

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington
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"CONFINE YOUR LETTER TO ONE SUBJECT ONLY" _____

****CONFIDENTIAL****

February 2, 1989

*This is an excellent
report.*

*See comments on
questions on your
specific areas
Bill*

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FROM: W. H. Coleman, II

ILION R & D AND TECHNICAL
MONTHLY REPORTS
JANUARY 1989

Constructive suggestions, ideas and criticism are welcomed by all
report contributors.

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Ilion, New York
February 2, 1989

TO: W. H. COLEMAN, II
FROM: L. B. BOSQUET/T. C. DOUGLAS

NEW PRODUCTS DEVELOPMENT MONTHLY REPORT - JANUARY

CURRENT PRODUCTS

EKSTROM-CARLSON CHECKERING MACHINE - Monteau/Hickey

The "INSERT CHECKER" and "EDIT EKSTROM" routines, as well as the post processor for this equipment, are operating. The optimization of these programs is continuing but does not interfere with our programming capabilities. Current capabilities include the SP-10MAG stock and fore-end and the Model 11-87 stock and fore-end. The Model 870 Wingmaster stock checkering is being worked on and should be running by the end of the month.

A common locator design was developed for the Ekstrom and the Bostomatic. The Tool Room has completed the build of these locators, giving production the capability of running the same pattern on both machines at the same time. This should result in improved throughput and prove beneficial in meeting production schedules.

The nose cones on the floating heads have been altered to allow for the maximum amount of clearance possible when the wood is rotated during the cutting cycle. This has greatly reduced the amount of hand touch-up that is required.

The design for the air counterbalance system and the noise enclosures for the air motors has been released for build. Higher priority items have delayed the start. When completed, this will result in lower decibel readings at the operator's position and it will eliminate the bounce in the cutting heads by replacing the springs which support each head. This will improve the quality of the checkering and improve the operation of the machine.

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A purchase order has been issued to Ekstrom-Carlson for the software needed to give Remington the ability to change the Programmable Application Logic. As soon as the changes can be made, it will give us the capability of running all twelve stations of the machine in a manner which satisfies all safety concerns and will essentially double the output of the equipment.

REMINGTON BARREL FOR THE SNIPER WEAPON SYSTEM - Martin

Three rifles made from the first mandrel and three rifles made from the second mandrel have been tested. The average mean radius of the three barrels from mandrel #2 was 1.148 inches versus the accuracy specification of 1.3 inches. The first 103 production rifles had an average mean radius of 1.021 inches. One of the rifles from mandrel #2 has been shot 5000 rounds to check barrel life. Accuracy after 5000 rounds was comparable to the current SWS barrel. Further testing of this barrel is planned using a 10 gun sample of GFM barrels and 10 Mike Rock barrels as controls. A third mandrel has been ordered which has 5 conventional lands and grooves versus the radiused configuration. This mandrel will be evaluated during this same test. The next step is to get the steel for the GFM barrels (if necessary), get GFM blanks manufactured, and then get GFM time to run them. Supply of M118 ammunition is also being evaluated.

MULTI-HEAD CHECKERING SOFTWARE - Monteau/Hickey

American Bay Limited is continuing their work on converting the NC checkering software from the GE 4020 format to our Compaq 386 PDs. The Model 700 Mountain Rifle pistol grip pattern was programmed and processed through the latest software supplied by Bob Turner. An NC tape was punched and was then used to dry run the multi-head equipment. Even though additional revisions are needed before we can cut wood, this has determined that those portions of the software that have been tried appear to work as they are supposed to. It has also shown that a tape can be punched correctly and that the tape will in turn drive the checkering machine. Work is continuing.

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TOOL DESIGN - Monteau

The project to replace the Bruning Model 870 print machine with a non-ammonia type whiteline printer has been approved (122258). A purchase requisition was issued for this equipment on January 11th. To date we have not received word that the machine is on order or when it is due.

Why doesn't someone ask?

FMS MODELING - Findlay

Modeling and detailing are complete for the LT-20 receiver for FMS manufacture. Advance drawings of the part were turned over to Bob Orf for review by his group. Upon approval, transmittal of the drawing will take place.

M/11-87/1100 FORE-END SUPPORT - Powers

The prototype fore-end reinforcements are undergoing test in the lab. Preliminary results indicate this design will not be acceptable. The five prototype fore-ends, with nylon reinforcing patches, from Sile-DeRobertis (Jerry Helmer project) will NOT be tested. Instead, we will be receiving about 40 more from the vendor, which will undergo design acceptance testing.

ELVALOY RECOIL PAD

The four prototype recoil pads (made of DuPont Elvaloy) from Rubber Industries have arrived and been inspected. The pads need to be corrected dimensionally before presentation for current product acceptance. Recoil force testing will be conducted by the end of January, using these samples to verify expected improvement resulting from reducing material hardness.

M/11-87 GAS CYLINDER COLLAR

A redesign of this part is being made so it will adhere itself to the gas cylinder. Either a prototype die or reworking of the current production die will be required to get parts for test.

CONFIDENTIALNEW PRODUCTS - 1988 CATALOGPARKER - Murphy

The primary effort in the previous month was directed towards building prototypes for test. Finally, about mid-month we began development testing of the first gun. Highlights of last months activity are as follows:

- o A formal report on the barrel assembly x-ray inspection procedure is still expected from Fred Schmidt. I will contact Fred for a date.
- o The stock drilling fixture has been designed by Tim McCormack and Kolar, was fabricated, and was sent to the custom shop on January 31. John Remington is in the process of making six prototype stocks and fore-ends for the remaining test guns and he will use this fixture.
- o Don Mainland was in Ilion on January 26 and 27 for meetings to formalize a contract to produce Parkers. R.S.Dobzelecki, P.H.Harper, W.L.Ericson, W.H.ColemanII and E.O.Fini were present and agreement in principle was reached on this contract. This meeting brought up issues that need to be addressed by Bobby Brown and I expect they will be resolved the week of January 30.
- o As a result of the January 27 meeting, I need to get approval on, and ship to Kolar, the following:
 - Two double spindle buffing machines
 - Two Divine polishing jacks
 - Obsolete 3200 cutters
- o It has been difficult to prepare the Test Lab for work on the Parker particularly without the ability to significantly influence the efforts of Kolar. This problem should be minimal now that we are finally testing. I am committed to completing development testing on the one gun by the end of February. Changes required to the design that become apparent will be made to the remaining six prototypes. Design acceptance testing will be done by March 31.

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PARKER - cont'd.

- o Testing on the Parker has gone as expected with timing and spring force problems surfacing. Each problem has been resolved as it came up and the test results have steadily improved.
- o Legal input was received regarding inspection procedures required upon receipt of production Parkers. In a nutshell, I will condense the design acceptance test to a procedure that can be used to inspect each incoming Parker.
- o The first draft of the Parker manual has been done and I am still waiting for approval from Jim Hutton and Ken Green.

CONFIDENTIALNEW PRODUCTS - 1989 CATALOGSP-10 MAGNUM - Rowlands/Bauman/Lewis/Verdura/Murphy

Reports from a gun writer indicate that the SP-10 Mag. will not function reliably with Win. 1 5/8 oz. steel T's....this is a load not previously tested. A field test at Ilion, using two unlubricated guns, confirmed this result. When the guns were lubricated with Rem Oil they functioned reliably. Additional polishing operations to the hammer and slide and/or larger gas orifice holes may be necessary to allow unlubricated guns to function correctly with some light loads.

The Test Lab has been requested to determine what size gas orifice hole is required to reliably function light loads in unlubricated guns, and also what effect that has on heavy loads in lubricated guns.

A sample of Carpenter Maraging Stainless Steel (custom 455) has been received for evaluation as an alternate choke tube material. This material is about 25% cheaper than the approved ferrous grade and should not require any coating for rust prevention. 12 Ga. choke tubes, made from this material, are now in test and to date are performing acceptably.

The latest version of the MIM 10 Ga. choke tube wrench with the 3/8 square hole has been processed. Some dimensions were out-of-spec, but do not affect wrench performance. Therefore, related drawing tolerances will be increased to allow part acceptance. Strength tests conducted so far indicate that the handle will fail before the teeth at about 26 Ft.Lbs. This is 40% above the minimum drawing spec.

The first draft of the Owners Instruction Book is complete (less illustrations), and will be distributed to Customer Service and Legal personnel for their approval. Work on the Field Service Manual has begun.

Development work on the alternate feed system for the SP-10 Magnum shotgun is continuing with alterations primarily being done to the springs of the gun (action, magazine, latch, and flipper) to change the timing and inertial characteristics of the system. Malfunctions being experienced by the gun at this point are Double Feeding, Doesn't Trip Latch, and Doesn't Lock Up (the DLU malfunction while not a "true" feeding malfunction is being addressed with a new action spring to aid the return stroke of the gun). Once initial design developmental testing is complete, the single prototype will be turned over to the test lab for a 500 round function test.

CONFIDENTIALSP-10 MAGNUM - cont'd.

Progress has been made on the trial and pilot of this model and from this point on will be tracked in daily meetings with the Process Designers and other people (on an as needed basis). As the result of a meeting held on January 26th, the transition from trial and pilot to full production will be coordinated through meetings held each Monday and Thursday until this product is flowing to the warehouse. These bi-weekly meetings will accomplish two goals; the first being the implementation of SPC on the SP-10 and the second being meeting the plant's commitment to have 2000 guns in the warehouse by the first of August.

TURKEY CHOKE TUBE - Powers

An identical tube, with the exception of a straight taper instead of a parabolic taper has been tested for design acceptance to replace the current design. The Design Acceptance report has been written, approved, and transmittal has been made.

SLUG GUN SYSTEM - D.Findlay/Lewis/Verdura

The first production run of this product is scheduled for April. There are an estimated 5000 hours of tool design and build required to add this to the product line. To provide sufficient time for build, all tool design was contracted to two outside firms. As of the end of January, all but three pieces of tool design have been received. The balance is due within the next week and a half. Build orders are being placed.

A time line will be established during the next month for purposes of tracking progress. All purchased components for this gun are on order and are being tracked. The last parts are due by the end of March.

CONFIDENTIALSLUG GUN SYSTEM - cont'd.*Status on Degrees
Multi of Freedom?*

Purchase order LRI 62323P was issued covering the purchase of an additional Leacock machine for counterboring and tapping barrels for choke tubes. This machine will be essentially the same as the present machine but will incorporate some fixturing revisions. Representatives of Leacock will be on the plant February 20th to discuss concept approval. Delivery is scheduled for October 10, 1989. Leacock will be providing Remington with monthly progress reports in the early stages of the project and will shift over to a bi-monthly schedule of reporting as the completion date approaches.

MODEL 700 AS BDL (ARYLON STOCK) - VERDURA, LEWIS

In 1989 Remington will offer the Model 700 BDL fitted with a stock made of DuPont Arylon. This will mark the first time that Arylon has been used as a viable material for a gun stock. This version of the Model 700 will replace the Rynite and right hand fiberglass stocks currently in the product line. It will be produced in long and short action versions as well as in regular, magnum and varmint barrel configurations in the following calibers:

- | | |
|--------------|---------------|
| o 22-250 REM | o 308 WIN |
| o 243 WIN | o 7mm REM MAG |
| o 270 WIN | o 280 REM |
| o 30-06 SPFD | |

Initial production is scheduled for March 1989 in 22-250 REM caliber. All paperwork has been completed.

A formal trial and pilot is not required on this item but the Test and Measurement Lab may want to draw a sample from the first production run and verify that it conforms to Model 700 specifications.

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MODEL 700 CLASSIC .300 WEATHERBY MAGNUM - Lewis/Verdura

The 1989 offering in the Model 700 Classic series will be the 300 Weatherby Magnum. This will be a synergistic offering from both Firearms and Ammunition.

All paperwork is in place and all tooling is reported to be available.

Total volume for this offering has been estimated at 6000 units to be produced in June. The trial and pilot run will consist of 350 guns scheduled for warehousing in March. This is to try and comply with a Marketing request that 300-500 guns be made available for the Alaskan bear season in March if possible.

May?

MODEL 1100 RETROFIT BARREL/STEEL SHOT - Verdura

The transmittal of model drawings is complete. Item masters, product structures and process records have been written and were issued January 3rd. Warehousing is scheduled to begin in April.

MARAGING STAINLESS STEEL CHOKE TUBES - Powers

A sample of the Carpenter Maraging Stainless Steel has been received and fabricated into 12 gauge choke tubes for evaluation as an alternative choke tube material over the ferritic Maraging Steel. If acceptable, this material could provide an approximate 25% cost savings in material costs. Testing has indicated that strength does not appear to be a concern, but some material was lost in the major diameter of the threads of the choke tubes. We know that the cutters used for production of these tubes are not recommended for use on the stainless maraging material, and suspect that is what caused a ribbon-like edge on the threads. Ed Ford is working with Sandvik to get the recommended cutter configuration.

Choke tubes have been sent out for rifling so that we can strength test that configuration. We will attempt to get some 10 Gauge tubes made up to piggy-back on the SP-10 Trial and Pilot testing. This will give us strength data on all variants of the choke tubes. We will then follow up with a final 12 Gauge test with tubes made with the correct tooling to prove that the thread area is ok to determine that we have a process.

CONFIDENTIALNEW PRODUCTS AND PROCESSES - 1990 AND BEYONDNEW .22 AUTOLOADING RIFLE - Smith/Findlay, Sr./Findlay

First proto-type build stage is well under way with both the Model Shop and N/C Group expected to have components built and ready by February 15th. Major components that are yet to be completed are:

- Receiver - in the Model Shop for final operations.
- Housing - N/C to start manufacture the week of 1-30-89.
- Magazine - Model Shop making tool paths, should begin manufacture the week of 1-30-89.
- Stock - N/C to begin manufacture the week of 1-23-89.

On Tuesday, January 24th, a meeting was held to discuss the progress of the .22 program, in attendance were D.S. Findlay Sr., D.S. Findlay Jr., Bill Marks and George Cato, of DuPont, and myself. Bill and George were here to discuss the components that will be molded, ie. receiver and housing. Bill had reviewed the two designs for feasibility of molding and material recommendations.

Results of the meeting were:

- Both the receiver and housing can be molded as designed with some modifications to the designs.
- Material recommended for proto-type will be Arylon, no glass-reinforcement, with graphite filler.
- Cato will recommend some mold tool builders to send drawings to for quotes for both proto-type and production tooling.
- D.S. Findlay Sr. will review drawings of the gun and make any recommendations to possible design/material changes.
- Bill Marks will be sent a set of updated prints of the receiver and housing and mark them up as to tolerances needed for molding. He will also run a computer cost analysis on both components for estimates of part cost.
- Bill will also be sent prints of the striker, operating handle, magazine box, and stock, to evaluate possible manufacturing of these components as molded parts.

Design area changes needed for molding of the receiver and housing are:

- Dovetail on top of the receiver is not good design practice and would leave that area weak when mounting a scope ring to it. Top of the receiver will be full radius and a separate scope mount attachment will have to be designed.

X
Comp to 604
Components
inls
etc

LET'S check
/MKG - Es
we really want
this?

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NEW .22 AUTOLOADING RIFLE - cont'd.

-Side panels on the receiver will be crowned to avoid possible sink/flatness spec. problems that would result from trying to achieve flat side panels.

-Remove lightening slots in receiver and core out front of receiver under the barrel to avoid sink.

-Housing will have to reflect removal of dovetail on top of the receiver by changing the top section of the housing to match the receiver.

-Possible change to magazine slot in the housing by making squared corner to better support/guide the magazine box.

-Re-design magazine guide in the housing to add rigidity to the guide and prevent possible bending and/or breakage.

The above changes will not affect the first proto-type guns being built. We will continue with the current design for the first guns and incorporate the changes into the 10 gun sample and test.

A completed parts list has been made and was issued along with a complete set of prints to Brad Bosquet for an engineering estimate and vendor contacts. Quotations have been requested and are expected around mid March.

It should be noted that the excellent efforts of Irv Traux, Jerry Starks, Bob Sanzo, and Bob Kozakowski in the manufacture of the critical and most difficult components is, and will allow us to keep and meet the schedule out-lined.

NEW CONCEPT SHOTGUN - Powers

First generation prototype design is progressing and CAD/CAM work is underway at EDL. For the barrel design we are considering both the GFM and Pilger manufacturing processes, with the emphasis on Pilger.

Test results of the modified KFC prototype indicate our simulation has accurately predicted bolt velocities. This testing has also revealed problems with magazine tube deformation which will have to be addressed in the NCS prototype design. Earl has sketched a concept which may solve this problem.

Recoil force testing of the NCS/KFC, 11-87, 1100, 870 and competitive models, fired by various shooters, is half done. The shooter impression portion of the test is complete and the transducer measurement portion is underway.

CONFIDENTIALNEW BOLT ACTION RIFLE - Bauman/Murphy

Little has been done on the NBAR in the previous month. Tom Bauman has been working exclusively on the SP-10 Mag. and my time has been spent with the Parker.

The schedule that we developed follows and is based on a number of assumptions. Among them:

- o Tom Bauman's involvement with the SP-10 Mag. will be "limited" in 1989.
- o My involvement with the Parker and the SBT will not cause any conflicts.
- o The Model Shop and N/C group can supply timely turnaround of prototypes.
- o The Test Lab can supply timely turnaround of required testing.
- o The firecontrol is the critical path item to be developed. This assumes that the untested magazine box designed by Dick Jackson will feed properly.

I described this schedule as ambitious since it presupposes the best case scenario for each of these assumptions. Tom and I will try to adhere to this schedule but it is important that we all realize the potential stumbling blocks.

NBAR Critical Path Schedule

Firecontrol

First Design	Mar. 1 89	2 mos.
Prototype (3)	Apr. 1 89	1 mo.
Engineering Evaluation	June 1 89	2 mos.
Redesign	July 1 89	1 mo.
Quotation & Economics	Oct. 1 89	3 mos.
Prototype (10)		
- Vendor Parts	Apr. 1 90	6 mos.
Test & Redesign	May 15 90	6 wks.
Build 30 Design Accept.	Feb. 15 91	9 mos.
and Trial and Pilot		
T & P Testing	Apr. 15 91	2 mos.

CONFIDENTIALNEW BOLT ACTION RIFLE - cont'd.

This is a list of the NBAR features, (that represent our design goals), in order of priority.

- o Detachable Magazine Box
- o Improved Firecontrol
 - No Connector
 - Two Trigger Pull Springs (low spring rate)
 - "Sealed Firecontrol"
 - Balanced Trigger
 - Trigger and Sear Block
 - Not Retrofittable to M/700
- o Bolt Lock w/override
- o Integral Scope Mounts
- o New Extractor
- o New "Custom Shop" Barrel Contour
 - Mountain Rifle Crown
- o Improved Bedding System
- o M/700 receiver, cosmetically altered
- o New Wood Stock

NEW AUTOLOADING RIFLE (NAR) - Powers/Findlay Sr.

This program is recently getting underway. The objective is to design a product which will replace the M/7400, but NOT the M/7600. This program's goals will be similar to those of the new .22 rimfire rifle:

- o Designed for high functional reliability
- o Designed for manufacture/assembly
- o New and/or improved safety features
- o Lower manufacturing cost

As with the .22 rimfire program, the majority of the actual design work will be done under contract by Dave Findlay, Sr. Remington personnel assigned to the program are: Tom Powers - Design and CAD/CAM, and Tom Plunkett - CAD/CAM.

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NEW AUTOLOADING RIFLE (NAR) - cont'd.

Initial caliber offerings will be 7mm REM MAG & 300 WIN MAG. Both these calibers will fit into a long action (30-06 etc.) The gun will operate on the Ljungman gas system principal with a three lug rotary bolt and a single-column magazine made from steel. The receiver will be aluminum, the magazine/trigger housing a molded polymer, and the stock/fore-end wood. Scheduled introduction is 1994.

MIN *

MODEL 700 CLASSIC .300 SAVAGE (1990) - Martin

Six prototype rifles have been fabricated in the Custom Shop. Ammunition for proof and testing have been ordered. The Design Acceptance Test procedures need to be finalized. A draft of the Parts List has been given to Ron Smithson.