

TEST REPORT
APPENDIX C
DATA RECORDS OF M16A1 RIFLE TEST

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Prepared For
United States Army
Test and Evaluation Command
Aberdeen Proving Ground
Maryland

By
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Digitized by:

Serial No. 5301961

Test Control No. 12

M16A1 Rifle Comparative Test of
Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Extreme Temperature (-50°) Ammunition: 5.56mm, Ball, M193
Lubricant: CLP

Lot No.: RA 2-24

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
1	33	Semi	FBF	BLE	Frozen
2-3	33	Semi	FFR		Firing pin frozen
584	36	Auto	FF	BOB	Magazine
1001-1003	33	Semi	FBC	Frozen	Bolt assist
1701	33	Semi	FBC	Frozen	Bolt assist
2001-2002	33	Semi	FBC	Frozen	Bolt assist
2501	33	Semi	FBC	Frozen	Bolt assist
2800	36	Semi	FBR	Unknown	
2904	33	Semi	FBF	BLE	

*Paragraph 6.1.6 of MTP-3-2-059

Serial No. _____

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
(-50°F)

Lubricant: CLP
Ammunition: 5.56mm, Ball, M193
Lot No.: RA 2-24

Serial No.: 5303398
Test Control No.: 24

	<u>Initial Inspection</u>	<u>Number of Rounds</u>		<u>3000 Upon Completion</u>
		<u>1000</u>	<u>2000</u>	
Bore Diameter (in.)		na	na	
Groove Diameter (in.)		na	na	
Headspace (in.)	1.4666	na	na	1.4666
Firing Pin				
Protrusion (in.)	0.034	na	na	0.033
Indentation (in.)	0.024	0.023	0.022	0.022
Trigger Pull (lb.)	7.25	8.0	7.75	7.0
Velocity				
Average	3020.1	3062.6	3080.1	3100.0
Extreme Variation	166.7	153.3	110.0	137.2
Chamber Temp/Duration	-58°/14	-54°/17		-52°/10

Cyclic Rate (rds/min)	<u>Cycle</u>	<u>Rate</u>	<u>Cycle</u>	<u>Rate</u>	<u>Cycle</u>	<u>Rate</u>
		1	900.0	11	884.2	21
	2	887.8	12	878.8	22	887.8
	3	873.4	13	830.8	23	866.0
	4	870.5	14	848.5	24	870.5
	5	861.5	15	843.8	25	866.0
	6	878.1	16	835.1	26	861.5
	7	878.1	17	787.9	27	866.0
	8	857.1	18	887.8	28	848.5
	9	878.8	19	848.5	29	830.8
	10	857.1	20	732.7	30	826.5

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
 (-50°F)

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm, Ball, M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
(0 Rds.)		(1000 Rds.)		(2000 Rds.)		(3000 Rds.)	
	3037.6		3012.9		3060.4		3019.3-
	3110.9+		2984.6		3089.7		3069.8
	2972.6		3044.1		3099.3		3125.4
	3074.5		3135.2+		3142.6+		3048.7
	3032.1		3096.9		3032.6-		3097.8
	2944.2-		2981.9-		3049.2		3146.6
	3002.5		3104.1		3117.6		3122.0
	3012.0		3085.4		3046.9		3095.4
	3045.5		3072.6		3076.4		3156.5+
	2969.5		3108.4		3094.5		3118.1
Average	3020.1		3062.6		3080.1		3100.0
Extreme variation	166.7		153.3		110.0		137.2

Serial No. 5303398
 Test Control No. 24

M16A1 Rifle Comparative Test of
 Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Extreme Temperature (-50°) Ammunition: 5.56mm, Ball, M193
 Lubricant: CLP
 Lot No.: RA 2-24

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
1	37	Semi	FBF/FS	BLE	Bolt assist
2	37	Semi	FBC		Bolt assist
3	37	Semi	FF	BOB	Magazine
501	37	Semi	FBC		Bolt assist
503	37	Semi	FBC		Bolt assist
1001	37	Semi	FBF/FFR	BLE	Bolt assist
1002	37	Semi	FBC/FFR		Bolt assist
1003-1004	37	Semi	FFR		Light indent
1601	37	Semi	FBC		Bolt assist
1701	37	Semi	FBC		
1801	37	Semi	FBC		
1850	38	Auto	FBR	MAG	
1901	37	Semi	FBC		Bolt assist
2001	37	Semi	FBC/FFR		Sluggish
2601	37	Semi	FBC		Bolt assist
2801-2802	37	Semi	FBC		Bolt assist

*Paragraph 6.1.6 of MTP-3-2-059

Serial No. _____

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
(-50°F)

Lubricant: CLP
Ammunition: 5.56mm, Ball, M193
Lot No.: RA 2-24

Serial No.: 5304458
Test Control No.: 34

	<u>Initial Inspection</u>	<u>Number of Rounds</u>		<u>3000 Upon Completion</u>		
		<u>1000</u>	<u>2000</u>			
Bore Diameter (in.)		na	na			
Groove Diameter (in.)		na	na			
Headspace (in.)	1.4666	na	na	1.4666		
Firing Pin						
Protrusion (in.)	0.034	na	na	0.034		
Indentation (in.)	0.023	0.021	0.021	0.022		
Trigger Pull (lb.)	7.0	7.75	7.50	7.25		
Velocity						
Average	2930.6	2994.5	3043.1	3073.4		
Extreme Variation	207.0	154.2	83.2	107.7		
Chamber Temp/Duration	-58°/14	-54°/17		-52°/10		
Cyclic Rate (rds/min)	<u>Cycle</u> 1	<u>Rate</u> 870.5	<u>Cycle</u> 11	<u>Rate</u> 750.0	<u>Cycle</u> 21	<u>Rate</u> 812.5
	2	848.5	12	804.1	22	866.0
	3	887.8	13	773.2	23	835.1
	4	878.8	14	826.5	24	848.5
	5	887.8	15	818.2	25	861.5
	6	870.5	16	830.8	26	818.2
	7	861.5	17	835.1	27	848.5
	8	866.0	18	818.2	28	826.5
	9	812.5	19	866.0	29	812.5
	10	818.2	20	742.5	30	787.9

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
 (-50°F)

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm, Ball, M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

<u>Cycle</u> (Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (1000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (2000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (3000 Rds.)	<u>Velocity</u> (ft/sec)
	3022.0		2969.5		3057.1		3106.0
	2861.2		2968.2		3037.6		3026.1
	2971.7		2976.1		3042.7		3083.5
	2896.0		2940.3-		3017.0-		3039.5
	3032.6+		2944.2		3039.0		3041.8
	2825.6-		3014.7		3019.3		3052.5
	2879.3		2944.6		3055.7		3054.8
	2928.6		3064.6		3100.2+		3098.3
	2962.9		3028.0		3017.0		3133.8
	2926.1		3094.5+		3045.5		3097.8
Average	2930.6		2994.5		3043.1		3073.4
Extreme variation	207.0		154.2		83.2		107.7

Serial No. 5304458
 Test Control No. 34

MI6A1 Rifle Comparative Test of
 Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Extreme Temperature (-50°) Ammunition: 5.56mm, Ball, MI93
 Lubricant: CLP

Lot No.: RA 2-24

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
1	41	Semi	FBF	BLE	Bolt assist
2	41	Semi	FBC/FFR		Bolt assist
501	41	Semi	FBC		Bolt assist
1001	41	Semi	FBF/FFR		Bolt assist
1002	41	Semi	FFR		Light indent
1601	41	Semi	FBC		Bolt assist
1950	42	Auto	FBR	MAG	
2001	41	Semi	FBF/FFR		Bolt assist
2002	41	Semi	FFR		Light indent
2003	41	Semi	FBC/FFR		Bolt assist
2701	41	Semi	FBC		Bolt assist
2759	43	Auto	FJ	Unknown	
2901	41	Semi	FBC		Bolt assist

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
(-50 °F)

Lubricant: STD
Ammunition: 5.56mm, Tracer, M196
Lot No.: TW 18204

Serial No.: 5301943
Test Control No.: 11

	<u>Initial Inspection</u>	Number of Rounds		<u>3000 Upon Completion</u>		
		<u>1000</u>	<u>2000</u>			
Bore Diameter (in.)		na	na			
Groove Diameter (in.)		na	na			
Headspace (in.)	1.4656	na	na	1.4656		
Firing Pin						
Protrusion (in.)	0.033	na	na	0.032		
Indentation (in.)	0.023	0.020	0.021	0.019		
Trigger Pull (lb.)	7.0	8.25	7.75	8.75		
Velocity						
Average	3077.6	3148.8	3088.7	3010.9		
Extreme Variation	68.0	73.7	138.1	108.2		
Chamber Temp/Duration	-48°/16	-53°/16		-57°/17		
Cyclic Rate (rds/min)	<u>Cycle</u> 1	<u>Rate</u> 925.5	<u>Cycle</u> 11	<u>Rate</u> 649.5	<u>Cycle</u> 21	<u>Rate</u> 666.7
	2	806.4	12	606.7	22	649.5
	3	826.5	13	642.9	23	656.3
	4	562.5	14	556.7	24	612.2
	5	633.2	15	612.2	25	636.4
	6	680.4	16	639.6	26	649.5
	7	734.7	17	660.0	27	673.5
	8	613.6	18	568.4	28	581.6
	9	649.5	19	612.2	29	625.0
	10	612.9	20	656.3	30	636.4

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
 (-50°F)

Lubrication/Cleaner: STD
 Ammunition: 5.56mm, Tracer, M196
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet

Screens: 5 and 25 feet

<u>Cycle</u> (Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (1000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (2000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (3000 Rds.)	<u>Velocity</u> (ft/sec)
	3071.2		3129.8		3110.4		3028.9
	3085.9		3129.7		3052.0		3070.7+
	3085.4		3172.0		3137.7		3039.0
	3049.2-		3099.3-		3023.4-		2995.8
	3117.2+		3166.5		3118.6		3021.6
	3060.9		3126.9		3059.5		2962.5-
	3064.6		3173.0+		3082.6		3008.8
	3064.6		3171.0		3161.5+		3012.5
	3098.3		3172.1		3077.3		3058.1
	3078.1		3148.1		3063.7		2991.3
erage	3077.6		3148.8		3088.7		3010.9
reme riation	68.0		73.7		138.1		108.2

Serial No. 5301943
 Test Control No. 11

M16A1 Rifle Comparative Test of
 Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Extreme Temperature (-50°) Ammunition: 5.56mm, Tracer, M196
 Lubricant: STD
 Lot No.: TW 18204

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
301	33	Semi	FBC ✓		Bolt assist
302	33	Semi	FBC	REP	Bolt assist
331	34	Auto	FF ✓	BLE	Bolt assist
1301	33	Semi	FBC ✓		Bolt assist
1302	33	Semi	FF ✓	BLE	Bolt assist
1701	33	Semi	FBC ✓		Bolt assist
1702	33	Semi	FF	BOB	Magazine
2482	36	Semi	FJ	Unknown	
2701	33	Semi	FBC ✓		Bolt assist
2702	33	Semi	FTR	Unknown	
2704	33	Semi	FF	BOB	Magazine
2708	33	Semi	FF ✓	BLE	Bolt assist

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
(-50°F)

Lubricant: STD
Ammunition: 5.56mm, Tracer, M196
Lot No.: TW 18204

Serial No.: 5303299
Test Control No.: 22

	<u>Initial Inspection</u>	<u>Number of Rounds</u>		<u>3000 Upon Completion</u>		
		<u>1000</u>	<u>2000</u>			
Bore Diameter (in.)		na	na			
Groove Diameter (in.)		na	na			
Headspace (in.)	1.4646	na	na	1.4646		
Firing Pin						
Protrusion (in.)	0.033	na	na	0.032		
Indentation (in.)	0.023	0.020	0.021	0.020		
Trigger Pull (lb.)	8.50	9.75	9.50	10.25		
Velocity						
Average	3109.6	3200.9	3087.3	3000.7		
Extreme Variation	146.9	76.5	121.8	111.8		
Chamber Temp/Duration	-48°/16	-53°/16		-57°/17		
Cyclic Rate (rds/min)	<u>Cycle</u>	<u>Rate</u>	<u>Cycle</u>	<u>Rate</u>	<u>Cycle</u>	<u>Rate</u>
	1	818.2	11	697.0	21	680.4
	2	787.9	12	649.5	22	656.3
	3	765.3	13	656.3	23	666.7
	4	573.0	14	575.8	24	625.0
	5	636.4	15	680.4	25	649.5
	6	673.5	16	680.4	26	676.9
	7	718.8	17	666.7	27	704.1
	8	606.7	18	593.8	28	618.6
	9	625.0	19	638.3	29	631.6
	10	587.6	20	612.2	30	663.2

DATA RECORD

MI6A1 Rifle
 Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
 (-50°F)

Lubrication/Cleaner: STD
 Ammunition: 5.56mm, Tracer, M196
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

<u>Cycle</u> (Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (1000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (2000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (3000 Rds.)	<u>Velocity</u> (ft/sec)
	3116.2		3178.1-		3117.6		2941.6-
	3156.0		3254.6+		3165.0+		3002.1
	3044.1		3178.1		3063.2		3053.4+
	3146.1		3209.2		3043.2-		3007.9
	3036.7-		3186.2		3054.3		2983.2
	3049.2		3185.7		3053.9		3024.3
	3106.0		3204.1		3101.7		2984.6
	3132.8		3214.4		3127.9		2989.0
	3183.6+		3210.7		3045.9		2987.3
	3124.9		3187.7		3099.8		3033.9
range	3109.6		3200.9		3087.3		3000.7
reme iation	146.9		76.5		121.8		111.8

Serial No. 5303299

Test Control No. 22

MI6A1 Rifle Comparative Test of
Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Extreme Temperature (-50°)
Lubricant: STD

Ammunition: 5.56mm, Tracer, M196

Lot No.: TW 18204

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
901	37	Semi	FBC ✓		Bolt assist
1701	37	Semi	FF ✓	BLE	Bolt assist
1731	38	Auto	FF ✓	BLE	Bolt assist
1733	38	Auto	FF ✓	BLE	Bolt assist
1735	38	Auto	FF ✓	BLE	Bolt assist
1746	38	Auto	FF	BOB	Magazine
2278	39	Auto	FFR	AMMO	Good indent
2701	37	Semi	FBC ✓		Bolt assist

*Paragraph 6.1.6 of MTP-3-2-059

Serial No. _____

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
(-50°F)

Lubricant: STD
Ammunition: 5.56mm, Tracer, M196
Lot No.: TW 18204

Serial No.: 5304041
Test Control No.: 29

	<u>Initial Inspection</u>	<u>Number of Rounds</u>		<u>3000 Upon Completion</u>		
		<u>1000</u>	<u>2000</u>			
Bore Diameter (in.)		na	na			
Groove Diameter (in.)		na	na			
Headspace (in.)	1.4676	na	na	1.4676		
Firing Pin						
Protrusion (in.)	0.035	na	na	0.035		
Indentation (in.)	0.020	0.021	0.019	0.018		
Trigger Pull (lb.)	7.75	8.75	9.25	10.25		
Velocity						
Average	3092.6	3164.3	2997.2	2972.4		
Extreme Variation	104.9	95.0	193.4	111.3		
Chamber Temp/Duration	-48°/16	-53°/16		-57°/17		
Cyclic Rate (rds/min)	<u>Cycle</u>	<u>Rate</u>	<u>Cycle</u>	<u>Rate</u>	<u>Cycle</u>	<u>Rate</u>
	1	884.2	11	680.4	21	693.5
	2	857.1	12	587.6	22	704.1
	3	804.1	13	636.4	23	673.5
	4	652.8	14	553.8	24	636.4
	5	680.4	15	625.0	25	663.2
	6	704.1	16	676.9	26	656.3
	7	765.7	17	666.7	27	718.8
	8	631.6	18	636.4	28	625.0
	9	636.4	19	727.3	29	642.9
	10	593.8	20	711.3	30	666.7

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
 (-50°F)

Lubrication/Cleaner: STD
 Ammunition: 5.56mm, Tracer, M196
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

Cycle (Rds.)	Velocity (ft/sec)	Cycle (1000 Rds.)	Velocity (ft/sec)	Cycle (2000 Rds.)	Velocity (ft/sec)	Cycle (3000 Rds.)	Velocity (ft/sec)
	3053.9		3114.2-		3017.0		3001.6
	3040.2-		3162.5		2981.9		2942.9
	3127.4		3127.4		2977.5		2992.2
	3059.9		3176.6		2907.8-		2951.5
	3065.1		3159.5		3101.2+		2970.8
	3067.4		3209.2+		3017.9		3045.5+
	3145.1+		3186.7		3003.9		2965.5
	3116.7		3154.5		2989.0		2934.2-
	3128.4		3190.3		2959.8		2966.4
	3123.0		3131.8		3015.6		2953.7
Average	3092.6		3164.3		2997.2		2972.4
Extreme variation	104.9		95.0		193.4		111.3

Serial No. 5304041
 Test Control No. 29

M16A1 Rifle Comparative Test of
 Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Extreme Temperature (-50°) Ammunition: 5.56mm, Tracer, M196
 Lubricant: STD

Lot No.: TW 18204

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
301	41	Semi	FBC ✓		Bolt assist
730	42	Auto	FBF/FS	MAG	Bolt assist
750	42	Auto	FBR	MAG	
2301	41	Semi	FBC ✓		Bolt assist
2302	41	Semi	FJ		Sluggish
2304	41	Semi	FBC ✓		Bolt assist
2750	42	Auto	FBR	MAG	

*Paragraph 6.1.6 of MTP-3-2-059

Serial No. _____

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
(-50 °F)

Lubricant: CLP
Ammunition: 5.56mm, Tracer, M196
Lot No.: TW 18204

Serial No.: 5301961
Test Control No.: 12

	Number of Rounds					
	<u>Initial Inspection</u>	<u>1000</u>	<u>2000</u>	<u>3000 Upon Completion</u>		
Bore Diameter (in.)		na	na			
Groove Diameter (in.)		na	na			
Headspace (in.)	1.4656	na	na	1.4656		
Firing Pin						
Protrusion (in.)	0.033	na	na	0.033		
Indentation (in.)	0.022	0.020	0.021	0.021		
Trigger Pull (lb.)	6.50	7.50	8.0	7.75		
Velocity						
Average	3147.1	3200.1	3099.8	3031.9		
Extreme Variation	197.0	125.1	88.0	102.0		
Chamber Temp/Duration	-48°/16	-53°/16		-57°/17		
Cyclic Rate (rds/min)	<u>Cycle</u> 1	<u>Rate</u> 680.4	<u>Cycle</u> 11	<u>Rate</u> 642.9	<u>Cycle</u> 21	<u>Rate</u> 656.3
	2	735.7	12	720.0	22	727.3
	3	730.2	13	751.6	23	735.7
	4	691.1	14	551.0	24	649.5
	5	735.7	15	773.2	25	757.6
	6	735.7	16	735.7	26	765.3
	7	718.8	17	765.3	27	720.0
	8	673.5	18	673.5	28	656.3
	9	656.3	19	773.2	29	704.1
	10	581.6	20	730.2	30	680.4

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
 (-50°F)

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm, Tracer, M196
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

<u>Cycle</u> (Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (1000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (2000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (3000 Rds.)	<u>Velocity</u> (ft/sec)
	3145.6		3172.4		3110.9		3109.9+
	3120.6		3127.4-		3121.0		3070.3
	3207.6+		3252.5+		3121.5		3016.5
	3112.3		3199.4		3082.6		3016.0
	3197.9		3210.2		3068.4		3045.0
	3203.0		3210.4		3094.0		3010.6
	3010.6-		3211.3		3112.3		3010.2
	3180.6		3205.1		3117.2		3019.7
	3150.5		3213.3		3040.9-		3007.9
	3142.1		3199.4		3128.9+		3012.5
Average	3147.1		3200.1		3099.8		3031.9
Extreme variation	197.0		125.1		88.0		102.0

Serial No. 5301961

Test Control No. 12

M16A1 Rifle Comparative Test of
Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Extreme Temperature (-50°) Ammunition: 5.56mm, Tracer, M196
Lubricant: CLP

Lot No.: TW 18204

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
1	33	Semi	FBF		Frozen
2-4	33	Semi	FBC/FFR		Bolt assist/Light indent
382	36	Auto	FF	BOB	Magazine
945	34	Auto	FF	BLE	Bolt assist
1001	33	Semi	FBF		Frozen
1002-1004	33	Semi	FBC/FFR		Bolt assist/Light indent
1701-1702	33	Semi	FBC		Bolt assist
2001-2003	33	Semi	FBC/FFR		Bolt assist/Light indent
2682	36	Semi	FS	Unknown	Closed on empty chamber
2684	36	Semi	FF	BOB	Magazine
2700	36	Semi	FBR		Magazine

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
(-50°F)

Lubricant: CLP
Ammunition: 5.56mm, Tracer, M196
Lot No.: TW 18204

Serial No.: 5303398
Test Control No.: 24

	<u>Initial Inspection</u>	<u>Number of Rounds</u>		<u>3000 Upon Completion</u>
		<u>1000</u>	<u>2000</u>	
Bore Diameter (in.)		na	na	
Groove Diameter (in.)		na	na	
Headspace (in.)	1.4666	na	na	1.4666
Firing Pin				
Protrusion (in.)	0.034	na	na	0.033
Indentation (in.)	0.024	0.022	0.022	0.022
Trigger Pull (lb.)	7.25	8.0	7.50	8.0
Velocity				
Average	3031.7	3132.4	3054.6	3035.1
Extreme Variation	71.0	127.4	92.5	102.7
Chamber Temp/Duration	-48°/16	-53°/16		-57°/17

Cyclic Rate (rds/min)	<u>Cycle</u>	<u>Rate</u>	<u>Cycle</u>	<u>Rate</u>	<u>Cycle</u>	<u>Rate</u>
	I		II		ZI	
	1	697.0	11	704.1	21	676.9
	2	720.0	12	734.7	22	718.8
	3	727.3	13	757.6	23	727.3
	4	656.3	14	612.2	24	673.5
	5	730.2	15	673.5	25	704.1
	6	718.8	16	734.7	26	720.0
	7	727.3	17	727.3	27	727.3
	8	666.7	18	711.3	28	656.3
	9	680.4	19	697.0	29	666.7
	10	560.4	20	711.3	30	656.3

DATA RECORD

ML6A1 Rifle
 Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
 (-50°F)

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm, Tracer, M196
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet

Screens: 5 and 25 feet

<u>Cycle</u> (Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (1000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (2000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (3000 Rds.)	<u>Velocity</u> (ft/sec)
	3058.1		3055.7		3057.1		3035.8
	3039.9		3054.8-		3016.1		3080.2+
	3071.7+		3138.2		3036.7		3039.5
	3029.3		3152.0		3082.6		3007.0
	3020.2		3153.0		3076.4		3077.3
	3000.7-		3121.0		3028.4		2977.5-
	3044.6		3141.1		3095.9+		3036.7
	3008.8		3182.2+		3055.7		3019.7
	3022.5		3143.6		3093.5		3065.6
	3021.1		3182.1		3003.4-		3011.5
Average	3031.7		3132.4		3054.6		3035.1
Extreme variation	71.0		127.4		92.5		102.7

Serial No. 5303398
 Test Control No. 24

M16A1 Rifle Comparative Test of
 Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Extreme Temperature (-50°) Ammunition: 5.56mm, Tracer, M196
 Lubricant: CLP

Lot No.: TW 18204

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
1-3	37	Semi	FBC		Bolt assist
17	37	Semi	FF	BOB	Magazine
401	37	Semi	FBC		Bolt assist
976	39	Auto	FF	BOB	Magazine
980	39	Auto	FBR		Magazine
1001-1002	37	Semi	FBC		Bolt assist
1334	38	Auto	FF	BOB	Magazine
1341	38	Auto	FS	BOB	Magazine
1801	37	Semi	FBC/FJ		Bolt assist
1802	37	Semi	FBC		Bolt assist
2001-2004	37	Semi	FBC		Bolt assist
2031	37	Semi	FF	BLE	Bolt assist
2302	37	Semi	FF	BOB	Magazine
2307	37	Semi	FF	BOB	Magazine
2701	37	Semi	FBC/FTR		Bolt assist
2731	38	Auto	FBC	BLE	Bolt assist

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
(-50°F)

Lubricant: CLP
Ammunition: 5.56mm, Tracer, M196
Lot No.: TW 18204

Serial No.: 5304458
Test Control No.: 34

	<u>Initial Inspection</u>	<u>Number of Rounds</u>		<u>3000 Upon Completion</u>		
		<u>1000</u>	<u>2000</u>			
Bore Diameter (in.)		na	na			
Groove Diameter (in.)		na	na			
Headspace (in.)	1.4666	na	na	1.4666		
Firing Pin						
Protrusion (in.)	0.034	na	na	0.033		
Indentation (in.)	0.022	0.020	0.019	0.018		
Trigger Pull (lb.)	7.25	8.25	7.50	8.50		
Velocity						
Average	3059.7	3155.1	3144.8	2979.6		
Extreme Variation	131.0	141.6	101.9	117.7		
Chamber Temp/Duration	-48°/16	-53°/16		-57°/17		
Cyclic Rate (rds/min)	<u>Cycle</u>	<u>Rate</u>	<u>Cycle</u>	<u>Rate</u>	<u>Cycle</u>	<u>Rate</u>
	1	649.5	11	680.4	21	638.4
	2	727.3	12	765.3	22	711.3
	3	704.1	13	773.2	23	720.0
	4	673.5	14	612.2	24	625.0
	5	680.4	15	649.5	25	676.9
	6	720.0	16	727.3	26	697.0
	7	735.7	17	757.6	27	718.8
	8	673.5	18	704.1	28	666.7
	9	649.5	19	694.7	29	656.3
	10	568.4	20	718.8	30	673.2

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—EXTREME TEMPERATURE PERFORMANCE TEST—
 (-50°F)

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm, Tracer, M196
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

<u>Cycle</u> (Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (1000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (2000 Rds.)	<u>Velocity</u> (ft/sec)	<u>Cycle</u> (3000 Rds.)	<u>Velocity</u> (ft/sec)
	3078.3		3071.7-		3172.1		3048.3+
	3069.3		3153.0		3197.8+		2953.7
	2998.9		3175.6		3095.9-		2956.3
	2988.6-		3213.3+		3139.8		2981.0
	3059.5		3203.5		3162.7		3012.9
	3019.3		3136.4		3144.5		3012.0
	3097.8		3172.5		3119.7		2981.5
	3104.1		3133.3		3128.0		2930.6-
	3061.8		3157.5		3155.5		2939.4
	3119.6+		3134.3		3132.2		2980.1
Average	3059.7		3155.1		3144.8		2979.6
Extreme variation	131.0		141.6		101.9		117.7

Serial No. 5304458
 Test Control No. 34

MI6A1 Rifle Comparative Test of
 Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Extreme Temperature (-50°)
 Lubricant: CLP

Ammunition: 5.56mm, Tracer, M196

Lot No.: TW 18204

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
1	41	Semi	FBC	BLE	Bolt assist
2-3	41	Semi	FBC/FFR		Bolt assist/Light indent
701	41	Semi	FBC	BLE	Bolt assist
901	41	Semi	FF	BLE	Bolt assist
907	41	Semi	FF	BOB	Magazine
932	42	Auto	FF	BOB	Magazine
1001	41	Semi	FBC	BLE	Bolt assist
1701	41	Semi	FBC	BLE	Bolt assist
2001	41	Semi	FBC/FFR		Bolt assist/Light indent
2002-2004	41	Semi	FBC/FFR		Bolt assist/Light indent
2332	42	Auto	FJ	Unknown	
2350	42	Auto	FBR		Bolt closed on empty chamber.
2902	41	Semi	FFR		Light indent

*Paragraph 6.1.6 of MTP-3-2-059

Serial No. _____

M16A1 RIFLE
BLANK FIRING TEST

DATA RECORD

M16A1
Comparative Test of Lubricants/Cleaners

—BLANK FIRING TEST—

Lubricant: STD
Ammunition: Blank, M200
Lot No.: LC 60-316

Serial No.: 5301238
Test Control No.: 4

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.034	na	na	na	na	0.031
Indentation (in.)	0.023	na	na	na	na	0.022
Trigger Pull (lb.)	7.25	na	na	na	na	8.0
Cyclic Rate (rds/min)	<u>61-90</u>	<u>301-330</u>	<u>541-570</u>	<u>781-810</u>	<u>1021-1050</u>	
	780	875	876	800	884	

Remarks:

Serial No. 5301238
 Test Control No. 4

**M16A1 Rifle Comparative Test of
 Lubricants/Cleaners**

—RECORD OF MALFUNCTIONS—

Test: Blank Firing
 Lubricant: STD

Ammunition: Blank (M200)

Lot No.: LC 60-316

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
562	27	Auto	FJ		Ejector pin
973	25	Semi	FJ		proved to be packed
994	26	Auto	FJ		solidly with carbon
997	26	Auto	FJ		
1005	26	Auto	FJ		
1006	26	Auto	FJ		
					Relubricated ejector pin

*Paragraph 6.1.6 of MTP-3-2-059

DATA RECORD

MI6A1
Comparative Test of Lubricants/Cleaners

—BLANK FIRING TEST—

Lubricant: STD
Ammunition: Blank, M200
Lot No.: LC 60-316

Serial No.: 5302500
Test Control No.: 16

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.033	na	na	na	na	0.032
Indentation (in.)	0.019	na	na	na	na	0.018
Trigger Pull (lb.)	6.75	na	na	na	na	7.0
Cyclic Rate (rds/min)	<u>61-90</u>	<u>301-330</u>	<u>541-570</u>	<u>781-810</u>	<u>1021-1050</u>	
	783	875	818	821	813	

Remarks:

DATA RECORD

MI6A1
Comparative Test of Lubricants/Cleaners

—BLANK FIRING TEST—

Lubricant: STD
Ammunition: Blank, M200
Lot No.: LC 60-316

Serial No.: 5304094
Test Control No.: 32

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.033	na	na	na	na	0.031
Indentation (in.)	0.023	na	na	na	na	0.019
Trigger Pull (lb.)	6.50	na	na	na	na	6.25
Cyclic Rate (rds/min)	<u>61-90</u>	<u>301-330</u>	<u>541-570</u>	<u>781-810</u>	<u>1021-1050</u>	
	960	900	813	821	800	

Remarks:

Serial No. 5304094
 Test Control No. 32

M16A1 Rifle Comparative Test of
 Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Blank Firing
 Lubricant: STD

Ammunition: Blank (M200)

Lot No.: LC 60-316

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
976	33	Semi	FJ		
977	33	Semi	FJ		
978	33	Semi	FJ		
979	33	Semi	FJ		
		Relubricated ejector pin			

*Paragraph 6.1.6 of MTP-3-2-059

Serial No. _____

DATA RECORD

MI6A1
Comparative Test of Lubricants/Cleaners

—BLANK FIRING TEST—

Lubricant: CLP
Ammunition: Blank, M200
Lot No.: LC 60-316

Serial No.: 5301430
Test Control No.: 5

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4656	na	na	na	na	1.4656
Firing Pin						
Protrusion (in.)	0.034	na	na	na	na	0.033
Indentation (in.)	0.024	na	na	na	na	0.022
Trigger Pull (lb.)	8.25	na	na	na	na	7.75
Cyclic Rate (rds/min)	<u>61-90</u>	<u>301-330</u>	<u>541-570</u>	<u>781-810</u>	<u>1021-1050</u>	
	938	900	867	884	894	

Remarks:

DATA RECORD

M16A1
Comparative Test of Lubricants/Cleaners

—BLANK FIRING TEST—

Lubricant: CLP
Ammunition: Blank, M200
Lot No.: LC 60-316

Serial No.: 5302859
Test Control No.: 18

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4656	na	na	na	na	1.4656
Firing Pin						
Protrusion (in.)	0.033	na	na	na	na	0.032
Indentation (in.)	0.024	na	na	na	na	0.022
Trigger Pull (lb.)	8.0	na	na	na	na	7.75
Cyclic Rate (rds/min)	<u>61-90</u>	<u>301-330</u>	<u>541-570</u>	<u>781-810</u>	<u>1021-1050</u>	
	918	791	867	758	767	

Remarks:

DATA RECORD

MI6A1
Comparative Test of Lubricants/Cleaners

—BLANK FIRING TEST—

Lubricant: CLP
Ammunition: Blank, M200
Lot No.: LC 60-316

Serial No.: 5304183
Test Control No.: 33

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.034	na	na	na	na	0.032
Indentation (in.)	0.022	na	na	na	na	0.020
Trigger Pull (lb.)	8.0	na	na	na	na	7.75
Cyclic Rate (rds/min)	<u>61-90</u>	<u>301-330</u>	<u>541-570</u>	<u>781-810</u>	<u>1021-1050</u>	
	894	758	876	796	839	

Remarks:

M16A1 RIFLE
WATER SPRAY TEST

Serial No. 5301238
Test Control No. 4.

MI6A1 Rifle Comparative Test of
Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Water Spray
Lubricant: STD

Ammunition: Ball (193)

Lot No.: RA 2-24

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
452	26	Semi	FBF	BLE	Bolt assist
455	26	Semi	FBC	PS	Bolt assist
572	26	Semi	FBF	BLE	Bolt assist
575	26	Semi	FBC	PS	Bolt assist
603	26	Semi	FBF	BLE	Bolt assist
606	26	Semi	FBF	PS	Bolt assist
609	26	Semi	FBF	PS	Bolt assist
613	26	Semi	FBC	PS	Bolt assist

*Paragraph 6.1.6 of MTP-3-2-059

DATA RECORD

MI6A1 Rifle
Comparative Test of Lubricants/Cleaners

—WATER SPRAY—

Lubricant: STD
Ammunition: M193, Ball
Lot No.: RA 2-24

Serial No.: 5302500
Test Control No.: 16

	<u>Initial Inspection</u>	<u>Upon Completion 720 Rounds</u>		
Bore Diameter (in.)				
Groove Diameter (in.)				
Headspace (in.)	1.4666	1.4666		
Firing Pin Protrusion (in.)	0.033	0.033		
Indentation (in.)	0.019	0.021		
Trigger Pull (lb.)	7.5	7.5		
	<u>Round</u>	<u>Rate</u>	<u>Round</u>	<u>Rate</u>
Cyclic Rate (rds/min)	61-90	1074	421-450	1011
	181-210	957	541-570	970
	301-330	894	661-690	1000

Remarks:

Serial No. 5302500
 Test Control No. 16

M16A1 Rifle Comparative Test of
 Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Water Spray
 Lubricant: STD

Ammunition: Ball (193)

Lot No.: RA 2-24

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
3	29	Semi	FF	MAG	Bullet tip against end of barrel.
4	29	Semi	FF	BOB	Bolt override
272	30	Auto	FBF	BLE	Bolt assist
302	31	Auto	FBF	BLE	Bolt assist
340	32	Semi	FBC	PS	Bolt assist
363	29	Semi	FBF	BLE	Bolt assist
606	29	Semi	FBC	PS	Bolt assist
624	29	Semi	FF	BOB	Bolt override
625	29	Semi	FBC	PS	Bolt assist

*Paragraph 6.1.6 of MTP-3-2-059

Serial No. 5302500

WATER SPRAY TEST

Serial No.: 5302500
 Test Control No.: 16
 Rain (in/min): 0.40

Water Temperature: 58°F
 Air Temperature: 55°F

	Exposure Time (min.)		Rain (ins.)	
	Increments	Cumulative	Increments	Cumulative
<u>Weapon Horizontal</u>				
Bolt open	5.0	5.0	1.7	1.7
Loaded, bolt closed	5.0	5.0	1.8	3.5
120 rounds fired as specified in Table V of MIL-R-45587A	3.5	13.5	1.7	5.2
Bolt open	5.1	18.6	1.9	7.1
Loaded, bolt closed	5.0	23.6	2.0	9.1
120 rounds fired as specified above	4.2	27.8	1.8	10.9
<u>Weapon Muzzle Up</u>				
Bolt open	5.0	32.8	1.9	12.8
Loaded, bolt closed	5.0	37.8	2.0	14.8
120 rounds fired as specified above	4.2	42.0	1.8	16.6
Bolt open	5.0	47.0	2.0	18.6
Loaded, bolt closed	5.0	52.0	2.0	20.6
120 rounds fired as specified above	4.0	56.0	1.7	22.3
<u>Weapon Muzzle Down</u>				
Bolt open	5.0	61.0	2.0	24.3
Loaded, bolt closed	5.0	66.0	1.9	26.2
120 rounds fired as specified above	4.0	70.0	1.6	27.8
Bolt open	5.0	75.0	2.0	29.8
Loaded, bolt closed	5.0	80.0	2.1	31.9
100 rounds fired as specified above	4.1	84.1	1.6	33.5

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—WATER SPRAY—

Lubricant: STD
Ammunition: M193, Ball
Lot No.: RA 2-24

Serial No.: 5301283
Test Control No.: 29

	<u>Initial Inspection</u>	<u>Upon Completion 720 Rounds</u>		
Bore Diameter (in.)				
Groove Diameter (in.)				
Headspace (in.)	1.4666	1.4666		
Firing Pin Protrusion (in.)	0.034	0.034		
Indentation (in.)	0.022	0.023		
Trigger Pull (lb.)	8.0	6.75		
	<u>Round</u>	<u>Rate</u>	<u>Round</u>	<u>Rate</u>
Cyclic Rate (rds/min)	61-90	968	421-450	1063
	181-210	990	541-570	857
	301-330	927	661-690	875

Remarks:

WATER SPRAY TEST

Serial No.: 5301283
 Test Control No.: 29
 Rain (in/min): 0.39

Water Temperature: 60°F

Air Temperature: 68°F

	Exposure Time (min.)		Rain (ins.)	
	Increments	Cumulative	Increments	Cumulative
<u>Weapon Horizontal</u>				
Bolt open	5.0	5.0	2.1	2.1
Loaded, bolt closed	5.0	10.0	2.2	4.3
120 rounds fired as specified in Table V of MIL-R-45587A	4.1	14.1	1.4	5.7
Bolt open	5.0	19.1	1.8	7.5
Loaded, bolt closed	4.8	23.9	2.0	9.5
120 rounds fired as specified above	4.0	27.9	1.8	11.3
<u>Weapon Muzzle Up</u>				
Bolt open	5.0	32.9	1.9	13.2
Loaded, bolt closed	5.1	38.0	2.0	15.2
120 rounds fired as specified above	4.1	42.1	1.8	17.0
Bolt open	5.0	47.1	1.8	18.8
Loaded, bolt closed	5.0	52.1	2.0	20.8
120 rounds fired as specified above	4.2	56.3	1.8	22.6
<u>Weapon Muzzle Down</u>				
Bolt open	5.0	61.3	2.0	24.6
Loaded, bolt closed	5.0	66.3	1.7	26.3
120 rounds fired as specified above	5.0	71.3	2.1	28.4
Bolt open	5.0	76.3	1.8	30.2
Loaded, bolt closed	5.0	81.3	1.7	31.9
100 rounds fired as specified above	3.7	85.0	1.5	33.4

DATA RECORD

MI6A1 Rifle
Comparative Test of Lubricants/Cleaners

—WATER SPRAY—

Lubricant: STD
Ammunition: M193, Ball
Lot No.: RA 2-24

Serial No.: 5304094
Test Control No.: 32

	<u>Initial Inspection</u>	<u>Upon Completion 720 Rounds</u>		
Bore Diameter (in.)				
Groove Diameter (in.)				
Headspace (in.)	1.4666	1.4666		
Firing Pin Protrusion (in.)	0.031	0.031		
Indentation (in.)	0.022	0.024		
Trigger Pull (lb.)	7.75	6.75		
	<u>Round</u>	<u>Rate</u>	<u>Round</u>	<u>Rate</u>
Cyclic Rate (rds/min)	61-90	1085	421-450	1000
	181-210	1055	541-570	969
	301-330	1021	661-690	913

Remarks:

WATER SPRAY TEST

Serial No.: 5304094
 Test Control No.: 32
 Rain (in/min): 0.40

Water Temperature: 55°F
 Air Temperature: 60°F

	Exposure Time (min.)		Rain (ins.)	
	Increments	Cumulative	Increments	Cumulative
<u>Weapon Horizontal</u>				
Bolt open	5.0	5.0	2.0	2.0
Loaded, bolt closed	5.0	10.0	1.8	3.8
120 rounds fired as specified in Table V of MIL-R-45587A	4.0	14.0	1.5	5.3
Bolt open	5.0	19.0	2.1	7.4
Loaded, bolt closed	5.0	24.0	2.0	9.4
120 rounds fired as specified above	4.0	28.0	1.7	11.1
<u>Weapon Muzzle Up</u>				
Bolt open	5.0	33.0	2.0	13.1
Loaded, bolt closed	5.0	38.0	1.9	15.0
120 rounds fired as specified above	4.1	42.1	1.7	16.7
Bolt open	5.0	47.1	2.1	18.8
Loaded, bolt closed	5.0	52.1	2.0	20.8
120 rounds fired as specified above	4.0	56.1	1.5	22.3
<u>Weapon Muzzle Down</u>				
Bolt open	5.0	61.1	2.2	24.5
Loaded, bolt closed	5.0	66.1	1.8	26.3
120 rounds fired as specified above	4.1	70.2	1.6	27.9
Bolt open	5.0	75.2	2.1	30.0
Loaded, bolt closed	5.0	80.2	2.0	32.0
100 rounds fired as specified above	3.8	84.0	1.5	33.5

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—WATER SPRAY—

Lubricant: CLP
Ammunition: M193, Ball
Lot No.: RA 2-24

Serial No.: 5301430
Test Control No.: 5

	<u>Initial Inspection</u>	<u>Upon Completion 720 Rounds</u>		
Bore Diameter (in.)				
Groove Diameter (in.)				
Headspace (in.)	1.4656	1.4656		
Firing Pin Protrusion (in.)	0.033	0.033		
Indentation (in.)	0.022	0.024		
Trigger Pull (lb.)	7.75	8.0		
	<u>Round</u>	<u>Rate</u>	<u>Round</u>	<u>Rate</u>
Cyclic Rate (rds/min)	61-90	1133	421-450	989
	181-210	1021	541-570	978
	301-330	978	661-690	957

Remarks: 3 Malfunctions

WATER SPRAY TEST

Serial No.: 5301430
 Test Control No.: 5
 Rain (in/min): 0.40

Water Temperature: 54°F
 Air Temperature: 52°F

	Exposure Time (min.)		Rain (ins.)	
	Increments	Cumulative	Increments	Cumulative
<u>Weapon Horizontal</u>				
Bolt open	5.0	5.0	2.1	2.1
Loaded, bolt closed	5.0	10.0	2.0	4.1
120 rounds fired as specified in Table V of MIL-R-45587A	4.2	14.2	1.7	5.8
Bolt open	5.0	19.2	1.8	7.6
Loaded, bolt closed	5.0	24.2	1.9	9.5
120 rounds fired as specified above	3.9	28.1	1.6	11.1
<u>Weapon Muzzle Up</u>				
Bolt open	5.0	33.1	2.1	13.2
Loaded, bolt closed	5.0	38.1	1.9	15.1
120 rounds fired as specified above	4.0	42.1	1.7	16.8
Bolt open	5.0	47.1	2.0	18.8
Loaded, bolt closed	5.0	52.1	1.9	20.7
120 rounds fired as specified above				
<u>Weapon Muzzle Down</u>				
Bolt open	5.0	61.2	1.8	24.2
Loaded, bolt closed	5.0	66.2	2.0	26.2
120 rounds fired as specified above	4.0	70.2	1.7	27.9
Bolt open	5.0	75.2	2.2	30.1
Loaded, bolt closed	5.0	80.2	2.0	32.1
100 rounds fired as specified above	3.9	84.1	1.6	33.7

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—WATER SPRAY—

Lubricant: CLP
Ammunition: M193, Ball
Lot No.: RA 2-24

Serial No.: 5302859
Test Control No.: 18

	<u>Initial Inspection</u>	<u>Upon Completion 720 Rounds</u>		
Bore Diameter (in.)				
Groove Diameter (in.)				
Headspace (in.)	1.4656	1.4656		
Firing Pin Protrusion (in.)	0.032	0.032		
Indentation (in.)	0.022	0.023		
Trigger Pull (lb.)	7.75	7.5		
	<u>Round</u>	<u>Rate</u>	<u>Round</u>	<u>Rate</u>
Cyclic Rate (rds/min)	61-90	1121	421-450	938
	181-210	1055	541-570	913
	301-330	989	661-690	957

Remarks: No Malfunctions

WATER SPRAY TEST

Serial No.: 5302859
 Test Control No.: 18
 Rain (in/min): 0.40

Water Temperature: 58°F

Air Temperature: 58°F

	Exposure Time (min.)		Rain (ins.)	
	Increments	Cumulative	Increments	Cumulative
<u>Weapon Horizontal</u>				
Bolt open	5.0	5.0	2.0	2.0
Loaded, bolt closed	5.0	10.0	2.0	4.0
120 rounds fired as specified in Table V of MIL-R-45587A	4.0	14.0	1.7	5.7
Bolt open	5.0	19.0	1.9	7.6
Loaded, bolt closed	5.0	24.0	1.9	9.5
120 rounds fired as specified above	3.9	27.9	1.6	11.1
<u>Weapon Muzzle Up</u>				
Bolt open	5.0	32.9	2.2	13.3
Loaded, bolt closed	5.0	37.9	2.0	15.3
120 rounds fired as specified above	4.0	41.9	1.5	16.8
Bolt open	5.0	46.9	2.0	18.8
Loaded, bolt closed	5.0	51.9	1.9	20.7
120 rounds fired as specified above	4.0	55.9	1.6	22.3
<u>Weapon Muzzle Down</u>				
Bolt open	5.0	60.9	2.0	24.3
Loaded, bolt closed	5.0	65.9	1.9	26.2
120 rounds fired as specified above	4.1	70.0	1.7	27.9
Bolt open	5.0	75.0	2.0	29.9
Loaded, bolt closed	5.0	80.0	2.2	32.1
100 rounds fired as specified above	4.0	84.0	1.6	33.7

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—WATER SPRAY—

Lubricant: CLP
Ammunition: M193, Ball
Lot No.: RA 2-24

Serial No.: 5304183
Test Control No.: 33

	<u>Initial Inspection</u>	<u>Upon Completion 720 Rounds</u>
Bore Diameter (in.)		
Groove Diameter (in.)		
Headspace (in.)	1.4666	1.4666
Firing Pin Protrusion (in.)	0.032	0.032
Indentation (in.)	0.020	0.023
Trigger Pull (lb.)	7.75	8.0
	<u>Round</u> <u>Rate</u>	<u>Round</u> <u>Rate</u>
Cyclic Rate (rds/min)	61-90 1121	421-450 933
	181-210 1011	541-570 968
	301-330 1000	661-690 989

Remarks: No Malfunctions

WATER SPRAY TEST

Serial No.: 5304183
 Test Control No.: 33
 Rain (in/min): 0.40

Water Temperature: 55°F

Air Temperature: 50°F

	Exposure Time (min.)		Rain (ins.)	
	Increments	Cumulative	Increments	Cumulative
<u>Weapon Horizontal</u>				
Bolt open	5.0	5.0	1.8	1.8
Loaded, bolt closed	5.0	10.0	2.0	3.8
120 rounds fired as specified in Table V of MIL-R-45587A	4.0	14.0	1.7	5.5
Bolt open	5.0	19.0	2.0	7.5
Loaded, bolt closed	5.0	24.0	1.9	9.4
120 rounds fired as specified above	4.0	28.0	1.7	11.1
<u>Weapon Muzzle Up</u>				
Bolt open	5.0	33.0	2.0	13.1
Loaded, bolt closed	5.0	38.0	2.0	15.1
120 rounds fired as specified above	3.9	41.9	1.5	16.6
Bolt open	5.0	46.9	2.1	18.7
Loaded, bolt closed	5.0	51.9	2.0	20.7
120 rounds fired as specified above	3.9	55.8	1.6	22.3
<u>Weapon Muzzle Down</u>				
Bolt open	5.0	70.8	2.1	24.4
Loaded, bolt closed	5.0	65.8	2.0	26.4
120 rounds fired as specified above	4.0	69.8	1.7	28.1
Bolt open	5.0	74.8	2.0	30.1
Loaded, bolt closed	5.0	79.8	2.0	32.0
100 rounds fired as specified above	4.0	83.8	1.7	33.7

M16A1 RIFLE
FOULING TEST

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: STD
Ammunition: 5.56mm Ball, M193
Lot No.: RA 2-24

Serial No.: 5301238
Test Control No.: 4

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.034	na	na	na	na	0.034
Indentation (in.)	0.023	na	na	na	na	0.022
Trigger Pull (lb.)	6.75	na	na	na	na	8.50
Cyclic Rate (rds/min)		857.1	821.1	821.1	838.7	838.7
Velocity						
Average	3220.6	3149.8	3175.6	3173.6	3155.2	3172.7
Extreme Variation	145.4	146.5	126.0	125.2	68.3	64.4

Remarks: No malfunctions.

DATA RECORD

MI6A1 Rifle
 Comparative Test of Lubricants/Cleaners

--FOULING TEST--

Lubrication/Cleaner: STD
 Ammunition: 5.56mm Ball M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
1	3304.4+	4	3224.1	8	3190.1+		
	3270.1		3223.5		3168.4		
(o Rounds)	3159.0-	(480 Rounds)	3238.4+	(960 Rounds)	3142.3		
	3173.2		3169.9		3160.3		
	3176.6		3196.0		3151.7		
	3191.9		3158.7		3121.8-		
	3226.4		3126.2		3154.9		
	3185.0		3143.1		3155.0		
	3286.1		3167.3		3173.3		
	3233.3		3112.4-		3134.1		
Average	3220.6	Average	3175.6	Average	3155.2		
Extreme Variation	145.4	Extreme Variation	126.0	Extreme Variation	68.3		
2	3237.6+	6	3231.6+	10	3200.1		
	3160.3		3201.1		3212.0+		
(240 Rounds)	3125.2	(720 Rounds)	3140.7	(1200 Rounds)	3174.2		
	3096.9		3106.4-		3174.1		
	3127.4		3177.0		3160.9		
	3122.8		3206.1		3147.6-		
	3170.1		3149.1		3162.0		
	3164.5		3161.8		3179.4		
	3204.0		3165.9		3168.8		
	3091.1-		3196.1		3147.6-		
Average	3149.8	Average	3173.6	Average	3172.7		
Extreme Variation	146.5	Extreme Variation	125.2	Extreme Variation	64.4		

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: STD
Ammunition: 5.56mm Ball, M193
Lot No.: RA 2-24

Serial No.: 5302500
Test Control No.: 16

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.033	na	na	na	na	0.033
Indentation (in.)	0.021	na	na	na	na	0.020
Trigger Pull (lb.)	7.5	na	na	na	na	6.25
Cyclic Rate (rds/min)		875.0	821.1	829.8	866.7	866.7
Velocity						
Average	3234.3	3169.7	3144.9	3187.1	3172.6	3158.3
Extreme Variation	145.3	125.2	183.7	120.3	106.5	83.8

Remarks: No malfunctions.

DATA RECORDM16A1 Rifle
Comparative Test of Lubricants/Cleaners

--FOULING TEST--

Lubrication/Cleaner: STD
Ammunition: 5.56mm Ball M193
Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet

Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
1	3324.4+	4	3242.7+	8	3123.3		
(0 Rounds)	3228.8	(480 Rounds)	3192.3	(960 Rounds)	3160.7		
	3249.6		3116.9		3150.6		
	3214.5		3083.2		3216.1		
	3257.6		3116.0		3214.6		
	3216.4		3144.3		3110.2-		
	3205.9		3147.9		3192.7		
	3179.1-		3059.0-		3216.7+		
	3264.5		3127.4		3194.2		
	3201.8		3169.2		3146.7		
Average	3234.3	Average	3144.9	Average	3172.6		
Extreme Variation	145.3	Extreme Variation	183.7	Extreme Variation	106.5		
2	3234.0+	6	3243.4+	10	3194.4+		
(240 Rounds)	3212.3	(720 Rounds)	3239.6	(1200 Rounds)	3174.1		
	3211.2		3172.8		3156.8		
	3108.8-		3210.7		3153.6		
	3166.3		3176.3		3136.3		
	3152.7		3161.4		3173.2		
	3153.9		3123.1		3184.8		
	3110.5		3201.9-		3169.5		
	3230.4		3157.9		3130.0		
	3117.0		3183.4		3110.6-		
Average	3169.7	Average	3187.1	Average	3158.3		
Extreme Variation	125.2	Extreme Variation	120.3	Extreme Variation	83.8		

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: STD
Ammunition: 5.56mm Ball, M193
Lot No.: RA 2-24

Serial No.: 5304094
Test Control No.: 32

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4667	na	na	na	na	1.4667
Firing Pin						
Protrusion (in.)	0.031	na	na	na	na	0.031
Indentation (in.)	0.024	na	na	na	na	0.022
Trigger Pull (lb.)	6.75	na	na	na	na	5.0
Cyclic Rate (rds/min)		847.8	840.0	840.0	857.1	893.6
Velocity						
Average	3174.5	3150.1	3146.0	3173.4	3175.0	3159.1
Extreme Variation	115.7	103.5	88.9	102.7	97.1	99.1

Remarks: No malfunctions.

DATA RECORD

MI6A1 Rifle
Comparative Test of Lubricants/Cleaners

--FOULING TEST--

Lubrication/Cleaner: STD
Ammunition: 5.56mm Ball M193
Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet
Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
1	3262.1+	4	3157.6	8	3180.2		
0 Rounds)	3175.7	(480 Rounds)	3153.8	(960 Rounds)	3182.9		
	3155.3		3144.8		3117.9-		
	3174.9		3145.5		3161.5		
	3146.4-		3116.1		3215.0+		
	3139.1		3177.3		3195.3		
	3153.3		3168.7		3175.9		
	3169.6		3095.2-		3179.2		
	3197.0		3184.1+		3149.0		
	3171.1		3116.6		3192.9		
	Average		3174.5		Average	3146.0	Average
Extreme Variation	115.7	Extreme Variation	88.9	Extreme Variation	97.1		
2	3158.8	6	3203.0	10	3202.0		
240 Rounds)	3163.1	(720 Rounds)	3205.1	(1200 Rounds)	3189.2		
	3138.2		3233.4+		3119.7		
	3166.6+		3173.6		3123.1		
	3162.3		3177.3		3172.5		
	3131.0		3159.1		3141.9		
	3169.4		3157.6		3210.0+		
	3159.4		3133.6		3191.2		
	3189.3		3160.1		3110.9-		
	3063.1-		3130.7-		3130.3		
	Average		3150.1		Average	3173.4	Average
Extreme Variation	103.5	Extreme Variation	102.7	Extreme Variation	99.1		

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

--FOULING TEST--

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm Ball M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
1	3209.6+	4	3187.0	8	3193.8		
0 Rounds)	3142.1	(480 Rounds)	3181.4	(960 Rounds)	3166.5		
	3142.5		3226.8+		3177.3		
	3215.2		3146.6		3113.0		
	3128.1		3105.9		3133.5		
	3126.5		3147.6		3107.2		
	3105.7-		3137.4		3104.7-		
	3111.2		3125.1		3148.2		
	3162.2		3099.6-		3226.5+		
	3145.1		3155.5		3151.6		
	Average		3148.8		Average	3151.3	Average
Extreme Variation	103.9	Extreme Variation	127.2	Extreme Variation	121.8		
2	3277.5+	6	3246.2+	10	3183.1		
240 Rounds)	3223.2	(720 Rounds)	3148.7	(1200 Rounds)	3190.3		
	3092.0-		3189.1		3212.6+		
	3132.5		3134.6		3115.6-		
	3117.3		3106.5-		3166.8		
	3099.6		3151.0		3138.7		
	3157.4		3136.4		3192.3		
	3116.1		3119.1		3147.4		
	3135.5		3144.2		3135.3		
	3180.2		3180.8		3118.7		
	Average		3153.1		Average	3155.7	Average
Extreme Variation	185.5	Extreme Variation	139.7	Extreme Variation	97.0		

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: CLP
Ammunition: 5.56mm Ball, M193
Lot No.: RA 2-24

Serial No.: 5301430
Test Control No.: 5

	Initial Inspection	Number of Rounds				1200 Upon Completion
		240	480	720	960	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4656	na	na	na	na	1.4656
Firing Pin						
Protrusion (in.)	0.033	na	na	na	na	0.033
Indentation (in.)	0.024	na	na	na	na	0.023
Trigger Pull (lb.)	8.0	na	na	na	na	8.25
Cyclic Rate (rds/min)		937.5	937.5	937.5	937.5	909.1
Velocity						
Average	3148.8	3153.1	3151.3	3155.7	3152.2	3160.1
Extreme Variation	103.9	185.5	127.2	139.7	121.8	97.0

Remarks: No malfunctions.

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: CLP
Ammunition: 5.56mm Ball, M193
Lot No.: RA 2-24

Serial No.: 5302859
Test Control No.: 18

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4656	na	na	na	na	1.4656
Firing Pin						
Protrusion (in.)	0.032	na	na	na	na	0.032
Indentation (in.)	0.023	na	na	na	na	0.023
Trigger Pull (lb.)	7.5	na	na	na	na	5.50
Cyclic Rate (rds/min)		875.0	884.2	838.7	838.7	821.0
Velocity						
Average	3122.6	3139.8	3133.2	3159.8	3144.3	3159.7
Extreme Variation	171.6	187.6	149.1	109.9	87.2	117.3

Remarks:

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm Ball M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
1	3231.2+	4	3230.7+	8	3175.2+		
(0 Rounds)	3059.8	(480 Rounds)	3081.6-	(960 Rounds)	3163.8		
	3105.5		3137.8		3147.4		
	3128.9		3147.9		3152.6		
	3112.0		3104.5		3149.9		
	3059.6-		3157.8		3169.7		
	3119.7		3155.5		3150.4		
	3108.9		3121.4		3125.6		
	3155.5		3109.9		3120.3		
	3144.7		3085.1		3088.0-		
Average	3122.6	Average	3133.2	Average	3144.3		
Extreme Variation	171.6	Extreme Variation	149.1	Extreme Variation	87.2		
2	3247.1+	6	3185.2	10	3158.2		
(240 Rounds)	3172.9	(720 Rounds)	3164.8	(1200 Rounds)	3198.0		
	3075.4		3176.7		3125.7		
	3197.5		3139.5		3194.8		
	3106.8		3206.5+		3136.9		
	3059.5-		3125.9		3164.0		
	3139.9		3115.7		3088.8-		
	3151.8		3096.6-		3139.9		
	3162.6		3186.0		3206.1+		
	3084.7		3200.6		3119.7		
Average	3139.8	Average	3159.8	Average	3159.7		
Extreme Variation	187.6	Extreme Variation	109.9	Extreme Variation	117.3		

Serial No. 5302859
 Test Control No. 18

M16A1 Rifle Comparative Test of
 Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Fouling
 Lubricant: CLP

Ammunition: 5.56mm, Ball (M193)

Lot No.: RA 2-24

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
979	29	Semi	FFR	Ammo	Good indent

*Paragraph 6.1.6 of MTP-3-2-059

Serial No. _____

DATA RECORD

MI6A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: CLP
Ammunition: 5.56mm Ball, M193
Lot No.: RA 2-24

Serial No.: 5304183
Test Control No.: 33

	Initial Inspection	Number of Rounds				1200 Upon Completion
		240	480	720	960	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4667
Firing Pin						
Protrusion (in.)	0.032	na	na	na	na	0.032
Indentation (in.)	0.023	na	na	na	na	0.022
Trigger Pull (lb.)	8.0	na	na	na	na	8.25
Cyclic Rate (rds/min)		903.2	884.2	893.6	875.0	829.7
Velocity						
Average	3150.4	3160.5	3149.7	3167.2	3145.2	3168.2
Extreme Variation	182.5	129.6	146.5	161.5	111.9	84.6

Remarks: No malfunctions.

DATA RECORD

MI6A1 Rifle
 Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm Ball M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

<u>Cycle</u>	<u>Velocity (ft/sec)</u>	<u>Cycle</u>	<u>Velocity (ft/sec)</u>	<u>Cycle</u>	<u>Velocity (ft/sec)</u>	<u>Cycle</u>	<u>Velocity (ft/sec)</u>
1	3235.6+	4	3240.3+	8	3209.9+		
(0 Rounds)	3053.1-	(480 Rounds)	3182.1	(960 Rounds)	3134.5-		
	3126.4		3167.8		3177.2		
	3152.2		3151.8		3186.7		
	3068.3		3146.1		3143.8		
	3150.9		3093.8-		3098.0-		
	3159.8		3107.8		3156.3		
	3160.7		3133.0		3124.2		
	3158.1		3153.9		3108.9		
	3139.3		3120.3		3112.1		
Average	3150.4	Average	3149.7	Average	3145.2		
Extreme Variation	182.5	Extreme Variation	146.5	Extreme Variation	111.9		
2	3220.9+	6	3195.6	10	3202.6+		
(240 Rounds)	3214.1	(720 Rounds)	3251.8+	(1200 Rounds)	3154.6		
	3091.3-		3159.2		3167.4		
	3132.0		3154.8		3170.5		
	3109.4		3090.3-		3118.0-		
	3137.8		3128.7		3149.2		
	3171.2		3160.1		3160.3		
	3196.0		3199.2		3198.4		
	3178.6		3175.7		3160.5		
	3154.1		3156.3		3200.3		
Average	3160.5	Average	3167.2	Average	3168.2		
Extreme Variation	129.6	Extreme Variation	161.5	Extreme Variation	84.6		

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: STD
Ammunition: 5.56mm, Tracer (M196)
Lot No.: TW 18204

Serial No.: 5301238
Test Control No.: 4

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4668	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.034	na	na	na	na	0.033
Indentation (in.)	0.022	na	na	na	na	0.021
Trigger Pull (lb.)	8.50	na	na	na	na	7.50
Cyclic Rate (rds/min)		782.6	705.9	742.3	733.3	674.2
Velocity						
Average	3083.3	3159.0	3134.0	3124.9	3145.7	3102.9
Extreme Variation	120.8	171.9	113.4	38.8	164.6	147.5

Remarks: No malfunctions.

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubrication/Cleaner: STD
 Ammunition: 5.56mm, Tracer (M196)
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

<u>Cycle</u>	<u>Velocity</u> (ft/sec)	<u>Cycle</u>	<u>Velocity</u> (ft/sec)	<u>Cycle</u>	<u>Velocity</u> (ft/sec)	<u>Cycle</u>	<u>Velocity</u> (ft/sec)
1		4		8			
(40 Rounds)	3164.5+	(480 Rounds)	3145.1	(960 Rounds)	3232.5+		
	3118.1		3138.2		3124.0		
	3120.6		3168.5		3180.6		
	3097.4		3111.8		3088.6		
	3052.9		3161.0		3128.9		
	3062.3		3196.9+		3160.0		
	3042.7-		3123.5		3168.0		
	3057.6		3098.8		3166.5		
	3063.7		3112.3		3140.2		
	3052.0		3083.5-		3067.9-		
Page	3083.3		3134.0		3145.7		
Time							
variation	120.8		113.4		164.6		
2		6		10			
(40 Rounds)	3276.5+	(720 Rounds)	3128.4	(1200 Rounds)	3053.4		
	3212.8		3121.5		3092.1		
	3207.6		3127.4		3163.0+		
	3104.6-		3114.2		3121.0		
	3120.6		3111.3		3143.6		
	3154.0		3115.7		3083.0		
	3150.5		3128.9		3096.4		
	3140.2		3112.3		3141.6		
	3111.8		3150.1+		3015.5-		
	3110.9		3139.2		3119.1		
Page	3159.0		3124.9		3102.9		
Time							
variation	171.9		38.8		147.5		

DATA RECORD

MI6A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: STD
Ammunition: 5.56, Tracer (M196)
Lot No.: TW 18204

Serial No.: 5302500
Test Control No.: 16

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.033	na	na	na	na	0.032
Indentation (in.)	0.020	na	na	na	na	0.018
Trigger Pull (lb.)	6.25	na	na	na	na	6.0
Cyclic Rate (rds/min)		857.1	795.9	791.2	800.0	766.0
Velocity						
Average	3080.9	3163.6	3149.3	3149.6	3175.8	3106.7
Extreme Variation	102.7	124.0	128.5	79.6	75.2	102.1

Remarks: No malfunctions.

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubrication/Cleaner: STD
 Ammunition: 5.56mm, Tracer (M196)
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
1	3090.7	4	3177.1	8	3183.6		
Rounds)	3087.3	(480 Rounds)	3141.1	(960 Rounds)	3199.4		
	3070.3		3158.0		3188.7		
	3099.3		3160.5		3160.0		
	3083.5		3146.6		3203.5		
	3076.9		3194.5+		3171.0		
	3095.9		3134.3		3154.5		
	3033.5-		3163.0		3142.1		
	3035.8		3066.0-		3140.2-		
	3136.2+		3151.0		3215.4+		
	average		3080.9		3149.2	3175.8	
erosion	102.7	128.5	75.2				
2	3135.7	6	3133.3	10	3139.7		
240 Rounds)	3140.2	(720 Rounds)	3143.1	(1200 Rounds)	3169.5+		
	3100.7-		3182.1		3118.6		
	3166.0		3156.0		3089.7		
	3160.5		3178.1		3088.3		
	3132.8		3116.7		3096.4		
	3196.4		3184.7+		3091.1		
	3184.2		3143.1		3100.7		
	3224.7+		3105.1-		3067.4-		
	3194.3		3154.0		3105.1		
	average		3163.6		3149.6	3106.7	
erosion	124.0	79.6	102.1				

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: STD
Ammunition: 5.56mm, Tracer (M196)
Lot No.: TW 18204

Serial No.: 5304094
Test Control No.: 32

	<u>Initial</u> <u>Inspection</u>	<u>Number of Rounds</u>				<u>1200</u> <u>Upon</u> <u>Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4667	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.031	na	na	na	na	0.031
Indentation (in.)	0.022	na	na	na	na	0.023
Trigger Pull (lb.)	8.0	na	na	na	na	6.75
Cyclic Rate (rds/min)		848.5	812.5	829.8	812.5	782.6
Velocity						
Average	3089.6	3134.7	3134.8	3129.7	3162.2	3134.6
Extreme Variation	108.5	80.1	88.9	97.6	124.0	84.9

Remarks: No malfunctions.

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubrication/Cleaner: STD
 Ammunition: 5.56mm, Tracer (M196)
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
1	3139.2+	4	3188.7+	8	3159.5		
0 Rounds)	3137.2	(480 Rounds)	3182.1	(960 Rounds)	3165.5		
	3065.6		3113.3		3211.8+		
	3030.7-		3137.7		3204.1		
	3066.0		3145.6		3176.1		
	3054.8		3124.0		3181.1		
	3064.6		3115.7		3128.9		
	3112.8		3108.9		3122.5		
	3125.3		3132.3		3087.8-		
	3099.7		309918-		3188.2		
verage	3089.6		3134.8		3162.6		
reme							
iation	108.5		88.9		124.0		
2	3160.0	6	3132.8	10	3174.6		
240 Rounds)	3125.4	(720 Rounds)	3114.2	(1200 Rounds)	3105.5		
	3133.8		3158.0		3117.2		
	3120.6		3181.1+		3121.0		
	3104.6-		3121.5		3123.0		
	3111.8		3083.5-		3099.3-		
	3154.0		3100.2		3137.2		
	3184.7+		3117.2		3128.0		
	3106.5		3153.0		3184.2+		
	3145.4		3135.7		3156.0		
verage	3134.7		3129.7		3134.6		
reme							
iation	80.1		97.6		84.9		

DATA RECORD

MI6A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: CLP
Ammunition: 5.56, Tracer (M196)
Lot No.: TW 18204

Serial No.: 5301430
Test Control No.: 5

	<u>Initial</u> <u>Inspection</u>	<u>Number of Rounds</u>				<u>1200</u> <u>Upon</u> <u>Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4656	na	na	na	na	1.4657
Firing Pin						
Protrusion (in.)	0.033	na	na	na	na	0.032
Indentation (in.)	0.023	na	na	na	na	0.023
Trigger Pull (lb.)	8.25	na	na	na	na	7.50
Cyclic Rate (rds/min)		847.8	821.1	829.8	800.0	847.8
Velocity						
Average	3107.9	3138.8	3134.6	3148.6	3165.1	3115.9
Extreme Variation	89.6	171.9	130.2	91.9	95.9	76.1

Remarks: No malfunctions.

DATA RECORD

MI6A1 Rifle
 Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm, Tracer (M196)
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

<u>Cycle</u>	<u>Velocity (ft/sec)</u>	<u>Cycle</u>	<u>Velocity (ft/sec)</u>	<u>Cycle</u>	<u>Velocity (ft/sec)</u>	<u>Cycle</u>	<u>Velocity (ft/sec)</u>
1	3116.2	4	3206.1+	8	3207.1		
(0 Rounds)	3132.1	(480 Rounds)	3128.4	(960 Rounds)	3142.1		
	3108.0		3075.9-		3197.4		
	3124.0		3090.7		3151.0		
	3088.3		3143.1		3140.7		
	3113.8		3152.0		3113.3-		
	3084.9		3096.4		3190.8		
	3086.8		3182.6		3209.2+		
	3157.0+		3106.5		3160.0		
	3067.4-		3164.0		3139.2		
Page	3107.9		3134.6		3165.1		
Time							
ation	89.6		130.2		95.9		
2	3170.5	6	3151.5	10	3151.0		
(240 Rounds)	3221.6+	(720 Rounds)	3140.2	(1200 Rounds)	3117.6		
	3178.1		3181.1+		3161.0+		
	3118.1		3141.6		3117.2		
	3115.7		3129.2		3103.1		
	3172.0		3161.0		3095.0		
	3161.5		3178.6		3084.9-		
	3087.8		3152.0		3096.9		
	3113.8		3162.0		3132.3		
	3049.7-		3089.2		3100.2		
Page	3138.8		3148.6		3115.9		
Time							
ation	171.9		91.9		76.1		

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: CLP
Ammunition: 5.56mm, Tracer (M196)
Lot No.: TW 18204

Serial No.: 5302859
Test Control No.: 18

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4656	na	na	na	na	1.4656
Firing Pin						
Protrusion (in.)	0.032	na	na	na	na	0.031
Indentation (in.)	0.023	na	na	na	na	0.022
Trigger Pull (lb.)	8.50	na	na	na	na	8.25
Cyclic Rate (rds/min)		809.0	774.2	709.7	694.7	750.0
Velocity						
Average	3081.7	3111.9	3118.5	3109.6	3135.6	3117.9
Extreme Variation	74.0	97.4	94.3	107.6	62.4	118.6

Remarks:

DATA RECORDM16A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm, Tracer (M196)
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet

Screens: 5 and 25 feet

<u>Cycle</u>	<u>Velocity</u> <u>(ft/sec)</u>	<u>Cycle</u>	<u>Velocity</u> <u>(ft/sec)</u>	<u>Cycle</u>	<u>Velocity</u> <u>(ft/sec)</u>	<u>Cycle</u>	<u>Velocity</u> <u>(ft/sec)</u>
1		4		8			
(0 Rounds)	3117.2+	(480 Rounds)	3165.5+	(960 Rounds)	3148.6		
	3043.2-		3113.8		3159.0		
	3120.6		3134.7		3121.0		
	3101.2		3108.4		3166.5+		
	3101.2		3084.5		3149.1		
	3067.9		3128.9		3111.8		
	3105.5		3133.8		3104.1-		
	3044.1		3122.5		3130.8		
	3067.0		3122.0		3157.0		
	3049.2		3071.2-		3108.4		
Age	3081.7		3118.5		3135.6		
eme							
ation	74.0		94.3		62.4		
2		6		10			
(240 Rounds)	3114.7	(720 Rounds)	3151.5	(1200 Rounds)	3190.3+		
	3062.3		3118.6		3116.7		
	3091.6		3153.5		3138.7		
	3139.2		3100.2		3125.9		
	3086.4		3077.3		3071.7-		
	3057.1-		3154.9+		3100.7		
	3154.5+		3075.9		3136.2		
	3136.7		3109.9		3086.4		
	3115.2		3047.3-		3101.7		
	3161.5		3106.5		3110.9		
Age	3111.9		3109.6		3117.9		
eme							
ation	97.4		107.6		118.6		

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubricant: CLP
Ammunition: 5.56mm, Tracer (M196)
Lot No.: TW 18204

Serial No.: 5304183
Test Control No.: 33

	<u>Initial Inspection</u>	<u>Number of Rounds</u>				<u>1200 Upon Completion</u>
		<u>240</u>	<u>480</u>	<u>720</u>	<u>960</u>	
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4667	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.032	na	na	na	na	0.032
Indentation (in.)	0.022	na	na	na	na	0.020
Trigger Pull (lb.)	8.25	na	na	na	na	7.75
Cyclic Rate (rds/min)		847.8	750.0	812.5	766.0	809.0
Velocity						
Average	3108.8	3138.0	3131.1	3123.3	3133.4	3104.4
Extreme Variation	68.9	204.3	154.2	67.2	70.3	93.2

Remarks:

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—FOULING TEST—

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm, Tracer (M196)
 Lot No.: TW 18204

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

<u>Cycle</u>	<u>Velocity</u> <u>(ft/sec)</u>	<u>Cycle</u>	<u>Velocity</u> <u>(ft/sec)</u>	<u>Cycle</u>	<u>Velocity</u> <u>(ft/sec)</u>	<u>Cycle</u>	<u>Velocity</u> <u>(ft/sec)</u>
1		4		8			
0 Rounds)	3079.7-	(480 Rounds)	3226.3+	(960 Rounds)	3117.6		
	3130.8		3155.5		3156.5		
	3133.8		3078.3		3100.7-		
	3098.8		3103.6		3125.4		
	3093.1		3151.5		3137.2		
	3116.2		3162.5		3111.3		
	3103.6		3132.3		3154.0		
	3092.6		3072.1-		3136.7		
	3148.6+		3122.5		3171.0+		
	3090.7		3106.0		3123.5		
age	3108.8		3131.1		3133.4		
eme							
ation	68.9		154.2		70.3		
2	3253.0+	6	3125.9	10	3143.6		
	3221.1		3138.2		3135.7		
240 Rounds)	3075.5	(720 Rounds)	3142.1	(1200 Rounds)	3069.3-		
	3130.8		3140.7		3100.7		
	3125.9		3100.7		3081.6		
	3102.6		3125.9		3162.5+		
	3147.1		3103.6		3079.7		
	3111.3		3088.8-		3117.6		
	3048.7-		3113.8		3048.3		
	3163.5		3153.0		3105.1		
age	3138.0		3123.3		3104.4		
eme							
ation	204.3		67.2		93.2		

Serial No. 5304183
Test Control No. 33

MI6A1 Rifle Comparative Test of
Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Fouling
Lubricant: CLP

Ammunition: 5.56mm, Tracer (M196)

Lot No.: TW 18204

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
806	35	Auto	FJ		

MI6A1 RIFLE

DUST TEST

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubricant: STD
Ammunition: Ball M193
Lot No.: RA 2-24

Serial No.: 5301238
Test Control No.: 4

	<u>Initial Inspection</u>	Number of Rounds		<u>360 Upon Completion</u>
		<u>120</u>	<u>240</u>	
Bore Diameter (in.)		na	na	
Groove Diameter (in.)		na	na	
Headspace (in.)	1.4666	na	na	1.4666
Fring Pin Protrusion (in.)	0.034	na	na	0.034
Indentation (in.)	0.023	na	na	.024
Trigger Pull (lb.)	6.75	na	na	7.75
Cyclic Rate (rds/min)	880	875		884
Duration of Exposure 1st Magazine	:58	:50		:52
Change	:15	:15		:16
2nd Magazine	:23	:21		:17
Change	:17	:15		:14
3rd Magazine	:03	:03		:03
Change	:18	:22		:21
4th Magazine	:53	:51		:48
Total Time Bolt Open	:50	:50		:51
Total Time	3:07	2:55		2:51
Velocity				
Average:	3181.8	3165.7		3180.2
Extreme Variation:	58.1	52.0		62.9

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubrication/Cleaner: STD
 Ammunition: Ball, M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
	3181.0		3199.9				
	3175.1		3207.9+				
	3156.5		3181.0				
	3163.1		3193.3				
	3167.6		3175.6				
	3194.9		3145.0-				
	3209.1		3205.2				
	3211.1+		3184.5				
	3206.2		3156.2				
	3153.0-		3153.5				
Average	3181.8		3180.2				
Extreme variation	58.1		62.9				
	3157.0						
	3193.9						
	3145.6						
	3168.2						
	3184.4						
	3153.5						
	3194.7+						
	3142.2						
	3175.2						
	3141.9-						
Average	3165.7						
Extreme variation	52.8						
			NO MALFUNCTIONS				

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubricant: STD
Ammunition: Ball M193
Lot No.: RA 2-24

Serial No.: 5302500
Test Control No.: 16

	<u>Initial Inspection</u>	Number of Rounds		<u>360 Upon Completion</u>
		<u>120</u>	<u>240</u>	
Bore Diameter (in.)		na	na	
Groove Diameter (in.)		na	na	
Headspace (in.)	1.4666	na	na	1.4666
Fring Pin Protrusion (in.)	0.033	na	na	0.033
Indentation (in.)	0.021	na	na	0.021
Trigger Pull (lb.)	7.5	na	na	8.25
Cyclic Rate (rds/min)	866	947		884
Duration of Exposure 1st Magazine	:58	:49		:46
Change	:17	:15		:10
2nd Magazine	:23	:18		:20
Change	:14	:17		:15
3rd Magazine	:03	:03		:03
Change	:16	:18		:18
4th Magazine	:45	:46		:51
Total Time Bolt Open	:47	:50		:52
Total Time	2:56	2:46		2:52
Velocity				
Average:	3175.1	3182.8		3166.0
Extreme Variation:	83.2	61.2		82.8

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubrication/Cleaner: STD
 Ammunition: Ball, M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet

Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
	3180.6		3178.6		3173.7		
	3203.5		3186.0		3155.1		
	3158.0		3201.9		3120.1-		
	3227.8+		3181.1		3188.0		
	3164.0		3192.8		3174.5		
	3144.6-		3205.6+		3202.9+		
	3158.1		3144.4-		3151.1		
	3179.1		3176.9		3160.7		
	3165.4		3191.1		3148.6		
	3169.5		3169.4		3185.1		
Average	3175.1		3182.8		3166.0		
Extreme variation	83.2		61.2		82.8		
NO MALFUNCTIONS							

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubricant: STD
Ammunition: Ball M193
Lot No.: RA 2-24

Serial No.: 5304094
Test Control No.: 32

	<u>Initial Inspection</u>	<u>Number of Rounds</u>		<u>360 Upon Completion</u>
		<u>120</u>	<u>240</u>	
Bore Diameter (in.)		na	na	
Groove Diameter (in.)		na	na	
Headspace (in.)	1.4666	na	na	1.4666
Fring Pin Protrusion (in.)	0.031	na	na	0.031
Indentation (in.)	0.024	na	na	0.024
Trigger Pull (lb.)	6.75	na	na	7.50
Cyclic Rate (rds/min)	875	923		913
Duration of Exposure 1st Magazine	:54	:45		:46
Change	:17	:13		:12
2nd Magazine	:20	:13		:13
Change	:14	:15		:12
3rd Magazine	:03	:03		:03
Change	:09	:10		:13
4th Magazine	:51	:55		:48
Total Time Bolt Open	:40	:38		:37
Total Time	2:48	2:34		2:27
Velocity				
Average:	3165.2	3164.4		3156.6
Extreme Variation:	66.9	68.9		71.3

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubrication/Cleaner: STD
 Ammunition: Ball, M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet

Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
	3194.7+		3165.3		3150.5		
	3182.1		3185.6		3152.5		
	3127.8-		3163.0		3195.3+		
	3161.7		3126.7-		3131.6		
	3190.2		3153.0		3182.4		
	3135.3		3190.1		3155.4		
	3159.9		3154.5		3146.1		
	3165.2		3195.6+		3175.5		
	3155.3		3149.2		3152.2		
	3180.1		3161.1		3124.0-		
average	3165.2		3164.4		3156.6		
variation	6.9		68.9		71.3		
NO MALFUNCTIONS							

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubricant: CLP
Ammunition: Ball M193
Lot No.: RA 2-24

Serial No.: 5301430
Test Control No.: 5

	<u>Initial Inspection</u>	<u>Number of Rounds</u>		<u>360 Upon Completion</u>
		<u>120</u>	<u>240</u>	
Bore Diameter (in.)		na	na	
Groove Diameter (in.)		na	na	
Headspace (in.)	1.4656	na	na	1.4656
Fring Pin Protrusion (in.)	0.033	na	na	0.033
Indentation (in.)	0.024	na	na	0.024
Trigger Pull (lb.)	8.0	na	na	8.25
Cyclic Rate (rds/min)	893	900		875
Duration of Exposure 1st Magazine	:00	:45		:48
Change	:11	:13		:13
2nd Magazine	:25	:17		:14
Change	:12	:24		:18
3rd Magazine	:03	:03		:03
Change	:10	:17		:21
4th Magazine	:42	:49		:47
Total Time Bolt Open	:33	:54		:52
Total Time	2:43	2:48		2:44
Velocity				
Average:	3161.8	3156.0		3154.3
Extreme Variation:	66.9	73.6		106.2

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubrication/Cleaner: CLP
 Ammunition: Ball, M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet

Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
	3193.7+		3180.2		3181.5		
	3159.4		3155.4		3148.7		
	3190.2		3165.1		3106.7-		
	3126.8-		3159.0		3151.2		
	3185.7		3135.4		3212.9+		
	3165.4		3190.3+		3147.6		
	3163.1		3116.7-		3180.8		
	3135.1		3127.9		3120.1		
	3154.4		3182.2		3155.5		
	3144.0		3147.9		3137.7		
Average	3161.8		3156.0		3154.3		
Extreme variation	66.9		73.6		106.2		
NO MALFUNCTIONS							

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubricant: CLP
Ammunition: Ball M193
Lot No.: RA 2-24

Serial No.: 5302859
Test Control No.: 18

	<u>Initial Inspection</u>	<u>Number of Rounds</u>		<u>360 Upon Completion</u>
		<u>120</u>	<u>240</u>	
Bore Diameter (in.)		na	na	
Groove Diameter (in.)		na	na	
Headspace (in.)	1.4666	na	na	1.4666
Fring Pin Protrusion (in.)	0.031	na	na	0.031
Indentation (in.)	0.023	na	na	0.023
Trigger Pull (lb.)	7.5	na	na	8.25
Cyclic Rate (rds/min)	834	889		848
Duration of Exposure 1st Magazine	:54	:44		:45
Change	:15	:16		:11
2nd Magazine	:24	:19		:23
Change	:16	:23		:21
3rd Magazine	:03	:03		:03
Change	:10	:09		:13
4th Magazine	:47	:48		:51
Total Time Bolt Open	:41	:48		:45
Total Time	2:49	2:42		2:37
Velocity				
Average:	3140.6	3153.2		3144.9
Extreme Variation:	80.7	80.8		74.4

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubrication/Cleaner: CLP
 Ammunition: Ball, M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
	3155.0		3121.9		3172.5+		
	3160.1		3137.4		3144.7		
	3108.8		3183.6		3149.9		
	3182.1+		3146.7		3167.9		
	3125.2		3163.1		3154.0		
	3146.1		3197.0+		3120.6		
	3101.4-		3171.5		3098.1-		
	3138.9		3116.2-		3166.2		
	3128.2		3156.5		3133.9		
	3159.7		3138.3		3141.1		
Average	3140.6		3153.2		3144.9		
Extreme variation	80.7		80.8		74.4		
NO MALFUNCTIONS							

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubricant: CLP
Ammunition: Ball M193
Lot No.: RA 2-24

Serial No.: 5304183
Test Control No.: 33

	<u>Initial Inspection</u>	<u>Number of Rounds</u>		<u>360 Upon Completion</u>
		<u>120</u>	<u>240</u>	
Bore Diameter (in.)		na	na	
Groove Diameter (in.)		na	na	
Headspace (in.)	1.4667	na	na	1.4667
Fring Pin Protrusion (in.)	0.032	na	na	0.032
Indentation (in.)	0.023	na	na	0.024
Trigger Pull (lb.)	8.0	na	na	7.50
Cyclic Rate (rds/min)	875	923		914
Duration of Exposure 1st Magazine	:48	:44		:43
Change	:15	:12		:10
2nd Magazine	:18	:14		:12
Change	:16	:14		:14
3rd Magazine	:03	:03		:03
Change	:13	:11		:12
4th Magazine	:52	:54		:52
Total Time Bolt Open	:44	:37		:36
Total Time	2:43	2:32		2:26
Velocity				
Average:	3160.7	3138.0		3154.0
Extreme Variation:	70.5	120.8		83.1

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—DUST TEST—

Lubrication/Cleaner: CLP
 Ammunition: Ball, M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet

Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
	3175.2		3164.0		3183.6		
	3163.8		3088.8		3149.9		
	3147.4		3139.9		3125.7		
	3152.6		3201.6+		3136.9		
	3149.9		3117.9		3152.6		
	3158.2		3186.3		3206.1+		
	3198.0+		3154.0		3164.0		
	3127.5-		3126.5		3125.6		
	3194.8		3120.3		3123.0-		
	3139.6		3080.8-		3172.5		
Average	3160.7		3138.0		3154.0		
Extreme variation	70.5		120.8		83.1		
NO MALFUNCTIONS							

M16A1 RIFLE

MJD TEST

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

— Mud Test —

Lubricant: STD
Ammunition: 5.56 Ball M193
Lot No.: RA 2-24

Serial No.: 5301238
Test Control No. 4

Number of Rounds

<u>Initial Inspection</u>	<u>120</u>	<u>240</u>	<u>360 Upon Completion</u>
Bore Diameter (in.)	na	na	
Groove Diameter (in.)	na	na	
Headspace (in.) 1.4666	na	na	1.4666
Firing Pin			
Protrusion (in.) 0.034	na	na	0.034
Indentation (in.) 0.024	0.99	0.020	0.018
Trigger Pull (lb.) 7.75	7.75	8.25	8.00
Cyclic Rate (rds/min.)	568	612.2	625.0

Remarks: See Malfunction Sheet

MI6A1 Rifle Comparative Test of
 Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Mud
 Lubricant: STD

Ammunition: 5.56mm Ball M193

Lot No.: RA 2-24

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
64	27 (3)	Auto	FBC	BLE	Bolt Assist
67	27	Auto	FBC	BLE	Bolt Assist
69	27	Auto	FBC	BLE	Bolt Assist
	USED CLEAN MAGAZINE				
95	28 (4)	Semi	FBC	BLE	Bolt Assist
101	28	Semi	FBC	BLE	Bolt Assist
103	28	Semi	FBC	BLE	Bolt Assist
	WATER CLEANED WEAPON FIRED REMAINDER - OK				
121-240	NO MALFUNCTION				
303	27	Auto	FBC	BLE	
304	27	Auto	FBC	BLE	
306	27	Auto	FBC	BLE	
	FAILED WITH CLEAN MAG. - WATER CLEANED RIFLE - OK				

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

— Mud Test —

Lubricant: STD
Ammunition: 5.56mm Ball M193
Lot No.: RA 2-24

Serial No.: 5302500
Test Control No. 16

	<u>Number of Rounds</u>		
	<u>120</u>	<u>240</u>	<u>360 Upon Completion</u>
Bore Diameter (in.)	na	na	
Groove Diameter (in.)	na	na	
Headspace (in.) 1.4666	na	na	1.4666
Firing Pin			
Protrusion (in.) 0.033	na	na	0.033
Indentation (in.) 0.021	0.020	0.020	0.018
Trigger Pull (lb.) 8.25	7.50	7.75	6.75
Cyclic Rate (rds/min.)	687.5	821.1	787.9

Remarks: See Malfunction Sheet

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

— Mud Test —

Lubricant: STD
Ammunition: 5.56mm Ball M193
Lot No.: RA 2-24

Serial No.: 5304094
Test Control No. 32

	<u>Number of Rounds</u>		
	<u>120</u>	<u>240</u>	<u>360 Upon Completion</u>
Bore Diameter (in.)	na	na	
Groove Diameter (in.)	na	na	
Headspace (in.) 1.4666	na	na	1.4666
Firing Pin			
Protrusion (in.) 0.031	na	na	0.031
Indentation (in.) 0.024	0.023	0.022	0.022
Trigger Pull (lb.) 7.50	7.75	7.00	7.00
Cyclic Rate (rds/min.)	576.0	638.3	618.6

Remarks: See Malfunction Sheet

Serial No. 5304094

Test Control No. 32

M16A1 Rifle Comparative Test of
Lubricants/Cleaners

—RECORD OF MALFUNCTIONS—

Test: Mud
Lubricant: STD

Ammunition: 5.56mm Ball M193

Lot No.: RA 2-24

Round No.	Magazine No.	Malfunctions			Remarks
		Auto or Semi	Type*	Cause*	
75	35 (3)	Auto	FBC	BLE	Bolt Assist
185	35 (3)	Auto	FBC	BLE	Bolt Assist
186	35	Auto	FBC	BLE	Bolt Assist
190	35	Auto	FBC	BLE	Bolt Assist
	CLEAN MAG.				
214	36 (4)	Semi	FBC	BLE	Bolt Assist
215	36 (4)	Semi	FBC	BLE	Bolt Assist
	WATER CLEANED	WEAPON FIRED REMAINDER - OK			
304	35 (3)	Auto	FBC	BLE	Bolt Assist
329	35 (3)	Auto	FF	BOB	Poss. Mag

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

— Mud Test —

Lubricant: CLP
Ammunition: 5.56mm Ball M193
Lot No.: RA 2-24

Serial No.: 5301430
Test Control No. 5

	<u>Initial Inspection</u>	<u>Number of Rounds</u>		
		<u>120</u>	<u>240</u>	<u>360 Upon Completion</u>
Bore Diameter (in.)		na	na	
Groove Diameter (in.)		na	na	
Headspace (in.)	1.4666	na	na	1.4666
Firing Pin				
Protrusion (in.)	0.034	na	na	0.034
Indentation (in.)	0.024	0.021	0.022	0.022
Trigger Pull (lb.)	8.25	8.50	8.25	8.50
Cyclic Rate (rds/min.)		734.7	766.0	787.9

Remarks: See Malfunction Sheet

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

— Mud Test —

Lubricant: CLP
Ammunition: 5.56mm Ball M193
Lot No.: RA 2-24

Serial No.: 5302859
Test Control No. 18

	<u>Number of Rounds</u>		
	<u>120</u>	<u>240</u>	<u>360 Upon Completion</u>
Bore Diameter (in.)	na	na	
Groove Diameter (in.)	na	na	
Headspace (in.) 1.4666	na	na	1.4666
Firing Pin			
Protrusion (in.) 0.031	na	na	0.031
Indentation (in.) 0.023	0.021	0.020	0.022
Trigger Pull (lb.) 8.25	8.00	8.00	8.50
Cyclic Rate (rds/min.)	680.4	666.7	673.5

Remarks: No Malfunctions

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

— Mud Test —

Lubricant: CLP
Ammunition: 5.56mm Ball M193
Lot No.: RA 2-24

Serial No.: 5304183
Test Control No. 33

Number of Rounds

<u>Initial Inspection</u>	<u>120</u>	<u>240</u>	<u>360 Upon Completion</u>
Bore Diameter (in.)	na	na	
Groove Diameter (in.)	na	na	
Headspace (in.) 1.4666	na	na	1.4666
Firing Pin			
Protrusion (in.) 0.034	na	na	0.034
Indentation (in.) 0.024	0.022	0.023	0.022
Trigger Pull (lb.) 7.50	8.25	8.00	8.00
Cyclic Rate (rds/min.)	694.7	782.6	742.3

Remarks: No Malfunctions

M16A1 RIFLE
SALT WATER TEST

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—Salt Water Immersion—

Lubricant: STD
Ammunition: 5.56mm, Ball (M193)
Lot No.: RA 2-24

Serial No.: 5301238
Test Control No.: 4

	<u>Initial Inspection</u>	<u>Number Of Rounds</u>				
		<u>120</u>	<u>240</u>	<u>360</u>	<u>480</u>	<u>600 Upon Completion</u>
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.034	na	na	na	na	0.032
Indentation (in.)	0.024	na	na	na	na	0.022
Trigger Pull (lb.)	8.00	na	na	na	na	10.25
Cyclic Rate (rds/min)		844.2	818.2	673.5	581.6	656.3

Remarks: Round No. 1 - Bolt assist necessary, magazine release rusted.
Day 1-9: No malfunctions.
Day 10: Rounds No. 481 - FBC - BLE - bolt assist necessary.

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—Salt Water Immersion—

Lubricant: STD
Ammunition: 5.56mm, Ball (M193)
Lot No.: RA 2-24

Serial No.: 5302500
Test Control No.: 16

	<u>Initial Inspection</u>	<u>Number Of Rounds</u>				
		<u>120</u>	<u>240</u>	<u>360</u>	<u>480</u>	<u>600 Upon Completion</u>
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.033	na	na	na	na	0.033
Indentation (in.)	0.021	na	na	na	na	0.020
Trigger Pull (lb.)	6.75	na	na	na	na	7.50
Cyclic Rate (rds/min)		843.8	835.1	687.5	633.6	687.5

Remarks: Day 1-7: No malfunctions.
Day 8: Round No. 361 - FBC - BLE - bolt assist necessary.
Day 9-10: No malfunctions.

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—Salt Water Immersion—

Lubricant: STD
Ammunition: 5.56mm, Ball (M193)
Lot No.: RA 2-24

Serial No.: 5304094
Test Control No.: 32

	<u>Initial Inspection</u>	<u>Number Of Rounds</u>				
		<u>120</u>	<u>240</u>	<u>360</u>	<u>480</u>	<u>600 Upon Completion</u>
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.031	na	na	na	na	0.032
Indentation (in.)	0.024	na	na	na	na	0.022
Trigger Pull (lb.)	7.50	na	na	na	na	11.25
Cyclic Rate (rds/min)		884.2	871.0	738.5	697.0	704.1

Remarks: Day 1 thru 9: No malfunctions.

Day 10: Round No. 481 - FS - BLE - Bolt assist necessary

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—Salt Water Immersion—

Lubricant: CLP
Ammunition: 5.56mm, Ball (M193)
Lot No.: RA 2-24

Serial No.: 5301430
Test Control No.: 5

	<u>Initial Inspection</u>	<u>Number Of Rounds</u>				
		<u>120</u>	<u>240</u>	<u>360</u>	<u>480</u>	<u>600 Upon Completion</u>
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.034	na	na	na	na	0.034
Indentation (in.)	0.024	na	na	na	na	0.023
Trigger Pull (lb.)	8.25	na	na	na	na	8.50
Cyclic Rate (rds/min)		884.2	887.8	691.2	773.2	704.1

Remarks: Day 1-9: No malfunctions.
Day 10: FS - BLE - bolt assist necessary.

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—Salt Water Immersion—

Lubricant: CLP
Ammunition: 5.56, Ball (M193)
Lot No.: RA 2-24

Serial No.: 5302859
Test Control No.: 18

	<u>Number Of Rounds</u>					
	<u>Initial Inspection</u>	<u>120</u>	<u>240</u>	<u>360</u>	<u>480</u>	<u>600 Upon Completion</u>
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.031	na	na	na	na	0.031
Indentation (in.)	0.023	na	na	na	na	0.022
Trigger Pull (lb.)	8.25	na	na	na	na	8.75
Cyclic Rate (rds/min)		857.1	830.8	663.2	625.0	636.4

Remarks: Day 1-7: No malfunctions.

Day 8: During automatic burst there was a 0.52 seconds delay between the first round (No. 361) and the next round.
Round No. 465 - FF - Magazine.

Day 9-10: No malfunctions.

DATA RECORD

M16A1 Rifle
Comparative Test of Lubricants/Cleaners

—Salt Water Immersion—

Lubricant: CLP
Ammunition: 5.56, Ball (M193)
Lot No.: RA 2-24

Serial No.: 5304183
Test Control No.: 33

	<u>Number Of Rounds</u>					
	<u>Initial Inspection</u>	<u>120</u>	<u>240</u>	<u>360</u>	<u>480</u>	<u>600 Upon Completion</u>
Bore Diameter (in.)		na	na	na	na	
Groove Diameter (in.)		na	na	na	na	
Headspace (in.)	1.4666	na	na	na	na	1.4666
Firing Pin						
Protrusion (in.)	0.034	na	na	na	na	0.033
Indentation (in.)	0.024	na	na	na	na	0.022
Trigger Pull (lb.)	7.75	na	na	na	na	8.75
Cyclic Rate (rds/min)		835.1	816.8	623.7	649.5	666.7

Remarks: Day 1-7: No malfunctions.

Day 8: Round 2 - FS - BLE - Magazine - bolt assist.
Round 4 - FS - BLE - Magazine - bolt assist. possibly faulty magazine

Day 9-10: No malfunctions.

M16A1 RIFLE
COMPATIBILITY TEST

DATA RECORD

MI6A1 Rifle
Comparative Test of Lubricants/Cleaners

—COMPATIBILITY TEST—

Lubricant: CLP
Ammunition: 5.56mm, Ball, M193
Lot No.: RA 2-24

Serial No.: 5303354
Test Control No.: 23

	<u>Initial Inspection</u>		<u>100 Rounds</u>	
Headspace (in.)	1.4646		1.4646	
Firing Pin				
Protrusion (in.)	0.033		0.033	
Indentation (in.)	0.023		0.022	
Trigger Pull (lb.)	7.0		7.75	
Cyclic Rate (rds/min)	916.8		935.5	
Velocity	<u>1-10</u>	<u>31-40</u>	<u>61-70</u>	<u>91-100</u>
Average	3169.1	3198.6	3205.5	3213.5
Extreme Variation	146.7	92.7	93.6	89.1

Remarks: No malfunctions.

DATA RECORD

M16A1 Rifle
 Comparative Test of Lubricants/Cleaners

—COMPATIBILITY TEST—

Lubrication/Cleaner: CLP
 Ammunition: 5.56mm, Ball, M193
 Lot No.: RA 2-24

Velocity taken over 20 feet at 15 feet
 Screens: 5 and 25 feet

Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)	Cycle	Velocity (ft/sec)
1	3098.8-	2	3239.3+	3	3191.7	4	3215.9
	3191.8		3230.4		3179.2		3263.1+
1-10 Rounds	3139.2	31-40 Rounds	3200.5	61-70 Rounds	3196.9	91-100 Rds	3212.3
	3128.9		3196.9		3221.6		3197.9
	3199.9		3181.1		3214.8		3194.8
	3181.6		3221.6		3162.0-		3216.4
	3245.6+		3146.6-		3212.4		3224.7
	3144.1		3214.9		3194.8		3226.3
	3181.6		3183.1		3226.3		3174.0-
	3179.1		3172.0		3255.6+		3209.7
Average	3169.1		3198.6		3205.5		3213.5
Extreme Variation	146.7		92.7		93.6		89.1