

TELEX:
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2-1-80

LIMITED DISTRIBUTION

ILION RESEARCH DIVISION
MONTHLY PROGRESS REPORT

January 1980

MODELS XSG - XPG and HPX AUTO/PUMP SHOTGUN

The XSG model being tested using 2 3/4" Magnum loads only is currently at 3000 rounds. This gun will continue testing after inspection and project priorities permit. A major concern in the test is the action spring, which is being monitored every thousand rounds. At 3000 rounds it has set 1.560. No major breakages have occurred.

The Locking Block - Actuating System is being redesigned for better mass distribution at unlock. Our objective in doing this is to reduce operating velocities of the Magnum loads and reduce the spread of velocities between Magnums and light loads.

Several new ideas on gas systems are being evaluated for improved efficiency and some degree of automatic compensation.

Six designers have been assigned to expedite this program.

MODEL 1100 COMMEMORATIVE (75th Limited Edition)

One receiver of five has been shipped from Aurum Etching. All other components have been completed and will be assembled to this receiver. The remaining four will be received the first week in February.

MODEL 7400 - 7600

Production has started assembly of Trial & Pilot 7400s. The first rifle assembled in Caliber 30-06 passed the gallery tests. As more rifles are assembled samples will be made available for Research evaluation.

A sample pewter insert and grip cap have been assembled to a rifle and turned over to Marketing for review. *Remington Arms Company, Inc.*

ILION RESEARCH DIVISION
MONTHLY PROGRESS REPORT
January 1980

-2-

BOLT ACTION FIRE CONTROL

Components for two new Fire Controls were completed and assembled. Revisions are required to both assemblies to assure proper function. Parts were sent back to the Model Shop for revision.

Bolt Locks have been assembled. The detent on one must be revised and both need revisions to improve appearance.

NYLON 66

Bolt Lock No activity last month because of priority conflict with Competition Trap Gun.

MODEL 700 - 7mm Mauser (7x57)

Testing of the press form stock has been completed. Deep cracks in the stock were uncovered during the test that make the stock unsatisfactory for use in a bolt action centerfire rifle. Production recommended that the long stock press form project be closed out at the January Operations Committee Meeting.

Accuracy of the rifle was acceptable.

A 5% malfunction rate was encountered due to stem chambers during feeding.

MODEL 700 VARMINTER - 7mm-08 Caliber

Accuracy tests with production ammunition and handloads are being conducted to establish production gallery standards. Results should be analyzed within a week.

ILLION RESEARCH DIVISION
MONTHLY PROGRESS REPORT
January 1980

-3-

BOLT ACTION CARBINE

A complete parts list and prints of new parts have been furnished to Process Engineering for a cost estimate of this model. Five prototypes in each caliber requested by Marketing are scheduled for completion in February, with testing to follow.

MODEL 870 COMPETITION TRAP SHOTGUN

During the past month intensive endurance tests were conducted to finalize the design of the recoil reduction system. The cause of "sticky pistons" was determined to be a result of peening the face of the piston on impact with the gas cylinder upon completion of the cycle. This has been corrected by slightly reducing the diameter of the piston between the face and the sealing band. Design parameters of the system have been finalized and production has been advised. These include the lighter piston, heavy spring and no vent hole in the buffer.

During these tests another problem has surfaced. Action bar and fore end tube assemblies are failing prematurely.

Initially Action Bar Assemblies were tested in the soft condition, the same as current 870, and exhibited three modes of failure:

1. Action bar failure
2. Separation of the tube through the threads
3. Failure of the tube at the braze joint.

Test history (January thru March 1979) shows a total of fourteen assemblies tested with failures ranging from 2200 rounds to 20,000 rounds. The average life of these action bar assemblies was 9,000 rounds.

ILION RESEARCH DIVISION
MONTHLY PROGRESS REPORT
January 1980

-4-

MODEL 870 COMPETITION TRAP SHOTGUN Continued

Working with PE & C, heat treatments were developed that resulted in four assemblies surviving shooting endurance tests for 38,000 rounds, 34,000 rounds and 17,000 rounds before failure. The fourth assembly endured 20,000 cycles (including 5,000 Express loads) and did not fail.

These tests were completed in May, June and December 1979, and January 1980. While conducting tests to isolate the cause of the sticky piston, two assemblies from Trial & Pilot operations failed at under 2000 rounds. Our efforts are now concentrated on this problem.

PE & C is continuing to refine their heat treatments by carburizing the assemblies to two different levels, heat treating and drawing them to increase impact strength. Research will:

1. Establish a recommended assembly torque on the tube nut
2. Test the effect of an "O" ring buffer between the tube nut and the fore end.
3. Test the effect of a shock ring between the fore end assembly and the gas cylinder to reduce tensile loading of the tube during firing.
4. Evaluate effect of reduced thread depth on fore end tube.

Parts have been modified and samples of each of the experimental assemblies are in test. No definitive results are available at this time. Marketing has established an endurance level of 25,000 rounds for a minimum acceptable product.

Heavy wall tubing has been ordered as a backup solution. Delivery is expected in mid-February.

ILION RESEARCH DIVISION
 MONTHLY PROGRESS REPORT
 January 1980

-5-

SEISMIC GUN

Components for the percussion fire on closing breech blocks have been designed and parts are in the N/C Shop for pilot runs.

There are a number of bugs in the guns shipped to Mapco.

1. Firing pin not central with contact button of primer on six guns.
 Field remedy: To machine a block to limit upward travel of the operating lever.
 Remington remedy: To hold operating arm pin hole and operating arm surface to a closer tolerance and from firing pin hole.
2. Ejection problem with all 12 guns. Shell was extracted but not thrown clear.
 Field remedy: To remove metal from breech block to allow clearance.
 Remington remedy: To remove extra metal from slot in bolt and to allow bolt to drop further. Also to reduce the severity of heat treat so that warpage is held to a minimum.
3. Erosion of Firing Pin Tip caused by too high capacitance in hand held blaster.
 Remedy: Specify maximum allowable capacitance for longer pin life.
4. Weak pin springs, pin "wobble" and other contact pin problems. After sealing with a silicone rubber compound by Mapco, several blocks were found to have weak firing pin springs and excessive pin "wobble". The rubber compound was removed and spring action was improved although wobble remained a problem. The insulating cups were removed and examined out of the gun. The firing pins were found to have a radius at the base of the pins that interfered with the opening of the insulating cup.
 Field remedy of Pin Wobble: To ream the insulating cup to allow the contact pin to seat properly. This also seemed to eliminate the weak spring problem.
 Remington remedy: To alter the breech block to accept a back cover plate. This will remove the necessity to fill the back of the breech block with rubber compounds. The firing pin hole will

ILION RESEARCH DIVISION
MONTHLY PROGRESS REPORT
January 1980

-6-

SEISMIC GUN Continued

4. be enlarged to allow greater clearance between firing pin and breech block. Also the firing pin hole and insulating cup hole will be drilled from the same side for better concentricity control. The firing pin radius in question was found on one sample of the lot in the breech blocks to be not of the specified dimensions on the model drawing. It is proposed that the radius be held to closer tolerances by the model makers.

We plan to replace the 12 breech blocks in service at the present time with 12 new breech blocks containing these proposed changes after they have been fully tested and accepted.

ILION RESEARCH DIVISION
MONTHLY PROGRESS REPORT
January 1980

-7-

PROCESS RESEARCH

Auto Drill Line Senior Supervisor of Process Development is in Detroit working with Albion preparing for vendor runoff. If successful, we anticipate installation and start-up at Ilion in March.

ASEA Manipulator All polishing machines for M742 and M760 receiver polishing is installed. A new manipulator polishing program will be tested in February. Dust collector ducts will be altered by mid-February.

Testing of the receiver repositioning system, designed to correct misalignment of the receiver with the polishing jack contact wheel, was moderately successful. If 100% success cannot be achieved with the current microswitch system and further refinement in the manipulator programming, a higher resolution, digital system based on the linear variable differential transformer (LVDT) might be necessary. An LVDT system was quoted by Schaevitz Engineering at \$3,500.

The part handling conveyor was quoted by A&M Tool at \$24M. Quotes from Techni Products and Sjogren Tool are expected in February. Conveyor fixtures, high precision parts, are being made by the Research N/C group. Conveyor chain, a long delivery item, was purchased and will be delivered February 9, 1980. The cost of these items, approximately \$4M, will be subtracted from the conveyor quotes.

Integral Ejectors LT-20 tooling is being modified to reduce the "bulge" in the area of the ejector, as requested by Marketing. Modifications will include a new clamp to prevent deformation of the

ILLION RESEARCH DIVISION
MONTHLY PROGRESS REPORT
January 1980

-8-

PROCESS RESEARCH Continued

outer barrel surface, as well as a thinner punch and a shallower die recess. The ejection surface will also be moved .030 away from the critical edge.

P E & C will not proceed with the transmittal of the LT-20 barrel until this problem has been solved.

Rivetless Extractors Additional endurance testing of small caliber rivetless extractors in bolt heads without anti-rotation projections is now complete. Four (4) guns were tested, each firing a minimum of 1400 rounds with no extraction problems. A "rusty chamber" test will be scheduled shortly.

Three (3) XP-100 7mm BR Rem. Pistols with rivetless extractors were function tested with no problems.

Thirty (30) bolt assemblies with rivetless extractor cuts have been completed for the new bolt action carbine.

M700 and M788 bolt head and bolt assembly drawings for regular and Magnum caliber rivetless extractors have been transmitted. All will have anti-rotation projections.

Tooling to coin anti-rotation projections into M788 regular caliber and M700 magnum caliber bolt heads has been started in the Model Shop. M788 regular caliber L.H. and M700 magnum caliber L.H. will follow.

Regular caliber rivetless extractors have been installed in pilot run quantities of M700 7mm-08 and M7400 rifles by Production personnel using special assembly fixtures. No problems were encountered.

ILION RESEARCH DIVISION
MONTHLY PROGRESS REPORT
January 1980

-9-

PROCESS RESEARCH Continued

Four Slide Machine The appropriation request to purchase a four slide machine and support equipment has been submitted to Bridgeport for review.

The investigation of a new building to house the four slide, its support equipment and future equipment for Process Research, has been expanded to also include the Model Shop and N/C Department. This will require a much larger 10,000 sq.ft. building, but will free up 7,700 sq.ft. for the plant to use as additional warehouse space.

High Energy Beam Applications Two designs of the Ducks Unlimited emblem, laser carved in stocks, were received from Lasermation. Stocks were finished and forwarded to Marketing for review.

Lasermation will proceed with two grip designs. They cannot carve full fore end radius with the current tooling. Some fore end designs will be narrowed and others reduced by approximately 70% for sample preparation. Lasermation estimates they would be able to handle the full fore end radius with an investment of \$10M to \$20M for tooling and 6 months of development time.

Free machining steel samples were forwarded to EDL for welding trials. Preliminary results are expected in March.

Spring Forming Machine Purchasing has been requested to furnish material costs for the large variety of wire diameters from which Remington springs are made. This will enable us to determine if cost savings can be realized if we manufacture some of our production springs on this equipment in order to justify its purchase.

ILION RESEARCH DIVISION
MONTHLY PROGRESS REPORT
January 1980

-10-

OTHER WORK - N/C - CAD

Computer Expansion Installation of the computer hardware for driving the replacement Calcomp plotter is 90% complete. The remainder of the work was not completed due to wiring list omission from engineering. Expected completion date for the installation is February 1.

Computer Software Work on debugging recompiled operating system software is near completion. Programs requiring modifications to run under the new operating system continue to be converted. The majority of this work is completed but will not be operational until the computer hardware installation is complete.

Replacement Calcomp Plotter Installation of the new replacement plotter will be scheduled following completion of hardware expansion. It is estimated that the plotter will be operational by February 15.

Interactive Graphics Evaluation The manufacturers of all six of the Interactive Graphics Systems being evaluated have been contacted. To date, meetings have been held with four and are scheduled with two to discuss our applications and the development of a benchmark. A report summarizing the investigation and evaluation is scheduled for completion by May 1, 1980.

M600 Restyled Carbine Stock Work on digitizing the stock contours has been complete and dimensions for the side view computed. Dimensioning of the cross sections is scheduled to be completed February 15.

ILLION RESEARCH DIVISION
MONTHLY PROGRESS REPORT
January 1980

-11-

OTHER WORK - N/C - CAD Continued

New Owner Manual Format Final draft version of the M700 Owner's Manual has been received from Smart Communications Inc. Minor revisions are being made before forwarding to Marketing and Legal Department for approval. Finalized draft is expected to be completed by February 15.

M7600 Auto Shaper Cams N/C fabrication of five fore end tube auto shaper cams has been completed and turned over to Production.

21mm Seismic Gun N/C fabrication of 50 breech bolts is scheduled for startup February 4. Programs are being altered to include requested design changes.

M870 Competition Trap Piston and Barrel Guide Ring 110 pistons have been altered for Production. 200 additional pistons will be altered with completion scheduled for February 2.

Barrel seats will be cut on 400 barrel guide rings in February to help Production meet their schedules.

540X Butt Pad and Butt Pad Base N/C production for butt pads and butt pad bases has been increased from 55 to 500 per month to cover a military order.

XP-100 Barrel (7mm BR Remington) N/C production of 7mm BR Rem. barrels for the XP-100 is scheduled to start in February.

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