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# SPRINGFIELD ARMORY

SPRINGFIELD, MASSACHUSETTS  
RESEARCH AND DEVELOPMENT

Report: SA-TR20-9101

Date: 16 February 1961

Report Title: Bibliography of Springfield Armory Reports  
(1 July 1959 - 31 December 1960)  
Technical, Memorandum, Notes on Materiel

Approved



H. F. HAWTHORNE  
Chief, Res and Dev Div

61-4-6  
XEROX



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7 Apr 60

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Prepared by Administrative Office, Res and Dev Div

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REPORT  
SA-TR20-9101

ABSTRACT

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Springfield Armory, Springfield, Mass.  
BIBLIOGRAPHY OF SPRINGFIELD ARMORY REPORTS -  
TECHNICAL, MEMORANDUM, NOTES ON MATERIEL - Res  
and Dev Div, Technical Report SA-TR20-9101,  
16 Feb 61.

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reports - technical, memorandum, notes on materiel -  
prepared and distributed from 1 July 59 to 31 Dec 60.

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#### FOREWORD

This bibliography contains a listing of Springfield Armory reports - technical, memorandum, notes on materiel - published from 1 July 1959 to 31 December 1960.

Springfield Armory has made initial distribution of the reports in this bibliography.

Reports published from 1 January 1948 to 30 June 1959 are listed in SA-TR20-9100 dated 30 September 1959.

| <u>NUMBER</u> | <u>TYPE</u> | <u>TITLE</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-7015        | TR          | Water Drainage Characteristics of Caliber .22/06 and 7.62mm Barrels - G.Pributsky, W.M.Kisner, 29 June 59 - Unclassified Report - Nonlimited distribution.<br><br>ABSTRACT: An investigation was conducted to evaluate the drainage characteristics of the caliber .22/06 and the 7.62mm barrels, and to determine the effect of temperature, metal finish, and supplementary finish on these characteristics. The investigation was conducted in three phases: (1) amount of water remaining in barrels after addition and subsequent drainage of varying quantities of water with and without cartridge in chamber (2) amount of water entering barrels of different calibers when immersed in water at various angles (3) quantitative test for evaluating effort and time required to empty barrels which had cartridge in chamber. Tests were conducted at 35°F, room temperature, and 100°F. Barrels drained efficiently and rapidly when the cartridge was removed. Test procedure is described, and results discussed. |
| 3-1704        | NM          | Notes on Development Type Materiel for M60 Machine Gun, 7.62mm, and M2 Tripod Mount (Modified) - P.W.Marshall, 27 Aug 59                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3-1903        | NM          | Notes on Development Type Materiel for the Chain Charger for the T197E2 7.62mm Tank Machine Gun - P.W.Marshall, 3 Nov 59                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3-2002        | NM          | Notes on Development Type Materiel for Gun, Machine, Tank, 7.62mm, M37E1 - P.W.Marshall, 12 Sept 58                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 5-4002        | NM          | Notes on Development Type Materiel for the machine Gun, Tank, Caliber .50, T175E2 (M85) - C.W.Baker, Jr., R.W.Hegarty, 26 Apr 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 7-1601        | TR          | Cannon, 37mm, Antiaircraft Gun, T250X1 (U) - G.H.Bornheim, H.D.Coombs, 2 Nov 59 - Confidential Report - Limited distribution.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

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| <u>NUMBER</u> | <u>TYPE</u> | <u>TITLE</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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|               |             | ABSTRACT: The design and development of the 37mm Vigilante T250X1 are summarized. This weapon was designed primarily for antiaircraft applications. A detailed description of the characteristic features of this weapon is given. Test procedures are described and results are discussed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 7-1710        | TR          | Muzzle Clamp Carbon Build-up Test, 20mm, M61 Automatic Gun - E.A.Humphrey, 10 Feb 60 - Unclassified report. - Limited distribution due to coding.<br><br>ABSTRACT: An investigation was made of the methods by which the muzzle clamp assembly for the 20mm Automatic Gun M61 could be removed from the gun after firing while the gun was in an aircraft installation. Investigations were also made of possible modifications of the clamp and clamp components to simplify removal. Development of a satisfactory puller tool made modification of clamp unnecessary. In order to facilitate the removal of carbon for the seating of a socket wrench, a chromium plated cap nut with helical coil mid-grip insert was recommended to be substituted for the nut presently used on the standard muzzle clamp assembly. Procedure is described and test results discussed. |
| 11-2621       | TR          | Comparative Evaluation of Chromium Plated M14 Rifle Barrels Fabricated from Chrome-Moly-Vanadium Steel and ORD 4150 Resulphurized Steel, MIL-S-11595 (ORD) - T.P.Jones, S.D.Caloccia, E.F.Koetsch, J.R.Eves, 3 Aug 59 - Unclassified report - Non-limited distribution.<br><br>ABSTRACT: Endurance tests were made to evaluate the performance characteristics of the 7.62mm M14 rifle barrels fabricated from chrome-moly-vanadium steel and ORD 4150 resulphurized steel, MIL-S-11595 (ORD). Results of erosion tests, and standard and accelerated firing tests for both materials were satisfactory. Headspace did not increase more than 0.001 inch. Breech bore diameter did not exceed the prescribed limit of 0.310 inch. Accuracy was satisfactory during and at the                                                                                                |



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|               |             | conclusion of the tests. Velocities were satisfactory and variation was within normal range for all tests. Bore damage for both materials was nearly equal. In view of known potential savings, use of ORD 4150 resulphurized steel is recommended.                                                                                                                                                                                                                |
| 11-2707       | NM          | Notes on Development Type Materiel for Pistol, Spotting, 10mm, XM14 - I.H.Atwood, Jr., 1 Sept 59                                                                                                                                                                                                                                                                                                                                                                   |
| 11-2708       | NM          | Notes on Development Type Materiel for the Rifle, Spotting, 20mm, XM-69 - I.H.Atwood, Jr., 6 Nov 59                                                                                                                                                                                                                                                                                                                                                                |
| 11-2711       | NM          | Notes on Development Type Materiel for Rifle, Spotting, 20mm (Demonstrator) - I.H.Atwood, Jr., 11 May 59                                                                                                                                                                                                                                                                                                                                                           |
| 11-3100       | TR          | Feasibility Study of a Caliber .222, Salvo Type Shoulder Rifle (U) - D.C.Fletcher, 10 May 59 - Confidential report - Limited distribution.<br><br>ABSTRACT: This report discusses the results of a feasibility study of a proposed design for a three-barrel, rotary-fed, caliber .222 salvo type shoulder rifle. The proposed salvo rifle design is for a percussion-fired, gas-operated, three-barrel, semiautomatic weapon weighing approximately 9-1/2 pounds. |
| 15-1103       | TR          | Stress Advantage of Nested Springs - H.P.Swieskowski, 22 Aug 60 - Unclassified report - Non-limited distribution.<br><br>ABSTRACT: A mathematical study of the characteristics of nested springs was made. The advantage of the use of nested springs in comparison with a single spring is shown by a reduction in stress for equivalent conditions of loading. Detailed derivations are shown and the results discussed.                                         |
| 16-1057       | TR          | Determination of the Reactivity of the Active Chemical Constituents in Cutting Fluids with Various Metals and Alloys - L.Krasnor, 30 Jul 59 - Unclassified report - Nonlimited distribution.                                                                                                                                                                                                                                                                       |

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ABSTRACT: An investigation was made to determine the chemical reaction of the active constituents in cutting fluids upon various metals and alloys. An analysis was made of the reaction of six different oils upon twelve different metals and alloys. A temperature of 400 F. was maintained for two hours. These oils were made with five separate classes of active chemical ingredients. Results show that there is a positive and substantial chemical effect. Test procedure is described, and results discussed.

16-1115

TR

Determination of Sulphate in Chromium Plating Solutions - C.M.Hanna, 10 Feb 60 - Unclassified report - Limited distribution, due to coding.

ABSTRACT: An investigation was made to determine the accuracy of an alternate, rapid, gravimetric method of sulphate analysis in chromium plating solutions by reduction of chromic acid by use of sodium nitrite in place of ethyl or isopropyl alcohol. The accuracy of the test results obtained with the alternate method compares favorably with the accuracy of the test results obtained with the standard method. A considerable amount of time is saved with the alternate method analysis. Suggested procedure for sulphate determination is given.

16-1116

TR

Ultrasonics in the Chromium Plating Process and in Copper Plating of Titanium - G.Pributsky, W.M.Kisner, 25 Jan 60 - Unclassified report - Nonlimited distribution.

ABSTRACT: An investigation was made to determine the effect of ultrasonic vibrations on the appearance, the adhesion, and the corrosion resistance of subsequent chromium plating. An investigation was also made to evaluate the effect of the use of ultrasonic vibrations during the electrodeposition of copper on titanium. Chromium plated drill rods were ultrasonically irradiated in dilute chromic acid in order to passivate the base metal in the pores and cracks of the chromium plate. No improvement in the corrosion

| <u>NUMBER</u> | <u>TYPE</u> | <u>TITLE</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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|               |             | resistance of the specimens was evident. In all instances the application of ultrasonics did not prove beneficial. Test procedures are described and results discussed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 18-1068       | TR          | Investigation of High Density Rigid Foams - K.A. Jorczak, 20 Nov 59 - Limited distribution, due to coding.<br><br>ABSTRACT: An investigation was conducted to obtain data to ascertain whether urethane foam materials (20 lb/cu ft) can be increased to higher densities and to determine the practicality of using fiber glass as a filler. Results indicate that rigid urethane foams of a density greater than 20 lb/cu ft can be molded and that fiber glass filler does not influence significantly the physical properties of the foams. Test procedures are given, and results discussed.                                                                                                                                                                                                                                                                                                                                                                      |
| 18-1070       | TR          | A Determination of the Distribution of Chromium Plate in the Bores of Small Arms Barrels. - M.S. Spivak, 12 Feb 60 - Unclassified report - Non-limited distribution.<br><br>ABSTRACT: An investigation was made to develop a method for the determination of the distribution of chromium plate in the bores of small arms barrels. Barrels of various calibers were chromium plated according to Springfield Armory procedures. These barrels were then sectioned and the chromium thickness was measured at the lands and grooves. Graphs were plotted of groove chromium thickness versus land chromium thickness for the various barrels. Ratios of land-to-groove chromium plating thicknesses have been established for calibers 0.30, 0.45, 0.50, 20mm, and 30mm barrel bores. These ratios apply to barrel bores which have been chromium plated under existing plating procedures used at Springfield Armory. Procedures are described and results discussed. |
| 19-1004       | TR          | Utilization of Investment Castings for Small Arms Weapon Components - J.F.Panda, 26 June 59 - Un-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

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ABSTRACT: An investigation was conducted to determine the feasibility of using investment castings for components of various small arms weapons. Description of the procedure used in fabricating components by the investment casting method is discussed.

19-1207      TR

Columbium as a High Temperature Structural Material - E.H.Abbe, 3 Jun 59 - Unclassified report - Limited distribution, due to coding.

ABSTRACT: An investigation was made to determine the influence of oxygen in the strengthening and hardening of columbium at both elevated and room temperatures, to establish the mechanism by which oxygen hardens and strengthens columbium, and to evaluate the high-temperature properties of oxygen-impregnated columbium. The results of metallurgical examination, X-ray diffraction studies, and hardness tests of sintered and compacted columbium specimens which had been impregnated with various amounts of oxygen are discussed. Increments of added oxygen diffused inwardly through the sintered and compacted metal will strengthen it in essentially a linear manner. The metallographic and X-ray evidence shows that the solute atoms of oxygen are accepted into the columbium lattice in an interstitial solid solution. Hardness values for columbium specimens with varying additions of oxygen differed considerably at room temperature, but appeared to converge at more elevated temperatures. This indicates that if hardness tends to equilibrate at higher temperature levels, the initial hardness may be of limited importance.

19-1502      TR

Ultrasonic Studies of Die Block Materials - RKorytoski, 25 May 59 - Unclassified report - Nonlimited distribution.

ABSTRACT: Basic studies were conducted to obtain data to determine the feasibility of using ultra-

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|               |             | sonic vibration principles in nondestructive evaluation of material and to develop reliable inspection methods and procedures. A series of studies were conducted on die block material. These studies included (1) ultrasonic reflection investigations, (2) destructive metallurgical examinations of materials ultrasonically tested, (3) evaluation of material performance in forging application.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 19-1504       | TR          | Nondestructive Inspection of Braze Clevis on 7.62mm M60 Machine Gun Operating Rod Guide Assembly - R.D.Korytoski and E.H.Abbe, 28 Dec 59 - Unclassified report - Nonlimited Distribution.<br><br>ABSTRACT: An investigation was made in order to develop a nondestructive test method for the evaluation of braze joints on the M60 guide assembly operating rod. The ultrasonic resonance method provided a nondestructive test means to evaluate the soundness of braze areas. Completely braze areas produced several resonance indications with thickness approximately 0.130 inch. A poorly braze joint shows a single resonance indication with thickness approximating 0.050 inch. Ultrasonic pulse echo method could not be practically applied. The ultrasonic resonance method proved most feasible and was used in the development of inspection procedures. Tests are described and results discussed. |
| 20-2135       | TR          | Study of Mechanisms and Firing Fixtures in Conjunction with Frankford Arsenal Development of Fin-Stabilized Ammunition (U) - CFPackard, 16 Oct 58- Confidential report - Limited distribution.<br><br>ABSTRACT: A feasibility study was made of various weapon systems capable of firing fin-stabilized ammunition at high cyclic rates and high muzzle velocities. Detailed study was made of breech, trigger, and feeding mechanisms. A firing mechanism which provides semiautomatic, controlled burst, and full automatic modes of fire was designed, and a plastic model fabricated.                                                                                                                                                                                                                                                                                                                          |

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|               |             | A layout was made of a proposed submachine gun type weapon. Cruciform type barrels were studied and one Mann type <u>cruciform</u> test fixture was fabricated. A locked breech, gas-actuated, reciprocating-bolt system appears feasible for firing the types considered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 20-2730       | NM          | Notes on Development Type Materiel for the Launcher, Grenade, XM79 (U) - C.E.Lanizzani, 23 Oct 59                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 20-6003       | TR          | Development of the Permetron Gage for the Measurement of 20mm Barrel Bore Plating Thickness - H.P. Hatch, C.N.Julian, 3 Apr 60 - Unclassified report - Nonlimited distribution.<br><br>ABSTRACT: Design and development of a gage based upon permeability principles for measurement of the plating thickness in the 20mm gun barrel bores are discussed. This gage operates on the principle that the coupling between two windings linked by a magnetic circuit varies with the permeability of the magnetic circuit. The magnetic circuit consists of the core carrying the two windings, the barrel steel, and the interposed chromium. The maximum error in thickness measurement is $0.33 \times 10^{-3}$ inch. The Permetron gage provides an accurate, continuous, nondestructive means of measuring the thickness of chromium along the lands of the 20mm barrels. Experimental procedure is described. |
| 20-6005       | TR          | Magnetic Method of Measuring Displacement and Velocity: Application as Function Generator - H.P.Hatch, 16 Aug 60 - Unclassified report - Nonlimited distribution.<br><br>ABSTRACT: A study was made to investigate geometry and core materials to increase the linear displacement range of Springfield Armory magnetic displacement transducer, to investigate a direct-current version responding directly to velocity of motion, and to explore the feasibility of using this device as a function generator. It appears feasible from experimental work that displacements greater than 5 inches can be measured. The output of the d.c.                                                                                                                                                                                                                                                                     |

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|               |             | excited transducer is linear with respect to armature velocity. . However, because of the large transverse response, the measurement of velocity appears impractical for all applications except those in which the armature is constrained to only one plane of motion. The displacement transducer can be used to generate any wave form that can be described by a rotated cam. Experimental procedure is given and results discussed.                                                                                                                    |
| 20-9000       | TR          | Basic Studies Concerning Slide Energy of Open-system, Gas-operated Weapons - F.M.Chakour, 26 Feb 59 - Unclassified report - Nonlimited distribution report.<br><br>ABSTRACT: A study was made in order to determine the relationship of available slide energy to the following parameters: orifice location, orifice diameter, initial cylinder volume, piston diameter, piston stroke, weights of recoiling parts. A test fixture was used to obtain experimental data. Correlation of these data was made. Procedure is described, and results discussed. |
| 20-9100       | TR          | Bibliography of Springfield Armory Reports - Technical, Memorandum, Notes on Materiel - Research and Development Division, 30 Sep 59 - Unclassified report - Nonlimited distribution.<br><br>ABSTRACT: Presented is a bibliography of Springfield Armory reports - technical, memorandum, notes on materiel - prepared and distributed from 1 Jan 48 through 30 Jun 59. Technical abstracts are included for those technical reports issued after receipt of OCTI 200-4-57, "Control and Distribution of Technical Reports," 27 March 1957.                  |
| 20-9200       | NM          | Notes on Development Type Materiel for the Caliber .30, M37, Gun Kit, on H-13 Army Helicopters. - G.H. Bornheim, 11 Jan 60.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 20-9204       | NM          | Notes on Development Type Materiel for the Caliber .30, M37, Gun Kit - SA-F42260, Revision B, on H-13 Army Helicopters (NOTE: This report supersedes                                                                                                                                                                                                                                                                                                                                                                                                         |

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|               |             | SA-NM20-9200) - G.H.Bornheim, 13 Sep 60.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 20-9205       | TR          | <p>Evaluation of the Seventh Army Ground Fire Suppression Kit (H-13 Gun Kit, SA-F42260, Rev B) - Final Report - G.H.Bornheim and H.D.Coombs, 21 Nov 60 - Unclassified Report - Nonlimited distribution.</p> <p>ABSTRACT: Tests were conducted to evaluate the performance of the Seventh Army Ground Fire Suppression Kit as used on the H-13 helicopters for conformance with CONARC military characteristics with reference to safety, operational, and maintenance features. The original kit was evaluated. Based upon findings, this kit was modified. The modified kit was evaluated. Test procedure for both evaluations is given, and results of both are discussed.</p> |
| 20-9206       | TR          | <p>Engineering Evaluation of the Armament Kit, KX-13-A1-2 - G.H.Bornheim, 19 December 1960 - Unclassified report - Nonlimited distribution.</p> <p>ABSTRACT: Engineering tests were made to evaluate the KX-13-A1-2 Armament Kit used on the Model H-13 helicopter for conformance with CONARC military characteristics. Test procedure is described, results discussed, and recommendations presented.</p>                                                                                                                                                                                                                                                                      |



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