

REMINGTON ARMS COMPANY, INC.
RESEARCH AND DEVELOPMENT - FIREARMS
SECOND QUARTER PROGRESS REPORT - 1981

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LIMITED DISTRIBUTION

HIGHLIGHTS

New Product Development

Page

- Design testing continues with four 3" magnum XSG autoloading shotguns. Approximately 600 rounds have been fired through each gun. The fabrication of eight new XSG's is on schedule. 3
- Research continues to work with Production to reduce gallery rejects with the M/7400 family of centerfire rifles. Improvements to the magazine box has reduced the 30-06 gallery reject rate to under 10%. 3
- Model Four Limited Edition stocks and fore-ends are being made by Research and Process Engineering. The quality of receiver etching from Newcut has improved, but is not yet acceptable. 4
- Production has experienced problems brazing the Model 870 Competition Trap fore-end tube assembly, and is testing a new brazing method, material, and heat treatment. 4
- Completion of a second Model 7 prototype is expected by September 1. 4
- Bolt Action Carbine accuracy and function testing will be completed by June 26. Rifles for field testing will be ready in August. 4
- Production of seismic guns remains on schedule. The draft of the operator's manual will be ready for review by June 30. 5

Remington Arms Company, Inc.

	Page
<u>Current Product Development</u>	
● Several Model 700 ADL upgraded samples have been shown to Marketing. A new model, to the latest design, is being built.	5
● Model 1100 Ducks Unlimited Commemorative Dinner Models are being assembled for trial and pilot. The Special Dinner Model is being warehoused. P.O.I. tests are being run on the Trade Model.	5
● Model 870 Limited Edition receiver samples are due in July. The remaining parts needed to assemble a Research model are being built.	6
● Model 1100 links that have been shot peened, and new links made from 1050 material, are being tested.	6
● Model 870 Ohio State Highway Patrol-Anniversary marking rolls have been received and are acceptable. Model guns are being assembled for review with Marketing.	7
● Project costs for the Models 870 and 1100 magnum guns with 26" barrels have been furnished to Process Engineering for presentation at the June Operations Committee Meeting.	7
<u>Process Development</u>	
● A partial closing of the Auto-Drill Line project is being started. Complete project closeout is anticipated by the end of the year.	7
● A production quantity trial and pilot will be scheduled using the ASEA manipulator to rough polish M/7400 receivers.	7
● Sample magazine followers, produced by the Four-Slide Machine, are expected shortly.	8
● Molded "Torlon" piston seals are expected by the end of June for endurance testing.	8
● Construction drawings for a machine loading robot are complete. A project will be started to authorize funds for a prototype.	8

STATUS - NEW PRODUCT DEVELOPMENTXSG/XPG Shotguns

New autoloading (XSG) and slide action (XPG) shotguns are being developed as potential replacements for the M/1100 and M/870. Objectives of the program include decreased weight, increased reliability, and reduced manufacturing cost. Completion of the preliminary design is scheduled for July.

Four 3" magnum XSG's have been field tested with four M/1100 3" guns as a control. Initial testing showed that the XSG needed a larger orifice to increase bolt velocity, and adjustments for feeding. After these adjustments were made, the XSG performed equally with the M/1100.

Work is continuing on gas system and feed system designs. Guns with these new designs will be ready for testing in July.

The fabrication of eight new XSG shotguns is on schedule. Four XPG shotguns will be delayed in order to concentrate on the XSG autoloaders.

Twenty-five XSG's are being fabricated, and are scheduled to be complete in September.

Model 7400 Autoloading and Model 7600 Slide Action Centerfire Rifles

Research is working with Production on a daily basis to decrease the gallery reject and overall malfunction rates. The new magazine boxes have produced a considerable decrease in feeding problems.

Two new gages have been made to measure the magazine box lip configuration. One gage will be sent to the stamping vendor and the other will remain in-house. It is still necessary to adjust the box to meet the gage.

Extractor problems are being resolved by working with the vendor to correct the part to the model drawing.

Three new calibers are being developed:

- Eight guns in both 25-06 and 7mm-08 calibers are in the Test Lab for evaluation.
- 223 caliber breech bolts are near completion. The rest of the gun is ready less the magazine box. A new magazine is being worked on with a larger capacity and new release for the hold-open mode of operation.

Model Four Limited Edition

Research is working with Process Engineering to make stocks and fore-ends to Marketing's latest request. The stock will be a sanded M/7400 with rosewood grip cap, presentation butt pad, no cheek piece, and a new checkering pattern. The fore-end will be a Model Four fore-end with an improved finish and no white line spacers.

Newcut continues to improve the quality of their etching. The latest receiver samples were well done but lacked artistic value compared to the work done on the M/1100 Limited Edition.

Model 870 Competition Trap Shotgun

The Competition Trap Shotgun is a special single shot version of the present Model 870, with a unique gas operated recoil reduction system.

Production has problems producing the fore-end tube assembly due to warpage from heat treat and braze operations. Fore-end tubes of 1035 material, with neutral salt hardening and lower temperature braze alloys, are being evaluated. Four assemblies which were torch-brazed have been dry cycled 100,000 times with no breakage. Live fire testing will be conducted on assemblies brazed with production equipment when available.

The piston retainer design has been changed to provide more positive retention of the piston to the barrel assembly.

Model 7 Bolt Action Rifle

The first model is complete and has been shown to Marketing. The gun depicts a new style in receiver design and has an octagon barrel and a new stock. A second model, being made for the long action caliber, should be complete by September 1.

Bolt Action Carbine

This is a short, lightweight centerfire rifle being developed to replace the Model 600. Function and accuracy testing of five calibers will be done using handmade stocks. The heaviest caliber (308) is being endurance tested for 500 rounds to check stock strength.

Six stocks have been received from Fajen. An alteration is required, and a reworked stock will be sent for finishing the field test model stocks in July.

A new latch design is being built for use in the field test guns due to be completed in August.

- 5 -

Model 979 Seismic Gun

Development of the seismic gun has been a joint undertaking by Firearms Research, Ammunition Research, and MAPCO, Inc. All guns produced to date have been converted kiln guns, of both Desa and Hofmann manufacture, with Ilion replacing the conventional breech block with an electrically actuated design for simultaneous firing of several guns.

MAPCO placed an order for 100 guns to be shipped in 1981. This was subsequently revised to 87 because of the limited availability of kiln guns to convert. A total of 32 guns have been shipped towards this order.

The draft of the operator's manual should be ready for review by June 30.

STATUS - CURRENT PRODUCT DEVELOPMENTModel 700 ADL Restyling

The Model 700 is Remington's top-of-the-line bolt action centerfire rifle. Due to increasing competition, Marketing has requested an upgrade of the ADL, for 1982 introduction, encompassing:

- the M/700 classic stock with a glossy lacquer finish
- the M/700 BDL grip cap and butt plate
- sling swivel studs
- barreled actions not drilled and tapped for iron sights

Research is working with Process Engineering to establish lead times to accomplish the various changes.

Model 1100 Ducks Unlimited

Marketing has developed a four year program, with the option for a fifth year, to build special model shotguns for Ducks Unlimited. This program will include three special production models each year.

Trial and pilot testing of the 1981 Special Dinner Model is complete and guns are being put in the warehouse.

Point-of-impact testing of the 3" magnum, 32" long barrels on the 1981 Trade Model will be completed in June. This model will be warehoused in December.

Emblems have been received for the 1981 Commemorative Dinner Model. Some emblems have been returned to the vendor because they were not flat. Production is having problems assembling emblems to receivers, and Research is assisting. Emblems have been assembled to five guns for endurance testing. Warehousing is scheduled for July.

Model 870 Limited Edition

A special high grade Model 870 has been proposed to commemorate the 75th anniversary of Remington's first slide action shotgun, the Model 10, built in 1907.

Marketing has defined the model requirements and preliminary costs have been requested from Process Engineering.

Marketing has furnished 4 to 1 artwork for the receiver, and Purchasing has been requested to obtain etched plate samples in July. A delay has been encountered with the new etching vendor (Newcut) until the Model Four Limited Edition etched receiver is approved.

Model 1100 Link Breakage

During a competitive shotgun evaluation, an excessive number of link failures occurred. Approximately 70 links were replaced at the Grand American Trap Shoot last year. Production records show that approximately 5,000 links were sold last year.

Research has standard links that have been shotpeened and new links made from 1050 material. Live piggyback firing tests using these parts have begun:

- One standard link has gone 5,000 rounds.
- One link from 1050 material has gone 5,000 rounds.
- One shotpeened link has gone 350 rounds.

Testing will continue as guns become available. A dry cycle device is also being built.

- 7 -

Model 870 Ohio Highway Patrol Anniversary

This shotgun, with special marking on the receiver, is to be a 50th anniversary model for the Ohio State Highway Patrol.

Marketing has defined the model requirements and artwork has been approved. Process Engineering is reviewing the rollmarking portion of the design. Research has purchased marking rolls to the design and Production has finished the first ten receivers, which look acceptable.

If Marketing accepts the prototype model now being built, the project will be presented to the Operations Committee in July.

Model 1100/870 Magnum with 26 in. Barrel

This model is a field grade 3" magnum shotgun with a 26" full choke vent rib barrel.

Models have been tested satisfactorily, and sample guns were presented to the Operations Committee in May. The Chairman asked that costs to complete this project be presented at the June meeting.

STATUS - PROCESS DEVELOPMENTAuto-Drill Line

The previous method of preparing shotgun barrel blanks for the forging machines was difficult to control and required an unacceptably high degree of technical and engineering support. A drilling process has been developed utilizing proven machining methods and completely automatic part handling to replace the current process.

A partial closing of the Auto-Drill Line project is being initiated. This action will close out the capital construction work orders, but leave the operations work orders open until items required to provide the system with good operating efficiency have been installed. Close out of the operations items now would place an unnecessary burden on plant maintenance costs. Complete project close out is anticipated for the end of the year.

ASEA Manipulator

Rifle and shotgun receivers are rough and finish polished by a labor intensive hand process. Project RXI-63 was approved to purchase an ASEA programmable manipulator, and develop a process to use it to replace the manual polishing.

- 8 -

Efforts to use the ASEA to completely finish polish a receiver have proven unsuccessful because of discrepancies with previous machining operations, poor handling, and weight restrictions of the robot itself. However, Production has approved a sample of M/7400 receivers rough polished by the ASEA and finish polished manually. A trial and pilot will be run pending completion of minor fixture revisions, and safety guarding of the ASEA.

Additional equipment will be required to completely finish polish. An estimate has been sent to Industrial Engineering for evaluation.

Four-Slide Machine

This automatic manufacturing system for in-house production of precision formed stampings will enable Remington to develop an expertise in stamping manufacture and eliminate our total dependence on costly outside suppliers. Prior to expiration of Remington's contract with its principal stamping vendor, the Four-Slide Machine will be used to make prototype parts for Research.

All forming cams are now complete. Sample M/7600 magazine followers should be complete by June 30, followed two weeks later by M/7400 followers. Pending acceptable samples, a machine runoff will be scheduled.

Torlon Piston Seal

A new stainless steel stamped piston and high temperature plastic piston seal are being investigated for autoloading shotguns. Implementation of this design into the M/1100 will result in an annual savings of \$100,000. In addition to this cost improvement, a reduction in gas system corrosion problems should result.

The high temperature plastic currently being tested has the trade name "Torlon", and is a product of Amoco Chemical. Alternate DuPont materials are also being researched. DuPont "Vespel" is not satisfactory, according to tests run in 1977 - 78. DuPont engineers have been furnished the test results.

Pistons are available. Molded seals are expected by the end of June.

Machine Loading Robot System

A robot system has been proposed for automating existing machining lines. As opposed to other applications, where a robot replaces a man in the center of a machine group, this concept equips each machine with a pick-and-place mechanism and sufficient storage capability to make it operate as a non-synchronous transfer machine. The M/7400 breech bolt and bolt carrier lines have been selected for initial investigation.

- 9 -

Two robot types have been defined — one each for horizontal and vertical loading — which will satisfy all of the M/7400 breech bolt and bolt carrier machining operations. Construction drawings for the horizontal robot have been completed. A project will be started to authorize funds to build a prototype system.