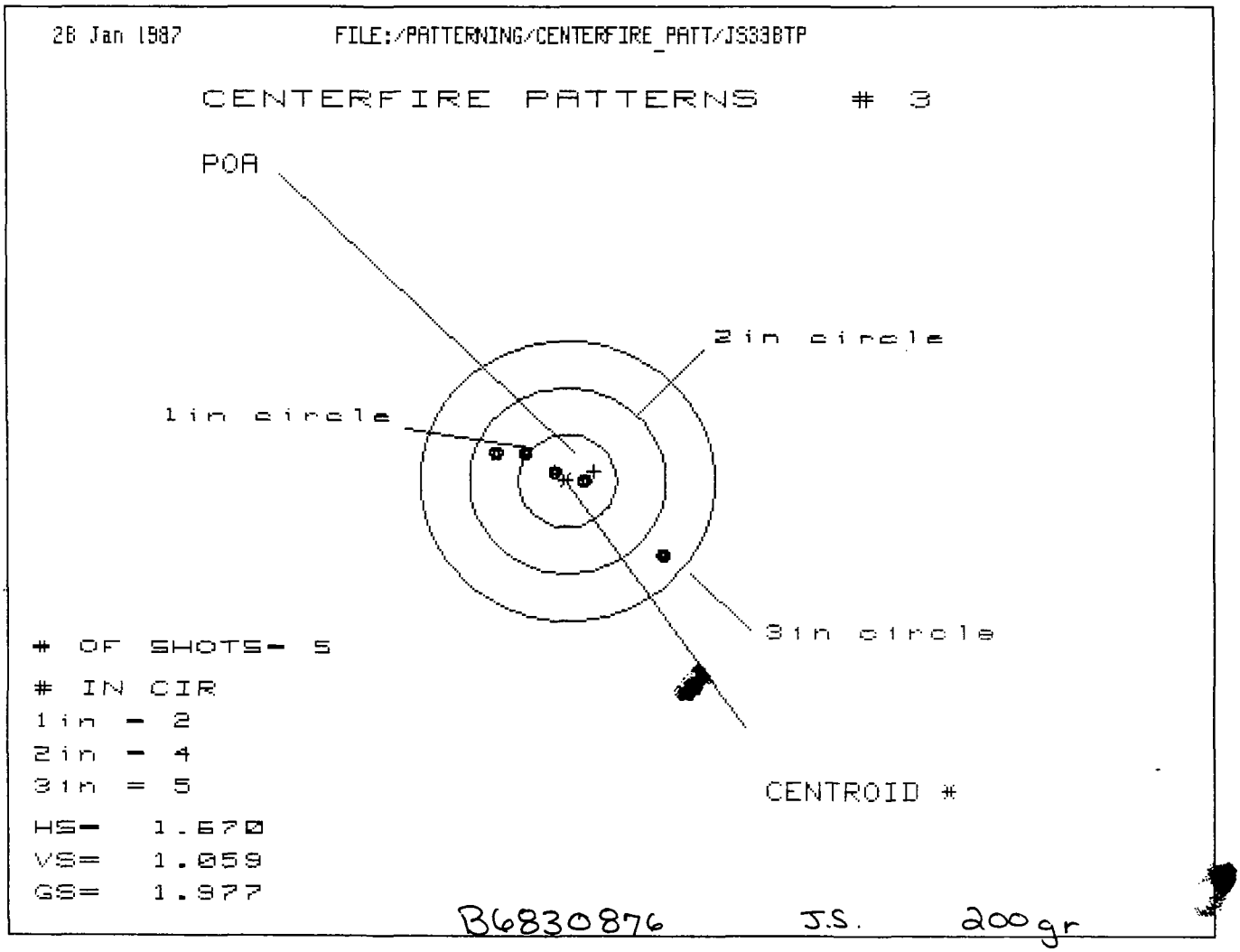


OF SHOTS= 5
IN CIR
1in = 1
2in = 4
3in = 5
HS= 1.818
VS= 1.617
GS= 1.882

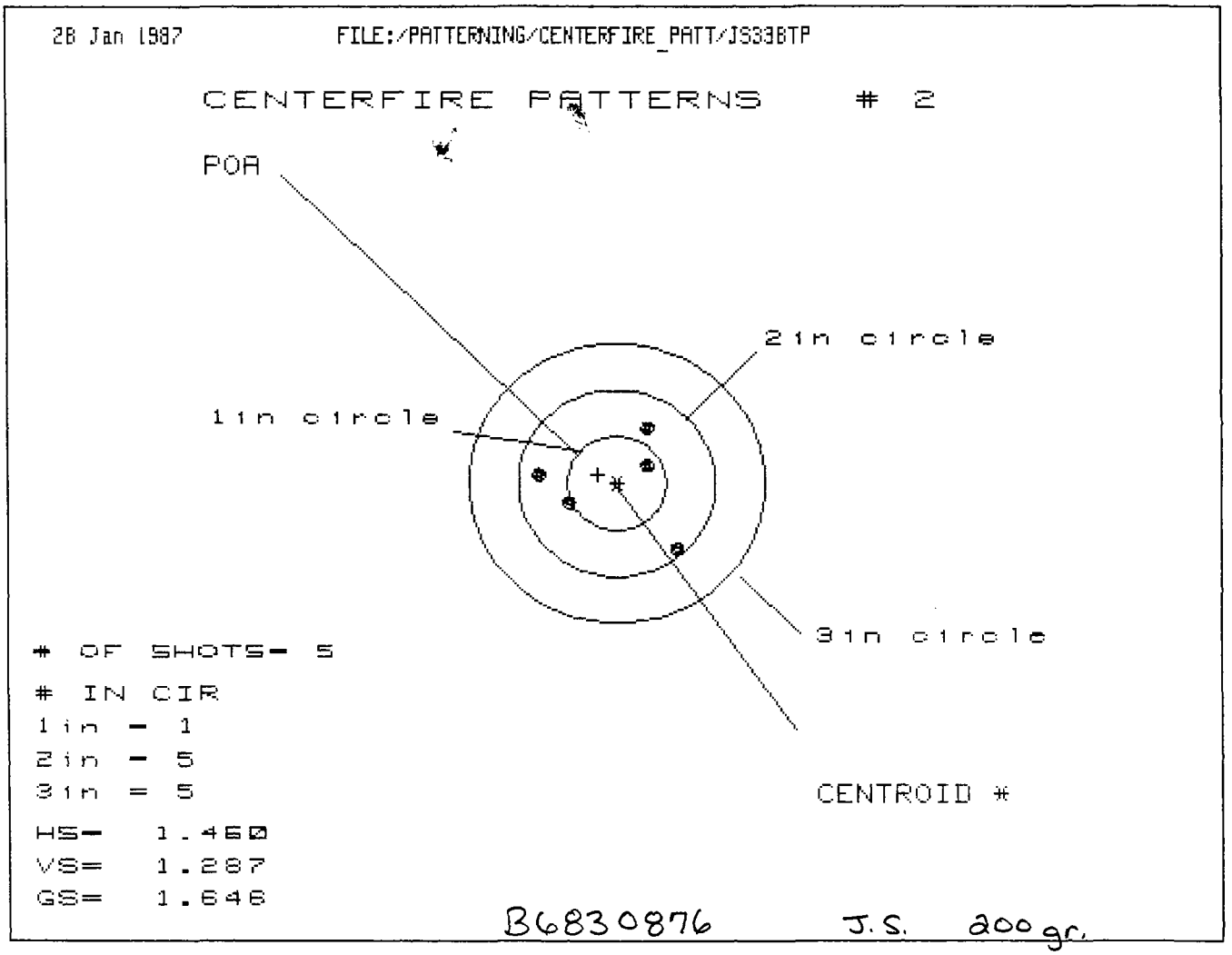
B6830876

PATTERN # : 9

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.838	.593	.674
MINIMUM X :	-.980	-.468	-.387
MAXIMUM Y :	.753	.831	.330
MINIMUM Y :	-.864	-.786	-.509
CENTROID X :	.032	.277	.196
CENTROID Y :	-.541	-.619	-.896
POA TO CENTROID in.:	.542	.678	.917
MIN RADIUS :	.127	.373	.438
MEAN RADIUS :	.760	.689	.592
MAX RADIUS :	1.028	.915	.698
HORIZONTAL SPREAD :	1.818	1.061	1.061
VERTICAL SPREAD :	1.617	1.617	.839
EXTREME SPREAD :	1.882	1.768	1.265
NUMBER IN ONE INCH CIRCLE =		1	
NUMBER IN TWO INCH CIRCLE =		4	
NUMBER IN THREE INCH CIRCLE =		5	



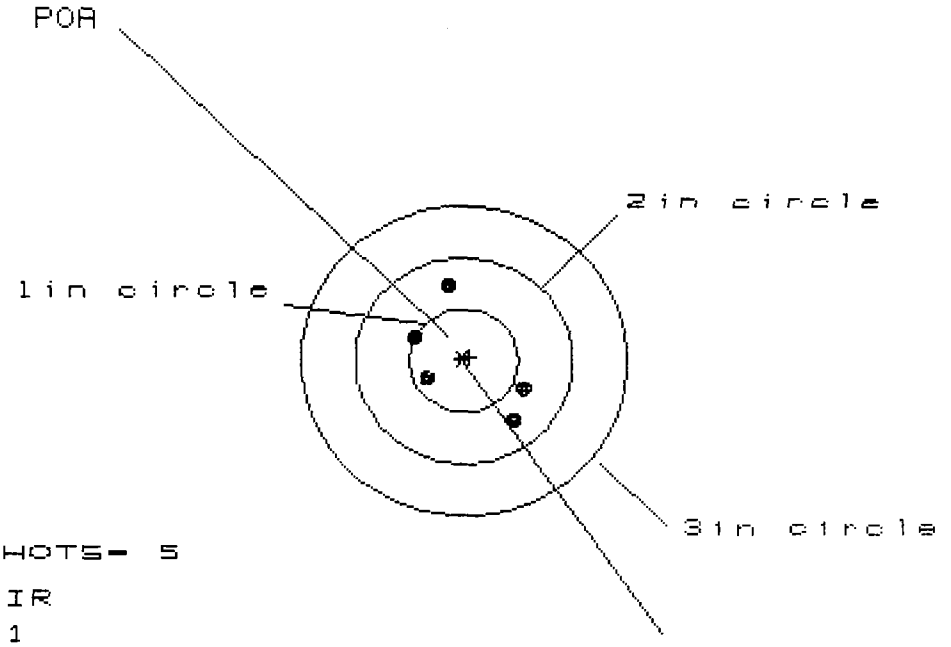
PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.977	.450	.301
MINIMUM X	:	-.693	-.449	-.315
MAXIMUM Y	:	.308	.121	.144
MINIMUM Y	:	-.751	-.181	-.141
CENTROID X	:	-.275	-.519	-.370
CENTROID Y	:	-.100	.087	.047
POA TO CENTROID in.	:	.293	.527	.373
MIN RADIUS	:	.165	.169	.014
MEAN RADIUS	:	.573	.329	.231
MAX RADIUS	:	1.232	.486	.346
HORIZONTAL SPREAD	:	1.670	.899	.616
VERTICAL SPREAD	:	1.059	.302	.285
EXTREME SPREAD	:	1.977	.948	.679
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.625	.516	.290
MINIMUM X	:	-.835	-.678	-.526
MAXIMUM Y	:	.615	.447	.420
MINIMUM Y	:	-.672	-.373	-.400
CENTROID X	:	.190	.033	.259
CENTROID Y	:	-.092	.076	.103
POA TO CENTROID in.	:	.211	.083	.279
MIN RADIUS	:	.399	.479	.290
MEAN RADIUS	:	.669	.580	.478
MAX RADIUS	:	.918	.683	.661
HORIZONTAL SPREAD	:	1.460	1.194	.816
VERTICAL SPREAD	:	1.287	.820	.820
EXTREME SPREAD	:	1.646	1.257	1.120
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

28 Jan 1987 FILE:/PATTERNING/CENTERFIRE_PATT/JS33BTP

CENTERFIRE PATTERNS # 4



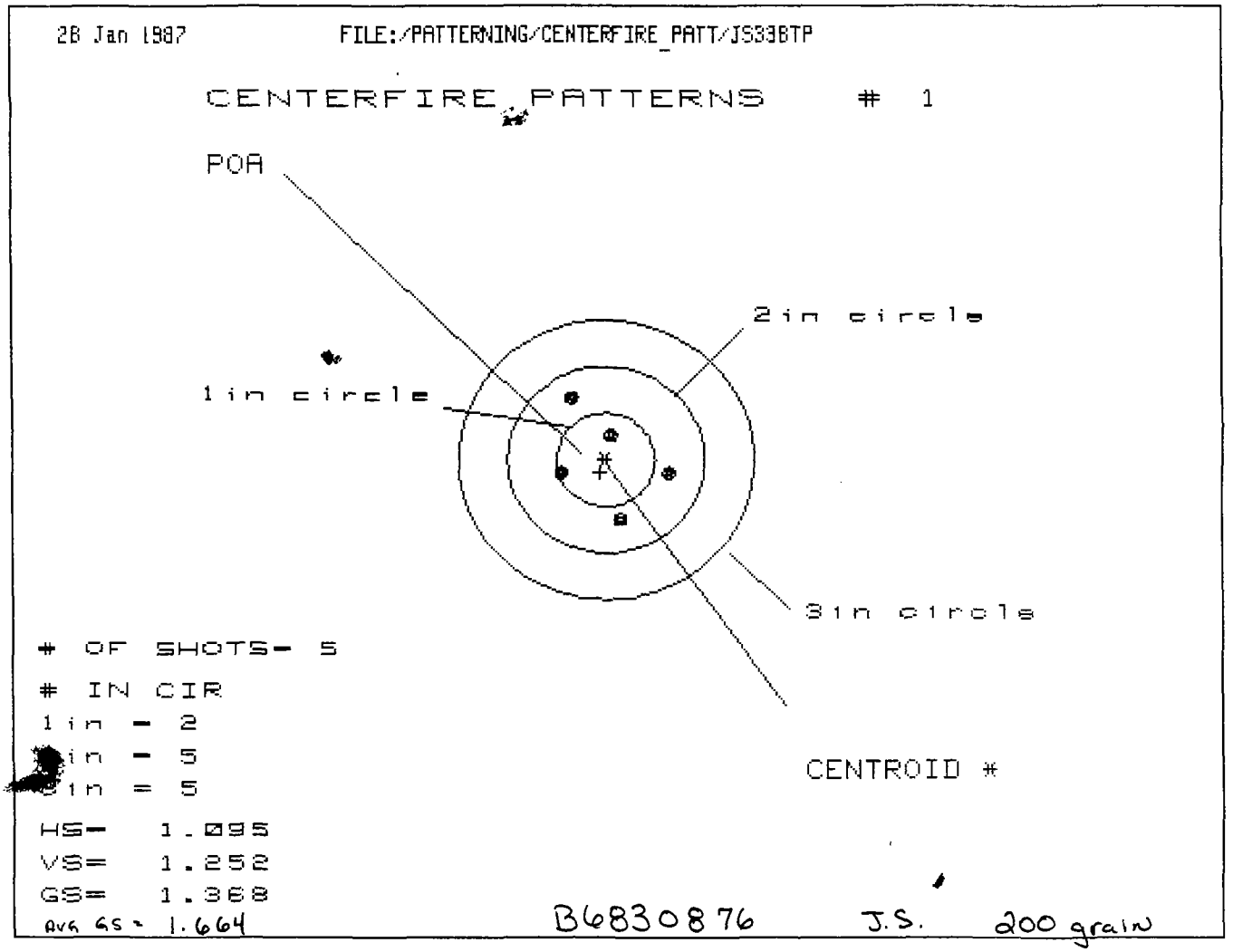
OF SHOTS= 5

IN CIR
1in = 1
2in = 5
3in = 5

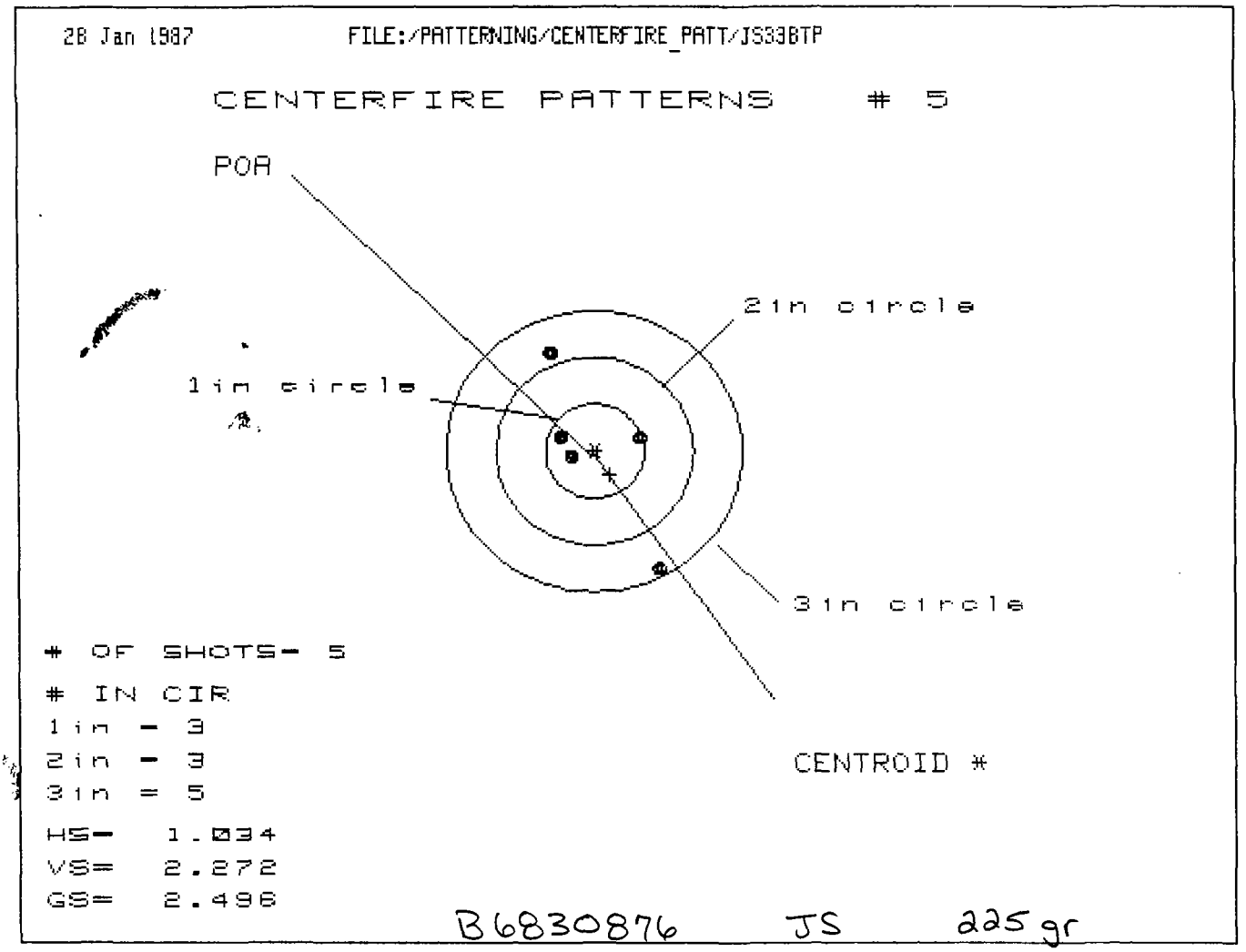
HS= .969
VS= 1.290
GS= 1.424
AVGGS: 2.144

B6830876 JS 225gr

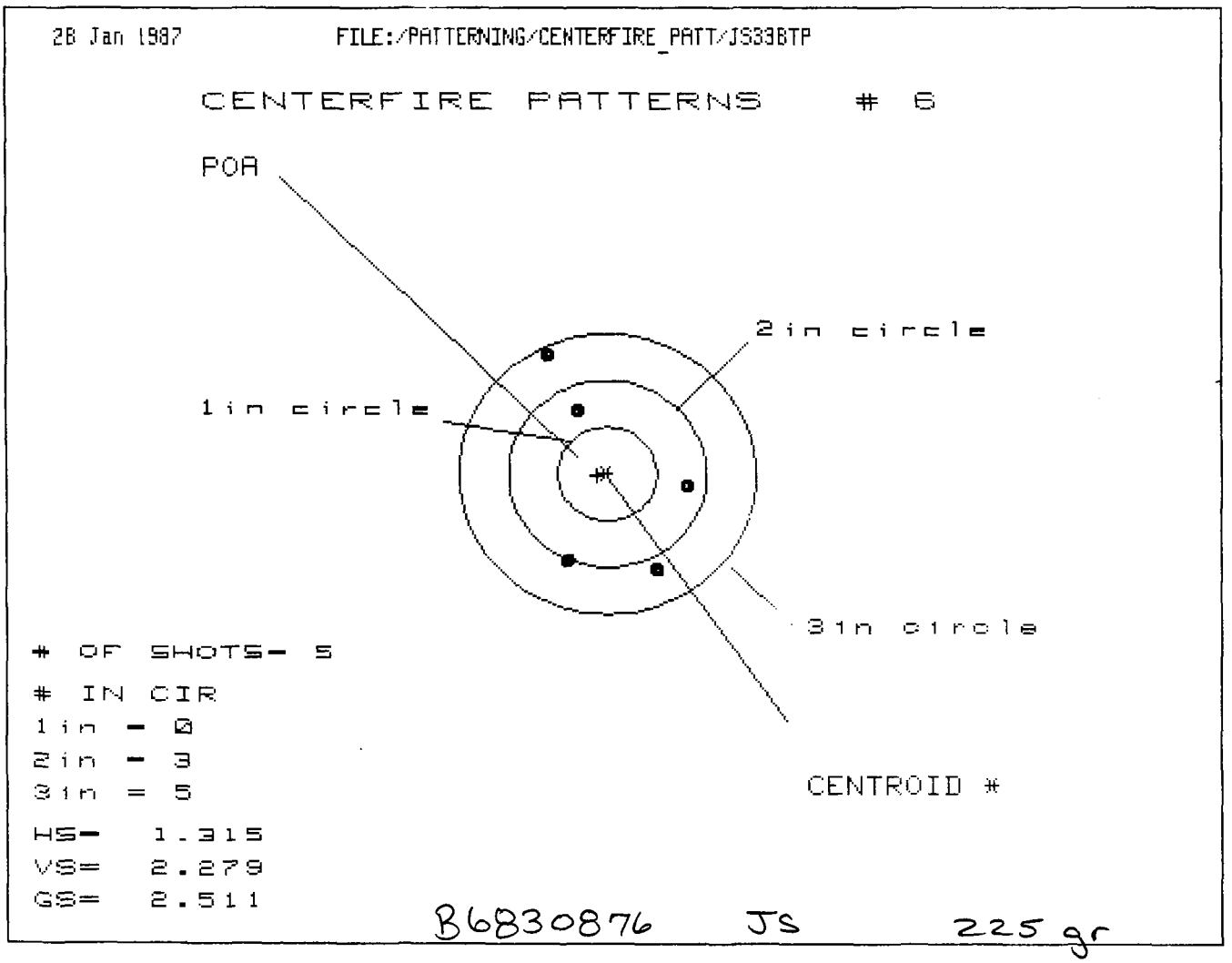
PATTERN #	:	4		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.540	.498	.630
MINIMUM X	:	-.429	-.470	-.339
MAXIMUM Y	:	.725	.454	.326
MINIMUM Y	:	-.565	-.383	-.186
CENTROID X	:	-.054	-.012	-.144
CENTROID Y	:	-.032	-.214	-.086
POA TO CENTROID in.	:	.063	.214	.168
MIN RADIUS	:	.428	.424	.324
MEAN RADIUS	:	.597	.532	.484
MAX RADIUS	:	.744	.654	.657
HORIZONTAL SPREAD	:	.969	.969	.969
VERTICAL SPREAD	:	1.290	.837	.512
EXTREME SPREAD	:	1.424	1.204	1.096
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.635	.542	.573
MINIMUM X	:	-.460	-.552	-.522
MAXIMUM Y	:	.622	.441	.283
MINIMUM Y	:	-.630	-.474	-.160
CENTROID X	:	.054	.146	.116
CENTROID Y	:	.135	-.021	.137
POA TO CENTROID in.	:	.145	.148	.180
MIN RADIUS	:	.286	.448	.287
MEAN RADIUS	:	.559	.507	.473
MAX RADIUS	:	.724	.554	.595
HORIZONTAL SPREAD	:	1.095	1.095	1.095
VERTICAL SPREAD	:	1.252	.915	.443
EXTREME SPREAD	:	1.368	1.096	1.096
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	5		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.621	.567	.481
MINIMUM X	:	-.413	-.257	-.279
MAXIMUM Y	:	1.004	.687	.103
MINIMUM Y	:	-1.268	-.361	-.132
CENTROID X	:	-.158	-.314	-.228
CENTROID Y	:	.251	.568	.339
POA TO CENTROID in.	:	.297	.649	.409
MIN RADIUS	:	.274	.231	.241
MEAN RADIUS	:	.719	.486	.340
MAX RADIUS	:	1.412	.733	.482
HORIZONTAL SPREAD	:	1.034	.824	.760
VERTICAL SPREAD	:	2.272	1.048	.235
EXTREME SPREAD	:	2.496	1.210	.763
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	6		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.763	.625	.747
MINIMUM X	:	-.552	-.510	-.388
MAXIMUM Y	:	1.296	1.028	.808
MINIMUM Y	:	-.983	-.659	-.803
CENTROID X	:	.101	.238	.117
CENTROID Y	:	.019	-.305	-.085
POA TO CENTROID in.	:	.102	.387	.145
MIN RADIUS	:	.771	.661	.747
MEAN RADIUS	:	1.009	.831	.841
MAX RADIUS	:	1.408	1.135	.892
HORIZONTAL SPREAD	:	1.315	1.135	1.135
VERTICAL SPREAD	:	2.279	1.687	1.611
EXTREME SPREAD	:	2.511	1.887	1.611
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	

MODEL 700 Left Hand 870641
308 # 243 caliber TEP

Report written 3/12/87

To Sued for his signature 3/13/87

RD-49-B

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington DUPONT PETERS DUPONT

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"_____

xc: W.H. Coleman, II/File
K.W. Soucy
G.J. Hill
J.R. Snedeker
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 870641
MARCH 12, 1987

MODEL 700 LEFT HAND - TRIAL AND PILOT EVALUATION
243 WIN AND 308 WIN CALIBERS

MODEL 700 LEFT HAND 243 WIN AND 308 WIN TRIAL AND PILOT EVALUATION

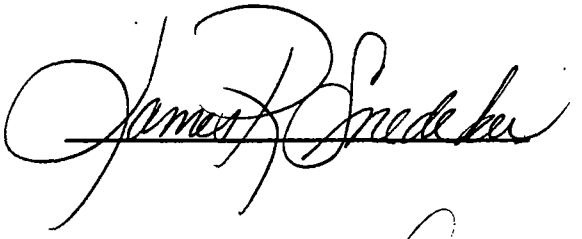
ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700 left hand 243 win caliber, and the Model 700 left hand 308 win caliber rifles to be acceptable. The Trial and Pilot Evaluation consisted of Visual Inspection, Accuracy, and Function. The ten rifle sample (five rifles of each caliber) was found to be within Remington specifications for each phase of the Trial and Pilot Evaluation.

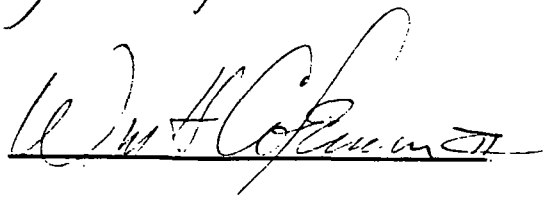
Prepared by: F.L. Supry
Date prepared: 12 march 1987

proofread and cleared by:

J.R. Snedeker, Research Supervisor
Test, Measurement & Mech. Analysis Lab



W.H. Coleman, II
New Products Research Lab Director



REPORT# 870641 WORK ORDER# 81411-905

To: J.R. Snedeker

From: F.L. Supry

MODEL 700 LEFT HAND (243 WIN, AND 308 WIN) TRIAL AND PILOT EVALUATION

INTRODUCTION:

On March 5, 1987 a request was received to conduct a Visual, Accuracy, and Function Evaluation of the Model 700 left hand (243 Win and 308 Win caliber) Trial and Pilot rifles. Five rifles of each caliber were randomly selected from production.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

The ten rifle Trial and Pilot Evaluation was found to be acceptable. The following results were obtained:

A. VISUAL:

a. The overall appearance of the rifles was good.

B. ACCURACY: (Average group size)

a. 243 Win = 1.972 inches.
b. 308 Win = 1.749 inches.

C. FUNCTION:

a. No malfunctions occurred.

REPORT# 870641 WORK ORDER# 81411-905

TEST REPORT:

1. VISUAL:

A. The visual inspection committee felt that the following two items need to be checked more thoroughly:

a. Finish peeling by the grip checkering.

b. Rear sight being raised off the ramp.

B. Data sheets containing the comments on each rifle inspected is included in the appendix of this report.

2. ACCURACY:

A. The Remington Specification for group size is as follows:

a. 243 Win caliber: 2.2 inches, center to center.

b. 308 Win caliber: 3.5 inches, center to center.

B. Three rifles of each caliber were tested for 100 yard accuracy and the following results were obtained.

243 WIN CALIBER	GROUP 1	GROUP 2	GROUP 3	AVG
Rifle# B6850372 -	2.305	2.329	1.505	2.046
Rifle# B6849949 -	1.815	1.666	1.603	1.695
Rifle# B6849906 -	2.603	1.527	2.395	2.175

OVERALL GROUP SIZE AVERAGE = 1.972 INCHES

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308 WIN CALIBER

Rifle# B6851090 -	2.337	1.852	1.713	1.968
Rifle# B6851007 -	1.497	2.266	1.188	1.650
Rifle# B6851094 -	1.324	2.204	1.356	1.628

OVERALL GROUP SIZE AVERAGE = 1.749

3. FUNCTION:

A. Three rifles of each caliber were subjected to a 30 round per rifle, function test and the following results were obtained:

a. No malfunctions occurred.

REPORT# 870641 WORK ORDER# 81411-905

TEST PROCEDURE:

1. VISUAL:

A. The visual inspection committee consisted of G. Hill, G. Barnes (P.E. & C.); J. Baggetta, C. Stephens, and F. Supry (R. & D.).

B. All five rifles of each caliber were used in the visual inspection. The rifles were as follows:

a. 243 Win caliber:
B6849906 B6849999 B6849949 B6849965 B6850372

b. 308 Win caliber:
B6851094 B6851145 B6851007 B6850969 B6851090

C. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the visual inspection committee. All comments were recorded, an are included in the appendix of this report.

2. ACCURACY:

A. The following rifles were used in the 100 yard accuracy test:

a. 243 Win caliber:
B6850372 B6849949 B6849906

b. 308 Win caliber:
B6851090 B6851007 B6851094

B. The accuracy was shot by C. Stephens, at the R&D 100 yard range located in building 52-1.

C. Leupold base and rings were used in conjunction with a Redfield 12X (4-plex) scope.

D. Remington ammunition; index R243W3, code W20LD0948, and index R308W3, code C13TC6305 was used for the 100 yard accuracy test.

E. Before shooting the accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

F. A total of three, five shot groups were shot with each rifle. The rifles were cooled between each group, and one "warmer" shot was fired before the next group was shot.

G. The targets were analyzed for group size and the averages calculated, using the HP 9000 computer and digitizing tablet.

REPORT# 870641 WORK ORDER# 81411-905

TEST PROCEDURE: (continued)

3. FUNCTION:

A. The following rifles were selected for the function test:

a. 243 Win Caliber:
B6849906 B6849999 B6849965

b. 308 Win caliber:
B6851007 B6851145 B6850969

B. Each of the rifles was subjected to the loading and firing of 30 rounds of Remington ammunition (15 rounds of 80 grain and 15 rounds of 100 grain for the 243 Win caliber rifles, and 15 rounds of 55 grain and 15 rounds of 180 grain for the 308 Win caliber rifles). Fifteen rounds were fired; 5 at a slow feeding cycle speed, 5 at a medium feeding cycle speed, and 5 at a fast feeding cycle speed. The rifles were allowed to cool, and then the procedure was repeated with the remaining ammunition type.

C. The following ammunition was used in the function test:

a. R243W1 - 80 grain pointed soft point.
b. R243W3 - 100 grain pointed soft point.
c. R308W5 - 55 grain Win accelerator.
d. R308W2 - 180 grain soft point.

REPORT# 870641 WORK ORDER# 81411-905

APPENDIX

REPORT# 870641 WORK ORDER# 81411-905

VISUAL INSPECTION MODEL 700 LEFT HAND 243 WIN AND 308 WIN CALIBERS

243 WIN CALIBER:

SERIAL NUMBER	COMMENTS
B6849906	FINISH PEELING AT GRIP CHECKERING. BRIGHT MARK ON THE BARREL. SMALL PIMPLES IN THE FINISH NEAR THE STUD, AT THE FORE END TIP.
B6849999	SMALL CHIP ON GRIP CAP. SMALL PIMPLES IN THE FINISH, ON THE RIGHT SIDE OF THE STOCK NEAR THE TRIGGER GUARD. SLIGHT CRACK IN THE BOLT HANDLE SLOT, AND SANDING BREAKTHROUGH IN THE SAME AREA.
B6849949	REAR SIGHT RAISED OFF THE SLIDE. MAR ON THE TRIGGER GUARD. BLEED OUT ON THE CROSS PIN. SLIGHT DING IN THE STOCK, LEFT SIDE NEAR FORE END TIP.
B6849965	GAP BOTH SIDES OF THE BUTT PLATE. SCRATCH LEFT SIDE OF STOCK BY THE RECEIVER.
B6850372	FINISH PEELING RIGHT SIDE OF STOCK NEAR THE CHECKERING.

308 WIN CALIBER:

B6851094	SLIGHT DING ON THE FLOOR PLATE, RIGHT SIDE.
B6851145	MAR ON THE FLOOR PLATE, LEFT SIDE. TWO SLIGHT DINGS ON THE BUTT PLATE. BUTT PLATE INSERT NOT FLUSH.
B6851007	FINISH RUN NEAR THE CHECKERING. SPACE UNDER FORE END TIP.
B6850969	DENT ON THE TOP OF THE STOCK, NEAR THE REAR SWIVEL. TWO SLIGHT DINGS ON THE RIGHT SIDE OF THE TRIGGER GUARD. REAR SIGHT RAISED OFF OF RAMP.
B6851090	SLIGHT DING, LEFT SIDE OF STOCK, NEAR THE BOLT HANDLE SLOT. EXCESSIVE WOOD MARGIN AT THE SAFETY SLOT. BOLT HANDLE SLOT IS ROUGH.

xc: W.H. Coleman, II/File
K.W. Soucy
G.J. Hill
J.R. Snedeker
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 870641
MARCH 12, 1987

MODEL 700 LEFT HAND - TRIAL AND PILOT EVALUATION
243 WIN AND 308 WIN CALIBERS

MODEL 700 LEFT HAND 243 WIN AND 308 WIN TRIAL AND PILOT EVALUATION

ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700 left hand 243 win caliber, and the Model 700 left hand 308 win caliber rifles to be acceptable. The Trial and Pilot Evaluation consisted of Visual Inspection, Accuracy, and Function. The ten rifle sample (five rifles of each caliber) was found to be within Remington specifications for each phase of the Trial and Pilot Evaluation.

Prepared by: F.L. Supry
Date prepared: 12 march 1987

proofread and cleared by:

J.R. Snedeker, Research Supervisor
Test, Measurement & Mech. Analysis Lab

W.H. Coleman, II
New Products Research Lab Director

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

REPORT# 870641 WORK ORDER# 81411-905

To: J.R. Snedeker

From: F.L. Supry

MODEL 700 LEFT HAND (243 WIN, AND 308 WIN) TRIAL AND PILOT EVALUATION

INTRODUCTION:

On March 5, 1987 a request was received to conduct a Visual, Accuracy, and Function Evaluation of the Model 700 left hand (243 Win and 308 Win caliber) Trial and Pilot rifles. Five rifles of each caliber were randomly selected from production.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

The ten rifle Trial and Pilot Evaluation was found to be acceptable. The following results were obtained:

A. VISUAL:

a. The overall appearance of the rifles was good.

B. ACCURACY: (Average group size)

a. 243 Win = 1.972 inches.
b. 308 Win = 1.749 inches.

C. FUNCTION:

a. No malfunctions occurred.

REPORT# 870641 WORK ORDER# 81411-905

TEST REPORT:

1. VISUAL:

A. The visual inspection committee felt that the following two items need to be checked more thoroughly:

a. Finish peeling by the grip checkering.

b. Rear sight being raised off the ramp.

B. Data sheets containing the comments on each rifle inspected is included in the appendix of this report.

2. ACCURACY:

A. The Remington Specification for group size is as follows:

a. 243 Win caliber: 2.2 inches, center to center.

b. 308 Win caliber: 3.5 inches, center to center.

B. Three rifles of each caliber were tested for 100 yard accuracy and the following results were obtained.

	GROUP#			AVG
243 WIN CALIBER	1	2	3	
Rifle# B6850372 -	2.305	2.329	1.505	2.046
Rifle# B6849949 -	1.815	1.666	1.603	1.695
Rifle# B6849906 -	2.603	1.527	2.395	2.175

OVERALL GROUP SIZE AVERAGE = 1.972 INCHES

---

308 WIN CALIBER				
Rifle# B6851090 -	2.337	1.852	1.713	1.968
Rifle# B6851007 -	1.497	2.266	1.188	1.650
Rifle# B6851094 -	1.324	2.204	1.356	1.628

OVERALL GROUP SIZE AVERAGE = 1.749

3. FUNCTION:

A. Three rifles of each caliber were subjected to a 30 round per rifle, function test and the following results were obtained:

a. No malfunctions occurred.

REPORT# 870641 WORK ORDER# 81411-905

TEST PROCEDURE:

1. VISUAL:

A. The visual inspection committee consisted of G. Hill, G. Barnes (P.E. & C.); J. Baggetta, C. Stephens, and F. Supry (R. & D.).

B. All five rifles of each caliber were used in the visual inspection. The rifles were as follows:

a. 243 Win caliber:
B6849906 B6849999 B6849949 B6849965 B6850372

b. 308 Win caliber:
B6851094 B6851145 B6851007 B6850969 B6851090

C. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the visual inspection committee. All comments were recorded, an are included in the appendix of this report.

2. ACCURACY:

A. The following rifles were used in the 100 yard accuracy test:

a. 243 Win caliber:
B6850372 B6849949 B6849906

b. 308 Win caliber:
B6851090 B6851007 B6851094

B. The accuracy was shot by C. Stephens, at the R&D 100 yard range located in building 52-1.

C. Leupold base and rings were used in conjunction with a Redfield 12X (4-plex) scope.

D. Remington ammunition; index R243W3, code W20LD0948, and index R308W3, code C13TC6305 was used for the 100 yard accuracy test.

E. Before shooting the accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

F. A total of three, five shot groups were shot with each rifle. The rifles were cooled between each group, and one "warmer" shot was fired before the next group was shot.

G. The targets were analyzed for group size and the averages calculated, using the HP 9000 computer and digitizing tablet.

REPORT# 870641 WORK ORDER# 81411-905

TEST PROCEDURE: (continued)

3. FUNCTION:

A. The following rifles were selected for the function test:

a. 243 Win Caliber:
B6849906 B6849999 B6849965

b. 308 Win caliber:
B6851007 B6851145 B6850969

B. Each of the rifles was subjected to the loading and firing of 30 rounds of Remington ammunition (15 rounds of 80 grain and 15 rounds of 100 grain for the 243 Win caliber rifles, and 15 rounds of 55 grain and 15 rounds of 180 grain for the 308 Win caliber rifles). Fifteen rounds were fired; 5 at a slow feeding cycle speed, 5 at a medium feeding cycle speed, and 5 at a fast feeding cycle speed. The rifles were allowed to cool, and then the procedure was repeated with the remaining ammunition type.

C. The following ammunition was used in the function test:

a. R243W1 - 80 grain pointed soft point.
b. R243W3 - 100 grain pointed soft point.
c. R308W5 - 55 grain Win accelerator.
d. R308W2 - 180 grain soft point.

REPORT# 870641 WORK ORDER# 81411-905

APPENDIX

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

xc: W.H. Coleman, II/File
K.W. Soucy
G.J. Hill
J.R. Snedeker
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 870641
MARCH 12, 1987

MODEL 700 LEFT HAND - TRIAL AND PILOT EVALUATION
243 WIN AND 308 WIN CALIBERS

MODEL 700 LEFT HAND 243 WIN AND 308 WIN TRIAL AND PILOT EVALUATION

ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700 left hand 243 win caliber, and the Model 700 left hand 308 win caliber rifles to be acceptable. The Trial and Pilot Evaluation consisted of Visual Inspection, Accuracy, and Function. The ten rifle sample (five rifles of each caliber) was found to be within Remington specifications for each phase of the Trial and Pilot Evaluation.

Prepared by: F.L. Supry
Date prepared: 12 march 1987

proofread and cleared by:

J.R. Snedeker, Research Supervisor
Test, Measurement & Mech. Analysis Lab

W.H. Coleman, II
New Products Research Lab Director

REPORT# 870641 WORK ORDER# 81411-905

To: J.R. Snedeker

From: F.L. Supry

MODEL 700 LEFT HAND (243 WIN, AND 308 WIN) TRIAL AND PILOT EVALUATION

INTRODUCTION:

On March 5, 1987 a request was received to conduct a Visual, Accuracy, and Function Evaluation of the Model 700 left hand (243 Win and 308 Win caliber) Trial and Pilot rifles. Five rifles of each caliber were randomly selected from production.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

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a. 243 Win = 1.972 inches.
b. 308 Win = 1.749 inches.

C. FUNCTION:

a. No malfunctions occurred.

REPORT# 870641 WORK ORDER# 81411-905

TEST REPORT:

1. VISUAL:

A. The visual inspection committee felt that the following two items need to be checked more thoroughly:

a. Finish peeling by the grip checkering.

b. Rear sight being raised off the ramp.

B. Data sheets containing the comments on each rifle inspected is included in the appendix of this report.

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a. 243 Win caliber: 2.2 inches, center to center.

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Rifle# B6849906 -	2.603	1.527	2.395	2.175

OVERALL GROUP SIZE AVERAGE = 1.972 INCHES

308 WIN CALIBER				
Rifle# B6851090 -	2.337	1.852	1.713	1.968
Rifle# B6851007 -	1.497	2.266	1.188	1.650
Rifle# B6851094 -	1.324	2.204	1.356	1.628

OVERALL GROUP SIZE AVERAGE = 1.749

3. FUNCTION:

A. Three rifles of each caliber were subjected to a 30 round per rifle, function test and the following results were obtained:

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REPORT# 870641 WORK ORDER# 81411-905

TEST PROCEDURE:

1. VISUAL:

A. The visual inspection committee consisted of G. Hill, G. Barnes (P.E. & C.); J. Baggetta, C. Stephens, and F. Supry (R. & D.).

B. All five rifles of each caliber were used in the visual inspection. The rifles were as follows:

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B6849906 B6849999 B6849949 B6849965 B6850372

b. 308 Win caliber:
B6851094 B6851145 B6851007 B6850969 B6851090

C. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the visual inspection committee. All comments were recorded, an are included in the appendix of this report.

2. ACCURACY:

A. The following rifles were used in the 100 yard accuracy test:

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B6850372 B6849949 B6849906

b. 308 Win caliber:
B6851090 B6851007 B6851094

B. The accuracy was shot by C. Stephens, at the R&D 100 yard range located in building 52-1.

C. Leupold base and rings were used in conjunction with a Redfield 12X (4-plex) scope.

D. Remington ammunition; index R243W3, code W20LD0948, and index R308W3, code C13TC6305 was used for the 100 yard accuracy test.

E. Before shooting the accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

F. A total of three, five shot groups were shot with each rifle. The rifles were cooled between each group, and one "warmer" shot was fired before the next group was shot.

G. The targets were analyzed for group size and the averages calculated, using the HP 9000 computer and digitizing tablet.

REPORT# 870641 WORK ORDER# 81411-905

TEST PROCEDURE: (continued)

3. FUNCTION:

A. The following rifles were selected for the function test:

a. 243 Win Caliber:
B6849906 B6849999 B6849965

b. 308 Win caliber:
B6851007 B6851145 B6850969

B. Each of the rifles was subjected to the loading and firing of 30 rounds of Remington ammunition (15 rounds of 80 grain and 15 rounds of 100 grain for the 243 Win caliber rifles, and 15 rounds of 55 grain and 15 rounds of 180 grain for the 308 Win caliber rifles). Fifteen rounds were fired; 5 at a slow feeding cycle speed, 5 at a medium feeding cycle speed, and 5 at a fast feeding cycle speed. The rifles were allowed to cool, and then the procedure was repeated with the remaining ammunition type.

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a. R243W1 - 80 grain pointed soft point.
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REPORT# 870641 WORK ORDER# 81411-905

APPENDIX



REPORT# 870641 WORK ORDER# 81411-905

VISUAL INSPECTION MODEL 700 LEFT HAND 243 WIN AND 308 WIN CALIBERS

243 WIN CALIBER:

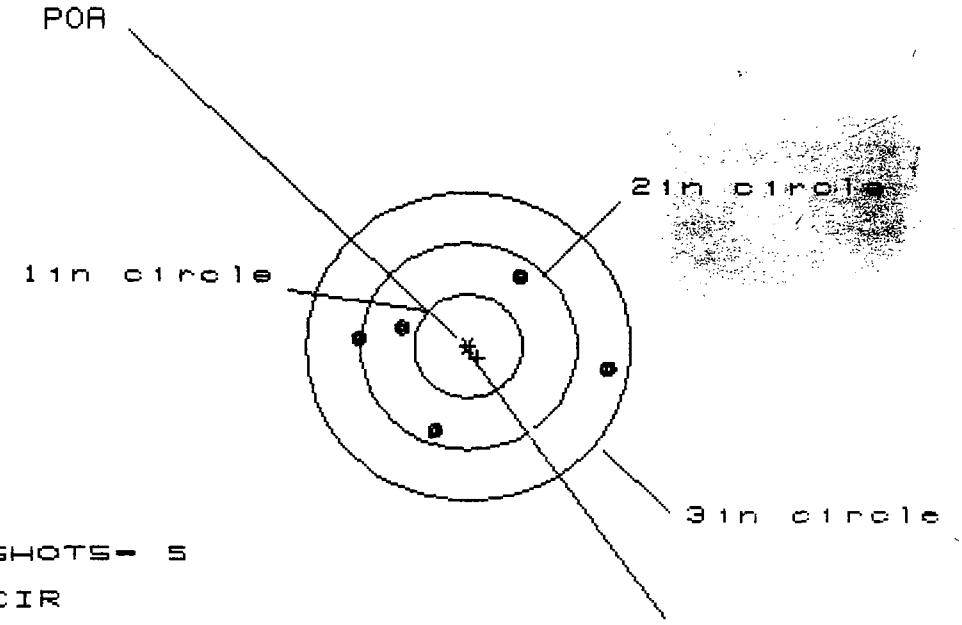
SERIAL NUMBER	COMMENTS
B6849906	FINISH PEELING AT GRIP CHECKERING. BRIGHT MARK ON THE BARREL. SMALL PIMPLES IN THE FINISH NEAR THE STUD, AT THE FORE END TIP.
B6849999	SMALL CHIP ON GRIP CAP. SMALL PIMPLES IN THE FINISH, ON THE RIGHT SIDE OF THE STOCK NEAR THE TRIGGER GUARD. SLIGHT CRACK IN THE BOLT HANDLE SLOT, AND SANDING BREAKTHROUGH IN THE SAME AREA.
B6849949	REAR SIGHT RAISED OFF THE SLIDE. MAR ON THE TRIGGER GUARD. BLEED OUT ON THE CROSS PIN. SLIGHT DING IN THE STOCK, LEFT SIDE NEAR FORE END TIP.
B6849965	GAP BOTH SIDES OF THE BUTT PLATE. SCRATCH LEFT SIDE OF STOCK BY THE RECEIVER.
B6850372	FINISH PEELING RIGHT SIDE OF STOCK NEAT THE CHECKERING.

308 WIN CALIBER:

B6851094	SLIGHT DING ON THE FLOOR PLATE, RIGHT SIDE.
B6851145	MAR ON THE FLOOR PLATE, LEFT SIDE. TWO SLIGHT DINGS ON THE BUTT PLATE. BUTT PLATE INSERT NOT FLUSH.
B6851007	FINISH RUN NEAR THE CHECKERING. SPACE UNDER FORE END TIP.
B6850969	DENT ON THE TOP OF THE STOCK, NEAR THE REAR SWIVEL. TWO SLIGHT DINGS ON THE RIGHT SIDE OF THE TRIGGER GUARD. REAR SIGHT RAISED OFF OF RAMP.
B6851090	SLIGHT DING, LEFT SIDE OF STOCK, NEAR THE BOLT HANDLE SLOT. EXCESSIVE WOOD MARGIN AT THE SAFETY SLOT. BOLT HANDLE SLOT IS ROUGH.

10 Mar 1987 FILE:/PATTERNING/CENTERFIRE_PATT/870641TP

CENTERFIRE PATTERNS # 1



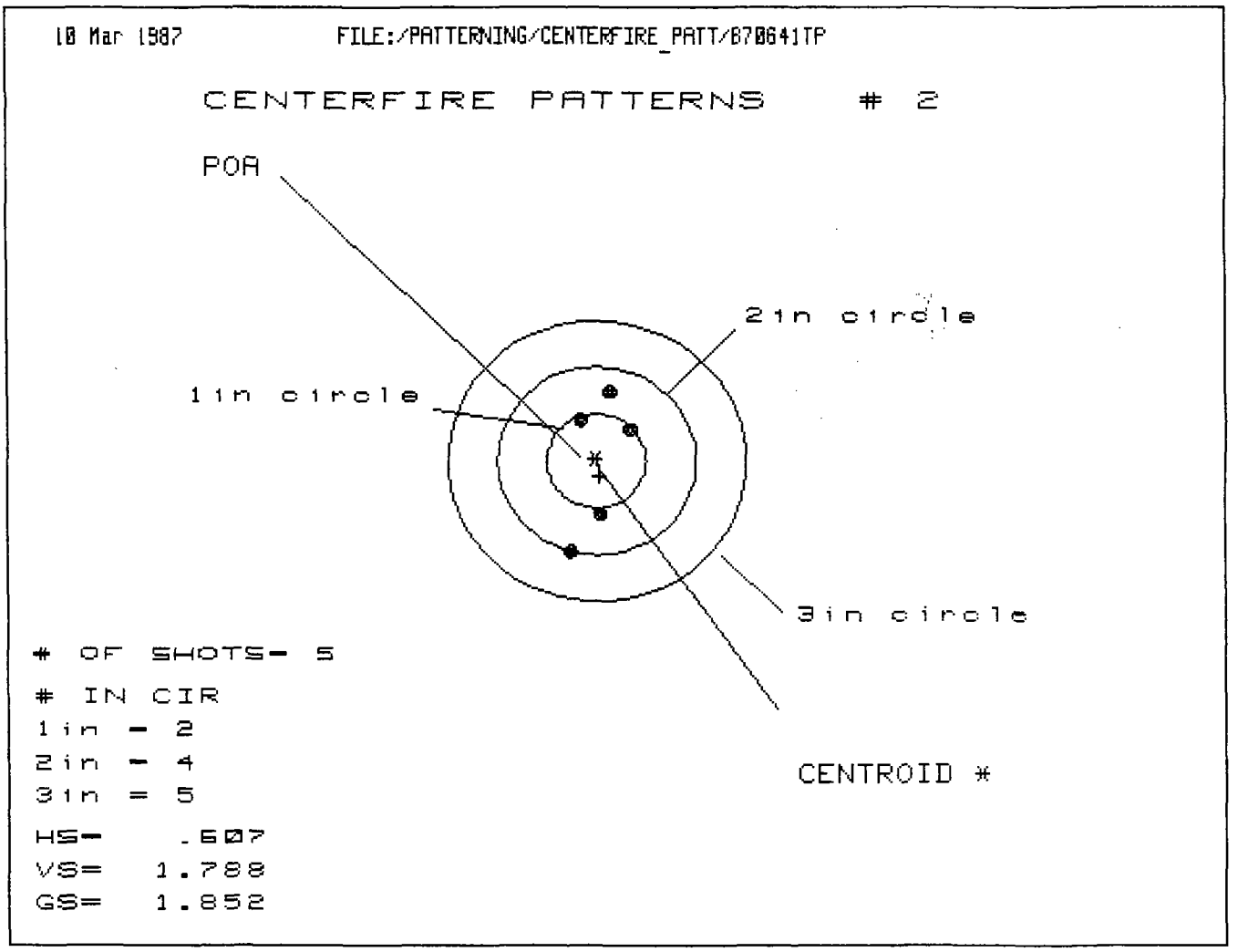
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2in = 4
3in = 5

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VS= 1.514
GS= 2.337

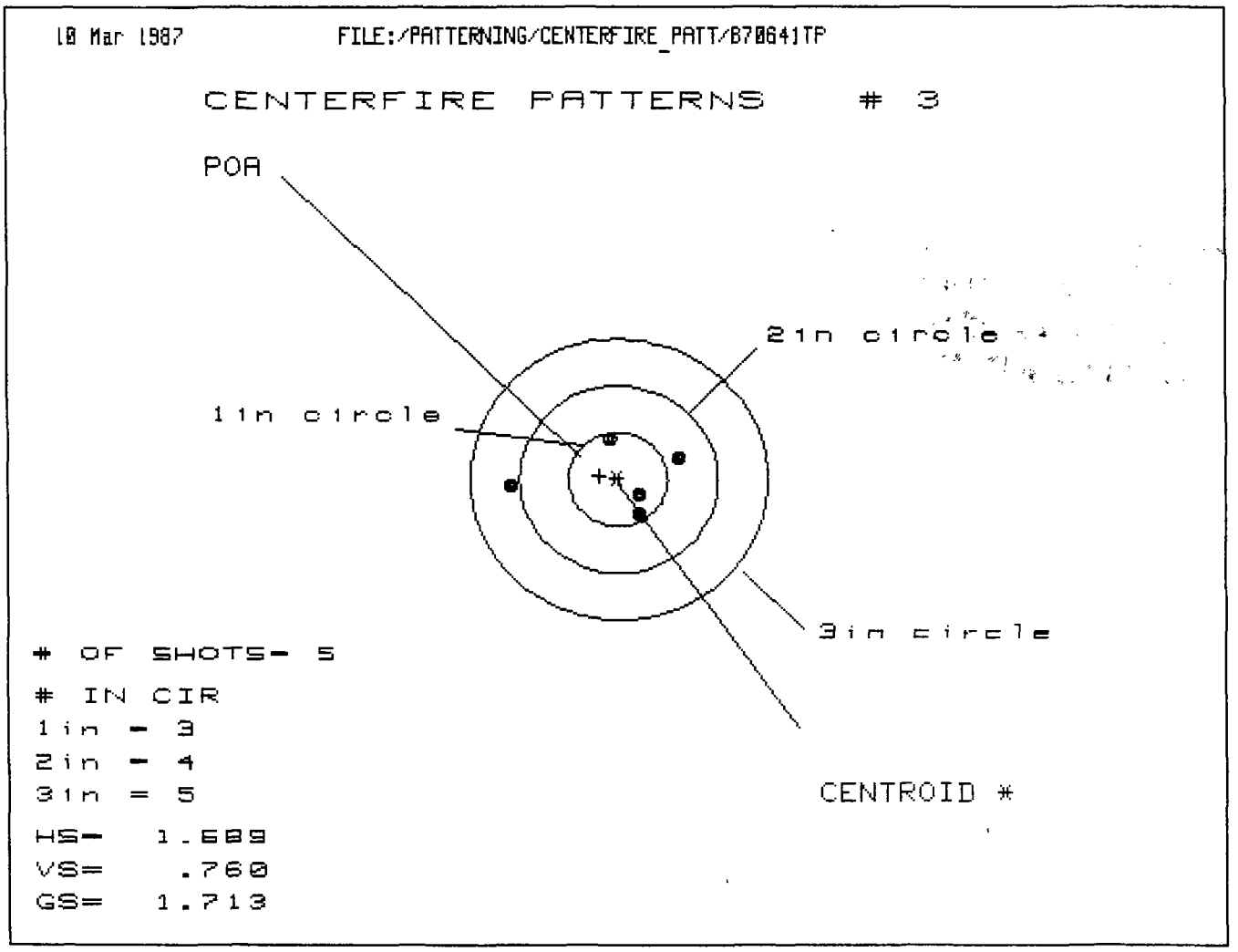
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SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.330	.839	.620
MINIMUM X	:	-.987	-.655	-.468
MAXIMUM Y	:	.701	.651	.669
MINIMUM Y	:	-.813	-.863	-.845
CENTROID X	:	-.089	-.422	-.203
CENTROID Y	:	.116	.166	.148
POA TO CENTROID in.	:	.146	.453	.251
MIN RADIUS	:	.618	.295	.500
MEAN RADIUS	:	.935	.720	.757
MAX RADIUS	:	1.345	1.061	.912
HORIZONTAL SPREAD	:	2.317	1.493	1.088
VERTICAL SPREAD	:	1.514	1.514	1.514
EXTREME SPREAD	:	2.337	1.700	1.700
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B6851090
Request # 870641
Ammo R308W3
Code C13 TC6305



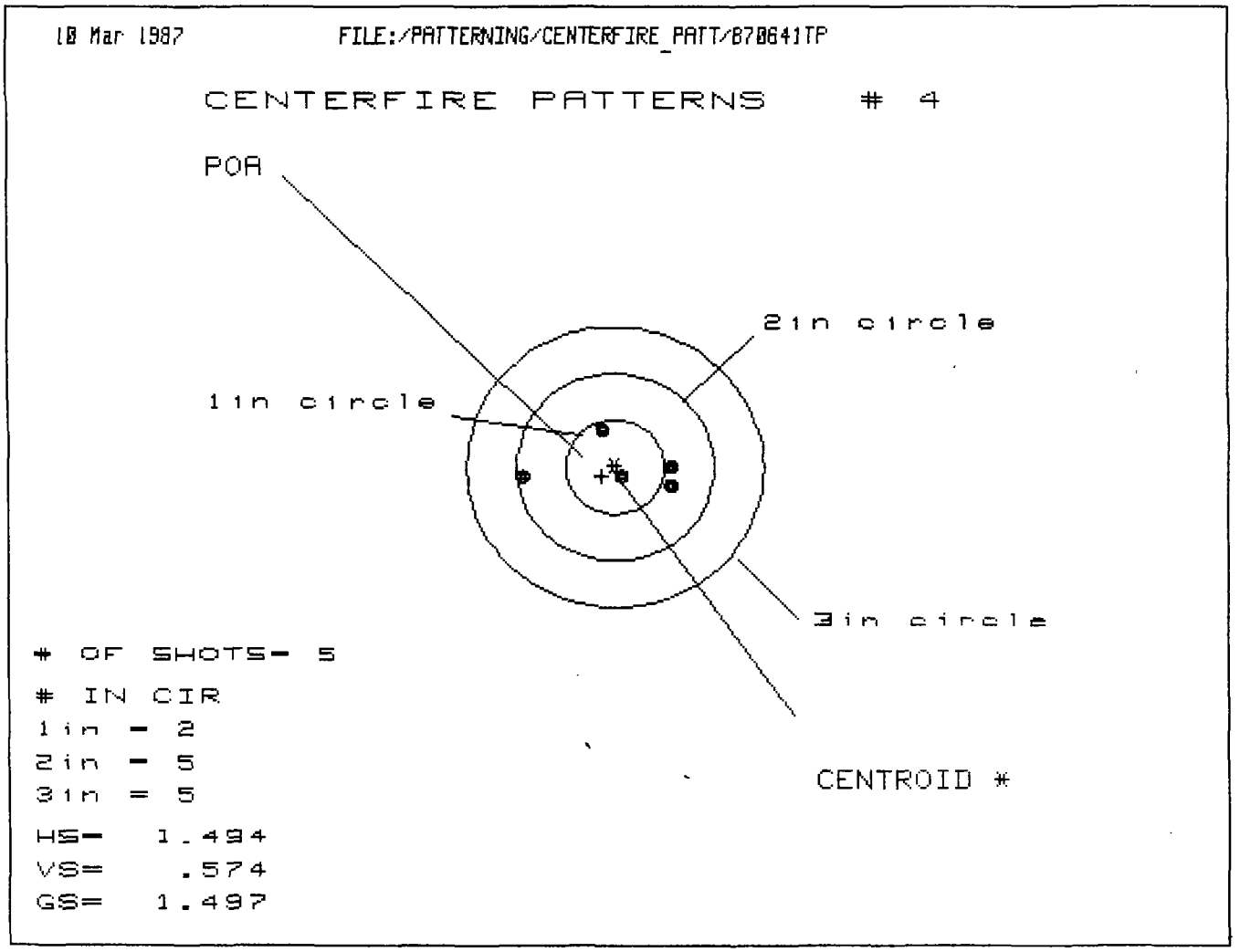
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SHOTS (BEST OF)	:	5	4	3
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MINIMUM X	:	-.306	-.234	-.201
MAXIMUM Y	:	.780	.528	.375
MINIMUM Y	:	-1.008	-.828	-.652
CENTROID X	:	-.034	.042	.009
CENTROID Y	:	.163	.415	.239
POA TO CENTROID in.	:	.167	.417	.239
MIN RADIUS	:	.464	.247	.379
MEAN RADIUS	:	.674	.481	.486
MAX RADIUS	:	1.053	.833	.654
HORIZONTAL SPREAD	:	.607	.459	.459
VERTICAL SPREAD	:	1.788	1.356	1.027
EXTREME SPREAD	:	1.852	1.369	1.037
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B6851090
Request # 870641
Ammo R308W3
Code C13 TC6305



PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.645	.384	.109
MINIMUM X	:	-1.044	-.337	-.209
MAXIMUM Y	:	.403	.378	.432
MINIMUM Y	:	-.357	-.383	-.328
CENTROID X	:	.186	.447	.319
CENTROID Y	:	-.037	-.012	-.066
POA TO CENTROID in.	:	.190	.447	.326
MIN RADIUS	:	.276	.159	.150
MEAN RADIUS	:	.567	.366	.324
MAX RADIUS	:	1.049	.506	.480
HORIZONTAL SPREAD	:	1.689	.721	.318
VERTICAL SPREAD	:	.760	.760	.760
EXTREME SPREAD	:	1.713	.820	.820
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B685 1090
Request # 87064/
Ammo R308W3
Code C13 TC6305

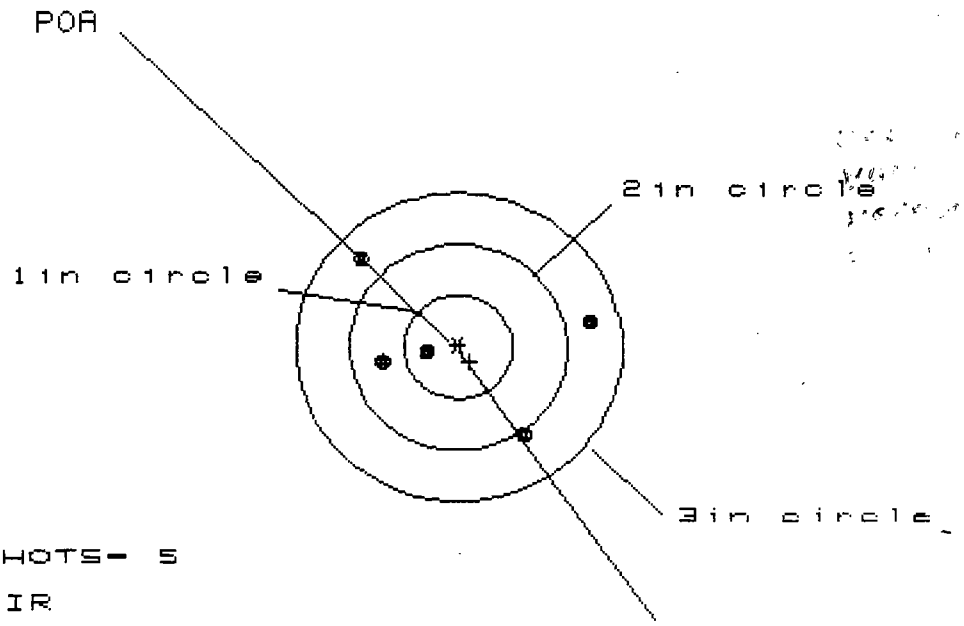


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MINIMUM X	:	-.940	-.396	-.289
MAXIMUM Y	:	.355	.325	.242
MINIMUM Y	:	-.219	-.249	-.179
CENTROID X	:	.133	.369	.262
CENTROID Y	:	.096	.126	.209
POA TO CENTROID in.	:	.165	.389	.335
MIN RADIUS	:	.069	.236	.209
MEAN RADIUS	:	.506	.361	.330
MAX RADIUS	:	.948	.512	.404
HORIZONTAL SPREAD	:	1.494	.714	.688
VERTICAL SPREAD	:	.574	.574	.421
EXTREME SPREAD	:	1.497	.916	.753
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B6851007
Request # 870641
Ammo R308W3
Code C13 TC6305

10 Mar 1987 FILE:/PATTERNING/CENTERFIRE_PATT/B70641TP

CENTERFIRE PATTERNS # 5



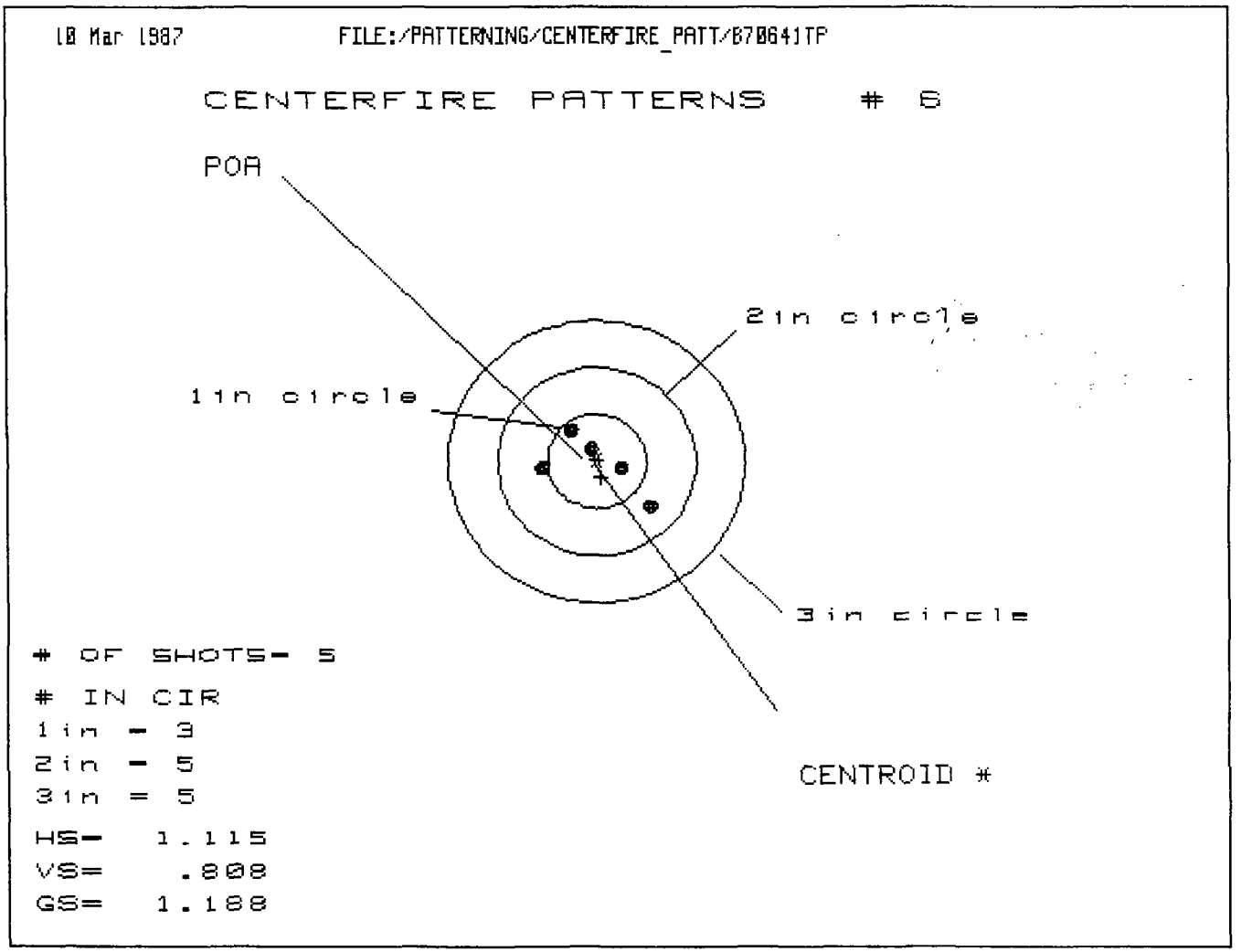
OF SHOTS= 5

IN CIR
1in = 1
2in = 2
3in = 5

HS= 2.130
VS= 1.700
GS= 2.266

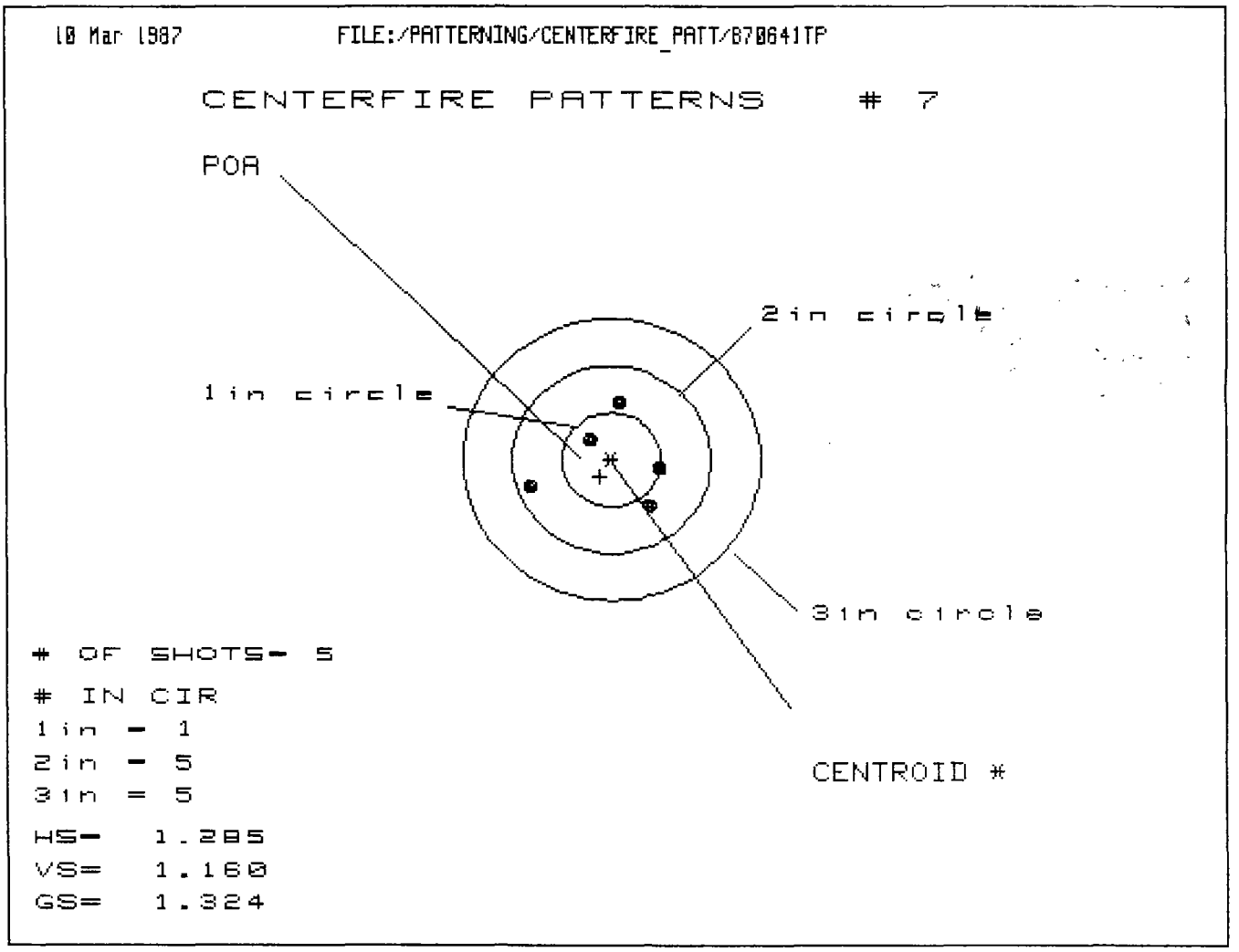
PATTERN #	:	5		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.232	.909	.713
MINIMUM X	:	-.898	-.590	-.534
MAXIMUM Y	:	.841	.908	.296
MINIMUM Y	:	-.859	-.792	-.490
CENTROID X	:	-.104	-.412	-.216
CENTROID Y	:	.143	.076	-.226
POA TO CENTROID in.	:	.177	.419	.313
MIN RADIUS	:	.299	.019	.346
MEAN RADIUS	:	.902	.666	.593
MAX RADIUS	:	1.261	1.206	.865
HORIZONTAL SPREAD	:	2.130	1.499	1.247
VERTICAL SPREAD	:	1.700	1.700	.786
EXTREME SPREAD	:	2.266	2.266	1.422
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		2	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B6851007
Request # 87064J
Ammo R308W3
Code C13 TC6305



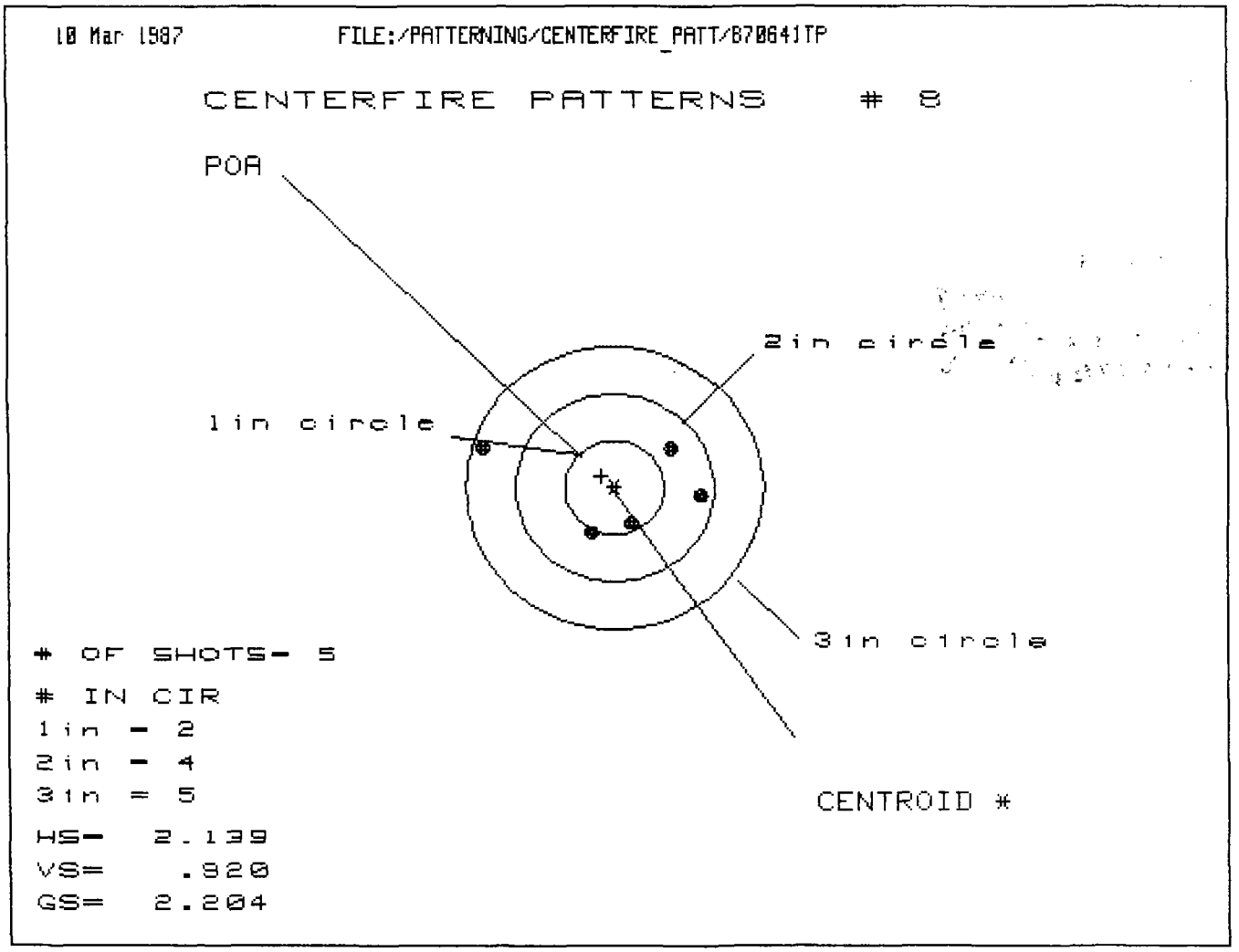
PATTERN #	:	6		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.574	.404	.272
MINIMUM X	:	-.541	-.398	-.254
MAXIMUM Y	:	.375	.267	.224
MINIMUM Y	:	-.433	-.136	-.179
CENTROID X	:	-.046	-.189	-.057
CENTROID Y	:	.169	.277	.320
POA TO CENTROID in.	:	.175	.335	.325
MIN RADIUS	:	.110	.115	.048
MEAN RADIUS	:	.418	.313	.237
MAX RADIUS	:	.719	.426	.339
HORIZONTAL SPREAD	:	1.115	.802	.526
VERTICAL SPREAD	:	.808	.403	.403
EXTREME SPREAD	:	1.188	.802	.663
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B6851007
Request # 87064)
Ammo R308W3
Code C13 TC6305



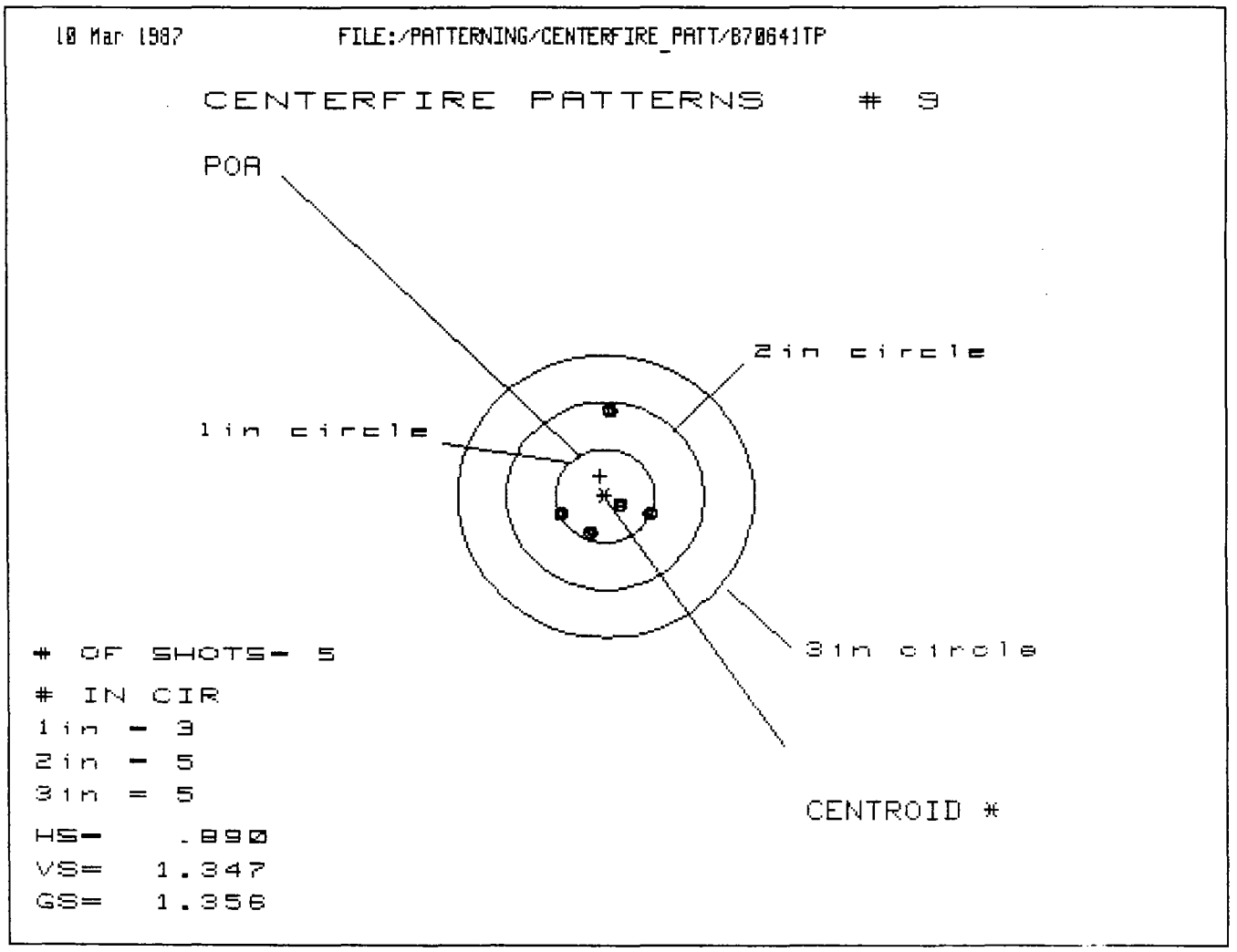
PATTERN #	:	7		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.509	.316	.287
MINIMUM X	:	-.776	-.429	-.458
MAXIMUM Y	:	.669	.591	.373
MINIMUM Y	:	-.491	-.570	-.373
CENTROID X	:	.117	.310	.339
CENTROID Y	:	.180	.259	.062
POA TO CENTROID in.	:	.214	.404	.344
MIN RADIUS	:	.347	.372	.287
MEAN RADIUS	:	.603	.509	.429
MAX RADIUS	:	.837	.603	.591
HORIZONTAL SPREAD	:	1.285	.745	.745
VERTICAL SPREAD	:	1.160	1.160	.746
EXTREME SPREAD	:	1.324	1.194	.975
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B6851094
Request # 870641
Ammo R308W3
Code C13 TC6305



PATTERN #	:	8		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.829	.501	.393
MINIMUM X	:	-1.310	-.517	-.350
MAXIMUM Y	:	.469	.511	.530
MINIMUM Y	:	-.451	-.334	-.315
CENTROID X	:	.132	.460	.293
CENTROID Y	:	-.124	-.241	-.260
POA TO CENTROID in.	:	.181	.519	.392
MIN RADIUS	:	.369	.314	.219
MEAN RADIUS	:	.752	.498	.450
MAX RADIUS	:	1.392	.616	.660
HORIZONTAL SPREAD	:	2.139	1.018	.743
VERTICAL SPREAD	:	.920	.845	.845
EXTREME SPREAD	:	2.204	1.125	1.125
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B6851094
Request # 870641
Ammo R308W3
Code C13 TC6305

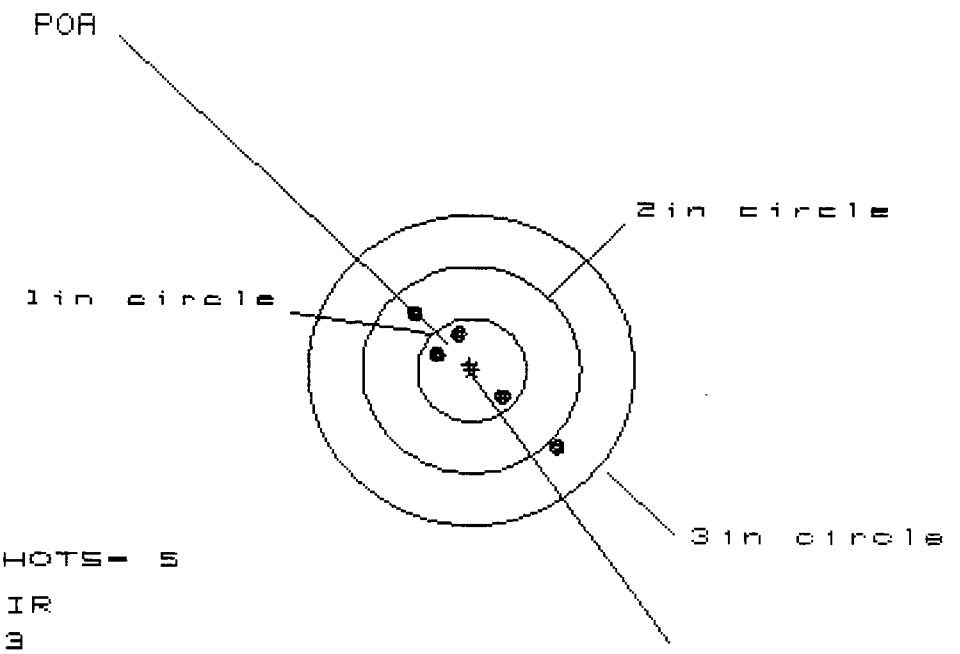


PATTERN #	:	9		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.428	.436	.285
MINIMUM X	:	-.462	-.454	-.267
MAXIMUM Y	:	.934	.140	.153
MINIMUM Y	:	-.413	-.179	-.166
CENTROID X	:	.050	.042	.193
CENTROID Y	:	-.213	-.447	-.460
POA TO CENTROID in.	:	.219	.449	.499
MIN RADIUS	:	.157	.194	.154
MEAN RADIUS	:	.502	.325	.251
MAX RADIUS	:	.935	.456	.315
HORIZONTAL SPREAD	:	.890	.890	.552
VERTICAL SPREAD	:	1.347	.319	.319
EXTREME SPREAD	:	1.356	.891	.581
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B6851094
Request # 870641
Ammo R308 W3
Code C13 TC6305

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CENTERFIRE PATTERNS # 1



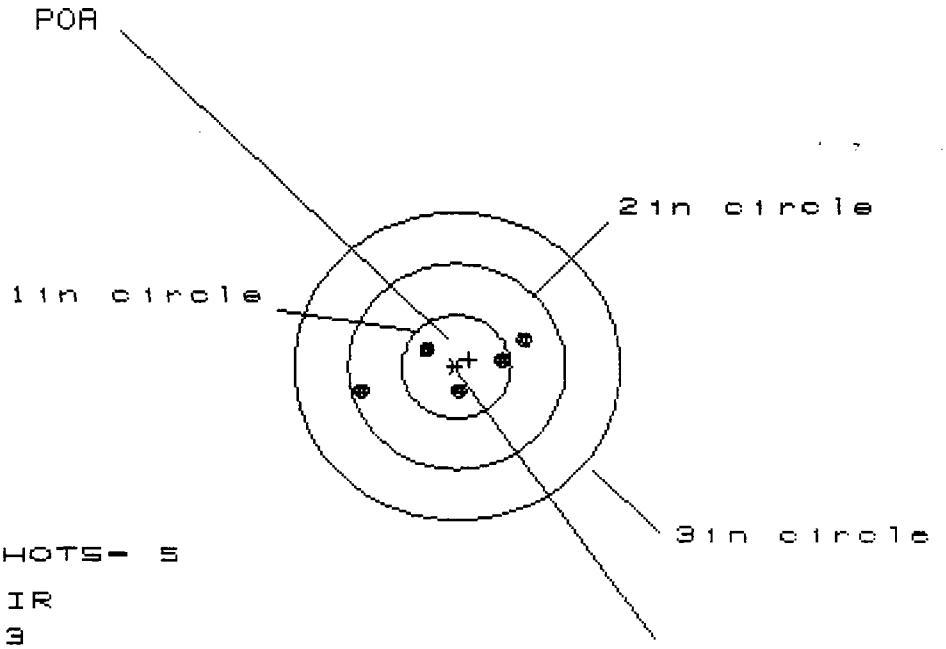
OF SHOTS= 5
IN CIR
1in = 3
2in = 4
3in = 5
HS= 1.244
VS= 1.312
GS= 1.808

PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.749	.420	.317
MINIMUM X	:	-.495	-.307	-.279
MAXIMUM Y	:	.523	.326	.241
MINIMUM Y	:	-.789	-.413	-.304
CENTROID X	:	.018	-.170	-.067
CENTROID Y	:	-.053	.144	.035
POA TO CENTROID in.	:	.056	.223	.076
MIN RADIUS	:	.317	.147	.244
MEAN RADIUS	:	.574	.341	.323
MAX RADIUS	:	1.088	.589	.440
HORIZONTAL SPREAD	:	1.244	.727	.596
VERTICAL SPREAD	:	1.312	.739	.545
EXTREME SPREAD	:	1.808	1.037	.700
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # Q4586 3B
Request # 870641
Ammo. R308W3
Code C13 TC6305
Qualify

9 Mar 1987 FILE:/PATTERNING/CENTERFIRE_PATT/0458638

CENTERFIRE PATTERNS # 2



OF SHOTS= 5
IN CIR
1in = 3
2in = 5
3in = 5
HS= 1.418
VS= .459
GS= 1.490

PATTERN # : 2

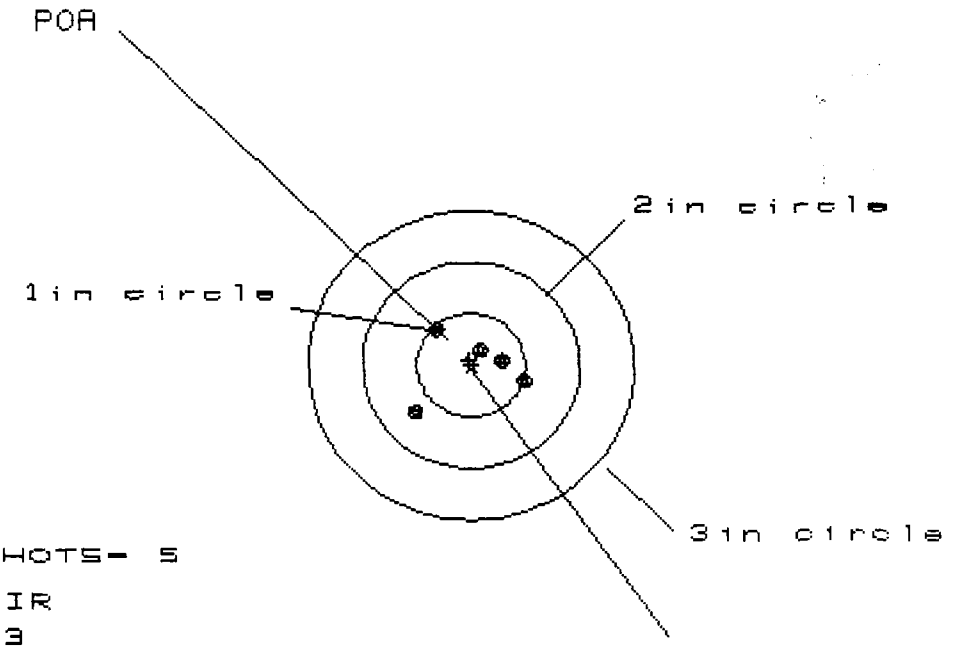
SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.585	.377	.351
MINIMUM X :	-.833	-.456	-.330
MAXIMUM Y :	.223	.164	.118
MINIMUM Y :	-.236	-.277	-.223
CENTROID X :	-.122	.086	-.040
CENTROID Y :	-.068	-.009	-.064
POA TO CENTROID in.:	.140	.086	.076
MIN RADIUS :	.227	.231	.224
MEAN RADIUS :	.488	.354	.313
MAX RADIUS :	.865	.460	.366
HORIZONTAL SPREAD :	1.418	.833	.681
VERTICAL SPREAD :	.459	.442	.341
EXTREME SPREAD :	1.490	.839	.681

NUMBER IN ONE INCH CIRCLE = 3
NUMBER IN TWO INCH CIRCLE = 5
NUMBER IN THREE INCH CIRCLE = 5

Serial # Q4586 3B
Request # 870641
Ammo. R308W3
Code C13 TC6305
Qualify

9 Mar 1987 FILE:/PATTERNING/CENTERFIRE_PATT/0458638

CENTERFIRE PATTERNS # 3



OF SHOTS= 5

IN CIR
1in = 3
2in = 5
3in = 5

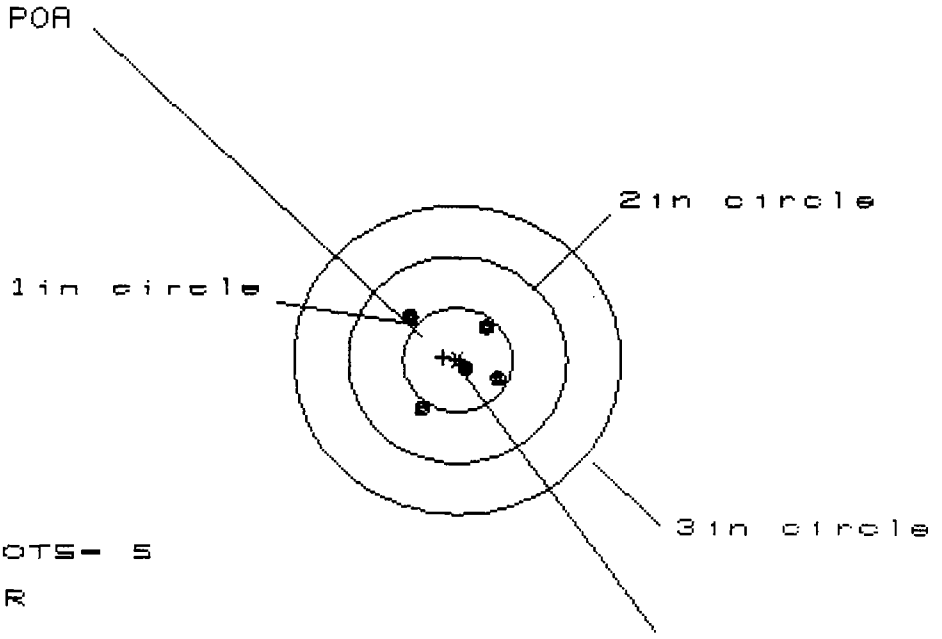
HS= .980
VS= .770
GS= 1.025

PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.465	.336	.175
MINIMUM X	:	-.515	-.483	-.214
MAXIMUM Y	:	.364	.263	.103
MINIMUM Y	:	-.406	-.207	-.120
CENTROID X	:	.015	.144	.305
CENTROID Y	:	-.048	.053	-.034
POA TO CENTROID in.	:	.050	.153	.307
MIN RADIUS	:	.140	.055	.042
MEAN RADIUS	:	.422	.303	.164
MAX RADIUS	:	.656	.550	.237
HORIZONTAL SPREAD	:	.980	.819	.389
VERTICAL SPREAD	:	.770	.470	.223
EXTREME SPREAD	:	1.025	.944	.448
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # Q4586 3B
Request # 870641
Ammo R308W3
Code C13 TC6305
Qualify

10 Mar 1987 FILE:/PATTERNING/CENTERFIRE_PATT/870641TP.1

CENTERFIRE PATTERNS # 1



OF SHOTS= 5
IN CIR
1in = 3
2in = 5
3in = 5
HS= .815
VS= .898
GS= 1.046

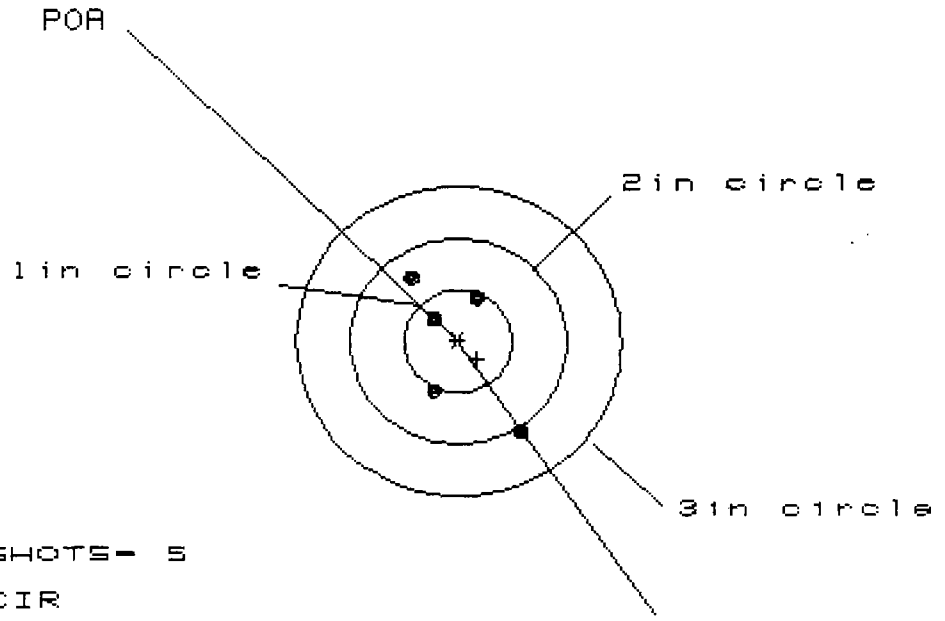
PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.375	.264	.109
MINIMUM X	:	-.440	-.468	-.150
MAXIMUM Y	:	.444	.407	.293
MINIMUM Y	:	-.454	-.343	-.214
CENTROID X	:	.127	.238	.393
CENTROID Y	:	-.024	-.135	-.021
POA TO CENTROID in.	:	.130	.273	.394
MIN RADIUS	:	.139	.035	.170
MEAN RADIUS	:	.440	.337	.235
MAX RADIUS	:	.626	.580	.296
HORIZONTAL SPREAD	:	.815	.732	.259
VERTICAL SPREAD	:	.898	.750	.507
EXTREME SPREAD	:	1.046	1.002	.511
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # 053845B
Request # 870641
Ammo R243 W3
Code W20 LD 0948
Qualify



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CENTERFIRE PATTERNS # 2



OF SHOTS= 5

IN CIR
1in = 2
2in = 4
3in = 5

HS= 1.021
VS= 1.477
GS= 1.796

PATTERN # : 2

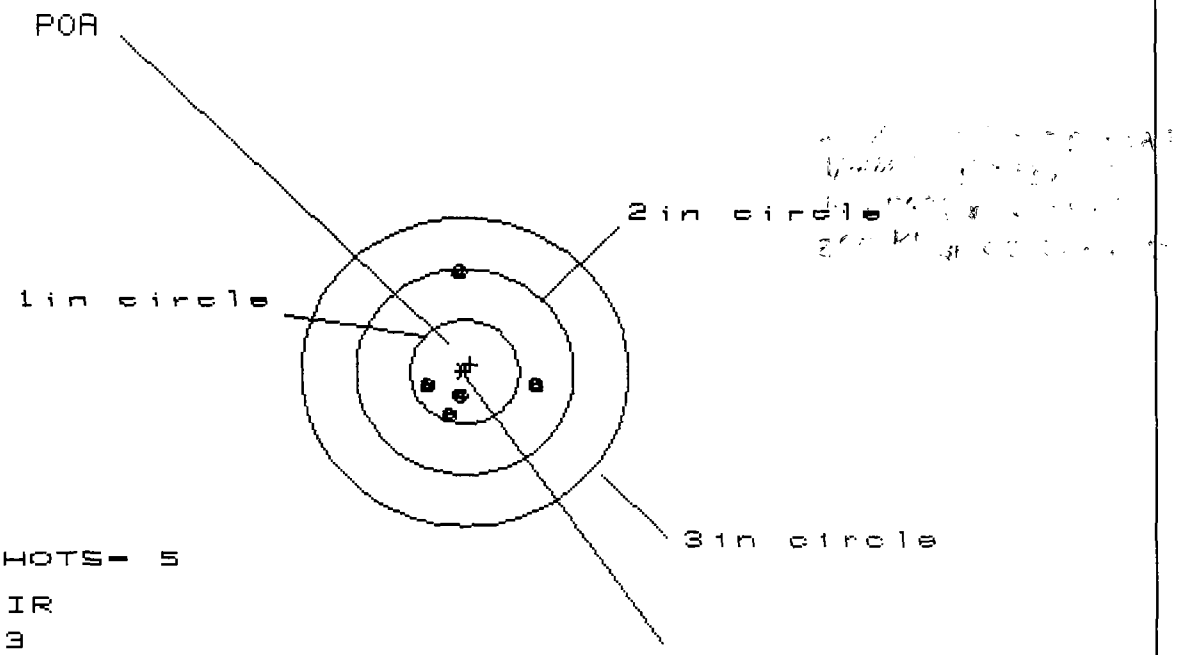
SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.616	.365	.282
MINIMUM X :	-.405	-.251	-.154
MAXIMUM Y :	.629	.418	.397
MINIMUM Y :	-.848	-.659	-.519
CENTROID X :	-.173	-.327	-.243
CENTROID Y :	.174	.386	.246
POA TO CENTROID in.:	.245	.505	.346
MIN RADIUS :	.298	.072	.197
MEAN RADIUS :	.619	.417	.406
MAX RADIUS :	1.048	.660	.535
HORIZONTAL SPREAD :	1.021	.617	.436
VERTICAL SPREAD :	1.477	1.076	.916
EXTREME SPREAD :	1.796	1.096	1.003

NUMBER IN ONE INCH CIRCLE = 2
NUMBER IN TWO INCH CIRCLE = 4
NUMBER IN THREE INCH CIRCLE = 5

Serial # 053845B
Request # 870641
Ammo R243W3
Code W20 LD0948
Qualify

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CENTERFIRE PATTERNS # 3



OF SHOTS= 5

IN CIR
1in = 3
2in = 5
3in = 5

HS= 1.035
VS= 1.388
GS= 1.392

PATTERN # : 3

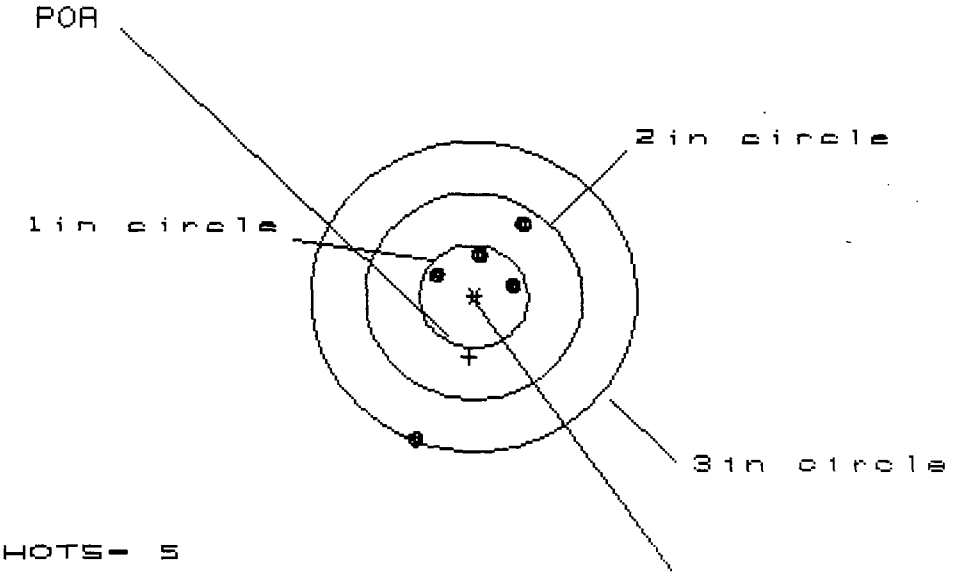
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.639	.625	.164
MINIMUM X	:	-.396	-.409	-.201
MAXIMUM Y	:	.922	.140	.129
MINIMUM Y	:	-.466	-.236	-.189
CENTROID X	:	-.053	-.040	-.248
CENTROID Y	:	-.071	-.301	-.348
POA TO CENTROID in.	:	.089	.304	.427
MIN RADIUS	:	.219	.046	.175
MEAN RADIUS	:	.541	.349	.202
MAX RADIUS	:	.923	.641	.239
HORIZONTAL SPREAD	:	1.035	1.035	.365
VERTICAL SPREAD	:	1.388	.376	.318
EXTREME SPREAD	:	1.392	1.037	.397

NUMBER IN ONE INCH CIRCLE = 3
NUMBER IN TWO INCH CIRCLE = 5
NUMBER IN THREE INCH CIRCLE = 5

Serial # 063845 B
Request # 87064)
Ammo R243 W3
Code W20 CD0948
Qualify

10 Mar 1987 FILE:/PATTERNING/CENTERFIRE_PATT/870641TP.1.1

CENTERFIRE PATTERNS # 1



OF SHOTS= 5

IN CIR
1in = 3
2in = 4
3in = 4

HS= .958
VS= 2.096
GS= 2.305

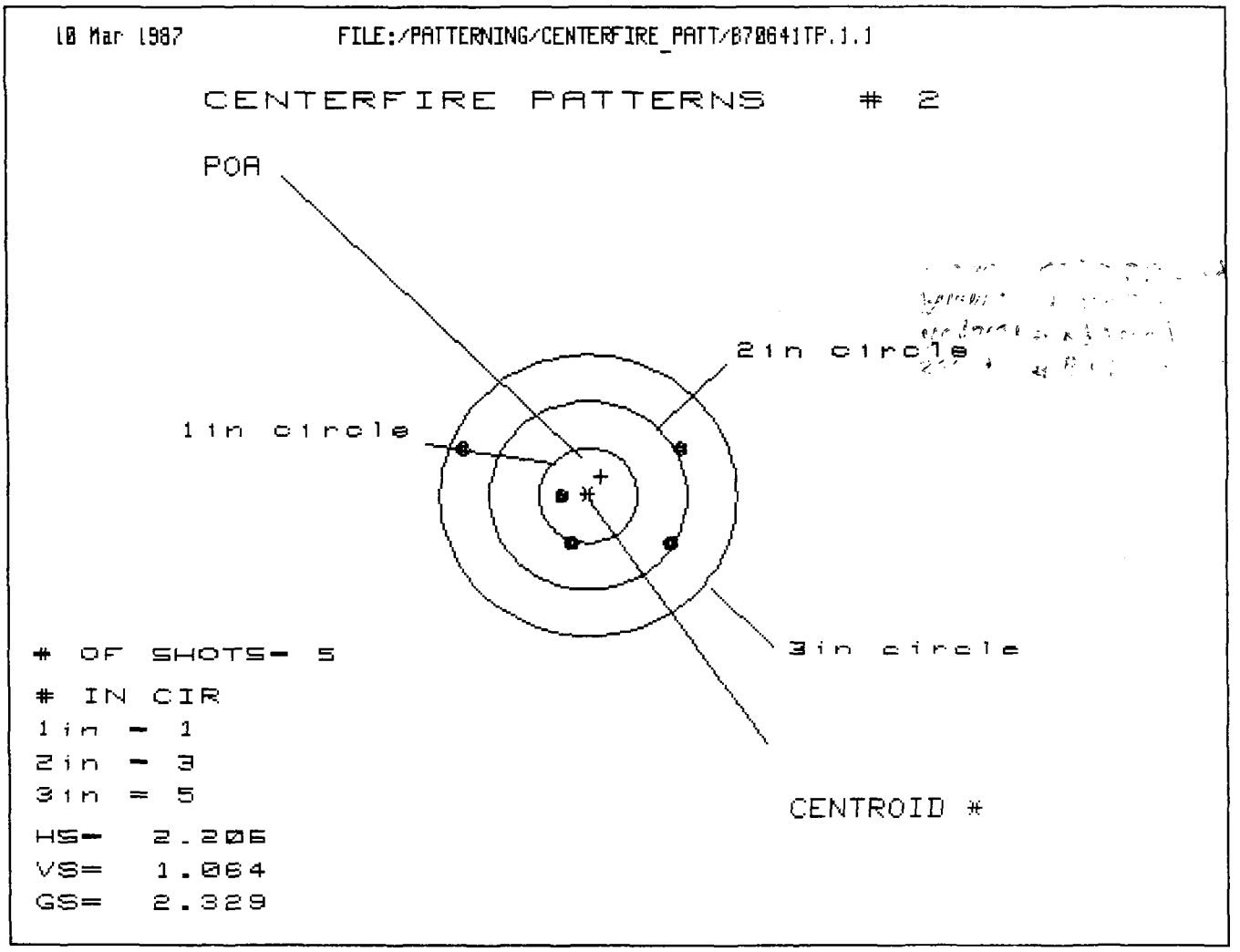
CENTROID #

PATTERN # : 1

		5	4	3
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.426	.293	.280
MINIMUM X	:	-.532	-.442	-.344
MAXIMUM Y	:	.666	.309	.193
MINIMUM Y	:	-1.430	-.247	-.144
CENTROID X	:	.036	.169	.071
CENTROID Y	:	.589	.946	.843
POA TO CENTROID in.	:	.590	.961	.846
MIN RADIUS	:	.334	.096	.203
MEAN RADIUS	:	.696	.324	.289
MAX RADIUS	:	1.526	.467	.348
HORIZONTAL SPREAD	:	.958	.735	.624
VERTICAL SPREAD	:	2.096	.556	.337
EXTREME SPREAD	:	2.305	.867	.631

NUMBER IN ONE INCH CIRCLE = 3
NUMBER IN TWO INCH CIRCLE = 4
NUMBER IN THREE INCH CIRCLE = 4

Serial # B6850372
Request # 870641
Ammo R243 W3
Code W20LD094Y

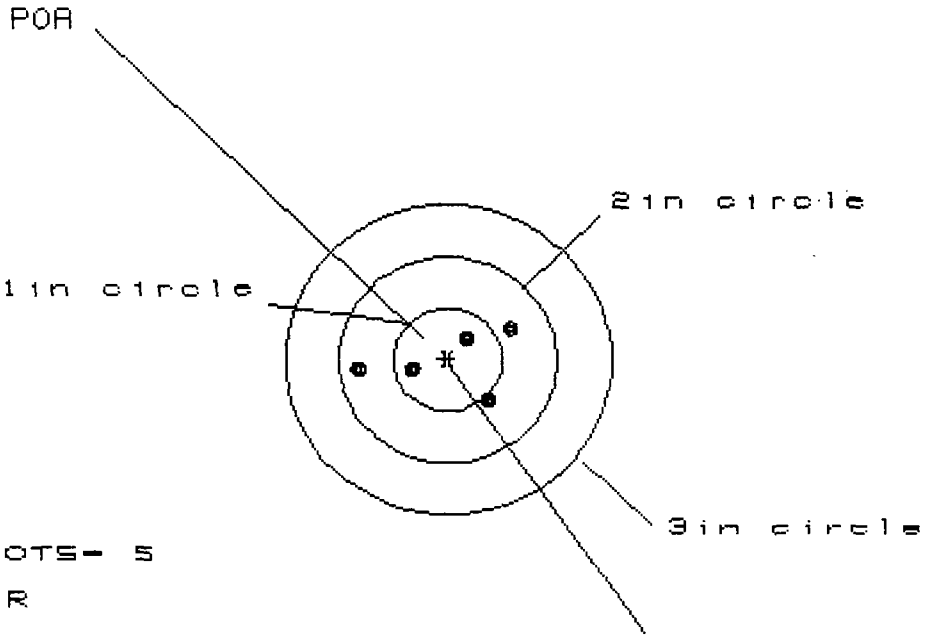


PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.926	.606	.674
MINIMUM X	:	-1.280	-.577	-.375
MAXIMUM Y	:	.533	.603	.348
MINIMUM Y	:	-.531	-.397	-.197
CENTROID X	:	-.129	.191	-.011
CENTROID Y	:	-.201	-.335	-.535
POA TO CENTROID in.	:	.239	.385	.535
MIN RADIUS	:	.258	.596	.335
MEAN RADIUS	:	.831	.670	.516
MAX RADIUS	:	1.387	.854	.702
HORIZONTAL SPREAD	:	2.206	1.183	1.049
VERTICAL SPREAD	:	1.064	1.000	.545
EXTREME SPREAD	:	2.329	1.461	1.182
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B6850372
Request # 870641
Ammo R243 W3
Code W20 LD0948

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CENTERFIRE PATTERNS # 3



OF SHOTS= 5

IN CIR
1in = 2
2in = 5
3in = 5

HS= 1.467
VS= .635
GS= 1.505

PATTERN # : 3

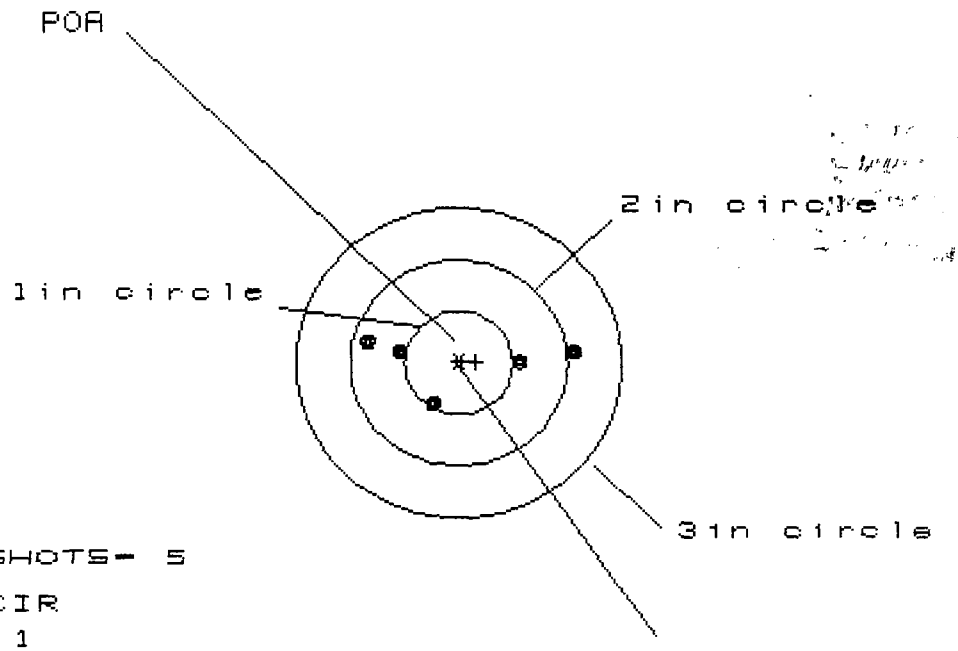
SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.618	.406	.309
MINIMUM X :	-.849	-.576	-.441
MAXIMUM Y :	.290	.278	.262
MINIMUM Y :	-.345	-.357	-.264
CENTROID X :	.028	.240	.105
CENTROID Y :	-.012	-.000	-.093
POA TO CENTROID in.:	.030	.240	.140
MIN RADIUS :	.276	.169	.293
MEAN RADIUS :	.540	.410	.380
MAX RADIUS :	.850	.583	.441
HORIZONTAL SPREAD :	1.467	.982	.750
VERTICAL SPREAD :	.635	.635	.526
EXTREME SPREAD :	1.505	1.049	.796

NUMBER IN ONE INCH CIRCLE = 2
NUMBER IN TWO INCH CIRCLE = 5
NUMBER IN THREE INCH CIRCLE = 5

Serial # B6850372
Request # 870641
Ammo R243 W3
Code W20LD094F

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CENTERFIRE PATTERNS # 4



OF SHOTS= 5

IN CIR
1in = 1
2in = 4
3in = 5

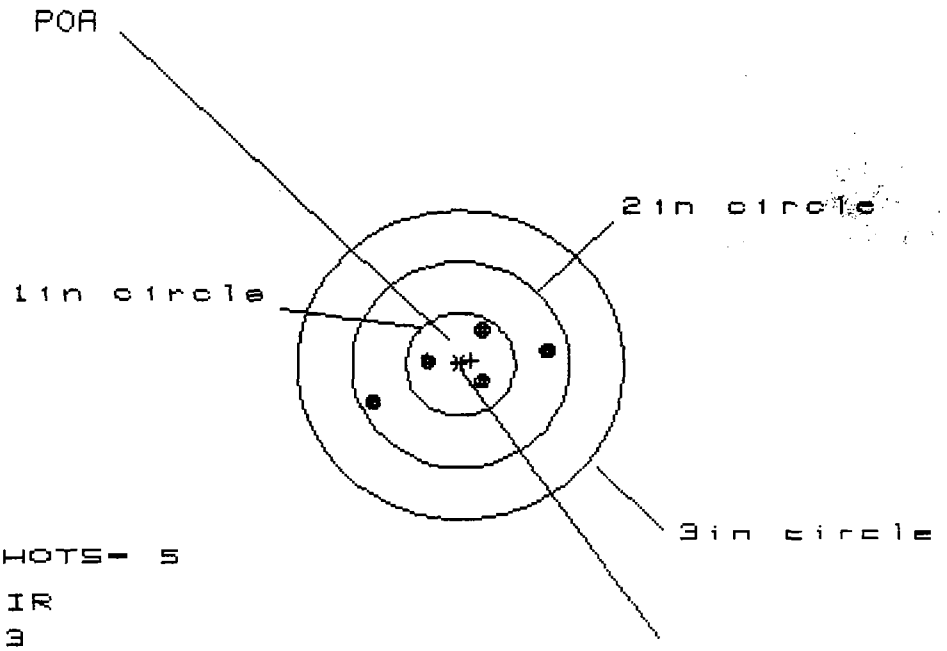
HS= 1.814
VS= .594
GS= 1.815

PATTERN #	:	4		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.013	.770	.587
MINIMUM X	:	-.801	-.547	-.448
MAXIMUM Y	:	.177	.208	.175
MINIMUM Y	:	-.417	-.386	-.317
CENTROID X	:	-.160	-.414	-.231
CENTROID Y	:	-.010	-.041	-.110
POA TO CENTROID in.	:	.161	.416	.256
MIN RADIUS	:	.467	.286	.346
MEAN RADIUS	:	.670	.508	.477
MAX RADIUS	:	1.021	.773	.604
HORIZONTAL SPREAD	:	1.814	1.317	1.035
VERTICAL SPREAD	:	.594	.594	.492
EXTREME SPREAD	:	1.815	1.324	1.036
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B6849949
Request # 870641
Ammo R243 W3
Code W20 LD0948

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CENTERFIRE PATTERNS # 5



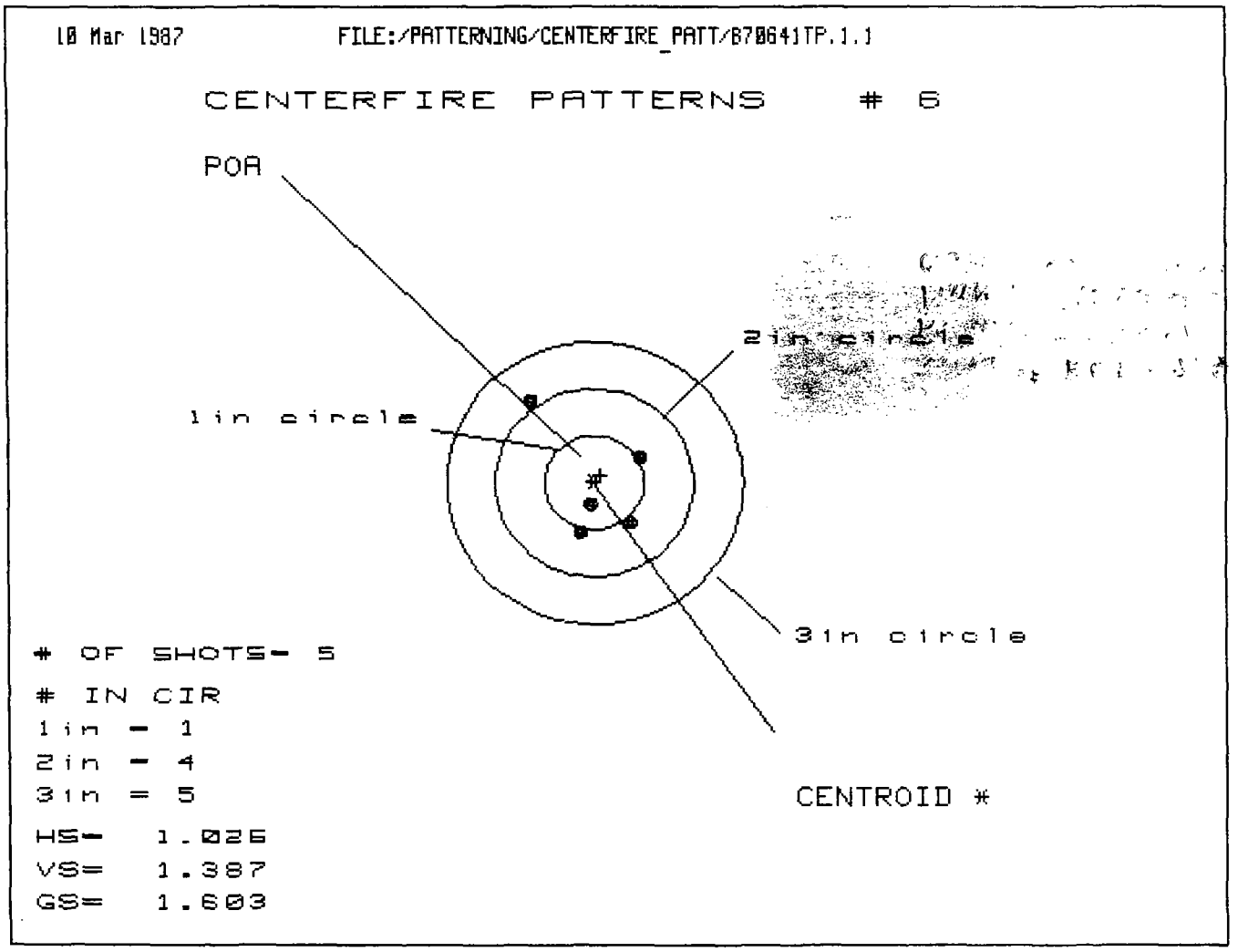
OF SHOTS= 5

IN CIR
1in = 3
2in = 5
3in = 5

HS= 1.609
VS= .696
GS= 1.666

PATTERN #	:	5		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.768	.558	.186
MINIMUM X	:	-.841	-.522	-.336
MAXIMUM Y	:	.365	.282	.288
MINIMUM Y	:	-.331	-.279	-.273
CENTROID X	:	-.098	.112	-.074
CENTROID Y	:	-.037	.046	.040
POA TO CENTROID in.	:	.105	.121	.084
MIN RADIUS	:	.263	.282	.312
MEAN RADIUS	:	.536	.411	.330
MAX RADIUS	:	.904	.558	.343
HORIZONTAL SPREAD	:	1.609	1.080	.522
VERTICAL SPREAD	:	.696	.561	.561
EXTREME SPREAD	:	1.666	1.081	.603
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5.	

Serial # B684 9949
Request # 870641
Ammo R243 W3
Code W20 LD09P



PATTERN # : 6

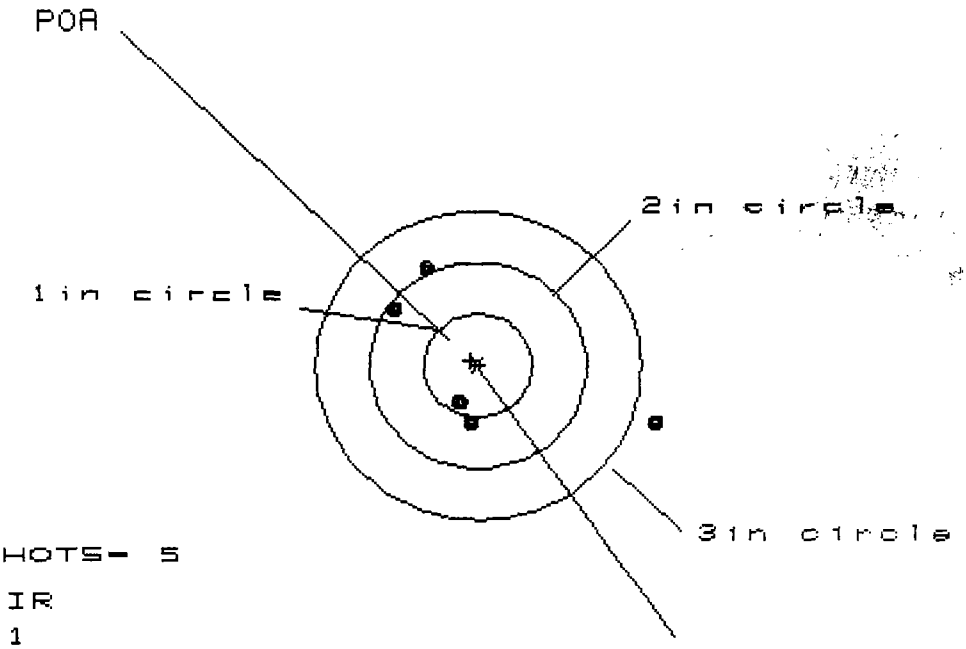
SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.421	.269	.353
MINIMUM X :	-.605	-.287	-.203
MAXIMUM Y :	.840	.516	.451
MINIMUM Y :	-.547	-.337	-.402
CENTROID X :	-.062	.090	.006
CENTROID Y :	-.077	-.287	-.222
POA TO CENTROID in.:	.099	.301	.222
MIN RADIUS :	.211	.234	.158
MEAN RADIUS :	.580	.394	.394
MAX RADIUS :	1.036	.582	.573
HORIZONTAL SPREAD :	1.026	.556	.556
VERTICAL SPREAD :	1.387	.853	.853
EXTREME SPREAD :	1.603	1.018	1.018

NUMBER IN ONE INCH CIRCLE = 1
NUMBER IN TWO INCH CIRCLE = 4
NUMBER IN THREE INCH CIRCLE = 5

Serial #B6849949
Request #870641
Ammo R243 W3
Code W20LD094B

10 Mar 1987 FILE:/PATTERNING/CENTERFIRE_PATT/B70641TP.1.1

CENTERFIRE PATTERNS # 7



OF SHOTS= 5

IN CIR
1in = 1
2in = 3
3in = 4

HS= 2.366
VS= 1.516
GS= 2.603

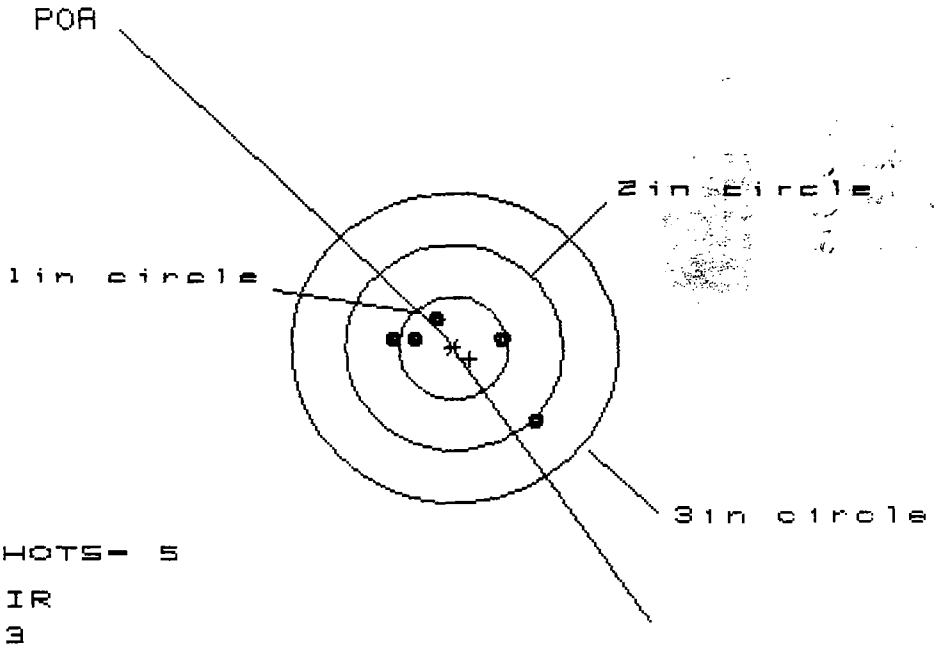
PATTERN # : 7

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	1.581	.328	.287
MINIMUM X :	-.785	-.390	-.431
MAXIMUM Y :	.946	.807	.663
MINIMUM Y :	-.570	-.709	-.440
CENTROID X :	.069	-.326	-.285
CENTROID Y :	-.049	.090	-.179
POA TO CENTROID in.:	.085	.338	.337
MIN RADIUS :	.412	.526	.266
MEAN RADIUS :	.938	.670	.527
MAX RADIUS :	1.675	.816	.791
HORIZONTAL SPREAD :	2.366	.718	.718
VERTICAL SPREAD :	1.516	1.516	1.103
EXTREME SPREAD :	2.603	1.581	1.316
NUMBER IN ONE INCH CIRCLE =		1	
NUMBER IN TWO INCH CIRCLE =		3	
NUMBER IN THREE INCH CIRCLE =		4	

Serial # B6849906
Request # 870641
Ammo R243W3
Code W20LD948

10 Mar 1987 FILE:/PATTERNING/CENTERFIRE_PATT/B70641TP.1.1

CENTERFIRE PATTERNS # 8



OF SHOTS= 5

IN CIR
1in = 3
2in = 5
3in = 5

HS= 1.312
VS= .972
GS= 1.527

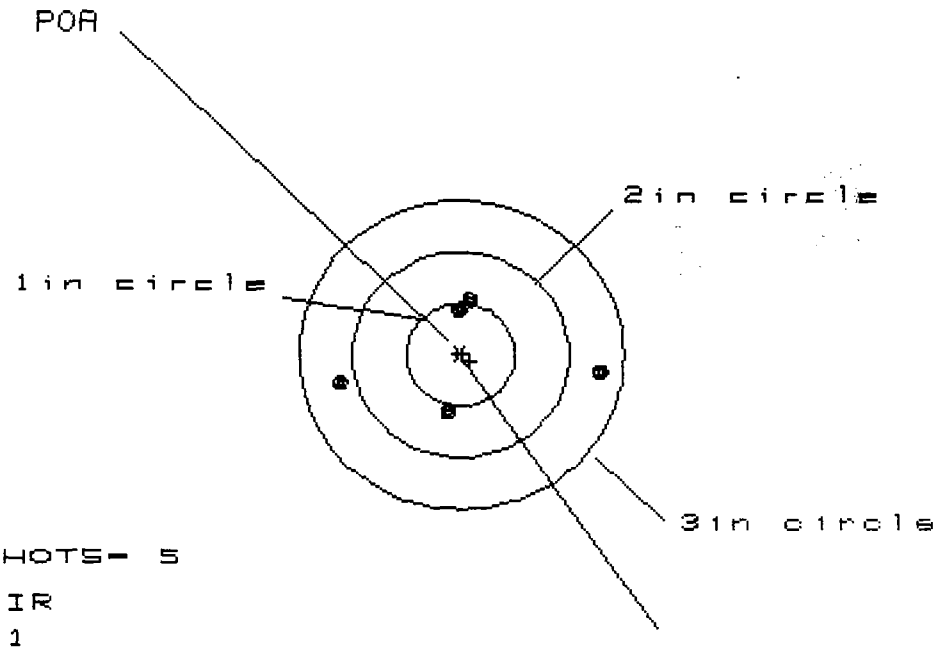
PATTERN # : 8

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.716	.585	.446
MINIMUM X :	-.596	-.416	-.286
MAXIMUM Y :	.299	.131	.112
MINIMUM Y :	-.673	-.059	-.065
CENTROID X :	-.146	-.326	-.187
CENTROID Y :	.108	.276	.295
POA TO CENTROID in.:	.182	.427	.349
MIN RADIUS :	.349	.133	.195
MEAN RADIUS :	.545	.323	.312
MAX RADIUS :	.983	.585	.448
HORIZONTAL SPREAD :	1.312	1.001	.732
VERTICAL SPREAD :	.972	.190	.177
EXTREME SPREAD :	1.527	1.002	.732
NUMBER IN ONE INCH CIRCLE =		3	
NUMBER IN TWO INCH CIRCLE =		5	
NUMBER IN THREE INCH CIRCLE =		5	

Serial # B6849906
Request # 870641
Ammo R243 W3
Code W20LD09FF

10 Mar 1997 FILE:/PATTERNING/CENTERFIRE_PATT/870641TP.1.1

CENTERFIRE PATTERNS # 9



OF SHOTS= 5

IN CIR
1in = 1
2in = 3
3in = 5

HS= 2.389
VS= 1.104
GS= 2.395

PATTERN #	:	9		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.271	.388	.122
MINIMUM X	:	-1.118	-.800	-.110
MAXIMUM Y	:	.548	.514	.402
MINIMUM Y	:	-.556	-.590	-.702
CENTROID X	:	-.083	-.401	-.135
CENTROID Y	:	.064	.098	.210
POA TO CENTROID in.	:	.105	.413	.249
MIN RADIUS	:	.450	.485	.300
MEAN RADIUS	:	.804	.652	.477
MAX RADIUS	:	1.278	.867	.711
HORIZONTAL SPREAD	:	2.389	1.188	.232
VERTICAL SPREAD	:	1.104	1.104	1.104
EXTREME SPREAD	:	2.395	1.461	1.128
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	

Serial # B6849906
Request # 87064/
Ammo R243W3
Code W20LD0948

xc: W.H. Coleman, II/File
K.W. Soucy
G.J. Hill
J.R. Snedeker
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 870641
MARCH 12, 1987

MODEL 700 LEFT HAND - TRIAL AND PILOT EVALUATION
243 WIN AND 308 WIN CALIBERS

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

MODEL 700 LEFT HAND 243 WIN AND 308 WIN TRIAL AND PILOT EVALUATION

ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700 left hand 243 win caliber, and the Model 700 left hand 308 win caliber rifles to be acceptable. The Trial and Pilot Evaluation consisted of Visual Inspection, Accuracy, and Function. The ten rifle sample (five rifles of each caliber) was found to be within Remington specifications for each phase of the Trial and Pilot Evaluation.

Prepared by: F.L. Supry
Date prepared: 12 march 1987

proofread and cleared by:

J.R. Snedeker, Research Supervisor
Test, Measurement & Mech. Analysis Lab

W.H. Coleman, II
New Products Research Lab Director

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

REPORT# 870641 WORK ORDER# 81411-905

To: J.R. Snedeker

From: F.L. Supry

MODEL 700 LEFT HAND (243 WIN, AND 308 WIN) TRIAL AND PILOT EVALUATION

INTRODUCTION:

On March 5, 1987 a request was received to conduct a Visual, Accuracy, and Function Evaluation of the Model 700 left hand (243 Win and 308 Win caliber) Trial and Pilot rifles. Five rifles of each caliber were randomly selected from production.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

The ten rifle Trial and Pilot Evaluation was found to be acceptable. The following results were obtained:

A. VISUAL:

a. The overall appearance of the rifles was good.

B. ACCURACY: (Average group size)

a. 243 Win = 1.972 inches.
b. 308 Win = 1.749 inches.

C. FUNCTION:

a. No malfunctions occurred.

REPORT# 870641 WORK ORDER# 81411-905

TEST REPORT:

1. VISUAL:

A. The visual inspection committee felt that the following two items need to be checked more thoroughly:

a. Finish peeling by the grip checkering.

b. Rear sight being raised off the ramp.

B. Data sheets containing the comments on each rifle inspected is included in the appendix of this report.

2. ACCURACY:

A. The Remington Specification for group size is as follows:

a. 243 Win caliber: 2.2 inches, center to center.

b. 308 Win caliber: 3.5 inches, center to center.

B. Three rifles of each caliber were tested for 100 yard accuracy and the following results were obtained.

	GROUP#			AVG
243 WIN CALIBER	1	2	3	
Rifle# B6850372 -	2.305	2.329	1.505	2.046
Rifle# B6849949 -	1.815	1.666	1.603	1.695
Rifle# B6849906 -	2.603	1.527	2.395	2.175

OVERALL GROUP SIZE AVERAGE = 1.972 INCHES

---

308 WIN CALIBER

Rifle# B6851090 -	2.337	1.852	1.713	1.968
Rifle# B6851007 -	1.497	2.266	1.188	1.650
Rifle# B6851094 -	1.324	2.204	1.356	1.628

OVERALL GROUP SIZE AVERAGE = 1.749

3. FUNCTION:

A. Three rifles of each caliber were subjected to a 30 round per rifle, function test and the following results were obtained:

a. No malfunctions occurred.

REPORT# 870641 WORK ORDER# 81411-905

TEST PROCEDURE:

1. VISUAL:

A. The visual inspection committee consisted of G. Hill, G. Barnes (P.E. & C.); J. Baggetta, C. Stephens, and F. Supry (R. & D.).

B. All five rifles of each caliber were used in the visual inspection. The rifles were as follows:

a. 243 Win caliber:
B6849906 B6849999 B6849949 B6849965 B6850372

b. 308 Win caliber:
B6851094 B6851145 B6851007 B6850969 B6851090

C. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the visual inspection committee. All comments were recorded, an are included in the appendix of this report.

2. ACCURACY:

A. The following rifles were used in the 100 yard accuracy test:

a. 243 Win caliber:
B6850372 B6849949 B6849906

b. 308 Win caliber:
B6851090 B6851007 B6851094

B. The accuracy was shot by C. Stephens, at the R&D 100 yard range located in building 52-1.

C. Leupold base and rings were used in conjunction with a Redfield 12X (4-plex) scope.

D. Remington ammunition; index R243W3, code W20LD0948, and index R308W3, code C13TC6305 was used for the 100 yard accuracy test.

E. Before shooting the accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

F. A total of three, five shot groups were shot with each rifle. The rifles were cooled between each group, and one "warmer" shot was fired before the next group was shot.

G. The targets were analyzed for group size and the averages calculated, using the HP 9000 computer and digitizing tablet.

REPORT# 870641 WORK ORDER# 81411-905

TEST PROCEDURE: (continued)

3. FUNCTION:

A. The following rifles were selected for the function test:

a. 243 Win Caliber:
B6849906 B6849999 B6849965

b. 308 Win caliber:
B6851007 B6851145 B6850969

B. Each of the rifles was subjected to the loading and firing of 30 rounds of Remington ammunition (15 rounds of 80 grain and 15 rounds of 100 grain for the 243 Win caliber rifles, and 15 rounds of 55 grain and 15 rounds of 180 grain for the 308 Win caliber rifles). Fifteen rounds were fired; 5 at a slow feeding cycle speed, 5 at a medium feeding cycle speed, and 5 at a fast feeding cycle speed. The rifles were allowed to cool, and then the procedure was repeated with the remaining ammunition type.

C. The following ammunition was used in the function test:

a. R243W1 - 80 grain pointed soft point.
b. R243W3 - 100 grain pointed soft point.
c. R308W5 - 55 grain Win accelerator.
d. R308W2 - 180 grain soft point.

REPORT# 870641 WORK ORDER# 81411-905

APPENDIX

REPORT# 870641 WORK ORDER# 81411-905

VISUAL INSPECTION MODEL 700 LEFT HAND 243 WIN AND 308 WIN CALIBERS

243 WIN CALIBER:

SERIAL NUMBER	COMMENTS
B6849906	FINISH PEELING AT GRIP CHECKERING. BRIGHT MARK ON THE BARREL. SMALL PIMPLES IN THE FINISH NEAR THE STUD, AT THE FORE END TIP.
B6849999	SMALL CHIP ON GRIP CAP. SMALL PIMPLES IN THE FINISH, ON THE RIGHT SIDE OF THE STOCK NEAR THE TRIGGER GUARD. SLIGHT CRACK IN THE BOLT HANDLE SLOT, AND SANDING BREAKTHROUGH IN THE SAME AREA.
B6849949	REAR SIGHT RAISED OFF THE SLIDE. MAR ON THE TRIGGER GUARD. BLEED OUT ON THE CROSS PIN. SLIGHT DING IN THE STOCK, LEFT SIDE NEAR FORE END TIP.
B6849965	GAP BOTH SIDES OF THE BUTT PLATE. SCRATCH LEFT SIDE OF STOCK BY THE RECEIVER.
B6850372	FINISH PEELING RIGHT SIDE OF STOCK NEAT THE CHECKERING.

308 WIN CALIBER:

B6851094	SLIGHT DING ON THE FLOOR PLATE, RIGHT SIDE.
B6851145	MAR ON THE FLOOR PLATE, LEFT SIDE. TWO SLIGHT DINGS ON THE BUTT PLATE. BUTT PLATE INSERT NOT FLUSH.
B6851007	FINISH RUN NEAR THE CHECKERING. SPACE UNDER FORE END TIP.
B6850969	DENT ON THE TOP OF THE STOCK, NEAR THE REAR SWIVEL. TWO SLIGHT DINGS ON THE RIGHT SIDE OF THE TRIGGER GUARD. REAR SIGHT RAISED OFF OF RAMP.
B6851090	SLIGHT DING, LEFT SIDE OF STOCK, NEAR THE BOLT HANDLE SLOT. EXCESSIVE WOOD MARGIN AT THE SAFETY SLOT. BOLT HANDLE SLOT IS ROUGH.

308

B6851094 - Slight ding on floor plate - Right side near tang

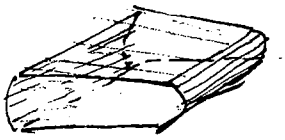
B6851145 - Mar front of floor plate left side stock rear dimple's
- 2 Dings on Butt plate gaps at fore-end tip
- Butt Pad insert not flush

B6851007 - ~~Dent near re~~ Finish run near checkering
- Space under fore-end tip

B6850969 Dent near rear swivel & Grip cap - top stock near rear
2 dings right side by trigger guard
Space fore end tip - rear sight set up

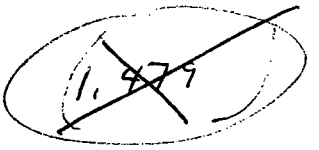
B6851090 Ding left, near bolt handle slot
wood margin at safety slot - slot rough
white spacer on the Butt Plate chipped.
Very little over travel with safe in rearward position

AVERAGE 100 YARD Patterns



243

	2.305	1.815	2.603
	2.329	1.666	1.527
	1.505	1.603	2.395
AVE	2.046	1.695	2.175



1.972

308

	2.337	1.497	1.324
	1.852	2.266	2.204
	1.713	1.188	1.356
AVE	1.968	1.650	1.628

1.749

308 Q

	1.808
	1.490
	1.025
AVE	1.441

243 Q

	1.046
	1.796
	1.392
	1.411

Fenton

B6849906

243 B6849999
B6849965

308 BC851007
B6851145
B6850969

Ammo

243 15 rds 80 gr PSP
R24306

15 100 gr PSP
R24313

308 R308WS 180 gr SP

Report No. _____

RESEARCH TEST & MEASUREMENT LAB WORK REQUEST

	AREA OF TESTING		
____ Developmental	____ Safety Related	____ Litigation	
____ Design Acceptance	____ Competitive Evaluation	____ Warehouse Audit	
____ Pre-Pilot	____ New Design	____ Cost Reduction	
X Pilot	____ Design Change	Stake _____	
____ Production Acceptance	____ Plant Assistance	____ Other	

FIREARM STAT'S.	REPORT REQ'D.	
MODEL: 700 LH	FORMAL ✓	DATE REQUESTED: 3/12/87
CAL. or GAGE: 308-243	TEST RESULTS ONLY _____	DATE NEEDED BY: _____
BARREL TYPE: _____		REQUESTED BY: GDHill
PROOFED: YES X NO ____		WORK ORDER NO: 81411-905

TEST TYPE

____ Strength Test	____ Ammunition Test	____ Dry Cycle Test	____ Photo/Video
____ Function Test	____ Environmental Test	____ Measurements	____ Other _____
____ Accuracy Test	____ Customer Complaint	____ Endurance Test	_____

EXPLAIN IN DETAIL THE REASON FOR THIS TEST:

Short action L.H. 308-243
Initial Production -

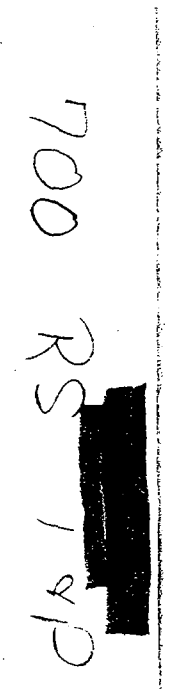
GUNS REQUIRED:

NOTE: NO firearms or parts will be tested in the Labs unless they are accompanied by a Work Request, and both are delivered to the Labs by the designer or engineer. All Work Requests are to be filled out in detail. No Exceptions.

DATE COMPLETED: _____

TEST COMPLETED BY: _____

REPORT DATE: _____


700
RS
[redacted]
P/P

RD-69-B

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington. DUPONT PETERS DUPONT

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"_____

xc: W.H. Coleman, II/File
K.W. Soucy
G.J. Hill
T.C. Douglas
J.R. Snedeker
J.F. Matousek, Jr.
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 871531
JUNE 10, 1987

MODEL 700 RS TRIAL AND PILOT EVALUATION

270 WIN CALIBER

MODEL 700 - 270 WIN CALIBER - TRIAL AND PILOT EVALUATION

ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700, 270 win caliber rifles to be acceptable. The Trial and Pilot Evaluation consisted of Visual Inspection, Accuracy, and Function. The eight rifle sample was found to be within Remington specifications for each phase of the Trial and Pilot Evaluation.

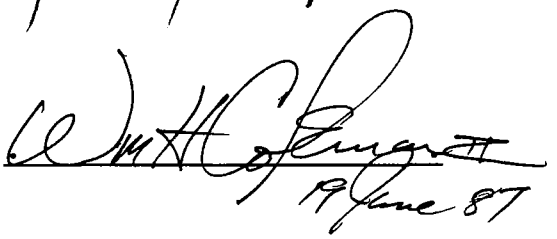
Prepared by: F.L. Supry
Date prepared: 10 June 1987

proofread and cleared by:

J.R. Snedeker, Research Supervisor
Test, Measurement & Mech. Analysis Lab



W.H. Coleman, II
New Products Research Lab Director



REPORT# 871531 WORK ORDER# 82034-905

To: J.R. Snedeker

From: F.L. Supry

MODEL 700 RS - 270 WIN CALIBER - TRIAL AND PILOT EVALUATION

INTRODUCTION:

On June 02, 1987 a request was received to conduct a Visual Inspection, Accuracy, and Function Evaluation of the Model 700 RS, 270 Win caliber, Trial and Pilot rifles. Eight rifles, four Camo and four Grey, were randomly selected from production.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

The eight rifle Trial and Pilot Evaluation was found to be acceptable. The following results were obtained:

A. VISUAL INSPECTION:

a. The overall appearance of the rifles was acceptable.
b. The pattern design of the Camo stocks was well liked.

B. ACCURACY: (Average group size)

a. 270 Win = 1.91 inches.

C. FUNCTION:

a. Three rifles fired 225 rounds each, with no malfunctions.
b. One rifle had one stem high malfunction.
c. The overall malfunction rate was 0.11%.

REPORT# 871531 WORK ORDER# 82034-905

TEST REPORT

1. VISUAL INSPECTION:

A. The visual inspection committee made the following general comments:

a. They liked the pattern in the Camo stocks.

b. Several of the stocks showed a rough area at the top of the grip. More care is needed in transit.

B. Data sheets containing the comments on each rifle inspected is included in the appendix of this report.

2. ACCURACY:

A. The Remington Specification for group size is as follows:

a. 270 Win caliber: 3.5 inches, center to center.

B. Four rifles tested for 100 yard accuracy and the following results were obtained.

	GROUP			AVG
	1	2	3	
Rifle# B6865078 -	1.435	1.648	2.199	1.761
Rifle# B6864276 -	1.668	2.420	1.584	1.891
Rifle# B6862889 -	1.951	1.838	2.422	2.070
Rifle# B6865545 -	2.169	1.856	1.750	1.925

OVERALL GROUP SIZE AVERAGE = 1.91 INCHES

3. FUNCTION:

A. Four of the rifles were subjected to a 225 round per rifle, field function test and the following results were obtained:

a. One stem chamber malfunction occurred.

REPORT# 871382 WORK ORDER# 82034-905

TEST PROCEDURE:

1. VISUAL:

A. The visual inspection committee consisted of J. Piseck, G. Barnes (P.E. & C.); C. Stephens, and F. Supry (R. & D.).

B. Six rifles, three Camo and three Grey, were used in the visual inspection. The rifles were as follows:

a. Camo:
B6865679 B6864928 B6864900

b. Grey:
B6866020 B6865078 B6862889

C. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the visual inspection committee. All comments were recorded, an are included in the appendix of this report.

2. ACCURACY:

A. The following rifles were used in the 100 yard accuracy test:

B6865078 B6864276 B6862889 B6865545

B. The accuracy was shot by C.J. Stephens, at the R&D 100 yard range located in building 52-1.

C. Leupold base and rings were used in conjunction with a Redfield 12X (4-plex) scope.

D. Remington ammunition; index R270W4, 150 grain soft point, code E23F B6007 was used for the 100 yard accuracy test.

E. Before shooting the accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

F. A total of three, five shot groups were shot with each rifle. The rifles were cooled between each group, and one "warmer" shot was fired before the next group was shot.

G. The targets were analyzed for group size and the averages calculated, using the HP 9000 computer and digitizing tablet.

REPORT# 871382 WORK ORDER# 82034-905

TEST PROCEDURE: (continued)

3. FIELD FUNCTION:

A. Four rifles were used in the function test. The rifles were as follows:

B6865078 B6864276 B6862889 B6865545

B. Each of the rifles was subjected to the loading and firing of 225 rounds of Remington and competitive ammunition, in a Field Function test conducted at the Ilion Fish and Game Club. Fifteen rounds were fired; 5 at a slow feeding cycle speed, 5 at a medium feeding cycle speed, and 5 at a fast feeding cycle speed. The rifles were allowed to cool, and then the procedure was repeated with each remaining ammunition type.

C. The following ammunition was used in the function test:

R270W1	270A	X2701	16902
R270W2	270B	X2703	16903
R270W3	270C	X2704	IVI 270
R270W4	270E	X2705	

APPENDIX

REPORT# 871382 WORK ORDER# 82034-905

VISUAL INSPECTION SUMMARY

CAMO STOCKS:

SERIAL NUMBER -	COMMENTS
B6865679	SLIGHT OPENING BETWEEN FLOOR PLATE AND STOCK
B6864928	SCUFF MARK AT BARREL BRACKET BULGE SCUFF MARK AT THE FORE-END TIP SCUFF MARK AT THE GRIP CAP MISMATCH AT THE TOE
B6864900	SLIGHT DISCOLOR AT THE BUTT PAD MAR AT THE TOP OF THE RECEIVER (BEFORE BLASTING)

GREY STOCKS:

B6866020	SLIGHT OPENING BETWEEN FLOOR PLATE AND STOCK MAR ON THE TANG SCUFF MARK ON THE TOP OF THE GRIP AREA GAP AT THE TOE OF THE BUTT PLATE
B6865078	OPENING AT THE REAR OF THE TRIGGER GUARD SCUFF MARK ON THE TOP OF THE GRIP AREA
B6862889	ROUGH CHEEK PIECE MINIMUM OVER-TRAVEL ON THE SAFETY MAR BY THE GRIP CAP

GENERAL COMMENTS"

THE COMMITTEE LIKED THE PATTERN DESIGN OF THE CAMO STOCKS.

MORE CARE NEEDS TO BE TAKEN, IN TRANSIT, TO KEEP FROM MARRING THE TOP OF THE GRIP AREA.

RD-69-B

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington. DU PONT PETERS DU PONT

*"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"*_____

xc: W.H. Coleman, II/File
K.W. Soucy
G.J. Hill
T.C. Douglas
J.R. Snedeker
J.F. Matousek, Jr.
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 871531
JUNE 10, 1987

MODEL 700 RS TRIAL AND PILOT EVALUATION

270 WIN CALIBER

MODEL 700 - 270 WIN CALIBER - TRIAL AND PILOT EVALUATION

ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700, 270 win caliber rifles to be acceptable. The Trial and Pilot Evaluation consisted of Visual Inspection, Accuracy, and Function. The eight rifle sample was found to be within Remington specifications for each phase of the Trial and Pilot Evaluation.

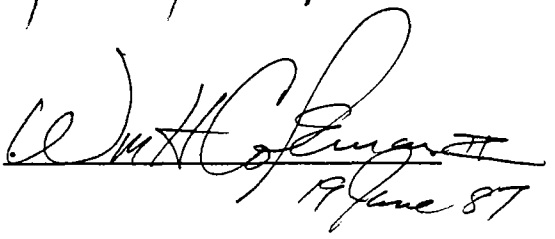
Prepared by: F.L. Supry
Date prepared: 10 June 1987

proofread and cleared by:

J.R. Snedeker, Research Supervisor
Test, Measurement & Mech. Analysis Lab



W.H. Coleman, II
New Products Research Lab Director



REPORT# 871531 WORK ORDER# 82034-905

To: J.R. Snedeker

From: F.L. Supry

MODEL 700 RS - 270 WIN CALIBER - TRIAL AND PILOT EVALUATION

INTRODUCTION:

On June 02, 1987 a request was received to conduct a Visual Inspection, Accuracy, and Function Evaluation of the Model 700 RS, 270 Win caliber, Trial and Pilot rifles. Eight rifles, four Camo and four Grey, were randomly selected from production.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

The eight rifle Trial and Pilot Evaluation was found to be acceptable. The following results were obtained:

A. VISUAL INSPECTION:

a. The overall appearance of the rifles was acceptable.
b. The pattern design of the Camo stocks was well liked.

B. ACCURACY: (Average group size)

a. 270 Win = 1.91 inches.

C. FUNCTION:

a. Three rifles fired 225 rounds each, with no malfunctions.
b. One rifle had one stem high malfunction.
c. The overall malfunction rate was 0.11%.

REPORT# 871531 WORK ORDER# 82034-905

TEST REPORT

1. VISUAL INSPECTION:

A. The visual inspection committee made the following general comments:

a. They liked the pattern in the Camo stocks.

b. Several of the stocks showed a rough area at the top of the grip. More care is needed in transit.

B. Data sheets containing the comments on each rifle inspected is included in the appendix of this report.

2. ACCURACY:

A. The Remington Specification for group size is as follows:

a. 270 Win caliber: 3.5 inches, center to center.

B. Four rifles tested for 100 yard accuracy and the following results were obtained.

	GROUP			AVG
	1	2	3	
Rifle# B6865078 -	1.435	1.648	2.199	1.761
Rifle# B6864276 -	1.668	2.420	1.584	1.891
Rifle# B6862889 -	1.951	1.838	2.422	2.070
Rifle# B6865545 -	2.169	1.856	1.750	1.925

OVERALL GROUP SIZE AVERAGE = 1.91 INCHES

3. FUNCTION:

A. Four of the rifles were subjected to a 225 round per rifle, field function test and the following results were obtained:

a. One stem chamber malfunction occurred.

REPORT# 871382 WORK ORDER# 82034-905

TEST PROCEDURE:

1. VISUAL:

A. The visual inspection committee consisted of J. Piseck, G. Barnes (P.E. & C.); C. Stephens, and F. Supry (R. & D.).

B. Six rifles, three Camo and three Grey, were used in the visual inspection. The rifles were as follows:

a. Camo:
B6865679 B6864928 B6864900

b. Grey:
B6866020 B6865078 B6862889

C. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the visual inspection committee. All comments were recorded, an are included in the appendix of this report.

2. ACCURACY:

A. The following rifles were used in the 100 yard accuracy test:

B6865078 B6864276 B6862889 B6865545

B. The accuracy was shot by C.J. Stephens, at the R&D 100 yard range located in building 52-1.

C. Leupold base and rings were used in conjunction with a Redfield 12X (4-plex) scope.

D. Remington ammunition; index R270W4, 150 grain soft point, code E23F B6007 was used for the 100 yard accuracy test.

E. Before shooting the accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

F. A total of three, five shot groups were shot with each rifle. The rifles were cooled between each group, and one "warmer" shot was fired before the next group was shot.

G. The targets were analyzed for group size and the averages calculated, using the HP 9000 computer and digitizing tablet.

REPORT# 871382 WORK ORDER# 82034-905

TEST PROCEDURE: (continued)

3. FIELD FUNCTION:

A. Four rifles were used in the function test. The rifles were as follows:

B6865078 B6864276 B6862889 B6865545

B. Each of the rifles was subjected to the loading and firing of 225 rounds of Remington and competitive ammunition, in a Field Function test conducted at the Ilion Fish and Game Club. Fifteen rounds were fired; 5 at a slow feeding cycle speed, 5 at a medium feeding cycle speed, and 5 at a fast feeding cycle speed. The rifles were allowed to cool, and then the procedure was repeated with each remaining ammunition type.

C. The following ammunition was used in the function test:

R270W1	270A	X2701	16902
R270W2	270B	X2703	16903
R270W3	270C	X2704	IVI 270
R270W4	270E	X2705	

APPENDIX

REPORT# 871382 WORK ORDER# 82034-905

VISUAL INSPECTION SUMMARY

CAMO STOCKS:

SERIAL NUMBER -	COMMENTS
B6865679	SLIGHT OPENING BETWEEN FLOOR PLATE AND STOCK
B6864928	SCUFF MARK AT BARREL BRACKET BULGE SCUFF MARK AT THE FORE-END TIP SCUFF MARK AT THE GRIP CAP MISMATCH AT THE TOE
B6864900	SLIGHT DISCOLOR AT THE BUTT PAD MAR AT THE TOP OF THE RECEIVER (BEFORE BLASTING)

GREY STOCKS:

B6866020	SLIGHT OPENING BETWEEN FLOOR PLATE AND STOCK MAR ON THE TANG SCUFF MARK ON THE TOP OF THE GRIP AREA GAP AT THE TOE OF THE BUTT PLATE
B6865078	OPENING AT THE REAR OF THE TRIGGER GUARD SCUFF MARK ON THE TOP OF THE GRIP AREA
B6862889	ROUGH CHEEK PIECE MINIMUM OVER-TRAVEL ON THE SAFETY MAR BY THE GRIP CAP

GENERAL COMMENTS"

THE COMMITTEE LIKED THE PATTERN DESIGN OF THE CAMO STOCKS.

MORE CARE NEEDS TO BE TAKEN, IN TRANSIT, TO KEEP FROM MARRING THE TOP OF THE GRIP AREA.

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

INSPECT NO.: _____ PAGE NO. 1

PREVIOUS ROUNDS: _____

DATE: 6/4/87 MODEL: 700 GAUGE: 270 Win SERIAL NO. B6845567

TEST TITLE: 700 BS T&P

TTL. RDS. FIRED: 225
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS" (1)

	SHOOTER	NO. OF ROUNDS FIRED	FIRED	TRIGGER SPEED	SAFETY DID NOT	BOLT DID NOT LOCK BACK	BOLT DID NOT CLOSE	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STICKS MAG.	POWER OVERRIDE	BOLT DID NOT LOCK UP	STEM CHAMBER: HIGH	STEM CHAMBER: LOW	STEM CHAMBER: RIGHT	STEM CHAMBER: LEFT	SHELL JUMPS MAG.	POSITIVE RINGS	LOADING	BOLT OVERRIDE	ACTION WILL NOT CLOSE	BOLT WON'T LOCK	SEPARATE	SLOW OPEN	SLOW CLOSE		
R270W1 100gBP	1	15	OK																								
R270W2 130BSP	2	15	OK																								
R270W3 130BP	3	15	OK																								
R270W4 150SP	4	15	OK																								
270A 130SP	1	15	OK																								
270B 150SP	2	15	OK																								
270C 150BSP	3	15	OK																								
270E 150NP	4	15	OK																								
X2701 100BSP	1	15	OK																								
X2703 130ST	2	15	OK																								
X2704 150SP	3	15	OK																								
X2705 130SP	4	15	OK																								
TOTAL (PER MAL.)																											

BARBER - PRESALE R 0136711

BARBER - PRESALE R 0136711

FIELD CYCLE TEST - CENTERFIRE

REPRINT NO.: _____ PAGE NO. 2

PREVIOUS ROUNDS: _____

DATE: 6/4/87 MODEL: 700 CAUSE: _____ SERIAL NO. B6815567

TEST TITLE: 700 RS TEP

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS" (1)

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DISC'T. RECK	DISC'T. KICK BACK	DISC'T. KICK OVER	DISC'T. KICK UP	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL SWING MAG.	POWER OVERRIDE	DISC'T. LOCK UP	STEM CHAMBER RISE	STEM CHAMBER LOW	STEM CHAMBER RISE	STEM CHAMBER LOW	SHELL JUMPS MAG.	BOLT NOTION	BOLT OVERRIDE	BOLT HOLD OPEN	CYCLING	SEAR	ADJUSTMENT	SAFETY		
16902 130	1	15	OK																								
16903 150	2	15	OK																								
IVI 220 130PSP	3	15	OK																								
TOTAL (PER MAL.)																											

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 0136712
BARBER - PRESALE R 0136712

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 1

PREVIOUS ROUNDS: _____

DATE: 6/4/87 MODEL: 700 CAUGE: 270 Win SERIAL NO. B6865033

TEST TITLE: 700 RS T&P

TTL. RDS. FIRED: 225
TTL. MALFUNCTIONS: 0
MALFONCTION RATE: 0

"MALFUNCTIONS" (2)

	SEQUENCE	NO. OF ROUNDS FIRED	FIRED	FAILED TO CYCLE SHELL	FAILED TO EJECT	FAILED TO KICK BACK	FAILED TO LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STICKS MAG.	POWER OVERRIDE	FAILED TO LOCK UP	STEM CYLINDER: RISE	STEM CYLINDER: FALL	STEM CYLINDER: RISER	STEM CYLINDER: LEFT	SHELL JUMPS MAG.	FOLLOWER RIDES	LOADING	BOLT OVERRIDE	BOLT WILL NOT CLOSE	FAILED TO EXTRACT	SEPARATE	AUTOMATIC	SEMI-AUTOMATIC	
R270W1 100gr BSP	2	15	OK																							
R270W2 130PSP	3	15	OK																							
R270W3 130BP	4	15	OK																							
R270W4 150SP	1	15	OK																							
270A 130SP	2	15	OK																							
270B 150SP	3	15	OK																							
270C 150BTSP	4	15	OK																							
270E 150NP	1	15	OK																							
X2701 100PSP	2	15	OK																							
X2703 130ST	3	15	OK																							
X2704 150SP	4	15	OK																							
X2705 130SP	1	15	OK																							
TOTAL (PER MAL.)																										

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 0136713
BARBER - PRESALE R 0136713

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 2

DATE: 6/4/87 MODEL: 700 GAUGE: _____ SERIAL NO. B6865033

PREVIOUS ROUNDS: _____ TEST TITLE: 700 RS TEP

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: (7)
MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	TIMER OVERRIDE	HAMMER NOT AT REST	BOLT NOT LOCKED	HAMMER NOT COCKED	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STICKS MAG.	POWER OVERRIDE	BOLT NOT LOCKED	STEM CLIMBER: KICK	STEM CLIMBER: HIT	STEM CLIMBER: HAMMER	STEM CLIMBER: SEAR	SHELL JUMPS MAG.	FOLLOWER BINDS	FAILURE TO EXTRACT	BOLT OVERRIDE	FAILURE TO EJECT	BOLT NOT LOCKED	SEPARATOR	ADJUSTMENT	MODIFICATION		
16902 130	2	15	OK																								
16903 150	3	15	OK																								
IVI 290 130PSP	4	15	OK																								
TOTAL (PER MAL.)																											

BARBER - PRESALE R 0136714

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136714

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 1

PREVIOUS ROUNDS: ~

DATE: 6/4/87 MODEL: 700 CALIBER: 270 Win SERIAL NO. B6864276

TEST TITLE: 700 RS TEP

TTL. RDS. FIRED: 225
TTL. MALFUNCTIONS: 9
MALFUNCTION RATE: 0

"MALFUNCTIONS" (3)

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	BOLT OPENED FULLY	BOLT LOCKED	BOLT NOT FULLY BACK	BOLT NOT LOCKED	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELLS TURNED MAG.	POWER OVERRIDE	BOLT NOT LOCKED UP	STEM CHAMBER: RIGHT	STEM CHAMBER: LEFT	SHELLS JUMPED MAG.	ROUGH EJECTION	LOCKING	BOLT OVERRIDE	BOLT NOT LOCKED UP	COVERED RAIL	SLOW	INCONSISTENT	INCONSISTENCY		
R270W1 100gr BSP	3	15	OK																						
R270W2 130BSP	4	15	OK																						
R270W3 130BP	1	15	OK																						
R270W4 150SP	2	15	OK																						
270A 130SP	3	15	OK																						
270B 150SP	4	15	OK																						
270C 150BTSP	1	15	OK																						
270E 150NP	2	15	OK																						
X2701 100BSP	3	15	OK																						
X2703 130ST	4	15	OK																						
X2704 150SP	1	15	OK																						
X2705 130SP	2	15	OK																						
TOTAL (PER MAL.)																									

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 0136715
BARBER - PRESALE R 0136715

FIELD CYCLE TEST - CENTERFIRE

REPROF NO.: _____ PAGE NO. 2

DATE: 6/4/87 MODEL: 700 CAUGE: _____ SERIAL NO. B6814276

PREVIOUS ROUNDS _____

TEST TITLE 700 RS TEP

TTL. RDS. FIRED:
TTL. MALFUNCTIONS:
MALFUNCTION RATE:

"MALFUNCTIONS" (3)

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	FAILED TO FEED	FAILED TO EJECT	FAILED TO FIRE	DOUBLE FEED	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SLOW SWING MAG.	SLOW CYCLING	SLOW LOCK UP	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	STEM CHAMBER BOTTOM	STEM CHAMBER TOP	SLOW MAG. SPRING TIMES	FOLLOWER RIDES	LOADING	BOLT OVERRIDE	SLOW BOLT CLOSING	LOCKING LUGS	EJECTOR	ACCELERATOR	SAFETY	
16902 130	3	15	OK																							
16903 150	4	15	OK																							
IVI 290 130PSP	1	15	OK																							
TOTAL (PER MAL.)																										

BARBER - PRESALE R 0136716

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136716

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: 6/4/87 MODEL: 700 CAUGE: 270 Win SERIAL NO. B6865545

TEST TITLE 700 RS T&P

TTL. RDS. FIRED: 225

TTL. MALFUNCTIONS: 1

MALFUNCTION RATE: .004

"MALFUNCTIONS" (4)

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STUCK MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JAMS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTN SLOW UP	DON'T UNLOCK	SLUGGISH	SLUGGISH	STICKY BOLT	
R270W1 100gBSP	1	15	OK																							
R270W2 130BSP	2	15	OK																							
R270W3 130BP	3	15	OK																							
R270W4 150SP	4	15	OK																							
270A 130SP	1	15	OK																							
270B 150SP	2	15											14F													
270C 150BTSP	3	15	OK																							
270E 150NP	4	15	OK																							
X2701 100BSP	1	15	OK																							
X2703 130ST	2	15	OK																							
X2704 150SP	3	15	OK																							
X2705 130SP	4	15	OK																							
TOTAL (PER MAL.)																										

BARBER - PRESALE R 0136717

BARBER - PRESALE R 0136717

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 2

PREVIOUS ROUNDS: _____

DATE: 6/4/87 MODEL: 700 CAUGE: _____ SERIAL NO. B6865545

TEST TITLE: 700 RS TEP (4)

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	TRIGGER SPRING	DISC'T SPRING	DISC'T HOOK SPRING	DISC'T HOOK DOWN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STOPS MAG.	POWER OVERRIDE	DISC'T HOOK UP	STEM CYLINDER: MID	STEM CYLINDER: RIGHT	STEM CYLINDER: LEFT	SHELL STOPS MAG.	POSITIVE SHELL EJECTION	EXTRACTOR	BOLT OVERRIDE SCREW	BOLT ACTION BIND UP	DISC'T SPRING	SAFETY	ACCESSORIES	SCREWDRIVER
16902 130	4	15	OK																					
16903 150	1	15	OK																					
IVI 270 130PSP	2	15	OK																					
TOTAL (PER MAL.)																								

BARBER - PRESALE R 0136718

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136718

Committee
- C J Jeplins
- F. Sniping
- John Piseck
- Gary Barnes

Model 700 RS BDL
CAMO
B6865679 -

- Opening floor plate & stock left side

B6864928 —
- Skuff mark @ Barrel Bracket Bulge left side of stock
- fore-end tip
- Grip Cap
mismatch on toe

B6864900 —
- slight discolor Butt pad
- Dmg on top of Receiver (Before Blasting)

GLEY

-6866020

- opening at rear of floor plate
- Ding on tang
- Scuff marks on top of grip area
- Gap at toe - Butt Plate
- ~~open~~

B-686 5078

- opening at rear of trigger guard
- Scuff mark top of grip area

B 686 2889 -

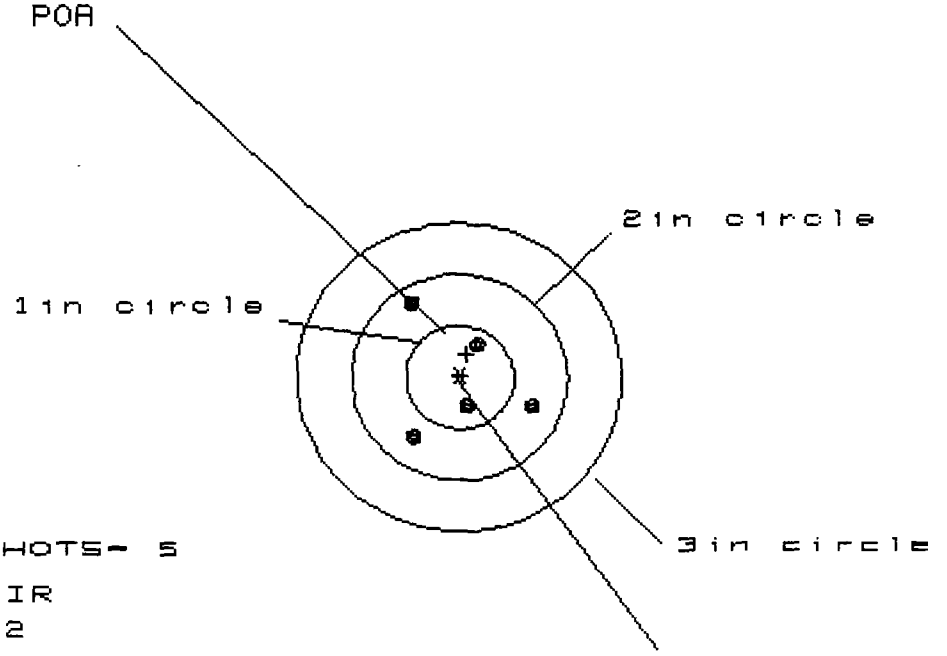
- Rough checkpiece
- Safety needs more overtravel
- Ding by grip cap

General Comment -

- Liked the Design of the Camo
- More care not to ding top of deck - Transit

3 Jun 1987 FILE:/PATTERNING/CENTERFIRE_PATT/B6B65078

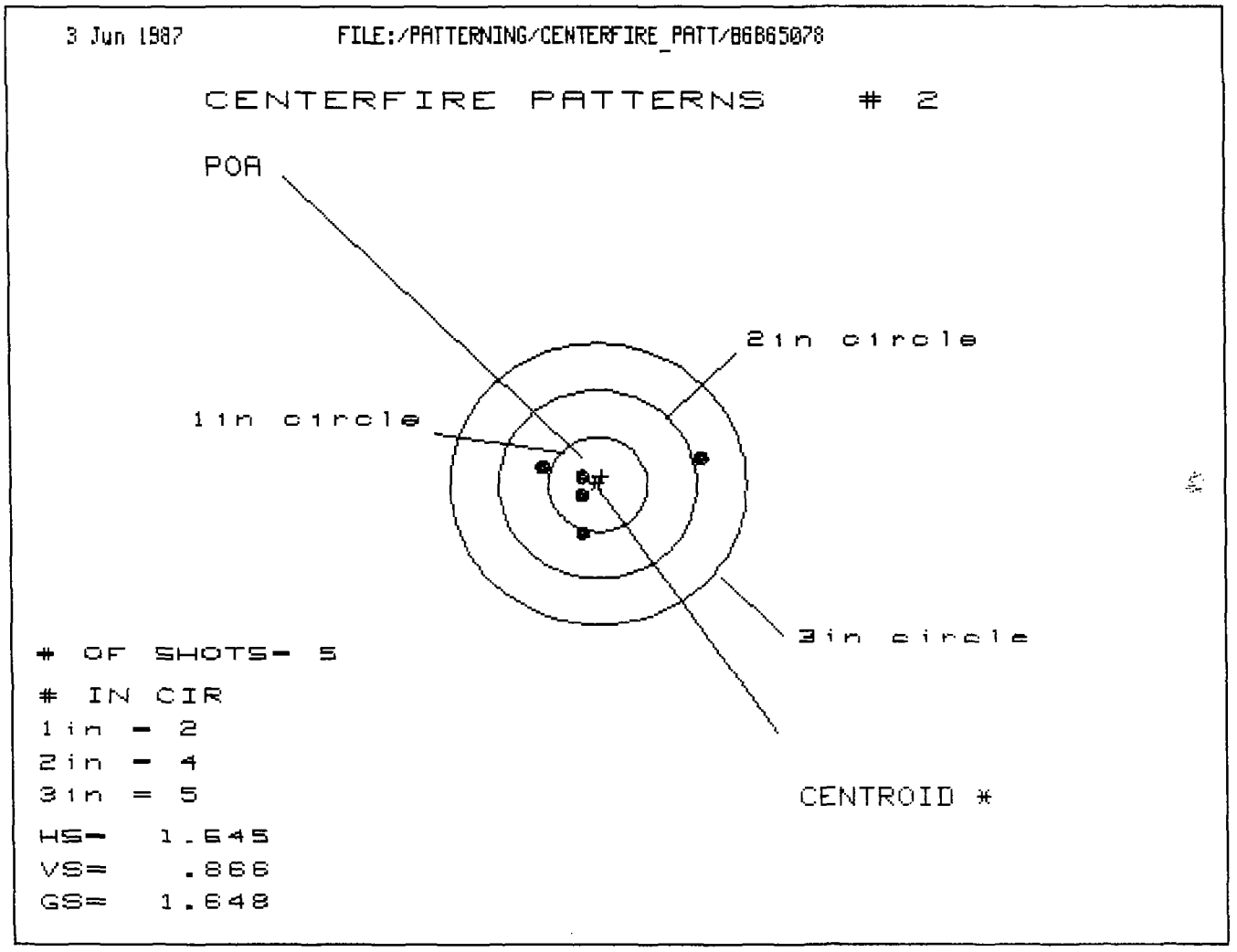
CENTERFIRE PATTERNS # 1



OF SHOTS= 5
IN CIR
1in = 2
2in = 5
3in = 5
HS= 1.098
VS= 1.286
GS= 1.435

Avg. 1.75"

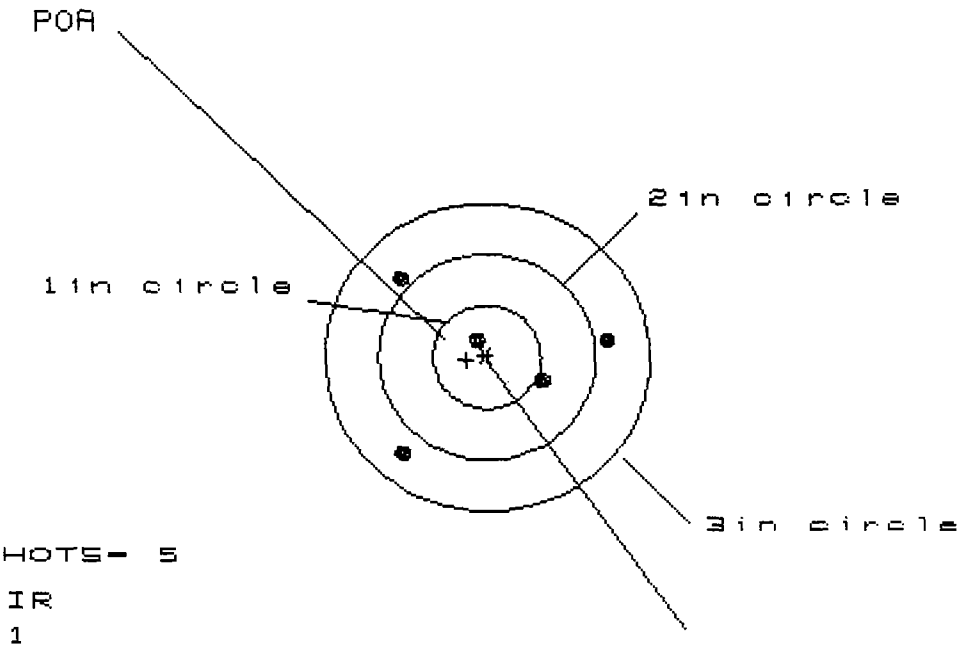
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SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.663	.561	.383
MINIMUM X :	-.435	-.536	-.248
MAXIMUM Y :	.716	.550	.420
MINIMUM Y :	-.570	-.392	-.226
CENTROID X :	-.069	.032	.211
CENTROID Y :	-.224	-.403	-.272
POA TO CENTROID in.:	.234	.404	.344
MIN RADIUS :	.276	.118	.336
MEAN RADIUS :	.584	.475	.402
MAX RADIUS :	.822	.664	.441
HORIZONTAL SPREAD :	1.098	1.098	.631
VERTICAL SPREAD :	1.286	.942	.646
EXTREME SPREAD :	1.435	1.146	.803
NUMBER IN ONE INCH CIRCLE =		2	
NUMBER IN TWO INCH CIRCLE =		5	
NUMBER IN THREE INCH CIRCLE =		5	



PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.060	.147	.040
MINIMUM X	:	-.585	-.320	-.029
MAXIMUM Y	:	.330	.311	.321
MINIMUM Y	:	-.536	-.453	-.349
CENTROID X	:	-.039	-.304	-.197
CENTROID Y	:	-.086	-.169	-.273
POA TO CENTROID in.	:	.095	.348	.336
MIN RADIUS	:	.197	.165	.049
MEAN RADIUS	:	.544	.327	.240
MAX RADIUS	:	1.110	.460	.351
HORIZONTAL SPREAD	:	1.645	.467	.069
VERTICAL SPREAD	:	.866	.764	.670
EXTREME SPREAD	:	1.648	.861	.670
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

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CENTERFIRE PATTERNS # 3



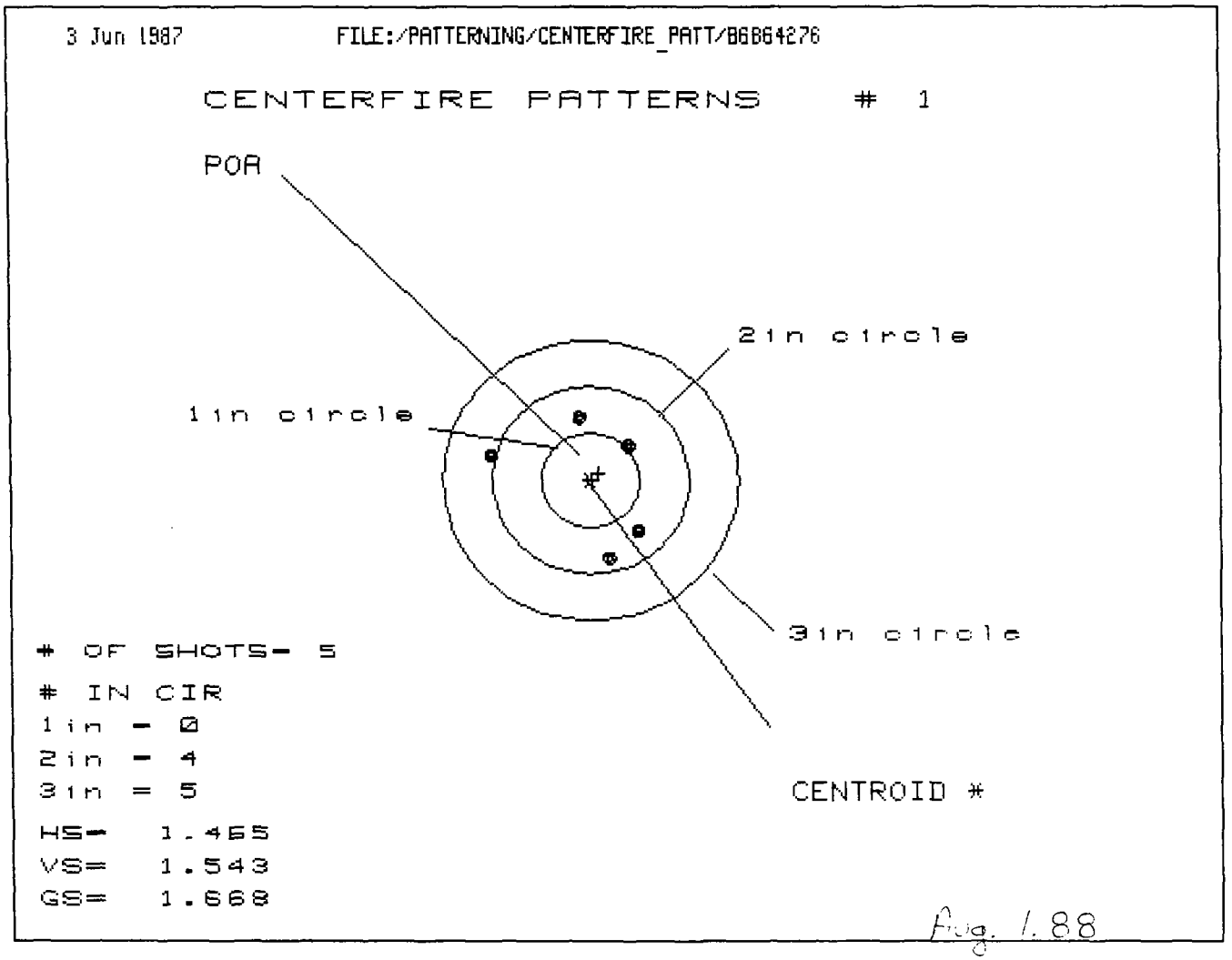
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IN CIR
1in = 1
2in = 2
3in = 5

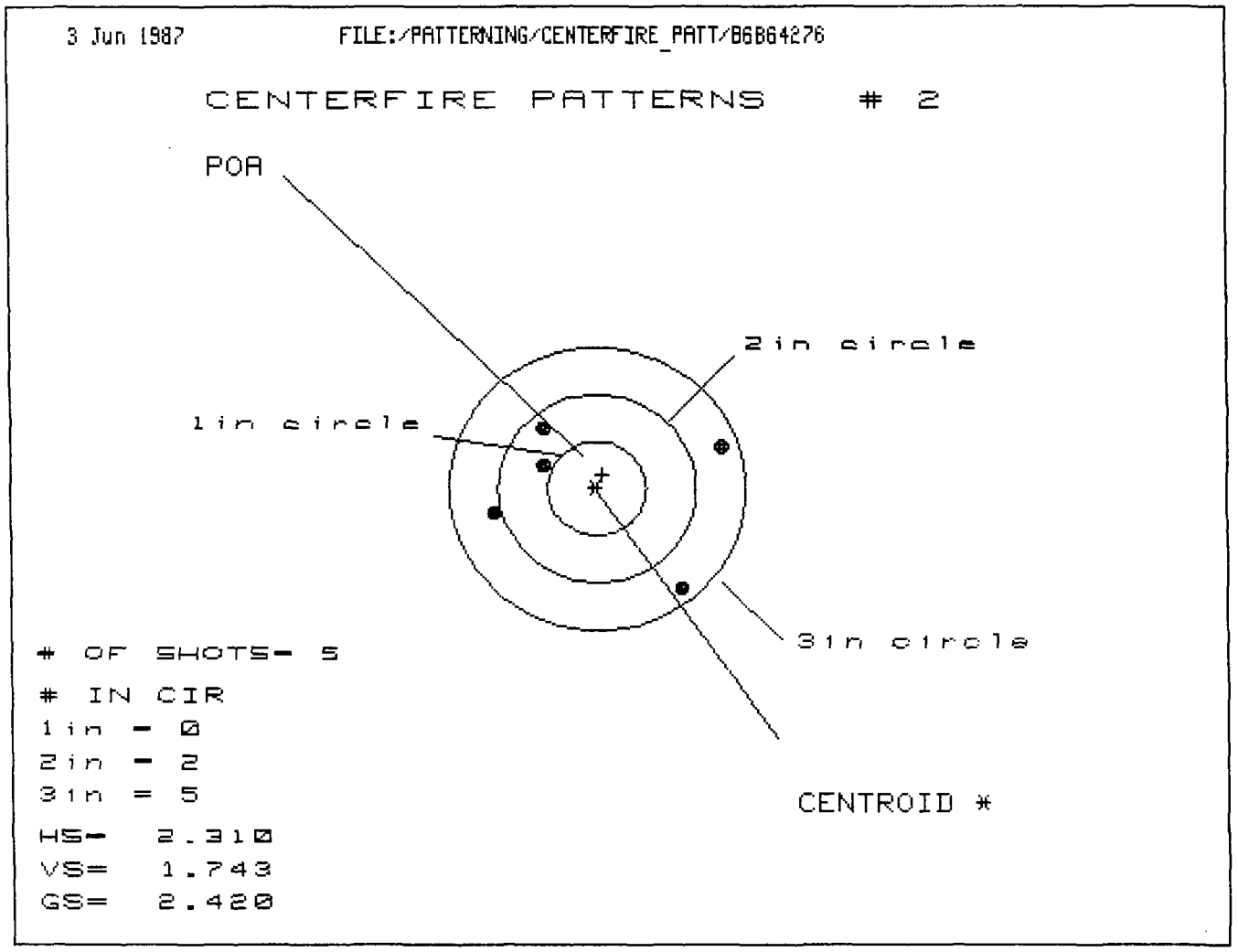
HS= 1.924
VS= 1.709
GS= 2.199

PATTERN # : 3

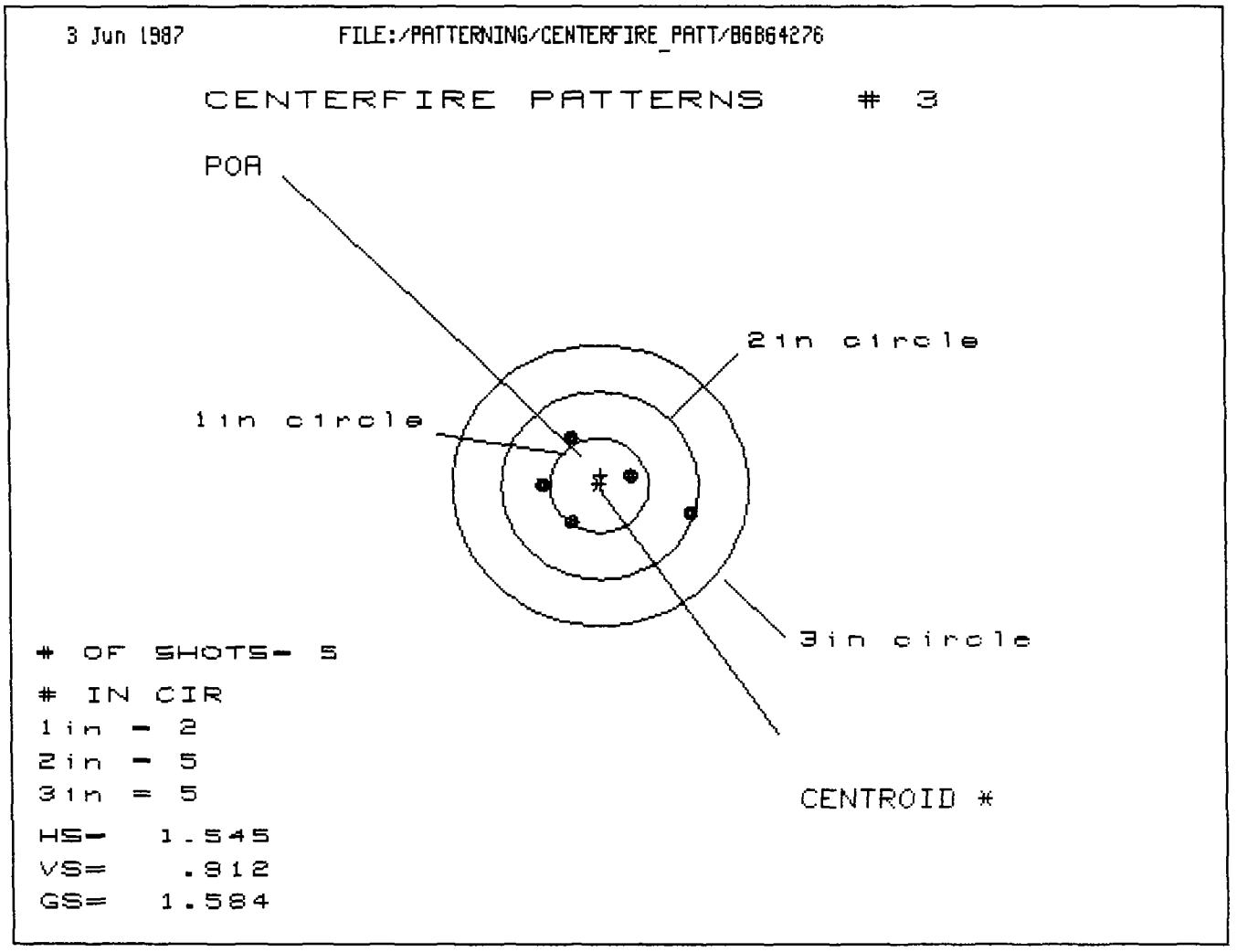
SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	1.146	.952	.595
MINIMUM X :	-.778	-.932	-.615
MAXIMUM Y :	.785	.554	.523
MINIMUM Y :	-.924	-.422	-.453
CENTROID X :	.187	.381	.064
CENTROID Y :	.027	.259	.289
POA TO CENTROID in.:	.189	.460	.296
MIN RADIUS :	.218	.301	.073
MEAN RADIUS :	.833	.712	.543
MAX RADIUS :	1.208	1.084	.807
HORIZONTAL SPREAD :	1.924	1.884	1.210
VERTICAL SPREAD :	1.709	.976	.976
EXTREME SPREAD :	2.199	1.991	1.555
NUMBER IN ONE INCH CIRCLE =		1	
NUMBER IN TWO INCH CIRCLE =		2	
NUMBER IN THREE INCH CIRCLE =		5	



PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.486	.241	.220
MINIMUM X	:	-.979	-.346	-.367
MAXIMUM Y	:	.696	.767	.509
MINIMUM Y	:	-.847	-.776	-.699
CENTROID X	:	-.087	.158	.179
CENTROID Y	:	-.069	-.140	.118
POA TO CENTROID in.	:	.111	.211	.214
MIN RADIUS	:	.559	.479	.240
MEAN RADIUS	:	.771	.650	.534
MAX RADIUS	:	1.020	.842	.733
HORIZONTAL SPREAD	:	1.465	.587	.587
VERTICAL SPREAD	:	1.543	1.543	1.208
EXTREME SPREAD	:	1.668	1.569	1.343
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5.	



PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.270	1.493	.188
MINIMUM X	:	-1.040	-.818	-.320
MAXIMUM Y	:	.654	.381	.447
MINIMUM Y	:	-1.089	-.526	-.460
CENTROID X	:	-.055	-.277	-.775
CENTROID Y	:	-.146	.127	.061
POA TO CENTROID in.	:	.156	.305	.777
MIN RADIUS	:	.576	.314	.188
MEAN RADIUS	:	1.057	.830	.405
MAX RADIUS	:	1.406	1.505	.561
HORIZONTAL SPREAD	:	2.310	2.310	.508
VERTICAL SPREAD	:	1.743	.907	.907
EXTREME SPREAD	:	2.420	2.420	1.013
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		2	
NUMBER IN THREE INCH CIRCLE	=		5	

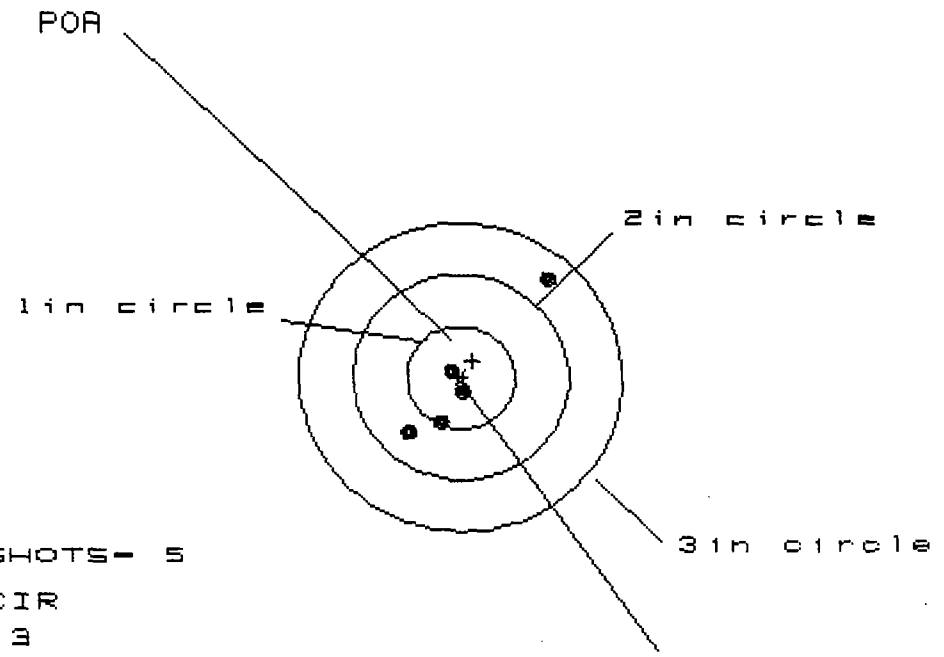


PATTERN # : 3

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.934	.556	.525
MINIMUM X :	-.611	-.378	-.409
MAXIMUM Y :	.536	.455	.211
MINIMUM Y :	-.376	-.457	-.306
CENTROID X :	-.014	-.247	-.216
CENTROID Y :	-.111	-.030	-.181
POA TO CENTROID in.:	.112	.249	.282
MIN RADIUS :	.353	.382	.327
MEAN RADIUS :	.615	.468	.438
MAX RADIUS :	.989	.560	.566
HORIZONTAL SPREAD :	1.545	.934	.934
VERTICAL SPREAD :	.912	.912	.517
EXTREME SPREAD :	1.584	.941	.941
NUMBER IN ONE INCH CIRCLE =		2	
NUMBER IN TWO INCH CIRCLE =		5	
NUMBER IN THREE INCH CIRCLE =		5	

3 Jun 1987 FILE:/PATTERNING/CENTERFIRE_PATT/86B628B9

CENTERFIRE PATTERNS # 1



OF SHOTS= 5

IN CIR
1in = 3
2in = 4
3in = 5

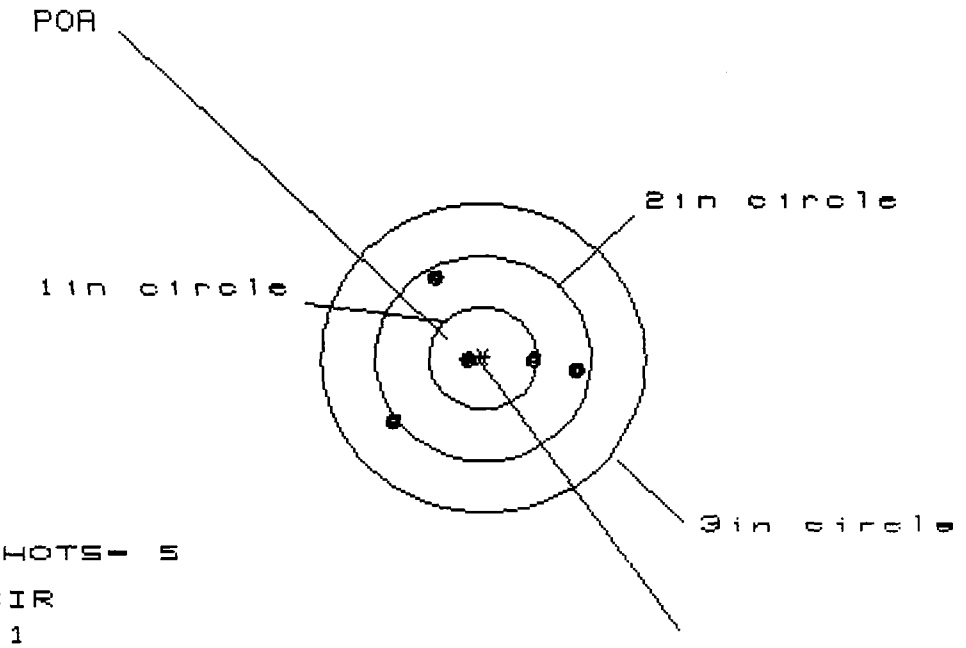
HS= 1.257
VS= 1.492
GS= 1.951

Avg. 2.06"

PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.789	.193	.103
MINIMUM X	:	-.468	-.270	-.115
MAXIMUM Y	:	.965	.315	.220
MINIMUM Y	:	-.527	-.285	-.237
CENTROID X	:	-.112	-.310	-.220
CENTROID Y	:	-.166	-.408	-.313
POA TO CENTROID in.	:	.201	.512	.382
MIN RADIUS	:	.120	.144	.104
MEAN RADIUS	:	.529	.273	.196
MAX RADIUS	:	1.247	.393	.264
HORIZONTAL SPREAD	:	1.257	.468	.218
VERTICAL SPREAD	:	1.492	.600	.457
EXTREME SPREAD	:	1.951	.706	.475
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

3 Jun 1987 FILE:/PATTERNING/CENTERFIRE_PATT/B6B628B9

CENTERFIRE PATTERNS # 2



OF SHOTS= 5

# IN CIR	
1in	= 1
2in	= 4
3in	= 5

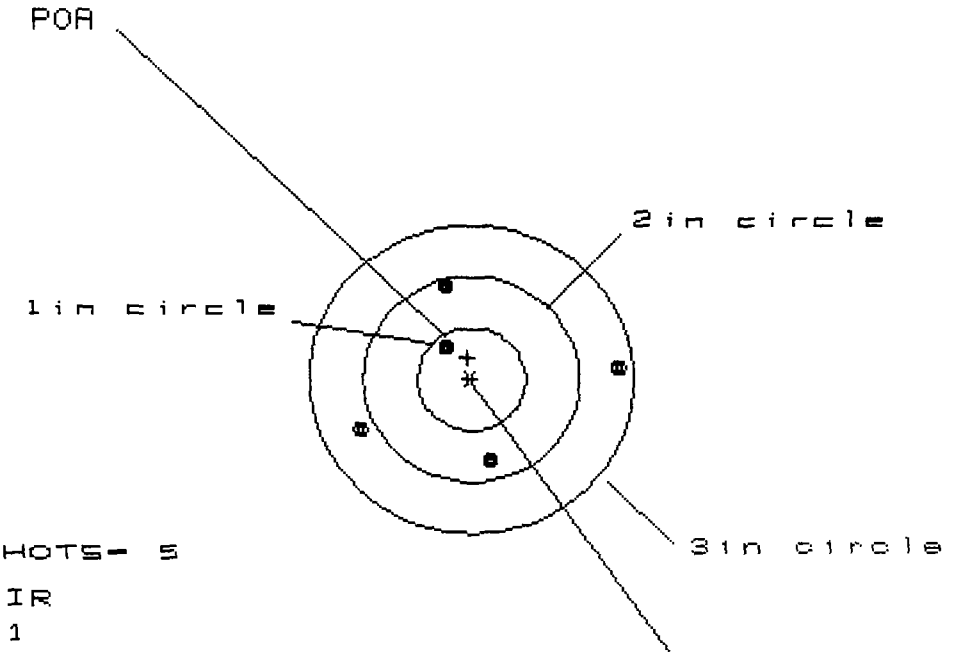
HS= 1.774
VS= 1.460
GS= 1.838

PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.902	.684	.520
MINIMUM X	:	-.872	-.612	-.384
MAXIMUM Y	:	.821	.661	.555
MINIMUM Y	:	-.639	-.318	-.288
CENTROID X	:	.133	.351	.123
CENTROID Y	:	.011	.171	.277
POA TO CENTROID in.	:	.134	.391	.303
MIN RADIUS	:	.147	.334	.318
MEAN RADIUS	:	.713	.599	.526
MAX RADIUS	:	1.081	.901	.675
HORIZONTAL SPREAD	:	1.774	1.296	.904
VERTICAL SPREAD	:	1.460	.979	.843
EXTREME SPREAD	:	1.838	1.624	1.223
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	



3 Jun 1987 FILE:/PATTERNING/CENTERFIRE_PATT/B6B62869

CENTERFIRE PATTERNS # 3



OF SHOTS= 5
IN CIR
1in = 1
2in = 3
3in = 5
HS= 2.341
VS= 1.732
GS= 2.422

PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.346	.476	.257
MINIMUM X	:	-.995	-.659	-.138
MAXIMUM Y	:	.918	.940	.769
MINIMUM Y	:	-.814	-.792	-.963
CENTROID X	:	.033	-.303	-.084
CENTROID Y	:	-.211	-.233	-.062
POA TO CENTROID in.	:	.214	.382	.104
MIN RADIUS	:	.427	.373	.238
MEAN RADIUS	:	.936	.769	.671
MAX RADIUS	:	1.349	.945	.996
HORIZONTAL SPREAD	:	2.341	1.135	.395
VERTICAL SPREAD	:	1.732	1.732	1.732
EXTREME SPREAD	:	2.422	1.772	1.772
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5.	

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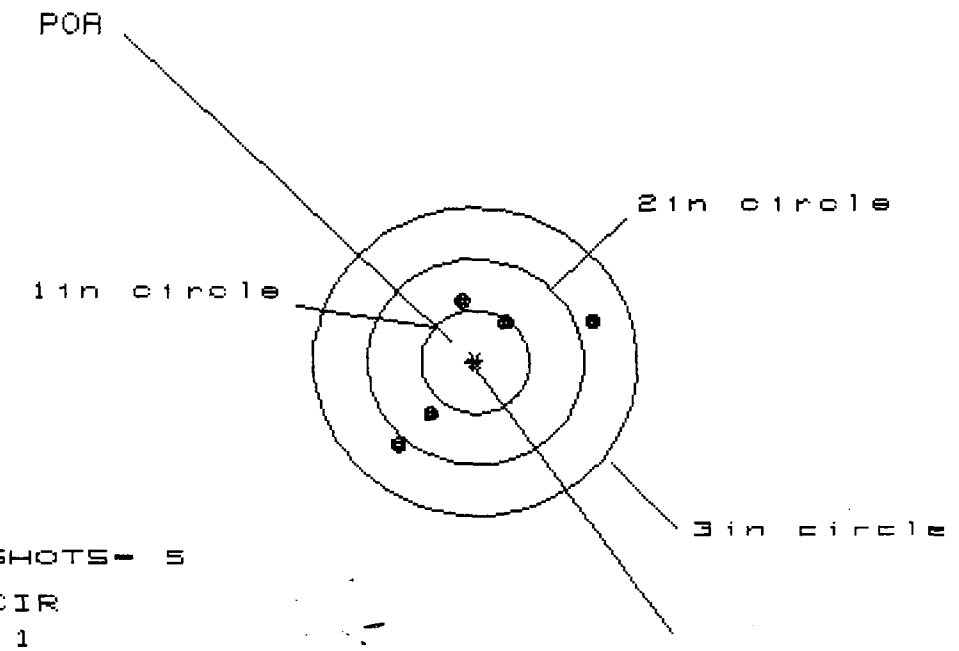
- 150 5.- 5,-

E23F 86007


Remington

3 Jun 1987 FILE:/PATTERNING/CENTERFIRE_PATT/B6B65545

CENTERFIRE PATTERNS # 1



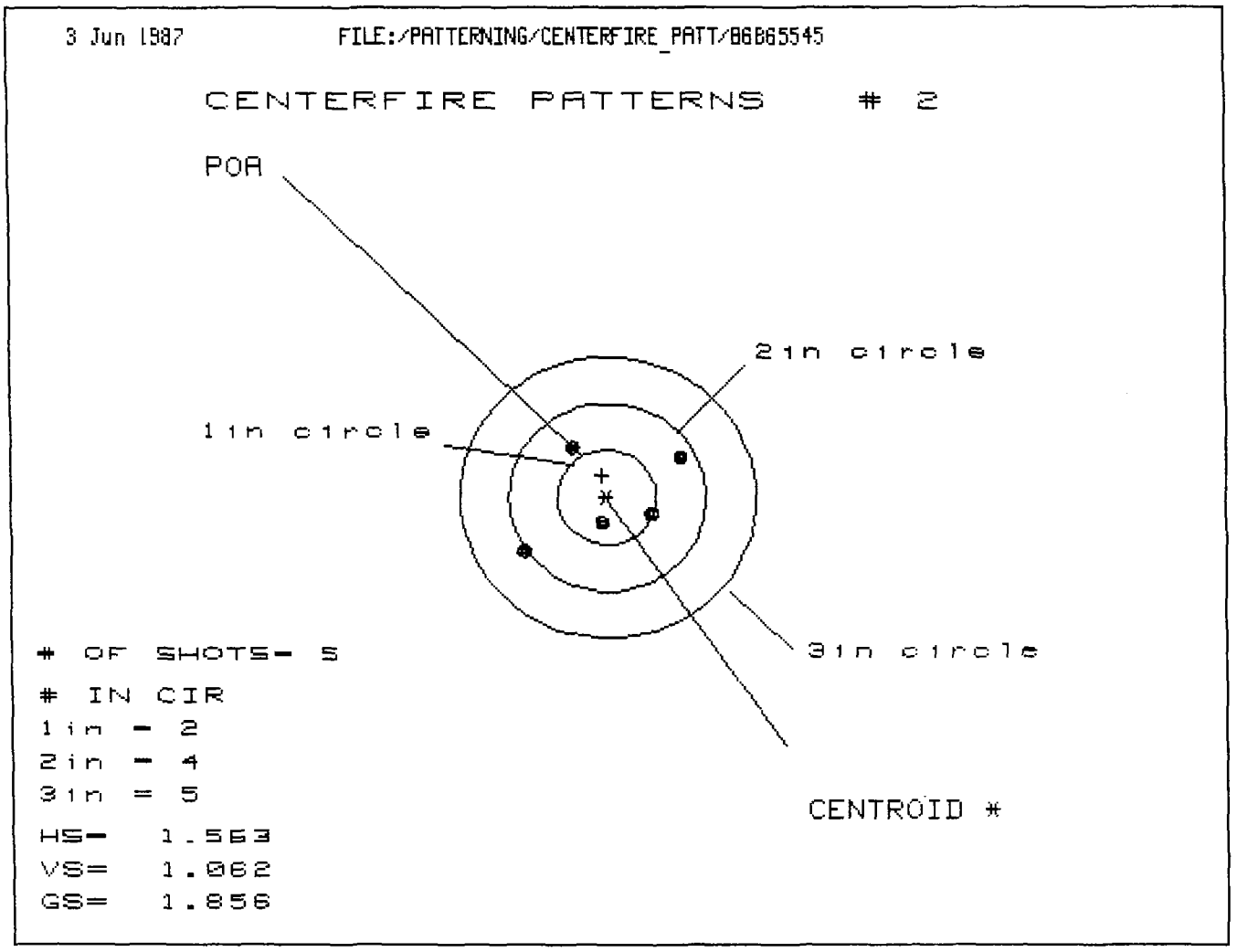
OF SHOTS= 5

IN CIR
1in = 1
2in = 3
3in = 5

HS= 1.809
VS= 1.445
GS= 2.169

Aug. 1.9

PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.046	.856	.379
MINIMUM X	:	-.763	-.591	-.306
MAXIMUM Y	:	.624	.419	.475
MINIMUM Y	:	-.821	-.753	-.697
CENTROID X	:	.021	.211	-.074
CENTROID Y	:	.006	.211	.155
POA TO CENTROID in.	:	.021	.299	.171
MIN RADIUS	:	.467	.190	.439
MEAN RADIUS	:	.805	.643	.560
MAX RADIUS	:	1.121	.958	.761
HORIZONTAL SPREAD	:	1.809	1.447	.685
VERTICAL SPREAD	:	1.445	1.172	1.172
EXTREME SPREAD	:	2.169	1.716	1.195
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	



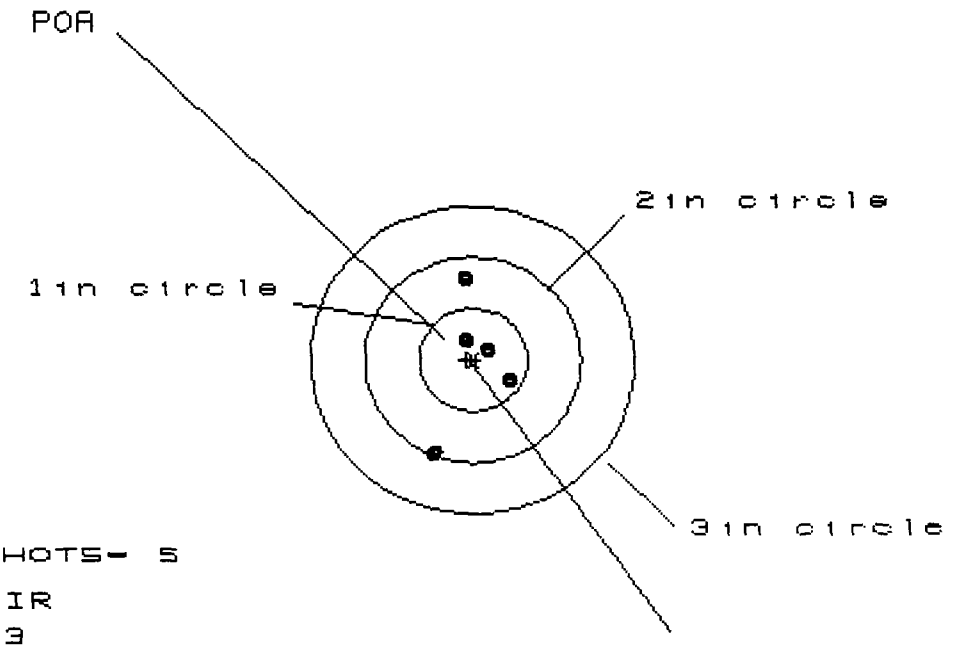
PATTERN # : 2

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.715	.503	.423
MINIMUM X :	-.848	-.535	-.368
MAXIMUM Y :	.520	.384	.492
MINIMUM Y :	-.542	-.410	-.302
CENTROID X :	.051	.263	.096
CENTROID Y :	-.230	-.094	-.202
POA TO CENTROID in.:	.235	.280	.224
MIN RADIUS :	.274	.392	.307
MEAN RADIUS :	.648	.529	.462
MAX RADIUS :	1.007	.659	.614
HORIZONTAL SPREAD :	1.563	1.038	.791
VERTICAL SPREAD :	1.062	.794	.794
EXTREME SPREAD :	1.856	1.044	1.044

NUMBER IN ONE INCH CIRCLE = 2
NUMBER IN TWO INCH CIRCLE = 4
NUMBER IN THREE INCH CIRCLE = 5.

3 Jun 1987 FILE:/PATTERNING/CENTERFIRE_PATT/86865545

CENTERFIRE PATTERNS # 3



OF SHOTS= 5

IN CIR
1in = 3
2in = 5
3in = 5

HS= .737
VS= 1.714
GS= 1.750

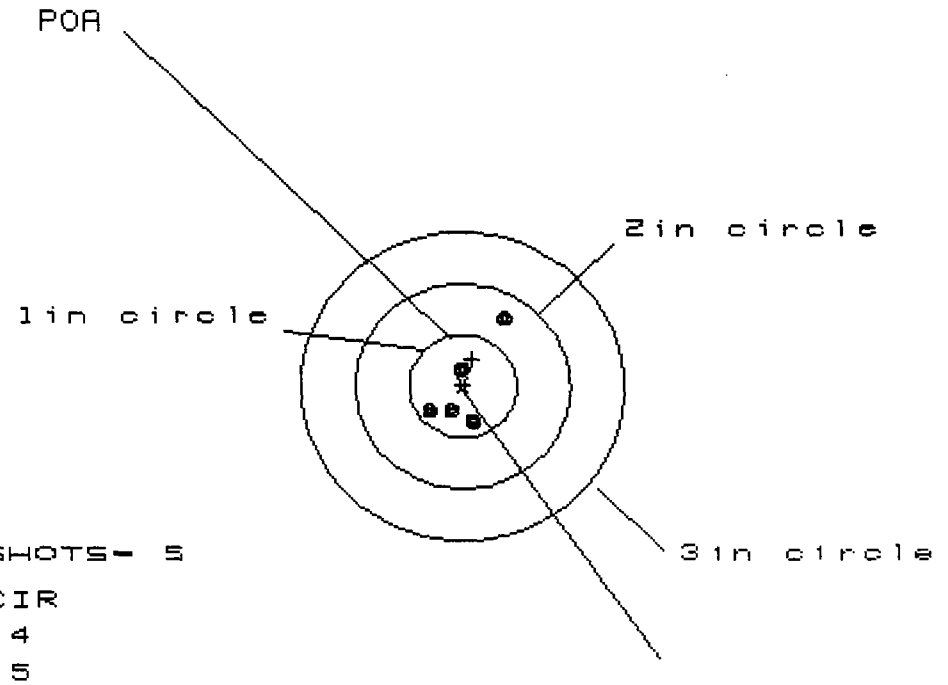
PATTERN # : 3

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.353	.257	.215
MINIMUM X :	-.384	-.127	-.169
MAXIMUM Y :	.822	.598	.161
MINIMUM Y :	-.892	-.391	-.191
CENTROID X :	.062	.158	.200
CENTROID Y :	.001	.225	.025
POA TO CENTROID in.:	.062	.274	.202
MIN RADIUS :	.107	.132	.055
MEAN RADIUS :	.496	.345	.192
MAX RADIUS :	.971	.612	.288
HORIZONTAL SPREAD :	.737	.384	.384
VERTICAL SPREAD :	1.714	.989	.352
EXTREME SPREAD :	1.750	1.061	.521

NUMBER IN ONE INCH CIRCLE = 3
NUMBER IN TWO INCH CIRCLE = 5
NUMBER IN THREE INCH CIRCLE = 5

3 Jun 1987 FILE:/PATTERNING/CENTERFIRE_PATT/422318

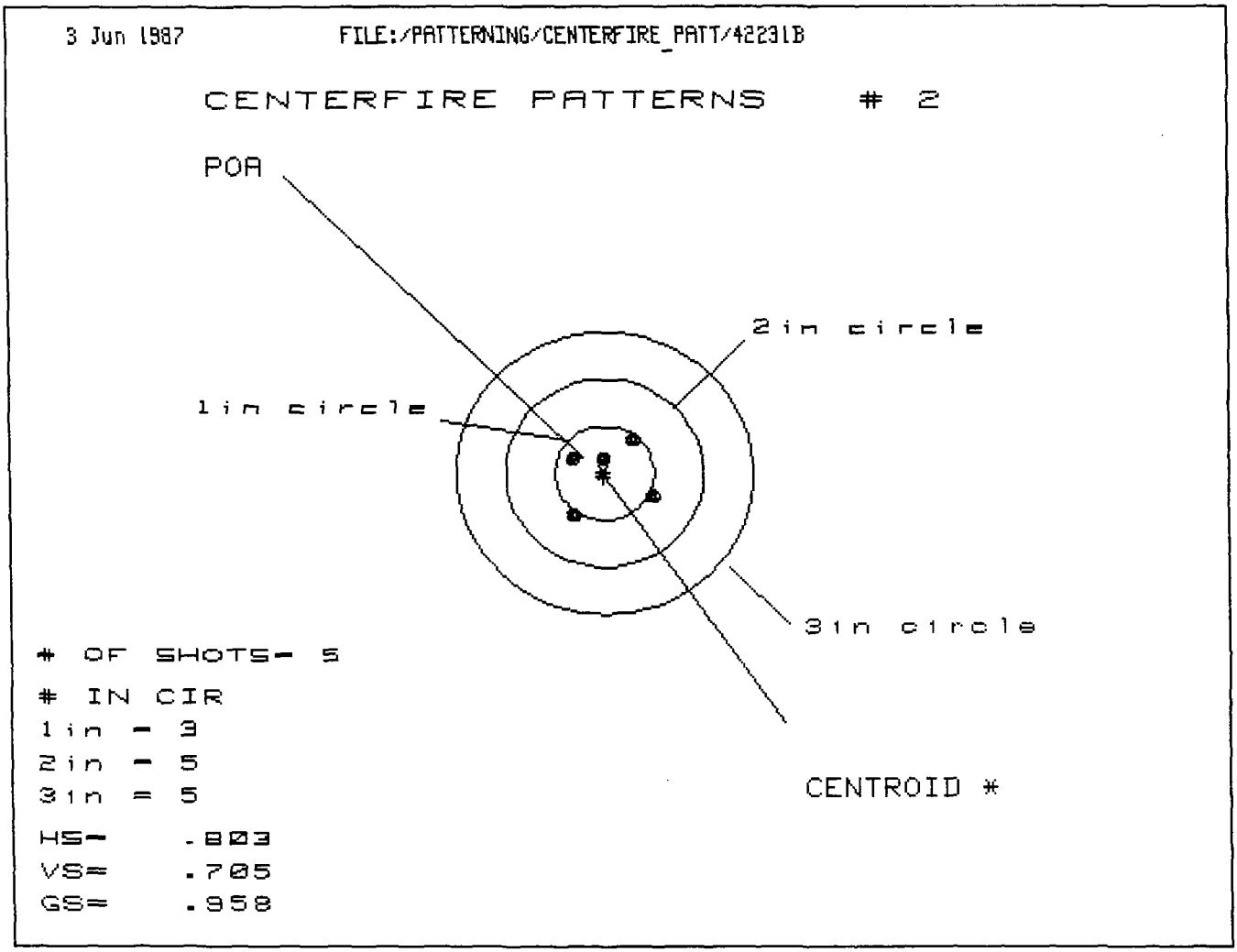
CENTERFIRE PATTERNS # 1



OF SHOTS= 5
IN CIR
1in = 4
2in = 5
3in = 5
HS= .668
VS= .999
GS= 1.082

Aug. 1.0

PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.379	.138	.073
MINIMUM X	:	-.289	-.195	-.120
MAXIMUM Y	:	.660	.280	.271
MINIMUM Y	:	-.339	-.174	-.183
CENTROID X	:	-.092	-.186	-.121
CENTROID Y	:	-.263	-.428	-.419
POA TO CENTROID in.	:	.278	.467	.437
MIN RADIUS	:	.116	.097	.149
MEAN RADIUS	:	.371	.204	.207
MAX RADIUS	:	.761	.301	.275
HORIZONTAL SPREAD	:	.668	.333	.193
VERTICAL SPREAD	:	.999	.454	.454
EXTREME SPREAD	:	1.082	.455	.455
NUMBER IN ONE INCH CIRCLE	=		4	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

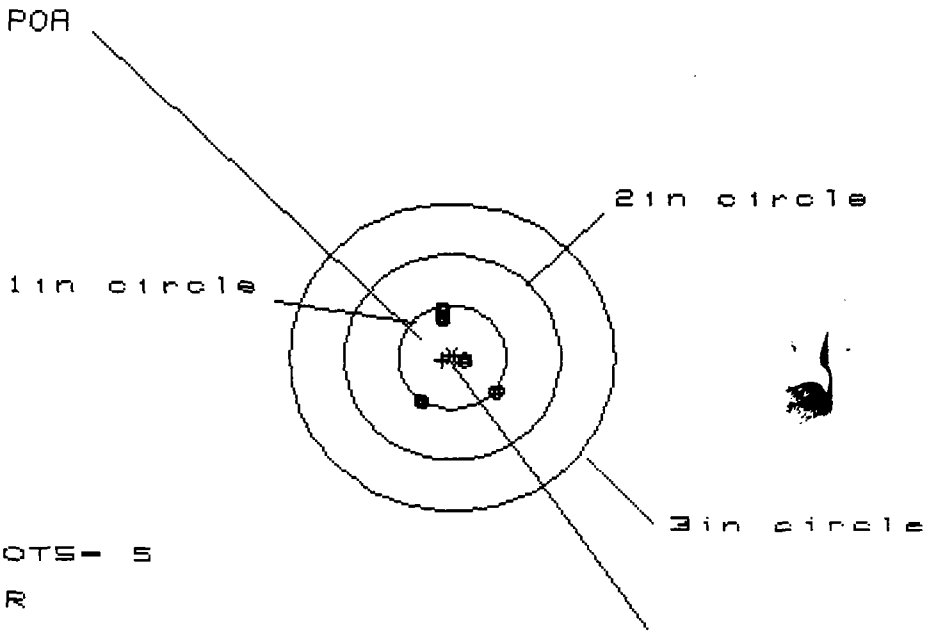


PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.448	.359	.326
MINIMUM X	:	-.355	-.444	-.324
MAXIMUM Y	:	.311	.213	.101
MINIMUM Y	:	-.394	-.337	-.097
CENTROID X	:	.012	.101	-.019
CENTROID Y	:	.041	.139	.251
POA TO CENTROID in.	:	.042	.172	.252
MIN RADIUS	:	.118	.123	.097
MEAN RADIUS	:	.399	.342	.254
MAX RADIUS	:	.530	.493	.341
HORIZONTAL SPREAD	:	.803	.803	.650
VERTICAL SPREAD	:	.705	.550	.198
EXTREME SPREAD	:	.958	.919	.658
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

3 Jun 1987 FILE:/PATTERNING/CENTERFIRE_PATT/42231B

CENTERFIRE PATTERNS # 3



OF SHOTS= 5

IN CIR
1in = 3
2in = 5
3in = 5

HS= .717
VS= .912
GS= .965

PATTERN # : 3

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.410	.333	.124
MINIMUM X :	-.307	-.206	-.095
MAXIMUM Y :	.460	.347	.195
MINIMUM Y :	-.452	-.455	-.279
CENTROID X :	.089	.166	.055
CENTROID Y :	.027	.140	.292
POA TO CENTROID in.:	.093	.217	.297
MIN RADIUS :	.091	.128	.089
MEAN RADIUS :	.401	.342	.204
MAX RADIUS :	.547	.563	.305
HORIZONTAL SPREAD :	.717	.539	.219
VERTICAL SPREAD :	.912	.801	.474
EXTREME SPREAD :	.965	.965	.522

NUMBER IN ONE INCH CIRCLE = 3
NUMBER IN TWO INCH CIRCLE = 5
NUMBER IN THREE INCH CIRCLE = 5

700 CLASSIC 350 REM MAG
VISO AL 4 ACCURACY
MARCH 14, 1985

850745

RD-69-B

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington DUPONT PETERS DUPONT

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"

cc: W.H. Coleman, II
J.W. Bower
K.W. Soucy
G.J. Hill
D.J. Anderson
L.B. Bosquet
J.R. Snedeker
D.S. Findlay
R.E. Nightingale
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 850745
MARCH 14,1985

MODEL 700 CLASSIC 350 REM MAG VISUAL INSPECTION

REPORT# 850745

WORK ORDER# G-0460-000
DATE: MARCH 14, 1985

TO: R.E. NIGHTINGALE

FROM: F.L. SUPRY

TITLE: VISUAL INSPECTION: MODEL 700 CLASSIC 350 REM MAG

ABSTRACT:

On March 13, 1985 a request was received to conduct a Visual Inspection evaluation on the Model 700 Classic rifle, chambered in the 350 Rem Mag caliber. Ten (10) rifles were randomly selected from the warehouse.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

The ten (10) rifle Visual Inspection was found to be unacceptable, due to the following:

A. Rifle #B6680586:

a. When the bolt was removed from the receiver, it could not be reassembled, due to a cross pin protruding from the bolt head.

B. Rifle #B6680598:

a. The underside of the stock, just ahead of the floor plate assembly, was cracked.

COMMENTS:

G.J. Hill took rifle #B6680586 to production, for further examination. All ten (10) rifles were returned to G.J. Hill. Upon the completion of a new sample, another Visual Inspection will be conducted.

700 350 Classic

B 6680611 - light stain around grip, safety selector hitting stock
Bad magnaflux stamp

B 6680598 - slight open grain, dirt under finish, swivel
could be tightened down - cracked stock
safety hits stock

B 6680596 - Dent top left rail, slight open grain right side

B 6680586 - Hard action, pin on bolt hits receiver
removing bolt, if could not be reassembled

B 6680945 - damaged grip checkering left side

- REJECT

RD 6606 cc: S. Darling

TO: J. ROGERTS

ILION RESEARCH DIVISION

FIREARMS WITHDRAWAL ~~OR RETURN~~

DATE 3/8/85

LETTER NO. 2156

QUANTITY 10

MODEL 700 CAL/GA. 350 Mag. WORK ORDER G-0460

SERIAL NOS.

RAMAC #5756		
B 6680611	B 6678813	
B 6680598	B 6680572	
B 6680596	B 6680160	
B 6680586	B 6680891	
B 6680945	B 6681154	

REMARKS: Visual Inspection and accuracy tests will be conducted. Rifles will be returned to production.

Approved

FSupry:js

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

RD 6606

cc: S. Darling

TO: D. SANITA

ILION RESEARCH DIVISION

FIREARMS ~~WITHDRAWAL OR~~ RETURN

DATE ~~3/15/85~~

LETTER NO. 2160

QUANTITY ~~10~~

MODEL ~~700~~ CAL/GA. ~~350 Mag.~~ WORK ORDER ~~G-0460~~

SERIAL NOS.

~~B6680611~~	~~B6678813~~	
B6680598	B6680572	
B6680596	B6680160	
~~B6680586~~	~~B6680891~~	
B6680945	B6681154	

REMARKS:

Guns withdrawn on Letter #2156

Approved

FSupry:js

T&P 700 FS GRAY CAMO .308 WIN

VISUAL & ACCURACY

SOW# 81389-914

8/11/12

RD-69-B

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington DUPONT PETERS DUPONT

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"_____

xc: W.H. Coleman, II/File
K.W. Soucy
G.J. Hill
J.R. Snedeker
J.F. Matousek, Jr
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 871112
APRIL 29, 1987

MODEL 700 FS TRIAL AND PILOT EVALUATION

308 WIN CALIBER

MODEL 700 FS 308 WIN CALIBER - TRIAL AND PILOT EVALUATION

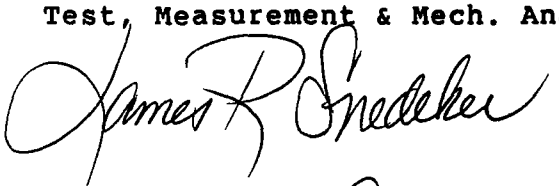
ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700 FS 308 win caliber rifles to be acceptable. The Trial and Pilot Evaluation consisted of Visual Inspection, Accuracy, and Function. The eight rifle sample (four rifles with gray stocks and four rifles with camo stocks) was found to be within Remington specifications for each phase of the Trial and Pilot Evaluation.

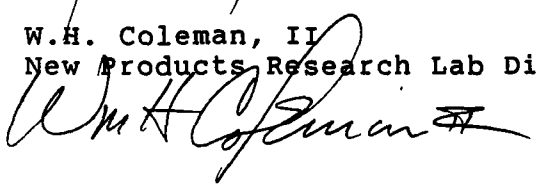
Prepared by: F.L. Supry
Date prepared: 29 April 1987

proofread and cleared by:

J.R. Snedeker, Research Supervisor
Test, Measurement & Mech. Analysis Lab



W.H. Coleman, II
New Products Research Lab Director



REPORT# 871112 WORK ORDER# 81389-914

To: J.R. Snedeker

From: F.L. Supry

MODEL 700 FS 308 WIN CALIBER - TRIAL AND PILOT EVALUATION

INTRODUCTION:

On April 21, 1987 a request was received to conduct a Visual, Accuracy, and Function Evaluation of the Model 700 FS 308 Win caliber, Trial and Pilot rifles. Eight rifles, four of each stock option, were randomly selected from production.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

The eight rifle Trial and Pilot Evaluation was found to be acceptable. The following results were obtained:

A. VISUAL:

a. The overall appearance of the rifles was good.

B. ACCURACY: (Average group size)

a. 308 Win (Gray) = 1.857 inches.
b. 308 Win (Camo) = 1.832 inches.

C. FUNCTION:

a. No malfunctions occurred.

REPORT# 871112 WORK ORDER# 81389-914

TEST REPORT:

1. VISUAL:

A. The visual inspection committee felt that the following three items need to be checked more thoroughly:

a. "F" stamp upsetting the receiver, near the bolt handle slot.

b. The Proof Stamp was light.

c. The swivels were off center.

B. Data sheets containing the comments on each rifle inspected is included in the appendix of this report.

2. ACCURACY:

A. The Remington Specification for group size is as follows:

a. 308 Win caliber: 3.5 inches, center to center.

B. Two rifles of each stock option were tested for 100 yard accuracy and the following results were obtained.

	GROUP			AVG
Gray Stock	1	2	3	
Rifle# B6848853 -	1.738	1.409	1.444	1.530
Rifle# B6848285 -	2.542	2.382	1.626	2.183

OVERALL GROUP SIZE AVERAGE = 1.857 INCHES

Camo Stock

Rifle# B6849758 -	1.813	1.606	2.421	1.947
Rifle# B6848296 -	1.359	1.804	1.986	1.716

OVERALL GROUP SIZE AVERAGE = 1.832

3. FUNCTION:

A. The rifles were subjected to a 30 round per rifle, function test and the following results were obtained:

a. No malfunctions occurred.

REPORT# 871112 WORK ORDER# 81389-914

TEST PROCEDURE:

1. VISUAL:

A. The visual inspection committee consisted of G. Hill, G. Barnes, P. Johnson, R. Long (P.E. & C.); R. Howe, and F. Supry (R. & D.).

B. All four rifles of each stock option were used in the visual inspection. The rifles were as follows:

a. Gray Stock:
B6848853 B6848285 B6849351 B6849316

b. Camo Stock:
B6849330 B6849758 B6848296 B6849254

C. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the visual inspection committee. All comments were recorded, an are included in the appendix of this report.

2. ACCURACY:

A. The following rifles were used in the 100 yard accuracy test:

a. Gray Stock:
B6848285 B6848853

b. Camo Stock:
B6848296 B6849758

B. The accuracy was shot by C. Stephens, at the R&D 100 yard range located in building 52-1.

C. Leupold base and rings were used in conjunction with a Redfield 12X (4-plex) scope.

D. Remington ammunition; index R308W3, code C13TC6305 was used for the 100 yard accuracy test.

E. Before shooting the accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

F. A total of three, five shot groups were shot with each rifle. The rifles were cooled between each group, and one "warmer" shot was fired before the next group was shot.

G. The targets were analyzed for group size and the averages calculated, using the HP 9000 computer and digitizing tablet.

REPORT# 871112 WORK ORDER# 81389-914

TEST PROCEDURE: (continued)

3. FUNCTION:

A. All four rifles of each stock option were used in the function test. The rifles were as follows:

a. Gray Stock:
B6848853 B6848285 B6849351 B6849316

b. Camo Stock:
B6849330 B6849758 B6848296 B6849254

B. Each of the rifles was subjected to the loading and firing of 30 rounds of Remington 308 Win caliber ammunition (15 rounds of 55 grain and 15 rounds of 180 grain). Fifteen rounds were fired; 5 at a slow feeding cycle speed, 5 at a medium feeding cycle speed, and 5 at a fast feeding cycle speed. The rifles were allowed to cool, and then the procedure was repeated with the remaining ammunition type.

C. The following ammunition was used in the function test:

a. R308W5 - 55 grain Win accelerator.
b. R308W2 - 180 grain soft point.

REPORT# 871112 WORK ORDER# 81389-914

APPENDIX

REPORT# 871112 WORK ORDER# 81389-914

VISUAL INSPECTION MODEL 700 FS 308 WIN CALIBERS

Gray Stock:

SERIAL NUMBER	COMMENTS
B6848853	MISMATCH ON THE TRIGGER GUARD. POOR COLOR ON THE BOLT. LIGHT PROOF MARK.
B6848285	POOR COLOR ON THE BOLT. LIGHT PROOF MARK.
B6849351	LIGHT PROOF MARK. GOUGE IN THE SAFETY SLOT.
B6849316	MAR ON THE TRIGGER GUARD. LIGHT PROOF MARK.

Camo Stock:

B6849330	SLIGHT BLEMISH OVER SERIAL NUMBER. LIGHT PROOF MARK. REAR SWIVEL OFF CENTER. BRIGHT MAR ON THE BOLT PLUG.
B6849758	LIGHT PROOF MARK. REAR SWIVEL OFF CENTER. BRIGHT MAR ON THE BOLT PLUG.
B6848296	LIGHT PROOF MARK. BRIGHT MAR ON THE BOLT PLUG.
B6849254	LIGHT PROOF MARK. BRIGHT MAR ON THE BOLT PLUG.

GENERAL COMMENTS:

THE BRIGHT MAR ON THE BOLT PLUGS WAS CAUSED BY THE "F" STAMP ON THE RECEIVER BEING STAMPED CLOSE TO THE EDGE, UPSETTING THE SLOT.

THE STYLE OF BARREL FINISH CONTRIBUTES TO THE PROOF MARK BEING LIGHT.

THE SWIVELS ARE PUT IN SLIGHTLY OFF CENTER BY THE VENDOR.

RD-69-B

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington DUPONT PETERS DUPONT

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"_____

xc: W.H. Coleman, II/File
K.W. Soucy
G.J. Hill
J.R. Snedeker
J.F. Matousek, Jr
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 871112
APRIL 29, 1987

MODEL 700 FS TRIAL AND PILOT EVALUATION

308 WIN CALIBER

MODEL 700 FS 308 WIN CALIBER - TRIAL AND PILOT EVALUATION

ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700 FS 308 win caliber rifles to be acceptable. The Trial and Pilot Evaluation consisted of Visual Inspection, Accuracy, and Function. The eight rifle sample (four rifles with gray stocks and four rifles with camo stocks) was found to be within Remington specifications for each phase of the Trial and Pilot Evaluation.

Prepared by: F.L. Supry
Date prepared: 29 April 1987

proofread and cleared by:

J.R. Snedeker, Research Supervisor
Test, Measurement & Mech. Analysis Lab

W.H. Coleman, II
New Products Research Lab Director

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

REPORT# 871112 WORK ORDER# 81389-914

To: J.R. Snedeker

From: F.L. Supry

MODEL 700 FS 308 WIN CALIBER - TRIAL AND PILOT EVALUATION

INTRODUCTION:

On April 21, 1987 a request was received to conduct a Visual, Accuracy, and Function Evaluation of the Model 700 FS 308 Win caliber, Trial and Pilot rifles. Eight rifles, four of each stock option, were randomly selected from production.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

The eight rifle Trial and Pilot Evaluation was found to be acceptable. The following results were obtained:

A. VISUAL:

a. The overall appearance of the rifles was good.

B. ACCURACY: (Average group size)

a. 308 Win (Gray) = 1.857 inches.
b. 308 Win (Camo) = 1.832 inches.

C. FUNCTION:

a. No malfunctions occurred.

REPORT# 871112 WORK ORDER# 81389-914

TEST REPORT:

1. VISUAL:

A. The visual inspection committee felt that the following three items need to be checked more thoroughly:

a. "F" stamp upsetting the receiver, near the bolt handle slot.

b. The Proof Stamp was light.

c. The swivels were off center.

B. Data sheets containing the comments on each rifle inspected is included in the appendix of this report.

2. ACCURACY:

A. The Remington Specification for group size is as follows:

a. 308 Win caliber: 3.5 inches, center to center.

B. Two rifles of each stock option were tested for 100 yard accuracy and the following results were obtained.

	GROUP			AVG
Gray Stock	1	2	3	
Rifle# B6848853 -	1.738	1.409	1.444	1.530
Rifle# B6848285 -	2.542	2.382	1.626	2.183

OVERALL GROUP SIZE AVERAGE = 1.857 INCHES

Camo Stock

Rifle# B6849758 -	1.813	1.606	2.421	1.947
Rifle# B6848296 -	1.359	1.804	1.986	1.716

OVERALL GROUP SIZE AVERAGE = 1.832

3. FUNCTION:

A. The rifles were subjected to a 30 round per rifle, function test and the following results were obtained:

a. No malfunctions occurred.

REPORT# 871112 WORK ORDER# 81389-914

TEST PROCEDURE:

1. VISUAL:

A. The visual inspection committee consisted of G. Hill, G. Barnes, P. Johnson, R. Long (P.E. & C.); R. Howe, and F. Supry (R. & D.).

B. All four rifles of each stock option were used in the visual inspection. The rifles were as follows:

a. Gray Stock:
B6848853 B6848285 B6849351 B6849316

b. Camo Stock:
B6849330 B6849758 B6848296 B6849254

C. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the visual inspection committee. All comments were recorded, an are included in the appendix of this report.

2. ACCURACY:

A. The following rifles were used in the 100 yard accuracy test:

a. Gray Stock:
B6848285 B6848853

b. Camo Stock:
B6848296 B6849758

B. The accuracy was shot by C. Stephens, at the R&D 100 yard range located in building 52-1.

C. Leupold base and rings were used in conjunction with a Redfield 12X (4-plex) scope.

D. Remington ammunition; index R308W3, code C13TC6305 was used for the 100 yard accuracy test.

E. Before shooting the accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

F. A total of three, five shot groups were shot with each rifle. The rifles were cooled between each group, and one "warmer" shot was fired before the next group was shot.

G. The targets were analyzed for group size and the averages calculated, using the HP 9000 computer and digitizing tablet.

REPORT# 871112 WORK ORDER# 81389-914

TEST PROCEDURE: (continued)

3. FUNCTION:

A. All four rifles of each stock option were used in the function test. The rifles were as follows:

a. Gray Stock:
B6848853 B6848285 B6849351 B6849316

b. Camo Stock:
B6849330 B6849758 B6848296 B6849254

B. Each of the rifles was subjected to the loading and firing of 30 rounds of Remington 308 Win caliber ammunition (15 rounds of 55 grain and 15 rounds of 180 grain). Fifteen rounds were fired; 5 at a slow feeding cycle speed, 5 at a medium feeding cycle speed, and 5 at a fast feeding cycle speed. The rifles were allowed to cool, and then the procedure was repeated with the remaining ammunition type.

C. The following ammunition was used in the function test:

a. R308W5 - 55 grain Win accelerator.
b. R308W2 - 180 grain soft point.

REPORT# 871112 WORK ORDER# 81389-914

APPENDIX

REPORT# 871112 WORK ORDER# 81389-914

VISUAL INSPECTION MODEL 700 FS 308 WIN CALIBERS

Gray Stock:

SERIAL NUMBER	COMMENTS
B6848853	MISMATCH ON THE TRIGGER GUARD. POOR COLOR ON THE BOLT. LIGHT PROOF MARK.
B6848285	POOR COLOR ON THE BOLT. LIGHT PROOF MARK.
B6849351	LIGHT PROOF MARK. GOUGE IN THE SAFETY SLOT.
B6849316	MAR ON THE TRIGGER GUARD. LIGHT PROOF MARK.

Camo Stock:

B6849330	SLIGHT BLEMISH OVER SERIAL NUMBER. LIGHT PROOF MARK. REAR SWIVEL OFF CENTER. BRIGHT MAR ON THE BOLT PLUG.
B6849758	LIGHT PROOF MARK. REAR SWIVEL OFF CENTER. BRIGHT MAR ON THE BOLT PLUG.
B6848296	LIGHT PROOF MARK. BRIGHT MAR ON THE BOLT PLUG.
B6849254	LIGHT PROOF MARK. BRIGHT MAR ON THE BOLT PLUG.

GENERAL COMMENTS:

THE BRIGHT MAR ON THE BOLT PLUGS WAS CAUSED BY THE "F" STAMP ON THE RECEIVER BEING STAMPED CLOSE TO THE EDGE, UPSETTING THE SLOT.

THE STYLE OF BARREL FINISH CONTRIBUTES TO THE PROOF MARK BEING LIGHT.

THE SWIVELS ARE PUT IN SLIGHTLY OFF CENTER BY THE VENDOR.

RD-69-B

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington (DUPONT) PETERS (DUPONT)

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"_____

xc: W.H. Coleman, II/File
K.W. Soucy
G.J. Hill
J.R. Snedeker
J.F. Matousek, Jr
F.L. Supry
File

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 871112
APRIL 29, 1987

MODEL 700 FS TRIAL AND PILOT EVALUATION

308 WIN CALIBER

MODEL 700 FS 308 WIN CALIBER - TRIAL AND PILOT EVALUATION

ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700 FS 308 win caliber rifles to be acceptable. The Trial and Pilot Evaluation consisted of Visual Inspection, Accuracy, and Function. The eight rifle sample (four rifles with gray stocks and four rifles with camo stocks) was found to be within Remington specifications for each phase of the Trial and Pilot Evaluation.

Prepared by: F.L. Supry
Date prepared: 29 April 1987

proofread and cleared by:

J.R. Snedeker, Research Supervisor
Test, Measurement & Mech. Analysis Lab

W.H. Coleman, II
New Products Research Lab Director

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

REPORT# 871112 WORK ORDER# 81389-914

To: J.R. Snedeker

From: F.L. Supry

MODEL 700 FS 308 WIN CALIBER - TRIAL AND PILOT EVALUATION

INTRODUCTION:

On April 21, 1987 a request was received to conduct a Visual, Accuracy, and Function Evaluation of the Model 700 FS 308 Win caliber, Trial and Pilot rifles. Eight rifles, four of each stock option, were randomly selected from production.

SCOPE OF TEST:

To determine if the production run samples meet the Remington Specifications set by the Research Design Section.

TEST RESULTS:

The eight rifle Trial and Pilot Evaluation was found to be acceptable. The following results were obtained:

A. VISUAL:

a. The overall appearance of the rifles was good.

B. ACCURACY: (Average group size)

a. 308 Win (Gray) = 1.857 inches.
b. 308 Win (Camo) = 1.832 inches.

C. FUNCTION:

a. No malfunctions occurred.

REPORT# 871112 WORK ORDER# 81389-914

TEST REPORT:

1. VISUAL:

A. The visual inspection committee felt that the following three items need to be checked more thoroughly:

a. "F" stamp upsetting the receiver, near the bolt handle slot.

b. The Proof Stamp was light.

c. The swivels were off center.

B. Data sheets containing the comments on each rifle inspected is included in the appendix of this report.

2. ACCURACY:

A. The Remington Specification for group size is as follows:

a. 308 Win caliber: 3.5 inches, center to center.

B. Two rifles of each stock option were tested for 100 yard accuracy and the following results were obtained.

	GROUP			AVG
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Rifle# B6848285 -	2.542	2.382	1.626	2.183

OVERALL GROUP SIZE AVERAGE = 1.857 INCHES

Camo Stock

Rifle# B6849758 -	1.813	1.606	2.421	1.947
Rifle# B6848296 -	1.359	1.804	1.986	1.716

OVERALL GROUP SIZE AVERAGE = 1.832

3. FUNCTION:

A. The rifles were subjected to a 30 round per rifle, function test and the following results were obtained:

a. No malfunctions occurred.

REPORT# 871112 WORK ORDER# 81389-914

TEST PROCEDURE:

1. VISUAL:

A. The visual inspection committee consisted of G. Hill, G. Barnes, P. Johnson, R. Long (P.E. & C.); R. Howe, and F. Supry (R. & D.).

B. All four rifles of each stock option were used in the visual inspection. The rifles were as follows:

a. Gray Stock:
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b. Camo Stock:
B6849330 B6849758 B6848296 B6849254

C. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the visual inspection committee. All comments were recorded, an are included in the appendix of this report.

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G. The targets were analyzed for group size and the averages calculated, using the HP 9000 computer and digitizing tablet.

REPORT# 871112 WORK ORDER# 81389-914

TEST PROCEDURE: (continued)

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A. All four rifles of each stock option were used in the function test. The rifles were as follows:

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B6848853 B6848285 B6849351 B6849316

b. Camo Stock:
B6849330 B6849758 B6848296 B6849254

B. Each of the rifles was subjected to the loading and firing of 30 rounds of Remington 308 Win caliber ammunition (15 rounds of 55 grain and 15 rounds of 180 grain). Fifteen rounds were fired; 5 at a slow feeding cycle speed, 5 at a medium feeding cycle speed, and 5 at a fast feeding cycle speed. The rifles were allowed to cool, and then the procedure was repeated with the remaining ammunition type.

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a. R308W5 - 55 grain Win accelerator.
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REPORT# 871112 WORK ORDER# 81389-914

APPENDIX

REPORT# 871112 WORK ORDER# 81389-914

VISUAL INSPECTION MODEL 700 FS 308 WIN CALIBERS

Gray Stock:

SERIAL NUMBER	COMMENTS
B6848853	MISMATCH ON THE TRIGGER GUARD. POOR COLOR ON THE BOLT. LIGHT PROOF MARK.
B6848285	POOR COLOR ON THE BOLT. LIGHT PROOF MARK.
B6849351	LIGHT PROOF MARK. GOUGE IN THE SAFETY SLOT.
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B6849254	LIGHT PROOF MARK. BRIGHT MAR ON THE BOLT PLUG.

GENERAL COMMENTS:

THE BRIGHT MAR ON THE BOLT PLUGS WAS CAUSED BY THE "F" STAMP ON THE RECEIVER BEING STAMPED CLOSE TO THE EDGE, UPSETTING THE SLOT.

THE STYLE OF BARREL FINISH CONTRIBUTES TO THE PROOF MARK BEING LIGHT.

THE SWIVELS ARE PUT IN SLIGHTLY OFF CENTER BY THE VENDOR.

GRAY

B6848853 - Trigger guard bow has mismatch
Poor color on bolt
light proof

B6848285 Poor color on bolt
(2)
~~gouge in safety slot~~

B6849351 (2)
gouge in safety slot

B6849316 - mar on trigger guard
follow tips down

General - - F stamp upsetting Rec.
light proof stamps
- bolt color
- swivels off center

- copy to operations matusiak

MODEL 700 FS ADL

R&D R. HOWE, F. SUPRY

CAMO PLANT J. Hill, R. Long, P. Johnson, G. Barnes

B6849330 - Slight blemish over Serial #
(2) Proof stamp light
(1) Bolt plug rubbing on Rec - leaving bright spot
Rear swivel off center

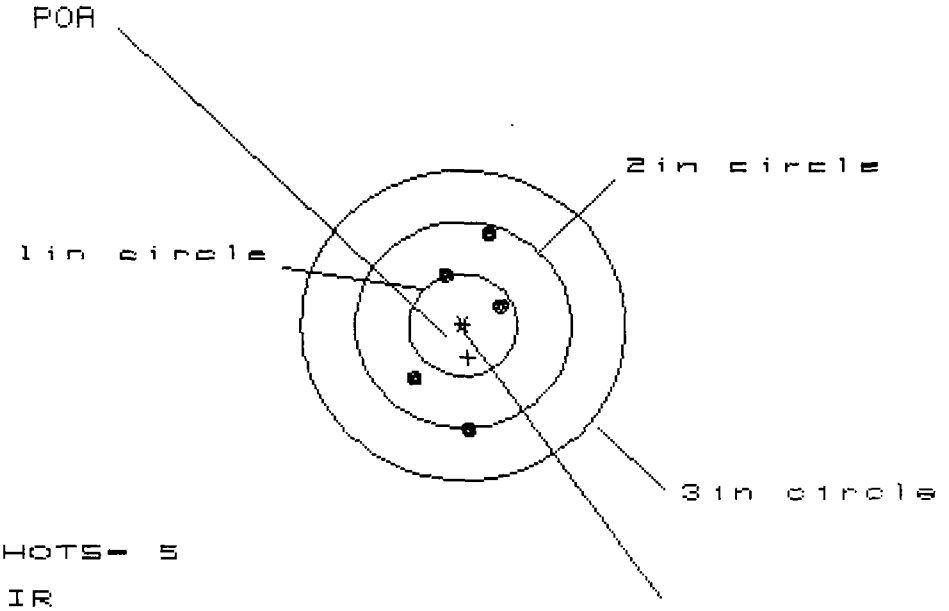
B6849758 - Bolt Plug rubbing on Rec - leaves bright spot
(3) - Rear swivel off center
(2)

B6848296 (1)
(2)

B6849254 (1)
(2)

28 Apr 1987 FILE:/PATTERNING/CENTERFIRE_PATT/86849758

CENTERFIRE PATTERNS # 1



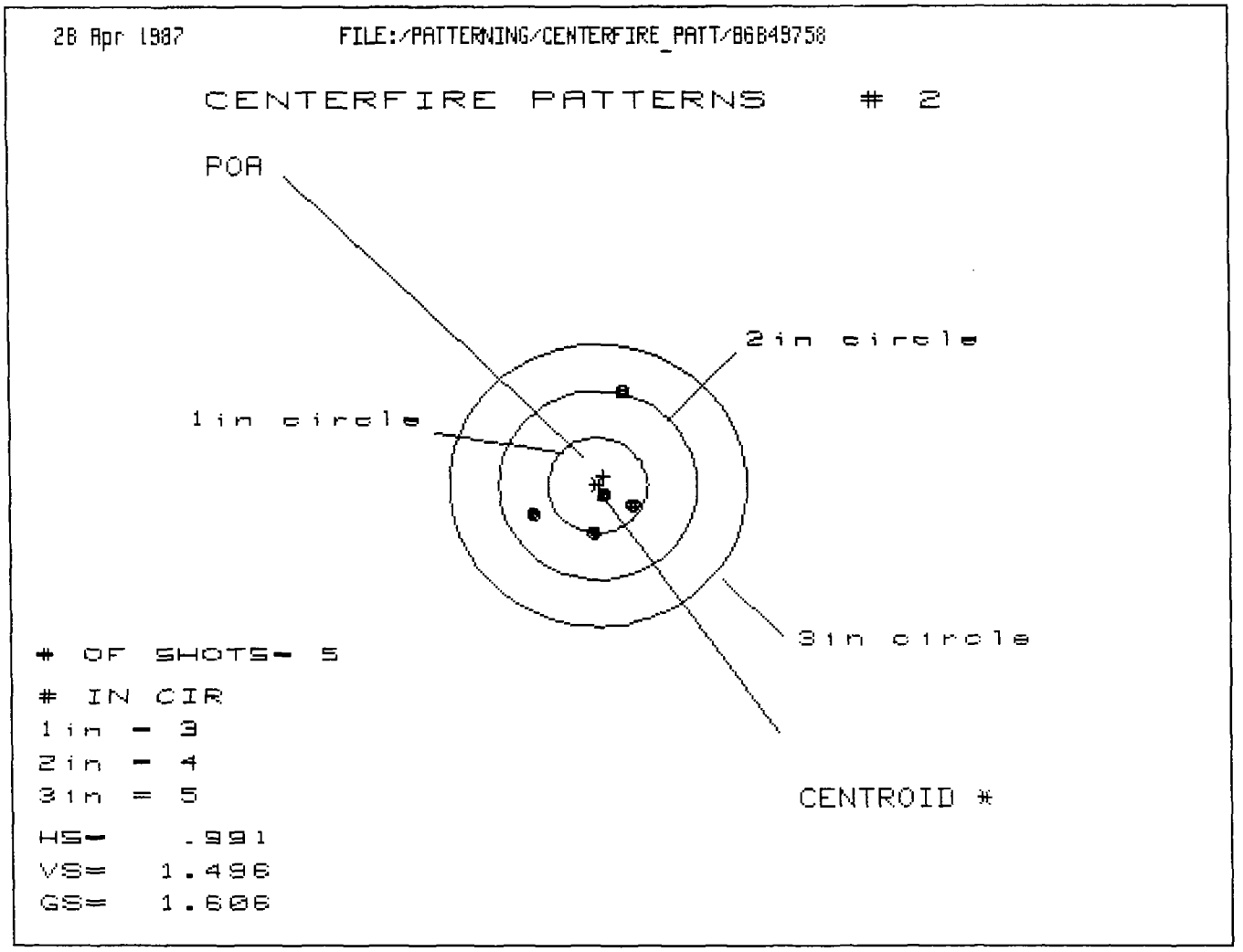
OF SHOTS= 5

IN CIR
1in = 2
2in = 5
3in = 5

HS= .846
VS= 1.809
GS= 1.813

PATTERN # : 1

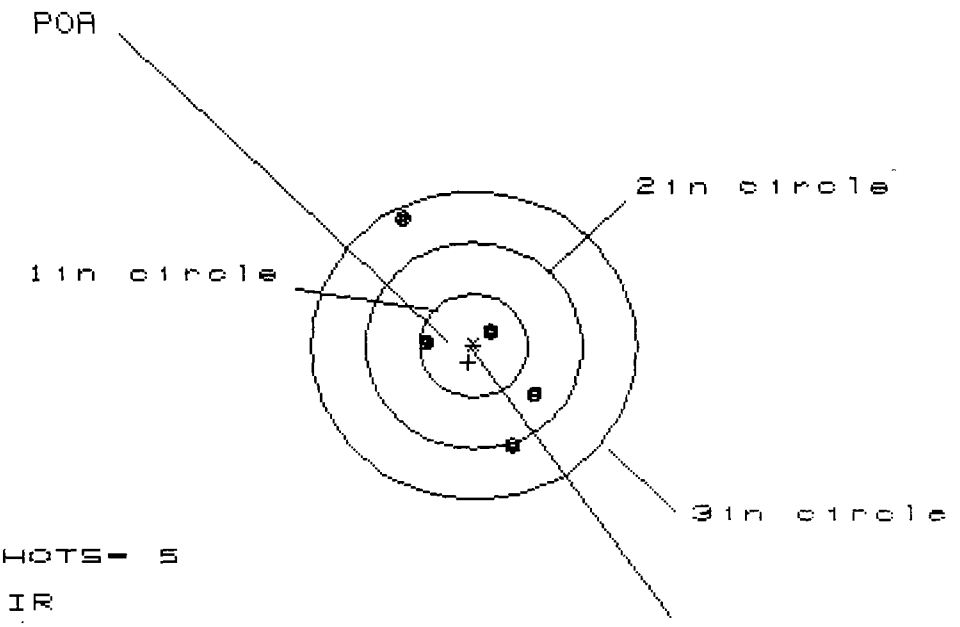
SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.354	.374	.448
MINIMUM X :	-.492	-.472	-.398
MAXIMUM Y :	.838	.596	.395
MINIMUM Y :	-.971	-.767	-.569
CENTROID X :	-.044	-.064	-.138
CENTROID Y :	.314	.556	.358
POA TO CENTROID in.:	.317	.560	.383
MIN RADIUS :	.416	.233	.399
MEAN RADIUS :	.687	.536	.524
MAX RADIUS :	.974	.901	.694
HORIZONTAL SPREAD :	.846	.846	.846
VERTICAL SPREAD :	1.809	1.363	.964
EXTREME SPREAD :	1.813	1.530	1.125
NUMBER IN ONE INCH CIRCLE =		2	
NUMBER IN TWO INCH CIRCLE =		5	
NUMBER IN THREE INCH CIRCLE =		5	



PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.370	.440	.256
MINIMUM X	:	-.621	-.551	-.155
MAXIMUM Y	:	1.031	.166	.152
MINIMUM Y	:	-.465	-.207	-.221
CENTROID X	:	-.056	-.126	.058
CENTROID Y	:	-.093	-.351	-.337
POA TO CENTROID in.	:	.109	.373	.342
MIN RADIUS	:	.093	.185	.183
MEAN RADIUS	:	.545	.349	.239
MAX RADIUS	:	1.068	.553	.270
HORIZONTAL SPREAD	:	.991	.991	.411
VERTICAL SPREAD	:	1.496	.373	.373
EXTREME SPREAD	:	1.606	.999	.503
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

28 Apr 1987 FILE:/PATTERNING/CENTERFIRE_PATT/B6B49758

CENTERFIRE PATTERNS # 3



OF SHOTS= 5

IN CIR
1in = 2
2in = 3
3in = 5

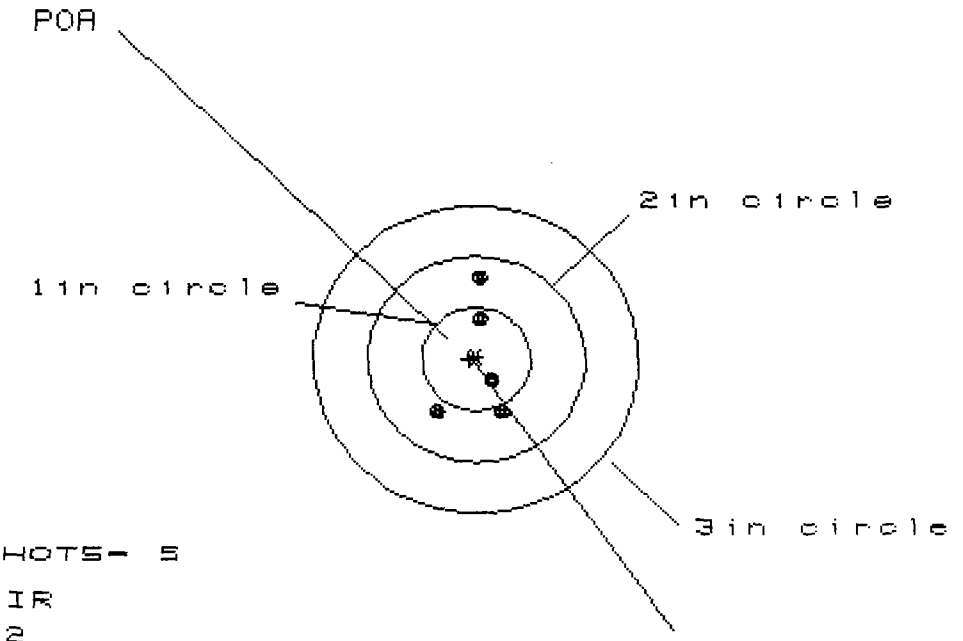
HS= 1.211
VS= 2.198
GS= 2.421

PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.554	.390	.455
MINIMUM X	:	-.657	-.567	-.502
MAXIMUM Y	:	1.210	.447	.218
MINIMUM Y	:	-.988	-.686	-.378
CENTROID X	:	.046	.210	.145
CENTROID Y	:	.162	-.140	.089
POA TO CENTROID in.	:	.169	.252	.170
MIN RADIUS	:	.206	.418	.223
MEAN RADIUS	:	.752	.566	.447
MAX RADIUS	:	1.376	.713	.591
HORIZONTAL SPREAD	:	1.211	.957	.957
VERTICAL SPREAD	:	2.198	1.133	.596
EXTREME SPREAD	:	2.421	1.316	1.097
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	

Ammo

28 Apr 1987 FILE:/PATTERNING/CENTERFIRE_PATT/86848296

CENTERFIRE PATTERNS # 1



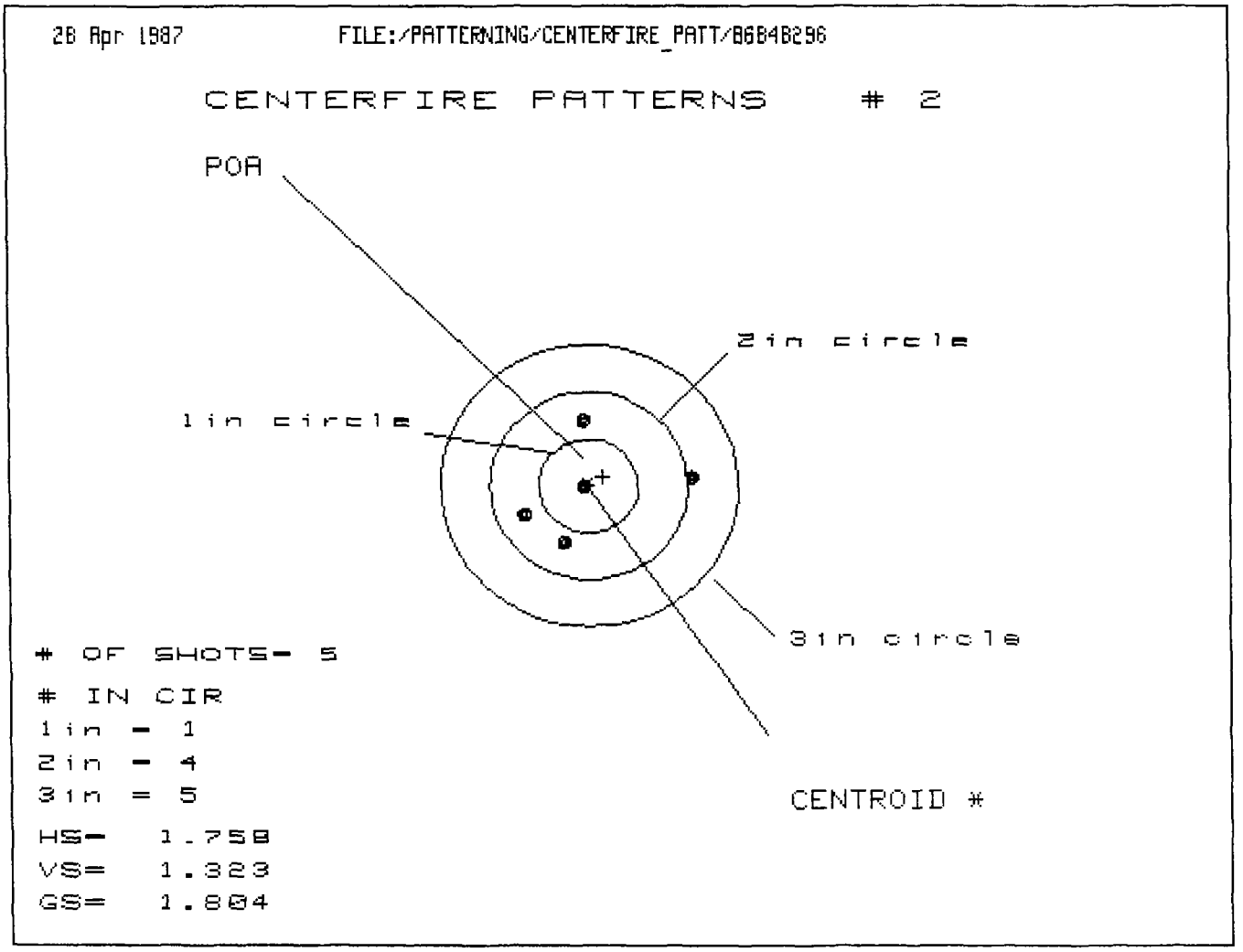
OF SHOTS= 5

IN CIR
1in = 2
2in = 5
3in = 5

HS= .567
VS= 1.328
GS= 1.359

PATTERN # : 1

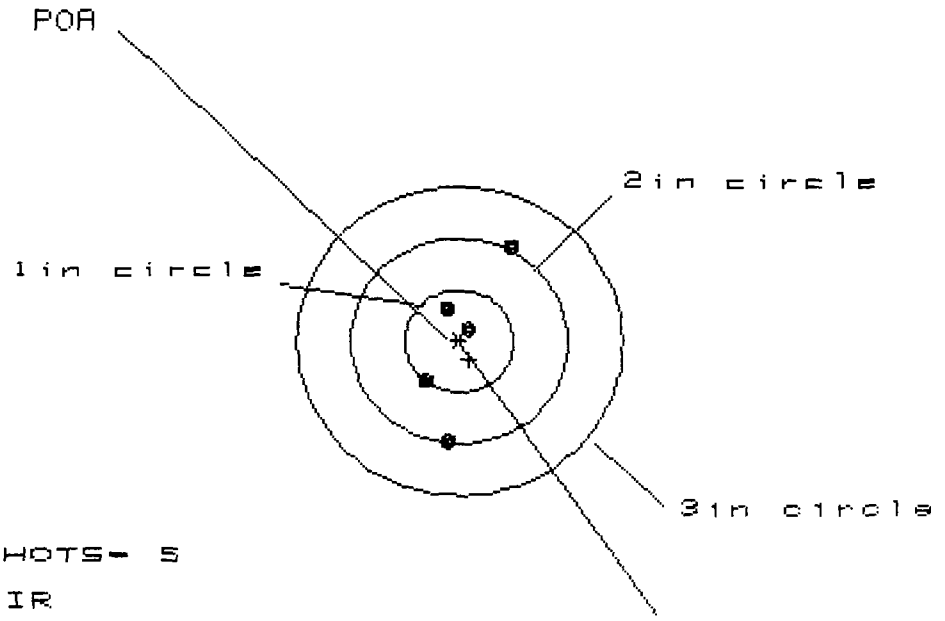
SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.195	.200	.077
MINIMUM X :	-.372	-.367	-.116
MAXIMUM Y :	.829	.572	.483
MINIMUM Y :	-.499	-.291	-.380
CENTROID X :	.065	.061	.183
CENTROID Y :	.003	-.205	-.116
POA TO CENTROID in.:	.065	.214	.217
MIN RADIUS :	.273	.162	.111
MEAN RADIUS :	.521	.385	.332
MAX RADIUS :	.830	.572	.497
HORIZONTAL SPREAD :	.567	.567	.193
VERTICAL SPREAD :	1.328	.863	.863
EXTREME SPREAD :	1.359	.917	.884
NUMBER IN ONE INCH CIRCLE =		2	
NUMBER IN TWO INCH CIRCLE =		5	
NUMBER IN THREE INCH CIRCLE =		5	



PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.070	.190	.248
MINIMUM X	:	-.688	-.420	-.362
MAXIMUM Y	:	.742	.774	.277
MINIMUM Y	:	-.581	-.548	-.290
CENTROID X	:	-.146	-.414	-.472
CENTROID Y	:	-.098	-.131	-.389
POA TO CENTROID in.	:	.176	.434	.612
MIN RADIUS	:	.079	.191	.312
MEAN RADIUS	:	.653	.506	.348
MAX RADIUS	:	1.078	.794	.372
HORIZONTAL SPREAD	:	1.758	.610	.610
VERTICAL SPREAD	:	1.323	1.323	.567
EXTREME SPREAD	:	1.804	1.329	.664
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

28 Apr 1987 FILE:/PATTERNING/CENTERFIRE_PATT/86848296

CENTERFIRE PATTERNS # 3



OF SHOTS= 5

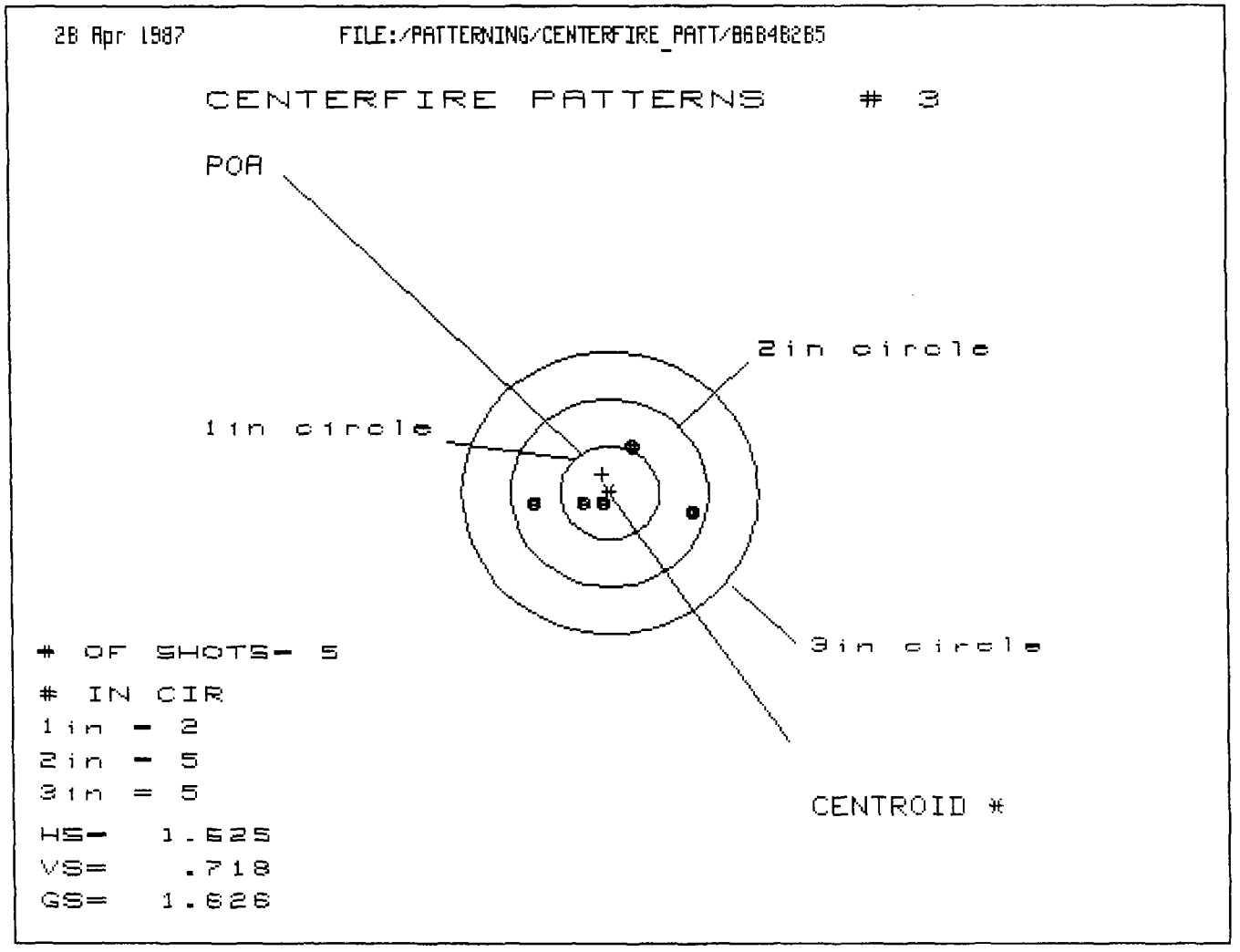
IN CIR
1in = 3
2in = 3
3in = 5

HS= .749
VS= 1.915
GS= 1.986

PATTERN # : 3

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.444	.422	.216
MINIMUM X :	-.305	-.327	-.186
MAXIMUM Y :	.899	.646	.306
MINIMUM Y :	-1.016	-.586	-.370
CENTROID X :	-.086	-.065	-.205
CENTROID Y :	.179	.432	.217
POA TO CENTROID in.:	.198	.437	.299
MIN RADIUS :	.142	.168	.226
MEAN RADIUS :	.598	.451	.316
MAX RADIUS :	1.019	.771	.414
HORIZONTAL SPREAD :	.749	.749	.402
VERTICAL SPREAD :	1.915	1.231	.676
EXTREME SPREAD :	1.986	1.441	.694

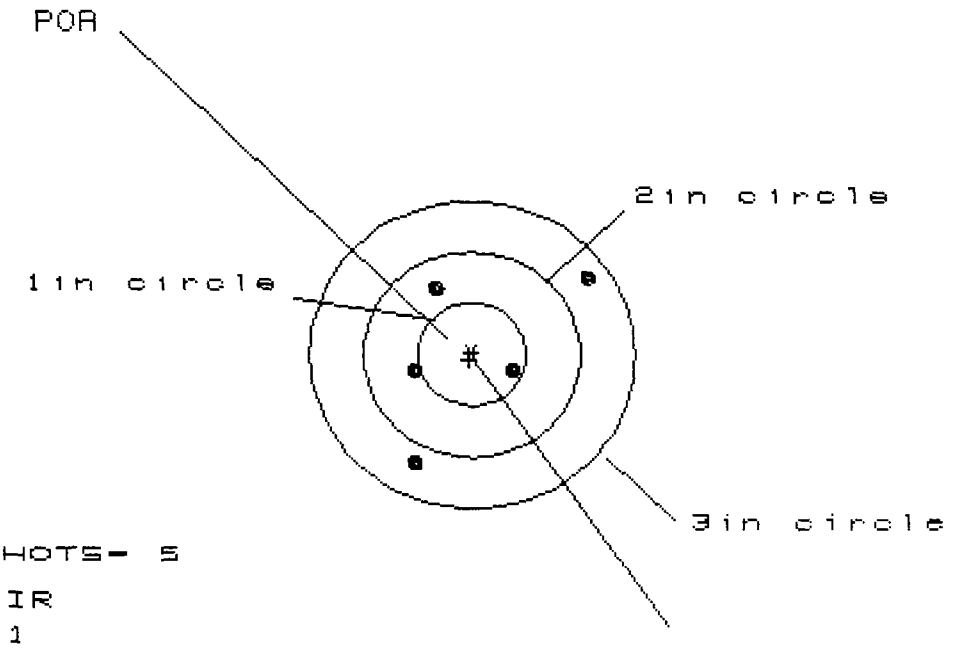
NUMBER IN ONE INCH CIRCLE = 3
NUMBER IN TWO INCH CIRCLE = 3
NUMBER IN THREE INCH CIRCLE = 5



PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.872	.453	.274
MINIMUM X	:	-.753	-.536	-.242
MAXIMUM Y	:	.528	.480	.416
MINIMUM Y	:	-.190	-.193	-.236
CENTROID X	:	.070	-.148	.031
CENTROID Y	:	-.195	-.147	-.083
POA TO CENTROID in.	:	.207	.208	.089
MIN RADIUS	:	.099	.183	.183
MEAN RADIUS	:	.529	.400	.340
MAX RADIUS	:	.892	.660	.498
HORIZONTAL SPREAD	:	1.625	.988	.516
VERTICAL SPREAD	:	.718	.673	.652
EXTREME SPREAD	:	1.626	1.195	.831
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

28 Apr 1987 FILE:/PATTERNING/CENTERFIRE_PATT/B6B4B2B5

CENTERFIRE PATTERNS # 2

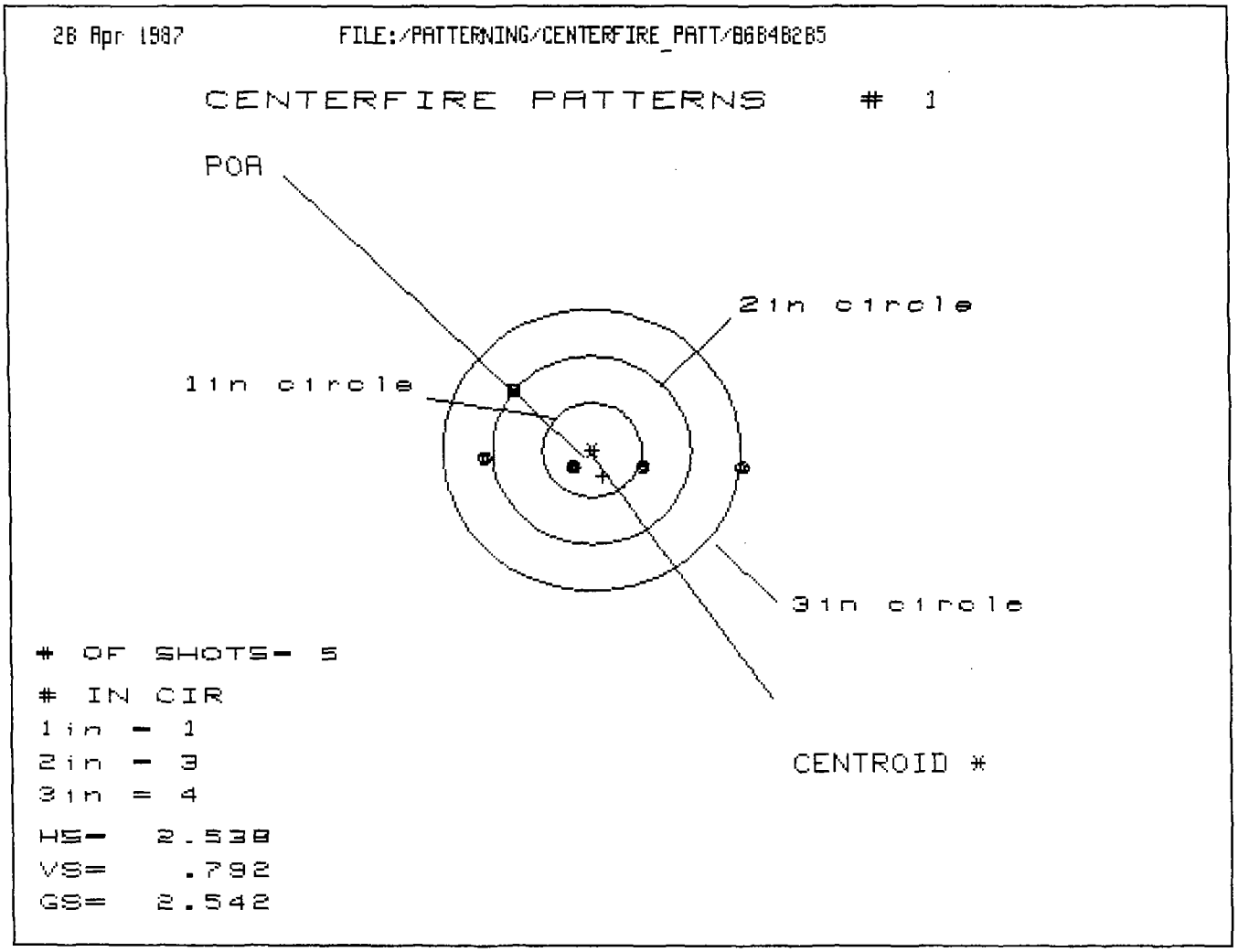


OF SHOTS= 5

IN CIR
1in = 1
2in = 3
3in = 5

HS= 1.643
VS= 1.725
GS= 2.382

PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.078	.617	.518
MINIMUM X	:	-.565	-.295	-.327
MAXIMUM Y	:	.721	.810	.536
MINIMUM Y	:	-1.004	-.824	-.284
CENTROID X	:	.025	-.245	-.146
CENTROID Y	:	.049	-.131	.143
POA TO CENTROID in.	:	.055	.278	.205
MIN RADIUS	:	.381	.229	.433
MEAN RADIUS	:	.818	.634	.526
MAX RADIUS	:	1.297	.875	.576
HORIZONTAL SPREAD	:	1.643	.912	.845
VERTICAL SPREAD	:	1.725	1.634	.820
EXTREME SPREAD	:	2.382	1.647	1.059
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	



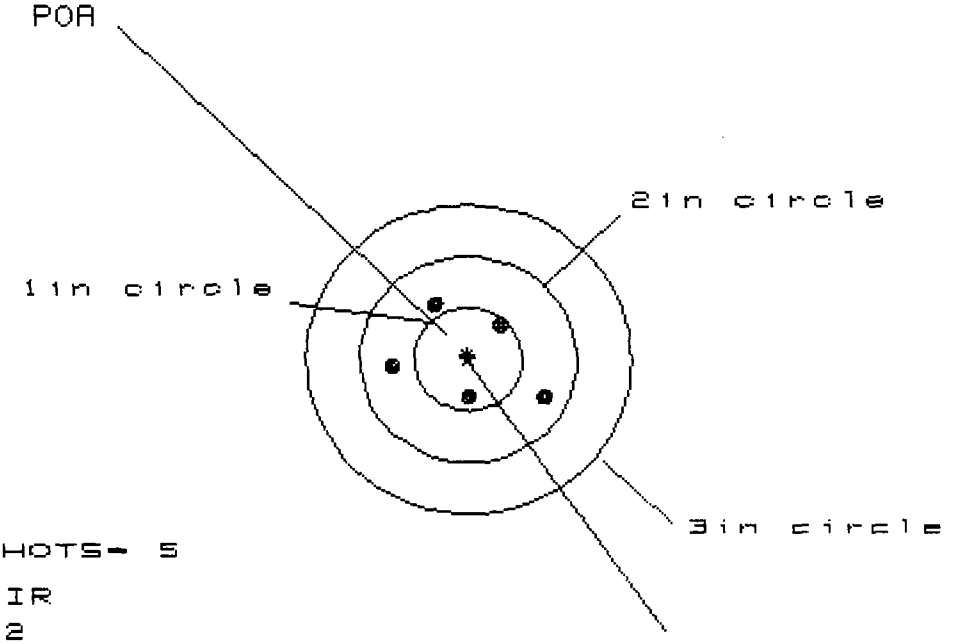
PATTERN # : 1

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	1.493	.892	.668
MINIMUM X :	-1.045	-.671	-.610
MAXIMUM Y :	.581	.538	.514
MINIMUM Y :	-.211	-.254	-.278
CENTROID X :	-.115	-.489	-.265
CENTROID Y :	.277	.320	.344
POA TO CENTROID in.:	.300	.584	.435
MIN RADIUS :	.267	.268	.242
MEAN RADIUS :	.866	.633	.588
MAX RADIUS :	1.503	.927	.797
HORIZONTAL SPREAD :	2.538	1.563	1.278
VERTICAL SPREAD :	.792	.792	.792
EXTREME SPREAD :	2.542	1.573	1.504
NUMBER IN ONE INCH CIRCLE =		1	
NUMBER IN TWO INCH CIRCLE =		3	
NUMBER IN THREE INCH CIRCLE =		4	

G-24

28 Apr 1987 FILE:/PATTERNING/CENTERFIRE_PATT/B6B4B853

CENTERFIRE PATTERNS # 2

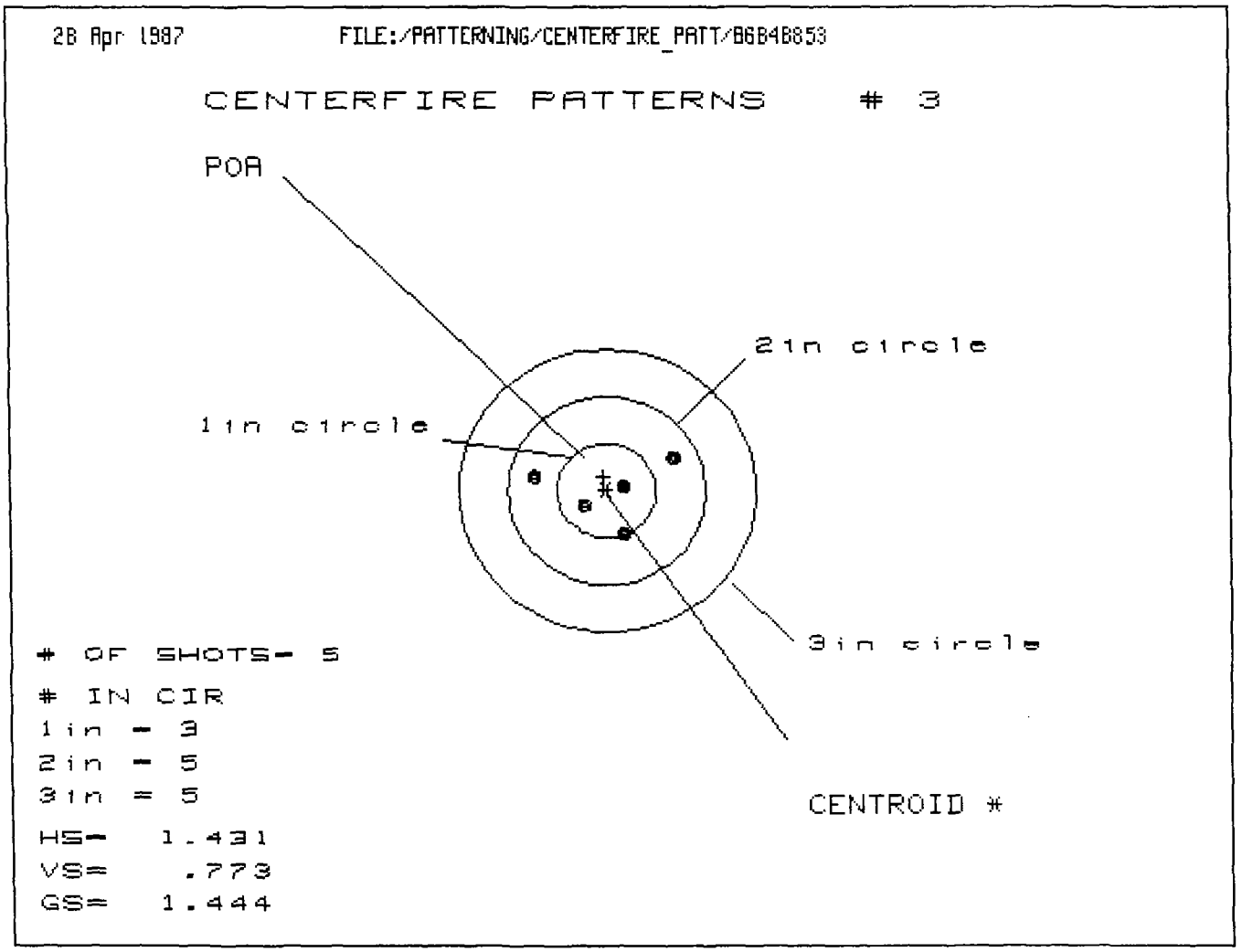


OF SHOTS= 5

# IN CIR	
1in	= 2
2in	= 5
3in	= 5

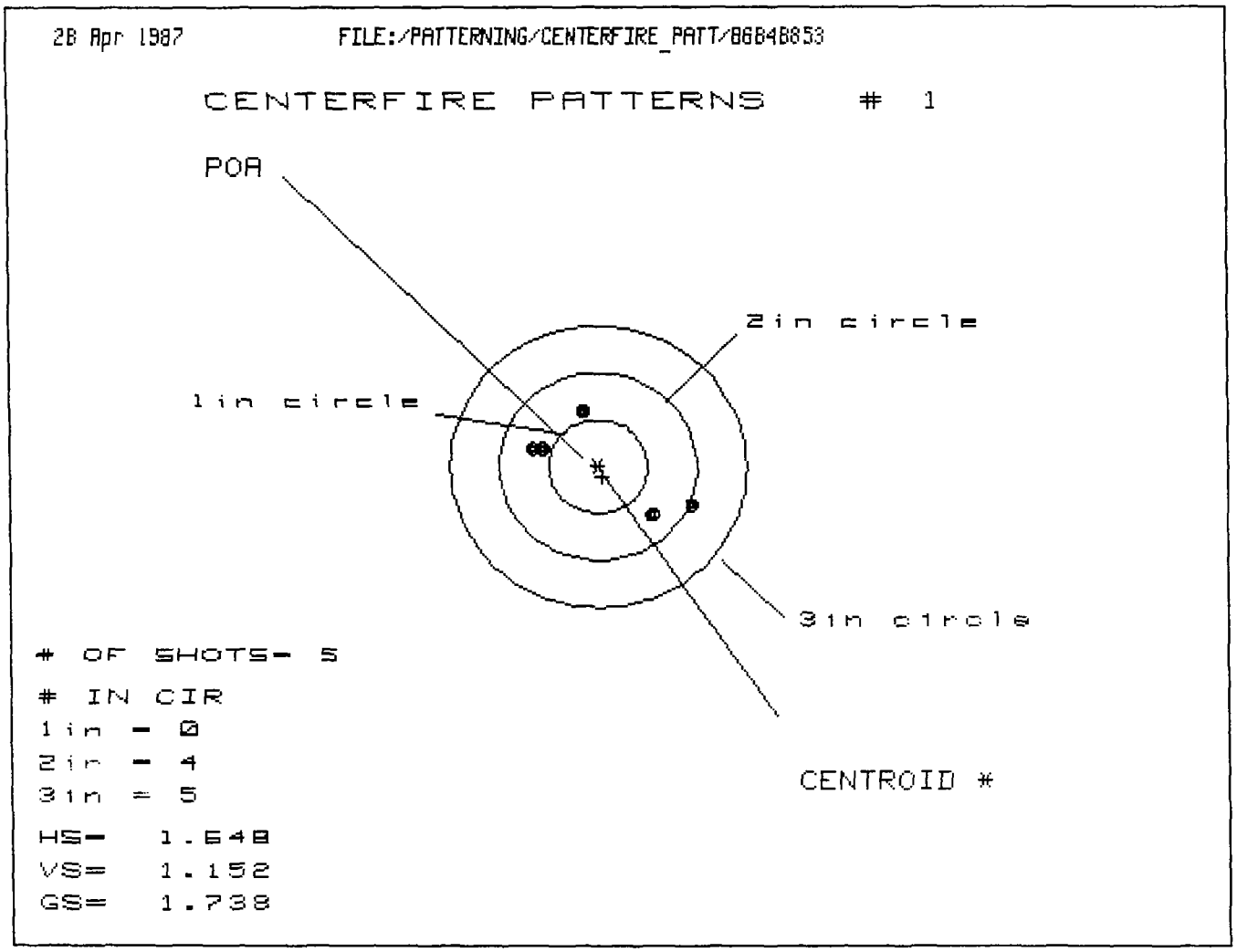
HS= 1.376
VS= .873
GS= 1.409

PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.708	.500	.336
MINIMUM X	:	-.668	-.492	-.322
MAXIMUM Y	:	.496	.402	.346
MINIMUM Y	:	-.377	-.439	-.495
CENTROID X	:	.003	-.174	-.010
CENTROID Y	:	-.038	.056	.112
POA TO CENTROID in.	:	.038	.182	.112
MIN RADIUS	:	.346	.432	.367
MEAN RADIUS	:	.572	.489	.445
MAX RADIUS	:	.802	.540	.495
HORIZONTAL SPREAD	:	1.376	.991	.658
VERTICAL SPREAD	:	.873	.841	.841
EXTREME SPREAD	:	1.409	1.059	.896
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.664	.472	.137
MINIMUM X	:	-.767	-.425	-.268
MAXIMUM Y	:	.369	.413	.216
MINIMUM Y	:	-.404	-.360	-.222
CENTROID X	:	.030	.222	.065
CENTROID Y	:	-.150	-.194	-.332
POA TO CENTROID in.	:	.153	.295	.338
MIN RADIUS	:	.169	.082	.252
MEAN RADIUS	:	.489	.379	.261
MAX RADIUS	:	.787	.627	.268
HORIZONTAL SPREAD	:	1.431	.897	.405
VERTICAL SPREAD	:	.773	.773	.438
EXTREME SPREAD	:	1.444	1.049	.465
NUMBER IN ONE INCH CIRCLE	=	3		
NUMBER IN TWO INCH CIRCLE	=	5		
NUMBER IN THREE INCH CIRCLE	=	5		

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER



PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.947	.741	.317
MINIMUM X	:	-.701	-.465	-.218
MAXIMUM Y	:	.614	.512	.299
MINIMUM Y	:	-.538	-.640	-.172
CENTROID X	:	-.042	-.278	-.525
CENTROID Y	:	.109	.211	.424
POA TO CENTROID in.	:	.116	.349	.675
MIN RADIUS	:	.613	.357	.161
MEAN RADIUS	:	.747	.580	.292
MAX RADIUS	:	1.031	.979	.436
HORIZONTAL SPREAD	:	1.648	1.206	.535
VERTICAL SPREAD	:	1.152	1.152	.471
EXTREME SPREAD	:	1.738	1.385	.713
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

Report No. 87 1112

RESEARCH TEST & MEASUREMENT LAB WORK REQUEST

	AREA OF TESTING	
____ Developmental	____ Safety Related	____ Litigation
____ Design Acceptance	____ Competitive Evaluation	____ Warehouse Audit
____ Pre-Pilot	____ New Design	____ Cost Reduction
____ Pilot	____ Design Change	Stake ____
____ Production Acceptance	____ Plant Assistance	____ Other

FIREARM STAT'S.	REPORT REQ'D.	
MODEL: 700 TM	FORMAL ✓	DATE REQUESTED: 4/21/87
CAL. or GAGE: 308 WIN	TEST RESULTS ONLY ____	DATE NEEDED BY: ____
BARREL TYPE: ____		REQUESTED BY: Plant
PROOFED: YES ____ NO ____		WORK ORDER NO: 81389-914

TEST TYPE

____ Strength Test	____ Ammunition Test	____ Dry Cycle Test	____ Photo/Video
____ Function Test	____ Environmental Test	____ Measurements	____ Other ____
____ Accuracy Test	____ Customer Complaint	____ Endurance Test	____

EXPLAIN IN DETAIL THE REASON FOR THIS TEST:

T&P - VISUAL & ACCURACY

4 gray & 4 camo styles

Select 2 of each for accuracy

GUNS REQUIRED:

NOTE: NO firearms or parts will be tested in the Labs unless they are accompanied by a Work Request, and both are delivered to the Labs by the designer or engineer. All Work Requests are to be filled out in detail. No Exceptions.

DATE COMPLETED: ____

TEST COMPLETED BY: ____

REPORT DATE: ____

Scott
894-8505

XC: R. MURPHY
FILE

TEST AND MEASUREMENT LAB TEST RESULTS

REQUESTER: J.W. BOWER TESTER: LAB DATE: 01/14/86
REPORT NO.: 860081 WORK ORDER NO.: G-0460
WRITTEN BY: F.L. SUPRY

TEST TYPE: WAREHOUSE AUDIT 500 rd. ENDURANCE

FIREARM STAT'S : MODEL: 700 MOUNTAIN RIFLE CAL or GAUGE: .280
BARREL TYPE: _____ PROOFED: YES X NO ___

REASON FOR TEST :

During the September 1985 T&P evaluation of the Mountain Rifle (refer to Report# 851412) we had some fore-end tips come loose. This test was conducted to verify that the problem has been corrected.

EQUIPMENT REQUIRED :

Five Model 700 Mountain Rifles, Ramac# 5632, of varied manufacture dates. The serial numbers of the five rifles, randomly selected from the warehouse are:

B6759118 B6758336 B6760766 B6758659 B6757788

TEST PROCEDURE :

The rifles were withdrawn from the warehouse on 1/8/86. The headspace "as received" was taken on each rifle. Each rifle was subjected to the loading and firing of 500 rounds of Remington .280 ammunition, with the rifle placed in a shooting jack. The fore-end tip was checked every 20 rounds. At the completion of the 500 round endurance, each rifle was subjected to The loading and firing of 20 additional rounds, fired from various shoulders.

TEST RESULTS :

The adhesion of the fore-end tip on the Model 700 Mountain rifles tested was found to be acceptable. None of the fore-end tips came loose.

At the completion of the test all five rifles will be returned to production.

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

Report No. 860081

RESEARCH TEST & MEASUREMENT LAB WORK REQUEST

	AREA OF TESTING		
____ Developmental	____ Safety Related	____ Litigation	
____ Design Acceptance	____ Competitive Evaluation	✓ Warehouse Audit	
____ Pre-Pilot	____ New Design	____ Cost Reduction	
____ Pilot	____ Design Change	Stake ____	
____ Production Acceptance	____ Plant Assistance	____ Other	

FIREARM STAT'S.

MODEL: 1700 MR

CAL. or GAGE: 280

BARREL TYPE: ____

PROOFED: YES ✓ NO ____

REPORT REQ'D.

FORMAL ____

TEST RESULTS ONLY ✓

DATE REQUESTED: 1/8/86

DATE NEEDED BY: ____

REQUESTED BY: Bower

WORK ORDER NO: G-0460

TEST TYPE

____ Strength Test	____ Ammunition Test	____ Dry Cycle Test	____ Photo/Video
____ Function Test	____ Environmental Test	____ Measurements	____ Other ENDURANCE
____ Accuracy Test	____ Customer Complaint	____ Endurance Test	____

EXPLAIN IN DETAIL THE REASON FOR THIS TEST:

Pull 5 mountain rifles, of various manufacture dates: RAMAC # 92 5632

Fire ~~1000~~ 500 rds. through each rifle, checking for fore end tips coming loose.

GUNS REQUIRED:

NOTE: NO firearms or parts will be tested in the Labs unless they are accompanied by a Work Request, and both are delivered to the Labs by the designer or engineer. All Work Requests are to be filled out in detail. No Exceptions.

DATE COMPLETED: ____

TEST COMPLETED BY: ____

REPORT DATE: ____

G-88

DON'T SAY IT—*WRITE IT*

To J.R. SNEDEKER Date 12/27/85

From J.W. BOWER xc: R. Murphy

During the T&P evaluation of the Mountain Rifle we had some fore-end tips come loose. At your earliest convenience, please take a warehouse audit and verify that the problem has been corrected.

Thanks.

XC: J.W. Bower

JWB:js

Fred. please fill out a work request to pull 5 Mountain Rifles from warehouse and put 1000 rds apiece thru them to check for fore end tips loose — try to get guns from 5 different production dates

J.R. Snedeker

"THE SAFE WAY IS THE SMART WAY"

RD 6606 cc: J. WHITE

TO: D. CHRISTIE

ILION RESEARCH DIVISION

FIREARMS WITHDRAWAL ~~OR RETURN~~ XXXXXXXXXXXXX

DATE 1/8/86

LETTER NO. #2207

QUANTITY 5

MODEL 700 CAL/GA. 280 WORK ORDER G-0460

(EACH WITH DIFFERENT MANUFACTURE DATES)

SERIAL NOS. RAMAC # 5632

B6759118	B6758336	B6758659
B6760766	B6757788	

REMARKS:

APPROVAL

FSUPRY:JS

DON'T SAY IT—*WRITE IT*

To _____ Location _____

From _____ Location _____ Phone No. _____

Subject _____ Date _____

M-700 .280

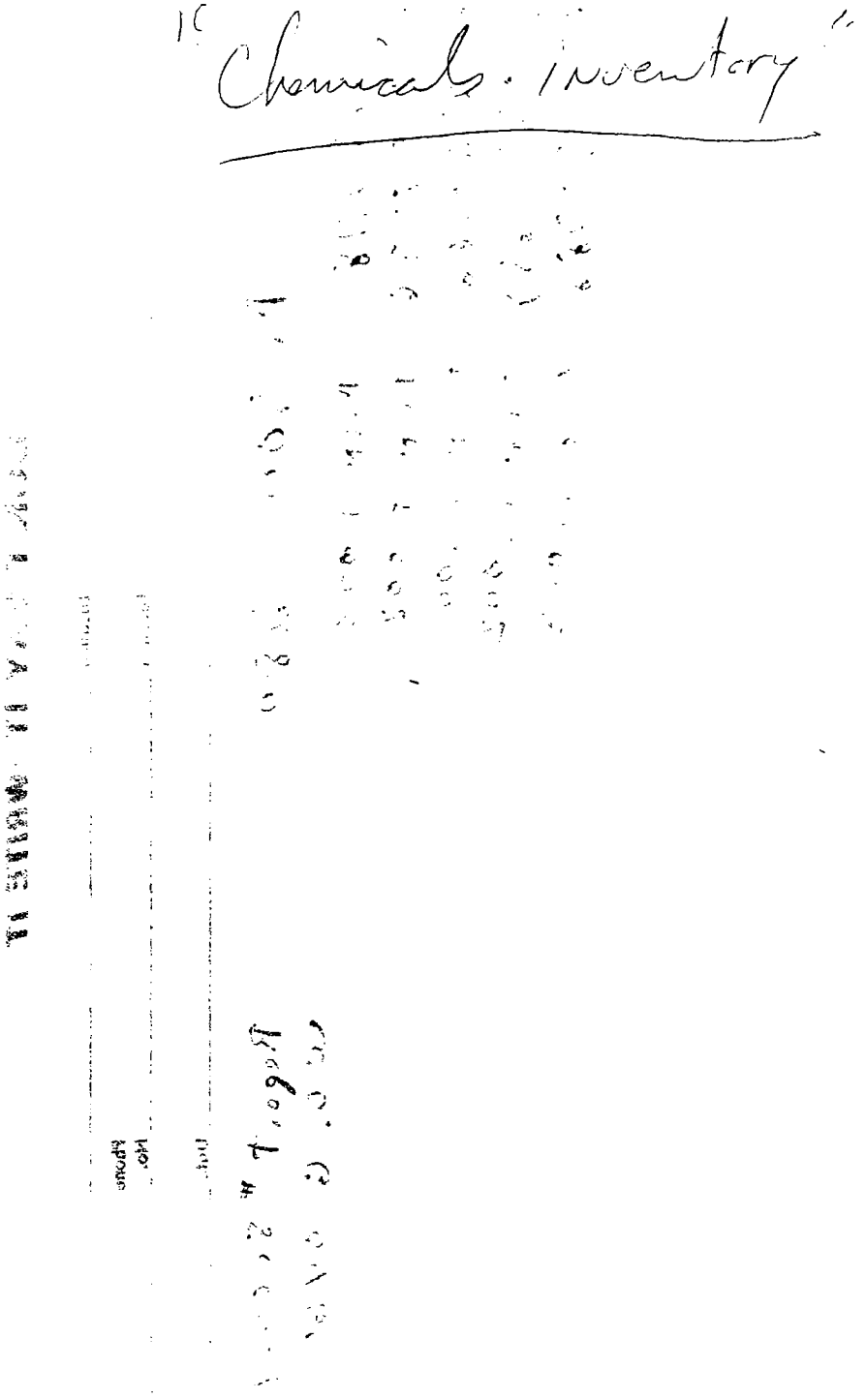
Report # 860081
W.O. G-0460

B 6759118 MIN +.003
B 6758336 MIN +.002
B 6760766 MIN +.005
B 6758659 MIN +.002
B 6757788 MIN +.003

G-88 REV. 10-62

SECURITY IS EVERYONE'S RESPONSIBILITY

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER


Chemicals - Inventory

JACK FUNCTION - CENTERFIRE

REPROT NO.: 860081 PAGE NO.

DATE: 1-9-86 MODEL: 700 CALIBER: 280 SERIAL NO. B6759118

PREVIOUS ROUNDS: 0

TEST TITLE: ENDURANCE

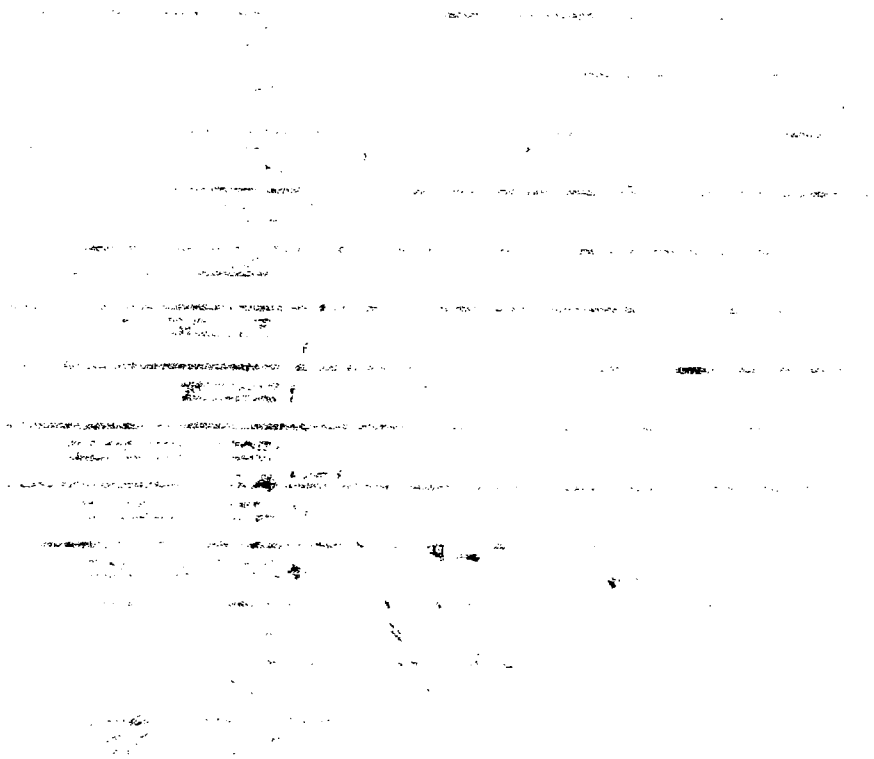
TTL. RDS. FIRED:
TTL. MALFUNCTIONS:
MALFUNCTION RATE:

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION WILL NOT CLOSE	DON'T EJECT	SEAR BREAK	ACTUATOR	STRIKER	Re-Run		
	JB	100	OK																							X		
	JB	100	OK																									
	JB	100	OK																									
	JB	100	OK																									
	JB	100	OK																									
	JB	100	OK																									
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 0136791
BARBER - PRESALE R 0136791

@ 80 Rds Lube Bolt - Heavy Bolt Light #.B



JACK FUNCTION - CENTERFIRE

REPROT NO.: 860081 PAGE NO.

DATE: 1-10-86 MODEL: 700 CALIBER: .280 SERIAL NO.

PREVIOUS ROUNDS: 0

TEST TITLE: ENDURANCE

TTL. RDS. FIRED:
TTL. MALFUNCTIONS:
MALFUNCTION RATE:

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	CASED SHELL	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREECHES	ADJUSTMENT	REPLACEMENT		
	TD	100	OK																								
	TD	100	OK																								
	TD	100	OK																								
	TD	100	OK																								
	DT	100													6											*	
TOTAL (PER MAL.)																											

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 0136793
BARBER - PRESALE R 0136793

* change 3rd pl. pres. comp.

JACK FUNCTION - CENTERFIRE

REPROT NO.: 86008/1 PAGE NO.

DATE: 1-10-86 MODEL: 700 CALIBER: 280 SERIAL NO. 6760766

PREVIOUS ROUNDS: 0

TEST TITLE: ENDURANCE JACK, #4

TTL. RDS. FIRED:
TTL. MALFUNCTIONS:
MALFUNCTION RATE:

"MALFUNCTIONS"

	SEQUENCE	CYCLE STOPPED AT NO. OF ROUNDS	REMARKS	TRIGGER SPRING	TRIGGER LINKAGE	BOLT LOCK LINK	BOLT LOCK SPRING	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STOPS MAG.	POWER OVERRIDE	BOLT LOCK UP	STEM CHAMBER REAR	STEM CHAMBER ACT	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER RIDES	LOADING	BOLT OVERRIDE	ACTION BARS UP	DOG'S ENGAGE	SEAR	TRANSMISSION	HAMMER	FLOOR PLATE LOOSE OPEN	BARBER - PRESALE R 01367950
	IS	100	OK																								✓
	IS	100	OK																								
	IS	100	—																						2		
	IS	100	OK																								
	IS	100	OK																								
TOTAL (PER MAL.)																											

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 01367950

AT START OF 400 Rd. ADJUSTED LATCH TAB ON FLOOR PLATE
TAB WAS FILED TO A VERY SHARP ANGLE

JACK FUNCTION - CENTERFIRE

REPROT NO.: 860081 PAGE NO.

DATE: 1-10-86 MODEL: 700 CALIBER: .280 SERIAL NO. B6758659

PREVIOUS ROUNDS: 0

TEST TITLE: ENDURANCE

TTL. RDS. FIRED:
TTL. MALFUNCTIONS:
MALFUNCTION RATE:

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREECHES	ADJUSTMENTS	REPLACEMENTS			
	JB	100	OK																									
	JB	100	OK																									
	JB	100	OK																									
	JB	100	OK																									
	JB	100	OK																									
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 013679
BARBER - PRESALE R 013679

JACK FUNCTION - CENTERFIRE

REPROT NO.: 86008/ PAGE NO.

DATE: 1-10-86 MODEL: 700 CALIBER: .280 SERIAL NO. B6758336

PREVIOUS ROUNDS: 0

TEST TITLE: ENDURANCE

TTL. RDS. FIRED: 500
TTL. MALFUNCTIONS: 10
MALFUNCTION RATE:

"MALFUNCTIONS"

1-200 Rds - 150GR. PSP

201-500 - 165 S.P.

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	TRIGGER SPRING	DON'T FIRE	DON'T EJECT	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BENDS	LOADING	BOLT OVERRIDE	ACTION ENG UP	DON'T CYCLE	SAFETY	TRIGGER	STOCK/ACTION	REMARK
	SB	100	OK																							
	SB	100	OK																							
	SB	100	—												2											X
	SB	18	—												4											
	SB	100													4											
TOTAL (PER MAL.)															10											

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 0136798
BARBER - PRESALE R 0136798

RD 6606 cc: J. White

TO: ~~Dennis J. Sarata~~

ILION RESEARCH DIVISION

FIREARMS [illegible] RETURN

DATE ~~1-14-86~~

LETTER NO. 2209

QUANTITY 5

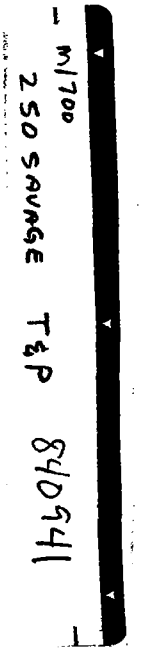
MODEL 700 CAL/GA. 280 WORK ORDER G-0460

SERIAL NOS.		
B6759118	B6758336	B6758659
B6760766	B6757788	

REMARKS: Returning - Withdrawn on Letter #2207

Approved

FSupry:js



CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

COPY

RD-69-B

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington (DUPONT) PETERS (DUPONT)

Distribution: W.H. Coleman, II
J.P. Linde
J.R. Snedeker
R.S. Murphy

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"

RESEARCH TEST AND MEASUREMENT REPORT - Report No. 840941

TRIAL AND PILOT EVALUATION; MODEL 700 CLASSIC,
250 SAVAGE CALIBER

Prepared by: FRED SUPRY

Date Prepared: 4-2-84

Proofread and Cleared by:

R.E. Nightingale,
Foreman - Test, Measurement Lab

R E Nightingale 4.3.84
Signature Date

J.R. Snedeker, Supervisor
Testing, Measurement & Mech. Analysis Lab

Signature Date

TEST & MEASUREMENT LAB REPORT

REPORT NUMBER: 840941

REPORT TITLE: TRIAL & PILOT EVALUATION - MODEL 700 CLASSIC, 250 SAVAGE CALIBER

MODEL(S): 700 CLASSIC

GAUGE OR CALIBER: .250 SAVAGE

DATE: 4-2-84

WORK ORDER NO.: 82833-905

PART NAME: RIFLE

DESIGNER/ENGINEER: REQUESTED BY P E & C

TEST TYPE:

1. PHOTO LAB
2. STRENGTH TEST-NO. OF GUNS TESTED _____
3. FUNCTION TEST-NO. OF GUNS TESTED 8
4. ACCURACY TEST-NO. OF GUNS TESTED 4
5. MEASUREMENTS - TYPE Preliminary
6. ENVIRONMENTAL TEST
7. AMMUNITION TESTING & EVALUATION-TYPE _____
8. VISUAL EVALUATION 10 OUT OF 40 GUN SAMPLE
9. ENDURANCE-NO. OF GUNS TESTED: 2

   NO. OF ROUNDS PER GUN 2,000

   TOTAL ROUNDS FIRED IN TEST 4,000

   AMMO TYPE: MAGS. _____ TARGET: _____

   RIM FIRE _____ CENTERFIRE X

REP.# 840941
W.O.# 82833-905

TO: R.E. Nightingale

FROM: F.L. Supry

TITLE: TRIAL AND PILOT EVALUATION; MODEL 700 CLASSIC, 250 SAVAGE CALIBER

ABSTRACT

On March 8, 1984 a request was received to conduct a Trial and Pilot Evaluation on the Model 700 Classic, 250 Savage caliber rifle. The Trial and Pilot consists of Visual Inspection, Preliminary Measurements, Accuracy, Field Function, and Endurance. Ten (10) rifles were randomly selected from a sample lot of forty (40) rifles.

SCOPE OF TEST

To determine if the production run samples meet Remington Specifications set by the Research Design Section.

TEST RESULTS

Two of the rifles, B6539281 and B6539186, were removed from the test and returned to P.E. & C., due to follow down malfunctions. P.E. & C. determined that the bolt handle was out of position. The test was continued with the remaining eight (8) rifles, and the samples met the specifications set by the Research Design Section.

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

REPORT TEXT

1. VISUAL INSPECTION:

A. The visual inspection committee found no major deterrent in the appearance of the ten rifles inspected.

B. The following general comments were made in overall reference to the rifles:

a. The rails appear too wide and too flat.

b. All rifles contained some amount of incomplete checkering.

c. The grip caps were not very oval.

C. The rifles used in the visual inspection were as follows:

B6539298	B6539281
B6538390	B6539204
B6539186	B6539673
B6539211	B6538385
B6538399	B6538401

D. Comments recorded for each individual rifle inspected are located in the appendix of this report.

2. PRELIMINARY MEASUREMENTS:

A. During the Preliminary Measurements, two of the rifles experienced follow down malfunctions. These rifles were returned to P.E. & C. They determined that the bolt handle was out of position. The Trial and Pilot Evaluation was continued using the remaining eight (8) rifles.

B. The following averages were established for the eight rifles.

a. Trigger Pull: 4.0 pounds

b. Safe "on" Force: 7.25 pounds

c. Safe "off" Force: 6.0 pounds

C. Preliminary Measurement results per individual rifle are located in the appendix of this report.

REPORT TEXT (continued)

3. ACCURACY:

A. Four (4) rifles were tested for 100 yard accuracy and the following averages were established:

a. Group Size: 1.2 inches

b. Vertical Spread: 0.8 inches

c. Horizontal Spread: 1.0 inches

B. Accuracy results per individual rifle are located in the appendix of this report.

4. Field Function:

A. The eight (8) rifles were subjected to a 90 round per rifle, Field Function Test and the following results were obtained:

a. It was necessary to oil the bolts, to prevent heavy bolt lift.
b. There were no malfunctions.

5. ENDURANCE:

A. Two (2) of the eight (8) rifles were subjected to a 2000 round endurance test and the following results were obtained:

a. There were no malfunctions or part breakages.

TEST PROCEDURE

1. VISUAL INSPECTION:

A. The Visual Inspection Committee consisted of R.S. Murphy, F.L. Supry, R.A. Jones, (Research); and D.E. Thomas, (Quality Control).

B. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the Visual Inspection Committee. All comments were recorded.

2. PRELIMINARY MEASUREMENTS:

A. Each rifle was checked for magnaflux and proof stamps.

B. The headspace was checked on each rifle, using min./max. headspace gauges.

C. The safe "off - on" forces were taken using a ten (10) pound push - pull gauge. Three (3) measurements were taken on each rifle and an average calculated.

3. ACCURACY:

A. The following four (4) rifles were used in the 100 yard accuracy test:

B6539298	B6538399
B6538401	B6539204

B. The accuracy test was shot by R. Williams, Research - Test Lab, at the R & D 100 yard range.

C. Weaver mounts and bases were used in conjunction with a Lyman 20X 1/8 inch dot scope.

D. Remington ammunition, Index R250SV; code T21H D4099, 100 grain pointed soft point, was used for the 100 yard accuracy test.

E. Before shooting the 100 yard accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

F. A total of three (3), five (5) shot groups were shot with each of the four (4) rifles. The rifles were cooled between each group, and one (1) "warmer" shot was fired before the next group was shot.

G. The patterns were analyzed for group size, vertical spread, horizontal spread, and averages were calculated for each rifle.

TEST PROCEDURE (continued)

4. FIELD FUNCTION:

A. All eight (8) rifles were subjected to the loading and firing of 90 rounds of Remington and competitive ammunition. The round robin method of firing the rifles was utilized. Fifteen (15) rounds were fired; five (5) at a slow feeding cycle speed, five (5) at a medium feeding cycle speed, and five (5) at a fast feeding cycle speed. The rifles were then cooled before the firing of the next ammunition type.

B. The following ammunition was used in the field test:

a. Remington: 100-psp code# T21H D4099

b. Winchester: 87-psp code# 96UA50
100-st code# 79TM40

C. All malfunctions were recorded, per rifle, per ammunition type, per feeding cycle speed, and per shooter.

5. APPENDIX:

A. Contents:

a. Visual Inspection comments per individual rifle.

b. Preliminary Measurement results per individual rifle.

c. Accuracy results per individual rifle.

d. A copy of the Lab Work Request.

6. Rifle B6539204 was placed in the Research Gun Library, all other rifles were returned to P.E. & C.

APPENDIX

VISUAL INSPECTION COMMENTS PER RIFLE:

GENERAL

A. All rifles inspected showed the following:

a. Rails appear too wide and too flat.

b. Some incomplete checkering.

c. Grip cap sanding not oval.

INDIVIDUAL

1. B6539298 - Run in the finish, right rail.
Swivel screws; rear screw not seated, front screw seated too deep.
Mar, right side of fore end, by floor plate.
Sanding dip, in the belly.
Poor finish repair, right side of the stock.
Rear of butt pad, not sanded.

2. B6539281 - Dip or ripple in the barrel, poor polish.
Mars in the grip area of the stock.

3. B6538399 - Rear swivel screw not seated.
Rings on bolt plug.
Cross grain scratches on both sides of the stock.
Mar on the side of the trigger guard.
Dimple in the right side of the comb cut.
Toe of the butt pad, rough.

4. B6538401 - Mar on the left rail.
Mar on the left side of the fore end.
Dip in the belly.
Too much wood margin, left side tang.

5. B6539204 - Indentation, right rail.
Open grain, right side of the fore end.
Front swivel screw, too deep, wood marred, caved in.
Wood to tang margin, off center.
Mars on the fore end.

VISUAL INSPECTION COMMENTS PER RIFLE:

INDIVIDUAL (continued)

6. B6539186 - Front swivel screw not seated.
Rough polishing marks on barrel, in front of the fore end.
Sanding breakthrough behind the comb cut.
Poor stain by the ejection port.
Wood broken, by floor plate.
Dent, left side of trigger guard.
Dip in the belly.
Poor fit, floor plate.

7. B6539673 - Run in the finish, right rail.
Wood burr in the bolt handle slot.
Deep mar, right side of the fore end.
Two holes in the wood, by the reinforcing screw.
Sanding scratches left panel.
Mar in the grip area.
Dip in the belly.
Sanding breakthrough, right rail.
Fore end pattern, off center.

8. B6538390 - Mars, left and right side of fore end.
Butt pad to wood match, poor at toe.
Mar, top left rail.
Mars, in the wood, left side of floor plate screws.
Poor wood margin, bottom side of tang.
Mar, front of trigger guard.
Step in the metal, rear of port.

9. B6539211 - Wood burr in the bolt handle slot.
Bright mar, front screw of the floor plate.
Mar, top of barrel, back of the roll mark.
Rear swivel screw, not seated.
Mar in the rail, near receiver.
Glob of fill, near ejection port.
Dip in the belly.
Cross grain scratches, in front of the rear swivel.

10. B6538385 - Mar in the wood, right side, near swivel screw.
Mar in the receiver, where the bolt handle hits.
Sanding breakthrough, right side, by the receiver.
Excessive finish, in front of the ejection port.
Poor steel margin, right side of tang.
Dip in the belly.
Pits in the bolt handle.
Wood burr in the bolt handle slot.
Toe of the butt pad, rough.

PRELIMINARY MEASUREMENTS PER INDIVIDUAL RIFLE:

SERIAL NUMBER	SAFE "ON" (LBS.)	SAFE "OFF" (LBS.)	TRIGGER PULL (LBS.)
B6538390	8.00	6.00	4.75
	8.00	6.00	4.50
	8.00	6.00	4.75
B6539281	7.50	8.00	4.25
	7.50	7.25	4.25
	7.50	7.75	4.25
B6539298	6.00	5.00	4.25
	6.50	5.00	4.25
	7.00	5.00	4.25
B6538385	7.50	6.00	4.25
	7.00	6.00	4.25
	7.00	6.00	4.25
B6539211	7.00	6.00	3.50
	7.00	6.00	3.50
	7.00	6.00	3.50
B6539673	8.00	5.25	3.75
	7.50	5.50	3.50
	7.00	5.75	3.50
B6539186	7.00	7.00	3.75
	7.00	7.00	4.00
	7.00	7.00	4.25
B6539204	7.00	7.00	4.50
	7.00	7.50	4.50
	7.0	7.50	4.50
B6538401	8.00	6.75	4.25
	8.00	6.75	4.00
	8.00	6.75	3.75
B6538399	6.75	6.75	3.50
	7.00	6.25	3.75
	7.00	6.25	3.75

ACCURACY RESULTS PER INDIVIDUAL RIFLE:

The following four (4) pages contain the individual accuracy results for the following rifles:

B6539204	B6538401
B6538399	B6539298

REPORT NO.

GUN #8
B6539204

ACCURACY: Minimum of 3 - 5-shot Groups

Ammunition Used REM. CAL. 250 SAVAGE 100Gr. P.S.P.

~~Previous Rounds~~ CODE T21H D4099

INDEX R250SV

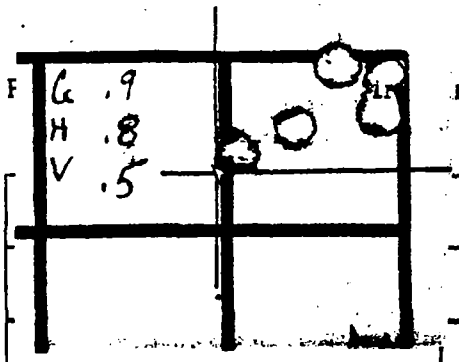
	Group Size (in.)	Vertical Spread	Horizontal Spread
1	.9	.5	.8
2	1.1	.5	1.1
3	1.2	.8	1.1
4			
5			
Avg.	1.0	.6	1.0

Tester R. Williams

Date 3-12-'84

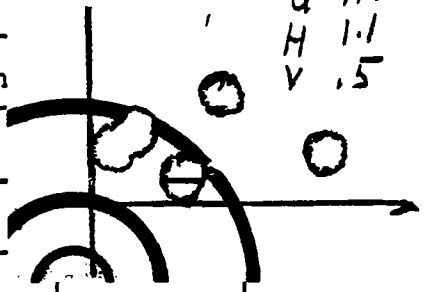
REM. STDS. 2.2" - 5 SHOT

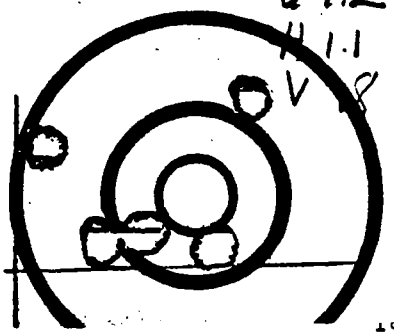
Marksman



F ... m of 3 - 10-sho ... load

	High (in	Left (in.)
Avg.		
Avg.		





Tester

Date

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136813

REPORT No.

GUN #3

B6539298

ACCURACY: Minimum of 3 - 5-shot Groups

Ammunition Used REM. CAL. 250 SAVAGE 100Gr. P.S.P.

~~Previous Rounds~~ CODE T21H D4099

INDEX R250SV

	Group Size (in.)	Vertical Spread	Horizontal Spread
1	1.8	.85	1.7
2	1.2	1.0	1.0
3	1.6	1.3	.8
4			
5			
Avg.	1.5	1.0	1.1

Tester R. Williams

REM. STDS. 2.2" - 5 SHOT

Date 3-12-'84

#3

G 1.8 - 10-sh

H 1.7

V .85

P

High (i

e load

G 1.2

H 1.0

V 1.0 Left (in.)

	Avg.
	Avg.
	Avg.
	Avg.

#5

G 1.6

H .8

V 1.3

Date

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136814

REPORT NO.

GUN #10
B6538399

ACCURACY: Minimum of 3 - 5-shot Groups

Ammunition Used REM. CAL. 250 SAVAGE 100 GR. P.S.P.

~~Previous~~ ~~Rounds~~ CODE T21H D4099

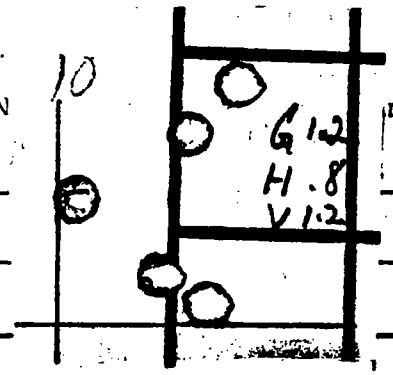
INDEX R250SV

	Group Size (in.)	Vertical Spread	Horizontal Spread
1	1.2	1.2	.8
2	1.1	1.1	.4
3	1.2	1.1	.9
4			
5			
Avg.	1.16	1.1	.7

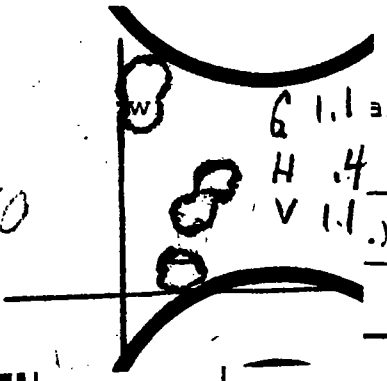
REM. STDS. 2.2" - 5 SHOT

Tester R. Williams

Date 3-12-84

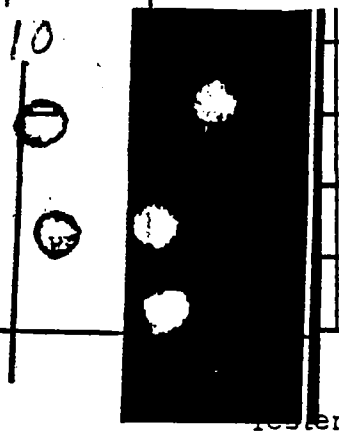


POIN m of 3 - 10-shc



able load

	High (in.)	Left (in.)
Avg.		



Tester

Date

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136815

REPORT

Page 14

GUN #9
B6538401

ACCURACY: Minimum of 3 - 5-shot Groups

Ammunition Used REM. CAL. 250 SAVAGE 100Gr. P.S.P.

~~Previous Rounds~~ CODE T21H D4099

INDEX R250SV

	Group Size (in.)	Vertical Spread	Horizontal Spread
1	1.0	.5	1.0
2	1.4	.6	1.3
3	1.1	.4	1.0
4			
5			
Avg.	1.1	.5	1.1

Tester R. Williams

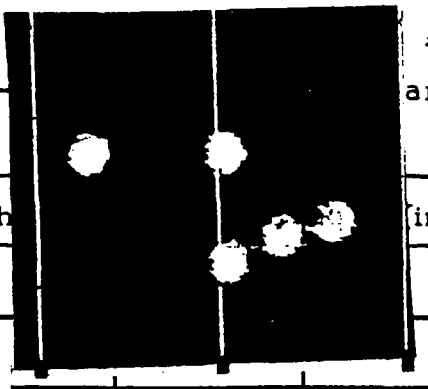
Date 3-12-84

REM. STDS. 2.2" - 5 SHOT

#9
G 1.0
H 1.0
V .5



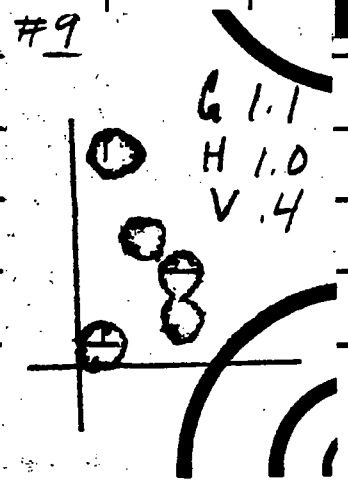
#9 G 1.4
H 1.3
V .6



POI ... mum of 3 - 10- ... ailable lo...

		High	...(in.)	Left (in.)
	Avg.			

#9
G 1.1
H 1.0
V .4



Tester _____

Date _____

465

Report No. 840941

RESEARCH TEST & MEASUREMENT LAB WORK REQUEST

	AREA OF TESTING		
___ Developmental	___ Safety Related	___ Litigation	
___ Design Acceptance	___ Competitive Evaluation	___ Warehouse Audit	
___ Pre-Pilot	* New Design	___ Cost Reduction	
___ Pilot	___ Design Change	Stake ___	
* Production Acceptance	___ Plant Assistance	___ Other	

FIREARM STAT'S.	REPORT REQ'D.	
MODEL: CLASSIC	FORMAL *	DATE REQUESTED: 4-3-84
CAL or GAGE: 250 SAV	TEST RESULTS ONLY ___	DATE NEEDED BY:
BARREL TYPE: 22"		REQUESTED BY: R.S. MURPHY
PROOFED: YES * NO ___		WORK ORDER NO: 82833-905

TEST TYPE

___ Strength Test	___ Ammunition Test	___ Dry Cycle Test	___ Photo/Video
* Function Test	___ Environmental Test	* Measurements	___ Other ___
* Accuracy Test	___ Customer Complaint	* Endurance Test	___

EXPLAIN IN DETAIL THE REASON FOR THIS TEST:

Using our selection of guns please run our Standard Trial + Pilot evaluation.

GUNS REQUIRED:

NOTE: NO firearms or parts will be tested in the Labs unless they are accompanied by a Work Request, and both are delivered to the Labs by the designer or engineer. All Work Requests are to be filled out in detail. No Exceptions.

DATE COMPLETED: 4-3-84
TEST COMPLETED BY: F.L. SUPRY
REPORT DATE: 4-3-84

TRIAL & PILOT TEST PROGRAM
CHECK LIST

GUN SELECTION:

- Eight firearms selected from minimum forty gun sample. All firearms to be completed through final inspection

VISUAL INSPECTION:

- All eight firearms -
- Finishes, margins, checkering
- Representatives: Q.C., P.E.&C., R&D, Supervision

MEASUREMENTS:

- Headspace
- Trigger pull
- Firing Pin indent
- Safe ON/OFF Forces
- Firearm length
- Firearm weight
- Stock dimensions
- Bolt lift
- Center of Gravity
- Action opening forces

COMPUTER AIDED TESTS AND MEASUREMENTS:

- Bolt Velocity
- Muzzle Velocity
- Lock Time
- Gun Cycle Time

ACCURACY:

- Minimum Four gun sample
- Min./Max sight adjustments
- Gallery device results
- Benchrest results
- Measurement results: Bore, groove, twist, crown

PATTERN:

- Minimum four gun sample
- Measurement results: Bore, choke
- Rifled slug results
- Min/Max sight adjustment results (Slug gun)
- Pattern/P.O.I. results

TRIAL & PILOT TEST PROGRAM - Contd. -2-

CHECK LIST - Contd.

FUNCTION:

- o Indoor jack shooting results
- o Live round unload results - centerfire
- o Outdoor field cycle test results - Breakdowns by:
  - Gun)
  - Shooter) All to include % and overall total
  - Ammo)

DROP/JAR-OFF:

- o Measurement results
- o Drop summary - heights, positions-remarks

LIMITED ENDURANCE:

Live Fire - (Minimum three gun sample)

- o Measurement results
- o Inspection summary
- o Breakage summary
- o Parts replacement/adjustment summary
- o Ammo breakdown

Dry Cycle - (Minimum three gun sample)

- o Measurement results
- o Inspection summary
- o Breakage summary
- o Parts replacement/adjustment summary



TRIAL & PILOT TEST PROGRAM

The purpose of a Trial and Pilot Test is to evaluate the first sample of production manufactured New Model product.

The Trial and Pilot Test should consist of the following:

Visual Inspection
Measurements
Computer aided test/measurements
Accuracy or Pattern Tests
Function Tests
Drop/Jar-off Tests
Limited Endurance - live fire/dry cycle

TEST GUIDE LINES

- TEST GUN SELECTION

  A minimum of eight (8) firearms should be selected from a minimum forty (40) gun sample. This would be a random selection. The technician should identify the origin and location of the forty gun sample.

- VISUAL INSPECTION

  The purpose of this visual is the final acceptance for the cosmetic appearance and quality of the New Model firearm.

  The main areas of interest are:

  1. Wood and Steel finishes
  2. Wood to Steel margins
  3. Checkering quality and placement

  Representatives from the following sections should accompany the technician and his supervision during the visual inspection:

  Quality Control
  Process Engineering
  Research Design - either - New Products or Current Product Sections

TEST GUIDE LINES - Contd.

o MEASUREMENTS

The measurements taken during a Trial & Pilot Test assist in establishing the Research Standards as originated by the Administrative Services Section.

A minimum of five (5) measurement samples should be taken per item being measured. The technician should list both the measurement procedure and the instrument used to obtain his results.

The following measurements should be taken during a Trial & Pilot Test:

1. Headspace
2. Trigger pull
3. Firing Pin indent
4. Safe ON/OFF operating forces
5. Firearm overall length and weight
6. Stock dimensions
   a. Pitch
   b. Drop at heel
   c. Drop at comb
   d. Trigger to grip
   e. Trigger to comb
   f. Drop at Monte-Carlo (if equipped)
   g. Length of pull
7. Bolt Lift
   a. Cocked
   b. Fired
8. Firearm center of gravity location
   a. With action closed ready to fire
9. Action opening forces
   a. Cocked
   b. Fired

There are other measurements that should be taken. They will be discussed later in the Guide Lines on:

1. Pattern and Accuracy tests
2. Drop/Jar-off Test

TEST GUIDE LINES - Contd.

- COMPUTER AIDED TESTS AND MEASUREMENTS

The measurements and tests conducted for the Pilot Line by the Measurement Lab vary depending upon the type of design and action being evaluated.

The following specialized tests or measurements should be taken:

1. Bolt Velocity
   a. Ammo used - lightest load/bullet wt.
      heaviest load/bullet wt.
      Min. of five shots per ammo type
2. Muzzle Velocity
   a. Ammo used - same as Bolt Velocity
      M.V. is especially important when evaluating a change in Barrel Length
3. Lock Time
4. Gun cycle time

- ACCURACY

Accuracy tests on centerfire and rimfire firearms are conducted in two manners:

1. Gallery accuracy devices
2. Bench rest using a scope

The purpose of utilizing both forms of accuracy evaluation is to provide a direct correlation between the Gallery Device and the benchrest shooter.

The following measurements should be taken prior to the actual shooting:

1. Bore measurements
2. Groove measurements
3. Inspection of the crowning and chamfering at the muzzle.
4. Twist
5. Barrel length

TEST GUIDE LINES - Contd.

- ACCURACY - Contd.

  A minimum of three/five shot groups should be fired through each rifle using the bullet weight and ammo as specified in the Process Records for the Gallery.

  The technician will record the following information:

  1. Range distance and location
  2. Ammunition description and code
  3. Group size, horizontal and vertical spread
  4. Shooter or operators name
  5. Description of scope used

  The complete spectrum of min/max. sight adjustments should be conducted also.

- PATTERN TEST

  Shotshell pattern and point of impact tests are evaluated from 25 to 40 yard ranges depending upon the choke in the Barrel.

  The following measurements should be taken prior to the actual shooting:

  1. Bore measurements
  2. Choke measurements
  3. Length of Barrel

  A minimum of three patterns should be fired through each shotgun using the ammunition and yardage as specified in the Remington Standards.

  Rifled slug accuracy is conducted at 40 yards with the following guide lines:

  1. Minimum of three/five shot groups
  2. All groups measured center to center
  3. The technician will record the following information:
     a. Range distance and location
     b. Ammunition description and code
     c. Group size, horizontal and vertical spread
     d. Shooters name
  4. The complete spectrum of min/max. sight adjustment measurements should be conducted

TRIAL AND PILOT EVALUATION

PROPOSED OUTLINE MARCH 6, 1984

Normally 8 guns are selected out of a minimum sample of 40 guns.

1. VISUAL:

   A. All 8 sample guns are inspected by a committee consisting of R & D, PE & C, and QC personnel.

   B. All guns are checked for magnaflux and proof stamps.

   C. All comments pertaining to wood to wood - wood to metal - finish - mars - etc. are recorded.

2. PRELIMINARY MEASUREMENTS:

   A. Headspace - Proof - Headspace

   B. Trigger Pull

   C. Firing Pin Indent

   D. Bore and Choke (shotgun only)

   E. Bolt Velocities (auto loading guns only)

3. ACCURACY:

   A. 4 of the 8 sample guns are selected for accuracy testing.

      a. Shotguns - patterns

      b. Rifles - targets

4. FIELD FUNCTION:

   A. All 8 guns are subjected to a round robin type field function test, usually conducted at the Ilion Fish & Game Club.

5. ENDURANCE:

   A. 2 or 4 of the 8 guns are subjected to a 2000 to a 5000 round jack endurance test.

      a. Round level and number of guns used are flexible.

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   B. Trigger Pull

   C. Firing Pin Indent

   D. Bore and Choke (shotgun only)

   E. Bolt Velocities (auto loading guns only)

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      a. Round level and number of guns used are flexible.

JACK ENDURANCE CENTERFIRE

REPROT NO.: _____ PAGE NO. 1

DATE: 5-26-84 MODEL: 700 Classic caliber: 250 SERIAL NO. B6538390

PREVIOUS ROUNDS 90 Field Cycle

TEST TITLE: ENDURANCE T&P

TTL. RDS. FIRED: 2,090

TTL. MALFUNCTIONS: 0

MALFUNCTION RATE: _____

"MALFUNCTIONS"

REM 250 100 Gr. PSP R250SV AMMUNITION Load Size	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRAPPED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS	BOLT VELOCITIES	REMARKS (ON BACK) YES	REMARKS (ON BACK) NO
	RW	100	OK																									
	RW	100	OK																									
	RW	100	OK																									
	RW	100	OK																									
	RW	100	OK																									
	RW	500	OK																									
	RW	500	OK																									
	RW	500	OK																									
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 0136827
BARBER - PRESALE R 0136827

TEST PROCEDURE SHEET (10)

MODEL# 700 Classic

CAL. ~~GR GA.~~ 250

SERIAL# B-6538399

SAFE FORCES

Headspace as Received: OK

Proof: ←

Headspace after Proof: ____

	ON:	OFF:
1.	6.75	6.75
2.	7.0	6.25
3.	7.0	6.25

TRIGGER PULL (lbs.)

1. 3.5
2. 3.75
3. 3.75

FIRING PIN INDENT (in.)

1. ____
2. ____
3. ____

BOLT OPEN FORCE (lbs.)

	DRY FIRED: Initial:	DRY FIRED: Full Open:	COCKED: Initial:	COCKED: Full Open:
1.	____	____	____	____
2.	____	____	____	____
3.	____	____	____	____

BOLT LIFT FORCE (lbs.)

	DRY FIRED: Full Open:	COCKED: Full Open:
1.	____	____
2.	____	____
3.	____	____

BOLT RELEASE FORCE (lbs.)

1. ____
2. ____
3. ____

TESTER: R.W. + F.S.

DATE: 3-9-84

REPORT# ____

WORK ORDER# ____

TEST PROCEDURE SHEET

(9)

MODEL# 700 Classic

CAL. OR GA. 250

SERIAL# B6558401

Headspace as Received: OK

Proof: ✓

Headspace after Proof: ____

SAFE FORCES

	ON:	OFF:
1.	8.0	6.75
2.	8.0	6.75
3.	8.0	6.75

TRIGGER PULL (lbs.)

1. 4.25
2. 4.0
3. 3.75

FIRING PIN INDENT (in.)

1. ____
2. ____
3. ____

BOLT OPEN FORCE (lbs.)

DRY FIRED:			COCKED:		
Initial:	Full Open:		Initial:	Full Open:	
1. ____	1. ____		1. ____	1. ____	
2. ____	2. ____		2. ____	2. ____	
3. ____	3. ____		3. ____	3. ____	

BOLT LIFT FORCE (lbs.)

DRY FIRED:		COCKED:	
Full Open:		Full Open:	
1. ____		1. ____	
2. ____		2. ____	
3. ____		3. ____	

BOLT RELEASE FORCE (lbs.)

1. ____
2. ____
3. ____

TESTER: R.W. + F.S.

DATE: 3-9-84

REPORT# ____

WORK ORDER# ____

overall $\bar{X}$ = 4.0

TEST PROCEDURE SHEET

(8)

MODEL# 700 CLASSIC

CAL. OR GA. 250

SERIAL# B6539204

SAFE FORCES

Headspace as Received: OK

Proof: ✓

Headspace after Proof: ____

ON: 1. 7.0 2. 7.0 3. 7.0

OFF: 1. 7.0 2. 7.5 3. 7.5

TRIGGER PULL (lbs.)

1. 4.5
2. 4.5
3. 4.5

FIRING PIN INDENT (in.)

1. ____
2. ____
3. ____

BOLT OPEN FORCE (lbs.)

DRY FIRED: Initial:	DRY FIRED: Full Open:	COCKED: Initial:	COCKED: Full Open:
1. ____	1. ____	1. ____	1. ____
2. ____	2. ____	2. ____	2. ____
3. ____	3. ____	3. ____	3. ____

BOLT LIFT FORCE (lbs.)

DRY FIRED: Full Open:	COCKED: Full Open:
1. ____	1. ____
2. ____	2. ____
3. ____	3. ____

BOLT RELEASE FORCE (lbs.)

1. ____
2. ____
3. ____

TESTER: R.V. & F.S.

DATE: 3-9-84

REPORT# ____

WORK ORDER# ____

TEST PROCEDURE SHEET

(7)

MODEL# 700 Classic

CAL. OR GA. 250

SERIAL# B6539186

Headspace as Received: OK

Proof:

Headspace after Proof:

SAFE FORCES

	ON:	OFF:
1.	7.0	7.0
2.	7.0	7.0
3.	7.0	7.0

TRIGGER PULL (lbs.)

1. 3.75
2. 4.0
3. 4.25

X Gun Follows Down

FIRING PIN INDENT (in.)

1. +
2. +
3. +

BOLT OPEN FORCE (lbs.)

DRY FIRED:			COCKED:		
Initial:	Full Open:		Initial:	Full Open:	
1.	1.		1.	1.	
2.	2.		2.	2.	
3.	3.		3.	3.	

BOLT LIFT FORCE (lbs.)

DRY FIRED:		COCKED:	
Full Open:		Full Open:	
1.		1.	
2.		2.	
3.		3.	

BOLT RELEASE FORCE (lbs.)

1.
2.
3.

TESTER: R.W. & F.S.

DATE: 3-9-84

REPORT#

WORK ORDER#

TEST PROCEDURE SHEET

(6)

MODEL# 700 Classic

CAL. OR GA. 250

SERIAL# B6539673

Headspace as Received: OK

Proof: L

Headspace after Proof: ____

SAFE FORCES

	ON:	OFF:
1.	8.0	5.25
2.	7.5	5.5
3.	7.0	5.75

TRIGGER PULL (lbs.)

1. 3.75
2. 3.5
3. 3.5

FIRING PIN INDENT (in.)

1. ____
2. ____
3. ____

BOLT OPEN FORCE (lbs.)

	DRY FIRED: Initial:	DRY FIRED: Full Open:	COCKED: Initial:	COCKED: Full Open:
1.	____	____	____	____
2.	____	____	____	____
3.	____	____	____	____

BOLT LIFT FORCE (lbs.)

	DRY FIRED: Full Open:	COCKED: Full Open:
1.	____	____
2.	____	____
3.	____	____

BOLT RELEASE FORCE (lbs.)

1. ____
2. ____
3. ____

TESTER: R.N. + F.S.

DATE: 3-9-84

REPORT# ____

WORK ORDER# ____

TEST PROCEDURE SHEET

(5)

MODEL# 700 Classic

CAL. OR GA. 250

SERIAL# B6539211

Headspace as Received: OK

Proof: ✓

Headspace after Proof: ____

SAFE FORCES

ON: 1. [redacted] 7.0 OFF: 1. 6.0

2. [redacted] 7.0 2. 6.0

3. [redacted] 7.0 3. 6.0

TRIGGER PULL (lbs.)

1. 3.5
2. 3.5
3. 3.5

FIRING PIN INDENT (in.)

1. ____
2. ____
3. ____

BOLT OPEN FORCE (lbs.)

DRY FIRED:				COCKED:			
Initial:	1.____	Full Open:	1.____	Initial:	1.____	Full Open:	1.____
	2.____		2.____		2.____		2.____
	3.____		3.____		3.____		3.____

BOLT LIFT FORCE (lbs.)

DRY FIRED:		COCKED:	
Full Open:	1.____	Full Open:	1.____
	2.____		2.____
	3.____		3.____

BOLT RELEASE FORCE (lbs.)

1. ____
2. ____
3. ____

TESTER: R.W. + F.S.

DATE: 3-9-84

REPORT# ____

WORK ORDER# ____

TEST PROCEDURE SHEET (4)

MODEL# 700 classic

CAL. OR GA. 250 SAVAGE

SERIAL# B6538385

Headspace as Received: ok
Proof: ✓
Headspace after Proof: ____

SAFE FORCES

ON: 1. 7.5
2. 7.0
3. 7.0

OFF: 1. 6.0
2. 6.0
3. 6.0

TRIGGER PULL (lbs.)

1. 4.25
2. 4.25
3. 4.25

FIRING PIN INDENT (in.)

1. ____
2. ____
3. ____

BOLT OPEN FORCE (lbs.)

DRY FIRED:				COCKED:			
Initial:	1.____	Full Open:	1.____	Initial:	1.____	Full Open:	1.____
	2.____		2.____		2.____		2.____
	3.____		3.____		3.____		3.____

BOLT LIFT FORCE (lbs.)

DRY FIRED:		COCKED:	
Full Open:	1.____	Full Open:	1.____
	2.____		2.____
	3.____		3.____

BOLT RELEASE FORCE (lbs.)

1. ____
2. ____
3. ____

TESTER: R.W. & F.S.
DATE: 3-9-84

REPORT# ____
WORK ORDER# ____

TEST PROCEDURE SHEET (3)

MODEL# 700 Classic

CAL. OR GA. 250 SAVAGE

SERIAL# B6539298

SAFE FORCES

Headspace as Received: OK
Proof: ✓
Headspace after Proof: ____

ON: 1. 6.0
2. 6.5
3. 7.0

OFF: 1. 5.0
2. 5.0
3. 5.0

TRIGGER PULL (lbs.)

1. 4.25
2. 4.25
3. 4.25

FIRING PIN INDENT (in.)

1. ____
2. ____
3. ____

BOLT OPEN FORCE (lbs.)

DRY FIRED:			COCKED:		
Initial:	1. ____	Full Open: 1. ____	Initial:	1. ____	Full Open: 1. ____
	2. ____	2. ____		2. ____	2. ____
	3. ____	3. ____		3. ____	3. ____

BOLT LIFT FORCE (lbs.)

DRY FIRED:		COCKED:	
Full Open:	1. ____	Full Open:	1. ____
	2. ____		2. ____
	3. ____		3. ____

BOLT RELEASE FORCE (lbs.)

1. ____
2. ____
3. ____

TESTER: FS / LW
DATE: 3-9-84

REPORT# ____
WORK ORDER# ____

TEST PROCEDURE SHEET

(2)

MODEL# 700 classic

CAL. OR GA. 250 Savage

SERIAL# B6539281

Headspace as Received: OK

Proof: ✓

Headspace after Proof: ____

SAFE FORCES

	ON:	OFF:
1.	7.5	8
2.	7.5	7.25
3.	7.5	7.25

TRIGGER PULL (lbs.)

1. 4.25
2. 4.25
3. 4.25

* Gun Follows down

FIRING PIN INDENT (in.)

1. ~~____~~
2. ~~____~~
3. ~~____~~

BOLT OPEN FORCE (lbs.)

DRY FIRED:			COCKED:		
Initial:	Full Open:		Initial:	Full Open:	
1. ____	1. ____		1. ____	1. ____	
2. ____	2. ____		2. ____	2. ____	
3. ____	3. ____		3. ____	3. ____	

BOLT LIFT FORCE (lbs.)

DRY FIRED:		COCKED:	
Full Open:		Full Open:	
1. ____		1. ____	
2. ____		2. ____	
3. ____		3. ____	

BOLT RELEASE FORCE (lbs.)

1. ____
2. ____
3. ____

TESTER: F.S. / LW

DATE: 3-9-84

REPORT# ____

WORK ORDER# ____

TEST PROCEDURE SHEET (1)

MODEL# 700 CLASSIC

CAL. OR GA. 250 SAVAGE

SERIAL# BG538390

SAFE FORCES

Headspace as Received: OK
Proof: ✓
Headspace after Proof: ____

XON: 1. 8 2. 8 3. 8

XOFF: 1. 6 2. 6 3. 6

XTRIGGER PULL (lbs.)

1. 4.75
2. 4.5
3. 4.75

FIRING PIN INDENT (in.)

1. ≠
2.
3.

BOLT OPEN FORCE (lbs.)

DRY FIRED:			COCKED:		
Initial:	Full Open:		Initial:	Full Open:	
1. ____	1. ____		1. ____	1. ____	
2. ____	2. ____		2. ____	2. ____	
3. ____	3. ____		3. ____	3. ____	

XBOLT LIFT FORCE (lbs.)

DRY FIRED:	COCKED:
Full Open:	Full Open:
1. ____	1. ____
2. ____	2. ____
3. ____	3. ____

BOLT RELEASE FORCE (lbs.)

1. ____
2. ____
3. ____

TESTER: RW / F.S.

DATE: 3-9-84

REPORT# ____

WORK ORDER# ____

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. B0539186

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

(7)

"MALFUNCTIONS"

	SECURE	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T CHAMBER	BINDING	SUPERFIRE	SLAMFIRE			
REM 100 S		5																										
M		5																										
F		5																										
WIN 87 S		5																										
M		5																										
F		5																										
WIN 100 S		5																										
M		5																										
F		5																										
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136838

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136838

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 2

DATE: _____ MODEL: _____ CAUSE: _____ SERIAL NO. 196

PREVIOUS ROUNDS _____

TEST TITLE. TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS" (7)

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SEARS	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	SAFETY DEFECTS			
REM 100 S		5																										
M		5																										
F		5																										
WIN 87 S		5																										
M		5																										
F		5																										
WIN 100 S		5																										
M		5																										
F		5																										
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136839

BARBER - PRESALE R 0136839

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. _____

TEST TITLE: TRIAL & PILOT 250 SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS" (2)

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRAINED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	RECYCLEMENTS			
REM 100 S		5																										
M		5																										
F		5																										
WIN 87 S		5																										
M		5																										
F		5																										
WIN 100 S		5																										
M		5																										
F		5																										
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136840

BARBER - PRESALE R 0136840

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

DATE: _____ MODEL: _____ CAUSE: _____ SERIAL NO. _____

PREVIOUS ROUNDS _____

TEST TITLE. TRIAL & PILOT 250 SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

(2)

_____	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SEAR	DON'T FEED	DON'T EJECT BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION SLOW UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS		
REM 100 S		5																									
M		5																									
F		5																									
WIN 87 S		5																									
M		5																									
F		5																									
WIN 100 S		5																									
M		5																									
F		5																									
TOTAL (PER MAL.)																											

BARBER - PRESALE R 0136841

BARBER - PRESALE R 0136841

TRIAL & PILOT TEST PROGRAM
CHECK LIST

GUN SELECTION:

- Eight firearms selected from minimum forty gun sample. All firearms to be completed through final inspection

VISUAL INSPECTION:

- ~~All eight firearms~~ -
- ~~Finishes~~, margins, checkering
- Representatives: Q.C., P.E.&C., R&D, Supervision

MEASUREMENTS:

- ~~Headspace~~
- Trigger pull
- Firing Pin indent
- Safe ON/OFF Forces
- ~~Firearm length~~
- ~~Firearm weight~~
- ~~Stock~~ dimensions
- Bolt lift
- Center of Gravity
- Action opening forces

COMPUTER AIDED TESTS AND MEASUREMENTS:

- Bolt Velocity
- ~~Muzzle~~ Velocity
- ~~Lock Time~~
- Gun Cycle Time

ACCURACY:

- Minimum Four gun sample
- Min./Max sight adjustments
- ~~Gallery device results~~
- Benchrest results
- Measurement results: ~~Bore, groove~~, twist, ~~groove~~

0.5"

PATTERN:

- Minimum four gun sample
- Measurement results: Bore, choke
- Rifled slug results
- Min/Max sight adjustment results (Slug gun)
- Pattern/P.O.I. results

TRIAL & PILOT TEST PROGRAM - Contd. -2-

CHECK LIST - Contd.

FUNCTION:

- Indoor jack shooting results
- Live round unload results - centerfire
- Outdoor field cycle test results - Breakdowns by:
  - Gun)
  - Shooter) All to include % and overall total
  - Ammo)

DROP/JAR-OFF:

- Measurement results
- Drop summary - heights, positions-remarks

LIMITED ENDURANCE:

Live Fire - (Minimum three gun sample)

- Measurement results
- Inspection summary
- Breakage summary
- Parts replacement/adjustment summary
- Ammo breakdown

Dry Cycle - (Minimum three gun sample)

- Measurement results
- Inspection summary
- Breakage summary
- Parts replacement/adjustment summary

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: _____ CAUSE: _____ SERIAL NO. B6538399

TEST TITLE. TRIAL & PILOT 250, SAVAGE MODEL 700

(10)

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

Ray 1
Skip 2
Bob 3
Ron 4

_____	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T EJECT	DON'T FEED	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
REM 100 S		5	OK																									
M		5	OK																									
F		5	OK																									
WIN 87 S		5	OK																									
M		5	OK																									
F		5	OK																									
WIN 100 S		5	OK																									
M		5	OK																									
F		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136844

BARBER - PRESALE R 0136844

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 2

PREVIOUS ROUNDS _____

DATE: _____ MODEL: _____ CAUGE: _____ SERIAL NO. 399

TEST TITLE. TRIAL & PILOT 250, SAVAGE MODEL 700

(10) TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	FAILED SHELL	DON'T FIRE	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STUCK MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION WILL NOT CLOSE	DON'T EXTRACT	BREECHES	ADJUSTMENTS	REPLACEMENTS	Light Cut		
REM 100 S		5	OK																									
M		5	OK																									
F		5	OK																									
WIN 87 S		5	OK																									
M		5	OK																									
F		5																								1		
WIN 100 S		5	OK																									
M		5	OK																									
F		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136845

BARBER - PRESALE R 0136845

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. B 6538401

PREVIOUS ROUNDS _____

TEST TITLE. TRIAL & PILOT 250, SAVAGE MODEL 700

(9)

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER CREEP	DON'T RESET	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BNG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	MISCELLANEOUS			
REM 100 S		5	OK																									
m		5	OK																									
F		5	OK																									
WIN 87 S		5	OK																									
m		5	OK																									
F		5	OK																									
WIN 100 S		5	OK																									
m		5	OK																									
F		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136846

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 2

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. 401

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT 250 SAVAGE MODEL 700

TTL. RDS. FIRED: _____

TTL. MALFUNCTIONS: _____

MALFUNCTION RATE: _____

(9)

"MALFUNCTIONS"

	SECONDS	NO. OF ROUNDS FIRED	FIRING	EJECTED SHELL	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STUCK MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JAMS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION TAKE UP	DON'T EXTRACT	BREAKAGE	ALTERATIONS	MISCELLANEOUS	HANG FIRE		
REM 100 S		5	1L																								
M		5	0L																								
F		5	6L																								
WIN 87 S		5																							1		
M		5	4L																								
F		5	0L																								
WIN 100 S		5																									
M		5																									
F		5																									
TOTAL (PER MAL.)																											

BARBER - PRESALE R 0136847

BARBER - PRESALE R 0136847

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. B 6539204

TEST TITLE: TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

(8)

"MALFUNCTIONS"

	SECONDS	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T EJECT	DON'T FEED NOT BACK	DON'T FEED NOT OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER HIGH	STEM CHAMBER LOW	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGE	EJECTION	SAFETY	
								LATCH																		
REM 100 S		5	OK																							
M		5	OK																							
F		5	OK																							
WIN 87 S		5	OK																							
M		5	OK																							
F		5	OK																							
WIN 100 S		5	OK																							
M		5	OK																							
F		5	OK																							
TOTAL (PER MAL.)																										

BARBER - PRESALE R 0136848

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 2

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. 304

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT 250, SAVAGE MODEL 700

(8)

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T CHAMBER	BRUISES	ABRASIONS	SCRATCHES			
REM 100 S		5	ok																								
m		5	OK																								
F		5	OK																								
WIN 87 S		5	ok																								
m		5	ok																								
F		5	OK																								
WIN 100 S		5	ok																								
m		5	ok																								
F		5	OK																								
TOTAL (PER MAL.)																											

BARBER - PRESALE R 0136849

BARBER - PRESALE R 0136849

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. B 6539 673

TEST TITLE. TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS" (6)

	SEQUENCE	NO. OF ACTIONS FIRED	FIRING	TRIGGER SHEER	DON'T RESET	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STRAYS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREECHES	ADJUSTMENTS	MISCONDUCT			BARBER - PRESALE R 0136850
REM 100 S		5	OK																								
M		5	OK																								
F		5	OK																								
WIN 87 S		5	OK																								
M		5	OK																								
F		5	OK																								
WIN 100 S		5	OK																								
M		5	OK																								
F		5	OK																								
TOTAL (PER MAL.)																											

BARBER - PRESALE R 0136850

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 2

PREVIOUS ROUNDS _____

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. 673

TEST TITLE: TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____

TTL. MALFUNCTIONS: (6)

MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	EJECTED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STUCK MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EJECT	BREAKAGE	ADJUSTMENTS	REPLACEMENTS		
REM 100 S		5	OK																								
M		5	OK																								
F		5	OK																								
WIN 87 S		5	OK																								
M		5	OK																								
F		5	OK																								
WIN 100 S		5	OK																								
M		5	OK																								
F		5	OK																								
TOTAL (PER MAL.)																											

BARBER - PRESALE R 0136851

BARBER - PRESALE R 0136851

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. B6539211

TEST TITLE: TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS" (5)

	SECONDS	NO. OF ROUNDS FIRED	FIRED	DON'T EJECT	DON'T FEED	DON'T LOCK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. gnd	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION WILL NOT CLOSE	DON'T EXTRACT	BREAKAGE	SLIDEFIRE	MISCHAMBER			
REM 100 S		5	ok																									
M		5	ok																									
F		5	ok																									
WIN 87 S		5	ok																									
M		5	ok																									
F		5	ok																									
WIN 100 S		5	ok																									
M		5	ok																									
F		5	ok																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136852

BARBER - PRESALE R 0136852

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 2

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. 8924

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS" (5)

	SECONDS	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
REM 100 S		5	ok																									
M		5	ok																									
F		5	ok																									
WIN 87 S		5	ok																									
M		5	ok																									
F		5	ok																									
WIN 100 S		5	ok																									
M		5	ok																									
F		5	ok																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 01368530537841

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 01368530

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: _____ CAUGE: _____ SERIAL NO. B6538385

TEST TITLE. TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS" (4)

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STUCK MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BREAKAGE	ADJUSTMENT	REPLACEMENT			
REM 100 S		5	ok																									
M		5	Ok																									
F		5	ok																									
WIN 87 S		5	OK																									
M		5	Ok																									
F		5	OK																									
WIN 100 S		5	Ok																									
M		5	OK																									
F		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136854

BARBER - PRESALE R 0136854

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 3

PREVIOUS ROUNDS _____

DATE: _____ MODEL: _____ CAUSE: _____ SERIAL NO. B 385

TEST TITLE: TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS" (4)

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STUCK MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ALTERATIONS	MISCELLANEOUS	MISFIRE		
REM 100 S		5	OK																									
M		5	OK																									
F		5	OK																									
WIN 87 S		5	OK																						1			
M		5	OK																									
F		5	OK																									
WIN 100 S		5	OK																									
M		5	OK																									
F		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 013685

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. B6539298

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____

TTL. MALFUNCTIONS: (3)

MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SECTION	NO. OF ROUNDS FIRED	FIRING	TRIGGER CREEP/WEIGHT	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION REG UP	DON'T CHAMBER	SLOPPINESS	ACCURACY	SHOOTABILITY			
REM 100 S		5	OK																								
m		5	OK																								
F		5	OK																								
WIN 87 S		5	OK																								
m		5	OK																								
F		5	OK																								
WIN 100 S		5	OK																								
m		5	OK																								
F		5	OK																								
TOTAL (PER MAL.)																											

BARBER - PRESALE R 01368560

BARBER - PRESALE R 01368560

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. B6539298

PREVIOUS ROUNDS _____

TEST TITLE. TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS" (3)

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STUCK MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HARD TO OPEN	DON'T CLOSE	BREAKAGE	ADJUSTMENTS	REPLACEMENTS	MISFIRE		
REM 100 S		5	ok																									
M		5	ok																									
F		5	ok																									
WIN 87 S		5	ok																							1		
M		5	ok																									
F		5	ok																									
WIN 100 S		5	ok																									
M		5	ok																									
F		5	ok																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136857

BARBER - PRESALE R 0136857

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. B6538390

TEST TITLE: TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS" (1)

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREECHES	ADJUSTMENTS	SCREWDRIVER			
REM 100 S		5	OK																									
M		5	OK																									
F		5	OK																									
WIN 87 S		5	OK																									
M		5	OK																									
F		5	OK																									
WIN 100 S		5	OK																									
M		5	OK																									
F		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136858

Heavy lift 2nd
87 WIW

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. 2

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. B6538390

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT 250, SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS" (1)

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BROKEN	STUCK CASE	MISCELLANEOUS	Hang fire		
REM 100 S		5	OK																									
M		5	OK																									
F		5	OK																									
WIN 87 S		5	OK																									
M		5	OK																									
F		5	OK																									
WIN 100 S		5	OK																									
M		5	OK																									
F		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136860

REPORT No.

Page_____

GUN #3

B6539298

ACCURACY: Minimum of 3 - 5-shot Groups

Ammunition Used REM. CAL. 250 SAVAGE 100Gr. P.S.P.

~~Previous Rounds~~ CODE T21H D4099

INDEX R250SV

	Group Size (in.)	Vertical Spread	Horizontal Spread
1	1.8	.85	1.7
2	1.2	1.0	1.0
3	1.6	1.3	.8
4			
5			
Avg.	1.5	1.0	1.1

Tester R. Williams

REM. STDS. 2.2" - 5 SHOT

Date 3-12-'84

P - 10-sh e load

High (i	Left (in.)

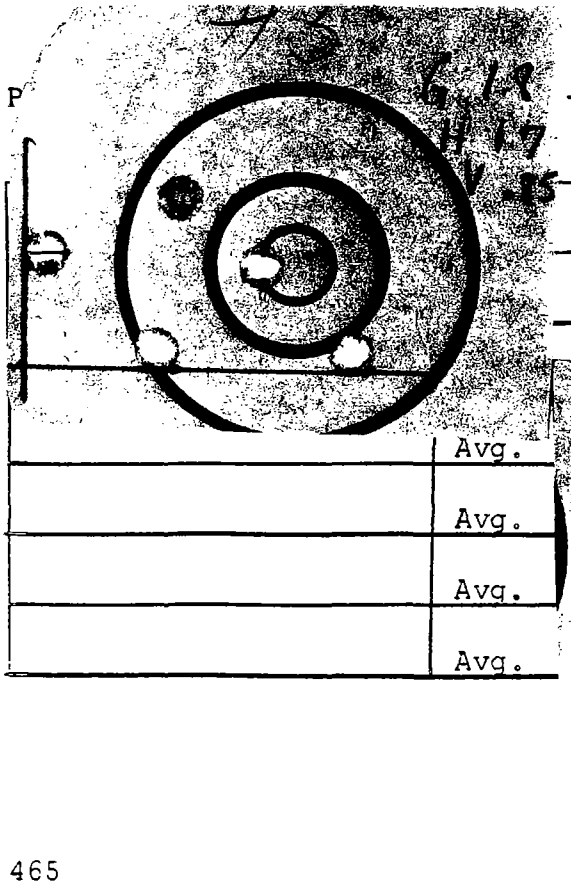
Avg.

Avg.

Avg.

Avg.

Date



465

REPORT No.

Page_____

GUN #8
B6539204

ACCURACY: Minimum of 3 - 5-shot Groups

Ammunition Used REM. CHL. 250 SAVAGE 100Gr. P.S.P.

~~Previous Rounds~~ CODE T21H D4099

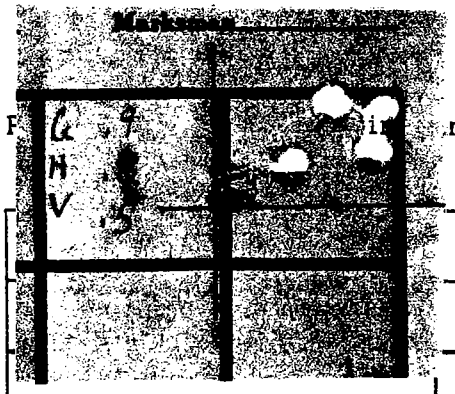
INDEX R250SV

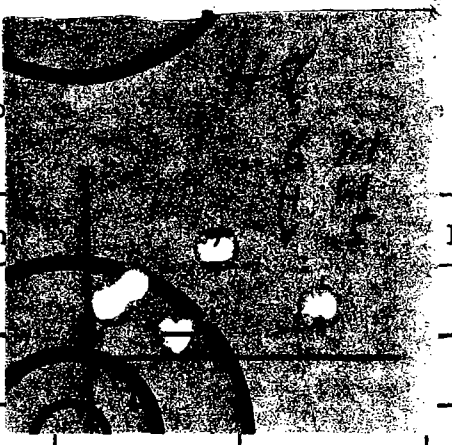
	Group Size (in.)	Vertical Spread	Horizontal Spread
1	.9	.5	.8
2	1.1	.5	1.1
3	1.2	.8	1.1
4			
5			
Avg.	1.0	.6	1.0

Tester R. Williams

REM. STDS. 2.2"-5 SHOT

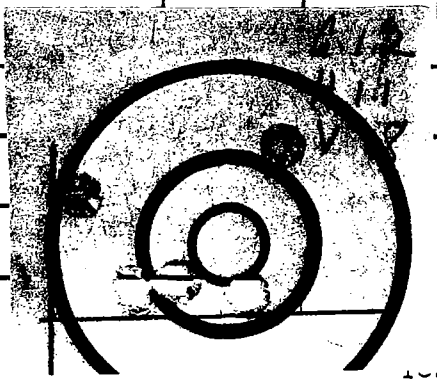
Date 3-12-'84





F ...m of 3 - 10-sho... load

	High (in.)	Left (in.)
Avg.		
Avg.		



Tester _____

Date _____

465

REPORT No.

Page_____

GUN #9
B6538401

ACCURACY: Minimum of 3 - 5-shot Groups

Ammunition Used REM. CAL. 250 SAVAGE 100Gr. P.S.P.

~~Previous Rounds~~ CODE T21H D4099
INDEX R250SV

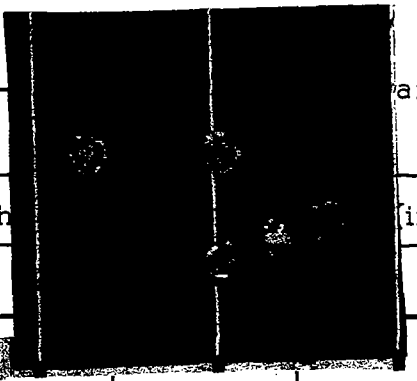
	Group Size (in.)	Vertical Spread	Horizontal Spread
1	1.0	.5	1.0
2	1.4	.6	1.3
3	1.1	.4	1.0
4			
5			
Avg.	1.1	.5	1.1

Tester R. Williams

Date 3-12-'84

REM. STDS. 2.2" - 5 SHOT





POI[illegible] mum of 3 - 10- ailable load

		High	in.)	Left (in.)
	Avg.			



Tester _____

Date _____

465

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

REPORT No.

Page

GUN #10
B 6538399

ACCURACY: Minimum of 3 - 5-shot Groups

Ammunition Used REM. CAL. 250 SAVAGE 100 GR. P.S.P.

~~Previous~~ ~~Rounds~~ CODE T21H D4099

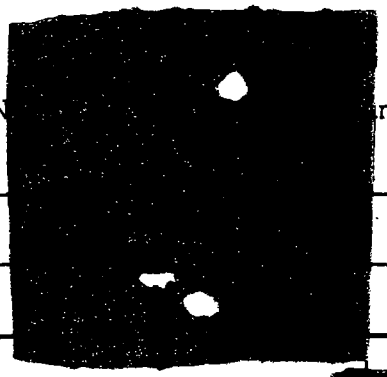
INDEX R250SV

	Group Size (in.)	Vertical Spread	Horizontal Spread
1	1.2	1.2	.8
2	1.1	1.1	.4
3	1.2	1.1	.9
4			
5			
Avg.	1.16	1.1	.7

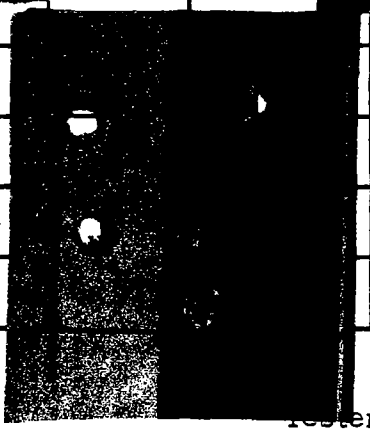
REM. STOS. 2.2" - 5 SHOT

Tester R. Williams

Date 3-12-84







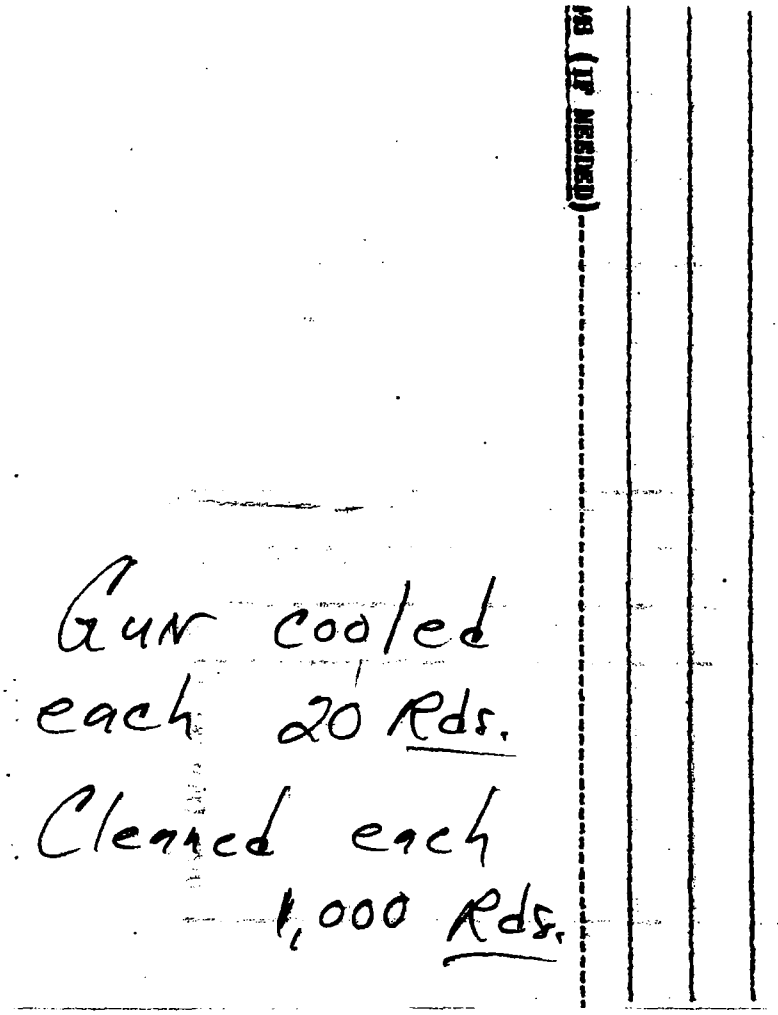
POIN m of 3 - 10-sho w able load

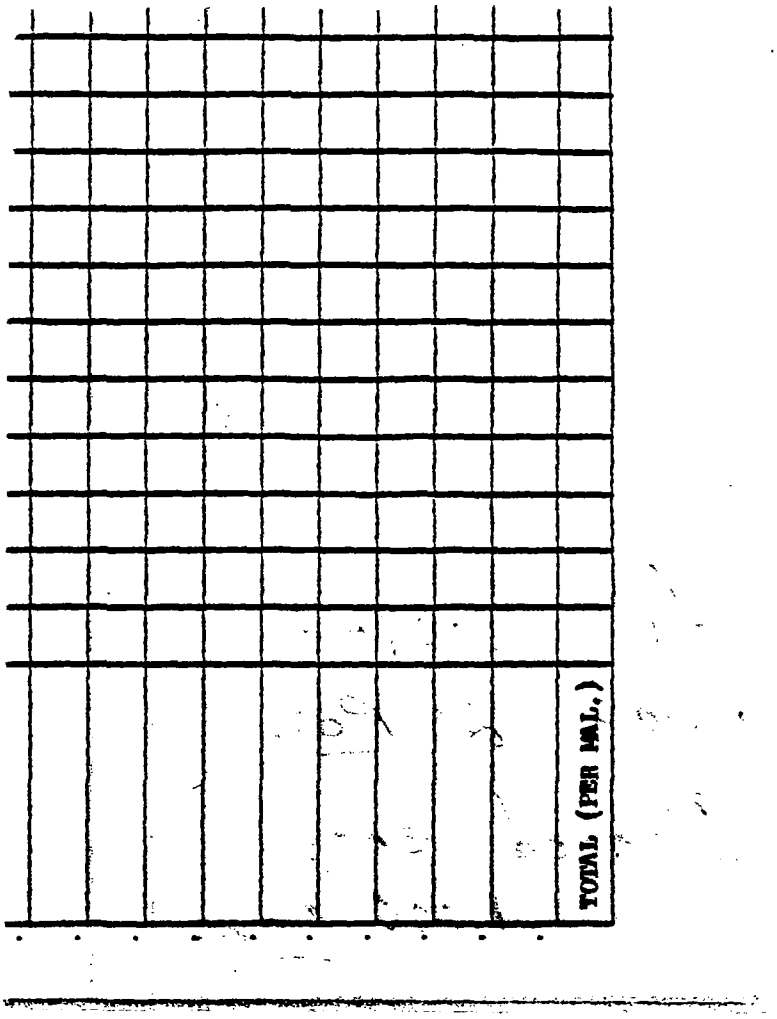
		High (in	.)	Left (in.)
	Avg.			

Tester

Date

465


Gun cooled
each 20 Rds.
Cleaned each
1,000 Rds.


TOTAL (PER MIL.)

JACK ENDURANCE CENTERFIRE

REPROT NO.: _____ PAGE NO. 1

DATE: 3-27-84 MODEL: 700 Classic CALIBER: 250 Savage SERIAL NO. B6539211

PREVIOUS ROUNDS 90

TEST TITLE: Endurance Tap Gun (5)

TTL. RDS. FIRED: 2000

TTL. MALFUNCTIONS: 0

MALFUNCTION RATE: _____

"MALFUNCTIONS"

Rem. 250
100Gr. P.S.P.
R250SV
AMMUNITION
Load Size

SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRAPPED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	ELEVATING	BOLT VELOCITIES	REMARKS (ON BACK) YES	REMARKS (ON BACK) NO
RW	100	OK																									
RW	100	OK																									
RW	100	OK																									
RW	100	OK																									
RW	100	OK																									
RW	500	OK																									
RW	500	OK																									
RW	500	OK																									
	2,000 Rds.																										
TOTAL (PER MAL.)																											

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 0136867
BARBER - PRESALE R 0136867

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: _____ GAUGE: _____ SERIAL NO. _____

TEST TITLE: TRIAL & PILOT 250 SAVAGE MODEL 700

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRAPPED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS		
REM 100 S		5																									
M		5																									
F		5																									
WIN 87 S		5																									
M		5																									
F		5																									
WIN 100 S		5																									
M		5																									
F		5																									
TOTAL (PER MAL.)																											

BARBER - PRESALE R 0136868

BARBER - PRESALE R 0136868

DIAGRAM (IF NEEDED)

REMARKS

Sand 4

87 - psp
x2501
9694

10' x2503 ST Exp
T&T MW40

10 guns -

INSPECTION COMMITTEE

R&D
- F. SUPRY
RANDY MURPHY
RAY JONES

QC
- DENNY Thomas

PESC

6538399

- Toe of Butt Pads — RAILS
- Dimple comb cut right hand side
- mar on trigger Guard front end, side
- cross-grain scratches Both sides
- rings on bolt plug
- rear sling swivel not seated

B6538401

- Mar left Rail
- incomplete checkering
- mar left side (forend)
- dip in belly
- too much wood margin left side tang

B6539204 dike wood

- indentation Right rail
- open grain ~~Right~~ side, fore-end
- front swivel screw too deep - wood marred - caved in
- wood to tang margin off center
- mars on fore-end

B6539186

- incomplete checkering front fore-end - undercuts on grips both sides
- front swivel screw not seated
- rough polishing marks front of fore-end on BBL
- sanding break through - poor stain behind comb cut ejection port
- wood broke from floor plate
- dent left side trigger guard - dip in belly
- Poor fit floor plate

B6539673

- run in finish right rail (checkering sealer)
- burr (wood) in cocking ~~notch~~ (bolt handle slot)
- wood broke from floor plate
- deep mar right side fore-end
- incomplete checkering
- two holes in wood by cross pin (reinforcing screw)
- sanding scratches left panel
- mar grip
- Dip in belly
- right rail sanding break through
- fore-end pattern off center more than normal

B6539211 -

- Burr (wood) in cocking notch bolt handle slot
- Bright mar front screw floorplate
- rear swivel screw not seated
- incomplete checkering
- mar in rail near receiver
- mar top of bbl back of roll mark
- glob of fill rear of ejection port
- dip in belly - cross grain scratches front of rear swivel

B6538385

- mar in wood right side swivel screw
- mar in receiver - where bolt handle hits
- Sanding break through - rail right side of rec.
- incomplete checkering
- excessive sd finish front of ejector port
- steel margin right side tang
- Dip in belly
- pits in bolt handle
- Burr in wood - bolt handle slot
- toe of butt pad

B6538390

- mars left & right side of fore-end
- butt pad to wood match at toe
- incomplete checkering
- mar top left rail
- mars (wood) left side of floor plate screw
- wood margin both side of tang
- mar front trigger guard.
- mis match in rear of port metal step

General comments -

- Rails too wide - Too flat
- Incomplete checkering
- Grip cap sanding not oval

B6539298

- runny finish right rail
- swivel screws - rear not seated - front seated too deep
- incomplete checkering
- mar right side fore-end by floor plate
- Dip in belly
- poor finish repair right side
- butt pad rear not sanding

B6539281

- bbl - dips - poor polish - undersize area ripple bbl. mars in grip
- bolt

851412 Sept 1985
M 700 Mountain Rifle 280 cal
Trigger Pilot

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

RD-69-8

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington DUPONT PETERS DUPONT

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"_____

cc: W.H. Coleman, II/File
J.W. Bower
J.R. Snedeker
K.W. Soucy
G.J. Hill
D.J. Anderson
L.B. Bosquet
R.S. Murphy
F.L. Supry

RESEARCH TEST AND MEASUREMENT REPORT

REPORT# 851412
SEPT. 3,1985

MODEL 700 MOUNTAIN RIFLE 280 CALIBER TRIAL AND PILOT EVALUATION

MODEL 700 280 CALIBER MOUNTAIN RIFLE TRIAL AND PILOT EVALUATION

ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700 280 Caliber Mountain Rifle, to be acceptable; upon the condition that the Plant investigates and corrects the glue failures that occurred on the adhesion of the fore end tip. The Trial and Pilot Evaluation consisted of Field Function, Accuracy, and an Endurance Test. The forty one (41) rifle sample was found to be within Remington Specifications for each phase of the Trial and Pilot Evaluation.

Prepared by: F.L. SUPRY
Date Prepared: 9/03/85

proofread and cleared by:

J.R. SNEDEKER, Research Supervisor
Test, Measurement & Mech. Analysis Lab _____

W.H. COLEMAN, II
New Products Research Lab Director _____

REPORT# 851412

WORK ORDER# 81389-911
DATE: SEPT. 3, 1985

TO: J.R. SNEDEKER
FROM: F.L. SUPRY

TITLE:

TRIAL AND PILOT EVALUATION: MODEL 700 280 CALIBER MOUNTAIN RIFLE

ABSTRACT:

On May 21, 1985 a request was received from R.S. Murphy to conduct a Trial and Pilot Evaluation of the Model 700 280 caliber Mountain Rifle. The evaluation was to consist of Field Function, 100 yard Accuracy, and Endurance. A sample run of forty one rifles was provided by production in August of 1985. No visual inspection was to be done on the sample rifles.

SCOPE OF TEST:

To determine if the production run samples meet Remington specifications set by the Research Design Section.

TEST RESULTS:

1. Forty one (41) rifles were subjected to a 20 round Field Function Test. The following malfunctions occurred:

   A. During the test the fore end tip came loose on four of the rifles.

   B. Three (3) operating malfunctions occurred, for an overall malfunction rate of 0.2%.

2. Ten rifles were tested for 100 yard accuracy and all ten were within the specified 3.5 inch group size.

3. Ten rifles were subjected to a 2000 round endurance. The following results occurred:

   A. Four rifles experienced no malfunctions. A total of six malfunctions occurred, an overall malfunction rate of 0.03%.

   B. One fore end tip came off, at 820 rounds.

REPORT# 851412

REPORT TEXT:

1. FIELD FUNCTION:

   A. All forty one of the rifles were subjected to the loading and firing of twenty (20) rounds of Remington ammunition, in a Field Function Test at the Ilion Fish and Game Club. The following results were obtained:

      a. Thirty four (34) of the rifles experienced no malfunctions.

      b. The rifles that experienced malfunctions, experienced them as follows:

         i. B6691073 - safe hard to take off
            B6710288 - 1 follower tip down
            B6710665 - 1 stem chamber left

      c. The fore end tip came off the following rifles:

         i. B6710588 - (after 10 rounds)
            B6691052 - (after 5 rounds)
            B6690266 - (after 5 rounds)
            B6690579 - (after 5 rounds)

2. ACCURACY:

   A. Ten rifles were tested for 100 yard accuracy. The groups were averaged for all ten rifles by three shot group, five shot group, and shooter. The following results were obtained:

      a. Shooter #1 - 3 shot group -- 2.098 inches
                      5 shot group -- 2.827 inches

      b. Shooter #2 - 3 shot group -- 2.479 inches
                      5 shot group -- 3.119 inches

   B. Individual results are included in the appendix of this report, in a summary prepared by Paul Conant.

3. ENDURANCE:

   A. Ten rifles were tested for 2000 round endurance. The following results were obtained:

      a. Four rifles experienced no malfunctions.
         i. B6688899 B6691097
            B6690272 B6690512

REPORT# 851412

REPORT TEXT: (continued)

3. ENDURANCE: (continued)

b. The rifles that experienced the malfunctions, experienced them as follows:

i. Rifle# B6691063 - the fore end tip came off at 820 rounds.
Rifle# B6710712 - trigger was hard to pull at 220 rounds.
Rifle# B6690555 - heavy bolt lift at 860 rounds.
Rifle# B6690491 - heavy bolt lift at 200 rounds.
Rifle# B6690514 - follower tip down at 620 rounds.
Rifle# B6710782 - heavy bolt lift at 1216 rounds.

TEST PROCEDURE:

1. FIELD FUNCTION:

A. All forty one rifles were subjected to the loading and firing of twenty rounds of Remington ammunition. The round robin method of firing the rifles was used, firing the rifles in both the medium and fast modes. The test was conducted at the Ilion Fish and Game Club.

B. The following ammunition was used:

a. 280 Caliber 150 grain.
280 Caliber 165 grain.

2. ACCURACY:

A. Refer to Appendix.

3. ENDURANCE:

A. The rifles used in the Endurance test were selected using random numbers.

B. Two thousand (2000) rounds were fired through each of ten rifles, one thousand each of 280 caliber 150 grain, and 280 caliber 165 grain Remington ammunition.

C. All shooting was done in the Research shooting room, with the rifles mounted in a shooting jack. All malfunctions were recorded.

4. APPENDIX:

A. Contents:

a. The Test Result report of the Accuracy test, written by Paul Conant

APPENDIX

MEASUREMENT LAB TEST RESULTS

REQUESTER: PLANT TESTER: P. Conant DATE: 08/30/85

REPORT NO.: 851412 WORK ORDER NO.: 81389-911

TEST TYPE: New design acceptance

FIREARM STAT'S : MODEL: Mountain Rifle CAL or GAUGE: 280 (7MM EXPRESS)

BARREL TYPE: _____ PROOFED: YES * NO ___

REASON FOR TEST : This test was conducted to determine if the Mountain Rifles met the accuracy specifications of 3.5 in. for a 5 shot group, and to see what the spread difference was between the 3 and 5 shot groups.

EQUIPMENT REQUIRED : Ten Mountain Rifles in 7MM express caliber, 12 power scope, 150 grain psp Remington ammo, lot # D6721.

TEST PROCEDURE : The guns were fired at 100 yards with three groups of five shots each. This procedure was accomplished with two technicians, one firing a set of groups from each gun while the other technician spotted and recorded where each bullet hit. This test procedure was used to later find the difference between the spread distance of three and five shot groups.

TEST RESULTS : The three group spread distances of five shots and three shots were averaged together for each gun and each shooter and then recorded. Then the spread distances for all the guns at three and five shot groups were averaged together. The results were as follows:

Shooter #1: 3 shot -- 2.098 in.
5 shot -- 2.827 in.

Shooter #2: 3 shot -- 2.479 in.
5 shot -- 3.119 in.

The tabulated results and the digitized pattern information accompany this report.

AUG. 30, 1985

MOUNTAIN RIFLE GROUP SPREADS

SERIAL NO.	PAUL CONANT		CHUCK STEPHENS	
	3 SHOT	5 SHOT	3 SHOT	5 SHOT
B6710665	1.839	2.468	2.228	2.439
B6710512	2.193	2.576	2.84	3.009
B6690418	2.156	2.751	2.363	3.034
B6691578	2.926	3.285	2.600	3.047
B6690561	2.899	3.281	2.38	2.921
B6690542	1.251	2.834	3.590	4.397
B6710768	1.461	1.867	1.594	2.584
B6691593	1.986	2.420	2.266	2.844
B6691038	2.576	3.461	2.091	3.191
B6710748	1.693	3.331	2.839	3.726
AVERAGE	**2.098**	**2.827**	**2.479**	**3.119**

EACH SPREAD REPRESENTS THREE GROUPS AT BOTH THREE AND FIVE SHOT GROUP SIZES

Report No. 85 1412

RESEARCH TEST & MEASUREMENT LAB WORK REQUEST

	AREA OF TESTING		
____ Developmental	____ Safety Related	____ Litigation	
____ Design Acceptance	____ Competitive Evaluation	____ Warehouse Audit	
____ Pre-Pilot	____ New Design	____ Cost Reduction	
* Pilot	* Design Change	Stake ____	
____ Production Acceptance	____ Plant Assistance	____ Other	

FIREARM STAT'S.	REPORT REQ'D.	
MODEL: 700 M.R.	FORMAL *	DATE REQUESTED: 5-21-85
CAL. or GAGE: 280		DATE NEEDED BY: ____
BARREL TYPE: 22"	TEST RESULTS ONLY ____	REQUESTED BY: RS MURPHY
PROOFED: YES * NO ____		WORK ORDER NO: 81389-911

TEST TYPE

____ Strength Test	____ Ammunition Test	____ Dry Cycle Test	____ Photo/Video
____ Function Test	____ Environmental Test	____ Measurements	____ Other ____
* Accuracy Test	____ Customer Complaint	* Endurance Test	____

EXPLAIN IN DETAIL THE REASON FOR THIS TEST:

The T+P evaluation of the Mountain Rifle show that this rifle looks and performs at least as well as the M/700 BDL. This T+P will be concerned with accuracy, endurance, visual appearance and function (inasmuch as endurance testing must include function testing)

GUNS REQUIRED: 12 rifles to be supplied by Process

NOTE: NO firearms or parts will be tested in the Labs unless they are accompanied by a Work Request, and both are delivered to the Labs by the designer or engineer. All Work Requests are to be filled out in detail. No Exceptions.

DATE COMPLETED: ____

TEST COMPLETED BY: ____

REPORT DATE: ____

G-88

DON'T SAY IT—*WRITE IT*

To _____ Date _____

From _____

Shooters

Paul Covant
Bill Dickingson
Marvin Failing
Dale Jennings
Jerry Selan
John Eckler

"THE SAFE WAY IS THE SMART WAY"

WR# 851412

81389-911

T&P

Field Function
Endurance
Accuracy

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO.

PREVIOUS ROUNDS: _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6710748

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER RISE	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
150gr MED	BP	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 013688

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690555

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED SHELL	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STUMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T CONVEY	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
150gr MED	MF	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136888

BARBER - PRESALE R 0136888

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690268

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
150gr MED	MF	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136889

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6691593

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 8
MALFUNCTION RATE: 8

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FEEDING	FAILED TO EJECT	DON'T EJECT	DON'T FLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STOPS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REMOVAL			
150gr MED	BD	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136890

BARBER - PRESALE R 0136890

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690418

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHELL	DON'T EJECT	DON'T BOLT BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STOPS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ALTERATIONS	REPLACEMENTS			
150gr MED	PC	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136891

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690257

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 8
MALFUNCTION RATE: 8

"MALFUNCTIONS"

	SHOOTING	NO. OF ROUNDS FIRED	FIRING	TURNED SHELL	DON'T EJECT	DON'T FEED	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOOSENS	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	MISFIRES	REPLACEMENTS			
150gr MED	DJ	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136892

BARBER - PRESALE R 0136892

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT CAUCE: .280 CAL SERIAL NO. B6710768

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T FULLY BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BREECHES	ADJUSTMENTS	SCREWDRIVER			
150gr MED	JE	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 01368930

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT CAUCE: .280 CAL SERIAL NO. B6710620

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	UNLOCKED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREECHES	ADJUSTMENTS	MISC.			
150gr MED	DJ	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136894

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136894

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT CAUCE: .280 CAL SERIAL NO. B6690523

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 8
MALFUNCTION RATE: 8

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER CREEP	DON'T FIRE	DON'T EJECT	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STUCK MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGE	ADJUSTMENTS	SCREWDRIVER			
150gr MED	JS	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136895

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690553

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SEEATER	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T FEED	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	MISCELLANEOUS			
150gr MED	BD	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 01368960

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO.

DATE: MODEL: 700 MT CAUGE: .280 CAL SERIAL NO. B6710712

PREVIOUS ROUNDS

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TEARED SHELL	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER HIGH	STEM CHAMBER LOW	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T RETRACT	SEARING	ADJUSTMENTS	STRIKER/FACE			
150gr MED	MF	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 013689
CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6710506

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	TRAINED SHELL	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	FEET/MISFIRES			
150gr MED	JE	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136898

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT CAUCE: .280 CAL SERIAL NO. B6690491

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	STACKED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STAYS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BRUISES	ADJUSTMENTS	REMOVAL			
150gr MED	PC	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136899

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136899_537007

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6691565

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 8
MALFUNCTION RATE: 8

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	UNLOCKED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER HIGHEST	STEM CHAMBER LOWEST	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREECHFACES	ADJUSTMENTS	FEED MECHANISM			
150gr MEO	BD	5	OK																									
FAST			OK																									
165gr MEO			OK																									
FAST			OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136900

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT CAUCE: .280 CAL SERIAL NO. B6688869

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED SHELL	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	SAFETY/LEVER			
150gr MED	JS	5	OK																									
FAST			OK																									
165gr MED			OK																									
FAST			OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 01369010

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6640272

TEST TITLE: TRIAL & PILOT FIELD FUNCTION _____

TTL. RDS. FIRED: 90
TTL. MALFUNCTIONS: 8
MALFUNCTION RATE: 8

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRACED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	POLISHER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
150gr MEO	JE	5E	OK																									
FAST		5	OK																									
165gr MEO			OK																									
FAST			OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136902

BARBER - PRESALE R 0136902

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT CAUGE: .280 CAL SERIAL NO. E669578

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FEATHER SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
150gr MEO	DJ	~~200~~	OK																									
FAST		5	OK																									
165gr MEO			OK																									
FAST			OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136903

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO.

DATE: MODEL: 700 MT CAUSE: .280 CAL SERIAL NO. B6710611

PREVIOUS ROUNDS

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T FIRE	DON'T ELEV BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STOPS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER RISE	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION RING UP	DON'T EXTRACT	BREECHES	ADJUSTMENTS	SEAR ENGAGEMENT			
150gr MED	PC	5	OK																									
FAST			OK																									
165gr MED			OK																									
FAST			OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 01369044

BARBER - PRESALE R 01369044

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO.

PREVIOUS ROUNDS

DATE: MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6710512

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRACED SHELL	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
150gr MED	MF	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136905

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136905

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690542

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SEROSER	NO. OF ROUNDS FIRED	FIRING	HEADED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
150gr MEO	PC	5	OK																									
FAST		5	OK																									
165gr MEO		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136906

BARBER - PRESALE R 0136906

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690460

TEST TITLE: TRIAL & PILOT FIELD FUNCTION _____

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T FLY BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BIDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	SEPARATE	SCRATCHED	STRAIGHTEN			
150gr MED	BD	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 013690Z

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6691038

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	EJECTED SHELL	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER EJECT	STEM CHAMBER LOW	STEM CHAMBER EJECT	STEM CHAMBER LOW	SHELL JUMPS MAG.	FOLLOWER RIDES	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	SEPERATES	ALTOGETHER	STRAWBERRIES			
150gr MED	MF	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136908

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412

PAGE NO.

DATE:

MODEL: 700 MT

GAUGE: .280 CAL

SERIAL NO. B6690561

PREVIOUS ROUNDS

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20

TTL. MALFUNCTIONS: 0

MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T FLY BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	SCREWDRIVER			
150gr MED	PC	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136909

BARBER - PRESALE R 0136909

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6691097

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	EJECTED SHELL	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. gnd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LOW	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	HEADSPACE	ADJUSTMENTS	SCREWDRIVER			
150gr MED	DJ	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 01369 10

BARBER - PRESALE R 01369 10

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690381

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FEATHER SHELL	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
150gr MED	JS	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136911

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690518

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	FAILED SHELL	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STUCK MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	HEADSPACE	ADJUSTMENTS	SCREWDRIVER			
150gr MED	PC	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136912

BARBER - PRESALE R 0136912

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO.

PREVIOUS ROUNDS

DATE: MODEL: 700 MT CAUSE: .280 CAL SERIAL NO. B6690595

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	STROKE	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STRAYS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREECHES	ADJUSTMENTS	PRIMER PROTRUDES			
150gr MEO	BD	5	OK																									
FAST		5	OK																									
165gr MEO		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136913

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690512

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	HAMMER SLOWLY	DON'T FIRE	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STOPS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER HIGH	STEM CHAMBER LOW	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BNG UP	DON'T EXTRACT	BREECHES	AUTOMATICALLY	FIRE CONTINUOUSLY			
150gr MED	MF	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136914

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6710534

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 8
MALFUNCTION RATE: 8

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	WEAPON SHIFT	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER HIGH	STEM CHAMBER LOW	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BNG UP	DON'T EXTRACT	BREAKAGE	ADJUSTMENTS	REPLACEMENTS			
150gr MED	JE	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136915

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136915

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6710782

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T FLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BRIDGES	SLIDE LOCKS	SLIDE CLOSES			
150gr MED	DJ	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 01369'6

BARBER - PRESALE R 0136916

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6710612

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 8
MALFUNCTION RATE: 8

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FITTING	FAILED TO EJECT	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STUCK MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	SCREWS LOOSE			
150gr MEO	JS	5	OK																									
FAST		5	OK																									
165gr MEO		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 013691

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6691063

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 8
MALFUNCTION RATE: 8

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER HIGHER	STEM CHAMBER LOW	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	MISCELLANEOUS			
150gr MED	DJ	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136918

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690581

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SECTIONS	NO. OF ROUNDS FIRED	FIRING	FAILED TO EXTRACT	DON'T EJECT	DON'T FEED BACK	DON'T LOCK BACK	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER: ENTER	STEM CHAMBER: LOCK	STEM CHAMBER: RIGHT	STEM CHAMBER: LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T CHAMBER	SLOW OPEN	SLOW CLOSE	SLUGGISHNESS	STIFF ACTION			
150gr MED	PC	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136919

BARBER - PRESALE R 0136919

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO.

DATE: MODEL: 700 MT CAUGE: .280 CAL SERIAL NO. B6690514

PREVIOUS ROUNDS

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRED	TRIGGER OVERTRAVEL	DON'T FIRE	DON'T EJECT	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER SIDE TILTS	LOADING	BOLT OVERRIDE	ACTION TAKE UP	DON'T CYCLE	SEPARATE	SLOW CYCLE	STOVEPIPE			
150gr MED	JS	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136920

JACK FUNCTION - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

DATE: _____ MODEL: _____ CALIBER: _____ SERIAL NO. B6690512

PREVIOUS ROUNDS _____

TEST TITLE: _____

TTL. RDS. FIRED: _____

TTL. MALFUNCTIONS: _____

MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T FIRE/SEAR	BREECHES	ADJUSTMENT	REMARKS			
R280R1- 1000 R280R1- 1000	BV	200	OK																									
	BV	100 100	OK																									
	BV	200	OK																									
	BV	200	OK																									
	BV	200	OK																									
R280R2	BV	200	OK																									
	BV	200	OK																									
	BV	200	OK																									
	BV	200	OK																									
	BV	100	OK																									
	BV	100	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0136921

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136921

JACK FUNCTION - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

DATE: _____ MODEL: _____ CALIBER: _____ SERIAL NO. B6690272

PREVIOUS ROUNDS _____

TEST TITLE: _____

TTL. RDS. FIRED: _____

TTL. MALFUNCTIONS: _____

MALFUNCTION RATE: _____

"MALFUNCTIONS"

R280R1 - 1000 R280R2 - 1000	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	FAILED SHELL	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL SHES THEN	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL SHES MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION TAKE UP	DON'T ENGAGE	BREAKAGE	MISCELLANEOUS	MISCELLANEOUS		
R280R1	(1)	200	OK																								
"	(2)	200	OK																								
"	(3)	200	OK																								
"	(4)	200	OK																								
"	(5)	200	OK																								
	(6)	100	OK																								
R280R2	(1)	100	OK																								
	(2)	100	OK																								
	(3)	100	OK																								
	(4)	200	OK																								
	(5)	200	OK																								
	(6)	200	OK																								
TOTAL (PER MAL.)																											

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 0136922
BARBER - PRESALE R 0136922

JACK FUNCTION - CENTERFIRE REPROT NO.: _____ PAGE NO. _____

DATE: 8-27-85 MODEL: 700 mountain CALIBER: 280 SERIAL NO. B6691097

PREVIOUS ROUNDS: 0

TEST TITLE: Endurance

TTL. RDS. FIRED: 2000
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T FIRE	DON'T EJECT	DON'T LOCK BACK	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CYLINDER: BIND	STEM CYLINDER: LOCK	STEM CYLINDER: BIND	STEM CYLINDER: LOCK	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	BOLT WON'T ACTION CLOSE UP	DON'T EXTRACT	SEPARATE	ASSEMBLY	DISASSEMBLY		
Shoot 1000 rds R280R1 Shoot 1000rds R280R2																											
R280R2	JE	900																									
R280R1	JE	500																									
R280R2	JE	500																									
R280R1	JE	300 200																									
TOTAL (PER MAL.)																											

BARBER - PRESALE R 0136923

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136923

JACK FUNCTION - CENTERFIRE

REPROT NO.: _____ PAGE NO. 2

DATE: 8/27/85 MODEL: 700 MT CALIBER: 280 SERIAL NO. B6658869

PREVIOUS ROUNDS 1000

TEST TITLE: 2000 rd ENDURANCE

TTL. RDS. FIRED: _____

TTL. MALFUNCTIONS: _____

MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER EJECT	STEM CHAMBER LOCK	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BNG UP	DON'T FIRE	SEAR BREAKS	SAFETY	DISCONNECTOR		
R 280 R1 -1000 R 280 R2 -1000																											
R 280 R1	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	R2	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
		1000																									
TOTAL (PER MAL.)																											

2,000 rds total

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 0136924
BARBER - PRESALE R 0136924

Field test
RDS- 20

JACK FUNCTION - CENTERFIRE

REPROT NO.: ______ PAGE NO. 1

PREVIOUS ROUNDS 0

DATE: 8/26/85 MODEL: 700 MT CALIBER 280 SERIAL NO. B6688869

TEST TITLE. 2000 rd Endurance

TTL. RDS. FIRED: ______
TTL. MALFUNCTIONS: ______
MALFUNCTION RATE: ______

"MALFUNCTIONS"

R280R1-1000 R280R2-1000	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRAPPED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS		
R280RA	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
	RE	100	OK																								
		1000																									
TOTAL (PER MAL.)																											

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136925

JACK FUNCTION - CENTERFIRE

REPROT NO.: ________ PAGE NO. ________

DATE: 8-26-85 MODEL: 700 mountain CALIBER: 280 SERIAL NO. B6690555

PREVIOUS ROUNDS: 0

TEST TITLE. Endurance

TTL. RDS. FIRED: ________
TTL. MALFUNCTIONS: ________
MALFUNCTION RATE: ________

"MALFUNCTIONS"

shoot 1000 rds R280R1
shoot 1000 rd R280R2

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRAPPED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS	Heavy Bolt Lift		
R280R	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
	JE	60 100																								30		
	JE	100																										
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136926

BARBER - PRESALE R 0136926

@ 860 rds Heavy bolt Lift 8-27-85 JE

↳ DEBURRED CAM SURFACE OF F.P. + LUBED 8-27-85 RH

@ 1540 rds Trigger pull over 10 lbs 8-28-85 JE Lubed

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136927

BARBER - PRESALE R 0136927

JACK FUNCTION - CENTERFIRE

REPROT NO.: ____ PAGE NO. ____

DATE: 8-26-85 MODEL: 700 mountain CALIBER .280 SERIAL NO. B6690555

PREVIOUS ROUNDS 1000

TEST TITLE. Endurance

TTL. RDS. FIRED: 2000
TTL. MALFUNCTIONS: ____
MALFUNCTION RATE: ____

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRAPPED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
R28DR1	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
	JE	100																										
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136928

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

JACK FUNCTION - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

DATE: 8-30-85 MODEL: 700 M.T. RIFLE CALIBER: 30-06 SERIAL NO. B6690514

PREVIOUS ROUNDS: 0

TEST TITLE: Jack Endurance

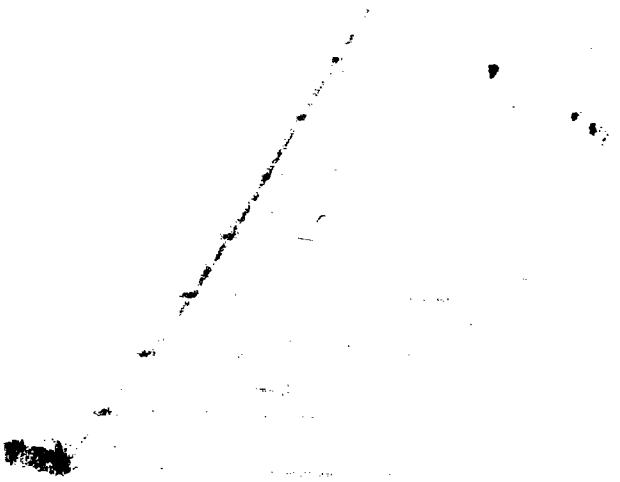
TTL. RDS. FIRED:
TTL. MALFUNCTIONS:
MALFUNCTION RATE:

"MALFUNCTIONS"

R280R1 - 1000
R280R2 - 1000

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	FAILED SHELL	DON'T EJECT	DON'T FEED BACK	DON'T LOCK BACK	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STUCK MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER HIGH	STEM CHAMBER LOW	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION ENG UP	DON'T EXTRACT	RELEASES	AUTOMATICS	RECHAMBERS	Follower tip		
R280R1	MF	200	OK																									
	MS	200	OK																									
	MS	200	OK																									
	MS	200																								1		
	MS	80																										
	RU	120	OK																									
R280R2	MF	200	OK																									
	RU	200	OK																									
	MS	200	OK																									
	MS	200	OK																									
	MS	200	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE P-010000



(1) (2) 620 Rds Follower tipped down.

JACK FUNCTION - CENTERFIRE

REPROT NO.: 85142 PAGE NO. 1

DATE: 8-26-85 MODEL: 700 MT CALIBER: 280 SERIAL NO. B67 10782

PREVIOUS ROUNDS: 0

TEST TITLE: Endurance

TTL. RDS. FIRED:
TTL. MALFUNCTIONS:
MALFUNCTION RATE:

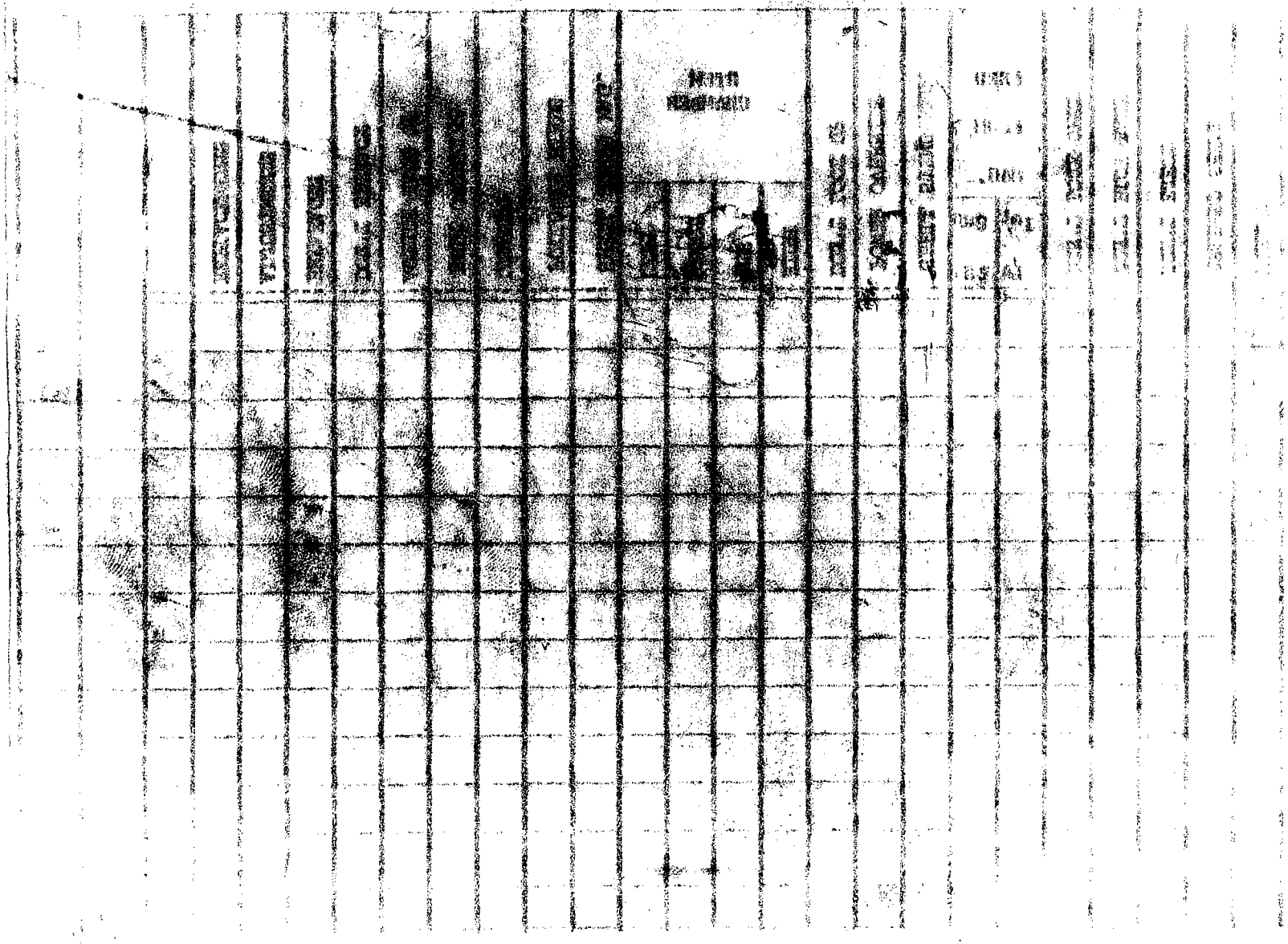
"MALFUNCTIONS"

	SEQUENCE	CARTRIDGE OR MAG.	FIRING	FAILURE TO FEED	FAILURE TO EJECT	FAILURE TO LOCK UP	FAILURE TO UNLOCK	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SLOW SPEED TIMES	POWER OVERTRAVEL	FAILURE TO LOCK UP	STEM CHAMBER				MAG. CATCH TIMES	SLIDE REACTION	FIRING	ACCIDENTAL DISCHARGE	SLOW BOLT ACTION	SAFETY	SAFETY/FIRE	SAFETY/BOLT			
1000 Rds K280K																											
1000 Rds R280R2																											
R280K2	1	200	OK																								
	2	200	OK																								
	3	200	OK																								
	4	200	OK																								
	5	200	OK																								
R280R1	1	200	OK																								
	2	100	OK																								
	3	100	OK																								
	4	200	OK																								
	5	200	OK																								
	6	200	OK																								
TOTAL (PER MAL.)																											

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 0136931
BARBER - PRESALE R 0136931

@ 1216 Rds 1-HEAVY BOLT LIFT

TOOK BURR OFF BOLT LOCKING LOCK-CAM SURFACE & LUBED



CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 013932

BARBER - PRESALE R 013932

Field test 2000s

JACK FUNCTION - CENTERFIRE

REPROT NO.: 8

PAGE NO.

DATE:

MODEL: 700 mT

CALIBER: 280

SERIAL NO. B6690491

PREVIOUS ROUNDS: 0

TEST TITLE: 2000 rd Endurance

TTL. RDS. FIRED:

TTL. MALFUNCTIONS:

MALFUNCTION RATE:

"MALFUNCTIONS"

R280R1-1000

R280R2-1000

	SHOOTER	CELL SOURCE NO. OF ROUNDS	FIRING	TIMES OVERRIDE	DON'T FEED	DON'T EJECT	DON'T LOCK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER: HIGH	STEM CHAMBER: LOW	STEM CHAMBER: RIGHT	STEM CHAMBER: LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION SLOW UP	DON'T CYCLE	SLOW BOLT	MISALIGNMENT	MISCELLANEOUS	84	over	
R280R1	RE	100	OK																								✓		
	RE	100	OK																										
	RE	100	OK																										
	RE	100	OK																										
	RE	100	OK																										
	RE	40 60	OK																										
	JE	400	OK																										
R280R2	JE	500	OK																										
	JE	200	OK																										
	JE	300	OK																										
TOTAL (PER MAL.)																													

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136933

BARBER - PRESALE R 0136933



@ #8 - Lube bolt

JACK FUNCTION - CENTER

REPROT NO.: _____ PAGE NO. _____

DATE: _____ MODEL: _____ CALIBER: _____ SERIAL NO. B6710 712

PREVIOUS ROUNDS _____

TEST TITLE: _____

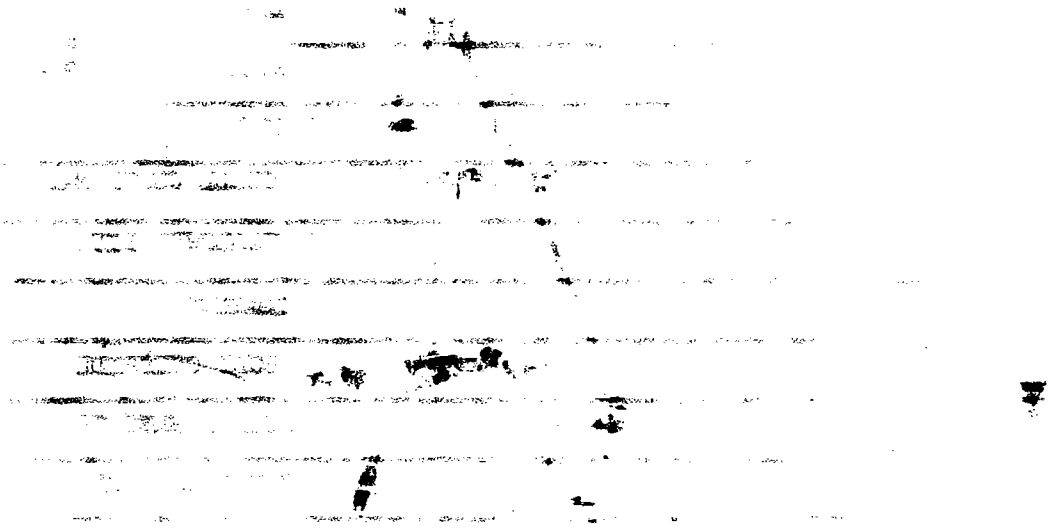
TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

R280R1 - 1000 R280R2 - 1000	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TAKEN OUT SHELL	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T FUNCTION	BREAKAGE	ADJUSTMENT	MISCELLANEOUS			
R280R1	MS.	200	OK																									
	MS.	100	OK																									
	MS.	100	OK																									
	MS.	200	OK																									
	MS.	200	OK																									
	MS.	200	OK																									
R280R2	MS.	200	OK																									
	MS.	200	OK																									
	MS.	120	OK.																									
	MS.	80	OK																									
	MS.	200	OK																									
	MS.	200	OK																									
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER PRESALE R 013935

@ 220 trigger is hard TO PULL. 8-2 6-8 .: MF.



JACK FUNCTION - CENTERFIRE

REPROT NO.: 85142 PAGE NO. 1

DATE: 8-26-85 MODEL: 700 MT CALIBER: 280 SERIAL NO. B 6691063

PREVIOUS ROUNDS: 0

TEST TITLE: Endurance

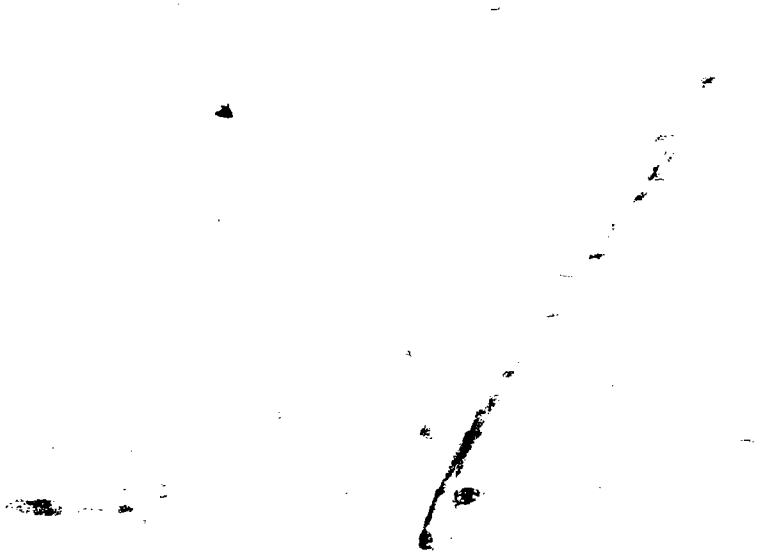
TTL. RDS. FIRED:
TTL. MALFUNCTIONS:
MALFUNCTION RATE:

"MALFUNCTIONS"

1000 Rds - R280R1
1000 rds - R280R2

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	DON'T EJECT	DON'T FLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGES	AUTOSEARS	SCREWS/NUTS			
R280R1	DJ	200	OK																									
	DJ	200	OK																									
	DJ	200	OK																									
	DJ	200	OK																									
	DJ	200	OK																				X					
R280R2	DJ	200	OK																									
	DJ	200	OK																									
	DJ	200	OK																									
	DJ	200	OK																									
	DJ	200	OK																									
TOTAL (PER ML.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 013693
BARBER - PRESALE R 013693



@ 830 Rds Fore End Tip Fell off

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6710588

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 8
MALFUNCTION RATE: 8

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	TRIGGER SEARCH	DON'T FEED	DON'T EJECT BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER DEEP	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	RECHARGES	ADJUSTMENTS	REPLACEMENTS			
150gr MED	JE	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER BRESALE B13888


*Fore end Tip Sell $$$

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6691052

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SPRING	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BREAKAGE	MISFIRES	SLAMFIRE			
150gr MEO	BD	5	OK																									
FAST		5	OK																									
165gr MEO		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE P013041

* Fone end Tip Fell off

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6690266

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	FAILURE TO RETURN TO SAFE	FAILURE TO FIRE	TIMER OPERATED	DON'T EJECT	DON'T FEED NEW ROUND	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER: HIGH	STEM CHAMBER: LOW	STEM CHAMBER: RIGHT	STEM CHAMBER: LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION WILL NOT CYCLE	DON'T EJECT	SAFETY	ADJUSTMENTS	SLOW LOCK			
150gr MED	OE	5	OK																							X		
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 013943

BARBER - PRESALE R 013943

* Fore end Tip Fell Off

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

DATE: _____ MODEL: 700 MT CAUGE: .280 CAL SERIAL NO. B6690579

PREVIOUS ROUNDS _____

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	WEAPON SHIFTED	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER EJECT	STEM CHAMBER LOT	STEM CHAMBER EJECT	STEM CHAMBER LOT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BNG UP	DON'T EXTRACT	BREAKAGE	ADJUSTMENTS	STONEWALL			
150gr MED	DJ	5	OK																							*		
FAST		5	OK																									
165gr MED		5	OK																									
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE P-013045

* Fore end Tip Sell ass.

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO.

PREVIOUS ROUNDS

DATE: MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6691073

TEST TITLE. TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 1
MALFUNCTION RATE: 5

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRAPPED SHELL	DON'T EJECT	DON'T BLOW BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION HANG UP	DON'T EXTRACT	BREAKAGES	ADJUSTMENTS	REPLACEMENTS			
150gr MED	JS	5	OK																									
FAST		5	OK																									
165gr MED		5	OK																							*		
FAST		5	OK																									
TOTAL (PER MAL.)																												

BARBER - PRESALE R 0135947
BARBER - PRESALE R 0135947

* Safe Hand to take off

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO.

PREVIOUS ROUNDS

DATE: MODEL: 700 MT GAUGE: .280 CAL SERIAL NO 86710288

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 1
MALFUNCTION RATE: 5

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FEEDING	TURNED CASES	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER HIGH	STEM CHAMBER DEEP	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BNG UP	DON'T EXTRACT	SEQUENCE	AZIMUTH	RECIPROCATE		
150gr MED	MF	5	OK																								
FAST		5	OK																								
165gr MED		5																							1	Follower Type Issue	
FAST		5	OK																								
TOTAL (PER MAL.)																											

BARBER - PRESALE B 0136949

FIELD CYCLE TEST - CENTERFIRE

REPROT NO.: 851412 PAGE NO. _____

PREVIOUS ROUNDS _____

DATE: _____ MODEL: 700 MT GAUGE: .280 CAL SERIAL NO. B6710665

TEST TITLE: TRIAL & PILOT FIELD FUNCTION

TTL. RDS. FIRED: 20
TTL. MALFUNCTIONS: 1
MALFUNCTION RATE: 5

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T EJECT	DON'T FEED BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER HIGHEST	STEM CHAMBER LOW	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BNG UP	DON'T EXTRACT	HANGFIRES	MISFIRES	SLAMFIRES	RICOCHETS		
150gr MED	SE	5	OK													1[5]											
FAST		5	OK																								
165gr MED		5	OK																								
FAST		5	OK																								
TOTAL (PER MAL.)																											

BARBER - PRESALE R 0136950

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

BARBER - PRESALE R 0136950

860 512

700 CLASSIC T&P 264 WIN MAG

VISUAL - ACCURACY

RD-69-B

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington DUPONT PETERS DUPONT

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"_____

cc: W.H. Coleman, II/File
J.W. Bower
J.G. Hill
J.R. Snedeker
F.L. Supry

RESEARCH TEST AND MEASUREMENT REPORT
REPORT# 860512

MODEL 700 CLASSIC .264 WIN. MAG. CALIBER TRIAL AND PILOT EVALUATION

MODEL 700 CLASSIC .264 WIN. MAG. CALIBER TRIAL AND PILOT EVALUATION

ABSTRACT:

Research and Development finds the Trial and Pilot Evaluation of the Model 700 .264 Win. Mag. caliber to be acceptable. However, the following should be investigated, by production:

1. During the Visual inspection rifle # B6763559 was found to have a floor plate latch that was difficult to latch.

Prepared by: F.L. SUPRY
Date Prepared: 3/14/86

proofread and cleared by:

J.R. SNEDEKER, Research Supervisor
Test, Measurement & Mech. Analysis Lab _____

W.H. COLEMAN, II
New Products Research Lab Director _____

REP.#860512 W.O.# 54489-000

MODEL 700 CLASSIC .264 WIN. MAG. CALIBER TRIAL AND PILOT EVALUATION

TO: J.R. Snedeker
FROM: F.L. Supry

INTRODUCTION:

On February 20, 1986 a request to conduct a Trial and Pilot Evaluation on the Model 700 Classic .264 Win. Mag. caliber rifle was received by the Test Lab. The evaluation would use eight guns, withdrawn from the warehouse, and consist of Visual Inspection, Field Function, and 100 Yard Accuracy.

SCOPE OF TEST:

To determine if the production run samples meet Remington Specifications set by the Research Design Section.

TEST RESULTS:

The Model 700 Classic, chambered in the .264 Win. Mag. caliber, was found to be acceptable in all phases of the Trial and Pilot Evaluation.

REPORT TEXT:

1. VISUAL INSPECTION:

A. The visual inspection committee found no major items in the appearance of the rifles inspected.

B. The following general comments were made in overall reference to the rifles:

a. The sanding of the rifles needs improvement.

b. The variation of metal/steel margin, at the tang, needs to be improved.

C. The rifles used in the visual inspection were:

B6763891	B6763559	B6763556	B6762956
B6763566	B6763416	B6763471	B6764853

D. Comments recorded for each individual rifle are located in the appendix of this report.

2. FIELD FUNCTION:

A. Five (5) rifles were selected for the Field Function test.

B6763891 B6763566 B6763416 B6763471 B6764853

B. The following results occurred:

a. The overall malfunction rate was 0.0%.

b. The action was hard to close on gun# B6763566 with Winchester 140 grain soft point ammunition.

3. ACCURACY:

A. Three (3) rifles were tested for 100 yard accuracy.

B6763471 B6763891 B6764853

B. The following averages were established:

a. Group Size: 2.0 inches

b. Horizontal Spread: 1.6 inches

c. Vertical Spread: 1.5 inches

B. Accuracy results per individual rifle are located in the appendix of this report.

TEST PROCEDURE:

1. VISUAL INSPECTION:

A. The Visual Inspection Committee consisted of J. Hill, B. Joy, (P.E. & C.); J. Selan, F. Supry, F. Martin, E. Owens, (Research); J. Willoughby, and L. Ferreira, (Q.C.).

B. All eight (8) rifles were used for the visual inspection.

C. Each rifle was wiped down with a clean white Coyne towel, and examined by each member of the Visual Inspection Committee. All comments were recorded.

2. FIELD FUNCTION:

A. Five (5) of the rifles were subjected to the loading and firing of thirty (30) rounds of Remington and Winchester ammunition. The round robin method of firing the rifles was used. Fifteen (15) rounds were fired; five (5) at a slow feeding cycle speed, five (5) at a medium feeding cycle speed, and five (5) at a fast feeding cycle speed. The rifles were then cooled before the firing of the next ammunition type.

B. The following ammunition was used in the field test:

a. Remington:	R264W1	code#	J 19 TD5944	100 gr. psp
	R264W2	code#	C11G-D2236	140 gr. psp
b. Winchester:	W2642	code#	13BN82	140 gr. sp

C. All malfunctions were recorded; per rifle, per ammunition type, per feeding cycle speed, and per shooter. Individual and overall malfunction rates were calculated.

3. ACCURACY:

A. The accuracy was shot by J. Selan, Research - Test Lab, at the R & D 100 yard range.

B. Leupold bases (standard long action) and Leupold one (1) inch rings were used, in conjunction with a Redfield 12X scope.

C. Remington ammunition, index R2642; code C11G-D2236, 140 grain pointed soft point, was used for the 100 yard accuracy test.

E. Before shooting the 100 yard accuracy test, the bores on each rifle were brushed with Hoppe's No. 9 solvent and patched dry.

F. A total of three (3), five (5) shot groups were shot with each rifle. The rifles were cooled between each group, and one (1) "warmer" shot was fired before the next group was shot.

G. The patterns were analyzed for group size, horizontal spread, and vertical spread. The averages were calculated for each rifle.

APPENDIX

MODEL 700 CLASSIC.264 WIN. MAG. CALIBER TRIAL AND PILOT EVALUATION

VISUAL INSPECTION: COMMENTS PER INDIVIDUAL RIFLE:

B6762956	Dents in wood, just ahead of bolt slot and on right rail. Scratch on right comb cut and on the floor plate. Left stock rail sanded too much, Toe sanded square. Finish varies from receiver to barrel. Stain breaks through at the grip.
B6763566	Discoloration of the magazine follower. Finish breaks through at the right side of the grip. Belt marks just ahead of the recoil lug.
B6763416	Right rail sanded too much, grip not symmetrical. Excess finish at the ejection port. Dent left side of fore end, and front of floor plate.
B6763891	Dent on trigger bow and right side of floor plate. Dirt in finish, behind tang. Inadequate polish, upper lip of ejection port. Stain breaks through, and checkering overruns at grip.
B6763559	Floor plate difficult to latch. Mar on floor plate. Dents on grip. Pits on stock rail, at the right side of the fore end. Scratch on the bolt plug.
B6763556	Flat toe on butt pad. Wood high at tang. Dent left side of the fore end tip. Finish breaks through at the grip, and has trapped dust. Chip out of magazine. Sight hole screws sticking up too much.
B6763471	Finish breaks through at grip. Excessive finish at the ejection port. Dust in finish, just above the trigger bow, left side. Dent in the fore end.
B6764853	Dents in the fore end tip. Low spot in the left side of the stock.

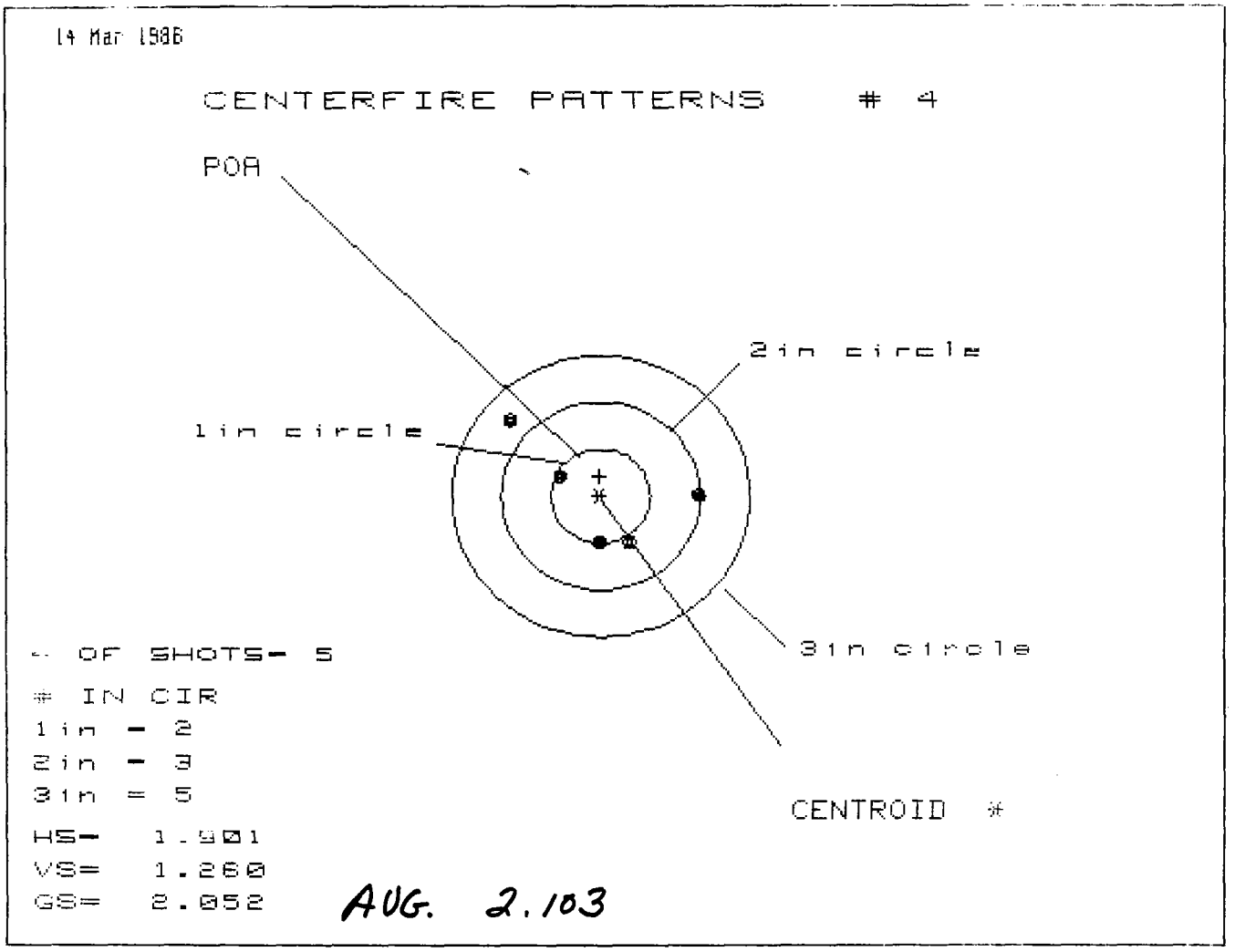
MALFUNCTIONS PER INDIVIDUAL RIFLE: (FIELD FUNCTION)

SERIAL#	MALFUNCTIONS	COMMENTS
B6763891	0	HARD TO CLOSE WITH WINCHESTER AMMO
B6763566	0	OK
B6763416	0	OK
B6763471	0	OK
B6764853	0	OK

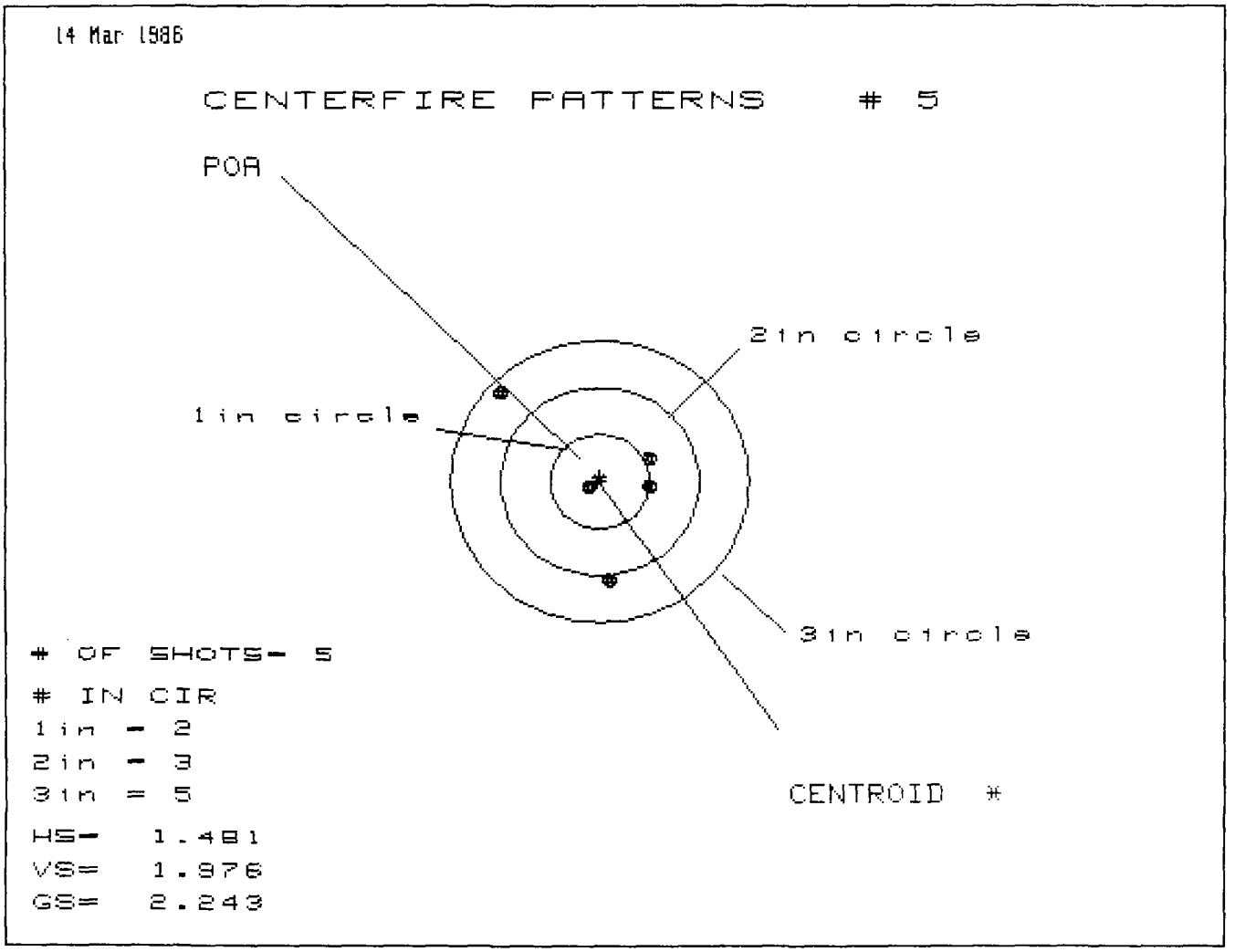
ACCURACY PER INDIVIDUAL RIFLE:

SERIAL#	GROUP SIZE (in.)	HORIZONTAL (in.)	VERTICAL (in.)
B6763471	1.3	0.6	1.3
	2.6	2.1	1.6
	2.4	2.4	0.9
AVERAGE =	2.1	1.7	1.3
B6763891	1.5	1.4	1.5
	1.8	1.1	1.5
	2.2	1.4	1.8
AVERAGE =	1.8	1.3	1.6
B6764853	2.1	1.9	1.3
	2.2	1.5	2.0
	2.0	1.7	1.2
AVERAGE =	2.1	1.7	1.5

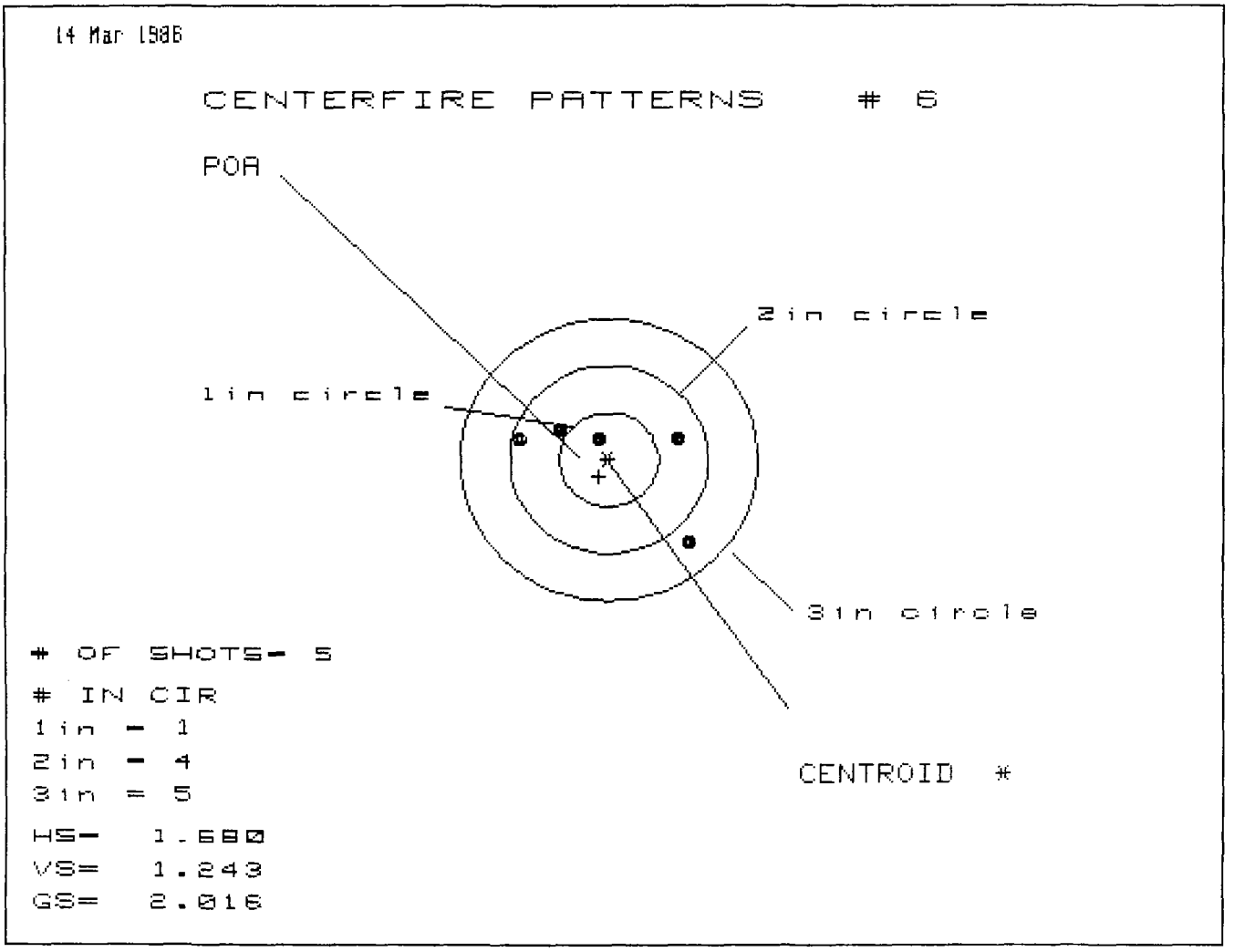
B-676 4853.
.264 WIN. MAG.
REM. 140 GR. PSP. LOT · C 11G · D · 2236



PATTERN #	:	4		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.008	.784	.370
MINIMUM X	:	-.893	-.673	-.412
MAXIMUM Y	:	.772	.388	.452
MINIMUM Y	:	-.488	-.295	-.231
CENTROID	:	.010	.234	-.028
CENTROID		-.212	-.405	-.469
POA TO CENTROID in.		.212	.467	.470
MIN RADIUS	:	.478	.314	.225
MEAN RADIUS	:	.749	.565	.424
MAX RADIUS	:	1.1[illegible]	.80[illegible]	.612
HORIZONTAL SPREAD	:	1.901	1.458	.782
VERTICAL SPREAD	:	1.260	.933	.663
EXTREME SPREAD	:	2.052	.971	1.038
[illegible]		ONE IN[illegible]		
[illegible]		TWO [illegible]		
[illegible]		THRE [illegible]		

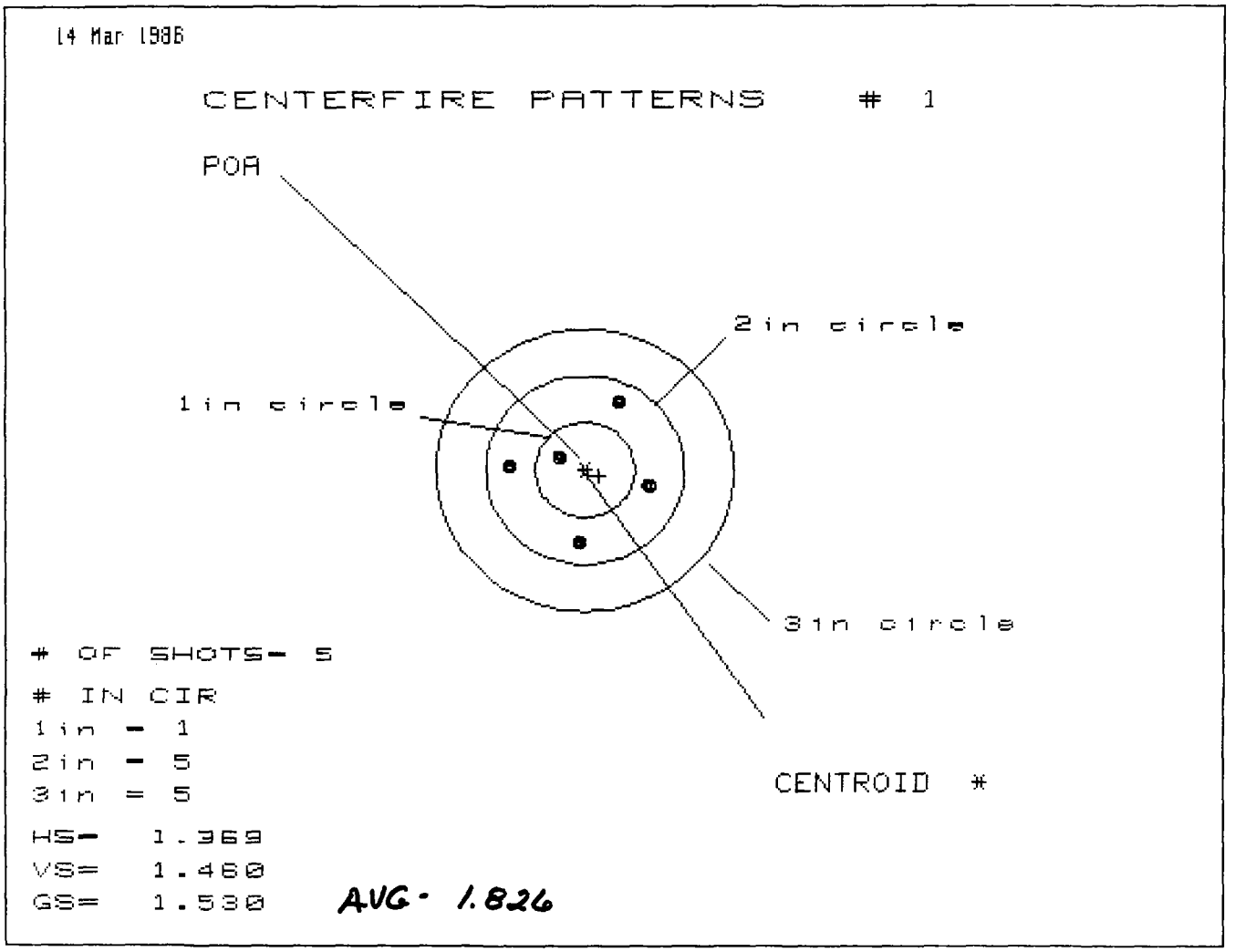


PATTERN #	:	5		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.508	.265	.213
MINIMUM X	:	-.973	-.359	-.411
MAXIMUM Y	:	.905	.489	.208
MINIMUM Y	:	-1.071	-.845	-.110
CENTROID X	:	.003	.246	.298
CENTROID Y	:	-.047	-.273	.008
POA TO CENTROID in.	:	.047	.368	.298
MIN RADIUS	:	.129	.310	.221
MEAN RADIUS	:	.720	.531	.315
[illegible] RADIUS	:	1.329	.859	.426
[illegible] SPREAD	:	1.481	.624	.624
VERTICAL SPREAD	:	1.976	1.334	.318
EXTREME SPREAD	:	[illegible]	1.398	.700
NUMBER IN 0 INCH C			2	
NUMBER IN 1 INCH C	3		3	

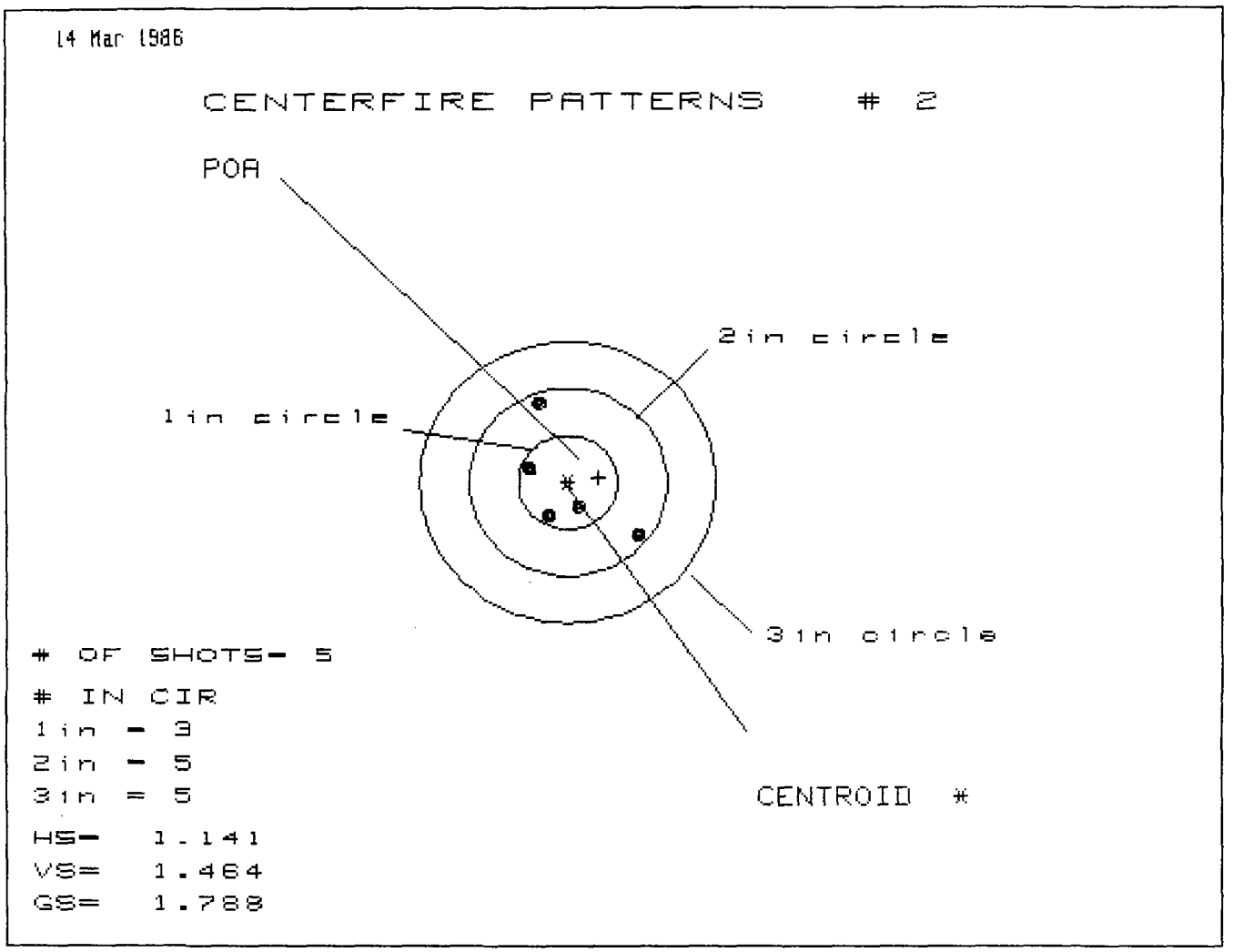


PATTERN #	:	6		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.781	.924	.689
MINIMUM X	:	-.899	-.704	-.569
MAXIMUM Y	:	.325	.096	.085
MINIMUM Y	:	-.918	-.034	-.045
CENTROID X	:	.099	-.096	.139
CENTROID Y	:	.178	.407	.418
POA TO CENTROID in.	:	.204	.418	.440
MIN RADIUS	:	.216	.118	.127
MEAN RADIUS	:	.743	.524	.464
MAX RADIUS	:	1.205	.925	.691
HORIZONTAL SPREAD	:	1.680	1.628	1.258
VERTICAL SPREAD	:	1.243	.130	.130
EXTREME SPREAD	:	2.016	1.628	1.260
NUMBER IN ONE INCH CIRCLE	:		1	
NUMBER IN TWO INCH CIRCLE	:		4	
NUMBER IN THREE INCH CIRCLE	:		5	

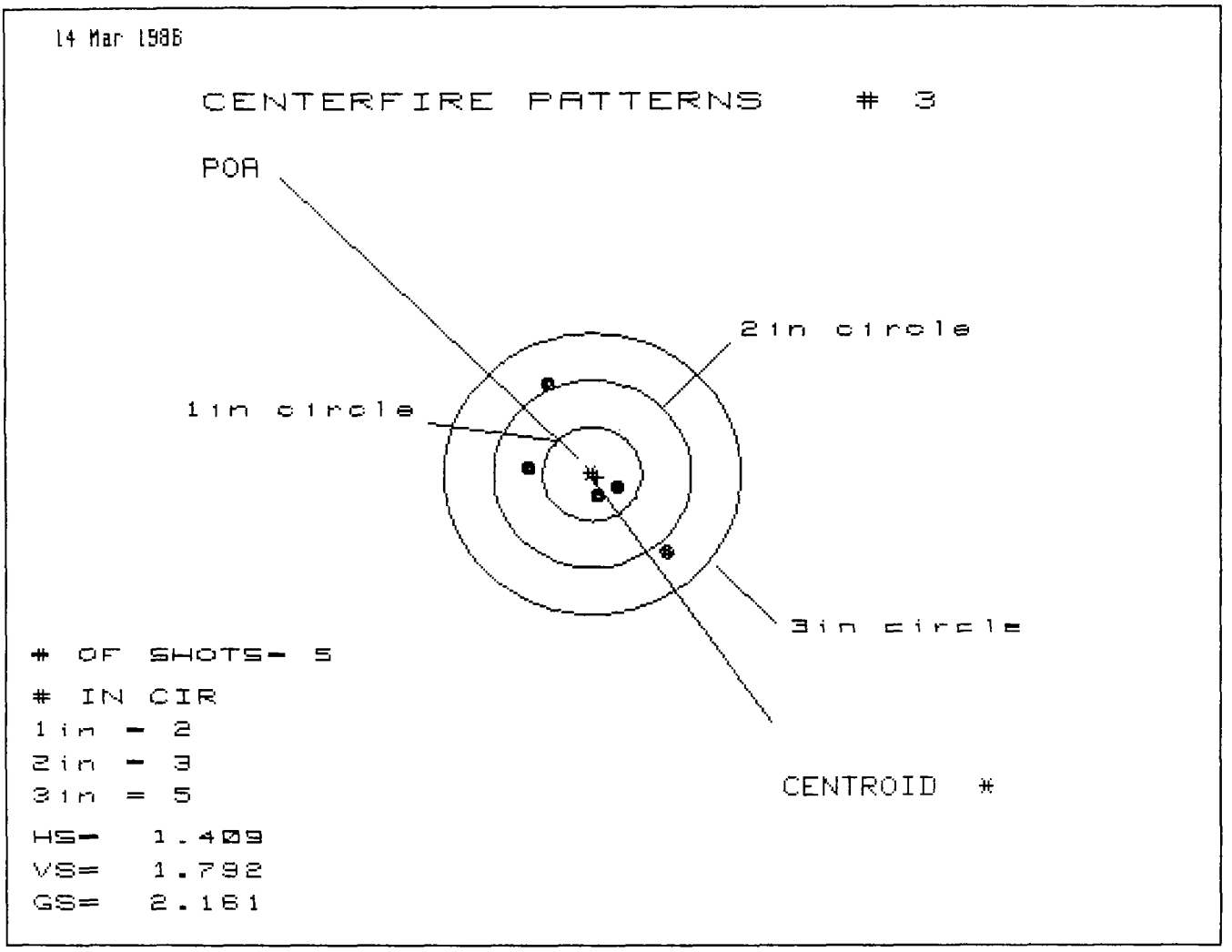
B-6763891
.264 WIN. MAG.
REM. 140 GR. PSP LOT: C11G-D-2236



PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.644	.741	.748
MINIMUM X	:	-.725	-.628	-.621
MAXIMUM Y	:	.732	.288	.106
MINIMUM Y	:	-.728	-.545	-.137
CENTROID X	:	-.140	-.237	-.244
CENTROID Y	:	.067	-.116	.066
POA TO CENTROID in.	:	.156	.263	.253
MIN RADIUS	:	.254	.318	.166
MEAN RADIUS	:	.639	.567	.516
MAX RADIUS	:	.827	.742	.761
HORIZONTAL SPREAD	:	1.369	1.369	1.369
VERTICAL SPREAD	:	1.460	.833	.243
EXTREME SPREAD	:	1.530	1.379	1.379
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.747	.295	.264
MINIMUM X	:	-.394	-.207	-.238
MAXIMUM Y	:	.892	.749	.290
MINIMUM Y	:	-.572	-.447	-.197
CENTROID X	:	-.309	-.496	-.465
CENTROID Y	:	-.051	.092	-.158
POA TO CENTROID in.	:	.313	.504	.491
MIN RADIUS	:	.227	.211	.199
MEAN RADIUS	:	.578	.466	.285
MAX RADIUS	:	.941	.755	.375
HORIZONTAL SPREAD	:	1.141	.502	.502
VERTICAL SPREAD	:	1.464	1.196	.487
EXTREME SPREAD	:	1.788	1.200	.631
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

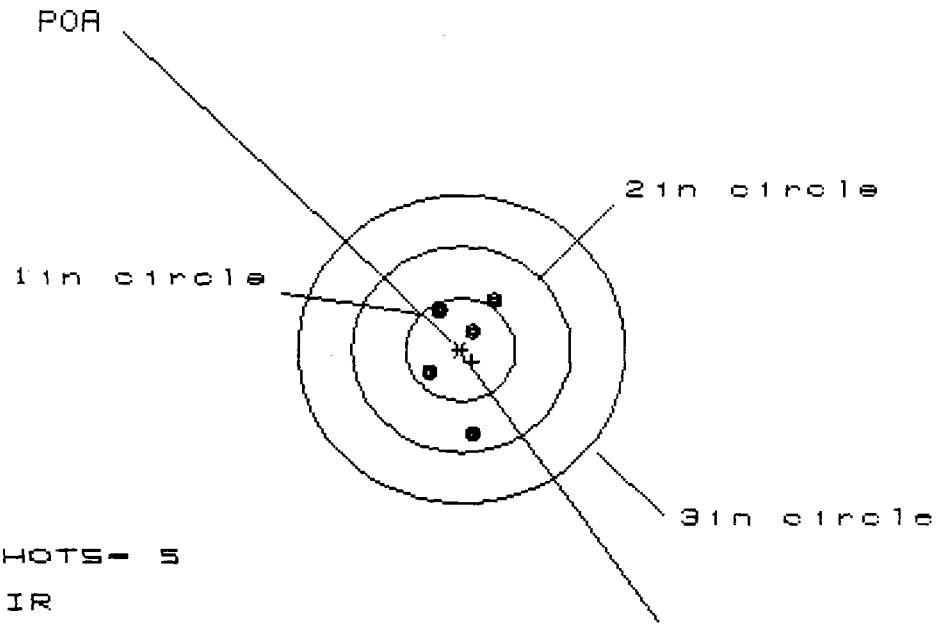


PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.765	.419	.335
MINIMUM X	:	-.644	-.453	-.537
MAXIMUM Y	:	.994	.795	.159
MINIMUM Y	:	-.798	-.386	-.121
CENTROID X	:	-.055	-.246	-.162
CENTROID Y	:	.031	.230	-.035
POA TO CENTROID in.	:	.063	.337	.166
MIN RADIUS	:	.209	.465	.235
MEAN RADIUS	:	.661	.574	.377
MAX RADIUS	:	1.105	.834	.560
HORIZONTAL SPREAD	:	1.409	.872	.872
VERTICAL SPREAD	:	1.792	1.181	.280
EXTREME SPREAD	:	2.161	1.297	.894
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	

B-6763471
.264 WIN. MAG.
REM. 140 GR. P.S.P. LOT. C11G-D2236

14 Mar 1986

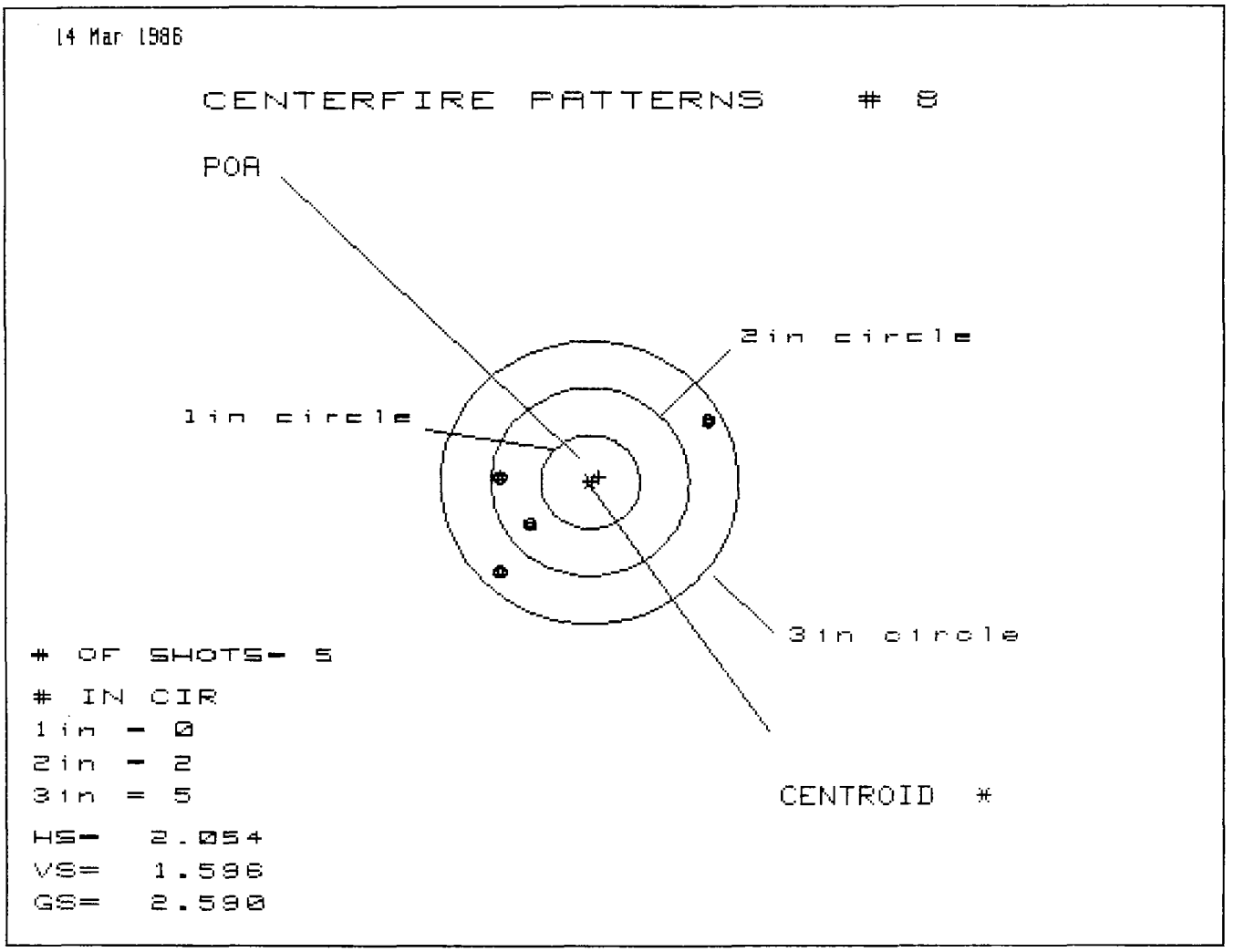
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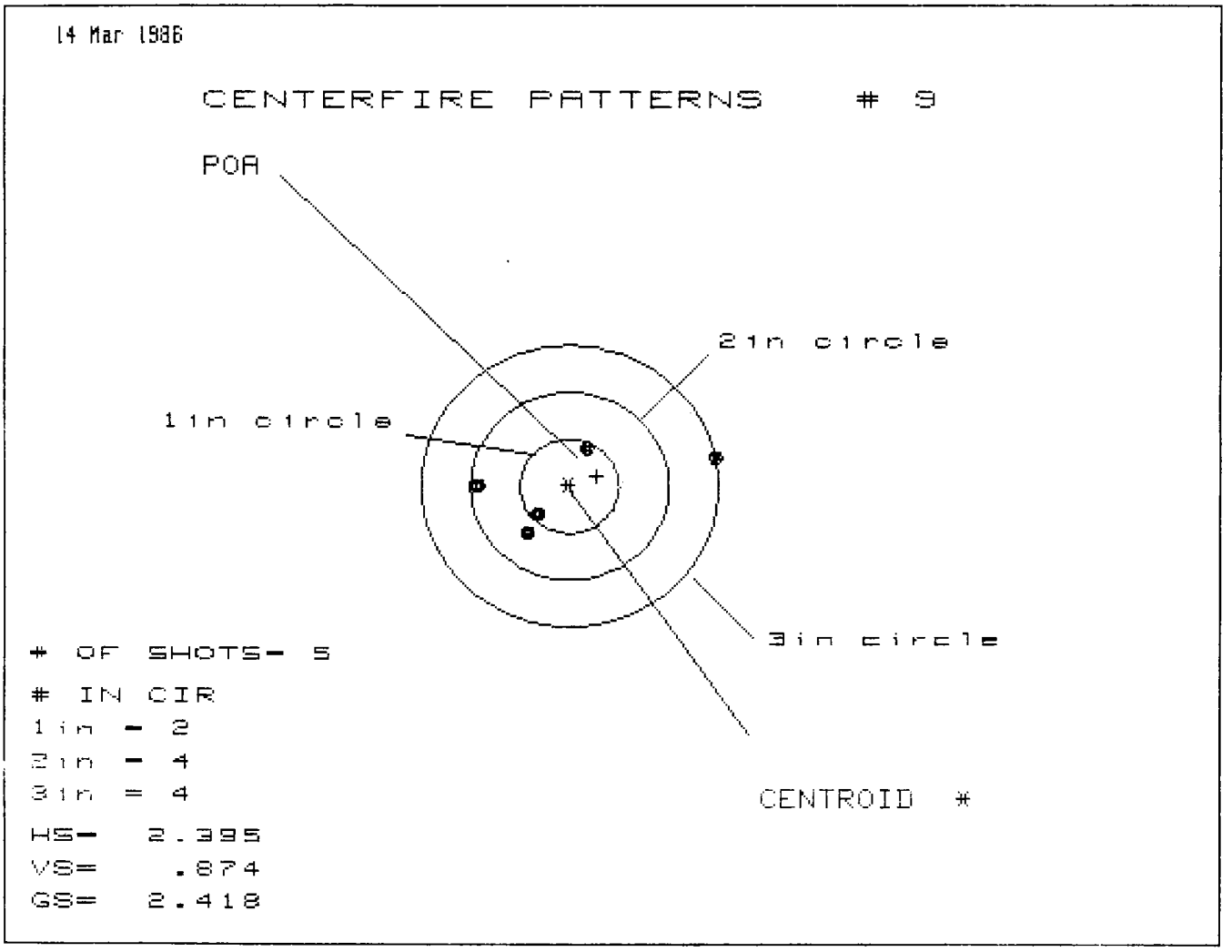
OF SHOTS= 5
IN CIR
1in = 3
2in = 5
3in = 5
HS= .619
VS= 1.275
GS= 1.291

AUG. 2. 099.

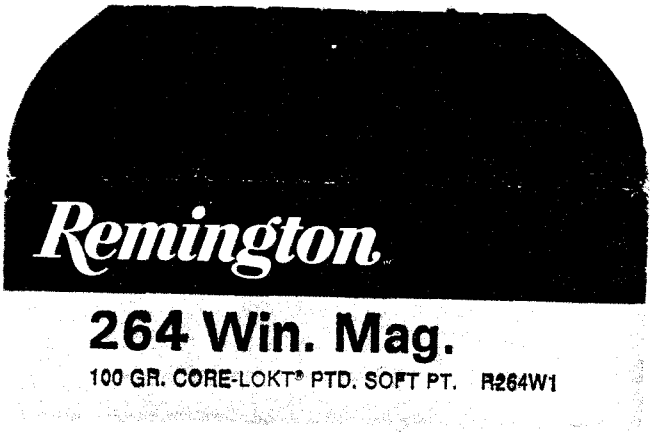
PATTERN #	:	7		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.309	.335	.231
MINIMUM X	:	-.310	-.284	-.172
MAXIMUM Y	:	.447	.240	.223
MINIMUM Y	:	-.828	-.407	-.327
CENTROID X	:	-.102	-.128	-.240
CENTROID Y	:	.116	.323	.243
POA TO CENTROID in.	:	.154	.348	.342
MIN RADIUS	:	.250	.122	.230
MEAN RADIUS	:	.480	.313	.284
MAX RADIUS	:	.835	.496	.370
HORIZONTAL SPREAD	:	.619	.619	.403
VERTICAL SPREAD	:	1.275	.647	.550
EXTREME SPREAD	:	1.291	.895	.591
NUMBER IN ONE INCH CIRC			3	
NUMBER IN TWO INCH CIRC			5	
NUMBER IN THREE INCH CIRC			5	

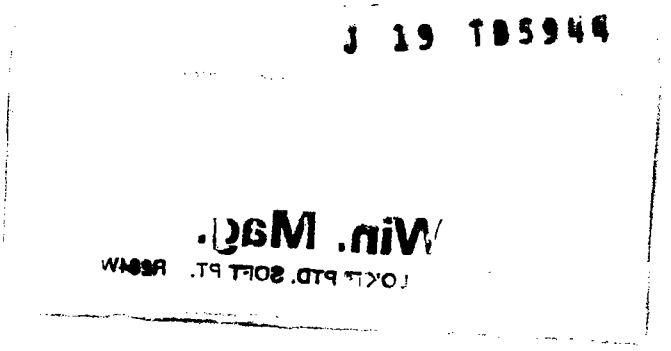


PATTERN #	:	8		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.175	1.457	.185
MINIMUM X	:	-.879	-.585	-.100
MAXIMUM Y	:	.686	.838	.494
MINIMUM Y	:	-.910	-.739	-.460
CENTROID X	:	-.091	-.385	-.870
CENTROID Y	:	-.053	-.224	-.503
POA TO CENTROID in.	:	.105	.445	1.005
MIN RADIUS	:	.767	.434	.189
MEAN RADIUS	:	1.121	.918	.387
MAX RADIUS	:	1.360	1.681	.504
HORIZONTAL SPREAD	:	2.054	2.042	.285
VERTICAL SPREAD	:	1.596	1.577	.954
EXTREME SPREAD	:	2.590	2.569	.954
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		2	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	9		
SHOTS (BEST OF)	:	5	4	
MAXIMUM X	:	1.518	.507	.42
MINIMUM X	:	-.877	-.498	-.194
MAXIMUM Y	:	.431	.508	.524
MINIMUM Y	:	-.443	-.366	-.350
CENTROID X	:	-.276	-.655	-.490
CENTROID Y	:	-.108	-.185	-.201
POA TO CENTROID in.	:	.296	.681	.529
MIN RADIUS	:	.449	.191	.228
MEAN RADIUS	:	.785	.444	.418
MAX RADIUS	:	1.549	.718	.626
HORIZONTAL SPREAD	:	2.395	1.005	.536
VERTICAL SPREAD	:	.874	.874	.874
EXTREME SPREAD	:	2.418	1.105	1.025
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		4	

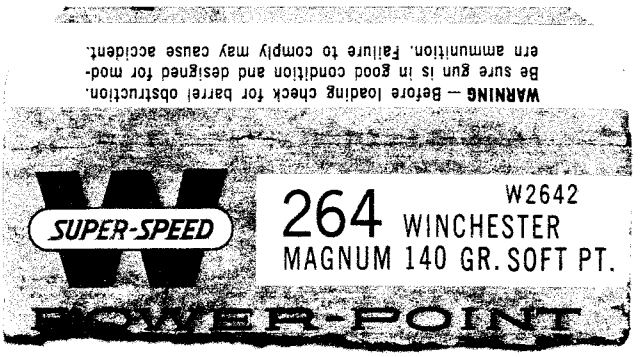

Remington
264 Win. Mag.
100 GR. CORE-LOKT® PTD. SOFT PT. R264W1



AL 0019711


Remington
264 Win. Mag.
140 GR. PTD. SOFT PT. CORE-LOKT®
R264W2

C11G 02236


WARNING — Before loading check for barrel obstruction.
Be sure gun is in good condition and designed for mod-
ern ammunition. Failure to comply may cause accident.
W2642
SUPER-SPEED
264 WINCHESTER
MAGNUM 140 GR. SOFT PT.
POWER-POINT



RD 6277 REV. 7/2/81

WORK ORDER

WORK ORDER NUMBER: 54489-000 | ISSUE DEPT.: 7283 | TO DEPT.: [illegible]

ACCOUNT: 7270-1971 | AMOUNT AUTHORIZED: 2000 | CRAFT: _____

DATE ISSUED: [illegible] 12 76 | DATE REQUIRED: _____ | BLDG. NO.: _____ N S E W

COMPONENT: _____ | OPERATION: _____ | QUANTITY: _____

NAME OF TOOL: _____ | DRAWING NUMBER: _____ | INV. NO. & SUFFIXES: _____

DESCRIPTION OF WORK: R+D Design Confirmation on M1200 264 cal.

FOR DATA PROCESSING USE ONLY:

CLEARANCE CODE | REFERENCE CODE | DATE CLOSED

COMPLETED BY	# MAN HRS.	DATE COMPLETED	EST. HRS.	

ISSUED BY	APPROVED BY	APPROVED BY	APPROVED BY
[illegible] 12/12/76	[illegible]		

The formal report has been started and is stored in my directory under:

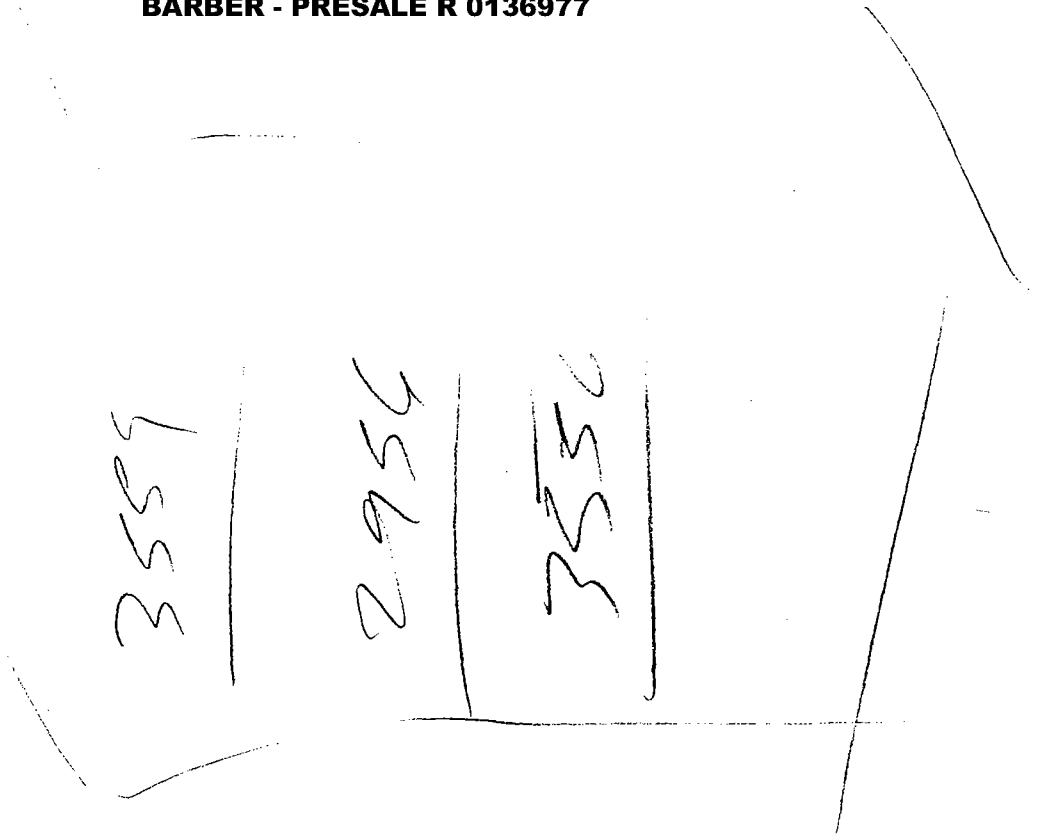
/USERS/SUPRY[ ]/WORK/TP860512

updated
3/12/86 RS

HR 86013~

SPPRF 86062 i

S9A86014 I


3564
2956
3552

Field ~~Test~~ FUNCTION — CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

PREVIOUS ROUNDS: 0

DATE: 3-12-86 MODEL: 700 CALIBER: .264 WIN MAG SERIAL NO. B6763471

TEST TITLE: Trial + Pilot

TTL. RDS. FIRED: 30
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	TRIGGER SEAR	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER: BASE	STEM CHAMBER: LIP	STEM CHAMBER: RIGHT	STEM CHAMBER: LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION ENG UP	DON'T EXTRACT	BREECHES	ACCESSORY	REPLACEMENT			
R-100 Gr PSP	3	10	OK																									
R-140 Gr PSP	4	10	OK																									
W-140 Gr SP	5	10	OK																									
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 013978

Field ~~Check~~ FUNCTION - CENTERFIRE REPROT NO.: _____ PAGE NO. _____

DATE: 3-12-86 MODEL: 700 CALIBER: .264 WIN MAG SERIAL NO. B6764853

PREVIOUS ROUNDS: 0

TEST TITLE: Trial + Pilot

TTL. RDS. FIRED: 30
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SECONDS	NO. OF ROUNDS FIRED	FIRING	BOLT OPENS SLOWLY	DON'T EJECT	DON'T EJECT BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER HIGH	STEM CHAMBER LOW	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGE	ADJUSTMENTS	REPLACEMENT			
								LATCH																				
R-100 GR PSP	2	10	OK																									
R-140 GR PSP	3	10	OK																									
W-140 GR SP	4	10	OK																									
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE P 013979
BARBER - PRESALE P 013979

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

Field ~~Trick~~ FUNCTION - CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

DATE: 3-12-86 MODEL: 700 CALIBER: 264 WIN MAG SERIAL NO. B6763566

PREVIOUS ROUNDS: 0

TEST TITLE: Trial + Pilot

TTL. RDS. FIRED: 30
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	FAILED TO EJECT	FAILED TO FEED	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SAFETY SWINGS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER				SAFETY JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	BREAKAGE	ATTACHMENTS	SCREWS	REMARKS
													BTEM	ICM	BIGEM	ICEM										
R-100 Gr PSP	5	~~10~~	OK																							
R-140 Gr PSP	1	~~10~~	OK																							
W-140 Gr SP	2	~~10~~	OK																						X	
TOTAL (PER MAL.)																										

BARBER - BRSALE-R-0160866

Field ~~TACK~~ FUNCTION - CENTERFIRE REPROT NO.: _____ PAGE NO. _____

PREVIOUS ROUNDS: 0

DATE: 3-12-86 MODEL: 700 CALIBER: 26 X WIN MAG SERIAL NO. B6763416

TEST TITLE: Trial + Pilot

TTL. RDS. FIRED: 30
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SECTION	NO. OF ROUNDS FIRED	FIRING	TRIGGER SHEAR	DON'T EJECT	DON'T KICK BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER: HIGH	STEM CHAMBER: LOW	STEM CHAMBER: RIGHT	STEM CHAMBER: LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BNG UP	DON'T EXTRACT	BREAKAGES	ATTACHMENTS	STRIKER/FIRE			
								LATCH																				
R-100 Gr PSP	4	10	OK																									
R-140 Gr PSP	5	10	OK																									
W-140 Gr SP	1	10	OK																									
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER PRESALE R 013091
BARBER PRESALE R 013091

Field ~~BREK~~ FUNCTION — CENTERFIRE

REPROT NO.: _____ PAGE NO. _____

DATE: 3-12-86 MODEL: 700 CALIBER: .264 WIN MAG SERIAL NO. B6763891

PREVIOUS ROUNDS: 0

TEST TITLE: Trial + Pilot

TTL. RDS. FIRED: 30
TTL. MALFUNCTIONS: 0
MALFUNCTION RATE: 0

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	TRIGGER SEAR	DON'T EJECT	DON'T EJECT BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER: BIKE	STEM CHAMBER: 45°	STEM CHAMBER: RIFLE	STEM CHAMBER: PISTOL	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	SEPARATES	AUTOSEARS	SLAMFIRES			
R-100GR PSP	1	10	OK																								
R-140 Gr PSP	2	10	OK																								
N-140 Gr SP	3	10	OK																								
TOTAL (PER MAL.)																											

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER PRESALE R 013093

extend

Report No. 860512

RESEARCH TEST & MEASUREMENT LAB WORK REQUEST

	AREA OF TESTING	
____ Developmental	____ Safety Related	____ Litigation
____ Design Acceptance	____ Competitive Evaluation	____ Warehouse Audit
____ Pre-Pilot	____ New Design	____ Cost Reduction
✓ Pilot	____ Design Change	Stake ____
____ Production Acceptance	____ Plant Assistance	✓ Other NEW CALIBER ADDED

FIREARM STAT'S.

MODEL: 700 Classic

CAL. or GAGE: 264 Win Mag

BARREL TYPE: ____

PROOFED: YES ✓ NO ____

REPORT REQ'D.

FORMAL ✓

TEST RESULTS ONLY ____

DATE REQUESTED: 2/20/86

DATE NEEDED BY: 3/20/86

REQUESTED BY: J. Bauer

WORK ORDER NO: E-0235

TEST TYPE

____ Strength Test	____ Ammunition Test	____ Dry Cycle Test	____ Photo/Video
____ Function Test	____ Environmental Test	____ Measurements	____ Other ____
____ Accuracy Test	____ Customer Complaint	____ Endurance Test	

EXPLAIN IN DETAIL THE REASON FOR THIS TEST:

TRIAL Pilot for the 264 WIN MAG ~~CLASSIC~~
being Added to the 700 Classic Line.

- Withdraw 40 from warehouse
- Select 10 for visual
- Select 5 for 100 yard accuracy
- Select 10 for field function

Handle guns with extreme care, To be Returned for inspection and packing, for return to warehouse

GUNS REQUIRED:

NOTE: NO firearms or parts will be tested in the Labs unless they are accompanied by a Work Request, and both are delivered to the Labs by the designer or engineer. All Work Requests are to be filled out in detail. No Exceptions.

DATE COMPLETED: ____

TEST COMPLETED BY: ____

REPORT DATE: ____

B6763471

- Dirt finish left side just above trigger bow. (left)
- Dent fore end
- finish break through
- excess finish at rear of ejection port

B6764853

- Tang metal/steel margin side varies
- fore end tips has dents
- left side of stock deep low spot

General:
- floor plates appear off-center
- Ripple in barrels
- wood/steel margins at the tang
- * sanding generally need to be approved.

B 6762956

- Dents in wood just ahead of bolt slot
- Dent on right rail
- Scratch on right comb cut
- ~~Ripple in barrel~~
- Square toe butt pad
- stain broken through at grip
- finish varies from Receiver to bbl
- left stock rail sanded too much
- floor plate scratch at front

B6763566

- ~~Discoloration on magazine follower~~
- ~~finish breakthrough right side grip~~
- ~~ripple in barrel~~
- ~~belt marks ahead of recoil lug.~~

B 6763416

- Wood margin/~~steel margin~~ @ tang
- excess finish ejection port cut of stock
- Dent front of floor plate
- now symetrical grip
- left side fore-end marred.
- Butt pad left side rough spacer
- right rail sanded heavier
- ~~Rwg/ripple in barrel~~

WO # _____

B6763891

- ✓ Strain broken through on grip
- ✓ Checkering undercuts grip
- ✓ upper lip of ejection port inadequate polish
- ✓ slight dent right side floor plate
- ✓ Dent on trigger bow
- ✓ Dirt in finish behind tang

B6763559 - ✓ GUN WOULD NOT Re-latch

- ✓ Dent, pits on grip
- ✓ Mar on floor plate
- Scratch on Bolt plug
- ✓ pits on stock rail right side fore end
- Ripply rail left side
- ✓ Floorplate latch

B6763556 - swivel screw not seated

- ✓ Back of grip finish broke through, filing marks...
- Recoil pad torn away from backer plate
- ✓ Flat on toe of butt pad
- ~~Ripple bottom of barrel~~
- ✓ screws sticking up
- ✓ Dent stock left side fore-end tip
- ✓ chip magazine
- ✓ Wood high at tang near safety
- ✓ Dust in finish stock
- checkering under runs
- Scratches on ~~finish left~~ side of

JACK FUNCTION — CENTERFIRE

REPROT NO.: _____ PAGE NO. 1

DATE: 3-12-86 MODEL: 700 - 264 CALIBER: 264 SERIAL NO. B 6763556

PREVIOUS ROUNDS: _____

TEST TITLE: Live Load + UnLoad

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SEQUENCE	NO. OF ROUNDS FIRED	FIRING	FAILED SEAR	DON'T FEED	DON'T EJECT BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st	FEED FROM MAG. 2nd	SHELL STEMS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER HIGH	STEM CHAMBER LOW	STEM CHAMBER HIGH	STEM CHAMBER LOW	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	SEQUENCE	SLAMFIRE	SLAMFIRE			
								LATCH																				
264 Win. Mag 140GR. PTD Soft Pt	TD	6	OK																								
264 Win Mag 140 GR. Soft Pt	TD	6	—		5																						
264 Win. Mag. 100GR. Core Lokt PTD Soft Pt	TD	6	OK																								
TOTAL (PER MAL.)																											

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER_PRESALE_013997

JACK FUNCTION – CENTERFIRE

REPROT NO.: _____ PAGE NO. 1

DATE: 3-12-86 MODEL: 700 CALIBER: 264 SERIAL NO. B 6762956

PREVIOUS ROUNDS _____

TEST TITLE: Live Load + UnLoad

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SECONDS	NO. OF ROUNDS FIRED	FIRING	FAILED TO FEED	DON'T EJECT	DON'T EJECT BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER: BASE	STEM CHAMBER: LUG	STEM CHAMBER: SHOULDER	STEM CHAMBER: NECK	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION TAKE UP	DON'T EXTRACT	BREAKS	ADJUSTMENTS	REPLACEMENTS			
264 Win. Mag. 140 GR. PTD Soft Pt	TD	6	—		5																							
264 Win. Mag 140 GR. Soft Pt	TD	6	-		6																							
264 Win. Mag 100 GR. CORE LOKT PTD SOFT PT.	TD	6	-		4																							
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER - PRESALE R 013098
BARBER - PRESALE R 013098

JACK FUNCTION — CENTERFIRE

REPROT NO.: _____ PAGE NO. 1

DATE: 3-12-86 MODEL: 700 CALIBER: 264 SERIAL NO. B676 3559

PREVIOUS ROUNDS: _____

TEST TITLE, Live Load + UnLoad

TTL. RDS. FIRED: _____
TTL. MALFUNCTIONS: _____
MALFUNCTION RATE: _____

"MALFUNCTIONS"

	SHOOTER	NO. OF ROUNDS FIRED	FIRING	FAILED TO FIRE	DON'T EJECT	DON'T EJECT BACK	DON'T LOCK OPEN	FEED FROM MAG. 1st LATCH	FEED FROM MAG. 2nd LATCH	SHELL STICKS MAG.	POWER OVERRIDE	DON'T LOCK UP	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	STEM CHAMBER RIGHT	STEM CHAMBER LEFT	SHELL JUMPS MAG.	FOLLOWER BINDS	LOADING	BOLT OVERRIDE	ACTION BANG UP	DON'T EXTRACT	EXTRACTION	SHORT EJECT	EJECTION			
264 Win Mag 140GR. Prd. Soft Pt.	TD	6	—		6																							
264 Win. Mag 140GR. Soft Pt.	TD	6	—		6																							
264 Win. Mag. 100GR. Core Lokt Prd. Soft Pt	TD	6	—		5																							
TOTAL (PER MAL.)																												

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER
BARBER_PRESALE_013999

RD 6606

cc: J. White

TO: D. CHRISTIE

ILION RESEARCH DIVISION

FIREARMS WITHDRAWAL [redacted]

DATE 2/26/86

LETTER NO. 2217

QUANTITY 8

MODEL 700 CAL/GA. .264 WORK ORDER [redacted]

RANGE # 5998

SERIAL NOS.

B C/C 3511	B C/C 3416	
B C/C 3557	B C/C 4053	
B C/C 3550		
B C/C 2156		
B C/C 3500		
B C/C 3471		

REMARKS: Trial & Pilot Testing

Approval

JDaggetta:js

.223 REM. - w/o c - 1803
f 6.56. m/m. REPORT 85/973
700 GOL

TEST AND MEASUREMENT LAB - TEST RESULTS

REQUESTER: J.W. BOWER TESTER: TEST LAB DATE: 02/11/87
REPORT NO.: 851973 WORK ORDER NO.: C-1803
WRITTEN BY: F.L. SUPRY

TEST TYPE: 100 YARD ACCURACY (223 REM vs 5.56 MILITARY)

FIREARM STAT'S : MODEL: 700 BDL CAL or GAUGE: 223
BARREL TYPE: STD PROOFED: YES X NO ___

REASON FOR TEST :

To compare the 100 yard accuracy of the Model 700 chambered in the 223 Rem caliber, before and after the barrels were rechambered to the 5.56 mm Military caliber.

EQUIPMENT REQUIRED :

Six Model 700 rifles chambered in the 223 Rem caliber, the 100 yard range, 223 Rem and 5.56 mm Military ammunition, chambering tools, scope, HP 9000 computer and digitizing tablet, and personnel.

TEST PROCEDURE :

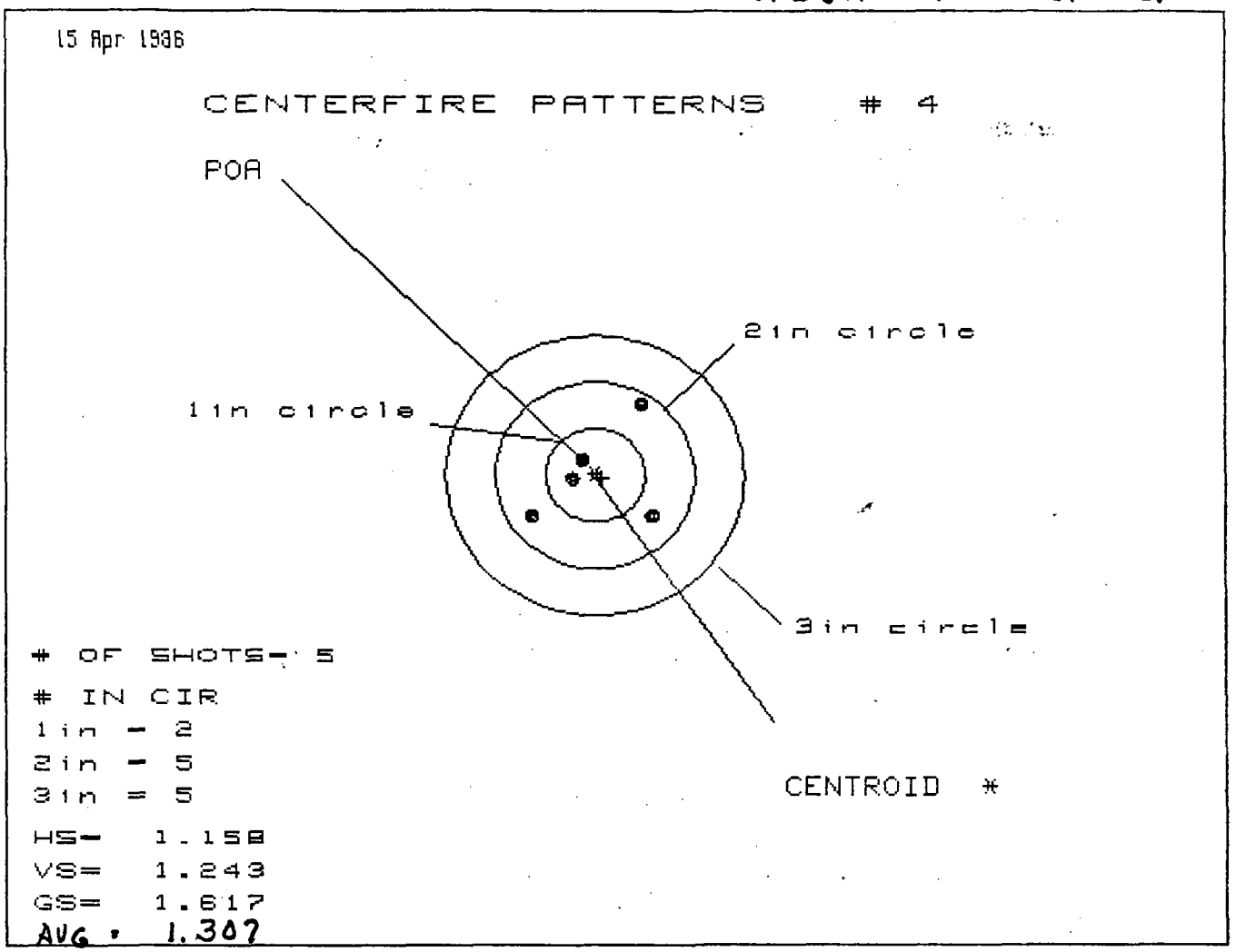
Three 5 shot groups were shot with each 223 Rem caliber rifle, as received. Then, the rifles were sent to the custom shop and rechambered to the 5.56 mm Military caliber. The 100 yard accuracy test was repeated. All the accuracy work was done by J. Selan, at the 100 yard range located in 52-1A. The targets were digitized and analyzed using the HP 9000 computer and digitizing tablet.

TEST RESULTS :

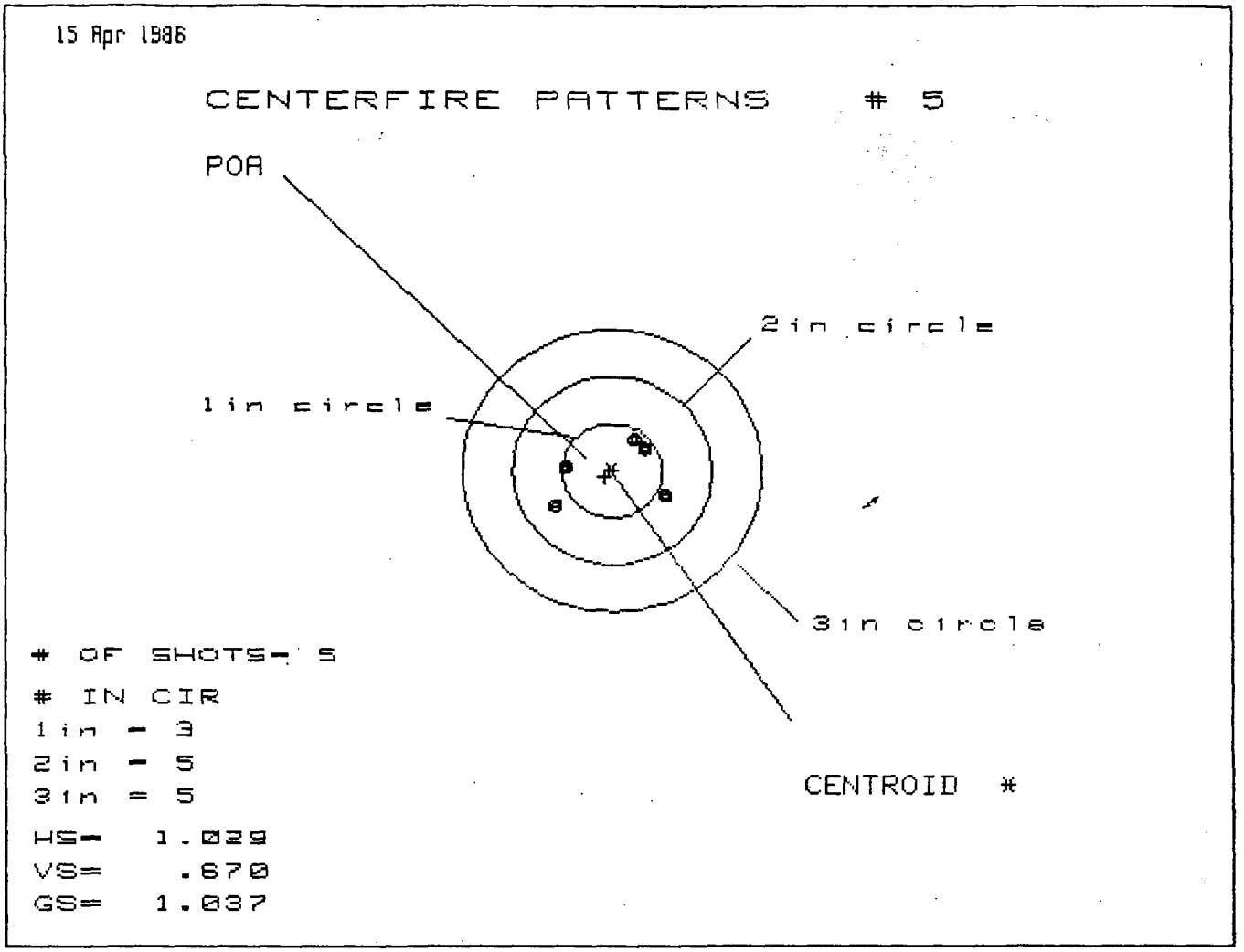
	AVERAGE GROUP SIZE (in inches)	
RIFLE SERIAL #	223 REM CAL	5.56 mm MILITARY CAL
B6430318	1.307	2.467
B6429112	1.065	3.690
B6429801	1.517	2.342
B6428889	1.450	1.913
B6430148	1.073	1.850
B6429055	1.173	2.446

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

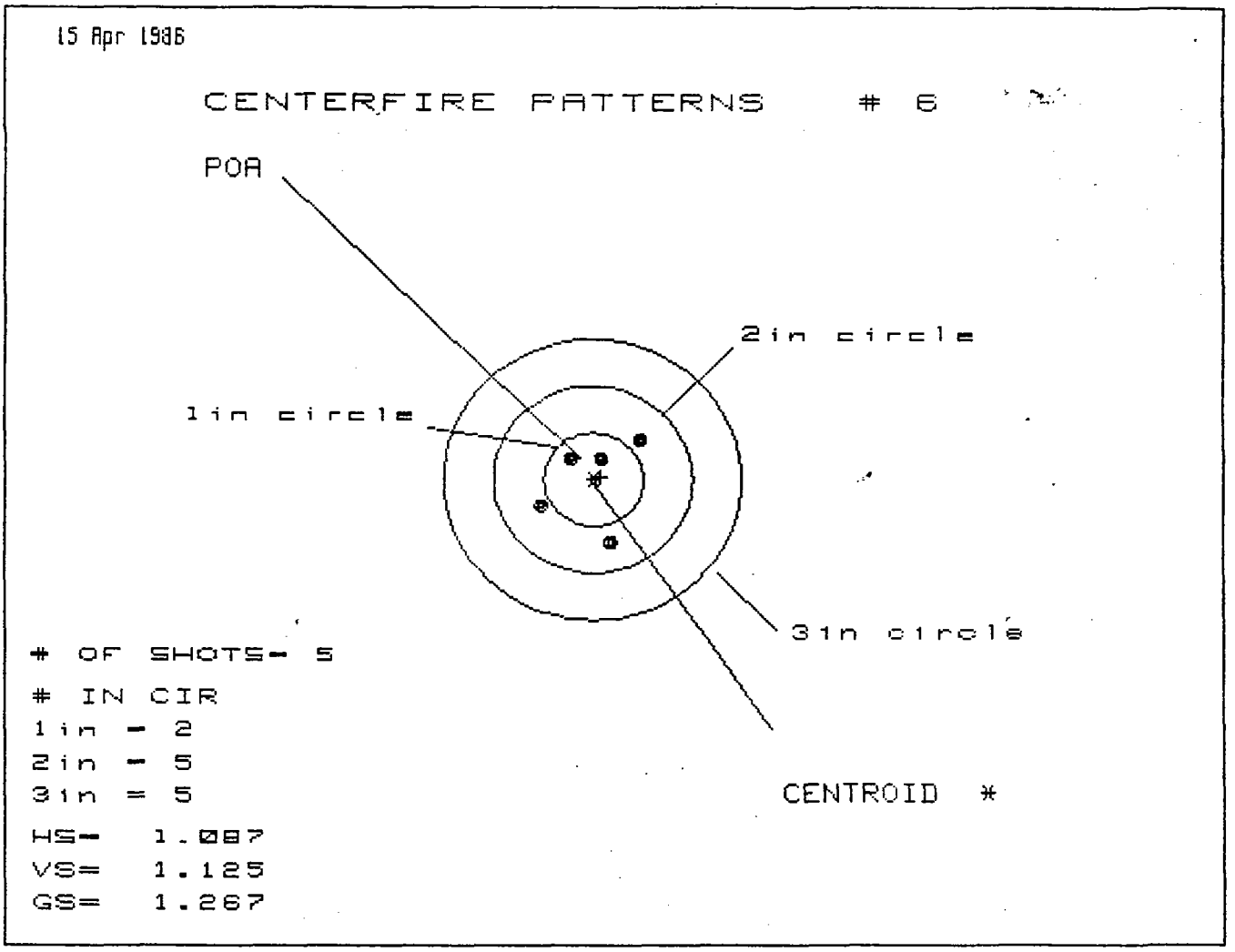
55GR. M.C. LOT *A06ID
100 YDS.
SPECS. 2.2 C. TOC.



PATTERN # :	4		
SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.565	.675	.514
MINIMUM X :	-.593	-.483	-.276
MAXIMUM Y :	.773	.352	.259
MINIMUM Y :	-.470	-.277	-.367
CENTROID X :	-.063	-.173	-.012
CENTROID Y :	.032	-.161	-.068
POA TO CENTROID in.:	.070	.236	.069
MIN RADIUS :	.225	.231	.296
MEAN RADIUS :	.570	.469	.426
MAX RADIUS :	.889	.728	.631
HORIZONTAL SPREAD :	1.158	1.158	.790
VERTICAL SPREAD :	1.243	.629	.626
EXTREME SPREAD :	1.617	1.158	.978
NUMBER IN ONE INCH CIRCLE =		2	
NUMBER IN TWO INCH CIRCLE =		5	
NUMBER IN THREE INCH CIRCLE =		5	

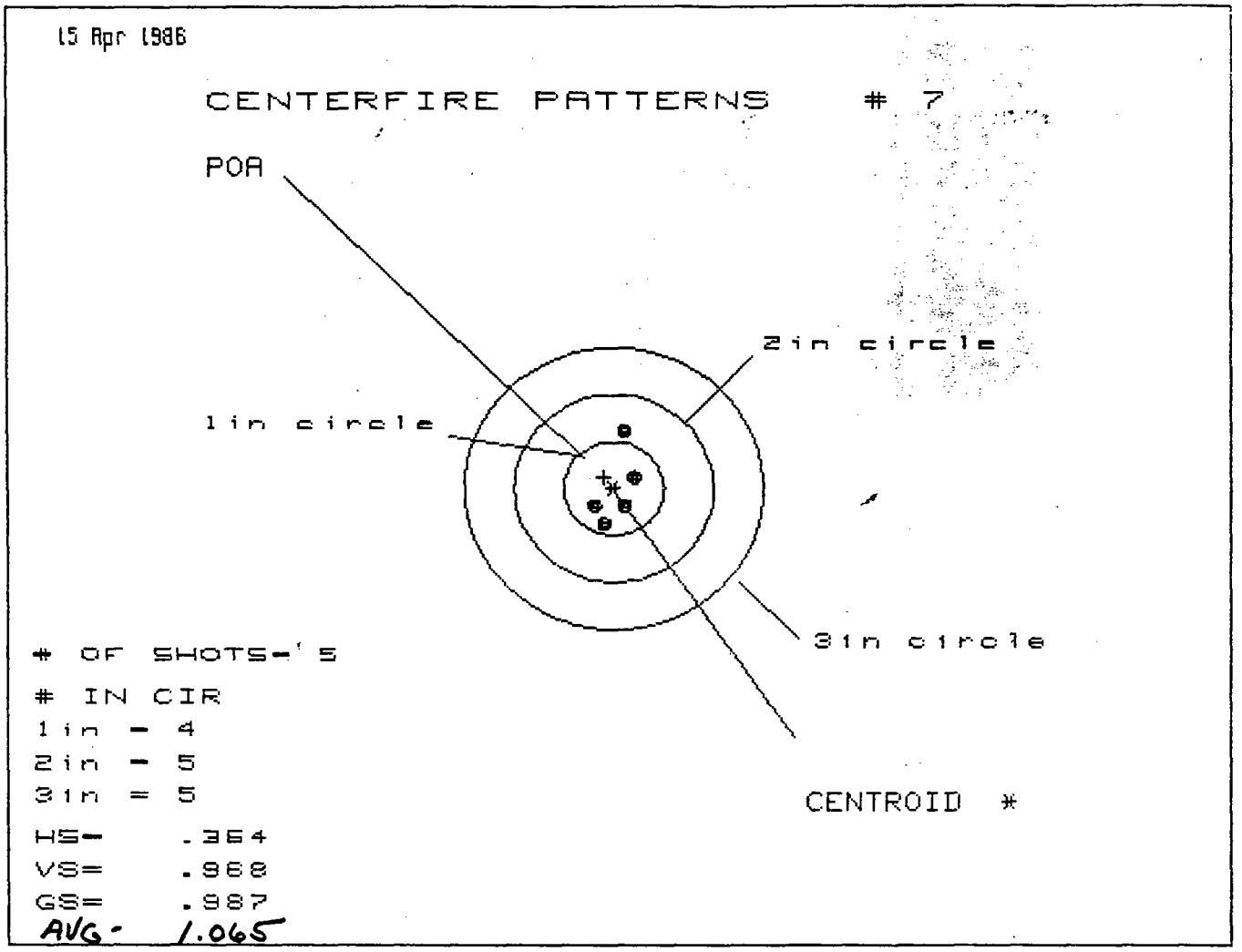


PATTERN #	:	5		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.504	.373	.279
MINIMUM X	:	-.525	-.628	-.504
MAXIMUM Y	:	.326	.240	.130
MINIMUM Y	:	-.344	-.330	-.168
CENTROID X	:	.074	.205	.081
CENTROID Y	:	.064	.150	.260
POA TO CENTROID in.	:	.098	.254	.272
MIN RADIUS	:	.369	.214	.260
MEAN RADIUS	:	.491	.401	.358
MAX RADIUS	:	.628	.631	.531
HORIZONTAL SPREAD	:	1.029	1.001	.783
VERTICAL SPREAD	:	.670	.570	.298
EXTREME SPREAD	:	1.037	1.037	.809
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

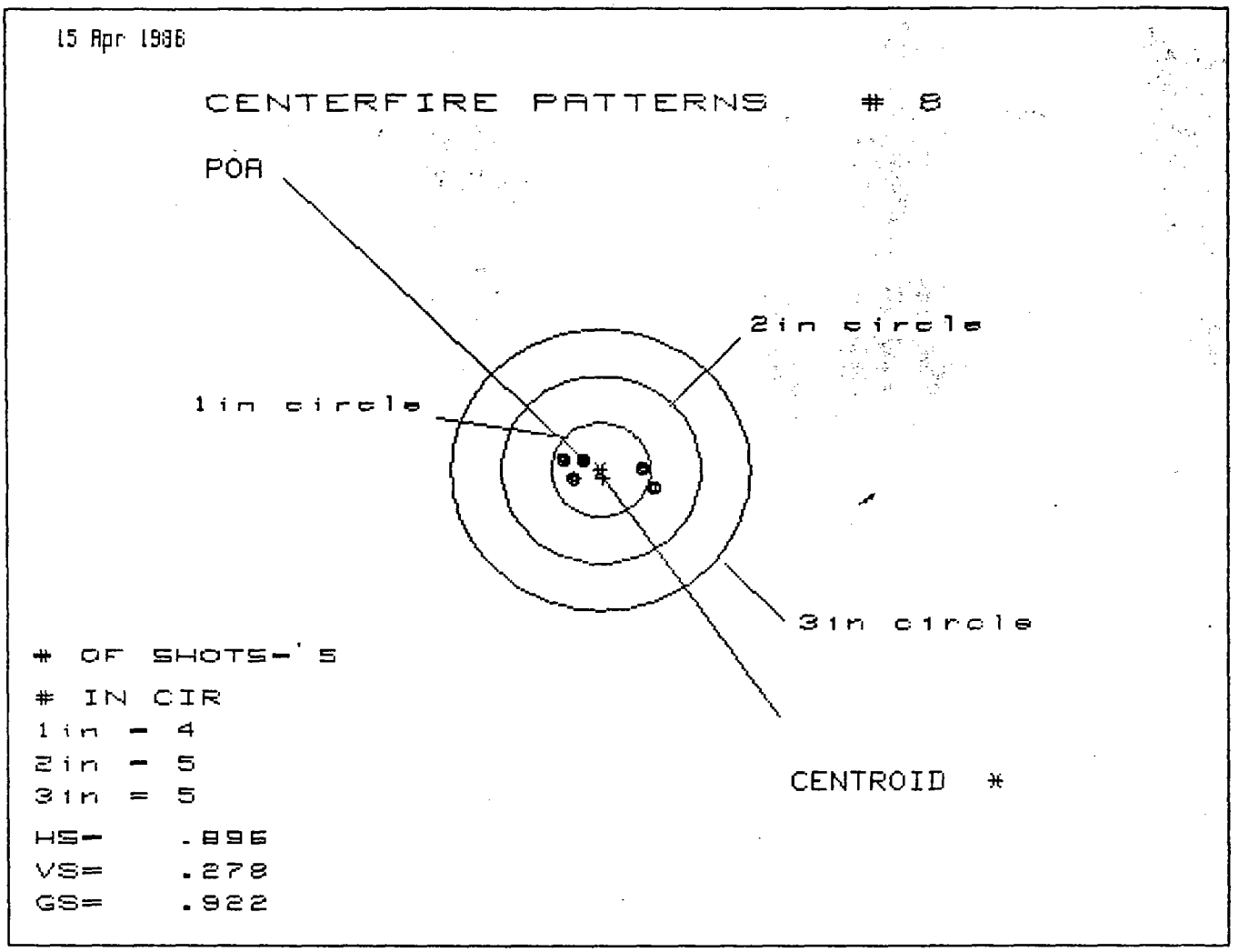


PATTERN #	:	6		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.510	.551	.309
MINIMUM X	:	-.577	-.536	-.353
MAXIMUM Y	:	.418	.241	.176
MINIMUM Y	:	-.707	-.410	-.330
CENTROID X	:	-.071	-.112	-.295
CENTROID Y	:	-.028	.149	.069
POA TO CENTROID in.	:	.076	.186	.303
MIN RADIUS	:	.264	.145	.182
MEAN RADIUS	:	.520	.398	.337
MAX RADIUS	:	.726	.675	.483
HORIZONTAL SPREAD	:	1.087	1.087	.662
VERTICAL SPREAD	:	1.125	.651	.506
EXTREME SPREAD	:	1.267	1.267	.819
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

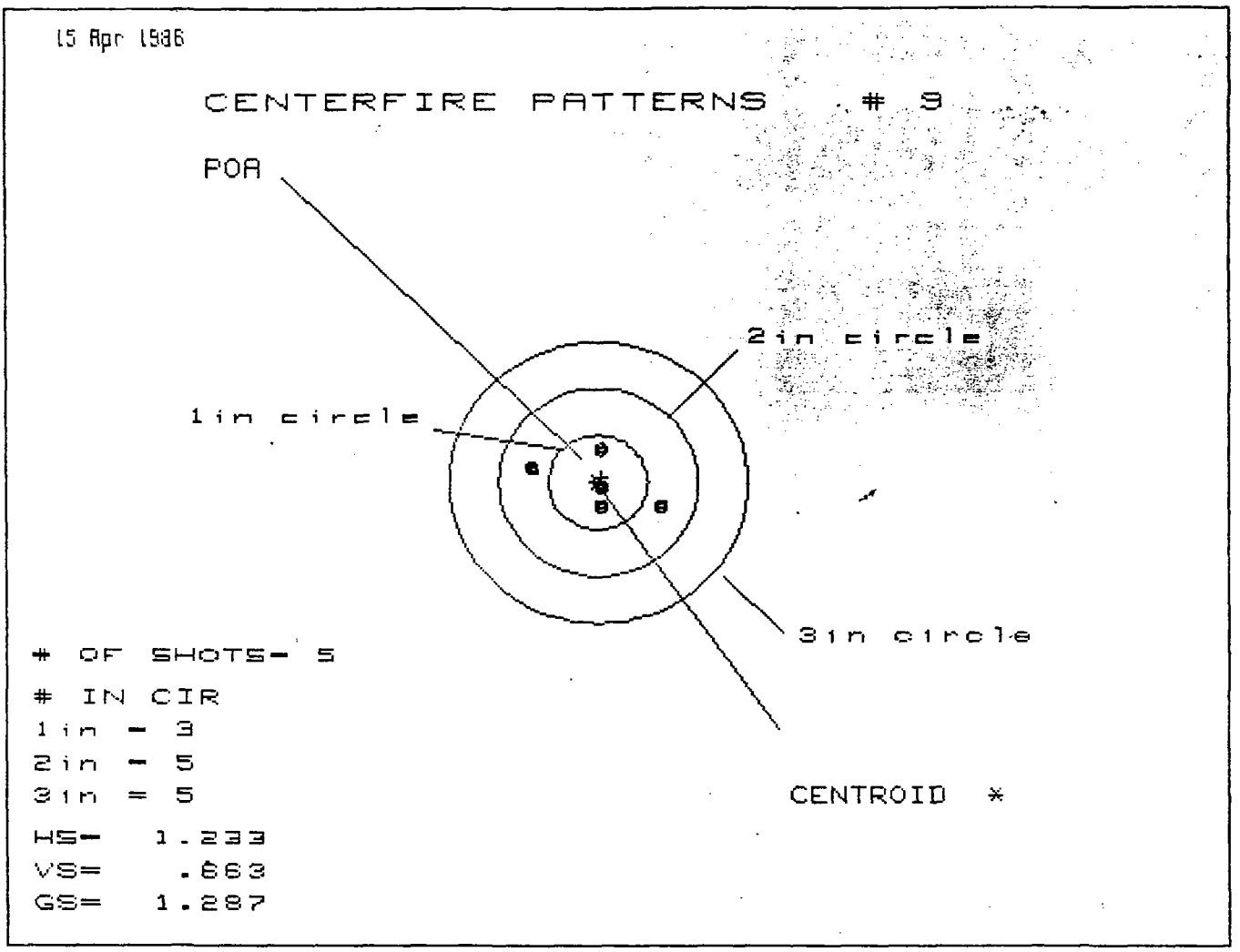
D·6426711C
B·642 9/14
.223 REM. 14/700 BDL.
55GR. M.C. LOT = A06ID
SPECS. 2.2 C.TO.C.



PATTERN #	:	7		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.156	.170	.128
MINIMUM X	:	-.208	-.194	-.236
MAXIMUM Y	:	.614	.273	.206
MINIMUM Y	:	-.354	-.200	-.124
CENTROID X	:	.098	.084	.126
CENTROID Y	:	-.122	-.276	-.209
POA TO CENTROID in.	:	.157	.288	.244
MIN RADIUS	:	.197	.150	.135
MEAN RADIUS	:	.341	.227	.215
MAX RADIUS	:	.617	.322	.266
HORIZONTAL SPREAD	:	.364	.364	.364
VERTICAL SPREAD	:	.968	.473	.330
EXTREME SPREAD	:	.987	.557	.491
NUMBER IN ONE INCH CIRCLE	=		4	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	8		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.480	.525	.426
MINIMUM X	:	-.416	-.296	-.297
MAXIMUM Y	:	.125	.086	.095
MINIMUM Y	:	-.153	-.111	-.102
CENTROID X	:	-.021	-.141	-.042
CENTROID Y	:	.089	.128	.119
POA TO CENTROID in.	:	.092	.190	.126
MIN RADIUS	:	.196	.092	.161
MEAN RADIUS	:	.371	.285	.300
MAX RADIUS	:	.504	.525	.426
HORIZONTAL SPREAD	:	.896	.821	.723
VERTICAL SPREAD	:	.278	.197	.197
EXTREME SPREAD	:	.922	.821	.731
NUMBER IN ONE INCH CIRCLE	=		4	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



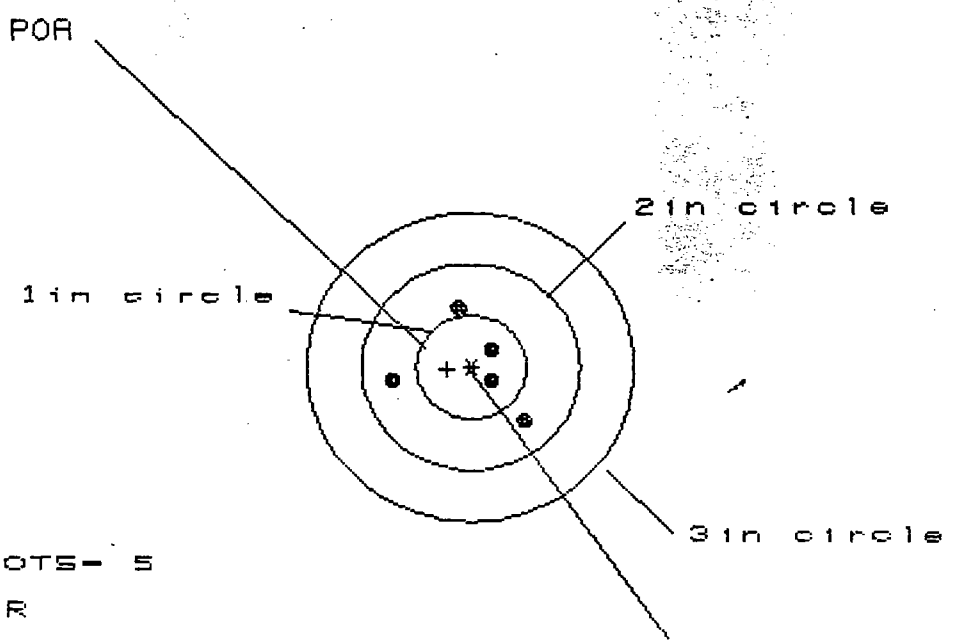
PATTERN #	:	9		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.601	.442	.031
MINIMUM X	:	-.632	-.172	-.025
MAXIMUM Y	:	.366	.407	.354
MINIMUM Y	:	-.297	-.255	-.309
CENTROID X	:	-.034	.124	-.023
CENTROID Y	:	-.050	-.091	-.038
POA TO CENTROID in.	:	.060	.155	.044
MIN RADIUS	:	.035	.173	.051
MEAN RADIUS	:	.398	.340	.238
MAX RADIUS	:	.654	.471	.354
HORIZONTAL SPREAD	:	1.233	.615	.056
VERTICAL SPREAD	:	.663	.663	.663
EXTREME SPREAD	:	1.287	.824	.664
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

B6729801

.223 REM. M/700 BDL.
55GR. M.C. LOT # A06II
100 YDS.
SPEC- 2.2" C.TO C.

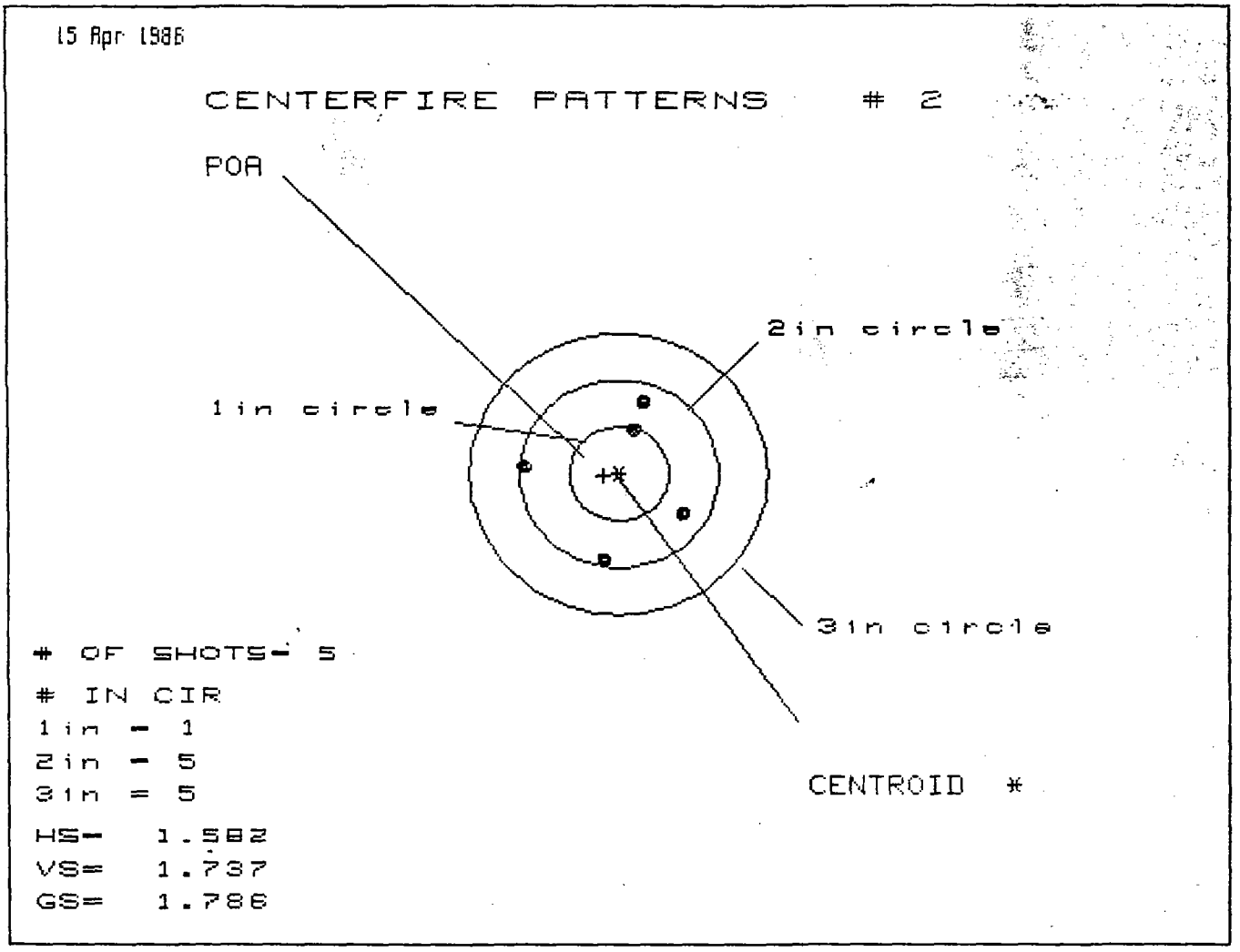
15 Apr 1986

CENTERFIRE PATTERNS # 1

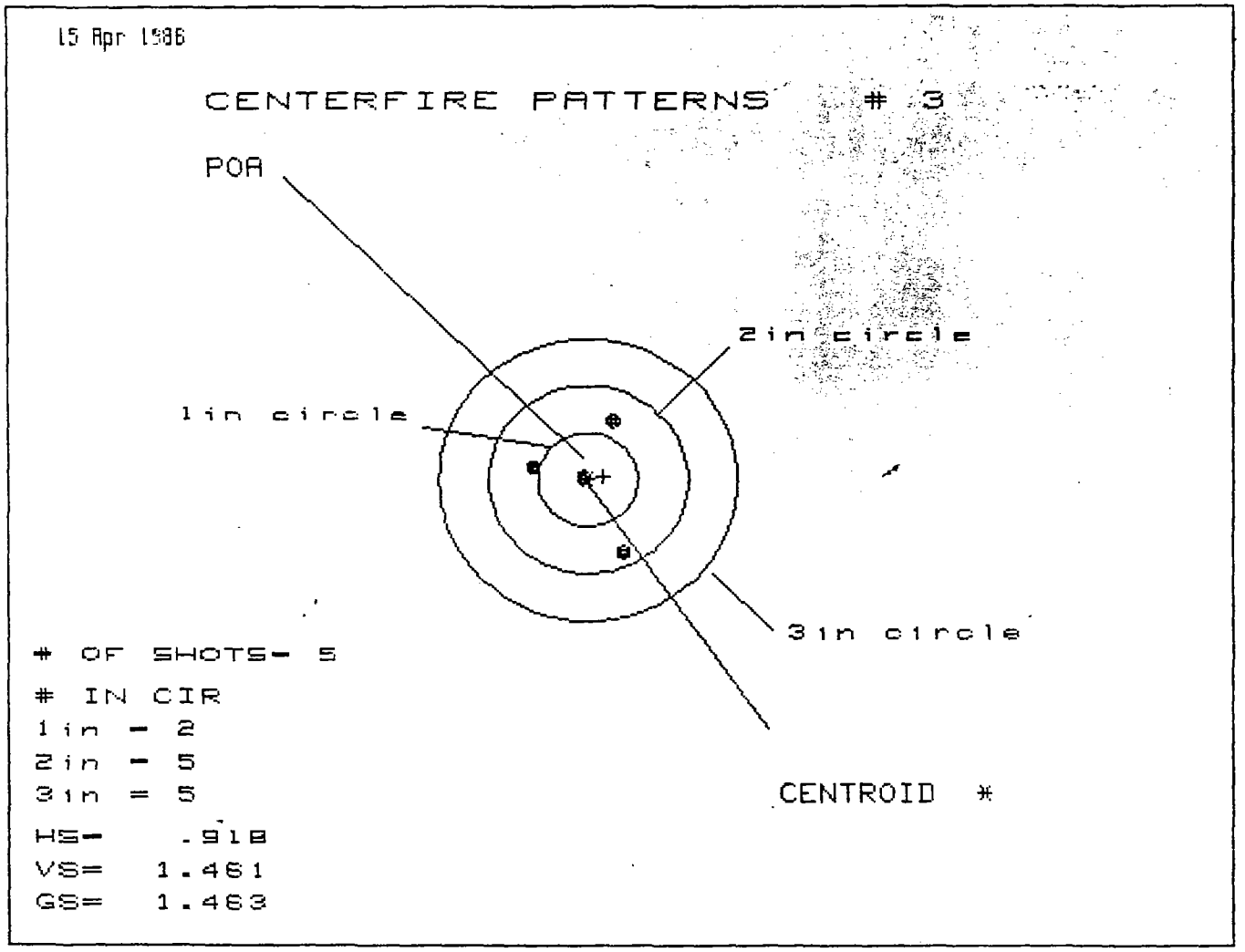


OF SHOTS= 5
IN CIR
1in = 2
2in = 5
3in = 5
HS= 1.229
VS= 1.109
GS= 1.303
AVG- 1.517

PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.509	.332	.134
MINIMUM X	:	-.720	-.592	-.202
MAXIMUM Y	:	.577	.444	.367
MINIMUM Y	:	-.532	-.259	-.336
CENTROID X	:	.216	.088	.286
CENTROID Y	:	.022	.155	.232
POA TO CENTROID in.	:	.217	.178	.368
MIN RADIUS	:	.186	.335	.138
MEAN RADIUS	:	.503	.446	.300
MAX RADIUS	:	.736	.636	.419
HORIZONTAL SPREAD	:	1.229	.924	.336
VERTICAL SPREAD	:	1.109	.703	.703
EXTREME SPREAD	:	1.303	.965	.753
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

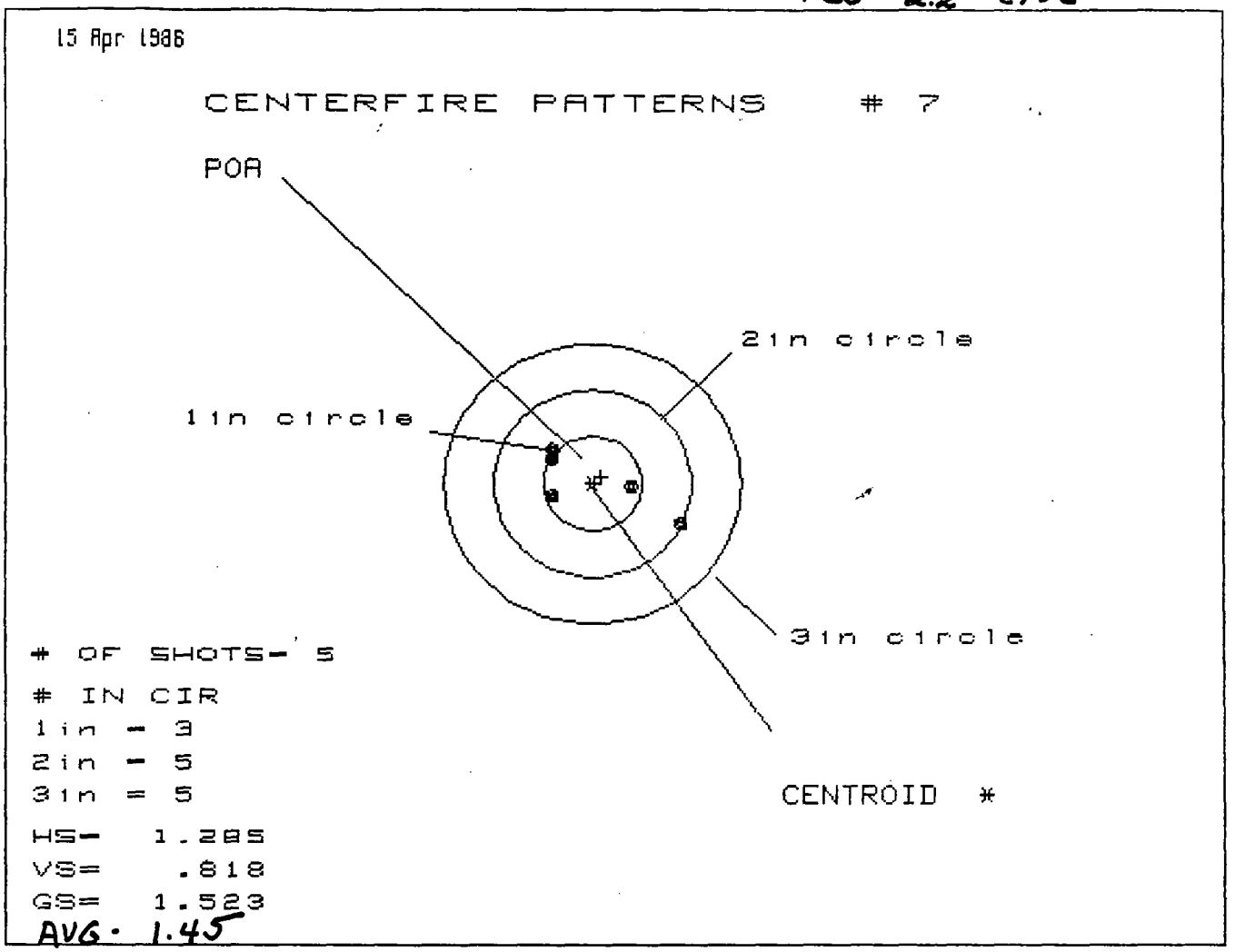


PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.661	.627	.309
MINIMUM X	:	-.921	-.955	-.241
MAXIMUM Y	:	.806	.574	.513
MINIMUM Y	:	-.931	-.621	-.682
CENTROID X	:	.156	.190	.508
CENTROID Y	:	.021	.253	.314
POA TO CENTROID in.	:	.158	.317	.597
MIN RADIUS	:	.476	.243	.294
MEAN RADIUS	:	.792	.681	.520
MAX RADIUS	:	.940	.972	.749
HORIZONTAL SPREAD	:	1.582	1.582	.550
VERTICAL SPREAD	:	1.737	1.195	1.195
EXTREME SPREAD	:	1.786	1.642	1.253
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



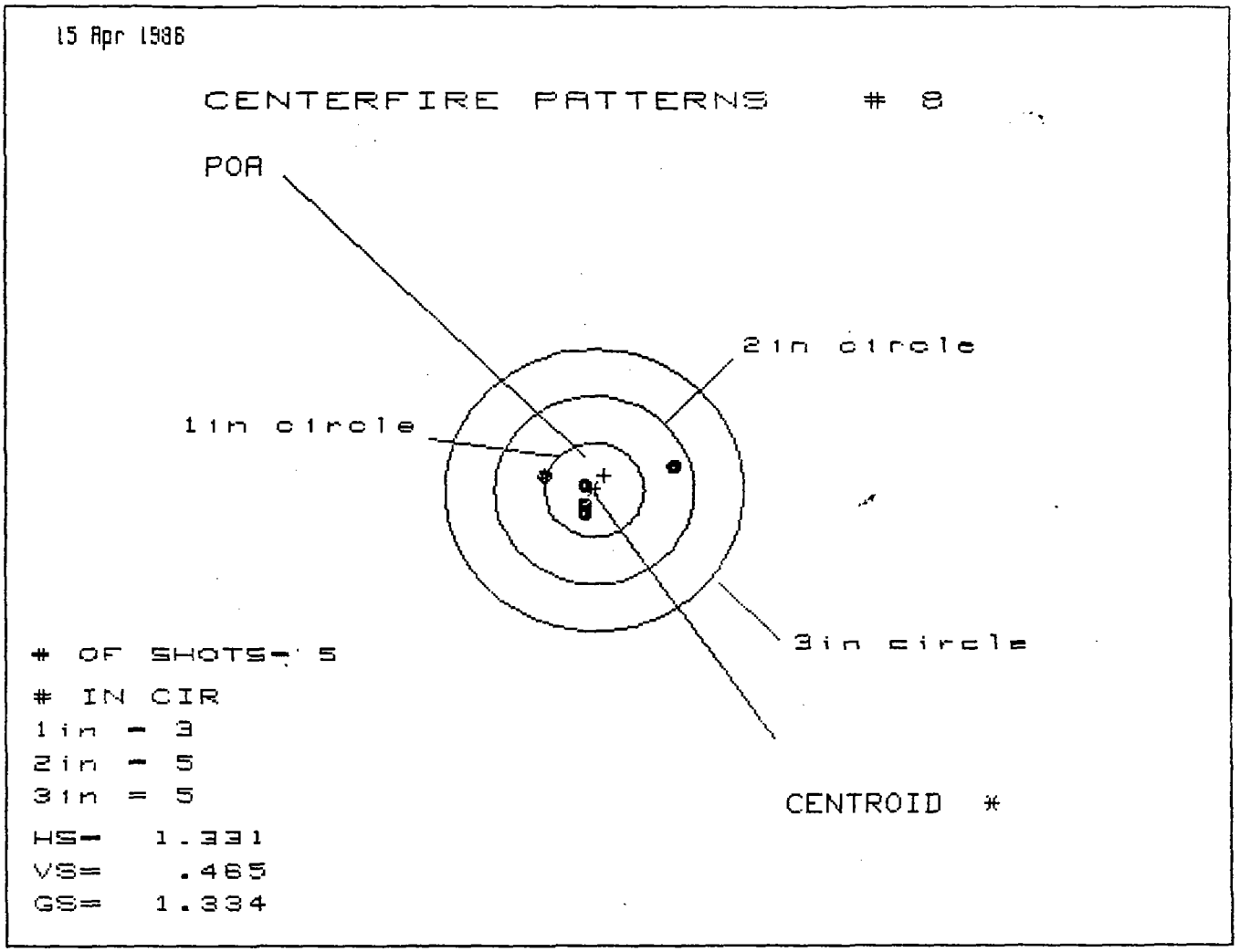
PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.375	.386	.166
MINIMUM X	:	-.543	-.449	-.321
MAXIMUM Y	:	.655	.453	.052
MINIMUM Y	:	-.806	-.192	-.041
CENTROID X	:	-.155	-.249	-.377
CENTROID Y	:	-.031	.171	.020
POA TO CENTROID in.	:	.158	.302	.378
MIN RADIUS	:	.057	.164	.155
MEAN RADIUS	:	.459	.354	.217
MAX RADIUS	:	.889	.595	.325
HORIZONTAL SPREAD	:	.918	.835	.487
VERTICAL SPREAD	:	1.461	.645	.093
EXTREME SPREAD	:	1.463	1.001	.496
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

55GR M.C. LOT # A06ID
100 YDS
SPEC. 2.2" CTOC"

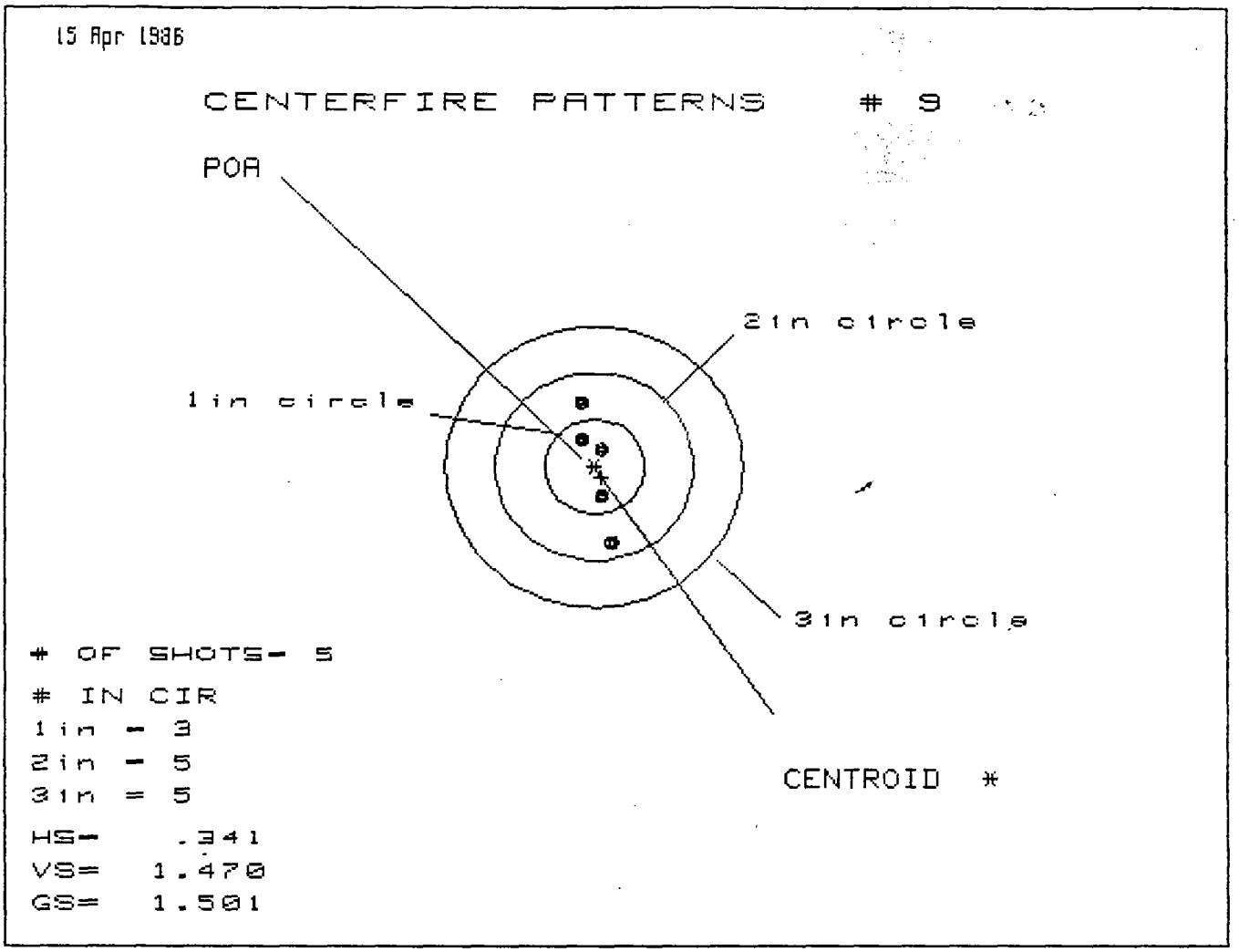


PATTERN #	:	7		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.839	.626	.548
MINIMUM X	:	-.446	-.236	-.288
MAXIMUM Y	:	.364	.251	.268
MINIMUM Y	:	-.454	-.243	-.159
CENTROID X	:	-.086	-.296	-.218
CENTROID Y	:	-.069	.045	-.039
POA TO CENTROID in.	:	.111	.300	.221
MIN RADIUS	:	.424	.258	.329
MEAN RADIUS	:	.577	.395	.420
MAX RADIUS	:	.954	.655	.558
HORIZONTAL SPREAD	:	1.285	.862	.836
VERTICAL SPREAD	:	.818	.493	.427
EXTREME SPREAD	:	1.523	.969	.891
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER



PATTERN #	:	8		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.793	.125	.012
MINIMUM X	:	-.538	-.339	-.022
MAXIMUM Y	:	.237	.210	.131
MINIMUM Y	:	-.228	-.169	-.099
CENTROID X	:	-.099	-.298	-.185
CENTROID Y	:	-.151	-.210	-.280
POA TO CENTROID in.	:	.180	.364	.335
MIN RADIUS	:	.074	.136	.038
MEAN RADIUS	:	.379	.221	.090
MAX RADIUS	:	.828	.399	.131
HORIZONTAL SPREAD	:	1.331	.464	.034
VERTICAL SPREAD	:	.465	.379	.230
EXTREME SPREAD	:	1.334	.598	.230
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

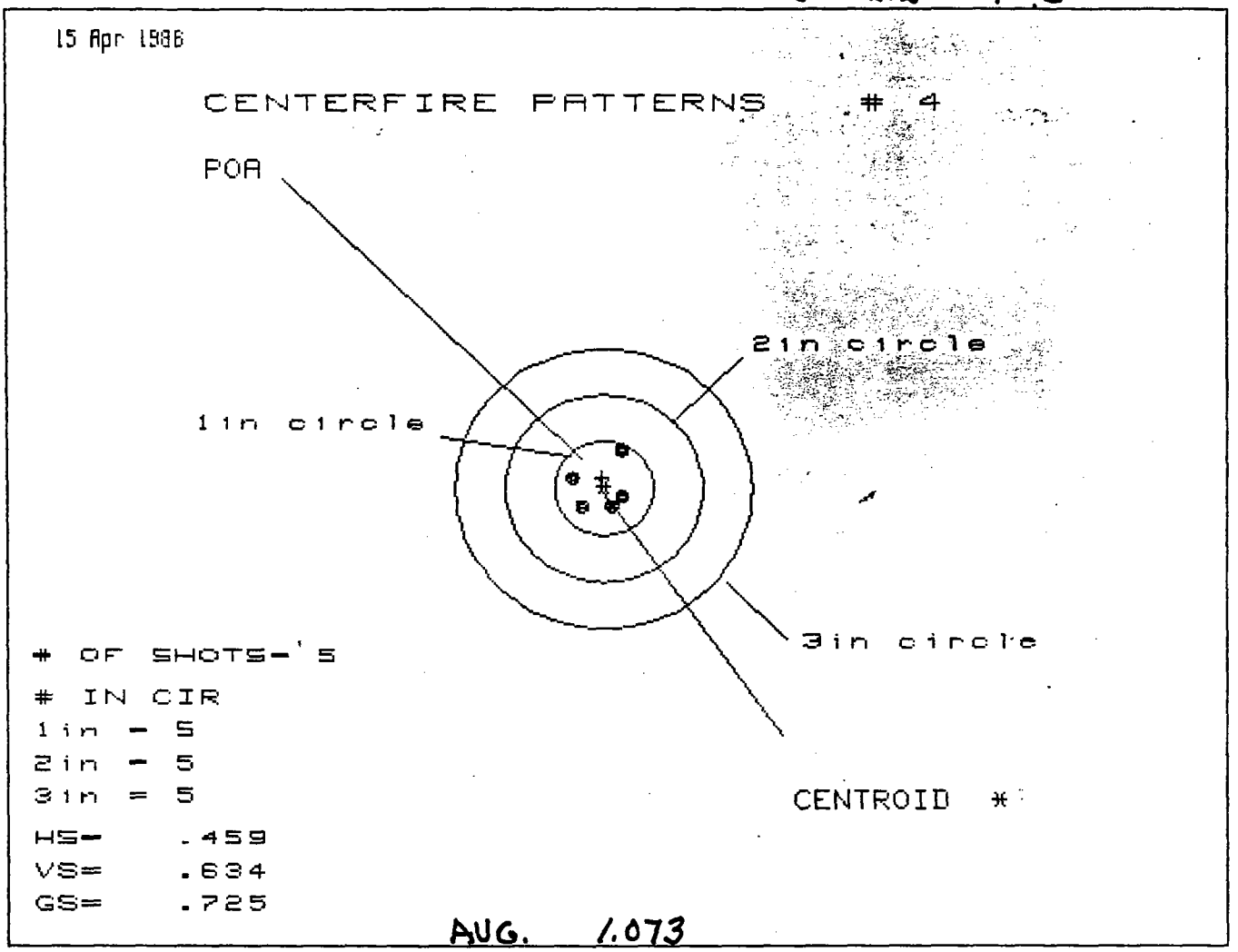


PATTERN #	:	9		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.169	.134	.103
MINIMUM X	:	-.172	-.130	-.161
MAXIMUM Y	:	.663	.461	.234
MINIMUM Y	:	-.807	-.555	-.402
CENTROID X	:	-.063	-.105	-.074
CENTROID Y	:	.113	.315	.162
POA TO CENTROID in.	:	.130	.332	.178
MIN RADIUS	:	.220	.089	.177
MEAN RADIUS	:	.484	.321	.292
MAX RADIUS	:	.825	.571	.415
HORIZONTAL SPREAD	:	.341	.264	.264
VERTICAL SPREAD	:	1.470	1.016	.636
EXTREME SPREAD	:	1.501	1.041	.689
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

U 64 30148

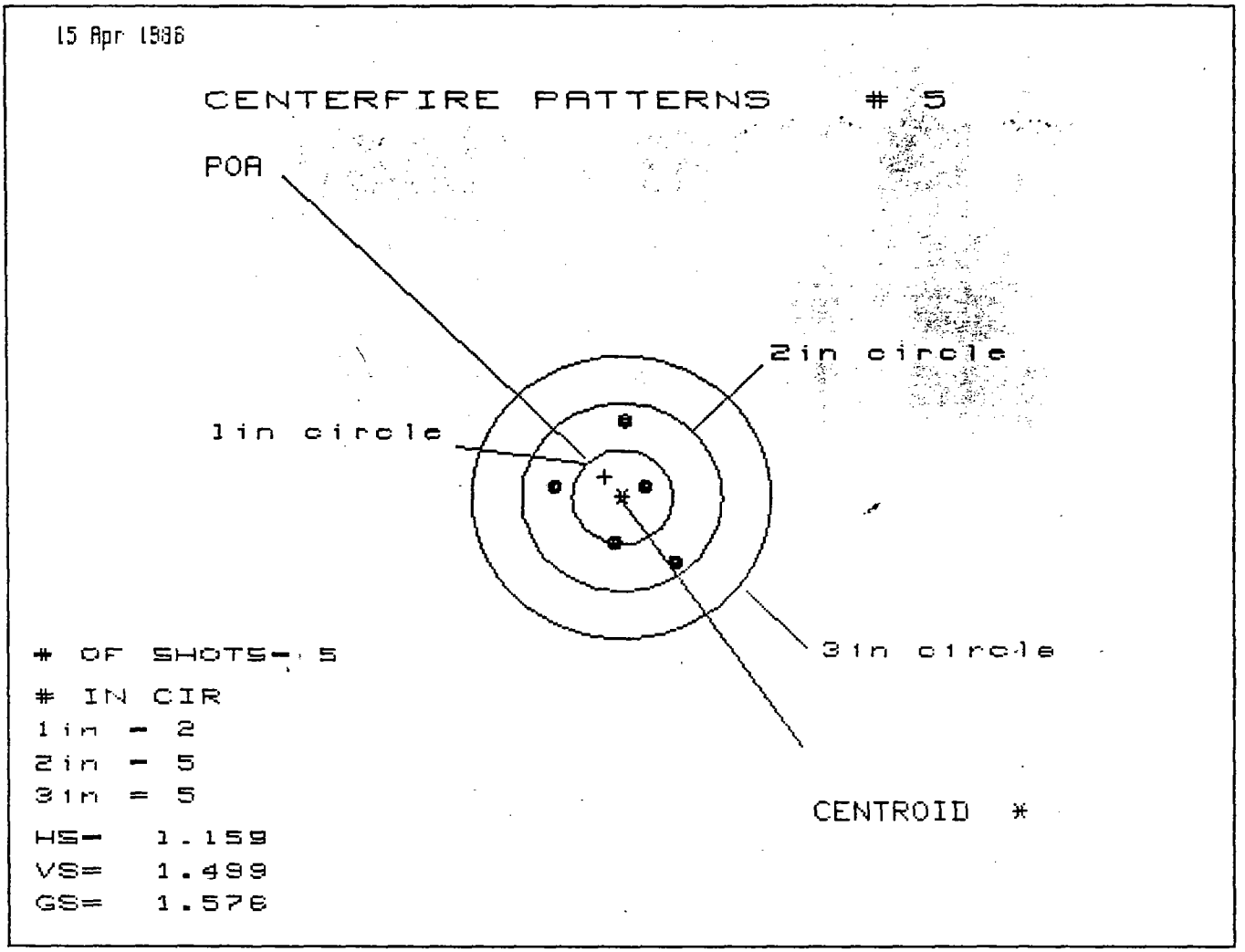
.223 REM. MI/700 BUL.
55 GR MC. LOT #A06ID
100 YDS.

SPEC. 2.2" C.TO.C"



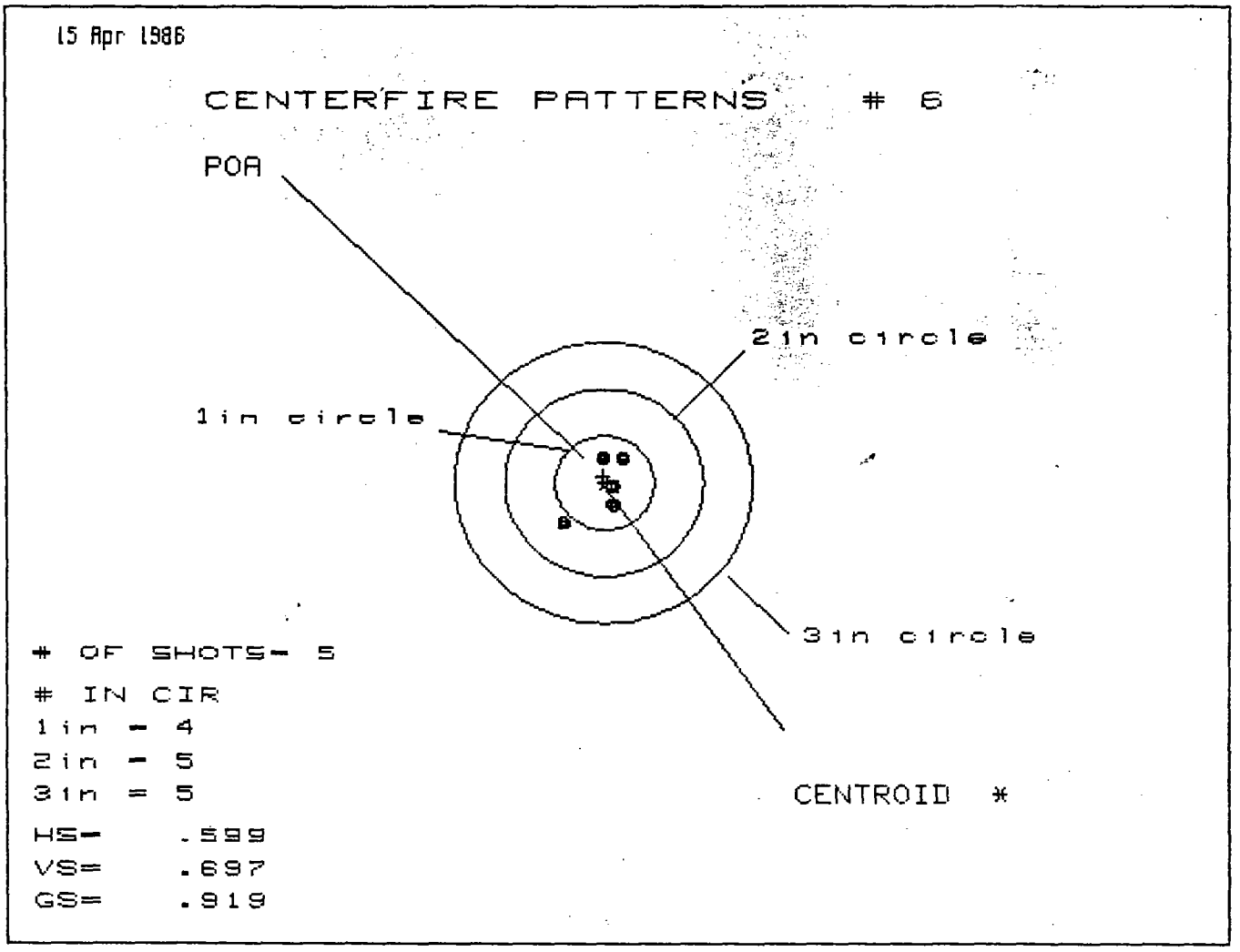
AUG. 1.073

PATTERN # :	4		
SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.178	.209	.130
MINIMUM X :	-.281	-.237	-.208
MAXIMUM Y :	.408	.167	.053
MINIMUM Y :	-.226	-.125	-.069
CENTROID X :	.023	-.021	.058
CENTROID Y :	-.112	-.213	-.269
POA TO CENTROID in.:	.114	.215	.275
MIN RADIUS :	.181	.161	.079
MEAN RADIUS :	.279	.210	.146
MAX RADIUS :	.445	.290	.219
HORIZONTAL SPREAD :	.459	.446	.338
VERTICAL SPREAD :	.634	.292	.122
EXTREME SPREAD :	.725	.477	.359
NUMBER IN ONE INCH CIRCLE =		5	
NUMBER IN TWO INCH CIRCLE =		5	
NUMBER IN THREE INCH CIRCLE =		5	



PATTERN #	:	5		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.501	.504	.402
MINIMUM X	:	-.658	-.655	-.486
MAXIMUM Y	:	.835	.363	.211
MINIMUM Y	:	-.664	-.456	-.413
CENTROID X	:	.171	.168	-.001
CENTROID Y	:	-.217	-.425	-.273
POA TO CENTROID in.	:	.276	.457	.273
MIN RADIUS	:	.271	.274	.421
MEAN RADIUS	:	.618	.531	.467
MAX RADIUS	:	.835	.749	.530
HORIZONTAL SPREAD	:	1.159	1.159	.888
VERTICAL SPREAD	:	1.499	.819	.624
EXTREME SPREAD	:	1.576	1.419	.888

NUMBER IN ONE INCH CIRCLE = 2
NUMBER IN TWO INCH CIRCLE = 5
NUMBER IN THREE INCH CIRCLE = 5

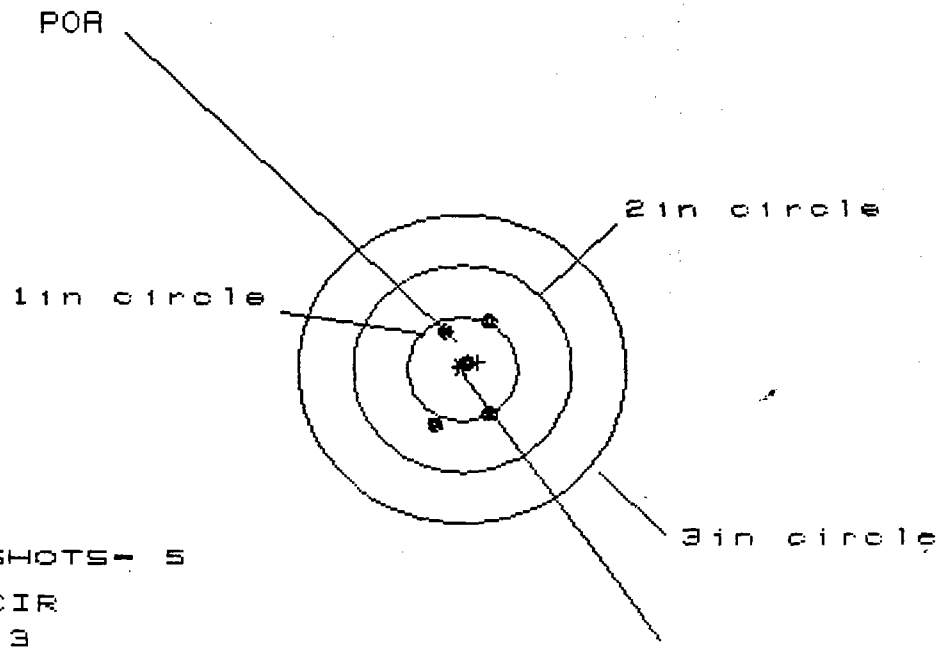


PATTERN #	:	6		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.232	.141	.057
MINIMUM X	:	-.367	-.128	-.081
MAXIMUM Y	:	.303	.205	.257
MINIMUM Y	:	-.394	-.288	-.220
CENTROID X	:	.016	.107	.060
CENTROID Y	:	-.070	.028	-.040
POA TO CENTROID in.	:	.072	.111	.072
MIN RADIUS	:	.102	.106	.068
MEAN RADIUS	:	.303	.218	.186
MAX RADIUS	:	.538	.289	.270
HORIZONTAL SPREAD	:	.599	.269	.138
VERTICAL SPREAD	:	.697	.493	.477
EXTREME SPREAD	:	.919	.519	.489
NUMBER IN ONE INCH CIRCLE	=		4	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

55GR. m/c. LOT #A06ID
100 YDS.
SPEC. 2.2 "C TO C"

15 Apr 1986

CENTERFIRE PATTERNS # 1



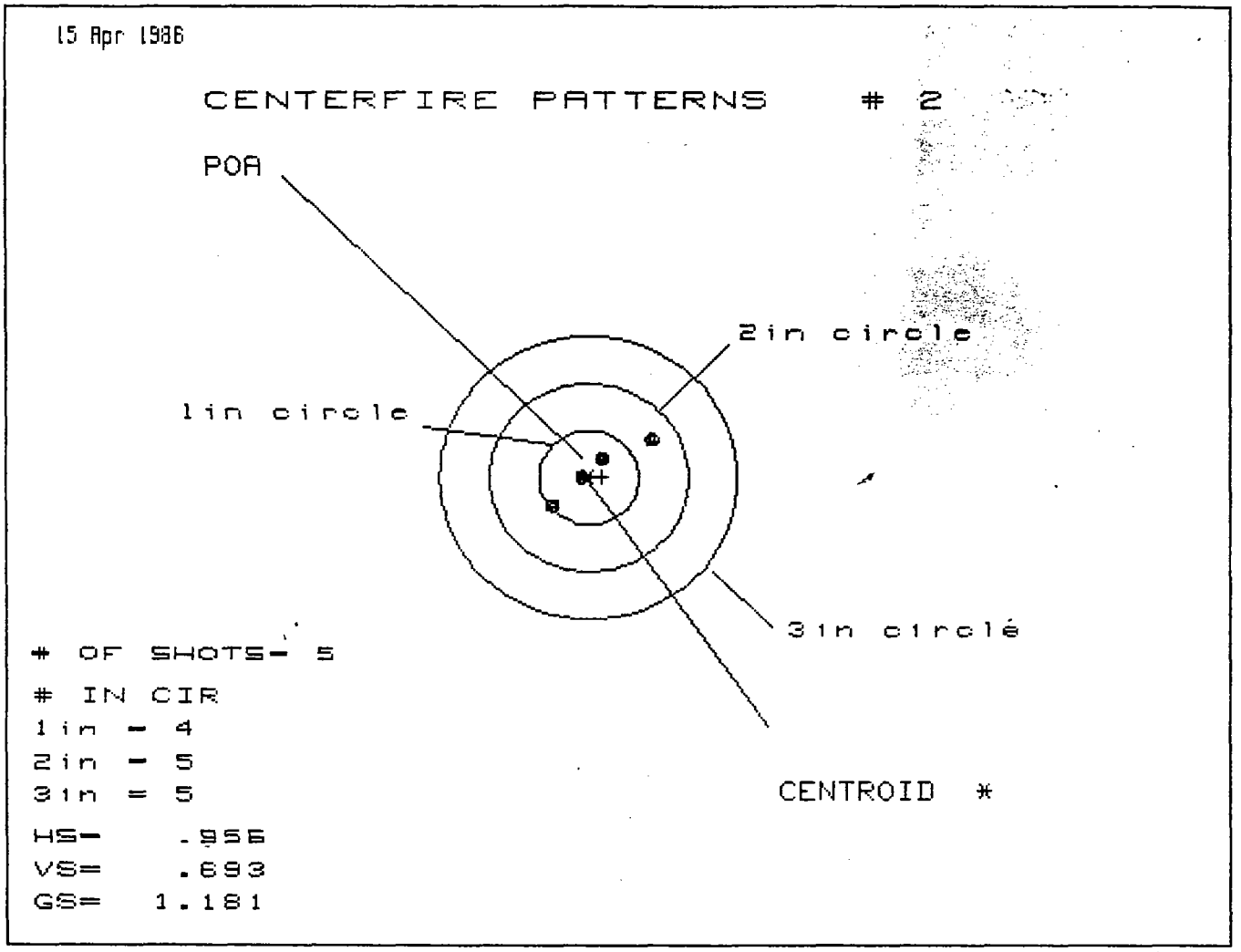
OF SHOTS= 5

IN CIR
1in = 3
2in = 5
3in = 5

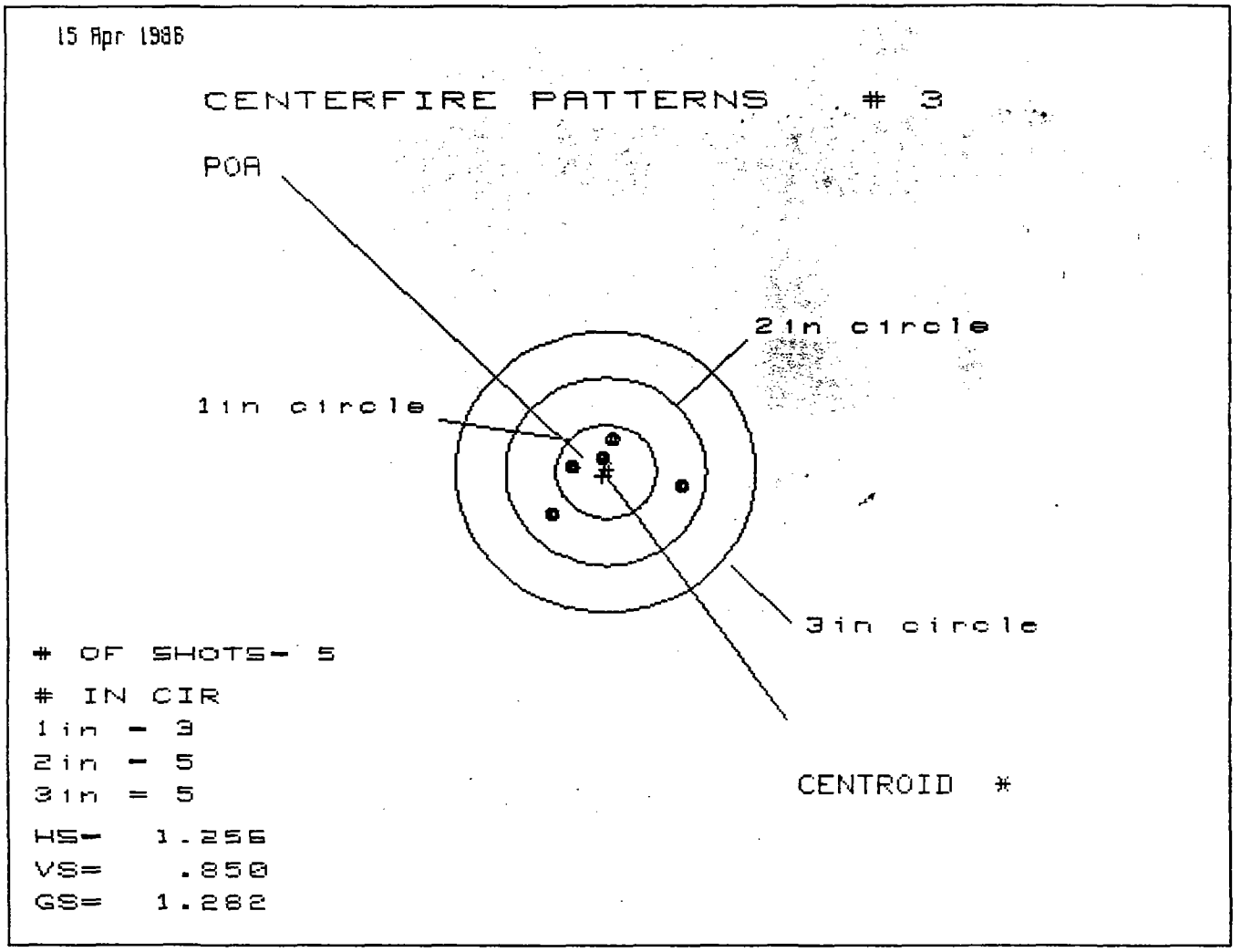
HS= .466
VS= .948
GS= 1.056

AVG- 1.173

PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.227	.167	.218
MINIMUM X	:	-.239	-.262	-.206
MAXIMUM Y	:	.458	.336	.389
MINIMUM Y	:	-.490	-.535	-.423
CENTROID X	:	-.142	-.082	-.138
CENTROID Y	:	-.066	.056	-.056
POA TO CENTROID in.	:	.156	.099	.148
MIN RADIUS	:	.046	.102	.036
MEAN RADIUS	:	.404	.354	.318
MAX RADIUS	:	.545	.559	.476
HORIZONTAL SPREAD	:	.466	.429	.424
VERTICAL SPREAD	:	.948	.871	.812
EXTREME SPREAD	:	1.056	.916	.916
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.599	.267	.198
MINIMUM X	:	-.357	-.207	-.252
MAXIMUM Y	:	.374	.319	.243
MINIMUM Y	:	-.319	-.225	-.245
CENTROID X	:	-.133	-.283	-.214
CENTROID Y	:	-.010	-.104	-.028
POA TO CENTROID in.	:	.134	.301	.216
MIN RADIUS	:	.032	.145	.054
MEAN RADIUS	:	.379	.279	.240
MAX RADIUS	:	.706	.416	.351
HORIZONTAL SPREAD	:	.956	.474	.450
VERTICAL SPREAD	:	.693	.544	.488
EXTREME SPREAD	:	1.181	.722	.664
NUMBER IN ONE INCH CIRCLE	=		4	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.768	.207	.109
MINIMUM X	:	-.488	-.296	-.209
MAXIMUM Y	:	.397	.348	.181
MINIMUM Y	:	-.453	-.502	-.128
CENTROID X	:	.038	-.154	-.056
CENTROID Y	:	.048	.097	.264
POA TO CENTROID in.	:	.061	.182	.270
MIN RADIUS	:	.163	.117	.114
MEAN RADIUS	:	.467	.334	.190
MAX RADIUS	:	.793	.582	.245
HORIZONTAL SPREAD	:	1.256	.503	.318
VERTICAL SPREAD	:	.850	.850	.309
EXTREME SPREAD	:	1.282	.988	.443
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

G-88

DON'T SAY IT—*WRITE IT*

MISSING MAG -10 ( )

To 2 2 3 1 1-10 556

Date

From

Renumbered to 556

1,065	2,467
1,517	3,690
1,450	2,342
1,073	1,913
1,173	1,850
1,307	2,446

"AN UNGUARDED MINUTE HAS AN ACCIDENT IN IT"

NATIONAL | 45-606 EYE-EASE 45-708 20/20 BUFF

.223 STRAIN PRESSURE DATA

		1	2	3	4	5	6
		Gun #	Gun #	Gun #	Gun #	Gun #	Gun #
	Ammo/Lot	9055	9801	8889	9112	0318	0148
1	Rem 8D1219	44309	46394	47787	45223	48354	50329
2	Win 52TK31	43425	45420	44559	45910	47249	51652
3	Fed 3A-2323	46760	44452	46537	48988	50682	53323
4	Proof LG03MD	54929	55794	55551	59220	62648	66984

Ammo	Range of $\bar{X}$s by Ammo
Rem	6020
Win	8227
Fed	8871
Proof	12055

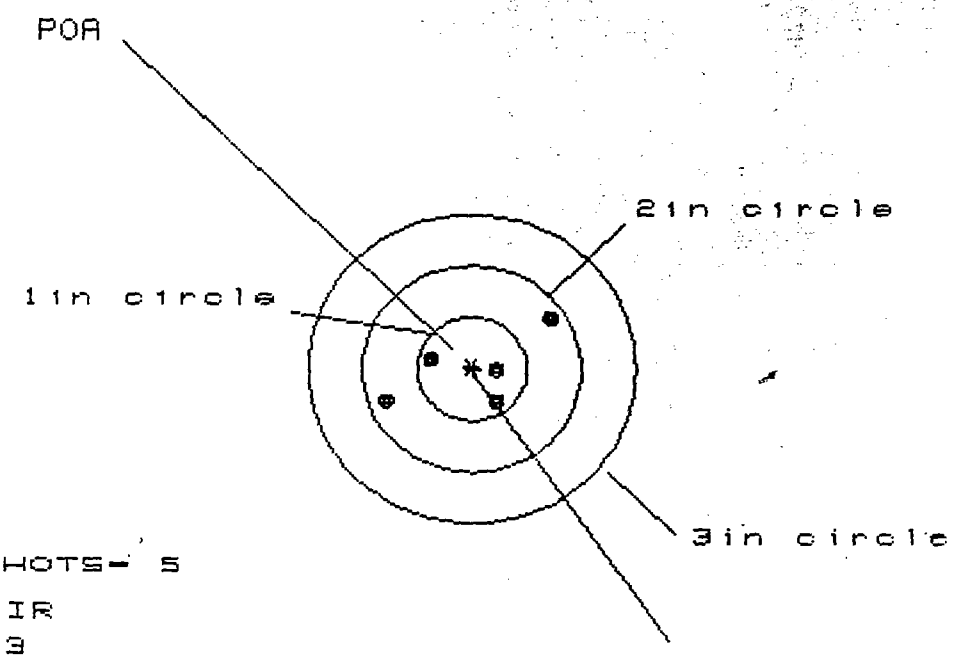
	Range of $\bar{X}$s by Gun (w/o Proof)
9055	3335
9801	1942
8889	3228
9112	3765
0318	3433
0148	2994

B-4430318

.223 REM. M/700 BDL.
5.56 MILITARY - LOT. TW 2-66
100 YDS.

15 Apr 1986

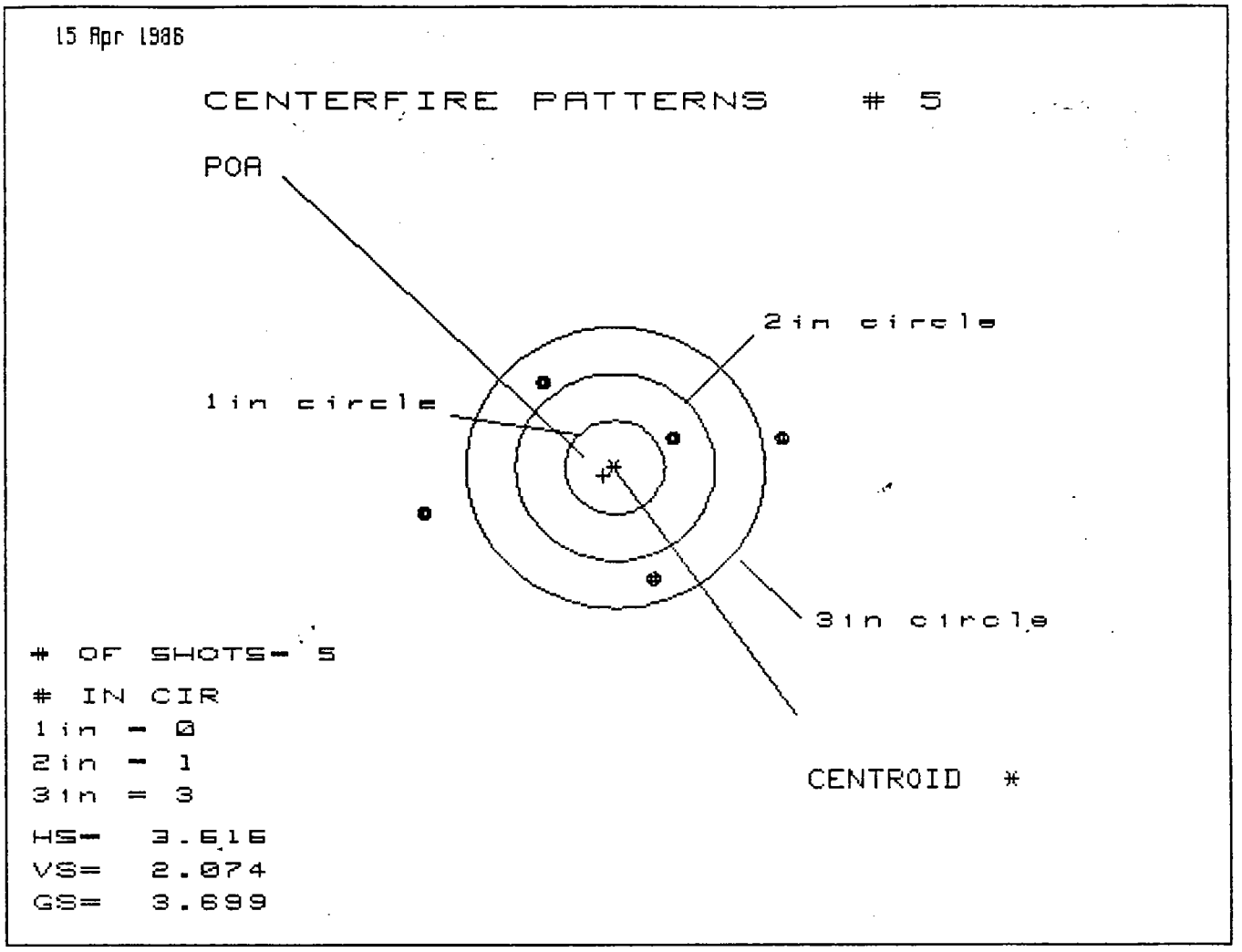
CENTERFIRE PATTERNS # 4



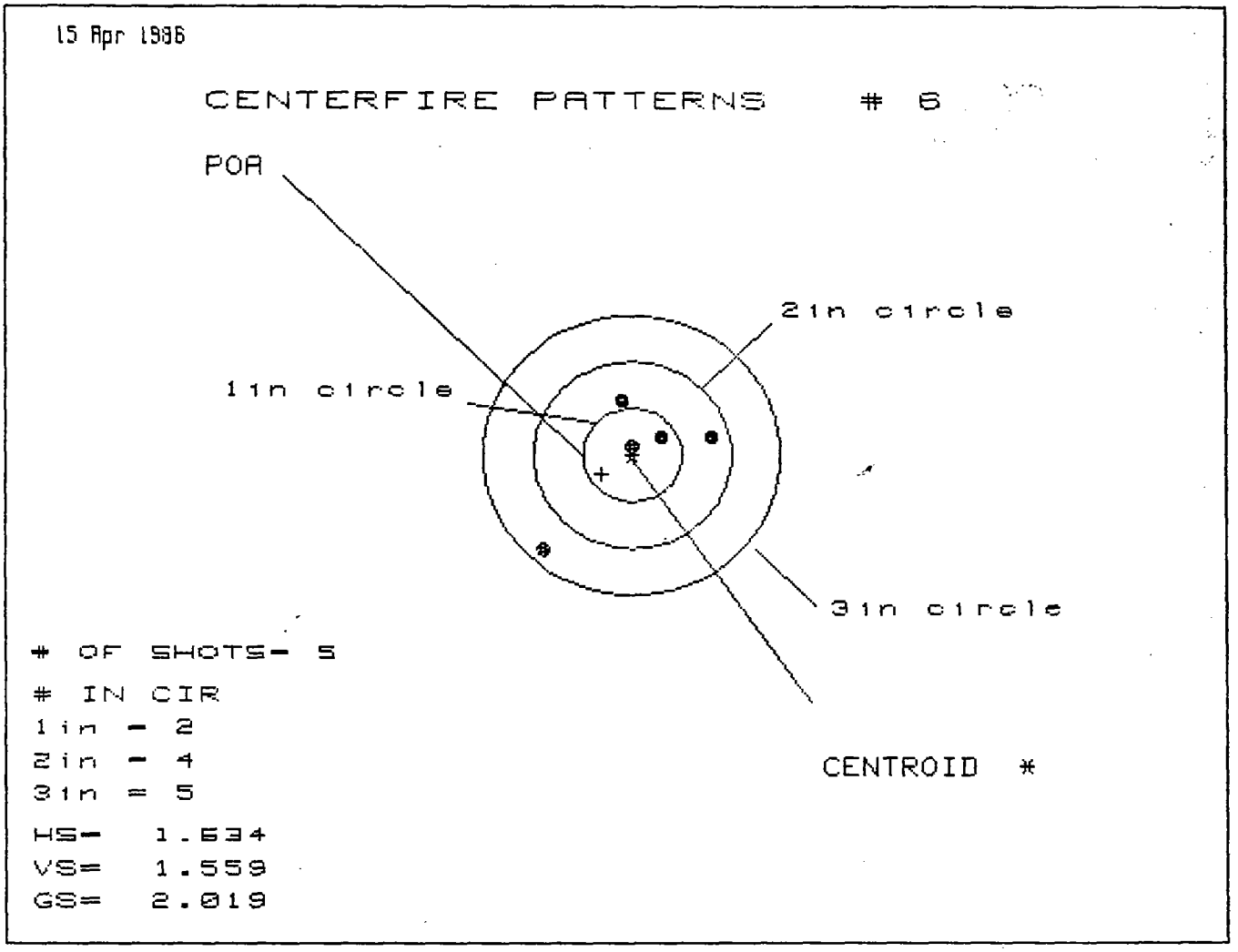
OF SHOTS= 5
IN CIR
1in = 3
2in = 5
3in = 5

HS= 1.492
VS= .832
GS= 1.685
AVG- 2.469

PATTERN #	:	4	
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.741	.412	.224
MINIMUM X	:	-.751	-.566	-.391
MAXIMUM Y	:	.499	.215	.163
MINIMUM Y	:	-.333	-.208	-.260
CENTROID X	:	-.017	-.203	-.014
CENTROID Y	:	.004	-.121	-.069
POA TO CENTROID in.	:	.018	.236	.070
MIN RADIUS	:	.172	.296	.193
MEAN RADIUS	:	.534	.433	.320
MAX RADIUS	:	.894	.587	.423
HORIZONTAL SPREAD	:	1.492	.978	.615
VERTICAL SPREAD	:	.832	.423	.423
EXTREME SPREAD	:	1.685	.979	.746
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	5		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.660	1.171	.525
MINIMUM X	:	-1.956	-1.177	-.787
MAXIMUM Y	:	.934	.819	.887
MINIMUM Y	:	-1.140	-1.255	-1.187
CENTROID X	:	.119	.608	.218
CENTROID Y	:	.089	.204	.136
POA TO CENTROID in.	:	.148	.641	.256
MIN RADIUS	:	.714	.268	.605
MEAN RADIUS	:	1.354	1.038	1.002
MAX RADIUS	:	2.009	1.434	1.215
HORIZONTAL SPREAD	:	3.616	2.348	1.312
VERTICAL SPREAD	:	2.074	2.074	2.074
EXTREME SPREAD	:	3.699	2.427	2.324
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		1	
NUMBER IN THREE INCH CIRCLE	=		3	



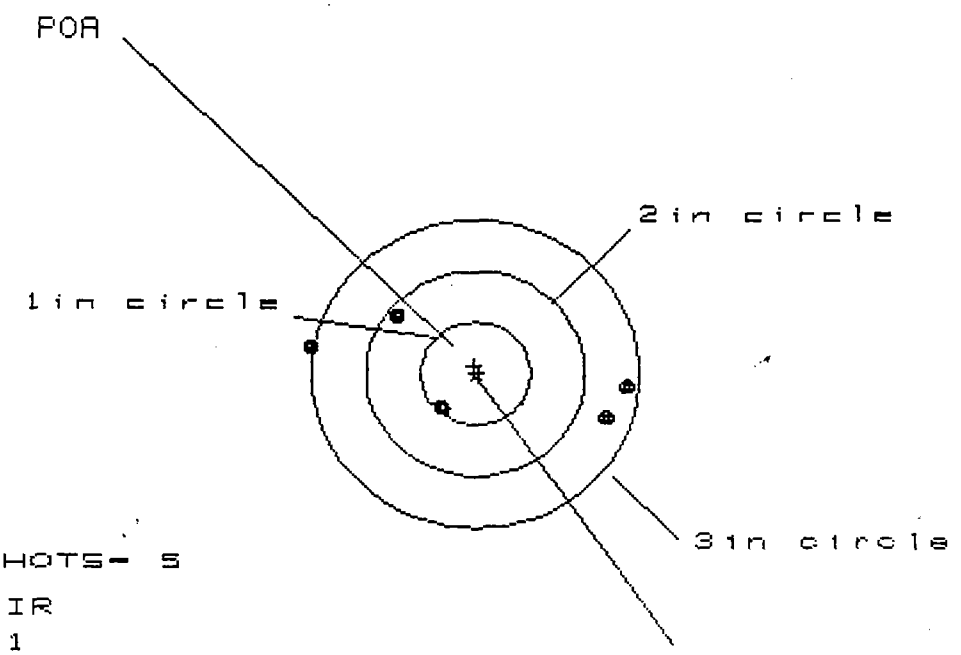
PATTERN #	:	6		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.746	.524	.198
MINIMUM X	:	-.888	-.290	-.115
MAXIMUM Y	:	.554	.302	.279
MINIMUM Y	:	-1.005	-.174	-.197
CENTROID X	:	.306	.528	.353
CENTROID Y	:	.208	.460	.483
POA TO CENTROID in.	:	.370	.700	.598
MIN RADIUS	:	.086	.063	.214
MEAN RADIUS	:	.613	.330	.243
MAX RADIUS	:	1.341	.529	.302
HORIZONTAL SPREAD	:	1.634	.814	.313
VERTICAL SPREAD	:	1.559	.476	.476
EXTREME SPREAD	:	2.019	.895	.478
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

B-642912

223 REM. M/700 BDL.
5.56. MILITARY.
LOT - UN KNOWN
100 YDS.

15 Apr 1986

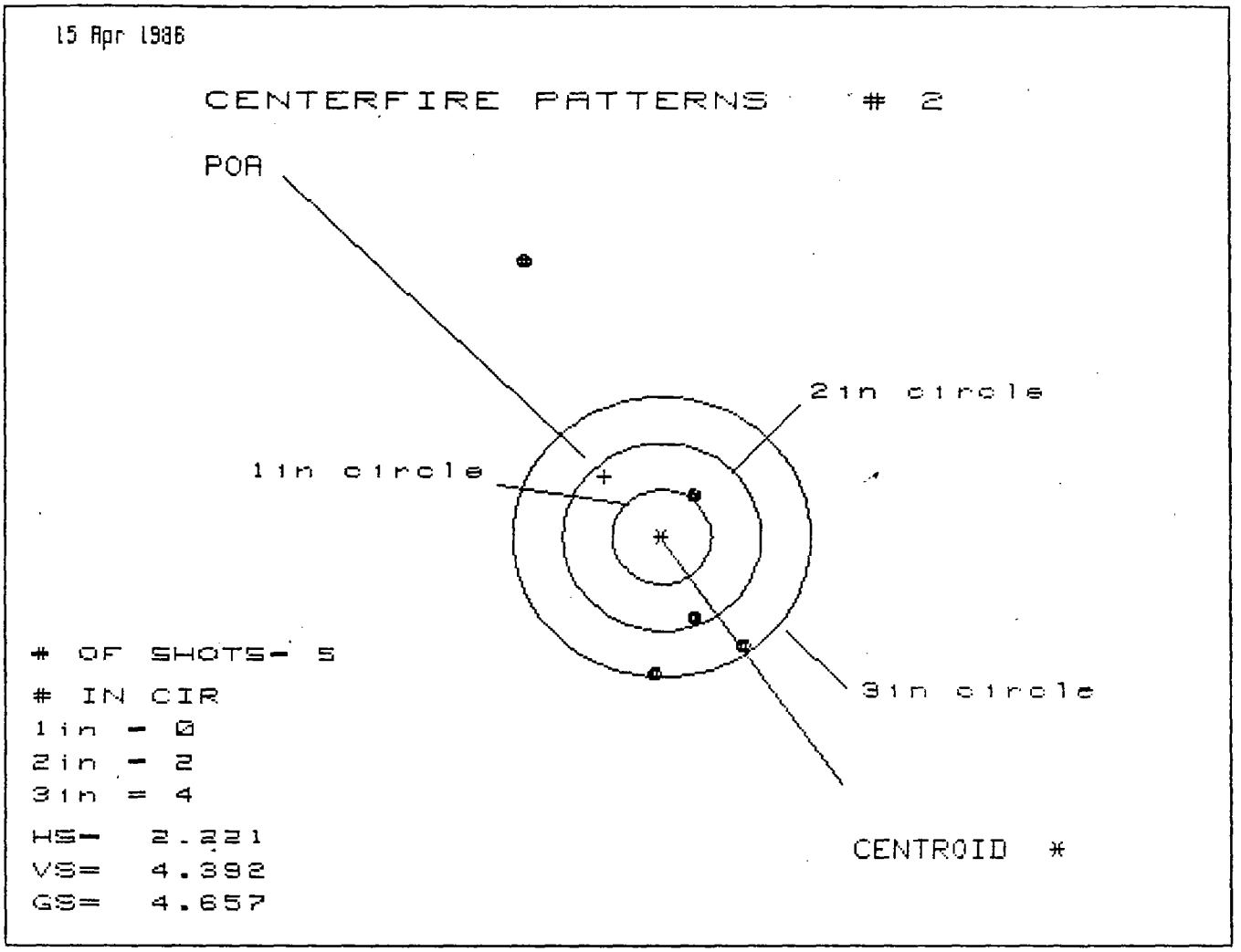
CENTERFIRE PATTERNS # 1



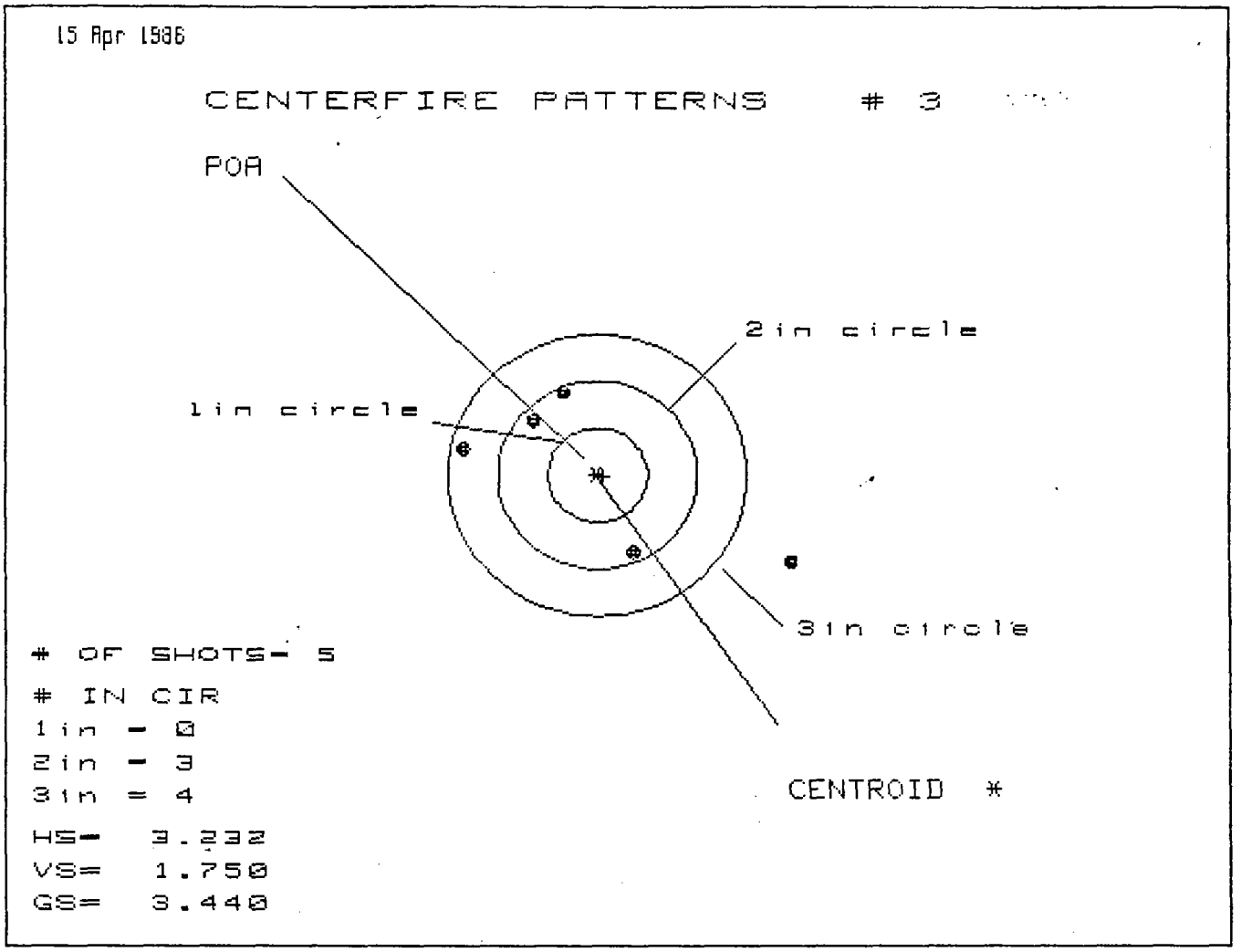
OF SHOTS= 5
IN CIR
1in = 1
2in = 2
3in = 4
HS= 2.951
VS= .961
GS= 2.973
AVG = 3.690

PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.418	1.034	1.097
MINIMUM X	:	-1.533	-1.066	-.721
MAXIMUM Y	:	.551	.619	.613
MINIMUM Y	:	-.410	-.342	-.348
CENTROID X	:	.014	.398	.053
CENTROID Y	:	-.073	-.141	-.135
POA TO CENTROID in.	:	.074	.422	.145
MIN RADIUS	:	.470	.766	.460
MEAN RADIUS	:	1.106	.965	.852
MAX RADIUS	:	1.558	1.232	1.151
HORIZONTAL SPREAD	:	2.951	2.100	1.818
VERTICAL SPREAD	:	.961	.961	.961
EXTREME SPREAD	:	2.973	2.194	2.056
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		2	
NUMBER IN THREE INCH CIRCLE	=		4	

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER



PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.825	.476	.329
MINIMUM X	:	-1.396	-.444	-.193
MAXIMUM Y	:	2.948	1.196	.960
MINIMUM Y	:	-1.444	-.708	-.644
CENTROID X	:	.582	.931	1.078
CENTROID Y	:	-.643	-1.379	-1.144
POA TO CENTROID in.	:	.867	1.664	1.572
MIN RADIUS	:	.550	.080	.343
MEAN RADIUS	:	1.513	.685	.682
MAX RADIUS	:	3.261	1.196	.979
HORIZONTAL SPREAD	:	2.221	.920	.522
VERTICAL SPREAD	:	4.392	1.903	1.604
EXTREME SPREAD	:	4.657	1.944	1.687
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		2	
NUMBER IN THREE INCH CIRCLE	=		4	



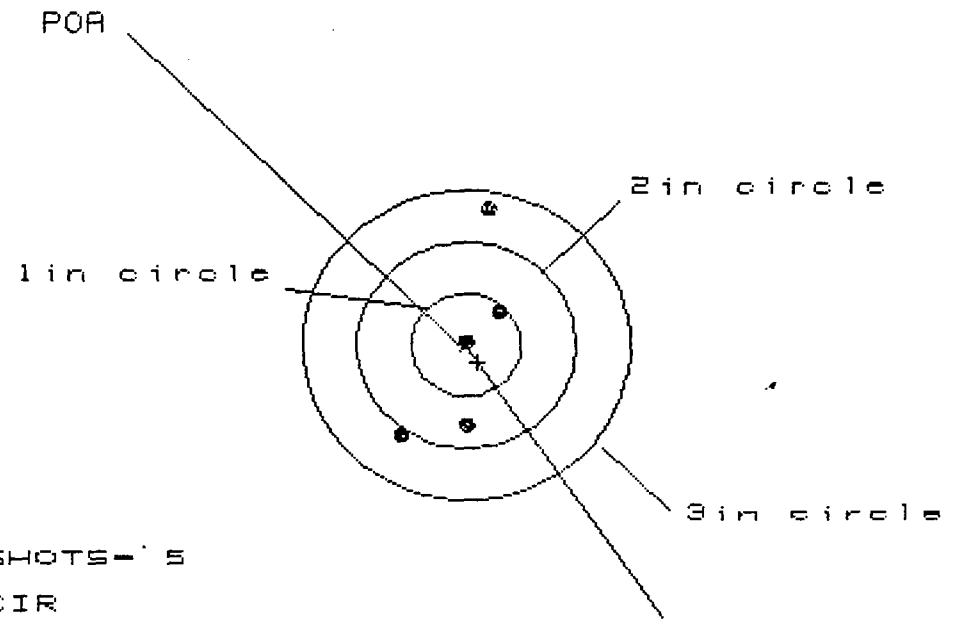
PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.909	.828	.546
MINIMUM X	:	-1.323	-.846	-.429
MAXIMUM Y	:	.860	.637	.659
MINIMUM Y	:	-.890	-1.021	-.999
CENTROID X	:	-.055	-.532	-.250
CENTROID Y	:	.017	.240	.218
POA TO CENTROID in.	:	.057	.584	.332
MIN RADIUS	:	.826	.350	.547
MEAN RADIUS	:	1.215	.793	.785
MAX RADIUS	:	2.106	1.315	1.138
HORIZONTAL SPREAD	:	3.232	1.674	.975
VERTICAL SPREAD	:	1.750	1.658	1.658
EXTREME SPREAD	:	3.440	1.996	1.786
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		4	

B-642980!

.223 REM. MV 700 BBL.
5.56 MILITARY LOT: L-C 1.5"
100 YDS.

15 Apr 1986

CENTERFIRE PATTERNS # 7



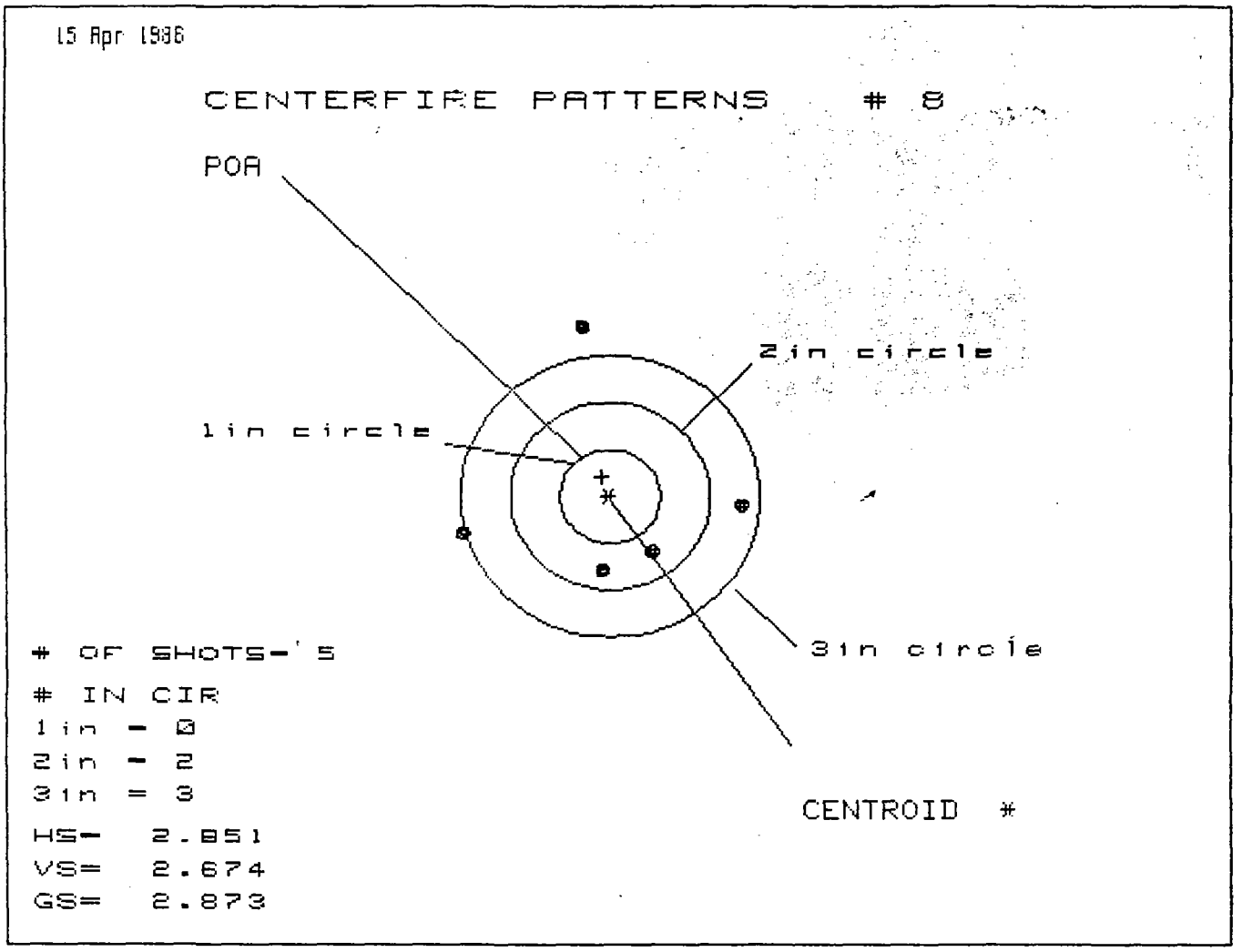
OF SHOTS= 5
IN CIR
1in = 2
2in = 3
3in = 5

HS= .911
VS= 2.245
GS= 2.377
AVG = 2.342

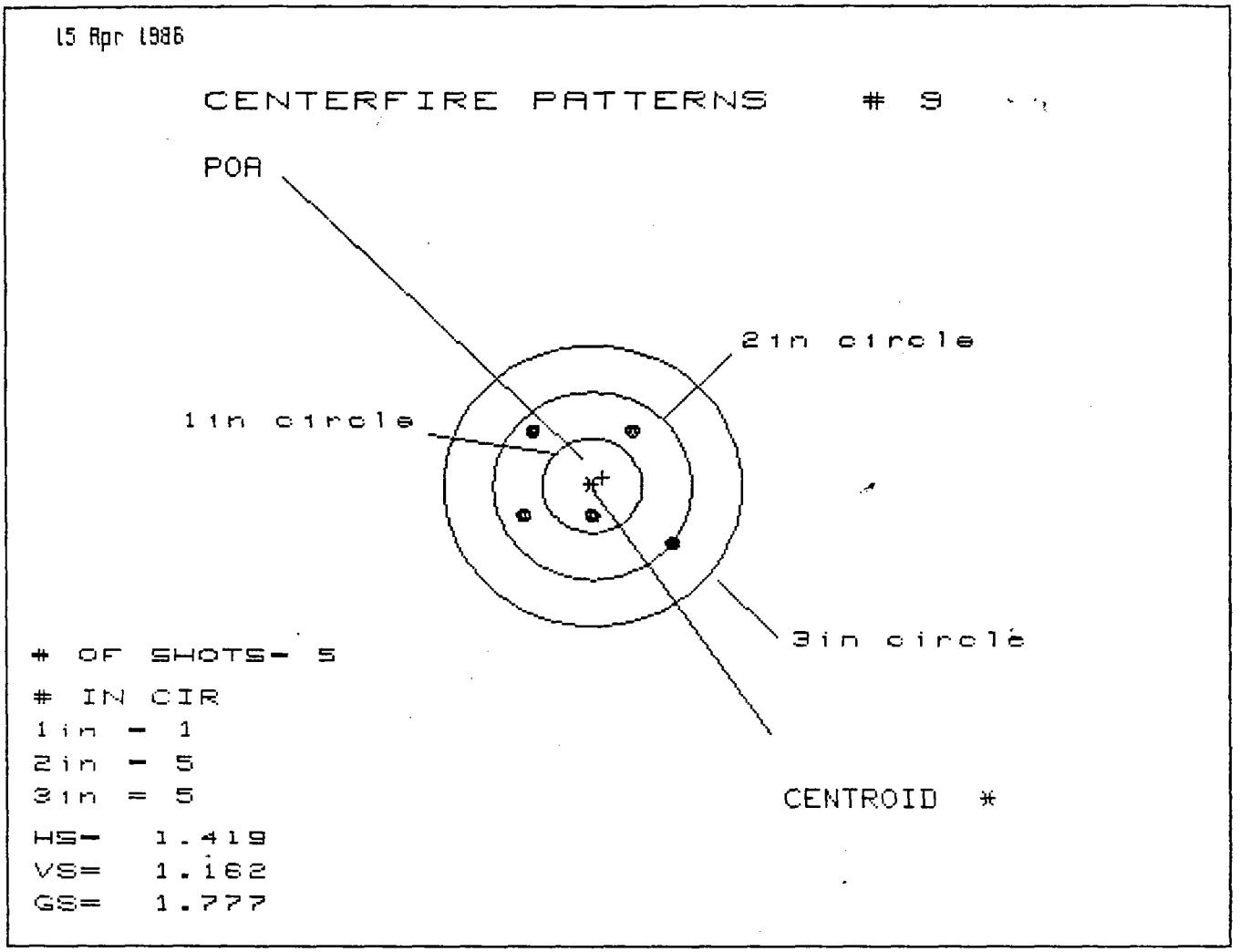
CENTROID *

PATTERN #	:	7		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.348	.402	.232
MINIMUM X	:	-.563	-.509	-.125
MAXIMUM Y	:	1.355	.626	.443
MINIMUM Y	:	-.890	-.551	-.617
CENTROID X	:	-.104	-.158	.012
CENTROID Y	:	.173	-.166	.017
POA TO CENTROID in.	:	.201	.229	.021
MIN RADIUS	:	.021	.364	.205
MEAN RADIUS	:	.734	.573	.445
MAX RADIUS	:	1.373	.750	.630
HORIZONTAL SPREAD	:	.911	.911	.357
VERTICAL SPREAD	:	2.245	1.177	1.060
EXTREME SPREAD	:	2.377	1.488	1.119
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	

CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER

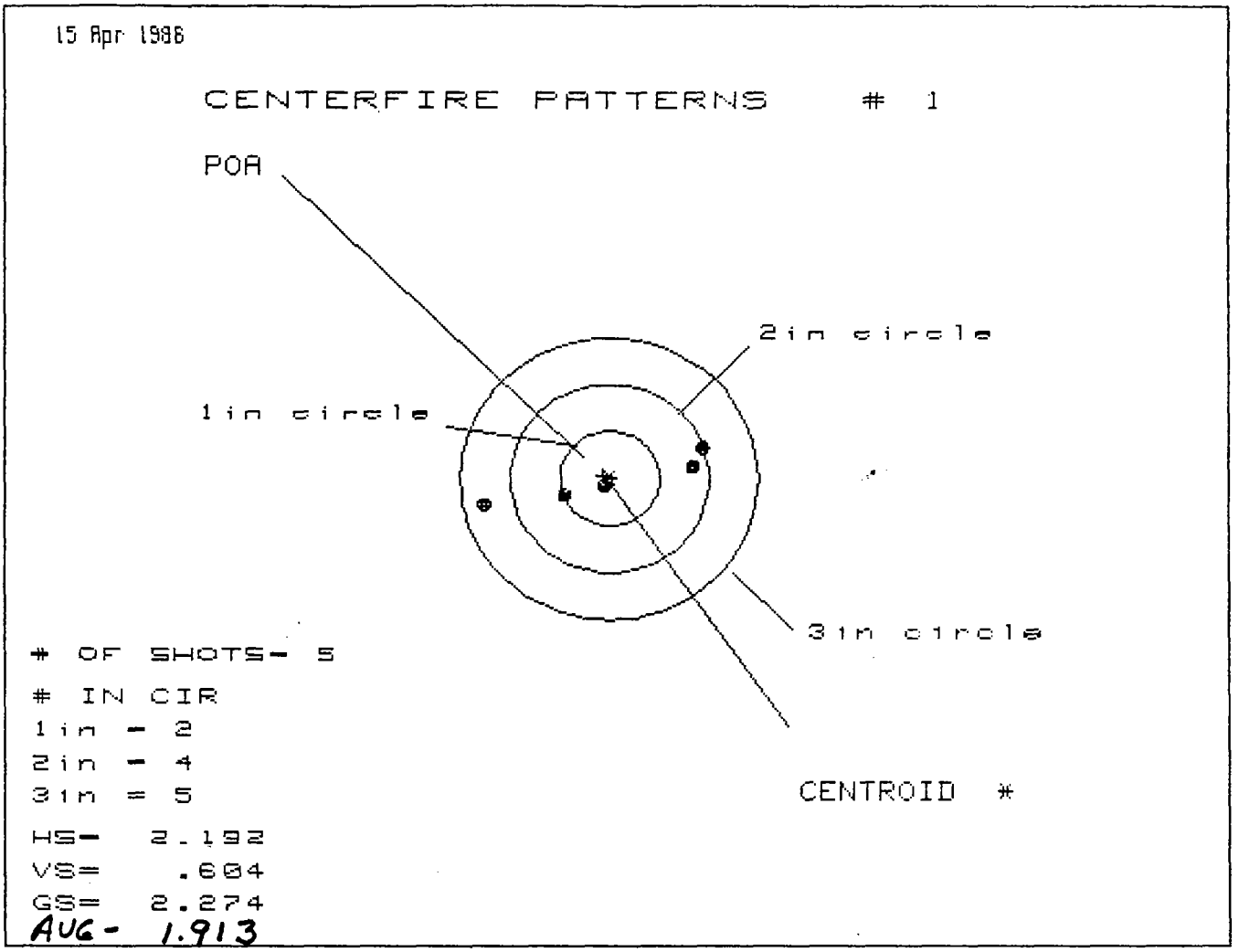


PATTERN #	:	8		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.353	1.286	.765
MINIMUM X	:	-1.498	-1.565	-.636
MAXIMUM Y	:	1.839	.414	.433
MINIMUM Y	:	-.835	-.375	-.356
CENTROID X	:	.079	.146	.667
CENTROID Y	:	-.213	-.673	-.692
POA TO CENTROID in.	:	.227	.689	.961
MIN RADIUS	:	.721	.392	.149
MEAN RADIUS	:	1.264	.928	.586
MAX RADIUS	:	1.859	1.566	.879
HORIZONTAL SPREAD	:	2.851	2.851	1.401
VERTICAL SPREAD	:	2.674	.789	.789
EXTREME SPREAD	:	2.873	2.873	1.608
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		2	
NUMBER IN THREE INCH CIRCLE	=		3	

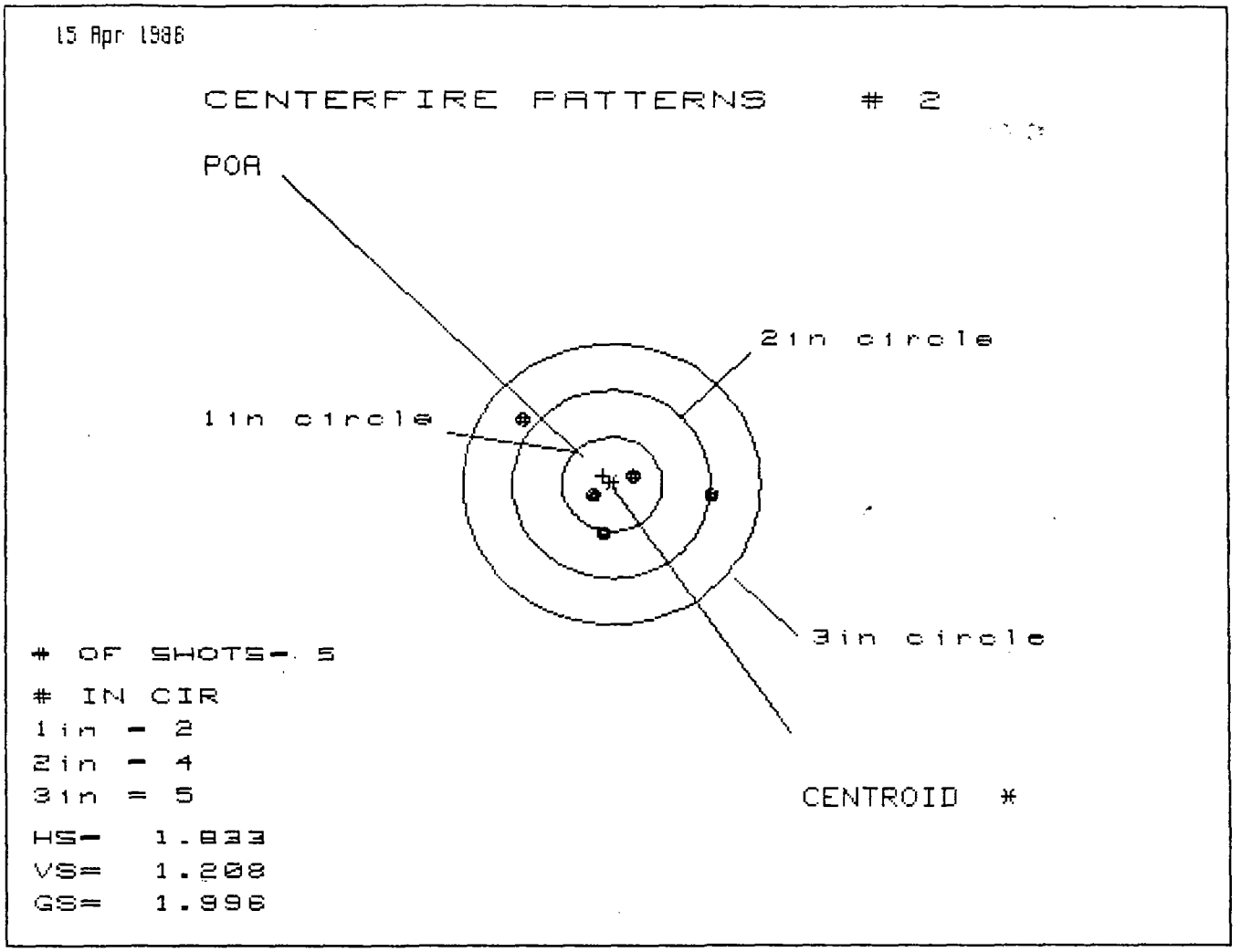


PATTERN #	:	9		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.771	.602	.472
MINIMUM X	:	-.648	-.455	-.585
MAXIMUM Y	:	.600	.459	.609
MINIMUM Y	:	-.562	-.478	-.328
CENTROID X	:	-.102	-.295	-.165
CENTROID Y	:	-.089	.052	-.098
POA TO CENTROID in.	:	.135	.299	.191
MIN RADIUS	:	.341	.536	.347
MEAN RADIUS	:	.712	.628	.589
MAX RADIUS	:	.954	.757	.770
HORIZONTAL SPREAD	:	1.419	1.057	1.057
VERTICAL SPREAD	:	1.162	.937	.937
EXTREME SPREAD	:	1.777	1.381	1.381
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

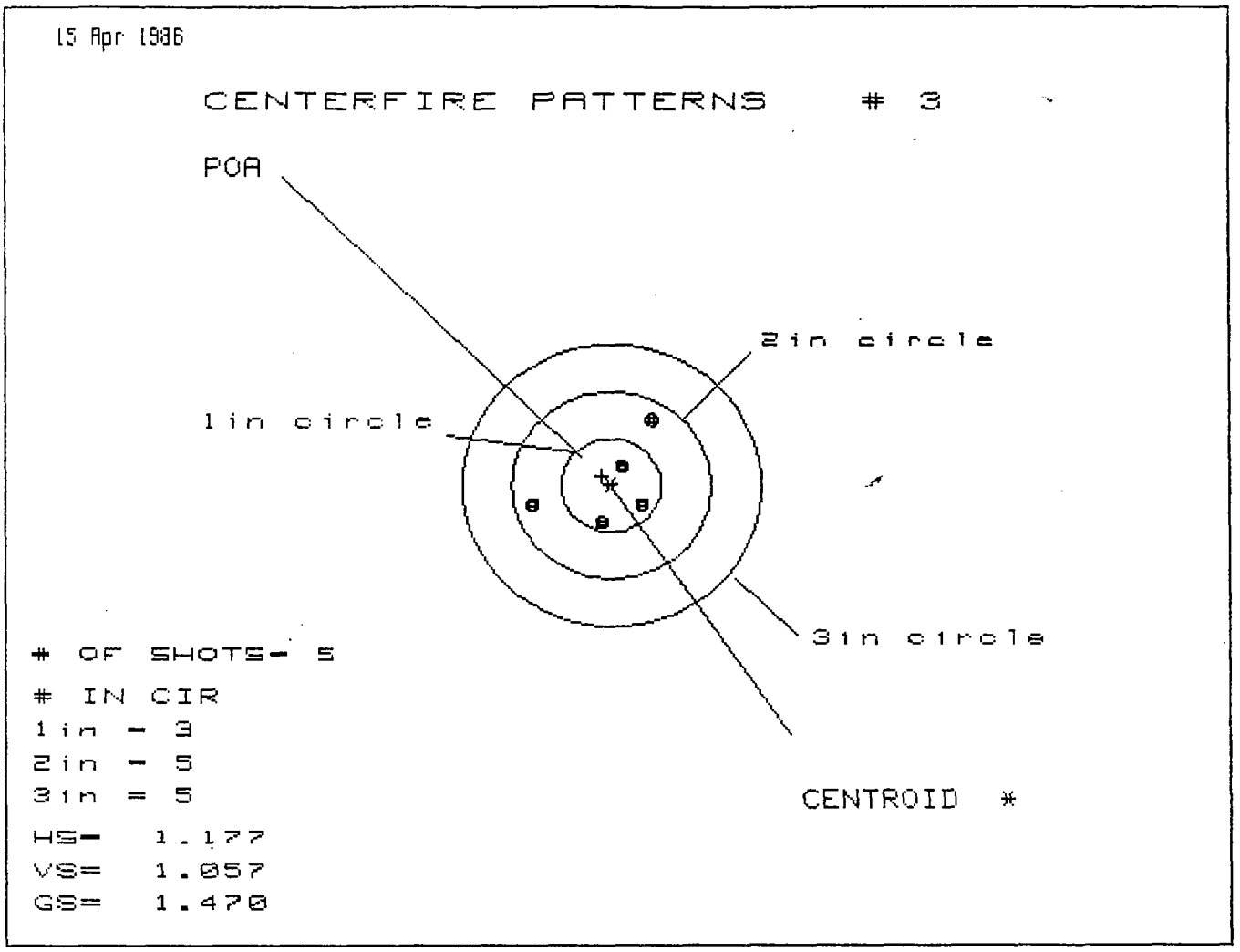
.223 REM. M/700 BDL.
5.56 MILITARY
LOT: TW-2-860
100 YDS.



PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.932	.616	.769
MINIMUM X	:	-1.260	-.754	-.548
MAXIMUM Y	:	.346	.282	.181
MINIMUM Y	:	-.258	-.200	-.106
CENTROID X	:	.066	.382	.176
CENTROID Y	:	-.025	.039	-.055
POA TO CENTROID in.	:	.071	.383	.184
MIN RADIUS	:	.153	.459	.233
MEAN RADIUS	:	.757	.622	.527
MAX RADIUS	:	1.286	.780	.790
HORIZONTAL SPREAD	:	2.192	1.370	1.317
VERTICAL SPREAD	:	.604	.482	.287
EXTREME SPREAD	:	2.274	1.452	1.348
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	



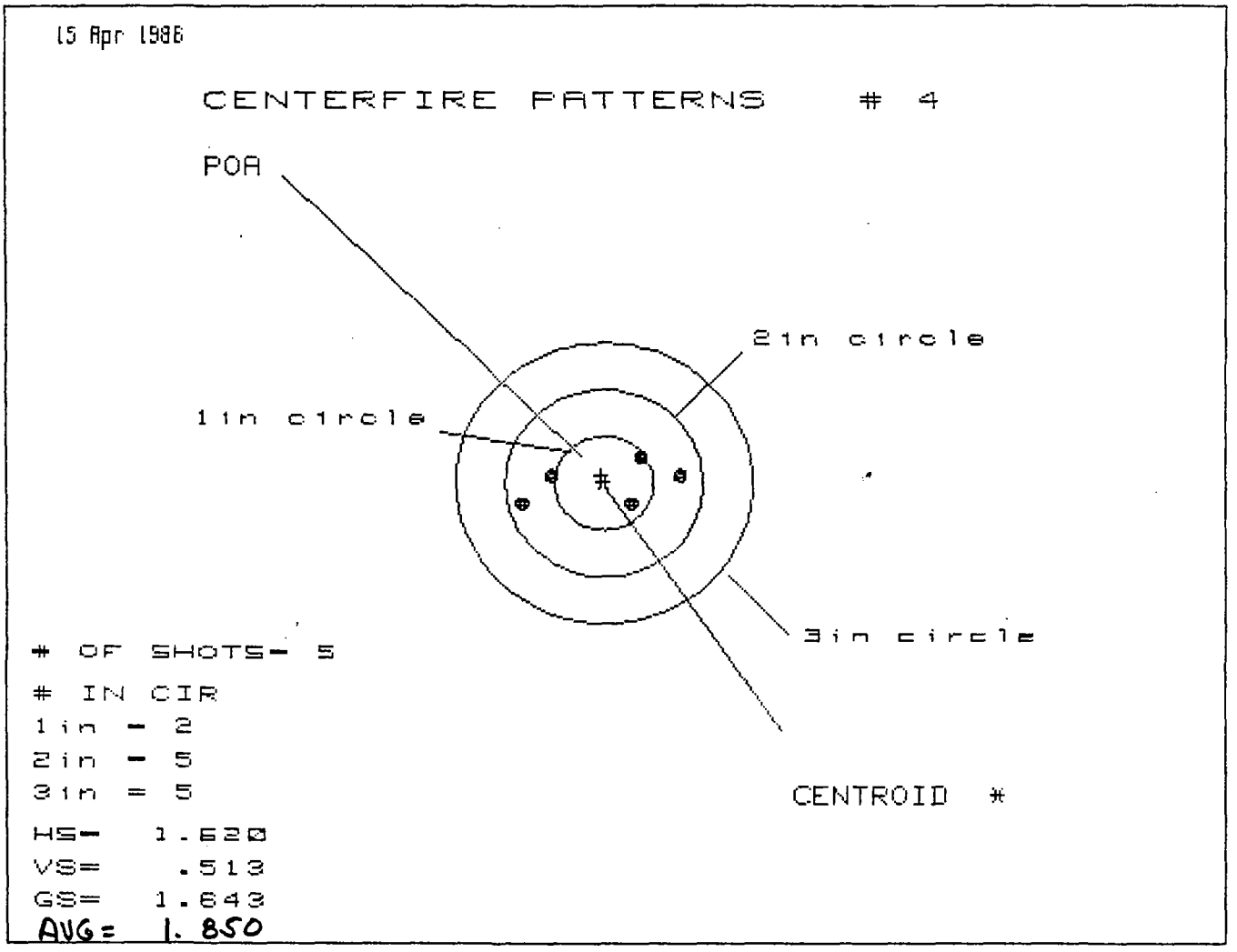
PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.964	.746	.287
MINIMUM X	:	-.869	-.441	-.192
MAXIMUM Y	:	.674	.287	.305
MINIMUM Y	:	-.534	-.366	-.348
CENTROID X	:	.093	.310	.062
CENTROID Y	:	-.090	-.258	-.276
POA TO CENTROID in.	:	.129	.404	.282
MIN RADIUS	:	.265	.290	.197
MEAN RADIUS	:	.633	.495	.326
MAX RADIUS	:	1.100	.748	.419
HORIZONTAL SPREAD	:	1.833	1.187	.479
VERTICAL SPREAD	:	1.208	.653	.653
EXTREME SPREAD	:	1.996	1.187	.757
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	



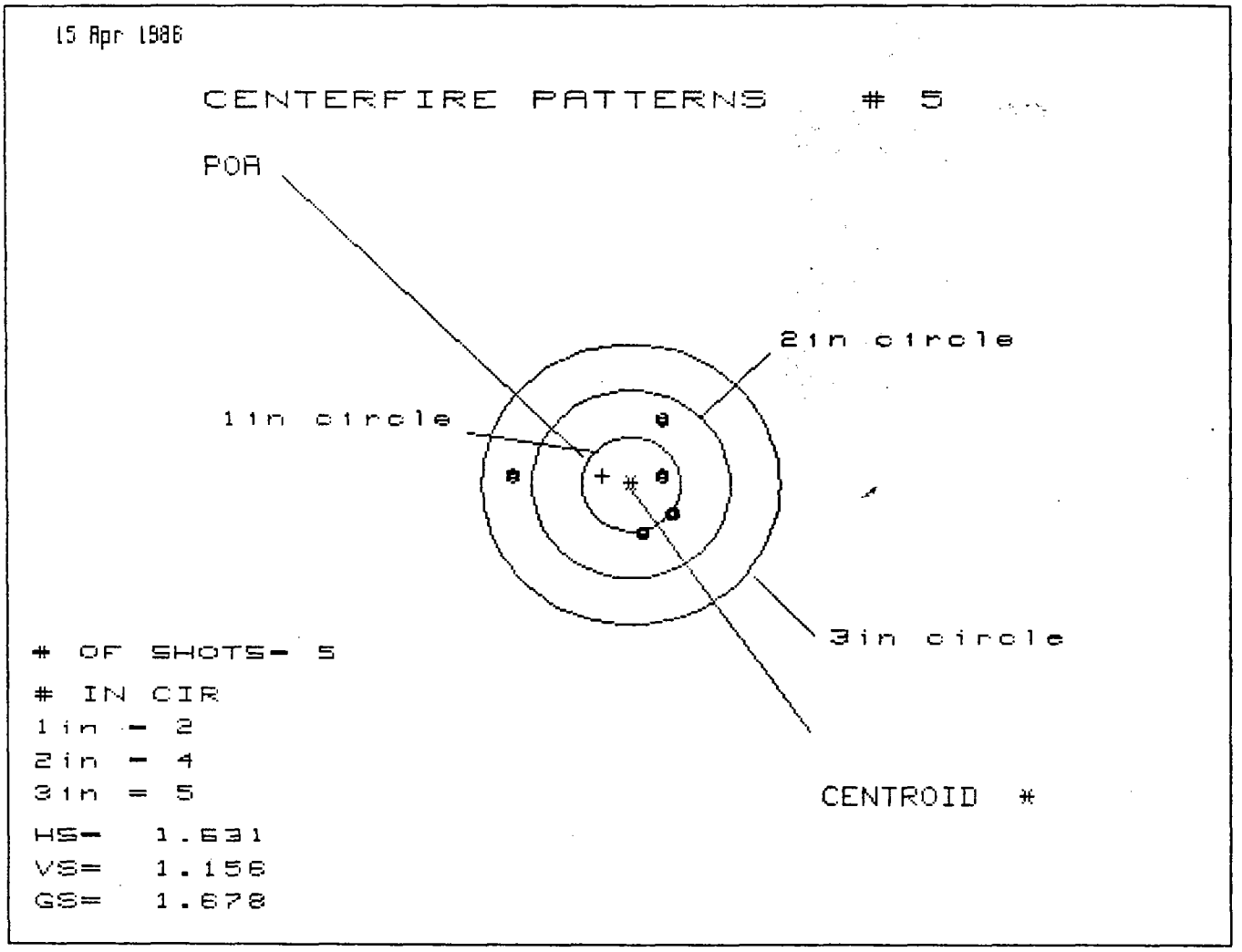
PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.430	.385	.172
MINIMUM X	:	-.747	-.640	-.161
MAXIMUM Y	:	.657	.373	.353
MINIMUM Y	:	-.400	-.235	-.255
CENTROID X	:	.095	-.012	.201
CENTROID Y	:	-.101	-.266	-.246
POA TO CENTROID in.	:	.139	.266	.318
MIN RADIUS	:	.229	.241	.198
MEAN RADIUS	:	.513	.425	.284
MAX RADIUS	:	.785	.643	.353
HORIZONTAL SPREAD	:	1.177	1.025	.333
VERTICAL SPREAD	:	1.057	.608	.608
EXTREME SPREAD	:	1.470	1.025	.626
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

B-6430148

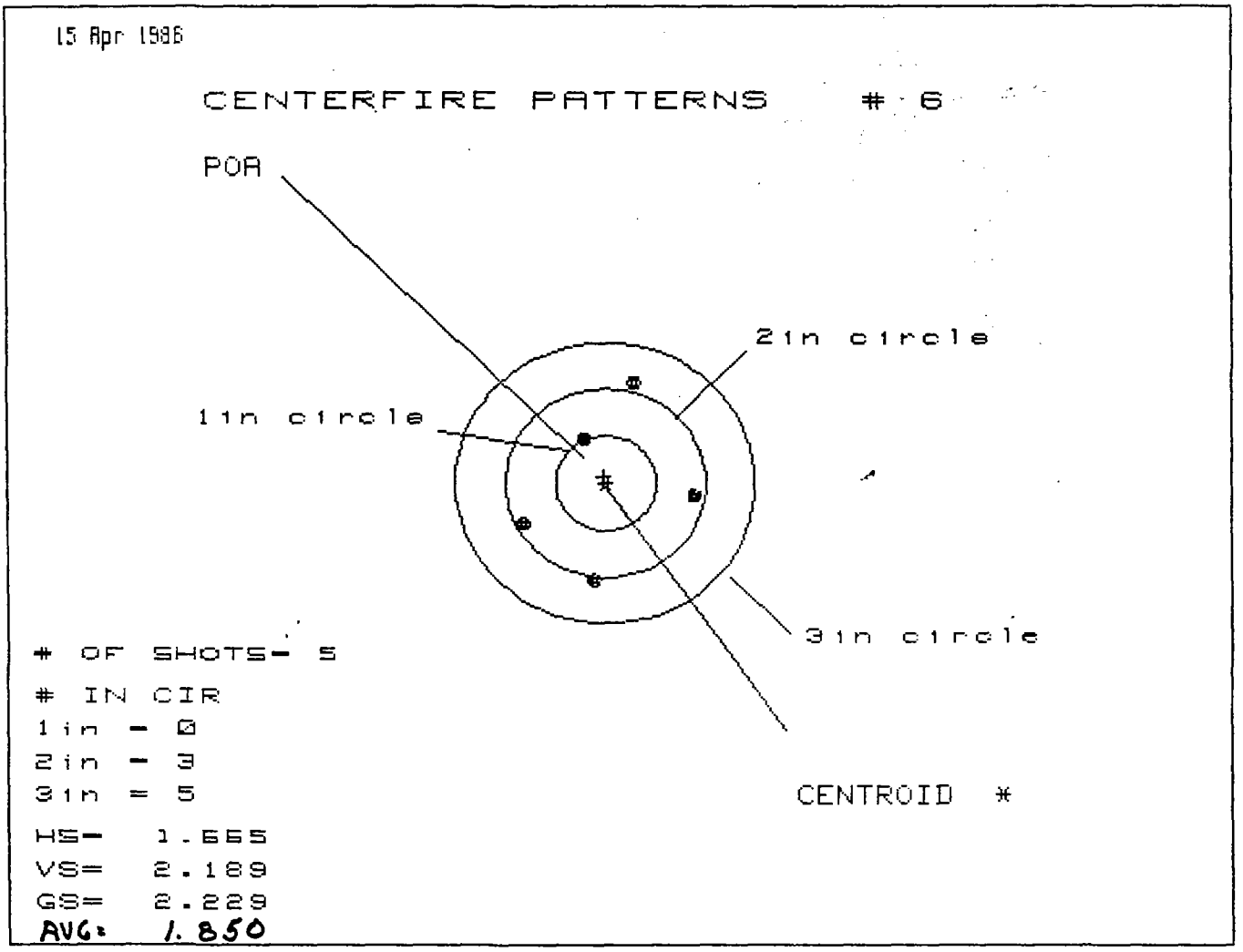
.223 REM. M/700 BDL.
5.56 MILITARY
LOT: UNKNOWN
100 YDS.



PATTERN #	:	4.		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.769	.557	.363
MINIMUM X	:	-.851	-.773	-.588
MAXIMUM Y	:	.288	.232	.231
MINIMUM Y	:	-.225	-.281	-.282
CENTROID X	:	.030	.242	.057
CENTROID Y	:	-.085	-.029	-.028
POA TO CENTROID in.	:	.090	.244	.063
MIN RADIUS	:	.338	.284	.361
MEAN RADIUS	:	.609	.477	.460
MAX RADIUS	:	.879	.775	.590
HORIZONTAL SPREAD	:	1.620	1.330	.951
VERTICAL SPREAD	:	.513	.513	.513
EXTREME SPREAD	:	1.643	1.331	.968
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



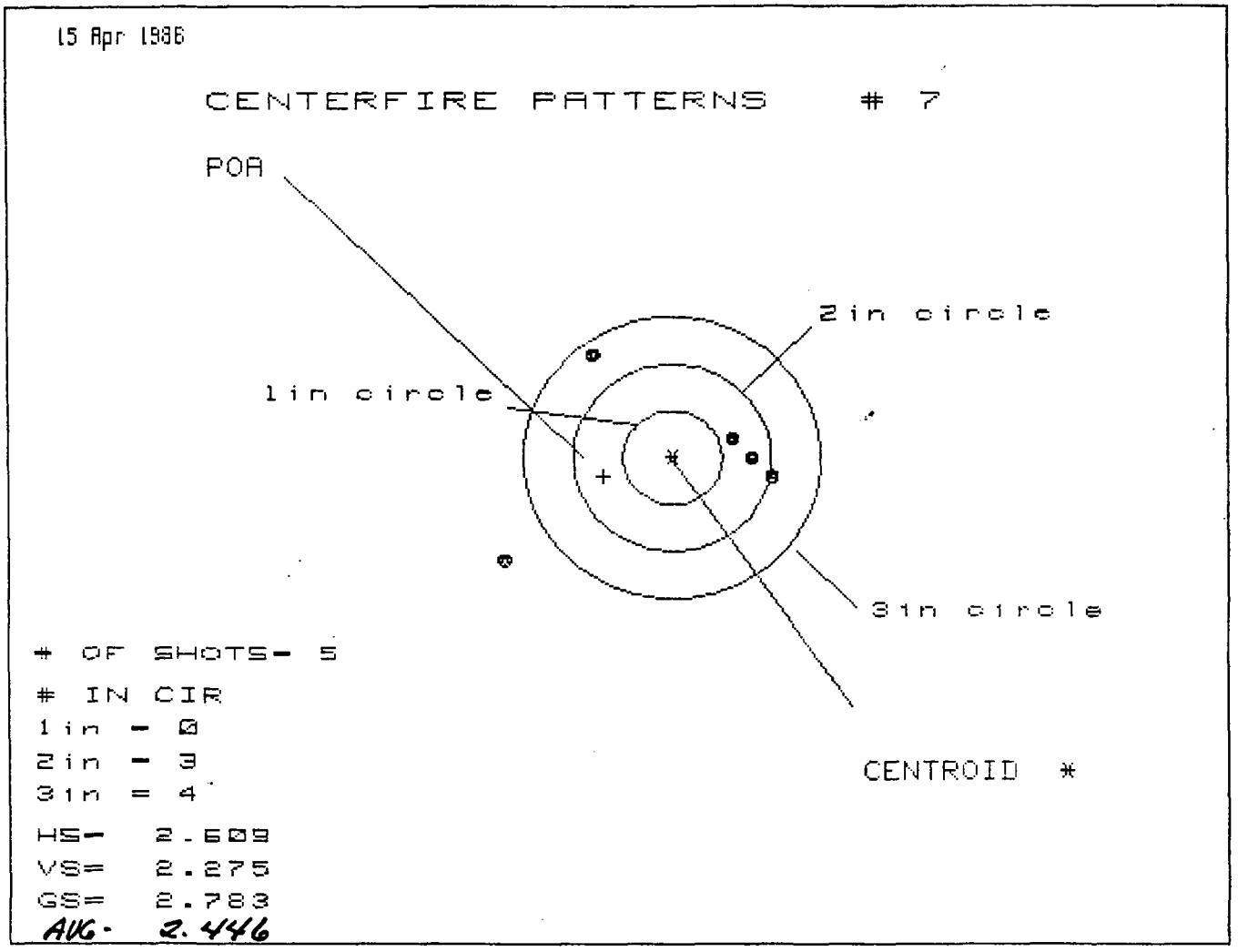
PATTERN #	:	5		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.454	.159	.154
MINIMUM X	:	-1.177	-.189	-.194
MAXIMUM Y	:	.689	.699	.336
MINIMUM Y	:	-.467	-.457	-.224
CENTROID X	:	.287	.582	.587
CENTROID Y	:	-.088	-.098	-.331
POA TO CENTROID in.	:	.300	.590	.674
MIN RADIUS	:	.352	.113	.190
MEAN RADIUS	:	.666	.422	.275
MAX RADIUS	:	1.178	.699	.338
HORIZONTAL SPREAD	:	1.631	.348	.348
VERTICAL SPREAD	:	1.156	1.156	.560
EXTREME SPREAD	:	1.678	1.169	.607
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	



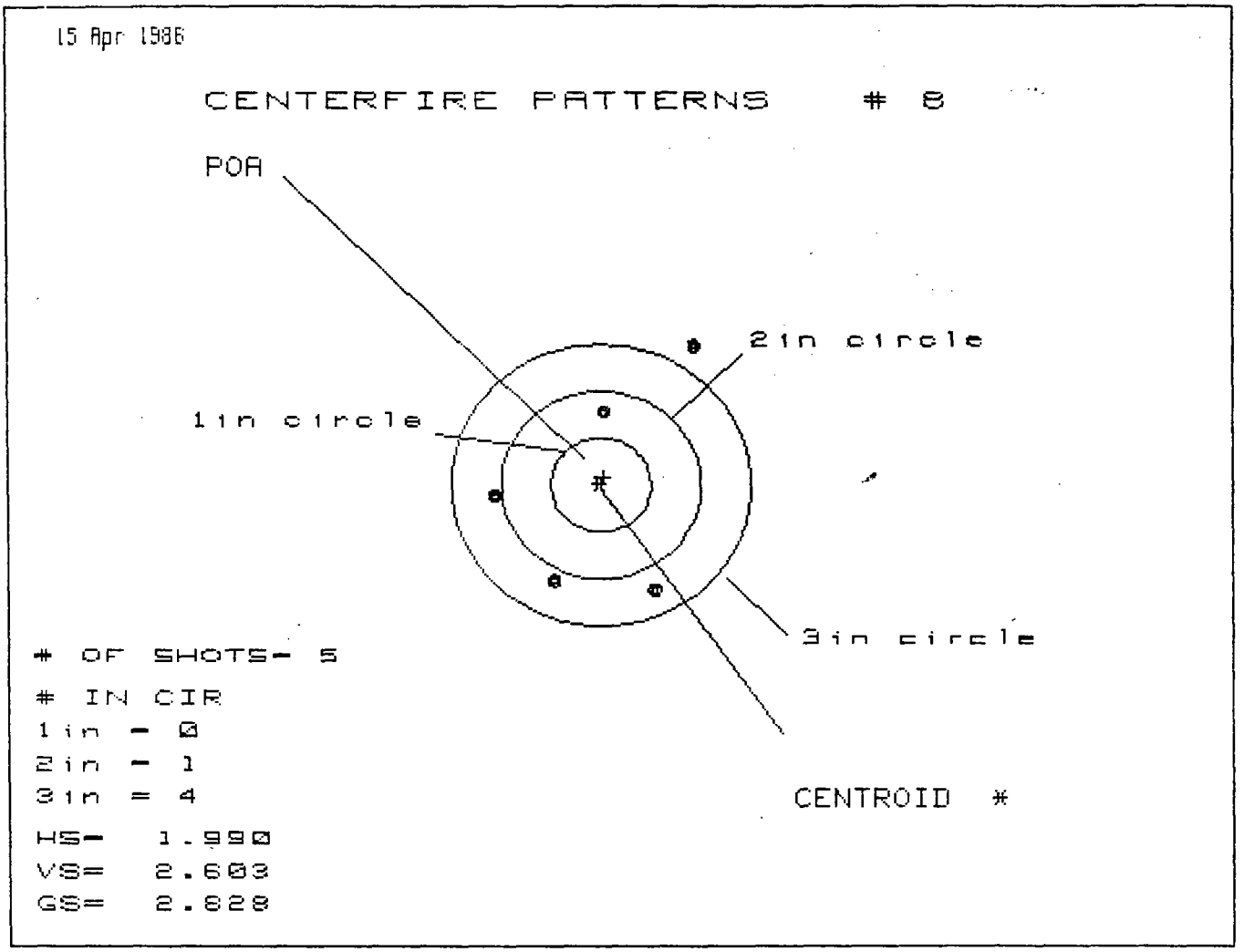
PATTERN #	:	6		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.845	.923	.912
MINIMUM X	:	-.820	-.742	-.753
MAXIMUM Y	:	1.110	.737	.469
MINIMUM Y	:	-1.079	-.801	-.378
CENTROID X	:	.020	-.058	-.047
CENTROID Y	:	-.069	-.347	-.079
POA TO CENTROID in.	:	.072	.351	.092
MIN RADIUS	:	.511	.750	.495
MEAN RADIUS	:	.901	.811	.751
MAX RADIUS	:	1.153	.939	.916
HORIZONTAL SPREAD	:	1.665	1.665	1.665
VERTICAL SPREAD	:	2.189	1.538	.847
EXTREME SPREAD	:	2.229	1.689	1.689
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		5	

B-6429055

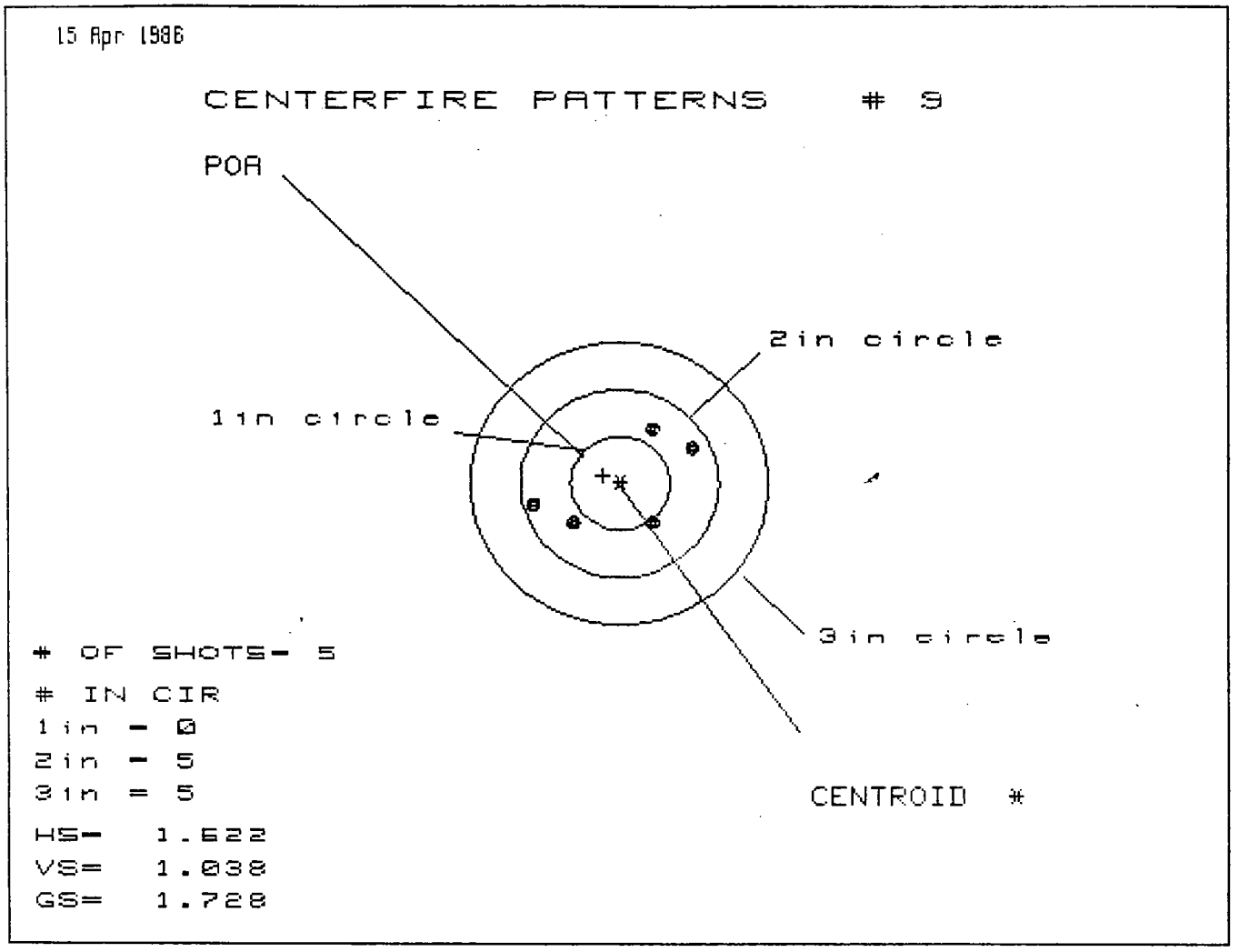
.22 REM. m/710 BDL.
5.56 MILITARY
LOT - UNKNOWN
100 YDS.



PATTERN #	:	7		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.954	.540	.137
MINIMUM X	:	-1.655	-1.210	-.170
MAXIMUM Y	:	1.149	.867	.165
MINIMUM Y	:	-1.126	-.440	-.150
CENTROID X	:	.696	1.110	1.513
CENTROID Y	:	.196	.477	.188
POA TO CENTROID in.	:	.723	1.208	1.525
MIN RADIUS	:	.666	.264	.037
MEAN RADIUS	:	1.177	.745	.159
MAX RADIUS	:	2.002	1.489	.237
HORIZONTAL SPREAD	:	2.609	1.750	.307
VERTICAL SPREAD	:	2.275	1.307	.315
EXTREME SPREAD	:	2.783	2.184	.440
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		4	



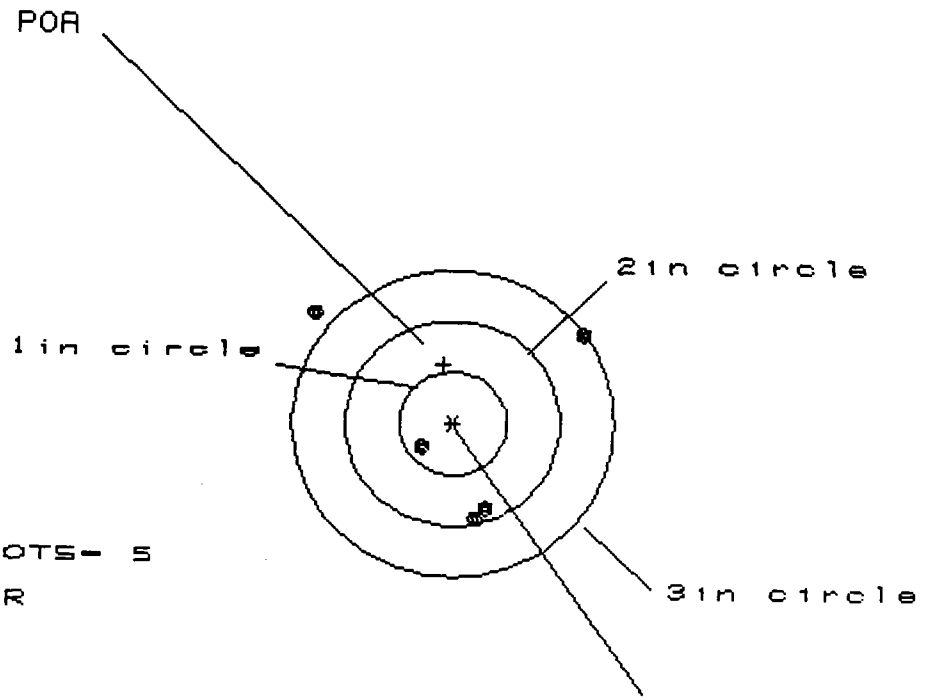
PATTERN #	:	8		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.953	.774	.508
MINIMUM X	:	-1.037	-.799	-.541
MAXIMUM Y	:	1.477	1.136	.884
MINIMUM Y	:	-1.126	-.757	-.854
CENTROID X	:	-.032	-.270	-.528
CENTROID Y	:	-.083	-.452	-.200
POA TO CENTROID in.	:	.089	.527	.564
MIN RADIUS	:	.767	.643	.542
MEAN RADIUS	:	1.179	.930	.805
MAX RADIUS	:	1.757	1.163	1.019
HORIZONTAL SPREAD	:	1.990	1.573	1.049
VERTICAL SPREAD	:	2.603	1.893	1.738
EXTREME SPREAD	:	2.828	1.964	1.802
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		1	
NUMBER IN THREE INCH CIRCLE	=		4	



PATTERN #	:	9		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.739	.519	.259
MINIMUM X	:	-.883	-.682	-.509
MAXIMUM Y	:	.597	.553	.679
MINIMUM Y	:	-.441	-.485	-.359
CENTROID X	:	.172	.392	.219
CENTROID Y	:	-.080	-.036	-.162
POA TO CENTROID in.	:	.190	.394	.272
MIN RADIUS	:	.532	.491	.438
MEAN RADIUS	:	.713	.627	.589
MAX RADIUS	:	.900	.814	.726
HORIZONTAL SPREAD	:	1.622	1.201	.768
VERTICAL SPREAD	:	1.038	1.038	1.038
EXTREME SPREAD	:	1.728	1.455	1.259
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

9 Dec 1986 FILE:/PATTERNING/CENTERFIRE PATT/B51973

CENTERFIRE PATTERNS # 16



OF SHOTS= 5
IN CIR
1in = 1
2in = 3
3in = 4
HS= 2.448
VS= 2.051
GS= 2.514
AVG: 2.427

*B-6430148
RECHAMBERED TO 5.56 M/M.

PATTERN #	:	16		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.158	.835	.229
MINIMUM X	:	-1.290	-.626	-.347
MAXIMUM Y	:	1.118	1.131	.429
MINIMUM Y	:	-.933	-.654	-.277
CENTROID X	:	.092	.415	.136
CENTROID Y	:	-.575	-.854	-1.231
POA TO CENTROID in.	:	.582	.949	1.239
MIN RADIUS	:	.379	.531	.275
MEAN RADIUS	:	1.065	.810	.376
MAX RADIUS	:	1.707	1.406	.552
HORIZONTAL SPREAD	:	2.448	1.461	.576
VERTICAL SPREAD	:	2.051	1.785	.706
EXTREME SPREAD	:	2.514	2.044	.846
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		4	

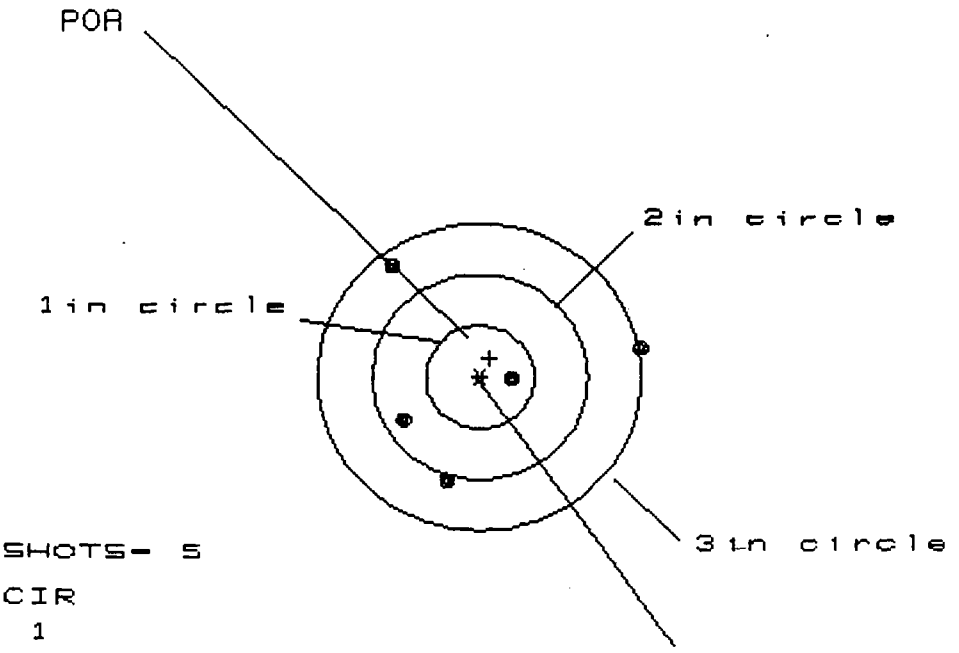
M-700. B.D.L.

MILITARY AMMO. 5.56
LOT. UNKNOWN

100 YDS.

9 Dec 1986 FILE:/PATTERNING/CENTERFIRE_PAT/851923

CENTERFIRE PATTERNS # 17

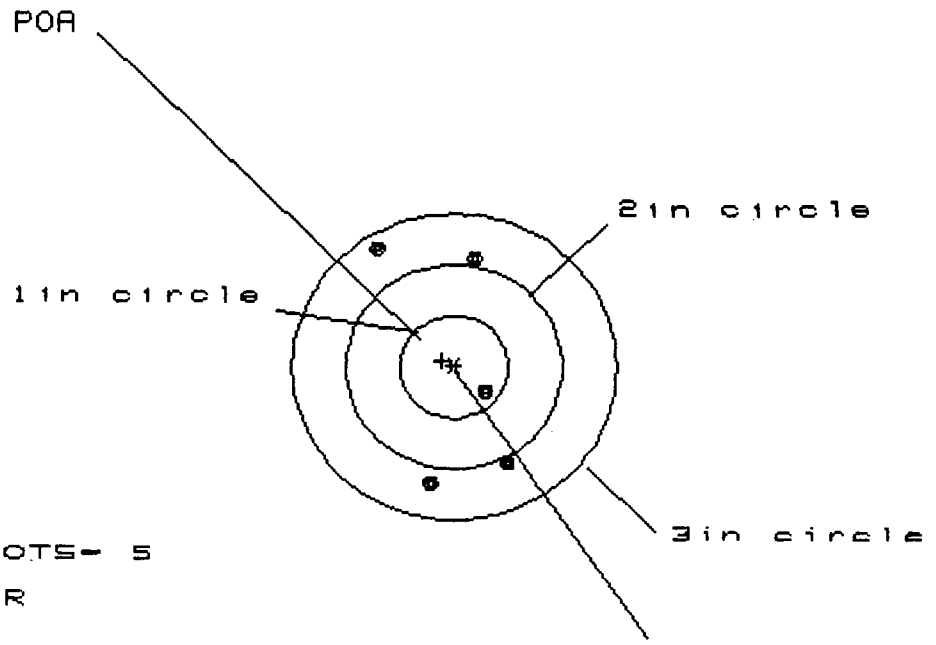


OF SHOTS= 5
IN CIR
1in = 1
2in = 2
3in = 5
HS= 2.211
VS= 2.036
GS= 2.325

PATTERN #	:	17		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.446	.663	.528
MINIMUM X	:	-.765	-.403	-.447
MAXIMUM Y	:	1.046	1.128	.458
MINIMUM Y	:	-.990	-.908	-.532
CENTROID X	:	-.092	-.454	-.319
CENTROID Y	:	-.186	-.268	-.644
POA TO CENTROID in.	:	.208	.527	.719
MIN RADIUS	:	.301	.434	.453
MEAN RADIUS	:	.978	.802	.563
MAX RADIUS	:	1.483	1.198	.699
HORIZONTAL SPREAD	:	2.211	1.066	.975
VERTICAL SPREAD	:	2.036	2.036	.990
EXTREME SPREAD	:	2.325	2.086	1.163
NUMBER IN ONE INCH CIRCLE	=	1		
NUMBER IN TWO INCH CIRCLE	=	2		
NUMBER IN THREE INCH CIRCLE	=	5		

5 Dec 1986 FILE:/PATTERNING/CENTERFIRE-PAT/BJ13/3

CENTERFIRE PATTERNS # 18



OF SHOTS= 5

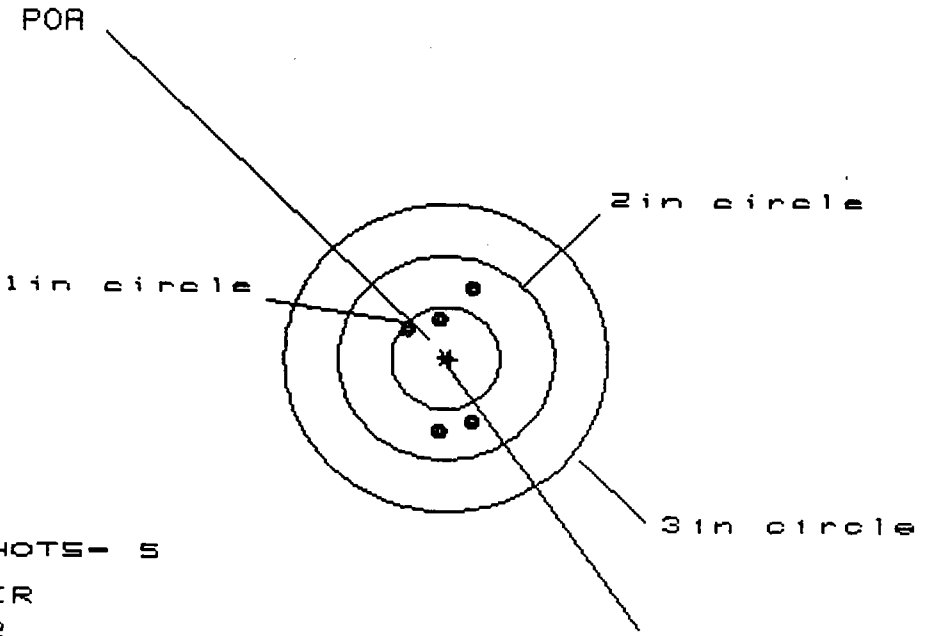
IN CIR
1in = 1
2in = 2
3in = 5

HS= 1.199
VS= 2.258
GS= 2.343

PATTERN #	:	18		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.457	.271	.138
MINIMUM X	:	-.742	-.398	-.124
MAXIMUM Y	:	1.126	1.372	1.089
MINIMUM Y	:	-1.132	-.851	-.889
CENTROID X	:	.113	.299	.432
CENTROID Y	:	-.064	-.345	-.062
POA TO CENTROID in.	:	.130	.457	.436
MIN RADIUS	:	.362	.145	.200
MEAN RADIUS	:	.994	.780	.732
MAX RADIUS	:	1.349	1.372	1.096
HORIZONTAL SPREAD	:	1.199	.669	.262
VERTICAL SPREAD	:	2.258	2.223	1.978
EXTREME SPREAD	:	2.343	2.260	1.995
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		2	
NUMBER IN THREE INCH CIRCLE	=		5	

9 Dec 1986 FILE:/PATTERNING/CENTERFIRE PATT/851973

CENTERFIRE PATTERNS # 13



OF SHOTS= 5

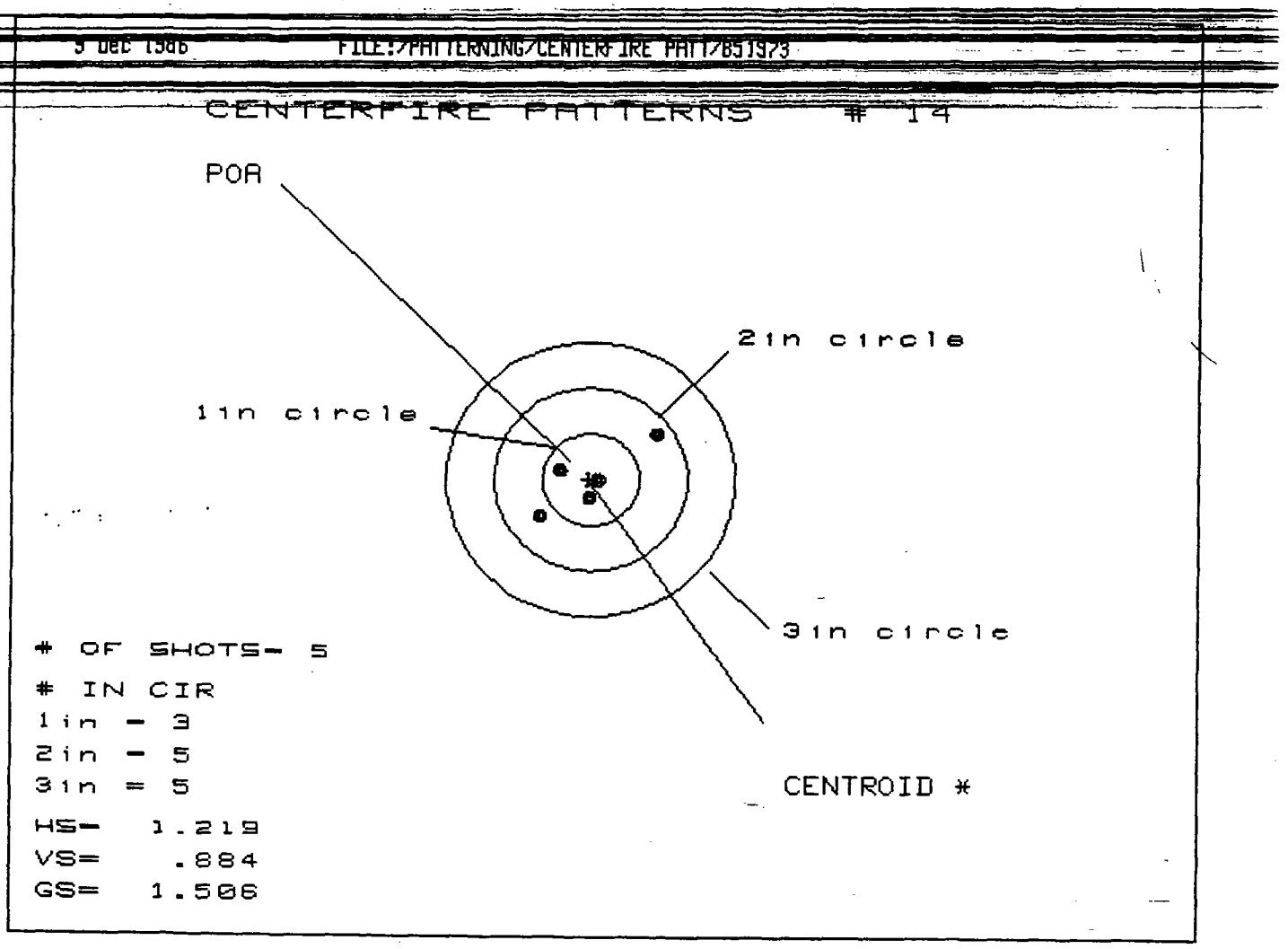
IN CIR
1in = 2
2in = 5
3in = 5

HS= .610
VS= 1.362
GS= 1.400
AVG = 1.351

* B-6430148
RECHAMBERED TO 5.56 M/M
M-700 BDL.
REM. AMMO: .223
55GR. M.C.
* LOT AOL1D
100 YDS.
SPECS. 2.2" C. TO. C.

PATTERN #	:	13		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.273	.272	.277
MINIMUM X	:	-.337	-.269	-.264
MAXIMUM Y	:	.658	.555	.375
MINIMUM Y	:	-.704	-.540	-.598
CENTROID X	:	-.045	-.113	-.118
CENTROID Y	:	.014	-.150	.030
POA TO CENTROID in.	:	.047	.188	.122
MIN RADIUS	:	.400	.484	.345
MEAN RADIUS	:	.570	.519	.460
MAX RADIUS	:	.712	.556	.659
HORIZONTAL SPREAD	:	.610	.541	.541
VERTICAL SPREAD	:	1.362	1.095	.973
EXTREME SPREAD	:	1.400	1.096	1.016

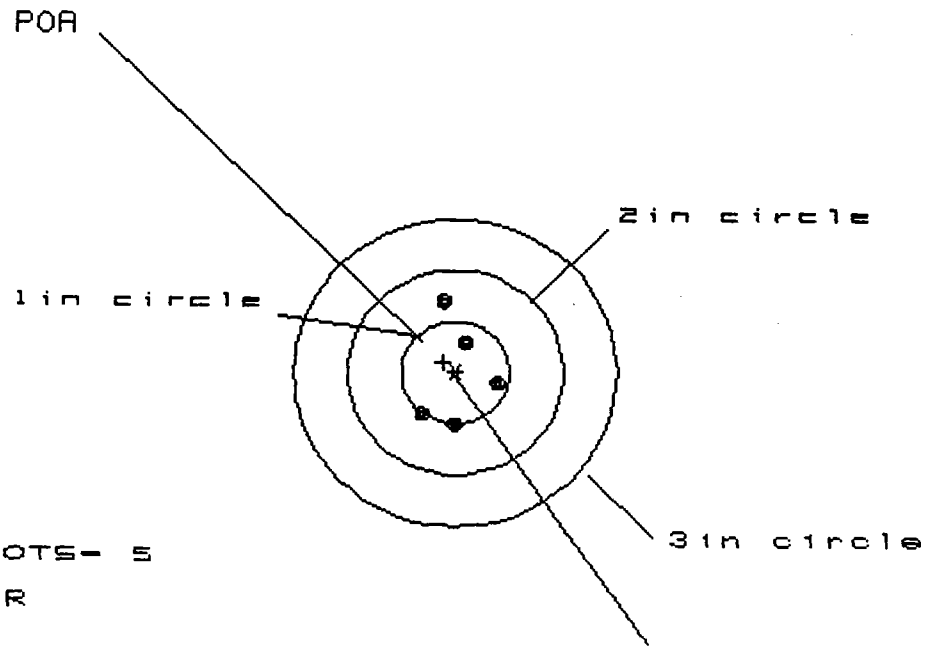
NUMBER IN ONE INCH CIRCLE = 2
NUMBER IN TWO INCH CIRCLE = 5
NUMBER IN THREE INCH CIRCLE = 5



PATTERN #	:	14		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.729	.288	.186
MINIMUM X	:	-.490	-.307	-.261
MAXIMUM Y	:	.471	.214	.116
MINIMUM Y	:	-.413	-.295	-.147
CENTROID X	:	.020	-.162	-.060
CENTROID Y	:	.001	-.117	-.019
POA TO CENTROID in.	:	.020	.200	.063
MIN RADIUS	:	.107	.184	.165
MEAN RADIUS	:	.427	.298	.213
MAX RADIUS	:	.868	.426	.285
HORIZONTAL SPREAD	:	1.219	.596	.447
VERTICAL SPREAD	:	.884	.509	.263
EXTREME SPREAD	:	1.506	.732	.455
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

9 Dec 1996 FILE: /PATTERNS/CENTERFIRE PATT/PF1015

CENTERFIRE PATTERNS # 15



OF SHOTS= 5

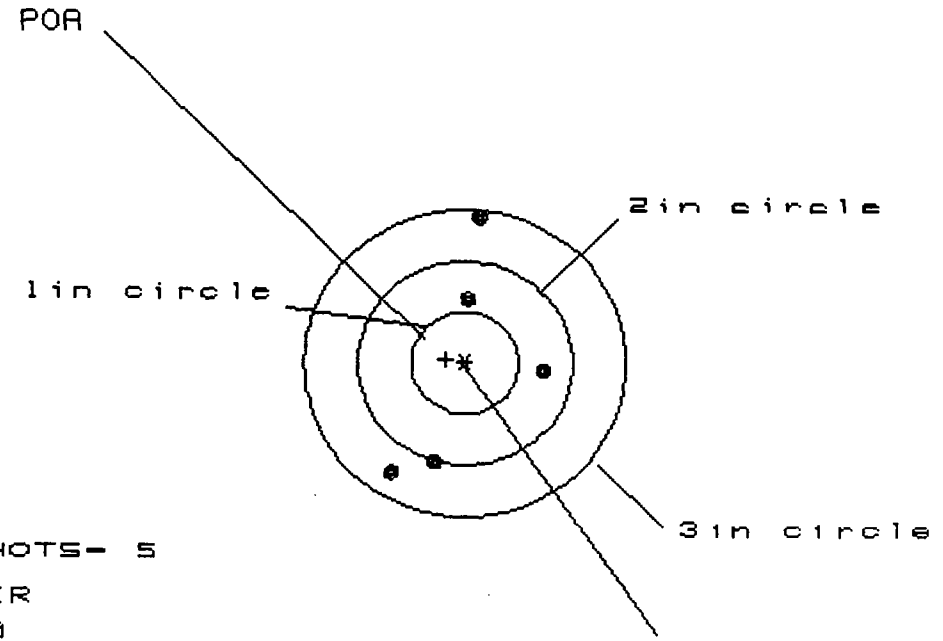
IN CIR
1in = 3
2in = 5
3in = 5

HS= .683
VS= 1.147
GS= 1.149

PATTERN #	:	15		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.379	.355	.246
MINIMUM X	:	-.304	-.328	-.156
MAXIMUM Y	:	.676	.513	.435
MINIMUM Y	:	-.471	-.302	-.380
CENTROID X	:	.111	.135	.244
CENTROID Y	:	-.098	-.267	-.189
POA TO CENTROID in.	:	.148	.299	.308
MIN RADIUS	:	.347	.305	.252
MEAN RADIUS	:	.483	.395	.369
MAX RADIUS	:	.683	.514	.444
HORIZONTAL SPREAD	:	.683	.683	.402
VERTICAL SPREAD	:	1.147	.815	.815
EXTREME SPREAD	:	1.149	.825	.818
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

5 Dec 1986 FILE:/PATTERNING/CENTERFIRE PAT/BJ1973

CENTERFIRE PATTERNS # 10



OF SHOTS= 5
IN CIR
1in = 0
2in = 2
3in = 5

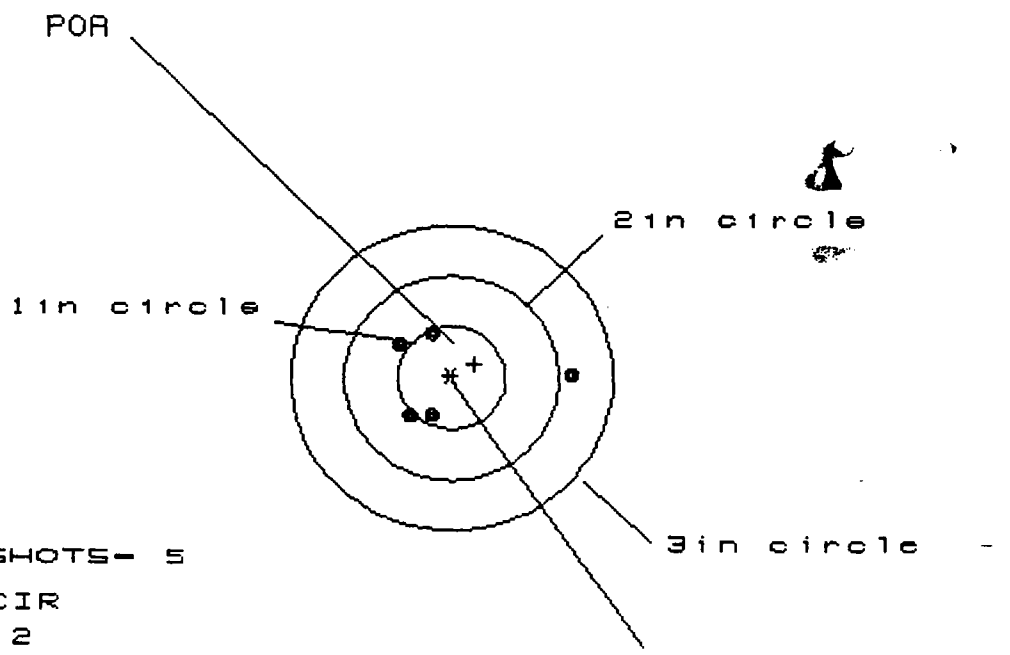
HS= 1.387
VS= 2.520
GS= 2.620
AVG= 1.769

B-642-8889
RECHAMBERED TO .556 M/M
M-700 BDL.
MILITARY AMMO - 5.56 M/M
LOT - UNKNOWN
100 YDS.

PATTERN #	:	10		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.758	.780	.577
MINIMUM X	:	-.629	-.608	-.447
MAXIMUM Y	:	1.482	.997	.775
MINIMUM Y	:	-1.038	-.668	-.868
CENTROID X	:	.175	.153	.356
CENTROID Y	:	-.033	-.403	-.181
POA TO CENTROID in.	:	.178	.431	.399
MIN RADIUS	:	.629	.690	.585
MEAN RADIUS	:	1.027	.859	.782
MAX RADIUS	:	1.484	1.000	.977
HORIZONTAL SPREAD	:	1.387	1.387	1.024
VERTICAL SPREAD	:	2.520	1.665	1.643
EXTREME SPREAD	:	2.620	1.799	1.673
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		2	
NUMBER IN THREE INCH CIRCLE	=		5	

9-Dec-1986 FILE: \PATTERNS\CENTERFIRE.PAT\051922

CENTERFIRE PATTERNS # 11



OF SHOTS= 5

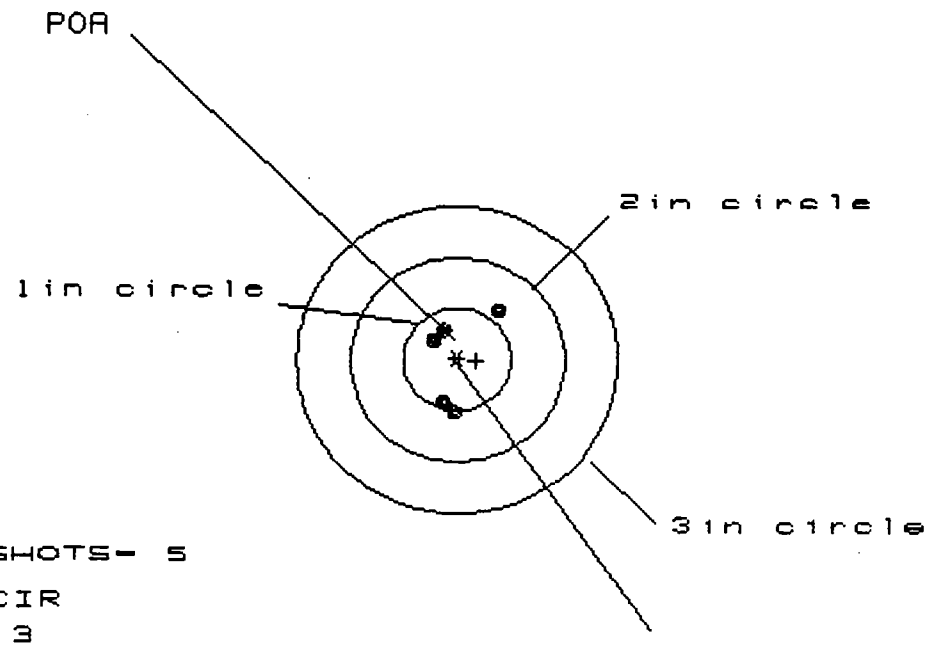
IN CIR
1in = 2
2in = 4
3in = 5

HS= 1.576
VS= .809
GS= 1.607

PATTERN #	:	11		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.131	.119	.065
MINIMUM X	:	-.445	-.163	-.118
MAXIMUM Y	:	.432	.430	.531
MINIMUM Y	:	-.377	-.379	-.278
CENTROID X	:	-.214	-.496	-.442
CENTROID Y	:	-.135	-.133	-.234
POA TO CENTROID in.	:	.252	.514	.500
MIN RADIUS	:	.394	.345	.258
MEAN RADIUS	:	.608	.386	.365
MAX RADIUS	:	1.131	.446	.535
HORIZONTAL SPREAD	:	1.576	.282	.183
VERTICAL SPREAD	:	.809	.809	.809
EXTREME SPREAD	:	1.607	.829	.829
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

9 Dec 1986 FILE:/PATTERNING/CENTERFIRE PAT1/851973

CENTERFIRE PATTERNS # 12



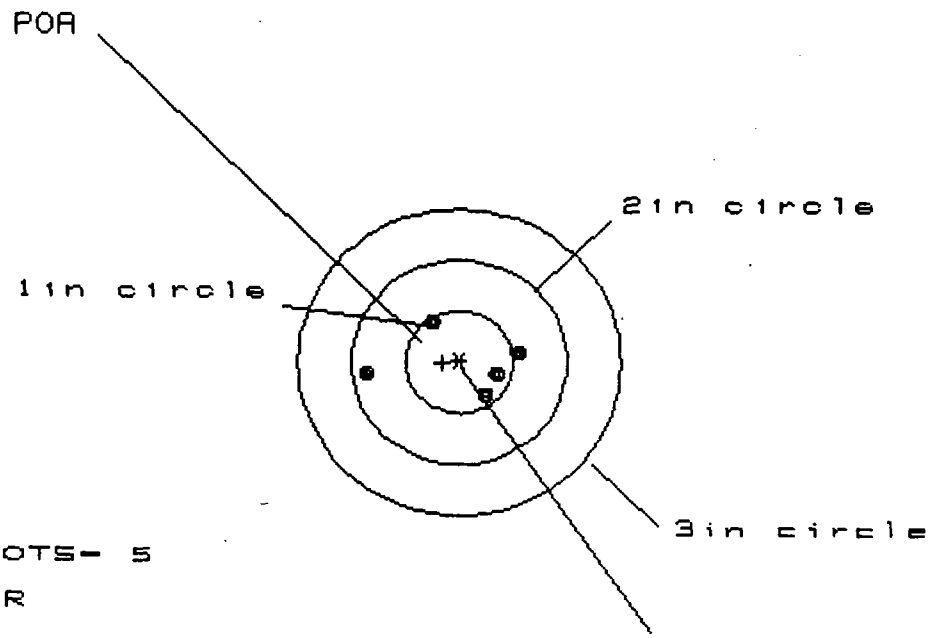
OF SHOTS= 5

IN CIR
1in = 3
2in = 5
3in = 5

HS= .565
VS= 1.002
GS= 1.082

PATTERN #	:	12		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.384	.073	.031
MINIMUM X	:	-.181	-.084	-.060
MAXIMUM Y	:	.480	.359	.225
MINIMUM Y	:	-.522	-.402	-.377
CENTROID X	:	-.176	-.273	-.297
CENTROID Y	:	.013	-.107	.027
POA TO CENTROID in.	:	.177	.293	.298
MIN RADIUS	:	.246	.243	.164
MEAN RADIUS	:	.403	.327	.256
MAX RADIUS	:	.615	.409	.378
HORIZONTAL SPREAD	:	.565	.157	.091
VERTICAL SPREAD	:	1.002	.761	.602
EXTREME SPREAD	:	1.082	.764	.602
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

CENTERFIRE PATTERNS # 7



OF SHOTS= 5

IN CIR
1in = 2
2in = 5
3in = 5

HS= 1.362
VS= .737
GS= 1.382
AVG= 1.217

B-642 8889

RECHAMBERED TO 5.56 m/m.

PATTERN #	:	7		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.536	.329	.272
MINIMUM X	:	-.826	-.504	-.394
MAXIMUM Y	:	.428	.396	.420
MINIMUM Y	:	-.309	-.341	-.317
CENTROID X	:	.157	.363	.254
CENTROID Y	:	.009	.041	.017
POA TO CENTROID in.	:	.157	.366	.254
MIN RADIUS	:	.378	.207	.291
MEAN RADIUS	:	.533	.382	.402
MAX RADIUS	:	.836	.640	.576
HORIZONTAL SPREAD	:	1.362	.833	.666
VERTICAL SPREAD	:	.737	.737	.737
EXTREME SPREAD	:	1.382	.899	.899
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

M-700 BDL.

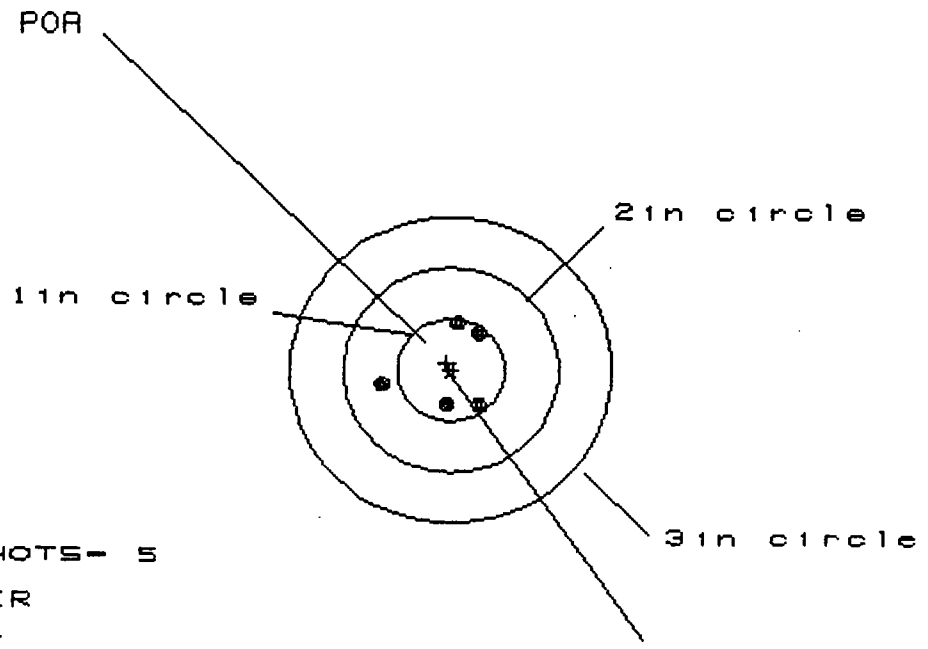
REM AMMO: .223
55 GR. MC.
FLOT. A0610

100 YDS.

SPECS.
2.2. C. TO. C.

9 Dec 1986 FILE:/PATTERNING/CENTERFIRE_PATT/851923

CENTERFIRE PATTERNS # 8

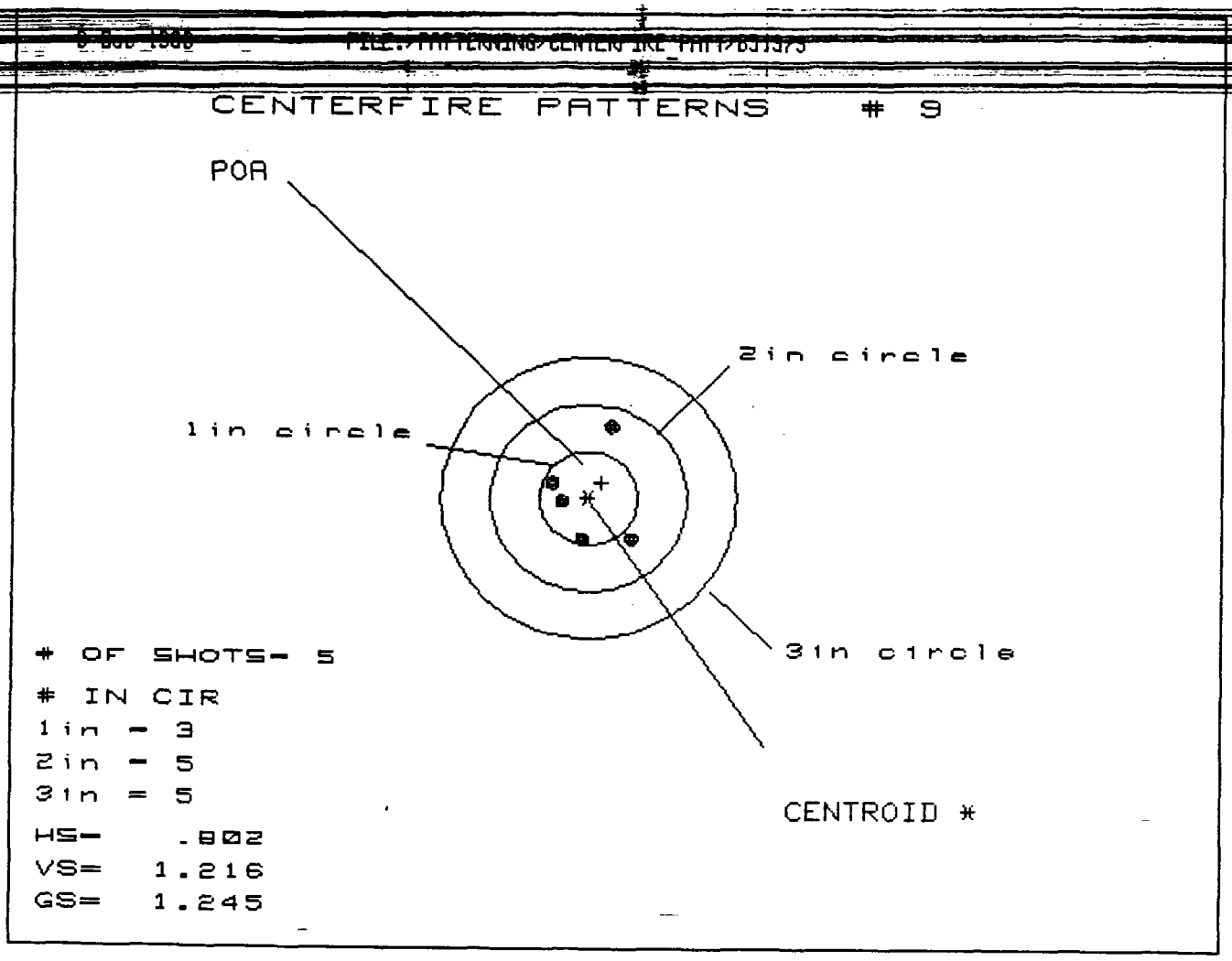


OF SHOTS= 5

IN CIR
1in = 4
2in = 5
3in = 5

HS= .916
VS= .844
GS= 1.024

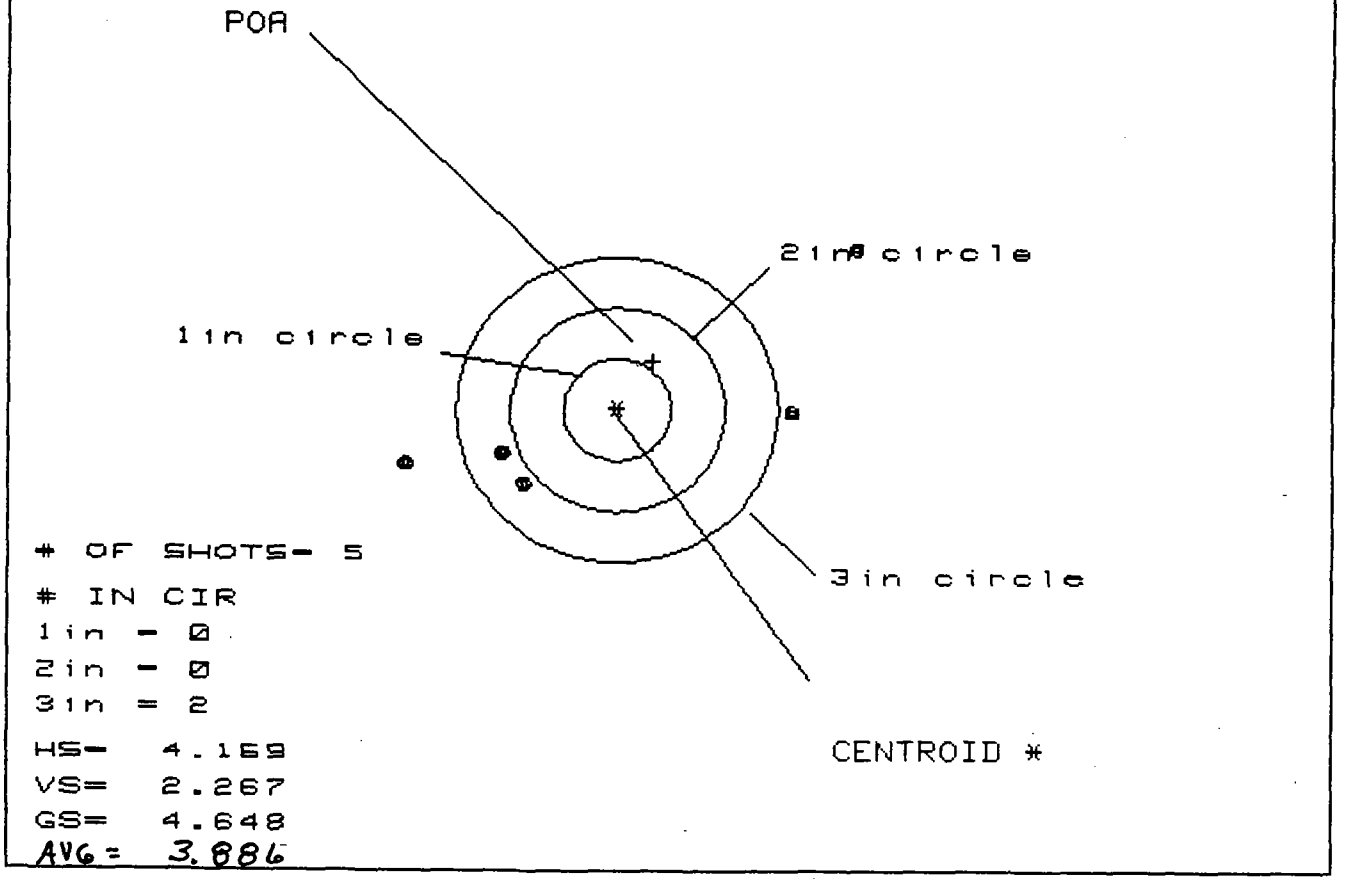
PATTERN #	:	8		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.300	.146	.107
MINIMUM X	:	-.616	-.151	-.189
MAXIMUM Y	:	.475	.440	.430
MINIMUM Y	:	-.369	-.404	-.257
CENTROID X	:	.042	.197	.235
CENTROID Y	:	-.067	-.032	-.179
POA TO CENTROID in.	:	.080	.199	.295
MIN RADIUS	:	.369	.319	.192
MEAN RADIUS	:	.462	.387	.318
MAX RADIUS	:	.632	.455	.444
HORIZONTAL SPREAD	:	.916	.296	.296
VERTICAL SPREAD	:	.844	.844	.687
EXTREME SPREAD	:	1.024	.845	.748
NUMBER IN ONE INCH CIRCLE	=		4	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	9		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.478	.531	.141
MINIMUM X	:	-.324	-.271	-.094
MAXIMUM Y	:	.740	.384	.287
MINIMUM Y	:	-.476	-.291	-.341
CENTROID X	:	-.129	-.182	-.359
CENTROID Y	:	-.169	-.354	-.257
POA TO CENTROID in.	:	.212	.398	.441
MIN RADIUS	:	.278	.247	.072
MEAN RADIUS	:	.508	.398	.248
MAX RADIUS	:	.769	.605	.369
HORIZONTAL SPREAD	:	.802	.802	.235
VERTICAL SPREAD	:	1.216	.675	.628
EXTREME SPREAD	:	1.245	1.048	.671
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

5 DEC 1986 FILE:/PATTERNING/CENTERFIRE PAT1/05J973

CENTERFIRE PATTERNS # 4



OF SHOTS= 5
IN CIR
1in = 0
2in = 0
3in = 2
HS= 4.169
VS= 2.267
GS= 4.648
AVG = 3.886

B-6429801

RECHAMBERED TO. 5.56 m/m.

M-700- BDL.

MILITARY AMMO-5.56

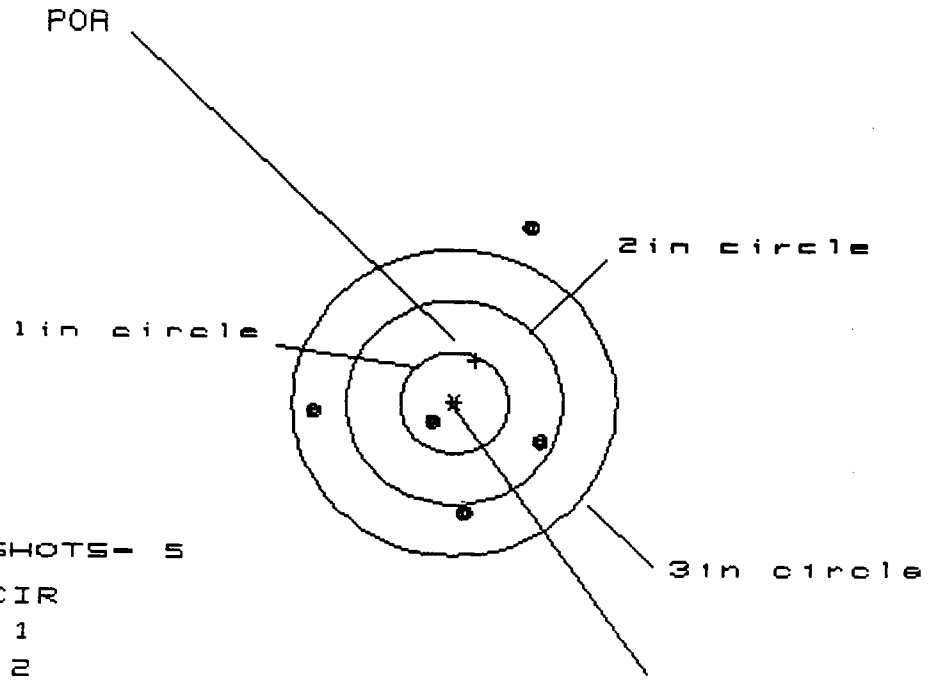
LOT - UNKNOWN

100 YDS.

PATTERN #	:	4		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	2.212	2.169	1.701
MINIMUM X	:	-1.957	-1.404	-.951
MAXIMUM Y	:	1.566	.400	.367
MINIMUM Y	:	-.701	-.310	-.343
CENTROID X	:	-.330	-.883	-.415
CENTROID Y	:	-.479	-.870	-.837
POA TO CENTROID in.	:	.582	1.240	.935
MIN RADIUS	:	1.090	.419	.825
MEAN RADIUS	:	1.708	1.129	1.172
MAX RADIUS	:	2.710	2.206	1.740
HORIZONTAL SPREAD	:	4.169	3.573	2.652
VERTICAL SPREAD	:	2.267	.710	.710
EXTREME SPREAD	:	4.648	3.608	2.681
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		0	
NUMBER IN THREE INCH CIRCLE	=		2	

9 Dec 1998 FILE: PATTERNING/CENTER_FIRE_PART/051372

CENTERFIRE PATTERNS # 5



OF SHOTS= 5

# IN CIR	
1in	1
2in	2
3in	4

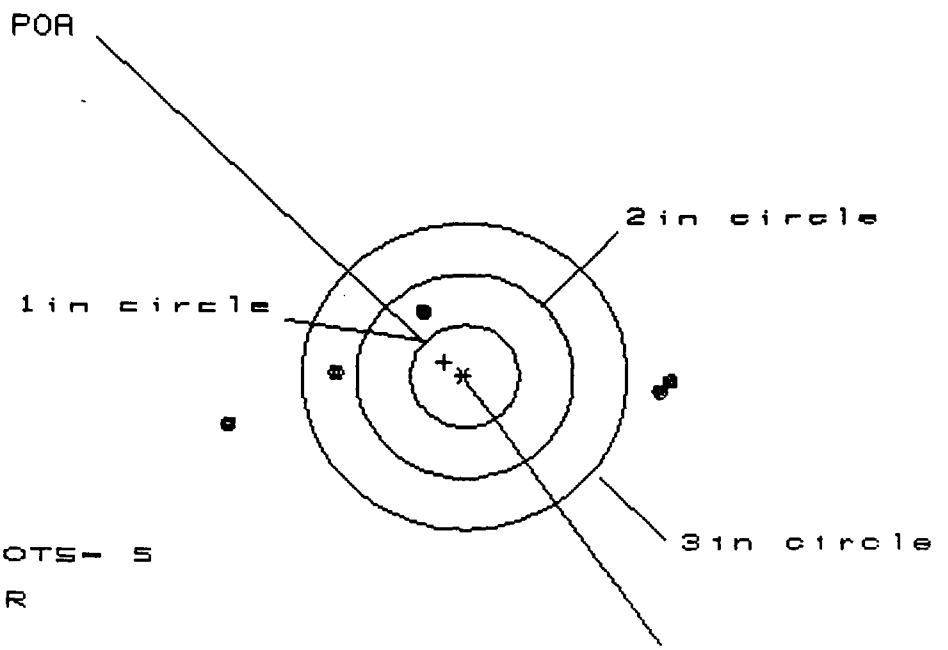
HS= 2.076
VS= 2.851
GS= 2.911

PATTERN # : 5

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.755	.924	.540
MINIMUM X :	-1.321	-1.152	-.409
MAXIMUM Y :	1.739	.390	.344
MINIMUM Y :	-1.112	-.678	-.548
CENTROID X :	-.196	-.365	.019
CENTROID Y :	-.420	-.854	-.984
POA TO CENTROID in.:	.463	.929	.985
MIN RADIUS :	.293	.216	.535
MEAN RADIUS :	1.087	.771	.558
MAX RADIUS :	1.865	1.216	.577
HORIZONTAL SPREAD :	2.076	2.076	.949
VERTICAL SPREAD :	2.851	1.068	.892
EXTREME SPREAD :	2.911	2.100	1.007
NUMBER IN ONE INCH CIRCLE =		1	
NUMBER IN TWO INCH CIRCLE =		2	
NUMBER IN THREE INCH CIRCLE =		4	

9 Dec 1986 FILE:/PATTERNING/CENTERFIRE PAT1/851973

CENTERFIRE PATTERNS # 6

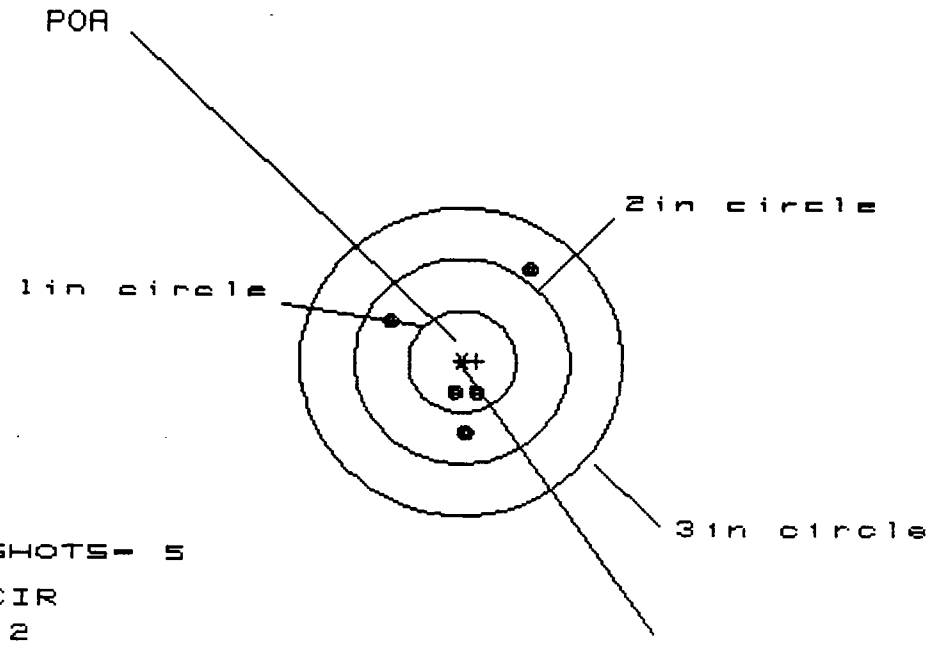


OF SHOTS= 5
IN CIR
1in = 0
2in = 1
3in = 2
HS= 4.079
VS= 1.140
GS= 4.100

PATTERN #	:	6		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	1.936	1.400	1.698
MINIMUM X	:	-2.143	-1.718	-1.251
MAXIMUM Y	:	.673	.556	.500
MINIMUM Y	:	-.467	-.271	-.327
CENTROID X	:	.189	.725	.258
CENTROID Y	:	-.141	-.024	.032
POA TO CENTROID in.	:	.236	.725	.260
MIN RADIUS	:	.772	1.070	.670
MEAN RADIUS	:	1.571	1.366	1.221
MAX RADIUS	:	2.193	1.722	1.729
HORIZONTAL SPREAD	:	4.079	3.118	2.949
VERTICAL SPREAD	:	1.140	.827	.827
EXTREME SPREAD	:	4.100	3.118	2.953
NUMBER IN ONE INCH CIRCLE	=		0	
NUMBER IN TWO INCH CIRCLE	=		1	
NUMBER IN THREE INCH CIRCLE	=		2	

5-Dec 1995 FILE:/PATTERNING/CENTERFIRE_PATT/B51973

CENTERFIRE PATTERNS # 1



OF SHOTS= 5
IN CIR
1in = 2
2in = 4
3in = 5

HS= 1.355
VS= 1.597
GS= 1.710
AVG = 1.794

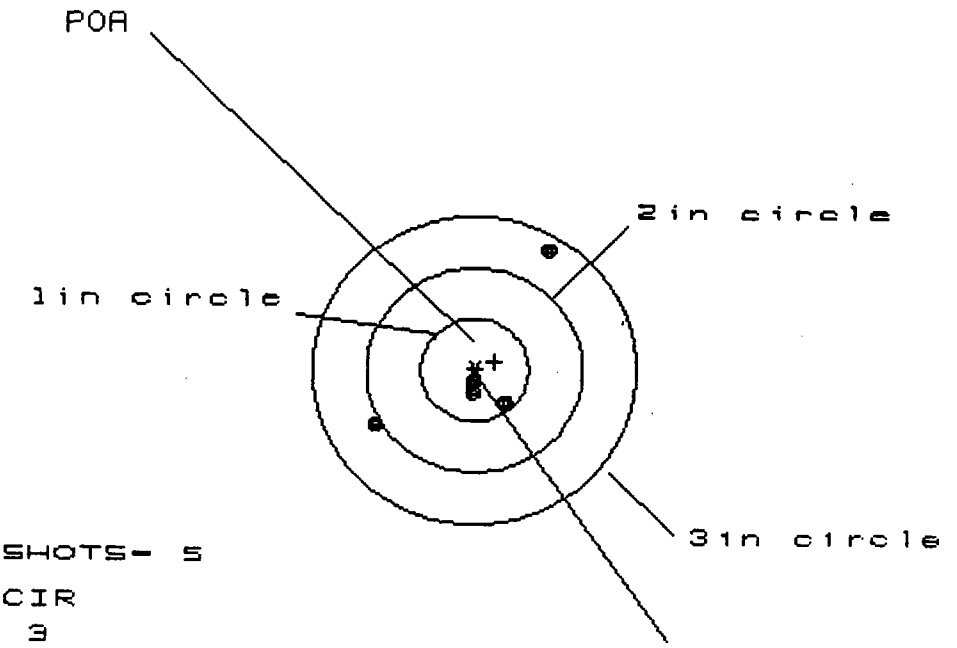
B-642 9801-
RECHAMBERED TO 5.56 m/m.

PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.652	.254	.074
MINIMUM X	:	-.703	-.539	-.098
MAXIMUM Y	:	.862	.642	.169
MINIMUM Y	:	-.735	-.519	-.305
CENTROID X	:	-.134	-.297	-.118
CENTROID Y	:	-.007	-.223	-.437
POA TO CENTROID in.	:	.135	.372	.453
MIN RADIUS	:	.276	.113	.168
MEAN RADIUS	:	.644	.442	.219
MAX RADIUS	:	1.081	.839	.306
HORIZONTAL SPREAD	:	1.355	.793	.172
VERTICAL SPREAD	:	1.597	1.161	.474
EXTREME SPREAD	:	1.710	1.379	.477
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	

M/700 BDL.
REM. AMMO. .223
55GR. M.C.
LOT. A06 ID
100 YDS.
SPECS. - 2.2" C. TO. C.

3 Dec 1986 FILE:/PATTERNING/CENTERFIRE PAT1/6J1973

CENTERFIRE PATTERNS # 2



OF SHOTS= 5
IN CIR
1in = 3
2in = 3
3in = 5
HS= 1.604
VS= 1.645
GS= 2.298

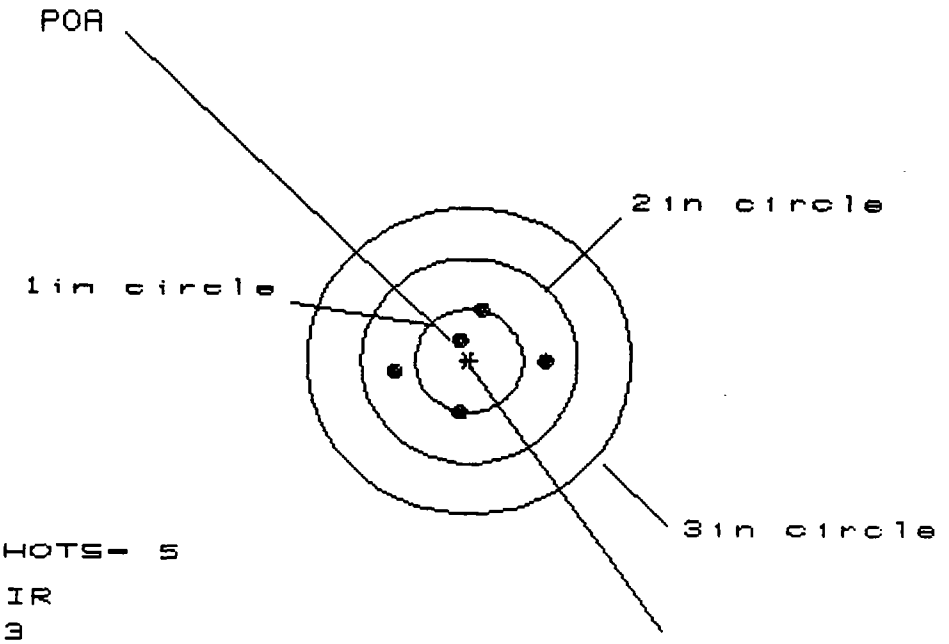
PATTERN # : 2

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.724	.419	.186
MINIMUM X :	-.880	-.699	-.109
MAXIMUM Y :	1.149	.179	.109
MINIMUM Y :	-.496	-.209	-.138
CENTROID X :	-.183	-.364	-.131
CENTROID Y :	-.079	-.366	-.296
POA TO CENTROID in.:	.199	.516	.324
MIN RADIUS :	.122	.184	.082
MEAN RADIUS :	.622	.389	.156
MAX RADIUS :	1.358	.730	.231
HORIZONTAL SPREAD :	1.604	1.118	.295
VERTICAL SPREAD :	1.645	.388	.247
EXTREME SPREAD :	2.298	1.127	.385

NUMBER IN ONE INCH CIRCLE = 3
NUMBER IN TWO INCH CIRCLE = 3
NUMBER IN THREE INCH CIRCLE = 5

9-Dec-1998 FILE: PATTERNING/CENTERFIRE/PAT3.BMP

CENTERFIRE PATTERNS # 3



OF SHOTS= 5

IN CIR
1in = 3
2in = 5
3in = 5

HS= 1.372
VS= .931
GS= 1.376

PATTERN # : 3

SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.732	.276	.124
MINIMUM X :	-.640	-.457	-.064
MAXIMUM Y :	.452	.445	.400
MINIMUM Y :	-.479	-.486	-.531
CENTROID X :	-.011	-.194	-.042
CENTROID Y :	-.001	.006	.051
POA TO CENTROID in.:	.011	.194	.066
MIN RADIUS :	.204	.199	.144
MEAN RADIUS :	.508	.423	.366
MAX RADIUS :	.733	.524	.535
HORIZONTAL SPREAD :	1.372	.733	.188
VERTICAL SPREAD :	.931	.931	.931
EXTREME SPREAD :	1.376	.950	.950

NUMBER IN ONE INCH CIRCLE = 3
NUMBER IN TWO INCH CIRCLE = 5
NUMBER IN THREE INCH CIRCLE = 5

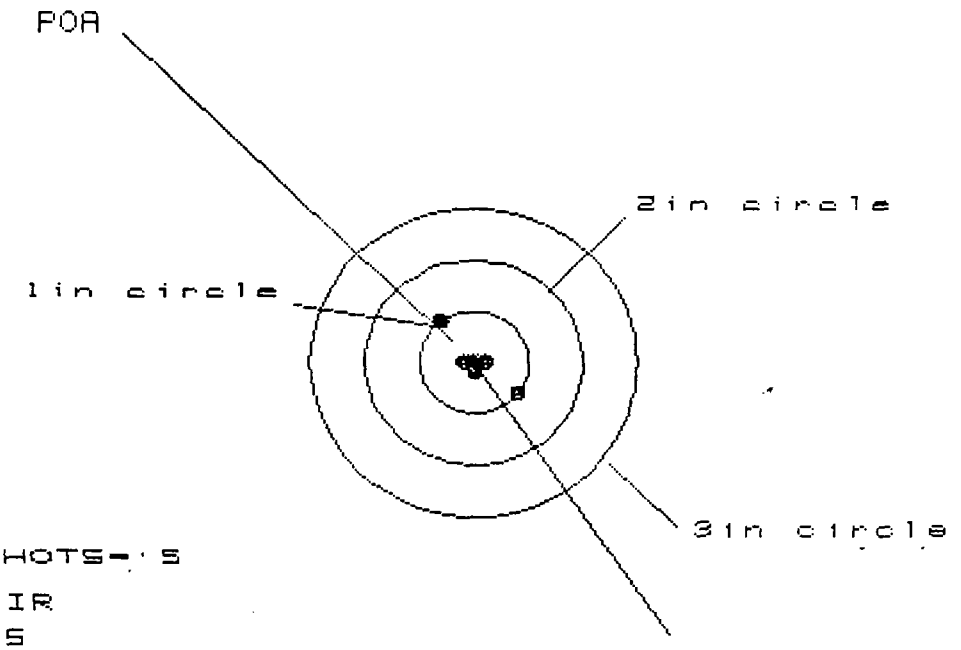
BARBER - PRESALE R 0137049

40.15 .223 REM. 1:14 TWIST
055788 B.
LYMAN. 20X SUPER TGT. SPOT.

AMMO. CONFIRMATION.
.223 REM.
55 GR. M.C. LOT # A06ID
100 YDS.

15 Apr 1986

CENTERFIRE PATTERNS # 1



OF SHOTS= 5
IN CIR
1in = 5
2in = 5
3in = 5

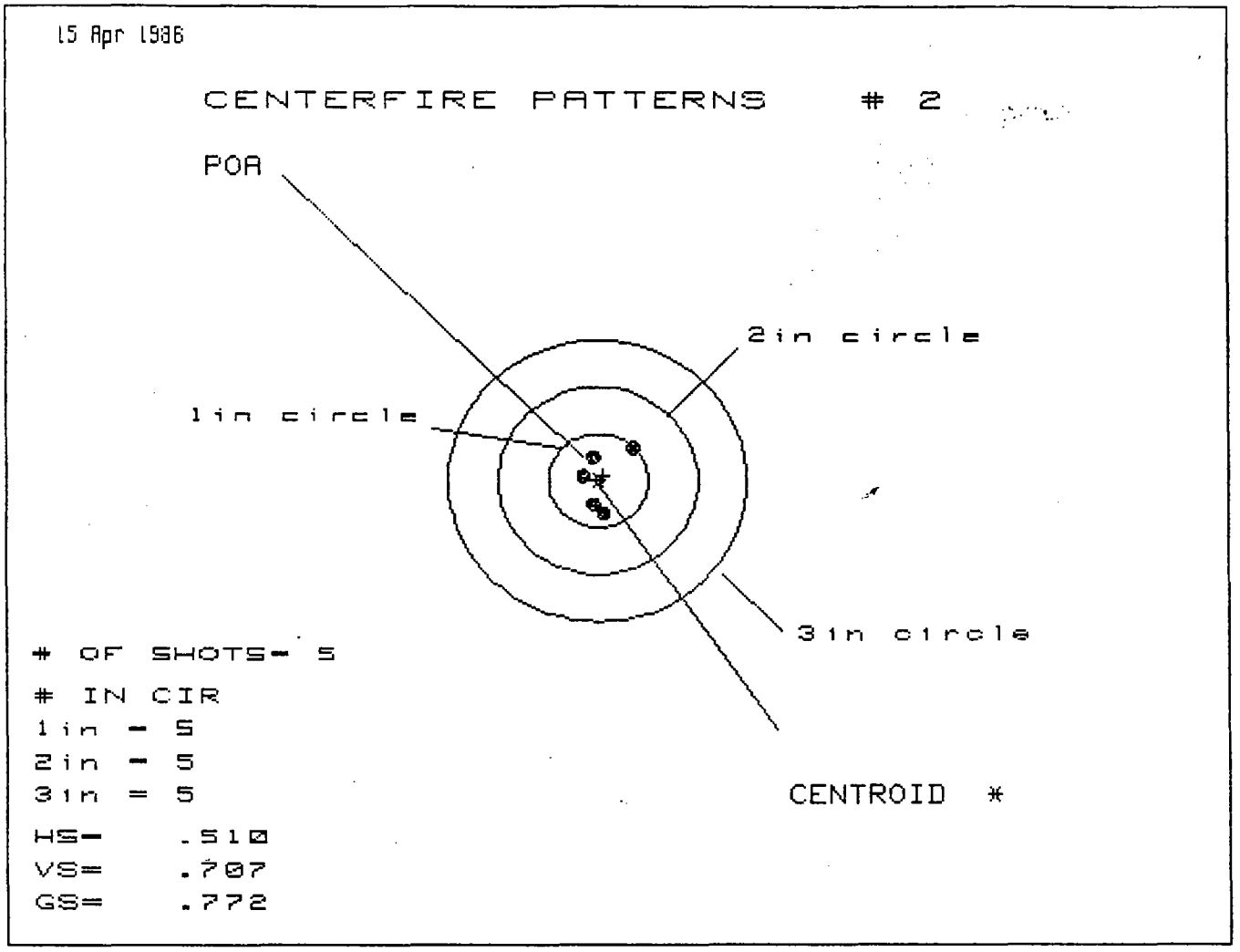
HS= .650
VS= .705
GS= .959
AVG: .772

PATTERN # : 1

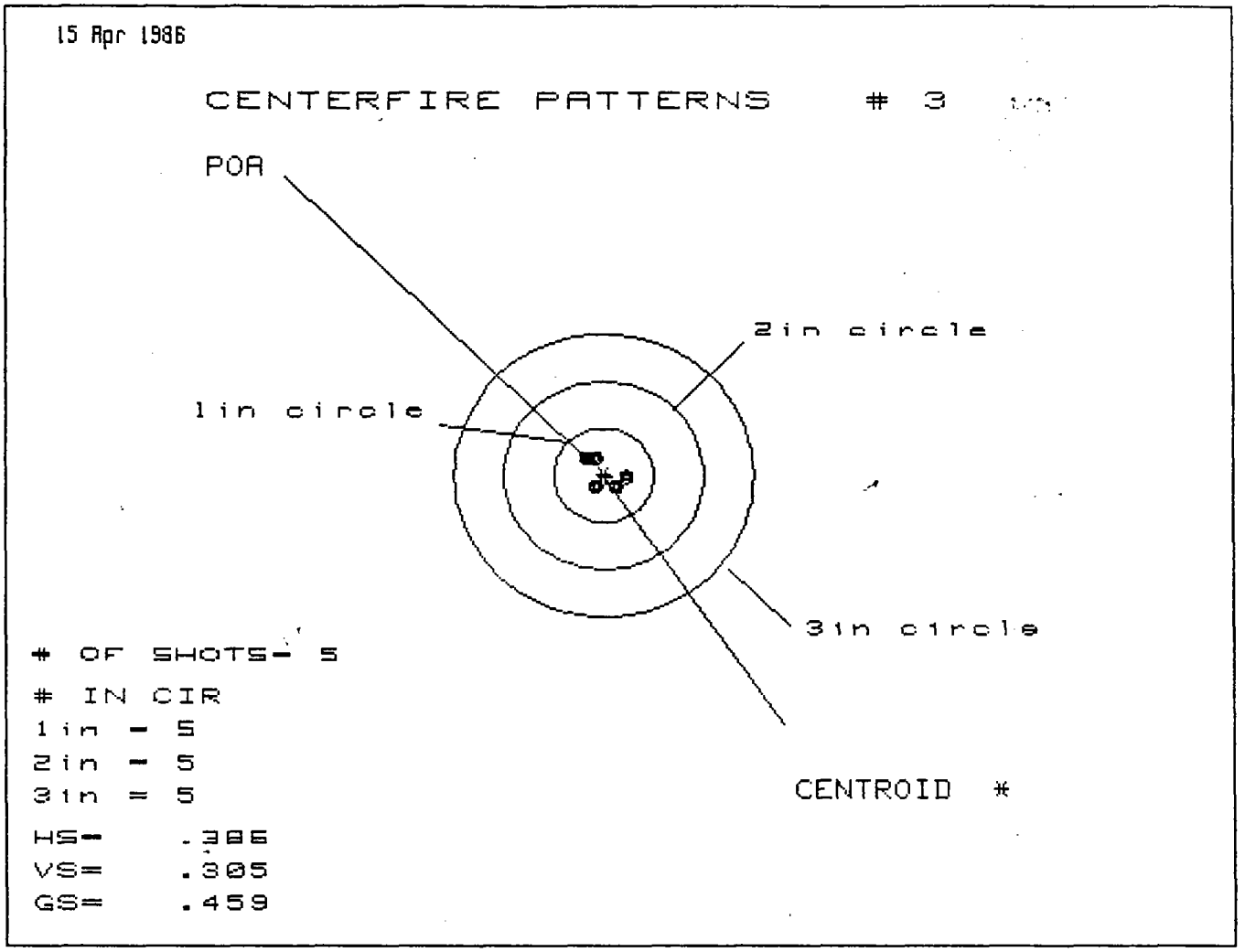
SHOTS (BEST OF) :	5	4	3
MAXIMUM X :	.366	.294	.124
MINIMUM X :	-.284	-.217	-.119
MAXIMUM Y :	.401	.116	.049
MINIMUM Y :	-.304	-.204	-.067
CENTROID X :	.004	.076	-.023
CENTROID Y :	-.008	-.108	-.041
POA TO CENTROID in.:	.009	.132	.047
MIN RADIUS :	.098	.090	.067
MEAN RADIUS :	.263	.199	.107
MAX RADIUS :	.492	.358	.129
HORIZONTAL SPREAD :	.650	.512	.243
VERTICAL SPREAD :	.705	.320	.116
EXTREME SPREAD :	.959	.604	.245

NUMBER IN ONE INCH CIRCLE = 5
NUMBER IN TWO INCH CIRCLE = 5
NUMBER IN THREE INCH CIRCLE = 5

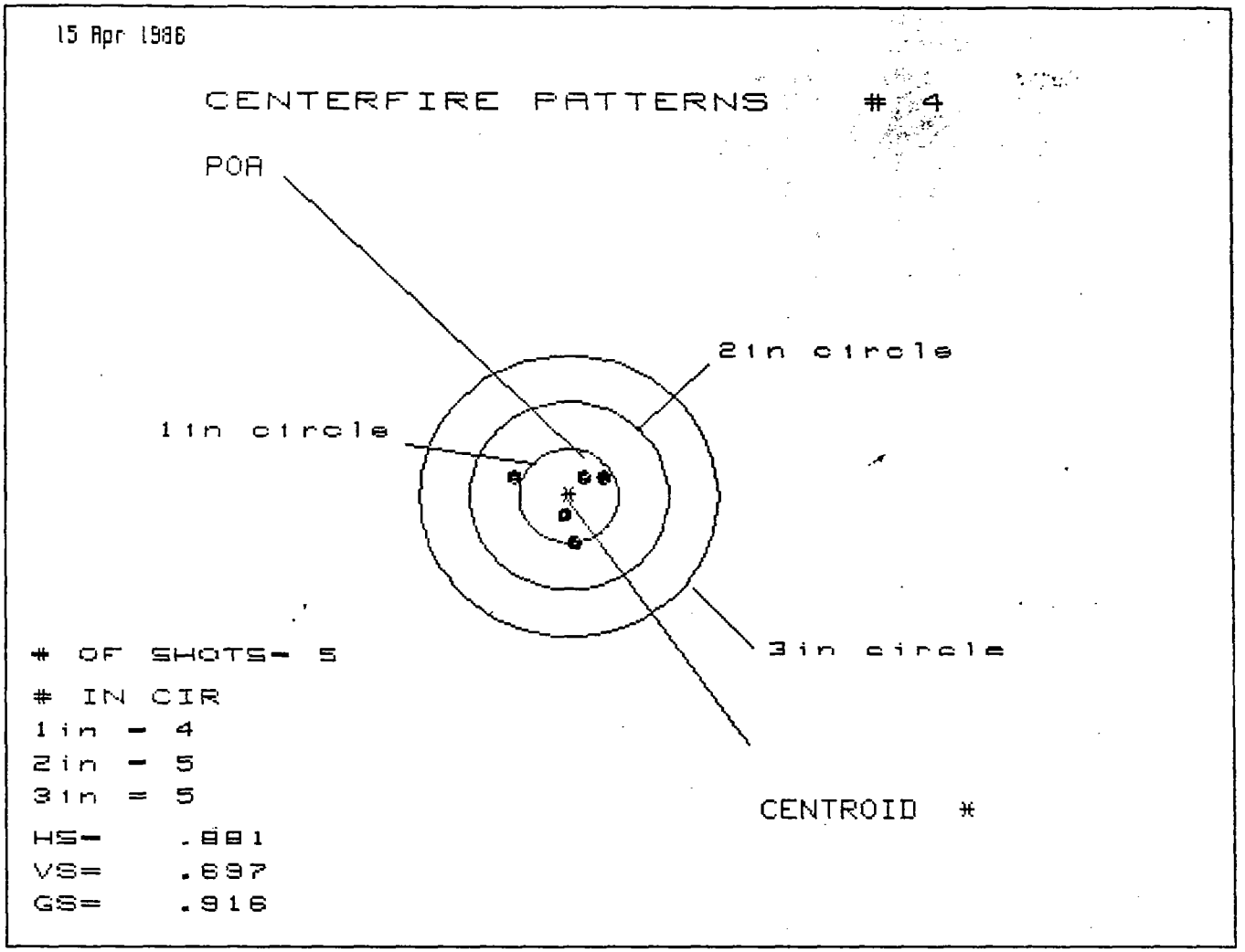
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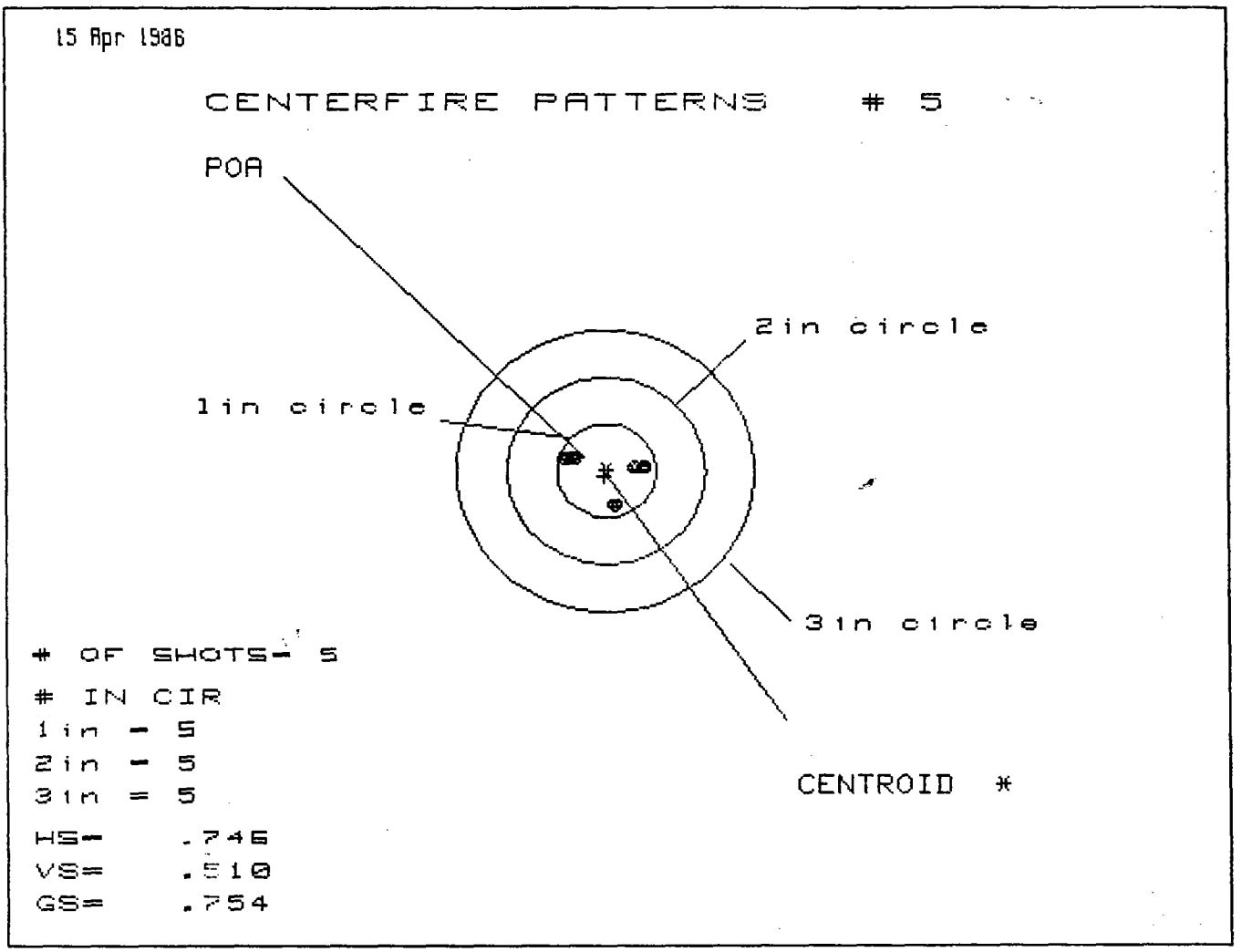
PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.318	.088	.070
MINIMUM X	:	-.192	-.112	-.083
MAXIMUM Y	:	.339	.310	.216
MINIMUM Y	:	-.368	-.283	-.273
CENTROID X	:	-.046	-.126	-.155
CENTROID Y	:	-.051	-.136	-.041
POA TO CENTROID in.	:	.069	.185	.160
MIN RADIUS	:	.203	.179	.101
MEAN RADIUS	:	.309	.244	.200
MAX RADIUS	:	.465	.313	.273
HORIZONTAL SPREAD	:	.510	.200	.153
VERTICAL SPREAD	:	.707	.594	.489
EXTREME SPREAD	:	.772	.596	.492
NUMBER IN ONE INCH CIRCLE	=		5	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.201	.155	.193
MINIMUM X	:	-.185	-.147	-.109
MAXIMUM Y	:	.160	.181	.146
MINIMUM Y	:	-.145	-.105	-.106
CENTROID X	:	-.019	.027	-.011
CENTROID Y	:	.014	-.026	.009
POA TO CENTROID in.	:	.024	.037	.014
MIN RADIUS	:	.134	.140	.135
MEAN RADIUS	:	.195	.171	.171
MAX RADIUS	:	.244	.233	.197
HORIZONTAL SPREAD	:	.386	.302	.302
VERTICAL SPREAD	:	.305	.286	.252
EXTREME SPREAD	:	.459	.386	.355
NUMBER IN ONE INCH CIRCLE	=		5	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	4		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.344	.210	.184
MINIMUM X	:	-.537	-.166	-.192
MAXIMUM Y	:	.240	.296	.164
MINIMUM Y	:	-.457	-.398	-.290
CENTROID X	:	-.352	-.218	-.192
CENTROID Y	:	-.203	-.263	-.130
POA TO CENTROID in.	:	.406	.341	.232
MIN RADIUS	:	.220	.229	.126
MEAN RADIUS	:	.389	.314	.240
MAX RADIUS	:	.588	.405	.348
HORIZONTAL SPREAD	:	.881	.376	.376
VERTICAL SPREAD	:	.697	.694	.454
EXTREME SPREAD	:	.916	.751	.589
NUMBER IN ONE INCH CIRCLE	=		4	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



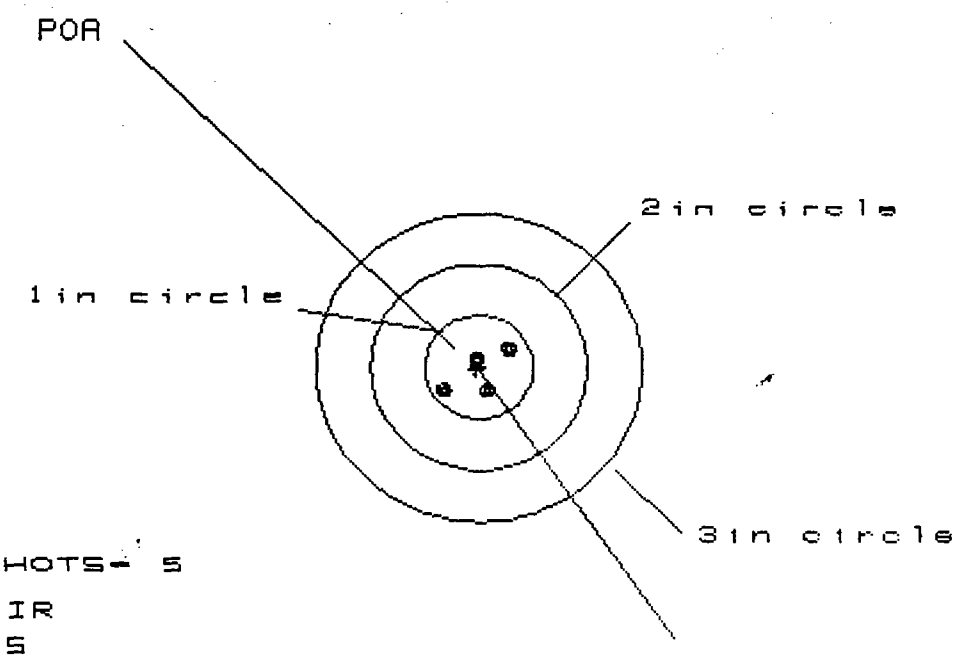
PATTERN #	:	5		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.337	.235	.239
MINIMUM X	:	-.409	-.430	-.426
MAXIMUM Y	:	.149	.177	.066
MINIMUM Y	:	-.361	-.333	-.075
CENTROID X	:	.019	.121	.117
CENTROID Y	:	.058	.030	.141
POA TO CENTROID in.	:	.061	.125	.183
MIN RADIUS	:	.300	.219	.188
MEAN RADIUS	:	.360	.314	.290
MAX RADIUS	:	.425	.465	.431
HORIZONTAL SPREAD	:	.746	.665	.665
VERTICAL SPREAD	:	.510	.510	.141
EXTREME SPREAD	:	.754	.680	.680
NUMBER IN ONE INCH CIRCLE	=		5	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

40 BARBER - PRESALE 0137054 TEST
#05788-B
SCOPE: LYMAN 20X · SUPER TAC SCOPE

#MMO. CONFIRMATION
5.56 MILITARY.
LOT - UNKNOWN
100 YDS.

15 Apr 1986

CENTERFIRE PATTERNS # 1



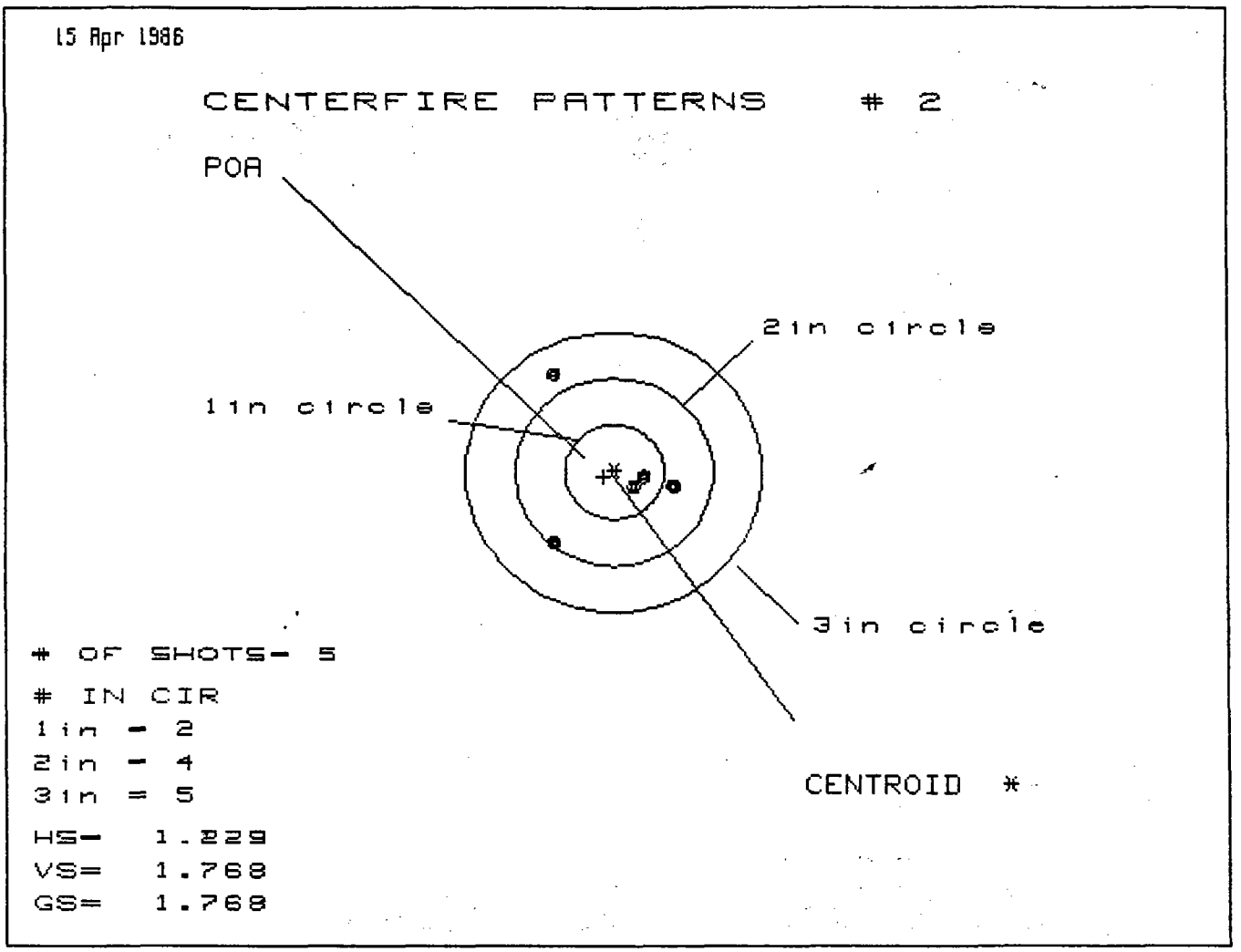
OF SHOTS= 5

IN CIR
1in = 5
2in = 5
3in = 5

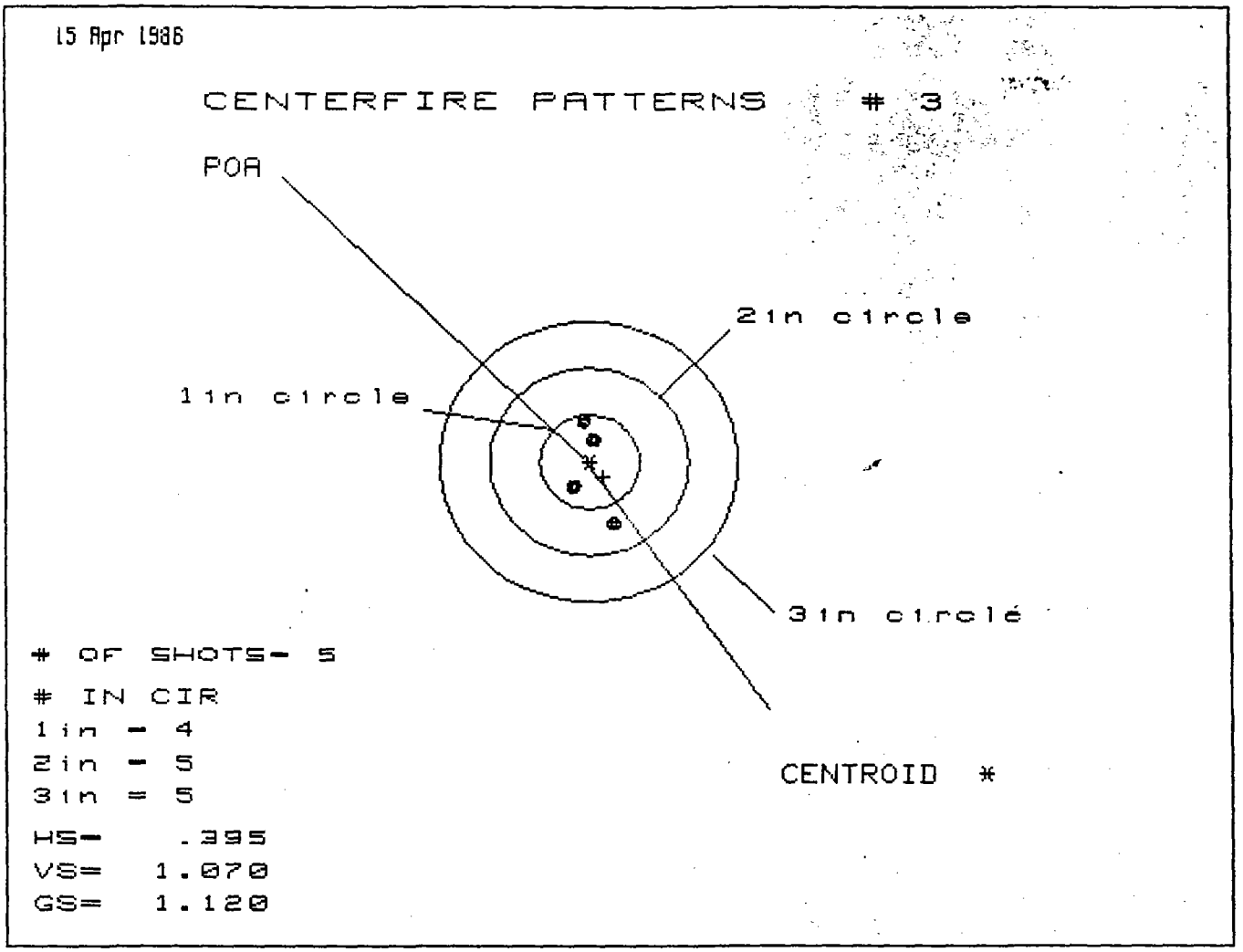
HS= .557
VS= .468
GS= .728
AVG. 1.5612

PATTERN #	:	1		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.259	.184	.013
MINIMUM X	:	-.298	-.071	-.010
MAXIMUM Y	:	.216	.152	.110
MINIMUM Y	:	-.252	-.269	-.219
CENTROID X	:	.030	.105	.044
CENTROID Y	:	.020	.083	.033
POA TO CENTROID in.	:	.037	.134	.055
MIN RADIUS	:	.121	.087	.108
MEAN RADIUS	:	.236	.173	.146
MAX RADIUS	:	.391	.274	.219
HORIZONTAL SPREAD	:	.557	.255	.023
VERTICAL SPREAD	:	.468	.422	.329
EXTREME SPREAD	:	.728	.482	.330
NUMBER IN ONE INCH CIRCLE	=		5	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	

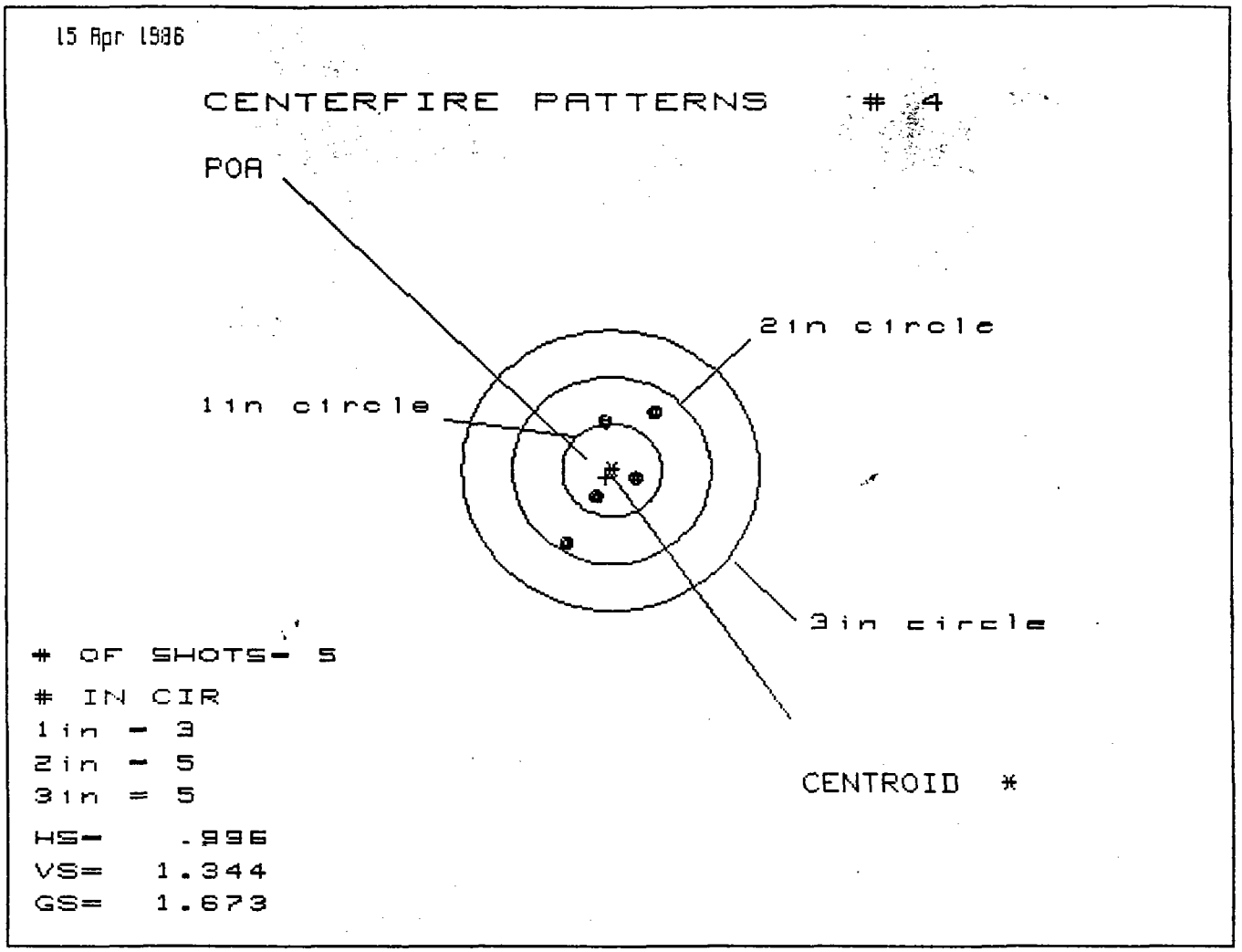
CONFIDENTIAL-SUBJECT TO PROTECTIVE ORDER



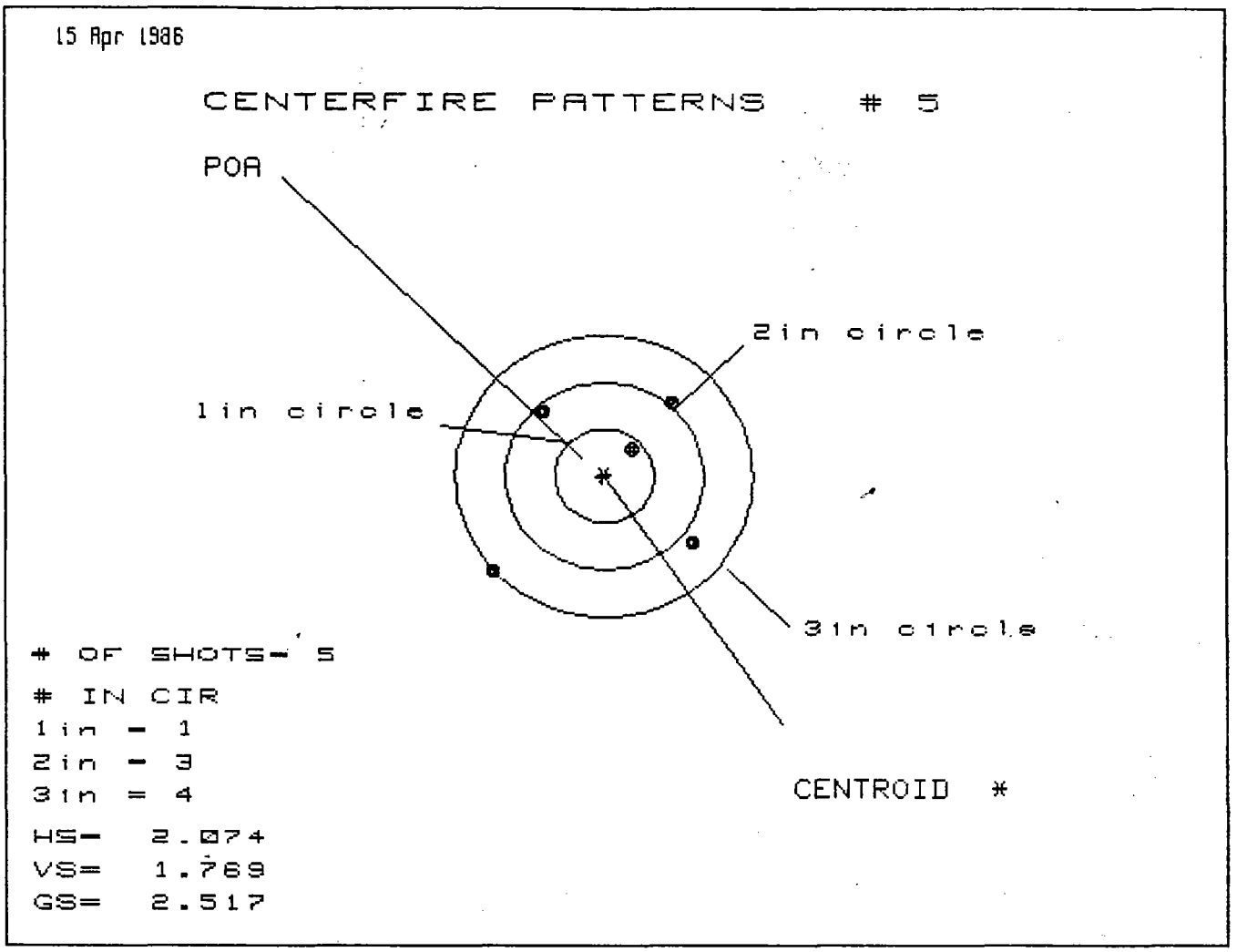
PATTERN #	:	2		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.638	.494	.250
MINIMUM X	:	-.591	-.734	-.198
MAXIMUM Y	:	1.053	.260	.109
MINIMUM Y	:	-.715	-.452	-.075
CENTROID X	:	.109	.253	.497
CENTROID Y	:	.049	-.214	-.063
POA TO CENTROID in.	:	.119	.331	.501
MIN RADIUS	:	.267	.089	.120
MEAN RADIUS	:	.677	.446	.195
MAX RADIUS	:	1.200	.863	.252
HORIZONTAL SPREAD	:	1.229	1.229	.448
VERTICAL SPREAD	:	1.768	.712	.184
EXTREME SPREAD	:	1.768	1.354	.450
NUMBER IN ONE INCH CIRCLE	=		2	
NUMBER IN TWO INCH CIRCLE	=		4	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	3		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.238	.067	.056
MINIMUM X	:	-.157	-.098	-.109
MAXIMUM Y	:	.398	.231	.171
MINIMUM Y	:	-.672	-.407	-.330
CENTROID X	:	-.137	-.196	-.185
CENTROID Y	:	.162	.330	.253
POA TO CENTROID in.	:	.212	.384	.313
MIN RADIUS	:	.250	.106	.168
MEAN RADIUS	:	.384	.218	.232
MAX RADIUS	:	.712	.418	.347
HORIZONTAL SPREAD	:	.395	.165	.165
VERTICAL SPREAD	:	1.070	.637	.501
EXTREME SPREAD	:	1.120	.640	.527
NUMBER IN ONE INCH CIRCLE	=		4	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	4		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.483	.355	.221
MINIMUM X	:	-.513	-.281	-.162
MAXIMUM Y	:	.584	.394	.438
MINIMUM Y	:	-.760	-.445	-.314
CENTROID X	:	.066	.194	.075
CENTROID Y	:	.078	.268	.137
POA TO CENTROID in.	:	.102	.331	.156
MIN RADIUS	:	.239	.275	.253
MEAN RADIUS	:	.542	.421	.349
MAX RADIUS	:	.917	.530	.442
HORIZONTAL SPREAD	:	.996	.636	.383
VERTICAL SPREAD	:	1.344	.839	.752
EXTREME SPREAD	:	1.673	1.053	.759
NUMBER IN ONE INCH CIRCLE	=		3	
NUMBER IN TWO INCH CIRCLE	=		5	
NUMBER IN THREE INCH CIRCLE	=		5	



PATTERN #	:	5		
SHOTS (BEST OF)	:	5	4	3
MAXIMUM X	:	.910	.619	.543
MINIMUM X	:	-1.164	-.925	-.719
MAXIMUM Y	:	.778	.530	.220
MINIMUM Y	:	-.991	-.931	-.309
CENTROID X	:	.025	.316	.109
CENTROID Y	:	.012	.260	.570
POA TO CENTROID in.	:	.027	.409	.581
MIN RADIUS	:	.360	.031	.356
MEAN RADIUS	:	.987	.696	.555
MAX RADIUS	:	1.529	1.118	.725
HORIZONTAL SPREAD	:	2.074	1.545	1.262
VERTICAL SPREAD	:	1.769	1.461	.529
EXTREME SPREAD	:	2.517	2.039	1.269
NUMBER IN ONE INCH CIRCLE	=		1	
NUMBER IN TWO INCH CIRCLE	=		3	
NUMBER IN THREE INCH CIRCLE	=		4	