

CONFIDENTIALIlion, New York
August 29, 1988TO: W. H. COLEMAN, II
FROM: L. B. BOSQUET ^{PAS} / T. C. DOUGLAS ^{TD}NEW PRODUCTS DEVELOPMENT MONTHLY REPORT - AUGUSTCURRENT PRODUCTSEKSTROM-CARLSON CHECKERING MACHINE - Monteau/Hickey

Synermation is making progress on the "INSERT CHECKER" routine which, when finished, will provide the means for programming both stock and fore-end checkering patterns. A revised version of the sub-routine "EDIT EKSTROM" has been received and will be loaded and tried by the end of the month. If the required corrections have been made, we should be able to edit a program and, when necessary, re-edit it without getting "display execution error" messages. The problems with the placing of cutter dwells at the end of each line should also have been corrected. An area still to be resolved is the ability to create unchecked "islands" in the middle of a pattern. A program was written for the SP-10MAG fore-end pattern. When it was tried, a problem associated with the post processor was discovered and must be resolved.

The cutter motors from Air Turbine Technology continue to perform well. The six motors returned to the manufacturer for modification are being examined and will be returned to Remington when changes are complete. In the meantime, noise enclosures are being designed for each cutter head. Design will be completed in conjunction with a program underway to design an air counterbalance for each head. The air counterbalance will replace two extension springs which are used to support each cutter head. This is an adequate but undesirable design.

Prints of the electrical system, marked up to show the required separation between the "A" and "B" drives, have been sent to Ekstrom-Carlson requesting a quotation to change the Programmable Application Logic (PAL).

In anticipation of the need for additional checkering capacity in the future, a monetary requirement was included in the 1989 capital forecast. The availability of a sum of capital this year, coupled with the need, has moved this up in priority. Information has been forwarded to Industrial Engineering for the preparation of a project.

CONFIDENTIALSNIPER WEAPON SYSTEM - Douglas

On July 28th, the U. S. Army approved First Article testing of Model 700 M24 SWS and released Remington for production of the original contract 500 systems. They also awarded Remington the 1988 option for an additional 500 systems with a contract value of \$1950M, bringing the total awarded contract to \$4450M.

The delivery schedule was revised as follows:

Oct. 25, 1988 - 100	Sep. 22, 1989 - 150
Dec. 21, 1988 - 100	Dec. 20, 1989 - 150
Mar. 29, 1989 - 150	Mar. 20, 1990 - 100
Jun. 23, 1989 - 150	Jun. 30, 1990 - 100

The second mandrel for the Remington 5R, 11.25 inch twist GFM produced SWS barrels has been run, producing barrels with excellent dimensions. This mandrel experienced some "bugging" problems and contact was made with the vendor. "Bugging" of the mandrels can be a function of the mandrel breaking in or it could be related to the material. These barrels are being made into guns for accuracy testing. It will be necessary to purchase military M118 ammunition to fully test these barrels. John Rogers has been contacted to find a source for the ammunition. We need approximately 600 rounds for the initial accuracy testing.

BOSTOMATIC CHECKERING MACHINE - Monteau/Hickey/Inserra

One of the systems being looked into for expanding the memory of the Bostomatic checkering machine has the potential to provide faster and more trouble free changeover from pattern to pattern by storing the programs and downloading the on command. A quote for a fileserver has been received in the amount of \$18,025. Installation and training are an additional \$500 per day. To assist in the evaluation of the proposal, arrangements are being made for a demonstration.

To help increase the float capabilities of the cutter heads and reduce the amount of touch-up required, the nose piece and follower shoes have been redesigned. The follower shoe, C-TS-7516, has been received and the nose piece, C-TS-7517, is expected early in September.

CONFIDENTIALMULTI-HEAD CHECKERING SOFTWARE - Monteau/Hickey

American Bay Limited is making excellent progress in converting the GE 4020 software to run on our Compaq 386 PDs. Bob Turner will be on the plant August 25 to give us an update on the project. Work is progressing with the "wrapped pattern" and "CKEdit" sub-routines as well as bringing everything together into a "user friendly" format. Late third or early fourth quarter is still a realistic goal for the completion of this program.

TOOL DESIGN - Monteau

A project is being prepared which proposes replacing the Bruning 870 print machine with a non-ammonia whiteline printer. All information needed will be given to Industrial Engineering by September 5. A three month rental with an option to purchase is being proposed. If approved, this will eliminate the use of ammonia and its' potential hazards.

Three people have been scheduled to attend surface design training September 26 and 27. This is the last of the scheduled training on the Compaq 386 Personal Designers for the tool design group.

An improvement to the "Z" and "TILT" drives on the multi-head checkering machines will be installed as soon as the bushings and wear plates have been received. This is part of the ongoing work to improve the dependability of the machines and the quality of their output.

N/C SHOP - Sanzo/Rankins/Jones/Kozakowski

In addition to assistance being provided on the SP-10MAG shotgun, the NC Shop supports the activities of the Technical Section. Items currently being worked on include:

- o Programming is underway for the fabrication of five aluminum magazine followers for the NBAR. A completion date has not been established yet.
- o A follower rest purchased for the Mori Seiki CNC has been installed and debugging of the system is progressing.
- o The fixture, programs and cutters necessary to produce developmental fore-ends for the proposed SP-MAG-10/12 shotgun are ready for try-out pending machine availability.

CONFIDENTIAL

FMS MODELING - Findlay

Re-modeling is complete on the M/1100 LT-20 receiver, but detailing to check this modeling work has yet to be done. This work has been delayed due to cantilever scope mount design and detailing work as well as the 22 project detailing. It is estimated that a detailed and completed model will be turned over to the N/C and ATO groups by September 15th for tool path generation.

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

Quotations from three vendors for a new design fore end support have been received. This part is intended to replace our current fore end/barrel support and eliminate the need for the reinforcing patch in the fore end. A purchase order has been placed with Square Stamping for prototype supports. They should be available for test by the end of October.

CONFIDENTIALNEW PRODUCTS - 1988 CATALOGPARKER - Murphy

The primary effort in the previous month was directed towards building prototypes for test. Highlights of last months activity are as follows:

- o AAA Industries in Chicago brazed set-up assemblies on Monday, August 8, and the balance of the prototype barrels were expected to be brazed on Friday of that week. The furnace was not available and by the time it was, the following Monday, Kolar had decided on a second set-up brazing to verify that the tri-chloroethylene de-grease and the brazing fixture would give good results. Rather than braze prototype barrels immediately following this test, Kolar held off and to date the furnace has been unavailable. John Hoppe of AAA has arranged for the furnace to be available on Sept 1 and 2 to braze the ten prototype assemblies.
- o The Design Acceptance Test procedure has been finalized and the Test Lab has ordered ammo in anticipation of this test.
- o A schedule outlining the design acceptance testing has been developed. The key dates are as follows, (however these dates do not reflect delays caused by brazing):

Braze	August 15
Prototype Metalwork Delivered to Remington	September 30
Stock-Ready for Test	October 7
Test Complete	November 11
First Production Metalwork Delivered to Remington	January 89

Other Business:

- o Kolar will submit a quotation for a brazing fixture.

CONFIDENTIAL

- o Kolar will submit a quotation for a stock drill fixture.
- o I have sent an old Parker parts list to Kolar to update reflecting the new parts so we can assign part numbers.
- o Pete will begin manufacturing fore-end tips for the splinter fore-end (with 2 degree draft).
- o Pete will set-up existing lock bases and add a 2 degree draft.

A meeting was held with Process Engineering and the Custom Shop to formalize a procedure to transmit the Parker to the plant. Several questions were answered regarding the need for part numbers, drawing format, material and heat treatment recording, and Remington Standards as they relate to the Parker. Concerning the question of incoming component inspection, legal input is needed to help determine exactly what inspection is required. A meeting will be scheduled with legal to resolve this issue.

The first draft of the Parker owners manual has been done on the Technical Publishing System and has been reviewed. The benefits of this system are becoming apparent as the corrections and modifications are being made. The show Parker has been requested from Marketing and will be used for photos employed in making illustrations for this manual.

MODEL 700 MOUNTAIN RIFLE CALIBER ADDITIONS - Bosquet

The Production Sample was approved at the August Product Team meeting and full authorization for invoiced shipment has been forwarded to the warehouse. Reporting on this item will be discontinued.

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

At the Product Team Meeting Aug. 23, the following items were approved:

1. New choke tube wrench with integral pilot.
2. Closed grain wood finish.
3. Convex radius around outside of trigger guard.

The five Alaskan field trip guns were shipped Aug. 24. One of the guns was furnished with a 26" barrel so that the participants can get a feel for the way the guns with different barrel lengths handle.

One gun has been shipped to Lonoke for testing of the new 10 ga. experimental steel loads. Some of this ammo was used to field test the Alaskan guns and it appears there may be a lack of down-bore pressure to reliably function the action. This was especially noticeable with a shooter with a light shoulder. A test report has been sent to Lonoke.

One fire control has successfully completed a 5000 cycle debris test. This involved adding aluminum chips to the working parts every 500 cycles to determine what effect they would have on the safe operation of the fire control. At no time during the entire test were any malfunctions observed.

Samples of the Injectalloy trigger, collar and carrier dog have been promised by the MIM Group the week of Aug. 29. Molds for the choke tube wrench are being altered to accommodate the integral pilot. Samples will be available before the Gun Writers Seminar in Nov.

The SP-10 Mag. will be furnished with only a modified and full choke tube. These will provide nominal pattern densities of 65% and 75% at 40 yards with 1 3/4 ounce steel BB ammo. Additional testing has verified that the point-of-impact meets Remington specifications.

Lou Ferreira has been supplied with five guns for the packaging drop test. One gun has been sent to Wilmington for photographing for the 89 catalog. Process Engineering will supply twenty guns for the November gun writers seminar.

CONFIDENTIAL

Final parts have been received from the model shop for the alternate feed system design and it has been assembled. Alterations to the carrier need to be made to eliminate an intermittent trap shell condition. Layout work is currently being done to determine the extent of the modifications required to prevent the shell from the magazine interfering with the extracting shell. Work also needed to be done to redesign the extractor system. This redesign work is complete and new extractors need to be made by the model shop before the gun can go into test.

The first meeting of the Design Review Team was held May 26. An overview of the review process was presented and the team members were shown the SP-10 Mag. cut-away gun and the improvements compared with the Ithaca Mag-10 were discussed. Sub teams were assigned to examine the firearm from a systems approach using a form of failure mode analysis and report back their findings.

Tool design completion remains at about 90% and tool build is currently at about 35%. It is expected that all outside tool design will be completed by the end of the month. Of the design remaining in-house, 70% are an "insurance policy" in the event that the casting vendor cannot perform an adjusting operation on the carrier. This block of design will be deferred until all other 10 gauge design is done.

Product structures have been entered into the MRP system and are being verified. About 85% of the Process Records have been updated and released for typing. Shop Floor Routers are being entered as the Process Records are released.

Programming of the checkering patterns has progressed nicely during the past month. The grip pattern has been programmed and is ready to try as soon as wood is available. A post processor change is required to overcome a problem with the software for the fore-end programming. It is expected that this pattern will also be ready for try-out within the next couple of weeks.

The K&T five station NC machining center has been installed in the FMS area (bldg. 60). As soon as an operator has been selected, arrangements will be made to bring a second K&T technician on plant for training purposes.

Controller maintenance classes are being conducted in-house by Joe Inserra. He is scheduled to attend machine maintenance training in October and will then do in-house training of Remington personnel.

CONFIDENTIAL

The tooling cubes for the interim method of processing the barrel extension, gas piston lug and receiver have been received. Locating and clamping needs will be satisfied on an individual part basis by machining locators from pieces of steel mounted on the cube. This approach should result in a saving of both time and money on the temporary fixturing.

Trial and pilot machining of several components has been started. Progress is being monitored in a weekly trial and pilot meeting. Minutes of each meeting are issued.

A request has been received to provide twenty guns for a writers seminar to be held November 9 thru 12. These guns should be assembled by the middle of October so that they can be field tested prior to the seminar. To accomplish this, the Model Shop and NC Shop are providing assistance in fabricating parts or assemblies for which the production tooling may not be available in time.

TURKEY CHOKE TUBE - Murphy

Design Acceptance Testing by the Ilion Technical Section of 15 tubes from Kolar Arms is complete. The data is still being evaluated, but it appears that the 3 inch Kolar tube provides the shooter with approximately a 5% increase in pattern percentage versus the standard Full choke tube. The 3 inch choke tube will be made from our current stainless steel material and will be coated black due to the fact that they protrude 1 inch from the muzzle.

MODEL 870/1100 LIGHTWEIGHT RESTYLE PROGRAM - Lewis/Verdura

All specifications for these models have been reviewed and agreed on. The complete drawing package has been transmitted. The process records and item masters have been completed. The product structures are being worked on and are nearing completion.

At the June Product Team meeting it was decided to keep the specifications for 1989 the same as currently offered. They will remain the same until the fourth quarter of next year. All lightweights produced in the fourth quarter of 1989 will be to the restyle specifications and the guns will be carried in the 1990 catalog. Further work on this item has been put on hold at this time.

CONFIDENTIALSLUG GUN SYSTEM - D.Findlay

The objective of this program is to improve the accuracy of the Model 11-87 and Model 870 12 guage Deer Guns through the use of a barrel mounted scope system and a rifled choke tube. The goals of the program are to achieve five shot groups of three inches or less using Remington, Winchester and BRI Sabot slugs.

Successful testing is complete on ten design acceptance choke tube samples which were shot 1,000 rds. each. The tubes were tested for turn out, seizing (diameter growth), and accuracy at 50 yards. The test samples exhibited no diametrical growth over the course of the test for any of the tubes. The rifled tubes tighten to around 100 in-lbs of torque during shooting rather than loosening. The current wrench design can remove a tube at this torque level with some effort. A new design choke tube wrench is being developed to aid the customer in taking out the tube and improve it's teeth strength, but the current wrench design is not unacceptable. Lastly, testing indicated group sizes of 3.0 inches and under for the Remington and Winchester 2 3/4 inch slugs. The data for the 3 inch Remington slug is suspect, showing average groups of 4.75 inches. The design acceptance testing of the full cantilever system will eliminate the device and all shooting will be from the shoulder. We feel that this will give a truer picture of the 3 inch Remington performance. We expect that the 3 inch load will also approach 3 inch groups. The BRI slugs showed a 50% improvement, from 4.25 to 2 inches with the rifled tube. As a result of this testing, design acceptance has been given and rifled choke tubes will be transmitted to the plant. This transmittal will take place in combination with the cantilever scope mount system, pending it's successful design acceptance testing. Samples of the rifled choke tube system have been turned over to marketing for catalog preparation.

Design work has been finalized on the cantilever and a scope mount base design has been chosen for design acceptance testing. A Tasco scope mount has been selected for the design acceptance testing over a modified NBAR style mount due to its shorter product introduction time. The NBAR modified design remains an alternative and will be pursued as a cost reduction item next year. Design acceptance samples are being fabricated and should be complete by the end of August with testing complete by September 30. Catalog samples are being prepared and only lack barrels and cantilevers.

An engineering estimate will be complete by the end of the month. It will be turned over to Industrial Engineering for development of economics so that a project can be prepared and funding approved. Quotations are being requested on components that will be purchased from the outside.

CONFIDENTIAL

MODEL 700 SYNTHETIC ARYLON STOCK - Smith

The synthetic stock offering for 1989 will be made from Du Pont Arylon. This stock will replace the current stocks made from Rynite and the right hand fiberglass stocks from Brown Precision. The Arylon stocks will be made in Lee Six's current mold. The options will be as follows:

- BDL only
- long action
- short action
- magnum barrel channel
- varmint barrel channel

Culpepper Plastics personal visited the plant on Monday August 15th, Tony Bruckner and Jim Bruckner. Rework of the mold is progressing on schedule with the next sampling to be done the week of August 22nd. Dan Saunders of DuPont will be at Culpepper's to supervise the sample and make sure that they have the process correct. All mold alterations will be done by the first week of September with a production run for trial & pilot of 200 stocks to be done by September 9th.

Stocks from the sample run will be sent in for our inspection and approval. The next run of recoil pads will be at a lower durometer reading, 50 +/- 5 same as our M/700.

Lee Six has received the contract and is reviewing it with his lawyers.

All phases appear to be a go at this time with production just around the corner.

18 Rynite stocks, samples from the project, were sent to Employees' Sales and sold for \$45 each. This money was credited back to Research under w/o # 481152, \$810.

This offering gives us first use of Arylon as a stock material and will replace the Brown Precision and Choate stocks for 1989, however the question of long range supply of synthetic stocks has not been answered and the determination of us developing a mold with a Mountain Rifle outside configuration also has not been answered.

CONFIDENTIAL

MODEL 7400-4, 7600-6 CONSOLIDATION - Lewis/Verdura

Process records, item masters and product structures have been written and are ready to issue. The consolidation of these models has been deferred until 1990 and all further work has been put on hold until 1989.

MODEL 700 CLASSIC .300 WEATHERBY MAGNUM - 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 has provided Ilion with chamber drawings and reamers. Ilion will provide Lonoke with three pressure barrels and one complete firearm for their ammunition development. Ilion will have five more completed rifles awaiting shipment of pilot run ammunition for Design Acceptance Testing.

Proof loads have been developed by Ilion. Accuracy has been shot using Weatherby ammunition. The bullet weights of 150 grain and 180 grain tested 1.65 inches and 1.35 inches respectively. 260 rounds of 190 grain Remington ammunition has been received and testing met Remington specifications. The drawings and parts list are being readied for transmittal.

Chamber tooling and gaging has been designed and placed on order from advance prints to assure their being available in time to run the trial and pilot. Approval prints have been received from JGS on the chamber tools. Delivery of the tooling could be in four to six weeks.

MODEL 870 FUNCTIONAL IMPROVEMENTS - Lewis/Verdura

Twenty-five of the new Delrin ejector bases have been sent to Aberdeen Proving Ground for liquid compatability testing. This test must be passed on any future military contract for shotguns. A report has been received on the results of the tests and is being evaluated to determine a path forward.

Process records and structures are complete and are on the system except for police versions which use the new ejector system. Police structures will not be activated until successful completion of trial and pilot.

CONFIDENTIAL

MODEL 1100 MAGNUM RETROFIT BARREL/STEEL SHOT - Franz/Powers

The Test & Measurement Lab report has been approved and distributed. The design has been transmitted.

M/1100 12 ga. Steel Shot Barrel Specifications

Gauge: 12

Barrel Rollmark: 2 3/4 inch Magnum and 3 inch Magnum
Shells - Steel Shot

Orifice: one .088 in.

One Choke Tube:

- Name: Remington Long Range Steel
- 80% patterns at 40 yds. (w/2 3/4" Magnum 2's)
- constriction: same as current full tube
- material: VascoMax 250 Maraging Steel
- titanium nitride finish

Barrel Lengths: 26 and 30 in.

Barrel Finish: Standard polish Black Oxide finish.

The barrel hang tag has been reviewed by Marketing and the Litigation Support groups.

We just recently discovered we have a problem marking the titanium nitride coated tubes in the plant. It is possible that the solution used on the stainless steel choke tubes is harmful to the titanium nitride coating, causing the tubes to show some corrosion. The marking experts have been contacted to provide an expeditious solution to the problem. A choke tube, complete less marking was delivered for catalog photos. Press-on letters will be used for the photo. We are also having tubes marked first (distinctly) for coating over the marking to see if this is acceptable.

CONFIDENTIAL

NEW PRODUCTS AND PROCESSES - 1990 AND BEYOND

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

This program will complement the present family of .22 autoloaders, M/552, N-66, and N-77. The new autoloader will be designed around an existing barrel and magazine box to allow the remainder of the parts to be sourced with minimal machining and finishing operations required. The wood stock version of this gun must be price competitive with the Ruger 10-22.

D.S.Findlay Sr. was in the plant on August 16th and 17th. We reviewed progress of the program and status of some of the components , to date 12 components have been detailed and built/being built , with 5 more having been detailed or being worked on by the C.V. group. Tom Plunkett is surfacing the stock and its 98% complete , this was not an easy task and Tom with Dave's help has done a great job.

The receiver drawing is complete and a copy was sent to Bill Marks , TSL , for review and work on graphite molding the part. The housing is being detailed and when complete a copy will be sent to Bill as this will also be a graphite molded part.

D.S.Findlay Sr. , D.S.Findlay Jr. , and I presented the program to Dick Ulak and Phil Allen on August 17th. The presentation went over well and both showed interest and enthusiasm in the project.

A parts list will be made and completed prints will be given to Brad Bosquet as soon as he is ready to handle them.

The Test Lab is doing bolt velocities, cycle times, and Pressure/Time curves on N/66's and N/77's. This data will be put in Scott Franz's newly developed "blow-back" computer simulation program to validate the program. Once validated, the computer simulation will be used to refine the operating parameters of the new rifle design.

CONFIDENTIALNEW CONCEPT SHOTGUN - Powers

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

A preliminary layout for a gas-assisted inertia operating gun has been submitted by Dick Rego and Earl Seppala.

Initial testing of the KFC prototype gas-assisted recoil gun has begun. This prototype is currently operating with all loads from standard target to 2 3/4" steel to 3" Magnum. Much more testing is planned, including bolt velocity measurements and extensive high speed movies. Digitizing of preliminary high speed movies is complete. The results of this testing will aid in verification and refinement of our computer simulation.

Recoil reduction efforts will center on recoil pad material/design and possibly using some type of "hydraulic" damping unit in the stock. Preliminary recoil force measurements on both the EAR and DuPont materials is complete. Additional samples of the DuPont material is forthcoming. Also, samples from the Rogers Corp. have been received and will be tested along with the other materials by mid-August. Testing is complete, this time being fired from the shoulders of two different shooters. Recoil pad materials and testing data have an immediate application for plant purposes also. Mike Branger of IPD is having molds made at a vendor's for prototype pads made from DuPont Elvaloy 50D or 50B. He will NOT be conducting measurements of pad materials as his equipment needs major rebuilding.

Two preliminary design reviews have been done. They have provided valuable direction for the project. First generation prototype design is now progressing and CAD/CAM work will begin at Ilion in Sept. The action system is still intended to be gas-assisted inertia.

MILITARY SPECIFICATION M/870 SHOTGUN - Findlay

This program is intended to enable the M/870 pump shotgun to meet Mil Spec 3443, which will allow Remington to bid on any future U.S. Government contracts. The most current version of Mil Spec 3443 has been received and is being reviewed.

CONFIDENTIAL

Design work is 75% complete on a preliminary Class I Mil Spec. 3443 shotgun. Parts for this bayonet adapter and heat shield equipped firearm are being received from the model shop to try two different bayonet adapter designs. A sample of one design is complete with the second undergoing fabrication. Sling swivel mounts have been received from the model shop and also require testing. However, at this point all work has been halted due to higher priority work and completion of this program will be pushed out to 1990 at best. Reporting on this program will be dropped until it can be restarted.

NEW BOLT ACTION RIFLE - Martin/Jackson

The receiver design will be a standard M/700 receiver with secondary cuts required for the bolt lock and possibly minor cosmetic changes in non-critical areas. We will continue to investigate providing the gun with rings and bases versus the previous integral receiver mounting.

The barrel will be a Custom Shop contour with a Mountain rifle crown. Upgraded iron sights as provided on Custom models. The barrel modeling and detailing has been completed on the CV system.

The magazine box will have a detachable bottom that will conceal any gaps or mismatch between the box, trigger guard, and/or the stock. First prototypes of the new design have been received for evaluation and test. It is planned to have the testing completed in September.

The trigger guard, magazine follower, magazine release, and magazine spring have been sent out for quotes.

Testing of a patented new technology rifle barrel is currently underway in a joint program between Remington and D.C. Brennan Firearms, Inc. The Brennan technology claims a 25% increase in accuracy with reduced recoil. However, test results to date show no significant improvement over our current design (at the 95% confidence level). A test is currently being shot using standard Sportsman 78 stocks with fore end bedding pressure. The results of these tests will determine if it is warranted to continue with this program.

ELECTRO-CHEMICAL RIFLING - Lewis

An updated quote has been received from Cation Corporation. As soon as the estimated testing costs are available from the Test Lab, an updated economic evaluation will be done and a Part II to the project submitted.