REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington SPORT — PETERS TEST

Distribution: C.B. Werkman
C.E. Ritchie

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"

RESEARCH TEST and MEASUREMENT REPORT – Report No. 82 0331

Lubricant Evaluation: M700 Cock and Fire Simulation

Prepared by: Fred Supry

Date Prepared: 3-22-82

Proofread and Cleared By:

J.H. Hemmings, Foreman-Test Lab / R.E. Nightingale, Foreman-Measurement Lab

James H. Hemmings 4-14-82
Signature Date

C.E. Ritchie, Sr. Supervisor - Testing, Meas. & Mech. Analysis Lab

C. Evan Ritchie 4-14-82
Signature Date

PLAINTIFF'S EXHIBIT
3157

1 of 22

TEST & MEASUREMENT LAB REPORT

REPORT NUMBER: 82 0331

REPORT TITLE: Lubricant Evaluation: M700 Cock and Fire Simulation

MODEL(S): 700

GAUGE OR CALIBER: 30.06

DATE: 3-22-82

WORK ORDER NO.: C-1803-000

PART NAME:

DESIGNER/ENGINEER:

TEST TYPE:

1. PHOTO LAB
2. STRENGTH TEST - NO. OF GUNS TESTED _____
3. FUNCTION TEST - NO. OF GUNS TESTED _____
4. ACCURACY TEST - NO. OF GUNS TESTED _____
5. MEASUREMENTS - TYPE: Static
6. ENVIRONMENTAL TEST
7. AMMUNITION TESTING & EVALUATION - TYPE: _____
8. VISUAL EVALUATION - _____ OUT OF _____ GUN SAMPLE
9. ENDURANCE - NO. OF GUNS TESTED: _____
   NO. OF ROUNDS PER GUN: _____
   TOTAL ROUNDS FIRED IN TEST: _____
   AMMO TYPE: MAGS _____ ; TARGET: _____
   RIM FIRE _____ CENTER FIRE _____
10. DRY CYCLE – NO. OF SAMPLES TESTED 5 - each lubricant
    MAX. NO. OF CYCLES 25000

Report No. 82 0331

REMINGTON ARMS COMPANY, INC.
Firearms Research Division

April 13, 1982

TO: J.H. Hennings

FROM: F.L. Supry

REPORT TITLE: Evaluation of Lubricants on Firearms M700 Cock and Fire Simulation

ABSTRACT

C.E. Ritchie requested that the Test Lab conduct a cock and fire evaluation on five spray lubricants.

1. Du Pont – Synthetic Diester
2. Krylon – Ten - 4
3. Sprayon – 711
4. CRC – 3-36
5. Houghton – HLP

These five lubricants were selected for evaluation from the results of a preliminary evaluation conducted by A.B. Hughes, Senior Consultant, ESD Maintenance Engineering Group, Du Pont. A copy of his evaluation for each of the five lubricants is located in Appendix "C".

Engineering Dept.

SCOPE OF TEST

To compare the five lubricants in a Model 700 cock and fire simulation test.

TEST RESULTS

In their order of finish, from the best performing lubricant to the poorest performing lubricant, the following results were obtained.

LUBRICANT	AVERAGE CYCLE LIFE (5 Samples)
1. Du Pont – Synthetic Diester	21,181 cys.
2. Sprayon – 711	17,646 cys.
3. CRC – 3-36	14,382 cys.
4. Houghton – HLP	8,333 cys.
5. Krylon – Ten-4	2,830 cys.

REPORT TEXT

A. Trigger pull, sear lift, sear engagement, safe on, safe off, and bolt lift measurements were taken on each test vehicle at the start of the test, and at 5000 cycle intervals. Remington specifications for the M700 components used are:

• Trigger Pull	3½ lbs. – 6½ lbs.
• Sear Lift	.005" – .018"
• Sear Engagement	.015" – .020"
• Safe "On" – "Off"	None Established
• Bolt Lift	None Established

Refer to Appendix "A", data sheets No. 1 through No. 5, for individual results.

The Rc hardness was measured, at the cocking cam area, on each M700 bolt. Remington specifications Rc 37-46.
Refer to Appendix "A", data sheet No. 6, for individual hardness, lubricant used, simulator used and cycles completed.

A graphical analysis comparing the lubricants tested to their cycle life, and their cycle life to the simluator used is found in Appendix "B".

TEST PROCEDURE

A. Measurements

1. Trigger Pull
Trigger Pull measurements were conducted using a Chatillon Model IN-10 pull scale.

2. Sear Lift and Sear Engagement
Sear lift and sear engagement measurements were conducted using a Model FC-14 optical comparator and measuring machine.

3. Safe "ON" and "OFF" Forces.
Safe On and Off forces were taken using a Chatillon Model DPP-25, push-pull scale.

4. Bolt Lift
Bolt lift forces, both cocked and fired, were taken utilizing a Chatillon Model 80D pull scale mounted on a machine designed to be used for bolt lift measurements.

5. Rc Hardness
The Rc hardness measurements were taken by George Catta, a production inspector, utilizing a Wilson Rockwell Hardness Tester.

B. Lubrication – (Pictorial presentation - Appendix "D")

1. Lubrication Points

a.	Receiver:	Locking lug area.
		Track on receiver tang.
b.	Bolt:	Cocking cam
		Locking lugs
c.	Firing Pin:	Threads
		Striker radius and track.
d.	Trigger Assembly:	Sear safety cam face.
		Interior of trigger assembly, through sear inspection hole.

2. Lubrication procedure

a. Components to be lubricated were completely degreased, using the solvent degreasing tanks located in our Heat Treat Department.

b. The interior of the trigger assembly was lubricated by holding the spray can to direct the spray into the sear inspection hole. Duration of spray approximately 1 second.

NOTE: The two position nozzle on Du Pont aerosol can was more difficult to control for pin point application, than the standard plastic tubes on the other samples. (Pictorial example included.)

ALEKSICH

APPENDIX A

(Data Sheets)

M 700 COCK &FIRE SIMULATION — F.L.S.

LUBRICANT EVALUATION — 3-5-82

FIRST SAMPLE of EACH LUBRICANT

		1 TRIGGER PULL	2 SEAR LIFT	3 SEAR ENGAGEMENT	4 SAFE ON	5 SAFE OFF	6 BOLT LIFT COCKED	6 BOLT LIFT FIRED
REM - SPECS →		3½-6½ lbs	.005"-.008"	.015"-.020"	(lbs)	(lbs)	(lbs)	(lbs)
1 = DUPONT		(AVG. OF 3)			(AVG. OF 3)	(AVG. OF 3)	(AVG. OF 3)	(AVG. OF 3)
2 = 7/11								
3 = GBC								
4 = HLP								
5 = TEXACO								
	1	6.75	.005	.020	7.5	6.50	3.00	7.00
0	2	6.50	.0046	.015	6.75	4.25	2.00	6.50
cycles	3	5.50	.005	.016	5.25	4.25	3.00	6.00
	4	6.00	.008	.017	7.00	5.75	3.00	6.50
	5	6.50	.008	.016	6.75	4.50	4.50	7.50
	1	6.00	.0055	.020	5.50	4.00	2.50	6.50
5000	2	6.00	.0065	.0175	6.00	5.50	2.50	6.50
cycles	3	6.00	.006	.020	6.00	4.50	2.00	6.00
	4	5.75	.010	.017	7.50	5.00	3.00	7.25
	* 5	6.50	.010	.020	7.25	5.50	5.00	9.00
	1	5.75	.0081	.020	5.75	4.0	2.25	7.00
10,000	* 2	5.75	.008	.018	5.25	3.75	2.50	10.50
cycles	3	5.25	.008	.022	4.50	3.75	2.01	7.00
	4	6.25	.0095	.019	9.25	4.75	3.01	13.00
	5	—	—	—	—	—	—	—
	1	6.00	.0091	.0205	6.00	4.00	2.00	8.50
15,000	2	—	—	—	—	—	—	—
cycles	3	5.50	.0091	.024	5.00	5.50	2.00	8.50
	* 4	6.00	.0105	.019	6.50	4.50	3.00	18.00
	5	—	—	—	—	—	—	—
	* 1	6.00	.0095	.0211	6.00	4.00	2.00	8.00
20,000	2	—	—	—	—	—	—	—
cycles	* 3	5.50	.0105	.027	4.50	4.00	2.00	9.00
	4	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—
	1	—	—	—	—	—	—	—
25,000	2	—	—	—	—	—	—	—
cycles	3	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—
	* 1	FAILED	15,594	cycles				
	* 2	FAILED	6,228	cycles				
	* 3	FAILED	16,359	cycles				
	* 4	FAILED	10,400	cycles				
	* 5	FAILED	1990	cycles			DATA SHEET	

M700 COCK & FIRE SIMULATION F.L.S.

LUBRICANT EVALUATION 3-8-82

SECOND SAMPLE OF EACH LUBRICANT

		TRIGGER PULL	SEAR LIFT	SEAR ENGAGEMENT	SAFE ON	SAFE OFF	BOLT LIFT COCKED	BOLT LIFT FIRED
REMISPECS →		3½ - 6½ lbs	.005" - .018"	.015" - .020"	(lbs)	(lbs)	(lbs)	(lbs)
1	DUPONT	(AVG. OF 3)			(AVG. OF 3)	(AVG. OF 3)	(AVG. OF 3)	(AVG. OF 3)
2	711							
3	182							
4	HLP							
5	TEN 4							
	1	6.00	.009	.0185	6.00	4.50	4.00	8.00
0	2	5.00	.006	.018	7.50	4.75	3.00	6.00
cycles	3	6.00	.012	.012	7.00	4.50	3.00	7.00
	4	6.75	.0095	.016	7.50	6.75	2.50	7.00
	5	5.50	.008	.016	7.50	5.50	3.50	7.00
5000	1	5.25	.0095	.0215	6.00	4.50	3.50	7.00
cycles	2	5.00	.0065	.019	5.75	4.00	3.50	6.00
	3	5.75	.013	.020	5.00	4.00	3.00	8.00
	4	6.25	.0095	.020	6.75	6.25	2.50	8.00
	* 5	5.00	.009	.020	5.75	4.00	3.50	13.00
10,000	1	5.50	.011	.025	5.75	4.25	3.50	7.00
cycles	2	4.75	.0065	.019	5.25	4.00	2.50	6.50
	* 3	6.00	.013	.023	6.25	3.75	3.00	15.00
	* 4	6.00	.0095	.021	6.50	5.75	3.00	25.00
	5	—	—	—	—	—	—	—
15,000	1	5.50	.011	.026	5.50	4.25	4.00	7.25
cycles	2	4.75	.0075	.019	5.00	4.00	3.00	7.00
	3	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—
20,000	1	5.50	.011	.0265	5.50	4.00	4.00	9.25
cycles	2	4.75	.009	.019	5.25	4.50	3.00	6.50
	3	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—
25,000	* 1	5.25	.011	.0285	5.50	3.75	4.00	14.00
cycles	* 2	4.50	.0095	.021	5.25	4.00	2.50	7.00
	3	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—
	* 1	COMPLETED 25,000 cycles						
	* 2	COMPLETED 25,000 cycles						
	* 3	FAILED 8317 cycles						
	* 4	FAILED 6115 cycles						
	* 5	FAILED 2788 cycles					DATA SHEET 2	

8 8 22

M700 COCK & FIRE SIMULATION — F.L.S.

LUBRICANT EVALUATION — 3-8-82

THIRD SAMPLE OF EACH LUBRICANT

			1	2	3	4	5	6
		TRIGGER PULL	SEAR LIFT	SEAR ENGAGEMENT	SAFE ON	SAFE OFF	BOLT LIFT COCKED	BOLT LIFT FIRED
		0½ - 6½ lbs	.005" - .019"	.015" - .020"	(lbs)	(lbs)	(lbs)	(lbs)
1	DUPONT	(AVG OF 3)			(AVG OF 3)	(AVG OF 3)	(AVG OF 3)	(AVG OF 3)
2	TIL							
3	CRC							
4	HLP							
5	TEN 4							
	1	5.75	.007	.015	7.25	4.50	2.50	6.50
0	2	6.00	.008	.015	7.50	7.50	2.50	8.25
cycles	3	6.25	.008	.017	6.75	5.50	3.00	7.00
	4	5.75	.0125	.0195	8.00	5.50	3.00	7.00
	5	5.50	.008	.015	8.00	5.00	2.50	6.00
5000	1	6.25	.009	.019	6.50	4.25	2.00	6.00
cycles	2	5.25	.009	.021	5.25	7.50	3.50	6.50
	3	6.25	.0105	.0175	7.25	4.00	3.00	9.00
	4	5.75	.0125	.021	7.00	5.00	3.00	10.00
	*5	5.50	.013	.021	6.00	3.75	2.50	18.00
10000	1	6.00	.0110	.020	6.00	3.75	2.00	5.50
cycles	2	5.25	.009	.021	7.00	6.00	3.50	7.00
	3	6.00	.015	.0195	6.75	4.75	3.00	10.00
	*4	5.75	.0125	.0225	6.50	4.50	3.50	51.00
	5	—	—	—	—	—	—	—
15000	1	5.25	.0115	.020	5.75	4.00	2.00	6.50
cycles	*2	5.50	.0095	.022	6.50	5.50	4.00	14.00
	*3	6.50	.015	.0195	6.75	4.00	3.00	15.00
	4	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—
20000	1	5.75	.0115	.020	6.00	4.00	2.00	6.00
cycles	2	—	—	—	—	—	—	—
	3	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—
25000	*1	6.00	.0115	.021	6.25	3.75	2.00	12.00
cycles	2	—	—	—	—	—	—	—
	3	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—
	*1	COMPLETED	25,000	cycles				
	*2	FAILED	15,140	cycles				
	*3	FAILED	10,410	cycles				
	*4	FAILED	6788	cycles				
	*5	FAILED	2484	cycles			DATA SHEET 3	

M700 COCK & FIRE SIMULATION — F.L.S.

LUBRICANT EVALUATION — 3-8-82

FOURTH SAMPLE OF EACH LUBRICANT

			1 TRIGGER PULL 3¼ - 6½ lbs	2 SEAR LIFT .005" - .018"	3 SEAR ENGAGEMENT .015" - .020"	4 SAFE ON (lbs)	5 SAFE OFF (lbs)	6 BOLT LOCKED (lbs)	7 LIFT FIRED (lbs)
1		Du Pont	(AVG. OF 3)			(AVG. OF 3)	(AVG. OF 3)	(AVG. OF 3)	(AVG OF 3)
2		TFE							
3		CRC							
4		HLP							
5		TEN 4							
6		1	6.50	.0095	.019	6.75	4.25	4.00	8.00
7	0	2	6.50	.008	.019	8.50	5.25	3.50	7.00
8	cycles	3	5.50	.008	.016	7.25	4.75	3.00	9.00
9		4	5.75	.009	.019	8.25	5.50	4.00	7.50
10		5	5.50	.005	.017	9.00	6.75	3.00	7.50
11	5000	1	6.25	.0110	.023	6.25	3.25	3.00	8.00
12	cycles	2	6.00	.0111	.020	7.50	4.25	3.50	7.00
13		3	5.50	.0085	.021	7.00	4.50	3.00	8.00
14		4	6.00	.0110	.019	7.25	5.00	4.00	10.00
15	*	5	5.75	.010	.0185	7.00	4.75	3.00	16.00
16	10000	1	5.75	.010	.023	5.75	3.50	4.00	8.00
17	cycles	2	6.00	.012	.022	7.00	4.00	3.00	8.00
18		3	5.50	.0085	.021	6.50	4.25	3.00	8.00
19		* 4	6.00	.0110	.021	7.00	5.25	4.00	29.00
20		5	—	—	—	—	—	—	—
21	15000	1	6.25	.0105	.024	5.25	3.00	3.50	9.00
22	cycles	2	6.25	.013	.0225	7.50	4.00	3.50	9.00
23		* 3	5.50	.0105	.0215	6.75	4.50	3.25	22.00
24		4	—	—	—	—	—	—	—
25		5	—	—	—	—	—	—	—
26	20000	* 1	5.75	.0115	.026	5.75	3.00	3.00	24.00
27	cycles	* 2	5.75	.0125	.024	6.50	4.00	4.00	24.00
28		3	—	—	—	—	—	—	—
29		4	—	—	—	—	—	—	—
30		5	—	—	—	—	—	—	—
31	25000	1	—	—	—	—	—	—	—
32	cycles	2	—	—	—	—	—	—	—
33		3	—	—	—	—	—	—	—
34		4	—	—	—	—	—	—	—
35		5	—	—	—	—	—	—	—
36		* 1	FAILED	19520 cycles					
37		* 2	FAILED	16865 cycles					
38		* 3	FAILED	11820 cycles					
39		* 4	FAILED	8576 cycles					
40		* 5	FAILED	3667 cycles				DATA SHEET 4	

M700 LOCK & FIRE SIMULATION — F.L.S.

LUBRICANT EVALUATION — 3-9-92

FIFTH SAMPLE OF EACH LUBRICANT

			1	2	3	4	5	6
			TRIGGER PULL	SEAR LIFT	SEAR ENGAGEMENT	SAFE ON	SAFE OFF	BOLT LIFT COCKED / FIRED
			3½ - 6½ lbs	.005" - .018"	.015" - .020"	(lbs)	(lbs)	(lbs) / (lbs)
1	1	DuPont	(AVG OF 3)			(AVG OF 3)	(AVG OF 3)	(AVG OF 3) / (AVG OF 3)
2	2	711						
3	3	CRC						
4	4	H&R						
5	5	TEN 4						
6		1	6.00	.0095	.0117	7.00	4.75	2.00 / 7.00
7	0	2	5.75	.0085	.0155	6.75	5.00	3.50 / 7.00
8	cycles	3	5.75	.0105	.0215	6.50	5.00	3.00 / 9.00
9		4	6.25	.012	.016	7.00	4.50	3.00 / 8.00
10		5	6.25	.008	.018	7.25	5.50	3.00 / 6.50
11	5000	1	5.50	.010	.0205	7.50	4.50	2.50 / 7.00
12	cycles	2	6.00	.0085	.016	5.75	4.00	4.00 / 8.00
13		3	5.75	.0105	.0215	5.50	4.25	3.00 / 8.00
14		4	6.25	.013	.019	6.50	4.25	4.00 / 7.50
15		*5	6.25	.010	.020	5.75	4.00	3.50 / 18.00
16	10000	1	5.25	.010	.021	7.50	4.00	3.00 / 8.00
17	cycles	2	5.50	.010	.018	5.75	3.75	4.00 / 7.50
18		3	5.75	.0105	.0215	5.50	4.25	3.00 / 7.50
19		*4	6.25	.0135	.025	7.25	3.75	4.00 / 27.00
20		5	—	—	—	—	—	— / —
21	15000	1	5.50	.0105	.021	6.50	4.00	3.00 / 8.00
22	cycles	2	5.75	.010	.018	5.75	4.00	3.50 / 7.50
23		3	6.00	.0105	.0215	5.50	4.50	3.00 / 7.00
24		4	—	—	—	—	—	— / —
25		5	—	—	—	—	—	— / —
26	20000	1	5.50	.0105	.021	7.00	3.75	3.50 / 14.00
27	cycles	2	6.25	.010	.019	5.50	4.00	3.50 / 9.00
28		3	5.75	.0105	.022	5.50	4.25	3.00 / 11.00
29		4	—	—	—	—	—	— / —
30		5	—	—	—	—	—	— / —
31	25000	*1	5.00	.0111	.0122	7.00	4.00	3.00 / 28.00
32	cycles	*2	5.75	.011	.020	5.75	3.75	4.00 / 12.00
33		*3	6.25	.011	.023	5.25	4.00	4.00 / 15.00
34		4	—	—	—	—	—	— / —
35		5	—	—	—	—	—	— / —
36		*1	FAILED	20790	cycles			
37		*2	COMPLETED	25000	cycles			
38		*3	COMPLETED	25000	cycles			
39		*4	FAILED	9787	cycles			
40		*5	FAILED	3220	cycles			DATA SHEET 5

M 700 COCK & FIRE SIMULATION — F.L.S.

LUBRICANT EVALUATION — 3-10-82

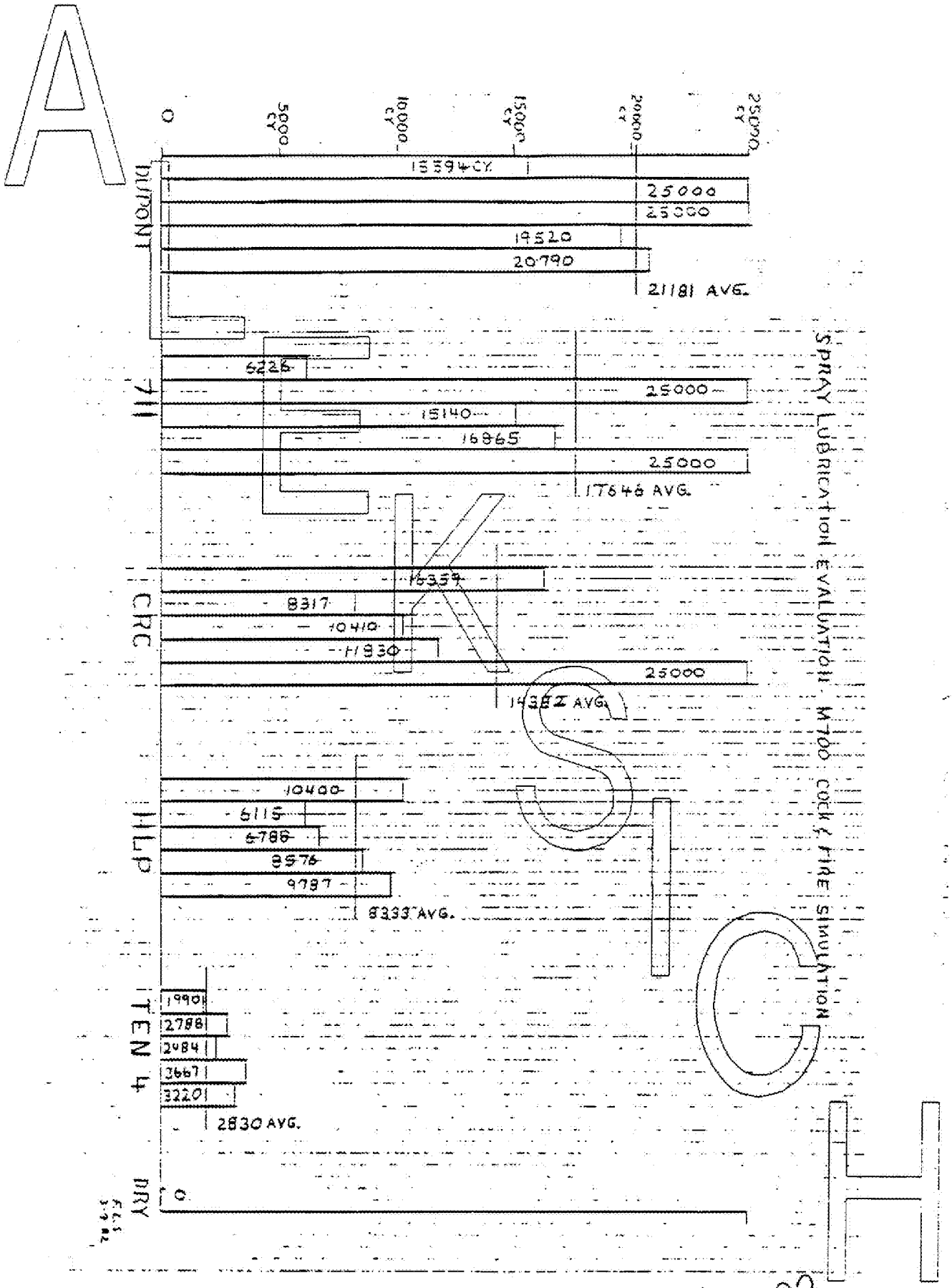
R_c HARDNESS: M700 BOLT COCKING CAM AREA

REM. SPEC. R_c 37-46	R_c HARDNESS	LUBRICANT USED	SIMULATOR USED	CYCLES COMPLETED
← BOLT NO. →				
C1	39	DUPONT	1	15 594
C9	40	DUPONT	3	25 000
C12	40	DUPONT	2	25 000
C19	38	DUPONT	4	19 520
C20	37	DUPONT	1	20 790
C3	38	711	3	6 226
C7	39	711	2	25 000
C16	39	711	1	15 140
C27	38	711	2	16 865
C29	39	711	4	25 000
C4	39	CRC 3-36	4	16 359
C10	39	CRC 3-36	1	8 317
C17	40	CRC 3-36	3	10 410
C21	39	CRC 3-36	2	11 830
C25	39	CRC 5-56	4	25 000
C11	39	HLP	4	10 400
C18	39	HLP	3	6 115
C24	39	HLP	2	6 788
C26	39	HLP	1	8 576
C28	38	HLP	1	9 787
C2	38	TEN-4	2	1 990
C5	38	TEN-4	2	2 788
C6	39	TEN-4	3	2 484
C8	38	TEN-4	4	3 667
C13	39	TEN-4	1	3 220
C22	39	DRY		0
				DATA SHEET 6

ALEKSICH

APPENDIX B

(Graphic Presentation)


A
0
5000 CY
10000 CY
15000 CY
20000 CY
25000 CY
DUTONT
15594 CY.
25000
25000
19520
20790
21181 AVG.
711
6226
25000
15140
16865
25000
17648 AVG.
CRC
16359
8317
10410
11830
25000
14382 AVG.
HLP
10400
6115
6786
8576
9797
8333 AVG.
TEN 4
1990
2788
2984
3667
32201
2830 AVG.
DRY
0
SPRAY LUBRICATION EVALUATION M700 COCK'S FIRE SIMULATION

H

SPRAY LUBRICATION EVALUATION – M 100 COCKPIT FIRE SIMULATION
SIM. NO. 1
SIM. NO. 2
SIM. NO. 3
SIM. NO. 4
DUPONT 15 594 CYS.
711 15100 CYS.
DUPONT 20 790 CYS
HLP 9387 CYS
HLP 8576 CYS
CRC 8012 CYS
TEN 4 3220 CYS.
711 25000 CYS.
DUPONT 25000 CYS.
711 16865 CYS
CRC 11830 CYS
HLP 6788 CYS.
T 4 1990 CYS.
T 4 2188 CYS.
DUPONT 25000 CYS.
CRC 10410 CYS.
711 6226 CYS.
HLP 6115 CYS.
T 4 2484 CYS.
711 25000 CYS.
CRC (3-36) 18359 CYS.
CRC (4-56) 25000 CYS.
DUPONT 19520 CYS.
HLP 10400 CYS.
TEN 4 3667 CYS.
25000 CYCLES
20000 CYCLES
15000 CYCLES
10000 CYCLES
5000 CYCLES
0

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APPENDIX C

(Previous Evaluation)

Test # 20

Product: Du Pont - Synthetic Diester - 20%

Function: Multipurpose, prevents rust
Displaces moisture, dirt and lubricates

Evaluation Notes

1. Odor: Synthetic chemical oily smell, not lasting
2. Feel: Light oily feel
3. Drying Rate: Slow drying
4. Penetration: Rapid penetration and spreading, clear color
5. Surface Wetting: Local wetting, removes oxidation, good cleanup
6. Grease Displacement: Rapid spreading, no dissolving, good cleanup
7. Type Container: 4 oz aerosol, nozzle with straw
8. Liquid Appearance: Watery, light tan
9. Wood-Open Pore: Damp look, no damage
10. Metal Surface: Wet look, no rust within 24 hours
11. Rust Removal: Most rust removed
12. Displace Moisture: Excellent
13. Displace Solids: Excellent
14. Gun Barrel: Excellent
15. Wood Stock: Excellent
16. Rust Prevention:
    Test 1 - 7
    Test 2 - 7
    Avg - 7.0
17. Reason for Elimination: Continue testing

Test # 14

Product: Spravon #711 Penetrant/Lube/Demoisturize

Function: Multipurpose, prevents rust
Displaces moisture and lubricates

Evaluation Notes

1. Odor: Strong oily spray, lasting
2. Feel: Very oily feel
3. Drying Rate: Medium drying rate
4. Penetration: Slow spreading, but continuous, clear color
5. Surface Wetting: Minimum spreading, removes oxidation, bright
6. Grease Displacement: Rapid spread, no dissolving, good cleanup
7. Type Container: 12 oz aerosol, nozzle with straw
8. Liquid Appearance: Very watery, light tan
9. Wood-Open Pore: Damp look, no damage
10. Metal Surface: Oily look, no rust within 24 hours
11. Rust Removal: Some rust removed
12. Displace Moisture: Excellent
13. Displace Solids: Good
14. Gun Barrel: Excellent
15. Wood Stock: Excellent
16. Rust Prevention:

    Test 1 - 6

    Test 2 - 5

    Avg - 5.5

17. Reason for Elimination: Continue testing

Test # 15

Product: CRC - 3-36

Function: Multipurpose, prevents rust
Displaces moisture and lubricates

Evaluation Notes

1. Odor: Pleasant peppermint smell, lasting
2. Feel: Light oily feel
3. Drying Rate: Medium drying rate
4. Penetration: Medium penetrating and spreading, tan color
5. Surface Wetting: Slow spread, removes oxidation, good cleanup
6. Grease Displacement: Rapid spreading, some dissolving, easy cleanup
7. Type Container: 1 oz aerosol, nozzle
8. Liquid Appearance: Watery, light tan
9. Wood-Open Pore: Damp look, no damage
10. Metal Surface: Oily look, no rust within 24 hours
11. Rust Removal: Some rust removed
12. Displace Moisture: Excellent
13. Displace Solids: Good
14. Gun Barrel: Excellent
15. Wood Stock: Excellent
16. Rust Prevention:
    Test 1 - 4
    Test 2 - 5
    Avg - 4.5
17. Reason for Elimination: Continue testing

Test # 11

Product: E. F. Houghton - ELP All Purpose

Function: Multipurpose, prevents rust
Displaces moisture, dirt and lubricates

Evaluation Notes

1. Odor: Fly spray smell, not lasting
2. Feel: Oily feel
3. Drying Rate: Rapid drying
4. Penetration: Rapid spreading, med. spreading, tan stain
5. Surface Wetting: Slow spreading, rapid dry to oily film, hard to clean
6. Grease Displacement: Rapid spread, no dissolving, good cleanup
7. Type Container: 12 oz aerosol, nozzle with straw
8. Liquid Appearance: Waxy, dark tan
9. Wood-Open Pore: Damp look, no damage
10. Metal Surface: Oil look, no rust within 24 hours
11. Rust Removal: No rust removal
12. Displace Moisture: Poor
13. Displace Solids: Fair
14. Gun Barrel: Good
15. Wood Stock: Good
16. Rust Prevention:

    Test 1 - 8

    Test 2 - 5

    Avg - 6.5

17. Reason for Elimination: Continue testing

Test # 13

Product: Krylon - Tan 4

Function: Multipurpose, prevents rust
Displaces moisture, gums, dirt and lubricates

Evaluation Notes

1. Odor: Strong fly spray, lasting
2. Feel: Light oily feel
3. Drying Rate: Medium drying rate
4. Penetration: Rapid absorption and spreading, dark tan stain
5. Surface Wetting: Slow spreading, oily appearance, good cleanup
6. Grease Displacement: Rapid spread, no dissolving, good cleanup
7. Type Container: 11 oz aerosol, nozzle with stray
8. Liquid Appearance: Dark tan, watery
9. Wood-Open Pore: Damp look, no damage
10. Metal Surface: Damp look, no rust within 24 hours
11. Rust Removal: Most rust removed
12. Displace Moisture: Good
13. Displace Solids: Good
14. Gun Barrel: Good
15. Wood Stock: Good
16. Rust Prevention:
    Test 1 - 8
    Test 2 - 5
    Avg - 6.5
17. Reason for Elimination: Continue testing

APPENDIX D

(Pictorial Presentation)

1. Lubrication procedures.
2. Individual components at the start and completion of test. (Available upon request.)