

**REMINGTON ARMS COMPANY, INC.**

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Ilion, New York  
January 28, 1988

TO: W. H. COLEMAN, II

FROM: T. C. DOUGLAS

NEW PRODUCTS DEVELOPMENT MONTHLY REPORT - JANUARY

CURRENT PRODUCTS

SYNTHETIC LONG STOCK - MODEL 700 RS - Skip Smith

Due to extra work required to keep the Grey stocks clean during handling in the plant it was decided by the Product Team to change the stock color to Black for 1988. Transmittals have been made and the vendor has been notified. In addition, it was decided to add a barrel bedding point in the fore end to eliminate the problem with the barrel laying left/right and touching the fore end causing visual quality problems. The drawing changes have been made and the vendor was contacted by Skip on December 22nd.

After reviewing the changes requested by Remington to correct the problem of the barrel laying to the left, the vendor contacted us on January 15th. He expressed his reluctance to make the change as it would affect all of his tooling, not merely a mold core. He proposed molding a separate bedding block which he would cement into the fore end of the stock. A sample was received on January 19th, assembled to a barreled action, and is in the test lab for accuracy testing.

Remington is also pursuing an injection molded stock program with Lee Six of Six Enterprises as a replacement of the Brown Precision M/700 FS stock and possibly the Choate produced RS stocks also. Lee Six has sent his stock mold to DuPont TSL for DuPont Engineers to develop an injection molding process for a M/700 stock using either DuPont Rynite or Arylon synthetics. It is planned for Remington personnel and Lee Six to observe the stock molding at TSL on January 28th. It is hoped that we will be able to bring back stocks with inserts and recoil pads for Design Acceptance Testing. A test request has been submitted to the Test Lab pending the arrival of the guns. The timing on this program is very tight in order to make the 1989 catalog.

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**SNIPER WEAPON SYSTEM - Jim Snedeker**

Ten of the nineteen First Article Test rifles were shipped on schedule to Aberdeen Proving Grounds in mid-November via Army helicopter from the Oneida County Airport. These weapons are being put through hot and cold environmental tests, noise testing and endurance testing.

Three of the ten systems are scheduled to be returned to Ilion after the Christmas holidays and additional testing will be conducted at the Ilion site and at Dayton T. Brown Testing in Long Island( for the fungus and corrosion testing).

One of the new trigger pull test fixtures should be completed by February 5th. The second is ready for the Tool Room to start building and should be complete by the end of February. Additionally, parts for fifty more SWS fire controls have been brought through the production line and critical dimensions, surface roughness, and spring weights are being examined to determine the characteristics that need to be controlled to consistently attain the  $\pm 4$  ounce specification required by the government.

**MODEL 700 MAGNUM CALIBERS/STANDARD BARREL CONTOUR - Jackson/Martin**

Magnum barrels require multiple turning operations during production. This adds cost and ties up barrel turning resources. This program will determine if the Production calibers of 7mm Rem Mag, .300 Win Mag, and .338 Win Mag can utilize the standard barrel contour without sacrificing safety or accuracy.

Samples of all 3 calibers have been tested by the Test Lab. Results indicated an equally safe failure mode with magnum or standard barrel contours in all 3 calibers. Accuracy testing indicates no significant loss of accuracy in the 7mm Rem Mag or in the .300 Win Mag, but there was a significant accuracy loss in the .338 Win Mag.

Transmittal of the standard contour 7mm Rem Mag and the .300 Win Mag is currently underway. More .338 Win Mag test guns will be produced in the next production run in early February. There are indications that the previous test guns barrels did not meet the bore specifications and they did not simulate the standard barrel contour process.

**SMALL PARTS FMS - Andy Baszczuk**

A process is being readied to Machine M/11-87 and M/870 breech bolts on the FMS. This program was initiated by the Firearms Modernization group and was temporarily interrupted when that group was dissolved.

This development program is now approximately 90% complete. Initial fixture designs have been altered and modified prototype fixture parts are now available for testing. A review of the test NC program and tooling package needs to be completed. Prototype testing is expected to begin in February, 1988.

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**FLEXIBLE SMALL PARTS ASSEMBLY - Andy Baszczuk**

Approximately 10,000 M/700 trigger housings have been produced on the flexible assembly machine which was turned over to Production in December, 1987. Several small mechanical problems have occurred and were corrected with assistance from R&D. A Process Engineer has been assigned to the machine, but has not been able to spend sufficient time necessary to learn the operation.

Through operation of the equipment, a condition surfaced concerning misalignment of the two side plates on some of the trigger housing assemblies. The cause of this problem was found to be inherent in the assembly machine workstation design and would be difficult and costly to correct. A 100% inspection operation is now being used and any misaligned parts easily hand corrected by the operator.

With this added operation, production rates have dropped from approximately 1200 to 800 parts per shift using a single operator. This compares to 400 per shift using the current manual operation. Utilizing the help of the fourslide machine operator provides sufficient manpower to obtain full throughput from both operations.

**MODEL 870 POLICE - Scott Franz**

Some complaints have been received from two law enforcement agencies that their M/870s stem occasionally during high cyclic rates used during training (5 shots in less than 3 seconds). These malfunctions do not occur at normal rates of fire. The Idaho State Police returned two guns that were said to malfunction regularly. Dry cycling these guns with dummy rounds at an extremely high cyclic rate confirmed the malfunction. Both guns would stem low on occasion. High speed movies were shot in an attempt to determine the cause. The high speed movies showed that at extremely high cyclic rates, the carrier rebounds down during the feeding cycle after the shell hits the top of the barrel extension. The carrier eventually recovers due to the force exerted by the carrier dog follower spring. It was felt that a heavier spring would minimize this carrier rebound. The M/1100 and M/11-87 carrier latch spring could be used as a replacement for the M/870 carrier dog follower spring. It fits physically as is and exerts approximately 2 lbs. more force for the same deflection. High speed movies confirmed that carrier rebound was minimized with this spring. This information was given to John Rogers and Fred Emhof. We will dry cycle and endurance test this spring to determine if it will fatigue during normal usage. If testing does not indicate a fatigue problem, we will recommend replacing the current carrier dog follower spring with the M/1100/11-87 carrier latch spring.

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**BOSTOMATIC CHECKERING MACHINE - Maurice Monteau/John Hickey**

Available memory has been exhausted and contact will be made with Bostomatic relative to memory expansion. When enough data is available relative to costs, a proposal will be prepared.

**EKSTROM-CARLSON CHECKERING MACHINE - Maurice Monteau/John Hickey**

A considerable amount of work is underway on this equipment to get it to the point where it will handle long stocks, short stocks, and fore ends. A quotation has been requested from Synermation for completion of the "INSERT CHECKER" command. A March 1st completion is being requested. Work has started to convert from extremely expensive, long-delivery electric cutter motors to more economical air turbine motors on both the Ekstrom-Carlson and Bostomatic machines. A quote will be requested for revisions to the Programmable Application Logic (PAL) on the Model 7320 controller. This is required so that electrical control changes can be made.

**MULTI-HEAD CHECKERING SOFTWARE - Maurice Monteau/John Hickey**

Synermation, Inc. has been contracted to develop the necessary software to run checkering programs for the multi-head machines on the Computervision CAD system, thus making it possible to dispose of the GE 4020 and peripherals. This will result in an annual cost avoidance of approximately \$40,000. Synermation has not been successful to date. Steps are being taken to convert the existing 4020 software to run on the COMPAQ 386. This can be done in relatively short time and accomplish the same end goal; disposal of the GE 4020.

NEW PRODUCTS - 1988 CATALOG

PARKER - Randy Murphy

The Shot Show Parker was a success due to the dedicated efforts of Don Mainland, Larry DelGrego, Bryson Gwinell and a number of Remington people. The gun was very well received and was auctioned off for \$21,700.

Prototypes for testing will be produced similar to the show gun except for the barrels and engraving. A barrel process was finalized with our materials consultant, Fred Schmidt. Current 1140 Modified barrel steel will be used with an induction hardening heat treatment of the chamber to strengthen this area. Barrels for the test guns are through our GFM and are ready to be turned. Kolar Arms has special turning equipment on order with an equipment run-off expected in early February. In the interim, Kolar is continuing the barrel brazing development in addition to a redesign of the ejector system and the alteration of the trigger linkage.

A schedule outlining the test program timing will be developed pending the receipt of the barrel turning equipment by Kolar.

MODEL 700 CLASSIC .35 WHELAN - Brad Bosquet

Design acceptance testing is complete, with the design being approved for transmittal. The design was transmitted on June 10th. Trial and Pilot machining is underway with final assembly scheduled for February 1988.

MODEL 700 MOUNTAIN RIFLE CALIBER ADDITIONS - Brad Bosquet

Five rifles of each caliber offering(.308, 243, and 7mm-08) were tested for accuracy and function. The Design Verification Test was acceptable(Report #871111) and the design has been transmitted. Trial and Pilot assembly is scheduled for early February 1988.

NEW PRODUCTS - 1989 CATALOG

SP-10 MAGNUM - Ken Rowlands and Tom Bauman

Further delays are being experienced in getting guns ready for the 12 gun test. Extensive receiver rework was necessary due to damage caused by excessive shot blasting to produce the "Express" metal finish, which resulted in collapsed side walls and material roll-over into critical slots and holes. Additional finishing problems with powder coated trigger plates have also been identified. Plant personnel will be developing techniques to overcome these problems. One positive aspect of these delays is that we can now also test the actual investment castings and injectalloy parts that will be used in Production guns. The revised schedule for the test to begin is now the last week in January. The test will include six guns with 30" barrels and six guns with 26" barrels.

We now have 25 each each of all ten of the investment castings produced by Vestshell and three of the Injectalloy parts produced by the MIM Group. Some of these parts will be used for dimensional verification and some will be endurance tested.

Marketing has given preliminary approval for the use of high strength maraging steel for choke tube manufacture. Cost and machinability still have to be determined. In testing to date, BB size steel loads produced negligible swelling of the tube. A full range of pattern densities have not yet been consistently achieved. Choke tube wrenches and pilots have been tested and approved for production.

A packing box design is complete and five prototypes are ready for drop testing when guns from the 12 gun test become available.

All part and assembly drawings are now complete.

This Project was estimated to require 7000 hours of tool design. The goal for completing tool design is the end of February, and to this end, in-house capacity is being augmented by using three outside design firms. At this time, 85-90% of the required design work has been assigned and 50% is complete.

All Item Masters have been submitted to Planning and approximately 95% of the required Process Records have been written. Product Structures will be issued once all drawings have been transmitted.

Checkering patterns have been designed and will be transmitted by the end of the month. Programming has been started. Initially, the Fore End will be checkered on the Ekstrom-Carlson, and the Stock will be done on the Bostomatic.

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MODEL 700 CLASSIC .300 WEATHERBY MAGNUM - Fred Martin

The Model 700 Classic offering for 1989 will be the .300 Weatherby Magnum. This will be a synergistic offering from Firearms and Ammunition. Lonoke is providing Ilion with chamber drawings and reamers. Ilion will then provide Lonoke with three pressure barrels and two completed firearms for their ammunition development. Ilion will have five more completed rifles awaiting shipment of pilot run ammunition for Design Acceptance Testing. It is anticipated that the ammunition will be available in April, 1988. This caliber will be tested in a magnum barrel contour and a standard barrel contour.

MODEL 1100 MAGNUM RETROFIT BARREL FOR STEEL SHOT - S. Franz/T. Powers

The design acceptance test has been completed. Analysis of test data is currently under way. A final report will be written when this is completed. Initial indications are good. Gun functioning with the established orifice size was good. No significant choke tube deformation occurred on any of the experimental VascoMax 250 Maraging tubes. One Extra Full choke tube was fired over 4000 rds with Remington BB's and Federal T's and F's with no problems. The Extra Full tubes averaged approximately 80% patterns with Rem 2 3/4" Magnum 2's. The Full tubes averaged about 75%. It was felt that the Full tube performance was too close to the Extra Full tube. Desired Full tube performance is 70%. Further patterning work will be required to perfect the Full tube. It is hoped the Improved Cylinder constriction will yield this performance. A stainless steel IC tube is currently being tested for pattern and endurance. With the lesser constriction, it is hoped that the tube will not deform with the larger steel shot. If this is true, the Full tube would not have to be made with the VascoMax 250 Maraging steel, a more expensive material than our current stainless steel.

TURKEY CHOKE TUBE - Tom Powers

The first set of patterns to determine if better than Full tube performance can be obtained in a standard Rem Choke barrel and bore configuration have been shot and evaluated. Results indicated that no greater performance could be obtained. Since this test, a new benchmark ammunition has been recommended by the Product Team. A new round of testing has been scheduled to reflect the ammunition change along with new tubes and barrels. It must be noted that better than Full choke performance in the trap guns was not achievable with the standard bore configuration.

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MODEL 870 FUNCTIONAL IMPROVEMENTS - Brad Bosquet

All phase-in components are in production. Process Records and Structures covering the new ejector system for use on police guns have been submitted to Planning. In order to avoid problems, the Structures will not be entered into the MRP system until Trial and Pilot testing has been completed.

Twenty-five of the new Delrin ejector bases have been sent to the Aberdeen Proving Ground for Liquid Compatability Testing. This test must be passed on any future military contract for riot shotguns.

MODEL 870 AND 1100 LIGHTWEIGHT RESTYLE PROGRAM - Brad Bosquet

Work on these models has been limited to programming the checkering patterns for both pistol grips. The fore end patterns have to be programmed and tooling has to be designed and built. Model specifications will be reviewed in early February to ensure that all criteria are met.



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**NEW PRODUCTS AND PROCESSES - 1990 AND BEYOND**

**NEW BOLT ACTION RIFLE - Fred Martin and Dick Jackson**

Fabrication of prototype parts necessary for the next phase of testing has begun in the Model Shop and the N/C area. Detachable magazine components to be produced by outside vendors have been sent to vendors to provide those prototype parts. Trigger guard blanks have been received. Development testing of the magazine latch system is underway. An accuracy and endurance test is planned for the first of March that will include the complete barreled action and the proposed bedding system versus conventional wood stock bedding. The detachable magazine box will not be included in this test. A revised Development Schedule is attached at the end of this report.

Testing of a patented new technology rifle barrel is currently underway in a joint program with Remington and D. C. Brennan Firearms, Inc. The Brennan technology promises a 25% increase in accuracy with reduced recoil. The D. C. Brennan modified guns and their personnel will be in Ilion on February 3rd. Testing will start immediately.

**SHOTGUN BARREL AUTOMATION - Andy Baszczuk**

Arrangements are being made to alter our experimental Pilger roll form dies and procure new mandrel tooling to produce cold-form shotgun barrels with finished bore and chamber, and a partially finished outside contour. Fred Schmidt, ETL Materials Consultant has suggested that we test C-1035 for these barrels. Inquiries are being made to obtain sample quantities of both C-1035 and AISI 4130 ERW tubing for testing. Pilger tests to produce cold-formed M/11-87 and M/870 12 gauge shotgun barrels are expected to be run in April, 1988.

**NEW CONCEPT SHOTGUN - Tom Powers/Scott Franz/Earl Seppala/Dick Rego**

The computer simulation model for the gas-assisted inertia operating shotgun has been completed and trial runs are being made to determine the system parameters required for optimum performance.

A preliminary concept layout for a gas-assisted inertia operating gun has been submitted by Dick Rego and Earl Seppala. This layout is for a new gun and would not be used to alter a M/11-87. Computer simulation data can be used to provide a guide for altering a M/11-87, which will be done after simulation optimization.

High speed movies of the Browning A-500 Inertia shotgun have been taken and are awaiting processing and evaluation.

Recoil reduction efforts will center on recoil pad material/design and possibly using some type of "hydraulic" damping unit in the stock. Materials and devices will be ordered for evaluation.

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NEW .22 AUTOLOADING RIFLE - Skip Smith, Dick Jackson, Dave Findlay Sr.

This program will replace the family of synthetic autoloaders, the N-66 and the N-77. The current gun process is over 25 years old and has special equipment and molds which are nearing the end of their useful life. The new autoloader will be designed around an existing barrel and magazine box to allow the remainder of the parts to be readily sourced with minimal machining and finishing operations by Remington. The gun must be price competitive with the Ruger 10-22.

The design of this gun is being developed with the help of an outside consultant, Dave Findlay Sr. Dave has considerable firearms design experience, having worked many years for Winchester and doing consultant work with Marlin. The initial concept design is complete and work is underway to model the design on the CAD system.

The initial concept has been updated to reflect a trigger block, add a cocking indicator to the striker that prohibits gun disassembly when the striker is cocked, and balancing of the sear.

Currently, the breech bolt, barrel, magazine, and ejector are layed out on the CAD system. As we receive the remainder of the component drawings from Dave, the layout will be updated until the design is complete. We will then check for interferences, detail the parts, and do tolerance studies.

The Research Development Schedule for this gun is attached at the end of this report. It reflects a Design Transmittal 4Q1989.

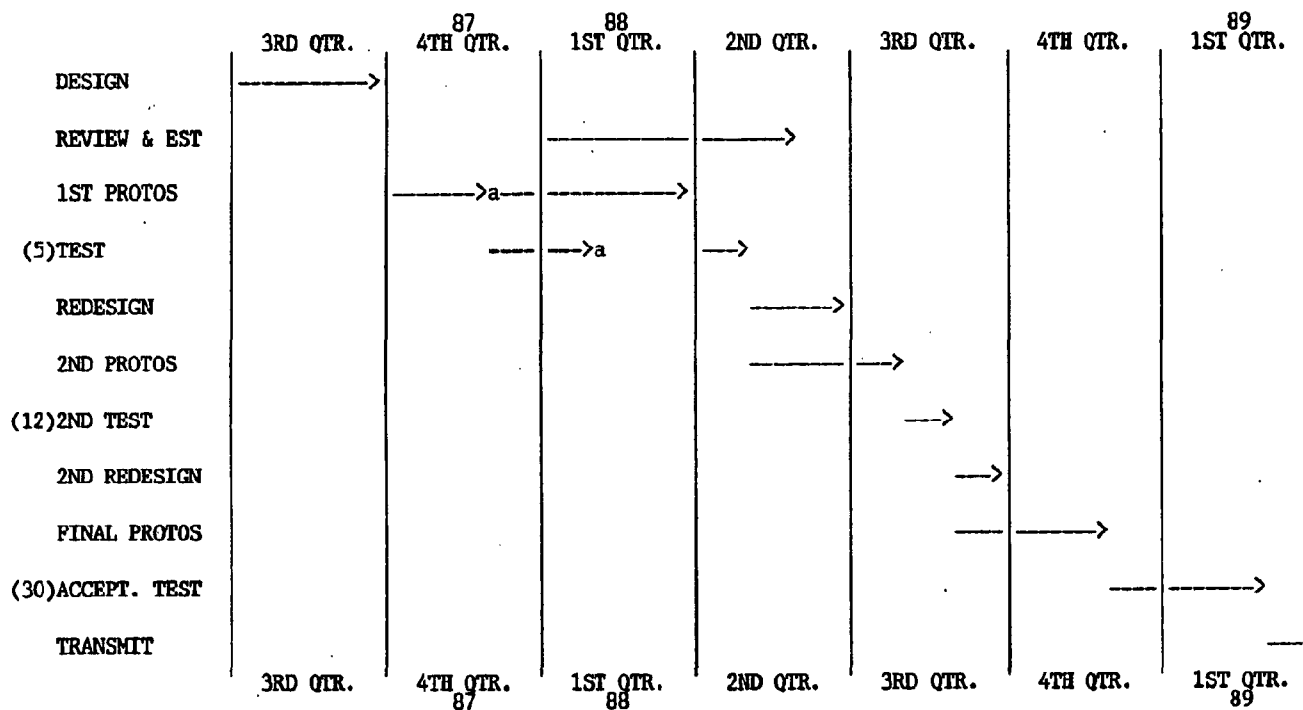
ELECTRO-CHEMICAL RIFLING - Don Lewis

A Part II on this project has to be submitted. To do this, quotes are needed from the CATION Corporation along with testing costs from the Research Test Lab.

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NEW BOLT ACTION RIFLE DEVELOPMENT SCHEDULE

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a)Schedule was revised due to priority conflicts with MAG 10.

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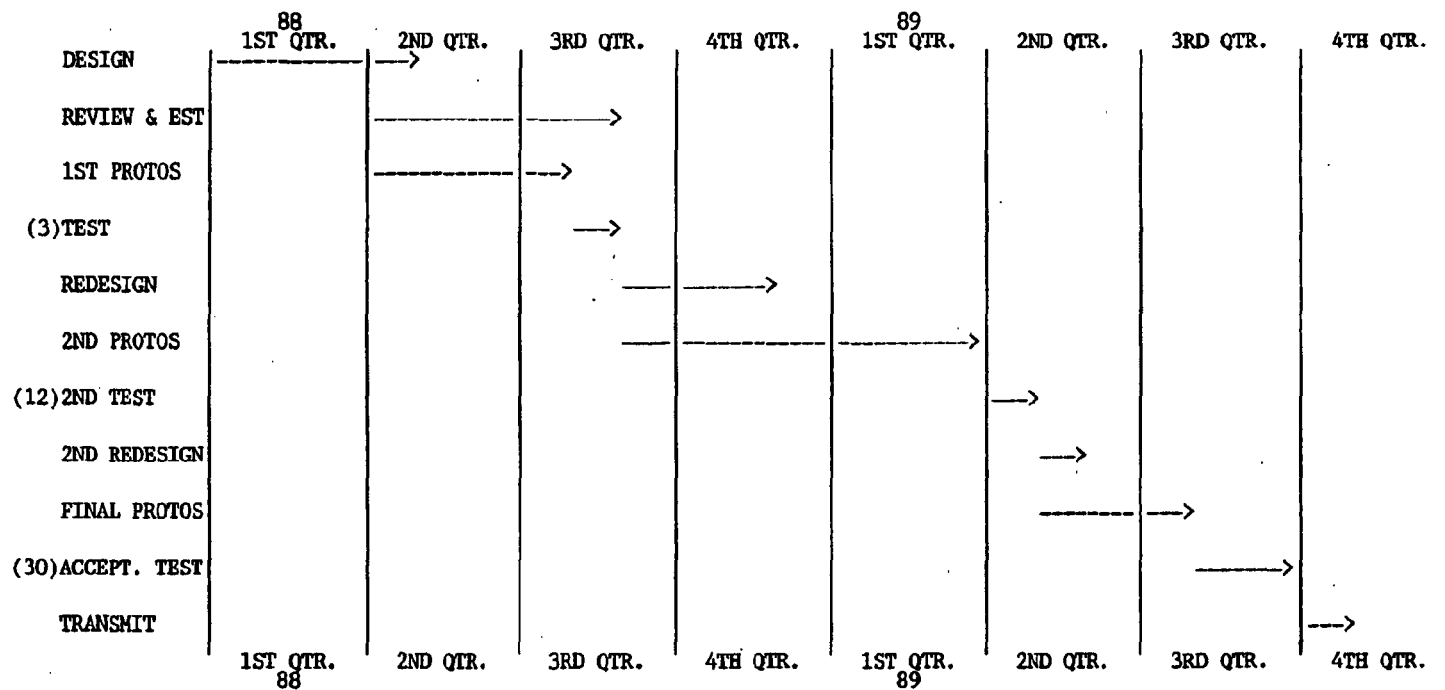
THIS SCHEDULE DOES NOT INCLUDE BRENNAN BARREL TECHNOLOGY

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NEW .22 RIMFIRE AUTOLOADER SCHEDULE

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