

CONFIDENTIAL

REMINGTON ARMS COMPANY, INC.

NEW PRODUCTS RESEARCH

SECOND QUARTER PROGRESS REPORT - 1985

JUNE 28, 1985

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HIGHLIGHTS

FIREARMS RESEARCH

<u>Shotgun Development</u>	<u>Page</u>
o M/1100 prototype shotguns with all functional improvements except the new gas system passed 4,000 round endurance testing.	1
o M/1100 12 Ga. Restyle parts list and drawing package have been transmitted to production.	1
o M/870 Delrin and steel ejectors passed 11,000 round endurance testing as part of the functional improvement program. Preliminary drawings have been transmitted to production for estimating.	2
o M/870 12 Ga. Restyle trial and pilot samples passed visual and field function tests.	2
o Vendor produced barrels and choke tubes passed preliminary testing. Production has been approved to change to the heavy walled barrel.	2
o M/870 Special Purpose Magnum trial and pilot with chrome plated barrel has been approved.	3
o M/870 and M/1100 Special Purpose Deer Gun drawing package has been transmitted to production for estimating.	3
o Parker Shotgun layout drawings with a modified M/3200 fire control are complete and vendor engineering and design quotes have been requested.	3
o New Concept Shotgun fire control models (2) have been prepared with assembly of one in a M/1100 scheduled IVQ85.	4

HIGHLIGHTS

FIREARMS RESEARCH

Rifle Development

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- o Prototype new bolt action rifles are being fabricated with completion expected in September. 4
- o M/700 Classic .350 Rem. Mag. trial and pilot sample has been approved. 5
- o Sportsman 78 .223 Rem. parts list and drawing package have been transmitted to production for estimating. 5

HIGHLIGHTS

AMMUNITION RESEARCH

	<u>Page</u>
<u>Shotshell Development</u>	
o Three of Five "Premier" specifications have been approved for shipment. The fourth is being evaluated for approval with the fifth expected by the end of July.	5
o Four of Four steel and buck specifications have been approved for shipment.	7,8
o The Remington Target Load new Figure "8" wad design has been demonstrated with production scale-up pending Business Team approval. The new 209 primer has been loaded and shipped for an extensive field test.	8
<u>Centerfire Development</u>	
o Eleven "Premier" bullets have been designed. Authorization of funds to modify a bullet assembly machine to demonstrate feasibility is pending Business Team Approval.	9

FIREARMS RESEARCH

SHOTGUN DEVELOPMENT

Model 1100 Functional Improvements

This program, along with the Model 1100 Restyle Program, is aimed at maintaining the Model 1100's position in the marketplace until its replacement by the New Concept Shotgun. Research efforts are concentrated on a new gas system which will allow the customer to shoot all field and magnum loads in one gun, a stainless steel magazine tube for improved corrosion resistance, and a thicker extractor and two-piece firing pin retractor spring for improved endurance. Product introduction is scheduled for 1987.

Nine development guns, containing all of the improvement items except the gas system (stainless steel magnum tube, Special Field-type magazine detent system, wide extractor, and two-piece firing pin retractor spring), have completed 4,000 rounds of endurance testing. All components meet program goals.

A six gun development test of the gas system will begin July 1. Vendor produced circular springs are due June 26. The dog-leg spring has been dropped because of manufacturing difficulties holding the required tolerances.

A thirty gun design verification test is scheduled to begin during the second half of July, with transmittal to production by September 1.

Model 1100 Restyle

This cosmetic program is a complement to the Model 1100 Functional Program. Specifications include cut checkering, 30-gloss wood finish, two-piece butt plate, screw machine magazine cap, and choke tubes. Introduction of the 12 Gauge Restyle has been delayed until 1987 so it can be included with the Model 1100 Functional Improvements. The small gauges will follow one year later.

The 12 Gauge Parts List and drawings package has been transmitted to Production.

The drawings package for the 20, 28 and 410 Gauges is 75% complete. New fore-ends for the 20 Ga. detent system have been received from Production. Additional detent and barrel components are ready for evaluation.

New Products Research

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June, 1985

Model 870 Functional Improvements

Similar to the Model 1100 Functional Improvement program, this, along with its complementary Restyle program, is designed to maintain the Model 870's position in the marketplace until its replacement by the New Concept Shotgun. Significant items include a new ejector, one-piece action bar with modified cam angles, Special Field-type magazine detent system, wide extractor, and two-piece firing pin retractor spring. Introduction is scheduled for 1987.

One Delrin® and one steel ejector were endurance tested to 11,000 rounds with no part breakage in either design. Delrin has significant cost advantages. Extensive field-function testing was conducted both at the beginning of the test and at the 5,000 round level. There were no malfunctions.

Preliminary drawings have been given to Production for estimating.

Model 870 Restyle

This cosmetic program is a complement to the Functional Improvement program. Specifications include 30-gloss wood finish, cut checkering, new recoil pad, and choke tubes. Introduction of the 12 Gauge is scheduled for 1986. Introduction of the 20, 28 and 410 Gauges has been delayed one year to 1988, consistent with the Model 1100 Restyle.

The 12 Gauge production Trial and Pilot sample was received and passed visual and field function test. Final testing will be complete by July 1.

The drawings package for the 20, 28 and 410 gauge is 90% complete. Barrels for the 20 Gauge choke tube design are ready for evaluation.

Shotgun Choke Tubes

Choke Tubes allow the shooter to change the choke constriction in the field to adopt to different shooting conditions. Remington's choke tubes are superior to other OEM tubes: They are the only stainless steel tube offered by any gun manufacturer; the slightly longer length reduces choke strain; and the combination of material selection and heat treatment makes them the strongest choke tubes available, either OEM, or as an aftermarket product, which is critical for their use with steel shot. Choke tubes will be offered in 1986.

Preliminary testing of vendor assembled barrels and choke tubes has been completed satisfactorily. Production has been released to change to the heavy walled barrel which is used for choke tubes.

New Products Research

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June, 1985

Models 870, 1100 Special Purpose Magnum

These guns have been developed to address special shotgun market segments. Specifications included Parkerized metal finishes, oil finished birch stock and fore-end, 26" and 30" barrels with chrome plated bores, and a Cordura® sling strap. The 30" version is specifically aimed at waterfowl hunters, and the 26" version at turkey hunters. Research approved the Model 1100 in January. The Model 870 should be available for the fall hunting season.

Specifications for chrome plating of the barrel have been changed. Research has approved Production's trial and pilot sample of the Model 870, and authorized production to the warehouse.

Models 870, 1100 Special Purpose Deer Gun

Specifications for this gun are similar to the Special Purpose Magnums except for barrel length and no chrome plating in both guns, and 2 3/4" chamber in the Model 1100. Introduction is scheduled for 1986.

Drawings have been issued to Production for estimating. Transmittal can take place once economics are approved by the Firearms Business Team.

Parker Shotgun

The Parker is considered to be one of the finest side-by-side shotguns ever produced. Originally made by Parker Brothers, a firm founded in 1868 in Meriden, Connecticut, it was later manufactured by Remington, when Remington purchased Parker Brothers in 1934. Remington ceased production of the Parker in 1947. Consideration is now being given to making a limited number of guns available each year that would have the look and feel of the original Parker, but would be updated to meet current design standards.

Research has decided to modify the proven Model 3200 fire control for assembly to the Parker frame. Preliminary layouts are complete. Quotes have been requested from five outside design houses to complete the engineering and design work.

New Products Research

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June, 1985

International Over/Under Shotgun

Marketing has requested a sourced gun for sale in Europe. FIAS was selected as the supplier. Research has been asked to conduct an engineering evaluation to determine if the FIAS guns meet Remington standards. Research has contracted with Philip Haskell, a retired Research Engineer, to coordinate the evaluation.

Philip Haskell was in Ilion on June 18 to begin the engineering evaluation. FIAS has been notified of two changes necessary to conform with Remington standards. A trip is scheduled for June 25 to review facilities at an independent testing house.

New Concept Shotgun

The Model 870 and Model 1100 have been in the line since 1950 and 1963 respectively. This program is designed to replace those guns, probably early in the 1990's, with new products that will utilize state-of-the art technology and materials.

Research's consultant, Product Development Services, has completed bread-board models of two new fire controls. One will be adapted, by the end of 1985, to fit in a Model 1100. Development of the second fire control will continue, but at a slower pace.

EDL is continuing with their modeling of the 1100 using the "ADAM" and "COSAM" programs on the Computervision CAD System.

A meeting is scheduled for June 26 at Chestnut Run to continue the investigation of synthetic materials. Previous meetings were held with Textile Fibers, PPD, and F&FP's Composites Group.

RIFLE DEVELOPMENT

New Bolt Action Rifle

A new Bolt Action Rifle is being developed as a replacement for the Model 700 BDL. Introduction is scheduled for 1988. Technical improvements include a safety to block both the sear and trigger, a detachable magazine box, a claw-type extractor, an independent bolt lock, and integral scope mounts.

This program has progressed to the fabrication phase with the major effort now swinging from design to Model Shop and CV Group. The design is approximately 90% complete with the stock assembly, short action, and left hand components remaining. Completion of Model Shop prototypes for development testing is expected in September.

A meeting with Marketing has been scheduled to make plans for the next series of focus panels to define styling.

New Products Research

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June, 1985

Model 700 Classic - 350 Rem. Mag

For the past several years, Remington has produced a limited quantity of Model 700 Classics chambered for calibers not generally available from Remington. For 1985 this will be the 350 Rem. Mag.

Research has approved Production's Trial and Pilot sample and authorized production to the warehouse.

Sportsman 78 .223 Caliber

The Sportsman 78 is a less expensive version of the Model 700 bolt action rifle. This is a new caliber offering for 1986.

The parts list and drawings are complete. Drawings have been turned over to Process Engineering for estimating. The formal transmittal can take place shortly after economics are approved by the Firearms Business Team.

AMMUNITION RESEARCH

SHOTSHELL DEVELOPMENT

"Premier"

Competitive shotshell products with buffered and/or hard copper plated shot have gained acceptance among upland game and waterfowl hunters. Marketing has requested a similar line of products to maintain our competitive position.

A decision has been made by the Ammunition Business Team to eliminate sourcing of all "Premier" shotshell. A priority effort was undertaken by Research and Production to develop these loads. Six of the nine sourced products have been approved for shipment and a seventh is being evaluated for approval. The remaining two are expected to be approved IIIQ85. The following is a summary:

New Products Research

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June, 1985

SHOTSHELL DEVELOPMENT - Contd."Premier" - Contd.

	<u>Experimental Run</u>	<u>Release to Ship</u> <u>Expected</u> <u>Approved</u>
<u>"Premier"</u>		
12-3"-1 7/8	7/85	7/85
12-3"-1 5/8	Complete	6/85
12-2 3/4"-1 1/2	Complete	X
20-3"-1 1/4	Complete	X
20-2 3/4" - 1 1/8	7/85	8/85
<u>Steel</u>		
12-3" 1 1/4	Complete	X
12-2 3/4"-1 1/8	Complete	X
<u>Buck</u>		
12-3"	Complete	X
12-2 3/4"	Complete	X

- 12 Ga. 3" 1 7/8 oz.

Handload development using the SPLV body and Federal #209 primer had indicated that a blend of Hercules powders (HM80/HM90), the more compressible RP12 wad and the free flowing Gulf buffer gave satisfactory ballistics at the test temperature extremes in 16 hour and 120 hour environmental storage. The RP12 wads molded from tough, linear low density polyethylene (LLDPE) further reduced -20°F pressure deviations by substantially reducing wad breakup. A designed experiment evaluation of the candidate load indicated acceptable results under all the loading and temperature conditions.

Based on these positive results, an experimental loading run was made at Lonoke and product evaluation tests were run. All testing showed good results with the exception of the 30 day +150°F ballistics which gave an $\bar{x} + 3$ sigma pressure value of 17,000 psi. Consequently R&D began another series of screening experiments. This effort has now identified several potential loads which use the new Remington 150X Primer, (mechanically identical to the existing primer but with a mix similar to that used at Lake City), screened "Paxon" buffer (a Winchester type buffer with good flow characteristics) and two possible powder candidates - Hercules HM80 or Du Pont 8468. More comprehensive testing of these new loads on the loading machine are now underway.

- 12 Ga. 3" 1 5/8 oz.

R&D handload development had indicated acceptable loads based on extensive testing with the SPLV body, Federal #209 Primer, Hercules HM80 powder, SP12 LLDPE wad (for improved -20°F performance) and Gulf buffer. However, an experimental loading run performed at Lonoke encountered unsatisfactory ballistics variations.

Based on these results, additional screening tests were made which resulted in an experimental loading run at Lonoke using the same components with the exception of the Remington 150X Primer, Du Pont 8688 Powder, and Soltex buffer. Short term and 5 day environmental tests along with 90%RH+120°F high humidity storage tests have been completed at Lonoke with satisfactory results. 30 day environmental tests are due for firing in early July. A sample of this loading has been received at Ilion for evaluation which will include patterns, choke strain, bolt velocity, and environmental testing.

- 20 Ga. 3" 1 1/4 oz.

This load using new Hercules powder, 20 MAG "Power Piston" wad, Federal 209 Primer, and GULF Buffer with the RC body passed all testing and has been approved for shipment.

- 20 Ga. 2 3/4" 1 1/8 oz.

Handload screening and designed experiment tests using the RC body identified HM90 powder, Federal 209 Primer, GULF Buffer and the 20 MAG "Power Piston" wad with the RC body. However, 7 days humidified storage tests resulted in low pressures. Additional screening tests are in progress with the 150X Primer which permits use of faster powders.

Steel

Federal and state regulations mandate that steel pellets be used in many waterfowl hunting areas to decrease the incidence of lead poisoning in waterfowl.

Two specifications currently in the line which had been sourced have been developed using Expro 8688 powder, 150X primer, steel shot container and SP large volume body. These loads have been approved for shipment.

Buck

A decision has been made by the Ammunition Business Team to eliminate sourcing of Remington's existing buck shotshell. Two specifications currently in the line have been developed. These loads in 000-3" and 00-2 3/4" use Expro's 8688 powder, 150X primer and SP large volume body. They have been approved for shipment. Other buck sizes may require an alternate powder and are under development.

Remington Target Load

Marketing has determined a need to introduce a new line of target loads (RTL) to enhance our competitive position. This new load would consist of the new unibody shotshell, Remington 209 primer, brass cap in all gauges and two configurations of the Figure "8" wad in 12 gauge (component and factory wad design).

Factory tooling for one cavity each of the two wad configurations and compatible with existing "RXP" wad mold frames has been fabricated, installed and samples made. Both wad samples met the dimensional requirements of the product drawing and -20°F firing tests indicated 0% breakup versus 100% breakup for the "RXP" control wads. Authorization of funds to scale up two 24 cavity production molds is pending review by the Ammunition Business Team.

The new Remington 209 Primer has been manufactured and loaded in the current Peters Target Load for an extensive field test in two major state trap shoots. This primer will replace the existing target primer as soon as testing is complete pending successful results.

The Rotary Cam body has been proven superior to the existing RXP body. Tooling for one full quadrant of operation is expected in July at which time it will replace the existing RXP body in the Peters Target Load.

CENTERFIRE DEVELOPMENT

"Premier" Centerfire

Competitive "Premium" centerfire rifle products with superior downrange ballistics, accuracy and appearance have gained acceptance among big game hunters. Marketing has requested a similar line of products to maintain our competitive position.

Eleven bullets planned for this program have been designed as follows:

New Products Research

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June, 1985

"Premier" Centerfire - Contd.

<u>Caliber</u>	<u>Weight</u>	<u>Cartridge</u>
.30	180	308 Win., 30-06, 300 Win. Mag.
.30	150	308 Win., 30-06, 300 Win. Mag., 300 Sav
7mm	175	7mm Rem. Mag., (280 Rem., 7mm-08)
7mm	150	7mm Rem. Mag., (280 Rem., 7mm-08)
.270	130	270 Win.
.270	100	270 Win.
.25	120	25-06 Rem.
.25	100	25-06 Rem.
6mm	100	6mm Rem., 243 Win.
.22	55	22/250, 223
.22	50	222

Bullet Forming dies for .30 and 7mm caliber have been fabricated. Production machine demonstration has been delayed because of conflicting schedules. In order to complete this development within a reasonable time frame R&D will need a dedicated bullet assembly machine. Authorization of funds for this machine is pending review by the Ammunition Business Team.

Improved appearance of the brass case is also part of the "Premier" program. This has been demonstrated on plant equipment using R.H. Miller's exclusive "Hybrite" bright dip. Preliminary chemical cost of \$.03/case are within the goal of \$.05/case. Waste treatment can be handled using existing facilities. However, regulations imposed by the Resource Conservation Recovery Act may require Lonoke to significantly alter its present waste treatment process. ETL has been asked to develop alternatives to handle the chemical polish process waste. Prior to final project submission ETL has also been asked to review electro-polishing for feasibility and cost.

WHColeman:js *WHE/WLT*

New Products Research

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June, 1985

RESEARCH PERSONNEL AS OF JUNE 30, 1985FIREARMS

Exempt <u>24</u>	Non/Exempt <u>10</u>	Wage Roll <u>17</u>
Bauman, Thomas G.	Frost, Helen B.	Baggetta, Joseph A.
Bower, James W.	Jones, Raymond A.	Beader, Robert W.
Calkins, Kevin L.	Pickett, Wm., F.	Bedworth, Gary R.
Coleman, Wm., H., II	Saunders, Susan P.	Butler, Richard G.
Curry, Wm., M.	Schuster, Joyce M.	Eastwood, Ralph
Douglas, Terry C.	Smithson, Ronald L.	Eckler, John
Ericson, Wm., L.	Stephens, Charles J.	Florentino, Dominick J.
Findlay, David S.	Supry, Fred L.	Harter, James D.
Franz, Scott R.	Urtz, Donald J.	Howe, Robert W.
Hand, Charles J.	Weaver, Harold E.	Jennings, Dale E.
Hennings, James H.		Kozakowski, Robert
Hugick, Adam A.		McManus, Owen
Hutton, James C.		Paslak, Wm., A.
Lawrence, Jeffrey A.		Starks, Gerry
Martin, Fred E.		Truax, Irving E.
Martin, James S., Jr.		Williams, Clifford
Murphy, Randall S.		Williams, Donald
Plunkett, Thomas J.		
Powers, Thomas P.		
Rankins, Edwin D.		
Rowlands, Kenneth C.		
Sanzo, Robert J.		
Saunders, Eugene L.		
Snedeker, James R.		

Total Firearms Personnel - 51

AMMUNITION

Exempt <u>5</u>	Non/Exempt <u>2</u>	Wage Roll <u>2</u>
Cole, Wm., T.	Conant, Paul	Dunn, Timothy
desJardins, C.F.	Thomas, Dennis	Selan, Jerry
McDonald, Alexander D.		
Smith, Floyd H.		
Tomak, Warren L.		

Total Ammunition Personnel - 9

* ESD Engineer	- James Ronkainen
+ LSE	- Robert Caivana

REMINGTON PERSONNELRemington RollActual
6/30/85ExemptAmmunition Research
Firearms Research
Firearms Modernization
Administration5
24
7
1

Total Exempt

37

Non/ExemptAmmunition Research
Firearms Research
Firearms Modernization
Administration2
10
1
1

Total Non/Exempt

14

Wage RollAmmunition Research
Firearms Research
Firearms Modernization2
17
1

Total Wage Roll

20

Total Research

71