

**REMINGTON ARMS COMPANY, INC.**

INTER-DEPARTMENTAL CORRESPONDENCE

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March 13, 1989

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FROM: W. H. Coleman, II

**ILION R & D AND TECHNICAL**  
**MONTHLY REPORTS**  
**FEBRUARY 1989**

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

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Ilion, New York  
March 13, 1989

TO: W. H. COLEMAN, II

FROM: L. B. BOSQUET/T. C. DOUGLAS

NEW PRODUCTS DEVELOPMENT MONTHLY REPORT - FEBRUARY

CURRENT PRODUCTS

EKSTROM-CARLSON CHECKERING MACHINE - Monteau/Hickey

The software needed to enable Remington to make modifications to the Programmable Application Logic routine in the controller is past due. It is on order with Ekstrom - Carlson on LRI 62291K and was due the end of February. Follow up on this item is being provided by OVRO. Plant personnel are ready to make the necessary changes as soon as the software is available. When completed, this will give us the capability of running all twelve stations in a manner which will satisfy all safety concerns and will significantly increase the output of the equipment. In anticipation of this, additional locators are being procured.

Optimization of the checkering software is continuing but, as stated previously, does not interfere with programming capabilities on this equipment. The Model 870 Wingmaster stock checkering is being worked on. Some problems with data input were encountered but are being resolved.

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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REMINGTON BARREL FOR THE SNIPER WEAPON SYSTEM - Martin

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 received 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. The steel has been ordered, with a tentative delivery date of 3Q89.

MULTI-HEAD CHECKERING SOFTWARE - Monteau/Hickey

Work continues with American Bay Limited to provide the capability of programming the multi-head checkering machines using routines written for our Compaq 386 PDs. Revisions were made to a tape written for the Model 700 Mountain Rifle and a pistol grip pattern was cut. The next step in the process is to debug the "CKEDIT" routine in order that line length corrections and tilt moves can be made. A major problem to be resolved is the overdriving of the axes which causes the machine to not return to the correct load, or home, position.

Concurrently, the fore arm routines are being verified and debugged using the Model 700 Mountain Rifle fore arm pattern. Problems have been encountered in the input of cross section data. This is being worked on.

A complete report on the current status of this project will be issued by the end of March.

TOOL DESIGN - Monteau

The non-ammonia white line printer is due in mid April. A location has been prepared in the Print Room. This machine will be leased for a trial period of up to ninety days at which time a decision will be made whether or not to purchase it. If the decision is to purchase, the lease charges will be applied to the purchase price. The purpose of this project is to replace the present machine and thereby eliminate the use of ammonia and any associated safety concerns.

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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 supports failed miserably, with virtually all of the prototype supports breaking within the first 100 rounds. The failures were all in the thin cross-sectional areas. Some of the parts showed inertia sleeve impact marking. Some of the remaining parts will be altered to see if there is any hope for this design. The 40 prototype fore ends with nylon reinforcing patches (from Sile-DeRobertis) have not arrived for testing.

ELVALOY RECOIL PAD - Powers

The latest version of the prototype recoil pads (made of DuPont Elvaloy) from Rubber Industries have arrived. These pads are of the correct thickness and will be shot for recoil so they may be compared to an earlier, thicker version which outperformed our standard ventilated pad. Originally, we were planning to bond this pad to a Rynite backer plate, thereby eliminating the two steel washers. This will not be possible. Alternatives are being explored.

VISIT TO H & P DIE AND STAMPING - Powers

Ed Owens and I visited this vendor to discuss production of various parts. We met with: Ron Stevens-GM, Bob Thomson-QC, George Habian-Tool Designer and various tool/die makers. This visit was in keeping with our new policy in dealing with vendors. Ed prepared a list of parts discussed along with who's responsible for what we agreed to do. The list is ambitious, but good follow-up should be helpful to both H & P and Remington.

M/11-87 GAS CYLINDER COLLAR - Powers

The redesign of this part, to adhere it to the gas cylinder, has been completed. I will be visiting with our vendor on March 1 to discuss prototype fabrication.

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NEW PRODUCTS - 1988 CATALOG

PARKER - Murphy

The primary effort in the previous month was directed towards the development testing of one gun. In addition, stocking and final alterations of the six design acceptance test guns has been started. 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 John Remington is in the process of shaping six prototype stocks (and fore-ends), and completely finishing three. Larry DelGrego will finish the remaining three stocks. Based on this experience, Larry and Tim McCormack will be able to quote on stocking production Parkers and a final decision can be made.
- o I have received approval to ship to Kolar the following:
  - Two double spindle buffing machines
  - Two Divine polishing jacksIn addition, obsolete 3200 cutters are being identified that can be sent as well.
- o I am committed to completing development testing on the one gun by the end of February. This date may slide to the third of March. Changes required to the design that become apparent are being made to the remaining six prototypes. Design acceptance testing will be done by March 31.
- 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. One problem that has persisted relates to the design of the ejector leaf spring. We have not yet been able to design a spring that will give a suitable force without taking a set.
- 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.

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PARKER - cont'd.

- o The first draft of the Parker manual has been done and after almost ten months I have finally gotten feedback from Ken Green and Legal. This has been given to Ron Smithson along with a manual need date of July 1.

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NEW PRODUCTS - 1989 CATALOG

SP-10 MAGNUM - Rowlands/Bauman/Lewis/Verdura/Murphy

The draft of the Owners Instruction Book has been approved by legal and customer service personnel, with minor changes. Work on the exploded view and additional illustrations is continuing. A goal of mid April has been set for printing the booklets. The Field Service Manual is also being worked on.

Plant assembly personnel have been given a demonstration on how to assemble the SP-10 MAGNUM. The general consensus was that it is going to be an easy gun to assemble.

Process Eng. has requested an alteration to the gas piston because of the short drill life encountered when drilling the .110 dia. by .750 deep gas hole in the 17-4PH stainless material. The proposed modification will allow the use of a .125 carbide drill, but will require that the hole location be changed to maintain minimum wall thickness. The effect of the larger gas hole on bolt velocities will also have to be determined. Four guns with modified gas pistons have been sent to the Test Lab for bolt velocity measurement.

All drawings of the SP-10 MAGNUM have been revised to the Initial Transmittal level and have been transmitted.

Corrosion resistance of choke tubes made from Carpenter Maraging Stainless Steel (custom 455) has been found to be far superior to the titanium coated ferrous grade initially proposed for the 10 Ga. choke tubes for use with steel shot. This material has so far only been endurance tested with steel shot in 12 Ga. choke tube configuration, and thread burr problems were encountered. Subsequent investigation indicates that the thread form was incorrectly manufactured. Additional choke tubes, including 10 Ga., made from this material will be manufactured and tested.

As of this date, all trial and pilot components are progressing except for the trigger plate. A major set back occurred on this component when it was determined that the sear pivot pin hole was out of position. A concerted effort is now underway to correct deficiencies in the offset routine and the main program as well as to resolve clamping problems in both the "A" and "B" load fixtures.

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SP-10MAGNUM - cont'd.

A bi-weekly meeting has been instituted to follow the completion of the trial and pilot and to coordinate the transition into full production. Meetings are held Mondays and Thursdays in the O.E. conference room. A "product tree" has been put together by the SPC and occupies two walls of the room. It is being used to track the progress of both SPC and the first production lots of parts. It is also being used as a means of highlighting problems and potential problems so that resources can be more effectively utilized in fulfilling the plant's commitment to have 2,000 guns in the warehouse by August 1 of this year.

SLUG GUN SYSTEM - D.Findlay/Lewis/Verdura

The first production run of this product is scheduled for June and will cover 1,000 Model 870 SP and 750 Model 11-87 SP Cantilever deer guns with rifled choke tubes.

All purchased parts are on schedule and should be received by the end of March or early April. The one unknown at this time is the scope ring sets. Purchasing is working with Tasco to establish a delivery date.

All tool design has been completed and the build has been placed. Close coordination with the Tool Room is being maintained relative to the build schedule. Within the next week or two, dates should be available for all tooling. At that time a time line will be put together.

Representatives from Leacock were on the plant February 20th and met with Remington personnel. They presented several proposed improvements to the locating and clamping details which addressed some of the trouble spots encountered on the present machine. It is felt that a greater degree of freedom in the fixturing may be required to ensure that the counterbore for the choke tube is on the same centerline as that of the bore. Further discussions on this subject are underway. At this time delivery is still scheduled for October 1989.

MODEL 700 AS BDL (ARYLON STOCK) - SMITH/VERDURA/LEWIS

A double field function test was held on Friday 2-24 to determine if there would be any feeding problems with the short action Arylon stocks that we received from Six Enterprises. The cause for concern is that the Arylon stocks are thicker thru the rear take down screw area than are our production walnut stocks, this allows the magazine box to ride up and down inside the stock and the thought was that this could possibly affect feeding of the rounds from the magazine box.



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MODEL 700 AS BDL (ARYLON STOCK) - cont'd.

Ten M/700 AS guns were assembled in .308 cal. and taken on the field function test, each gun was tested using eleven different ammo types shooting ten rounds of each ammo type in each gun ( two full five round loadings ). The test was shot looking for feeding malfunctions from the magazine. Results of the testing were as follows:

- 5 bolt over-rides, these all occurred on round #2, the first round out of the box, this malfunction occurred in 4 guns. (not uncommon in our current guns)
- 1 ejector stuck back, brass got in behind the ejector and held it back.

This calculates out to a feeding malfunction rate of .45%.

Another concern of process is the fit of the grip cap and recoil pad to the stock. It was decided on Monday 2-27 that production would:

- o clean excess glue from recoil pad and, using a small bladed screwdriver, would trace the outline of the pad where it meets the stock to create a defined line between the stock and pad. This would eliminate a call on what gap is/isn't acceptable.
- o look for a uniform fit of the grip cap from side to side.

This information will be forwarded to the vendor as will be least acceptable samples, when these have been determined. The vendor has also been notified of the fit of the floorplate and the rear tang section of the receiver, these two areas will be corrected in his tooling.

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

Responsibility for this trial and pilot has been assumed by John Balio's ATO group. The trial and pilot run will include 300-350 guns to be shipped to Alaska in time for the opening of the Alaskan bear season. These guns will have to be ready for shipment by March 17 and every effort will be made to accomplish this request from the marketing group.

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

The choke tubes made of Carpenter Merging Stainless Steel (Custom 455) have been evaluated. This material is about 25% cheaper than our current ferrous grade and will not require any coating for rust prevention. To satisfy first year production we could use this material and titanium-nitride coat it. Test results indicate this material is strong enough to withstand steel shot. These tubes also significantly outlasted the titanium-nitride coated tubes in a salt spray test. The material has not been accepted for production as the prototype tubes exhibited a burr on the threads which got worse during testing. Additional prototypes, made with better tooling to prevent burrs, have been requested so we may obtain design acceptance. Testing of this material in the rifled choke tube configuration will also be done.

John Simpson and I visited Precisionmatics, one of vendors, to acquaint them with the Vasco Max 250 and it's processing. I mentioned the Custom 455 as being evaluated. We will probably send them some their evaluation. Briley already makes his tubes from it.

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NEW PRODUCTS AND PROCESSES - 1990 AND BEYOND

NEW .22 AUTOLOADING RIFLE - Smith/Findlay, Sr./Findlay

Building of the first prototype guns should be done the week of 3-13-89. The outstanding unfinished components that will effect this are:

- Stock, Bob Sanzo is currently cutting two stocks in the N/C area, these will be laminated.

- Housing, the magazine guide piece is also in the N/C area and awaits machine time behind the stock. When this part is complete then the housing assembly can be finished up.

- Disconnecter, the redesign has been built and is currently in Heat Treat to be carburized and colored.

- Butt plate is also in the N/C area and it too awaits machine time behind the stock and magazine guide piece. This part does not prevent us from building a gun however.

All the other components are in place and the redesign of some of the components, mentioned in last months report, has been done.

Internal components have been measured and weighted to verify results from Scott's simulation program on bolt velocity. The current weight of components ( bolt, striker, extractor, firing pin, and springs ) shows that our system will be slow in velocity using the steel striker design, however, using an aluminum striker puts the system at desired velocities. We will undoubtedly have to look at reducing the weight of this system, this will be one of the first test that will be run on our proto-types. This first testing of the proto-types will also tell us how well the gun feeds and how well our safety systems function.

The quote from MIM on manufacturing the magazine box was a develop "only on a best effort basis", this is due to the "potential for unanticipated problems during the binder removal process and elimination of warpage/distortion which may occur during sintering". However the current design also lends itself to being an injection molded part. This is our current fall back position. If we indeed want to stay with a metal magazine box then we may have to look at a stamped design. The design team feels that if we go with a stamped magazine box then we should look to purchasing a currently produced box, i.e. Marlin straight line box. This would mean

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NEW .22 AUTOLOADING RIFLE - cont'd.

redesigning the gun to except the new magazine design, which will add months to the development schedule. We strongly feel that our first alternative should be to have an injection molded part using a quality grade engineered plastic (staying away from the material that we are currently using in our M/541 magazine box). However, we will proceed with, and try to produce this part, using the MIM process.

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, 870, Browning B-80, Browning A-500 and the H & K Super 90, fired by various shooters, is now complete. Shoulder forces (as measured with our recoil force transducer) indicate the NCS/KFC is lowest, with the 11-87 almost identical. Earl weighed the guns and we found that the NCS/KFC was significantly heavier than the others. Since weight affects felt recoil we will conduct another test, this one featuring weight equalization of the guns, sometime in March.

NEW 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.

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NEW BOLT ACTION RIFLE - cont'd.

- 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.

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

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NEW BOLT ACTION RIFLE - cont'd.

- 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.

The design is in the cartridge-feeding layout phase (infancy). The two initial calibers (7mm REM MAG & 300 WIN MAG.) do not have as much history-in-use (especially with autoloaders) as the .308 Win or .223 Rem calibers. Consequently, the prototype design progresses slower than if we introduced it chambered for either .308 Win or .223 Rem.

Dave Findlay, Sr. should be here within the next week to consult on the Rimfire Rifle program. I will speak with him then about the NCAR.

MODEL 700 CLASSIC .300 SAVAGE (1990) - Martin

Design Acceptance testing has been successfully completed with Transmittal to take place by March 17th.