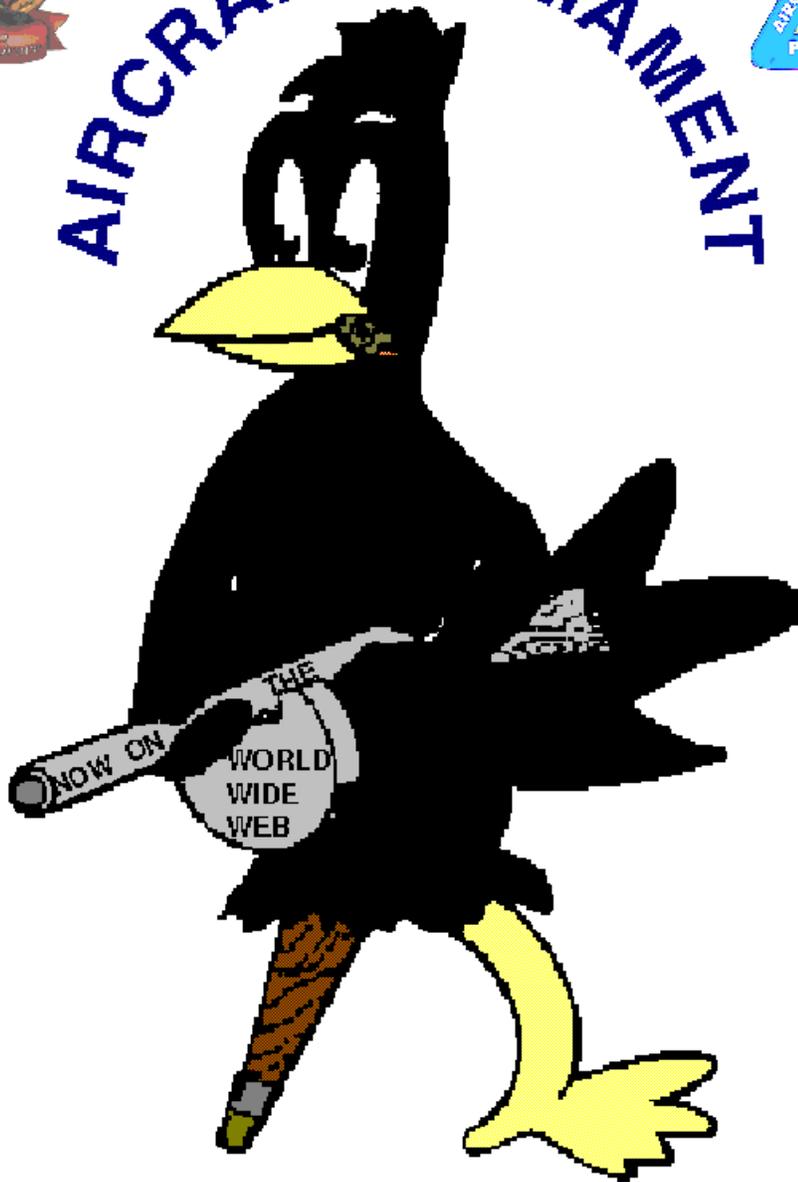




# AIRCRAFT ARMAMENT



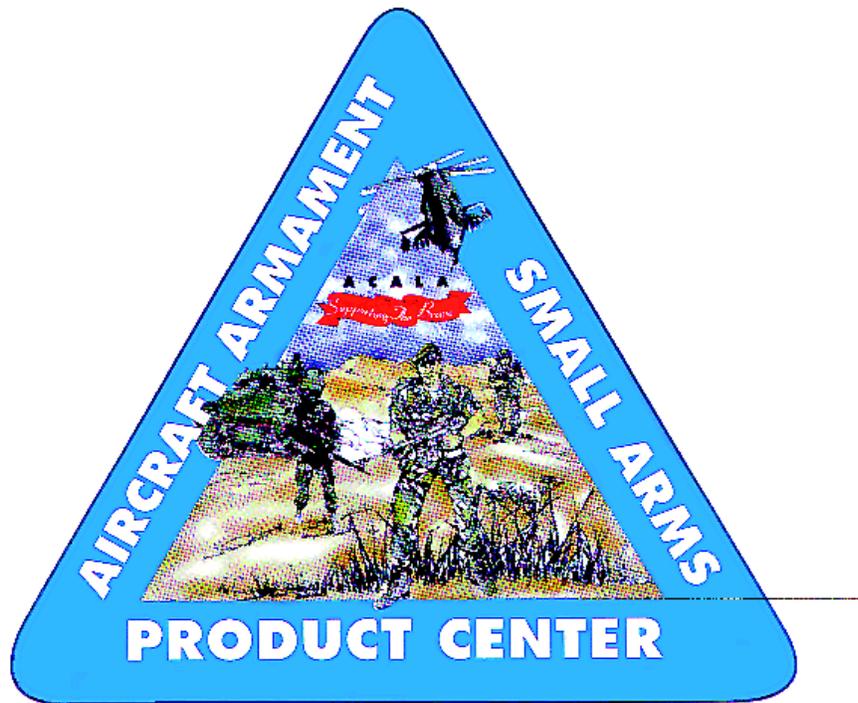
# UPDATE

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# Chapter I

## MAINTENANCE INFORMATION

*This section contains updated maintenance information pertaining to Aircraft Armament/Fire Control Systems and Support Equipment. The information provided within this section will normally pertain only to ACALA managed systems/ equipment (unless requested by other commodity commands to include information relative to their items). Additional information related to general maintenance appears in the appendices as indicated within the articles in this section.*

### Section I Apache General Maintenance

#### **1. AH-64A Apache Rocket Launcher Sway Brace Torquing Procedure.**

##### NOTE

This is a reprint from the previous volume due to an omission of step d in the previous printing.

- a. Loosen all four jam nuts, and finger tighten the sway braces evenly until they just make contact with the rocket pod.
- b. Set two inch-pound torque wrenches to 100 inch-pounds.
- c. Using the torque wrenches, simultaneously tighten the two front sway braces by 1/4 turn.
- d. Repeat step 3 on the two rear sway braces.
- e. Alternate tightening the two front and two rear sway braces until all sway braces are torqued to 100 inch-pounds.
- f. Hold the sway braces with a wrench, and torque the jam nuts to 200 inch-pounds.

#### **2. AH-64A Apache 89.8 Degree Turret Stop Installation, Modification Work Order (MWO) 9-1090-208-50-5.**

- a. The AH-64A Apache 89.8 degree turret stop MWO, 9-1090-208-50-5, may be applied to fielded aircraft without installing the fire control computer (FCC), MWO 9-1230-476-50-01, and turret control box (TCB), MWO 9-1090-208-50-9. Aircraft that have MWO 9-1090-208-50-5 applied, but not MWOs 9-1230-476-50-01 and 9-1090-208-50-9 are fully mission capable. The turret stop MWO is being applied ahead of the FCC and TCB MWOs as opportunities arise to minimize aircraft down time.

## ACALA PAMPHLET 750-1-2

b. Installing the new turret stops will limit the area weapon system (AWS) turret traverse to approximately 89.8 degrees, left and right. Be advised that the old FCC has fire control software command limits in excess of 89.8 degrees, so it is possible for the AWS turret to reach its mechanical limits while attempting to engage targets to the extreme right or left.

c. Testing conducted by McDonnell Douglas Helicopter Systems has shown there is no mechanical degradation caused by repeated turret stop contact. Their flight testing also concluded that there is a low probability of accidentally reaching AWS mechanical limits while engaging targets.

d. If the crew attempts to move the AWS turret past 89.8 degrees, the mechanical turret stops will limit traverse, creating an out-of-coincidence condition. When the out-of-coincidence conditions persists for 2.5 seconds or greater, the AWS will fail. A summary of the warnings and weapon system conditions expected during out-of-coincidence are provided below:

FAILURE CUES EXPECTED WITH 89.8 DEGREE AWS TURRET STOPS AND OLD FIRE CONTROL COMPUTER (PN 7-319200001) WHEN ATTEMPT IS MADE TO DIRECT THE AWS TURRET PAST THE MECHANICAL STOP LIMITS

-

1. After reaching the gun azimuth turret stop and remaining in that condition for a minimum of 2.5 seconds, these indications are expected:

- a. Master Caution illumination in both cockpits
- b. Gun Fail caution light illumination in both cockpits
- c. Selected Sight Reticle blinking
- d. High Action Display message, "Gun Fail"
- e. FD/LS message displayed
- f. FD/LS reports "Gun No-Go"
- g. Remaining weapon systems in a No-Fire condition until gun de-actioned

2. To clear the gun fail caution light:

- a. De-Action Gun
- b. Re-Action gun

3. To fire other weapon systems (rockets/missile):

De-Action Gun

4. Simply de-actioning the gun will allow the opposite crew member to fire rockets or missiles while the gun will continue to be pointed at the last failed azimuth condition.

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5. To resume firing of the AWS:

a. Slew the selected sight back into the gun system azimuth limits (right 89.8 degrees to left 89.8 degrees).

b. De-action the gun system via the appropriate weapon's action switch.

c. Re-action the gun system via the weapon's action switch.

6. Once MWOs 9-1230-476-50-01 and 9-1090-208-50-9 are applied, matching software command limits contained in the new FCC will prevent the possible out-of-coincidence conditions from occurring.

### Section II Cobra General Maintenance

#### **1. M136 Helmet Sight System.**

The receptacle connector plug (A1P1, NSN 5935-00-878-3959) now comes with a plastic cover. Aircrews need to exercise greater caution when handling this connector as the old aluminum cover is no longer available from the manufacturer, and the plastic cover is easily damaged. Recommend damaged plastic covers be submitted as Quality Deficiency Report (QDR) samples with the QDR in the hope that the contractor will start using the previous covers again.

#### **2. M76 Heads Up Display (HUD).**

The loose dessicant used in the HUD dehumidifier has been replaced with a dessicant in a round bag, PN PC98084-1, CAGEC 09344. This dessicant is also to be used in the **M147 Operations Unit (OU)** and in the **M147 Display Unit (DU)**. No NSN is available at this time; order by the PN.

#### **3. Preventive Maintenance Checks and Services (PMCS)**

The Cobra PMCS has been a little ragged at times, and with the re-assignment of the aircraft to the National Guard, some of the checks and services needed a second look. We have done this, and the results are provided in Chapter II, Section II of this Update.

## ACALA PAMPHLET 750-1-2

### Section III Kiowa Warrior General Maintenance

#### AIM-1 Laser

a. The ACALA Kiowa Team has been tasked by the Kiowa Program Manager (PM) to provide B-kits for the installation of AIM-1 lasers into the .50 cal. gun pod. These kits will consist of a bracket assembly which provides for mounting the laser on the gunpod, and two cable assemblies to provide electrical interface between the laser and a remote laser actuation switch in the aircraft. The first of these cable assemblies is mounted within the gunpod in conjunction with the pod/charger wiring harness. It connects to the laser and terminates at the rear of the pod in a bulkhead connector on a redesigned plate mounting it and the .50 cal. umbilical harness disconnect. The second cable assembly is routed in conjunction with the .50 cal. umbilical harness, connecting between the new pod disconnect and a new fuselage disconnect being installed as part of the PM's MPLH modification work order (MWO).

b. Components are currently being fabricated and kits assembled. Fielding/distribution of the B-kits will be in conjunction with aircraft/gun pod fieldings for new units. Existing units will be back-filled as the kits become available and units receive the MPLH MWO and obtain lasers. Notification of kit requirements and projected date of need is the responsibility of the individual unit. Information and requests should be directed to Mr. Gary Mau, Kiowa Team, DSN 793-1935, or (309) 782-1935, E-mail GMAU@ria-emh2.army.mil.

c. Procurement of the AIM-1 lasers is at the discretion and responsibility of the individual unit. As the laser is a GSA item and there is now national stock number, ordering information is as follows:

- (1) Order the following item.

<b>Item:</b>	<b>Part Number:</b>	<b>NSN</b>	<b>U/I</b>	<b>Cost each</b>
Kit, Laser, Aim-1/MLR	849000000	N/A	ea	\$1578.13

- (2) Requisition these sole source items from:

Monterey Bay Corp.  
P. O.Box 1538  
Columbia, MD 21044

Attn: Mr. Steve Rosa  
voice #: (301) 596-9797

Cite GSA contract No: GS-03F-5026C  
(The POC at GSA is Mr. Robert Gevar)

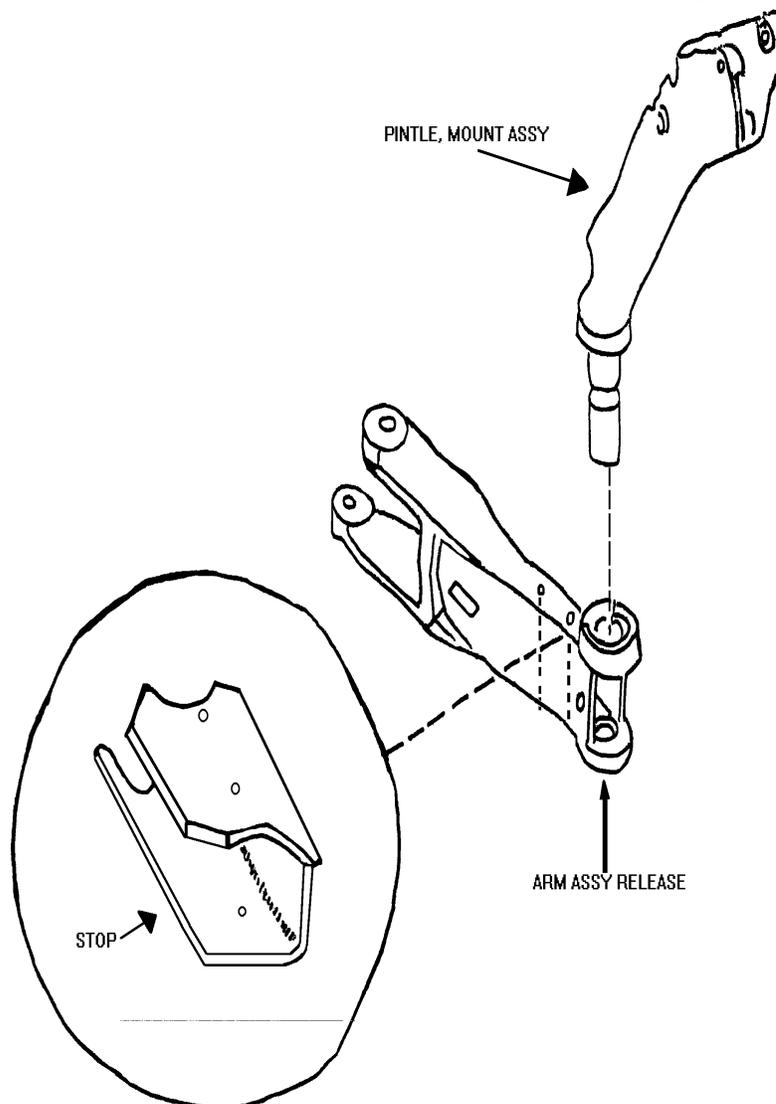
## Section IV General

### XM144 Armament Subsystem Pintle Mount Stop.

#### **NOTE**

*For UH-60s equipped with External Range Fuel System (ERFS), the pintle mount STOP must be installed when the external stores support system is installed and should be removed likewise when external stores are not in use.*

Place the pintle mount stop on the pintle arm in the external tanks position utilizing the existing aft stop as an index surface. The radius of the stop must maintain radius contact with the pintle yoke radius. Use shims, as required, to eliminate any freedom between pintle arm. Secure the stop to pintle arm assembly release using quick release pins.



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## English Calendar for 1997

**JANUARY**

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**MAY**

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**JUNE**

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**JULY**

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**AUGUST**

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31						

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**OCTOBER**

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**NOVEMBER**

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**DECEMBER**

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## Chapter II

### PUBLICATIONS INFORMATION

*This information contains update and supplemental information pertaining to Aircraft Armament/Fire Control Systems, Support Equipment, and Supply Publications until a formal change or revision is published. Annotate these changes in your manuals.*

#### Section I Apache Publications

1. **TM 9-1090-208-23-1-1, Armament Subsystem, Helicopter M139.**

a. Page 4-45 thru 4-47, table no. 4-5-1. The following statement will be added to the beginning of the semiannual PMCS requirements: Check must be performed unless a 5,000 rounds PMCS has been performed within 6 months.

b. Page 4-46, task 4-5-1, "Forward Flex Chute/Transfer Housing Inspection Becoming Biweekly/14 Day." After close scrutiny of the preventive maintenance checks and services schedule chart, it has been determined that a change will be made to the chart as follows:

(1) Item No. 11 - "Procedure" column will read "paragraphs 4-7-103 and -104."

(2) Item No. 12 - "Procedure" column will read "paragraph 4-7-103, step 1 ONLY."

c. Page 4-291, paragraph 4-7-59. In step 10, substep a, on the same page, we remove lockwire from 4 screws. It was an oversight on our part and will be rectified. This information was given to the contractor and will be added to change 6 of TM 9-1090-208-23-1-1, which is scheduled for release 4th Qtr FY 96.

d. Page 4-291, paragraph 4-7-59, step 10c.

(1) If gun movement is being experienced, it would indicate adjustments are being attempted with hydraulic power applied. Page 4-288, step 1, states "Apply electrical power only to the helicopter." (TM 55-1520-238-23)

(2) Power applied with the gun barrel removed will cause erratic turret movement or vibrations. With the gun barrel removed, the potential for the wire strike to hit the ground still exists.

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(3) Close coordination via the communications headset is required between the person in the CPG station and the person performing the physical adjustment of the resolver. Paragraph 10c information must be communicated to the person performing the physical adjustment. The person in the CPG station must indicate for the adjustment to stop when the display values are as indicated in paragraph 10c. If adjustments continue until the caution light appears or past the paragraph 10c readings, the circuit breakers AWS AC and AWS DC must be recycled and resolver adjustment continued. A note will be added after paragraph 10c on recycling the circuit breakers and continuing the resolver adjustment.

(4) Tightening the screws while maintaining no movement or minimal movement is difficult; however, ensure the screws are not overly loose to begin with, and this will greatly assist in the accomplishment of the task.

2. **TM 9-1090-208-23-1-2, Armament Subsystem, Helicopter M139.** Page C-2, Expendable/Durable Supplies and Materials List. The Federal Specification VV-D-1078 is no longer required for item C13 (lubricant, silicon). NSN 9150-01-056-7346 is correct and can be found in the Army Master Data File (AMDF). The nomenclature will be changed from "lubricant, silicon" to "damping fluid" at the next change (as yet unscheduled).

3. **TM 9-1090-208-23-2, Armament Subsystem, Helicopter, M139.** Page 5-155, task 5-32.

a. P1058 pins G and H are not 5 VDC out and in. From these pins you can check to see if your tensioner switches are closed or open. If one switch is closed, you will get a 7.5 VDC +/- 1 VDC. If both switches are closed, you get a 15 VDC reading +/- 2 VDC. If both switches are closed, you will read about 1 OHM. This is used with the -603 RCMC. This information can be found on drawing 7-362300011, paragraph 9, Signals, Section A, Tension Limit Switches. These switches are normally closed.

b. See task 5-28, 1b. Command Confirm, zero VDC ground signal sent through the RH/LH tensioner assembly limit switches. Limit switches are normally closed.

4. **TM 9-1090-208-23P, Armament Subsystem, Helicopter M139, M230 Gun.**

a. Page 28-1, figure no. 28. Since there are two gun control box configurations in the field, another card at item 4 should be added. The part number is 7-217222555-601 and used on 7-217222500-609 (see item 2, same page).

b. Page 36-1, figure no. 36. The correct part number is HS4883-5, NSN 4730-01-324-6636. This information was given to the contractor and will be added to change 2 to the TM, which is scheduled for release 3d Qtr FY 96.

## ACALA PAMPHLET 750-1-2

### 5. TM 9-1270-221-23&P, Aviation Unit and Intermediate Maintenance Manual for Fire Control Subsystem, Helmet Directed, M142.

a. Page 4.53, paragraph 4.24; page 4.57, paragraph 4.25. Replacement of HDU in either Pilot or CPG station creates a required vertical and horizontal size adjustment. In accordance with paragraphs 4.21 and 4.23, all that is required is a maintenance operational check (MOC). As a result, paragraph 4.24, page 4.53, step d, should read: "d. Perform Pilot Display Adjust Panel (DAP) adjustment (4.21)." This statement should be followed by: "Perform MOC (paragraph 3-3). Paragraph 4.25, page 4.57, step d, should read: "Perform CPG Display Adjust Panel (DAP) adjustment (4.23)." This statement should be followed by "Step e. Perform MOC (paragraph 3.3)."

b. Although the Maintenance Operational Check (MOC) would show any misalignment of the pattern (it would automatically be understood that a Pilot/Co-Pilot Gunner Display Adjust Panel (DAP) adjustment would be performed), for clarity, it would be beneficial to add a step as a reminder. We will update the MOC and add a note that if you are replacing the original Helmet Display Unit or DAP back into the same location, you should not have to perform the DAP adjustment procedure. We will also add a statement that the DAP adjustment procedure matches the HDU to that DAP. This will make the HDU and DAP a matched set for that position in the aircraft.

c. The following information was submitted on a DA Form 2028 to our Technical Publications Division regarding this TM(9-1270-221-23, change 6, Fire Control Subsystem, Helmet Directed: M142) and is provided for your information:

(1) Page 3-23, paragraph 3-3, line k, under TASK column: ADD - "Check for focus, vertical centering (ctr), horizontal ctr, vertical size and horizontal size." Under RESULTS column: Add - "If out of adjustment, do CPG Display Adjust Panel (DAP) adjustment (paragraph 4-23)."

(2) Page 3-23, paragraph 3-3, line m, under TASK column: Add - "Check for focus, vertical ctr, horizontal ctr, vertical size, and horizontal size." Under TASK column: Add - "If out of adjustment, do Pilot Display Adjust Panel (DAP) adjustment (paragraph 4-21)."

(3) Page 4-50, paragraph 4-24, next to ART M72-102: Add

#### **NOTE:**

HDU and DAP are matched by performing the Display Adjust Panel adjustment procedure. If the original HDU is not replaced back into the Pilot's position, the DAP adjustment procedure must be performed. If the DAP is being removed, it should be tagged as to what position it came from, PILOT or CPG.

## ACALA PAMPHLET 750-1-2

(4) Page 4-54, next to ART M72-108: Add - **"NOTE:** HDU and DAP are matched by performing the Display Adjust Panel adjustment procedure. If the original HDU is not replaced back into the Pilot's position, the DAP adjustment procedure must be performed. If the DAP is being removed, it should be tagged as to what position it came from, PILOT or CPG."

(5) Page 4-53, paragraph 4-24, line d: Delete "Perform MOC (paragraph 3-3)." Add "Perform Pilot Display Adjust Panel (DAP) adjustment (4-21)."

(6) Page 4-57, paragraph 4-25, lines c and d: Add - "(3). INSPECT (TI)." Change line d to read: "Perform CPG Display Adjust Panel (DAP) adjustment (4-23)."

### Section II Cobra Publications

1. **TM 9-1090-206-20-1/-2, Armament Subsystem Helicopter, 20MM Auto Gun.** Page 3-295, paragraph 2, line B; page 3-299, paragraph 4.

a. The Department of Defense cuts the cost of hardware procurement by deleting a lesser used bolt of two similar items. The shear bolts in question did not have lock wire holes in the heads until a standardization action deleted them in favor of a bolt with a lock wire hole.

b. The threaded inserts used in the M197 housing are screw lock inserts (they have chords which lock the bolt in place). Many of these inserts are colored red, dark gray, or olive drab, depending on the plating on them.

c. Lock wiring the shear bolts would merely be a second means of preventing them from backing out.

2. **TM 9-1090-206-20-1, M97A3/A4 Armament Subsystems**

Cobra Preventive Maintenance Checks and Services (PMCS) has been a little ragged at times, and now with the redistribution of aircraft to the National Guard, some of the checks and the methodology used to determine when checks are due needed to be re-visited. The following PMCS information will be in change 4 to this TM.

a. The PMCS table is designed to use aircraft flight hours to schedule periodic services instead of quarterlies. It has been determined that on average, an aircraft's accumulation of 25 flight hours, occurs in an approximate 3 month period. Therefore, using the aircraft flight hours to schedule periodic services, ensures most of the aircraft will be available for the required services.

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b. To prevent prolonged periods of time that PMCS would not be performed due to lack of accumulated flight hours in a related period of time. The PMCS should be performed between the related period and the not to exceed period, not by the accumulated flight hours. Also, to prevent the performing of excessive PMCS due to the accumulation of excessive aircraft flight hours during a related period of time. The PMCS should be performed between the related period and the not to exceed period, not by the accumulated flight hours.

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Cobra Armament Subsystem Flight Hours Related to Time for PMCS  
Table

<u>Flight Hours</u>	<b>OR</b>	<u>Related Period</u>	<b>BUT Not to</b> <u>Exceed Period</u>
25		90 Days	105 Days
50		180 Days	195 Days
75		270 Days	285 Days
100		360 Days	375 Days
125		450 Days	465 Days

B - Before  
the same as quarterly service  
D - Daily (When equipment is operated)  
cycled

H - 25 flight hours are  
RD - Rounds fired or  
cycled

Item	Phase Maintenance Interval				Item To Be Inspected	Procedure	Not Fully Mission Capable If:
	B	D	H	RD			
1	*		25		Armament Subsystem	Perform ARMAMENT SUBSYSTEM CHECK, para 2-8 for the following line replaceable units:	Cannon and sighting systems are out of alignment.
					Heads Up Display (HUD)		HUD inoperable.
					Electronic Processing Unit (EPU)		EPU inoperable.
					Low Airspeed Indicator (LAI)		LAI inoperable.
					Pilot Armament Control Panel (PACP)		PACP inoperable.
					Airspeed and Direction Sensor (AADS)		AADS inoperable.

## ACALA PAMPHLET 750-1-2

Item	Phase Maintenance Interval				Item To Be Inspected	Procedure	Not Fully Mission Capable If:
	B	D	H	RD			
					Rocket Management Subsystem (RMS) Display		RMS display inoperable.
					Gunner Armament Control Panel (GACP)		GACP inoperable.
					Helmet Sight Subsystem (HSS)		HSS inoperable.
2	*		25			Perform QUICK CHECK BORESIGHT, para 2-9.	
3	*	*	25		Armament Subsystem	Perform ROCKET LAUNCHER ALIGNMENT and lubrication, para 2-10.	Rocket launchers are out of alignment.
4	*		25		Recoil Adapter	Recoil adapter preload must be checked before operation unless a check has been performed during the previous 25 flight hours. Notify aviation intermediate maintenance to check recoil adapter preload in accordance with TM 9-1090-206-30.	Recoil adapter has not been preload checked in previous 25 flight hours.
5		*	25	1500	20-MM Gun, M197	Perform LUBRICATION OF GUN, M197 AND BREECH BOLT, para 3-0.	Gun or breech bolts are improperly lubricated.
6			50		20-MM Gun, M197	Perform REPAIR AND LUBRICATION OF GUN M197, para 3-46 and 3-0.	Gun inoperable or improperly lubricated.
7		*	25	1500	Feeder Assembly M89E1	Perform LUBRICATION OF FEEDER ASSEMBLY M89E1, para 3-0.	Feeder improperly lubricated.

**ACALA PAMPHLET 750-1-2**

Item	Phase Maintenance Interval				Item To Be Inspected	Procedure	Not Fully Mission Capable If:
	B	D	H	RD			
8			50		Feeder Assembly M89E1	Perform REPAIR AND LUBRICATION OF M89E1 FEEDER, para 3-42 and 3-0.	Feeder inoperable or improperly lubricated.
9			25	1500	Recoil Adapter	Perform REPAIR AND LUBRICATION OF RECOIL ADAPTER, para 3-55 and 3-0.	Recoil inoperable or improperly lubricated.
10			25	1500	Slider	Perform REPAIR AND LUBRICATION OF SLIDER, para 3-55.1 and 3-0.	Slider is improperly lubricated.
11			25	1500 0	Gun Drive	Perform LUBRICATION OF GUN DRIVE, para 3-0.	Gun drive is improperly lubricated.
12			25 50	1500 0 5000 0	Turret Assembly	Perform TURRET ASSEMBLY LUBRICATION, para 3-0. Inspect interface control unit, control assembly, turret and cable assemblies for cut, damaged, or missing harness wrap; cut or torn cable covering; missing clamps, brackets, or cable ties; loose or broken connectors; corrosion; security and bent connector pins.	Turret improperly lubricated. Cable assemblies cut, damaged, missing harness wrap; cut or torn cable covering; missing clamps, brackets, or cable ties; loose or broken connectors; corrosion; or loose or bent connector pins.
13			25	1500 0	Weapon Saddle Assembly	Perform LUBRICATION OF WEAPON SADDLE ASSEMBLY, para 3-0.	Weapon saddle improperly lubricated.

## ACALA PAMPHLET 750-1-2

Item	Phase Maintenance Interval				Item To Be Inspected	Procedure	Not Fully Mission Capable If:
	B	D	H	RD			
14			25	1500	Ammunition Feed System	Perform LUBRICATION OF AMMUNITION FEED SYSTEM, para 3-0. Check feed system for freedom of movement, worn or damaged section, and secure mounting.	Ammunition feed system improperly lubricated, worn, or damaged; or loose mounting.
15			25		Elevation Drive Clutch	Perform ELEVATION DRIVE CLUTCH CHECK, para 3-58.4.	Clutch slips with less than 50 lbs of force applied.
16			25		Logic Relay Assembly	Inspect for security; loose or broken connectors; and corrosion.	Connectors are corroded, loose, or broken.
17			150		Armament Subsystem	Notify aviation intermediate maintenance to boresight the armament subsystem in accordance with TM 9-1090-206-30.	Weapon system and sighting system are misaligned.
18			150		Azimuth Clutch	Notify aviation intermediate maintenance to check AZ clutch in accordance with TM 9-1090-206-30.	Clutch is improperly adjusted.
19		*			Armament Subsystem	Check dynamic accuracy during firing. Projectiles should impact selected target.	Projectiles do not impact target.

### 3. TM 9-1090-206-23P, M97A3/A4 Armament Subsystems RPSTL

a. Page 21-1, figure no. 21. Item 2. Bearing, ball, annular. You should order NSN 3110-01-148-4762, FSCM 19200, PN 12000373. This is the correct ball bearing. The other ball bearing, NSN 3110-01-365-7873, FSCM 19200, PN 12599989, requires a spacer with it. This part is no longer available. If you used this bearing and forgot the spacer, M197 gun rotation would be severely effected by this. The correct bearing does not require a spacer.

## ACALA PAMPHLET 750-1-2

b. The part numbers for items 3 and 4 are reversed and should read 12000394 (item no. 3) and 12000395 (item no. 4). The NSNs are correct.

c. Appendix I-69, figure 21, Cross-Reference Index. Items 3 and 4 should be reversed.

d. Appendix I-90, figure 21. Items 3 and 4 should be reversed.

e. Page 81-2, figure no. 81, sheet 2 of 2. Figure 81 needs to be updated to change 3. These changes will appear in the next routine change, which is currently unscheduled.

f. Figure 17, all items excluding item 2, have been replaced by a parts kit, PN 8838329, NSN 1005-01-310-7394. All breech bolt parts should be replaced at the same time.

### **4. TM 9-1090-206-30, Helicopter Armament Subsystems: M97A3/A4, 20MM Automatic Gun.**

a. Page 2-196.5 Paragraph 8. Fault code + 9113 (output AJ J1-G not 28 VDC) should be (output AJ J1-g (not 28 VDC). Paragraph 10. Fault Code + 9121 (output at J1-H not 28 VDC) should be (output at J1-h not 28 VDC).

b. Page 2-196.7 Paragraph 34. Fault code + 9181 (output at J1-P not 28 VDC) should be (output at J1-p not 28 VDC). Paragraph 35. Fault code + 9182 (output at J1-Q not 28 VDC) should be (output at J1-q not 28 VDC).

c. These changes will appear in the next routine change to this TM; currently unscheduled.

### **5. TM 9-1270-220-23&P, Sight, Helicopter; Head-Up Display Subsystem: M76**

a. Appendix B, page B-8, Reference Code 4, lists both the AN/USM 281C and the AN/USM 488. Either oscilloscope may be used.

b. The wave form shown is of major concern to the repairman. It does not matter which oscilloscope is used as long as the wave form is correct.

**6. TM 9-4931-363-14&P, Test Set, Helmet Sight Subsystem, AN/GSM-249** Page 3-9, Table 3-3, Test Set Self-test, Item 5, set CARD switch to 2 and linkage to 2. With the model 245 DMM the reading should be -8 +/- 0.48 volts. With the model 248 DMM, the reading should be -6.85 +/- 0.25 degrees.

## ACALA PAMPHLET 750-1-2

7. **TM 55-1520-244-PM.** Page 5-18, paragraph 62, requires an armament systems functional check; paragraph 63 requires an aircraft maintenance operational check (MOC). These two items should not be confused. The functional check is an in-depth examination of the armament system to determine its operational readiness condition. Whereas, the MOC is a post maintenance check to determine the successful completion of maintenance actions.

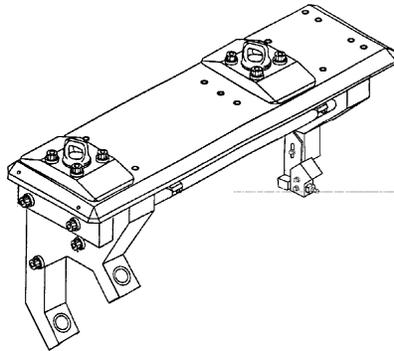
### Section III Kiowa Publications

1. **TM 9-1090-214-23&P, AVUM/AVIM Maintenance Manual for .50 cal. Machine Gun, 2.75" Rocket System and Missile Integration (October 1993).**

a. Page 1-12, paragraph 1-12, Location and Description of major components, Gun Pod.

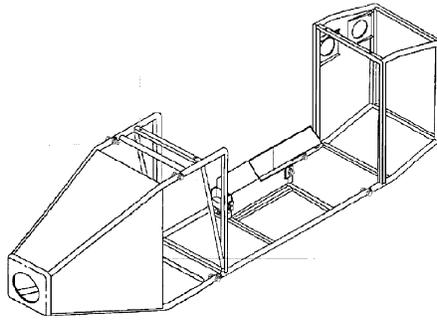
Add the following descriptions for the major components of the gun pod assembly:

Top Plate Assembly- Provides a shock-attenuating and boresightable mounting platform for the .50 cal. machine gun, mounting points for the protective cage assembly and lug assemblies for mounting the gun pod assembly on the universal weapons pylon ejector rack. Consists of the top plate, two lug assemblies, and the gun carriage assembly

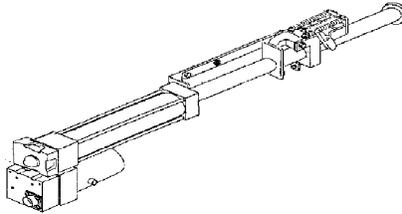


Cage Assembly- Provides protective confinement for the machine gun and mounting points for the harness assembly, the diode assembly, and the spent casing ejection chute. Consists of a forward nose shroud assembly which minimizes aerodynamic impact on the aircraft, mid-cage assembly, and an aft-cage assembly.

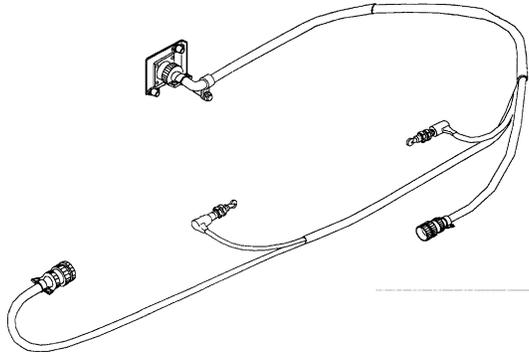
## ACALA PAMPHLET 750-1-2



Gun Charger Assembly- Attaches directly to the machine gun receiver. Provides remote charging of the gun; full aft and release (load/recock), full aft and latched (unload/safe).

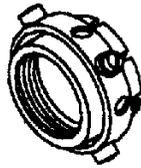


Wiring Harness- Provides electrical signal interface between gun pod components (gun charger, gun firing solenoid, diode assembly, and rounds count sensor assembly) and the aircraft (via the .50 cal umbilical harness). Also incorporates limit switches for the control of charger motor drive signals.

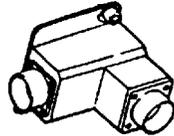


Gimbal Ring Assembly- Serves as the mechanical interface between the machine gun trunnion and the gun cradle. Provides 2-axis movement for machine gun boresight adjustments.

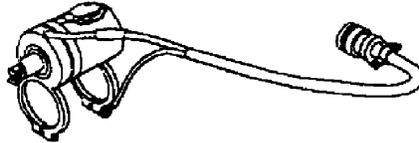
## ACALA PAMPHLET 750-1-2



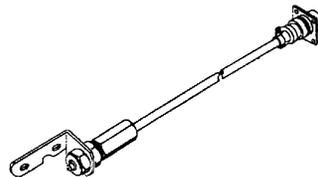
Diode Assembly- Mounted on the right rear inside of the cage assembly. Provides signal surge protection for the gun firing solenoid.



Electrical (gun firing) Solenoid- Mounted on the backplate of the machine gun. Provides a means of electrically/ remotely firing the machine gun. The solenoid action is adjustable.



Rounds Count Sensor Switch Assembly- Mounted to the right rear side of the machine gun receiver. The sensor is a proximity switch which senses cycles of the breech bolt (pin).



b. Page 4-169, paragraph 4-23, steps 15 and 16.

(1) Change step 15 to read: Tighten each sway brace bolt (6) to 100 inch-pounds from finger tight in 1/4 turn increments in the following sequence: inboard forward, outboard aft, outboard forward, inboard aft.

(2) Change step 16 to read: Torque jamnuts (5) to 200 inch-pounds while holding sway brace bolts (6).

c. Page 4-194, paragraph 4-27, steps 6a and 18a. Illustrations showing sear slide being removed/installed from left side of bolt are incorrect. Sear slide should be installed only from the right side of the bolt due to the machine gun's angular mounting in the gunpod. Illustrations will be corrected in the revision to the TM, due out 4th Qtr FY 96.

## ACALA PAMPHLET 750-1-2

- d. Page 4-203, paragraph 4-28, Materials Required.
- 1) Add Hydraulic Fluid (item 23, app D). Show existing (item 24, appendix D) as an alternate (cold weather).
  - 2) Add Sealing Compound (item 43a, appendix D)
- e. Page 4-209, paragraph 4-28, step 14d- Change step to read: "Turn tube clockwise 5 clicks."
- f. Page 4-209, paragraph 4-28, step 16e and page 4-215, paragraph 4-29, step 16d: change step to read: "Degrease filler screws (1) & (4) and apply a small amount of sealing compound to threads; then install filler screws (1) & (4) and washers (2) & (3).
- g. Page 4-210, paragraph 4-29.
- 1) Add the following tools to "Tools required":
    - a) Reamer, Hand, P.N. 103HS 9/16 IN. (NSN: 5110-00-260-1643)
    - b) Oil Buffer Rod Length Gage (item 5, fig C-25)
  - 2) Add the following to "Materials Required":
    - a) Hydraulic fluid (item 23, app D).
    - b) Silicon Grease (item 21a, app D).
    - c) Sealing Compound (item 43a, app D).
  - 3) Show existing (item 24, app. D) as an alternate (cold weather).
- h. Pages 4-212 , paragraph 4-29, step 6b: Delete the words "o-ring spring (3)," and "O-ring washer (4)," from the text and delete items 3 & 4 from the illustration. and items 6 & 7 (step 11)
- i. Page 4-213, paragraph 4-29, step 11.
- (1) Delete items 6 and 7 from the illustration.
  - (2) Change step text to read:
    11. ASSEMBLE THE PISTON
      - a. Coat O-rings (2), (4) and (5) with silicone grease.
      - b. Install large O-ring (4), into the groove on the outside diameter of sleeve bushing (3).

## ACALA PAMPHLET 750-1-2

c. Install the small O-rings (2) and (5) into the grooves on each end of bushing (3).

d. Use a 9/16" hand reamer (NSN 5110-00-260-1643) to smooth the inside diameter of the oil buffer tube cap (8).

### Note

The following step may require press fitting, and a part of the outside o-ring may peel off during the process.

e. Install bushing (3) with o-rings into tube cap (8).

f. Screw plug (1) into the tube cap (8) and hand tighten.

g. Install piston rod (9) by screwing it through the assembled bushing (3) and cap (8) to prevent the bottom o-ring from being forced out of the bushing.

j. Page 5-9, paragraph 5-4.  
Removal/installation procedure for the charger motor assembly, SMR coded PAODD, incorrectly appears in Chapter 5, AVIM Maintenance. This task may be accomplished by AVUM. This procedure will be moved to chapter 4 in the revision to the TM, due out 4th QTR FY 96.

k. Page C-21-1, figure C-21, item 29: Change SMR code for the Machine Gun Cradle to PAOFF.

l. Page C-23-3, Figure C-23, Item 51: Change SMR code for the Forward Handle Assembly to A0000.

m. Pages C-24 thru C-24-3: Recent 2028s and maintenance concept changes have resulted in corrections to figure C-24 and the repair parts and special tools list. These corrections are shown below:

# ACALA PAMPHLET 750-1-2

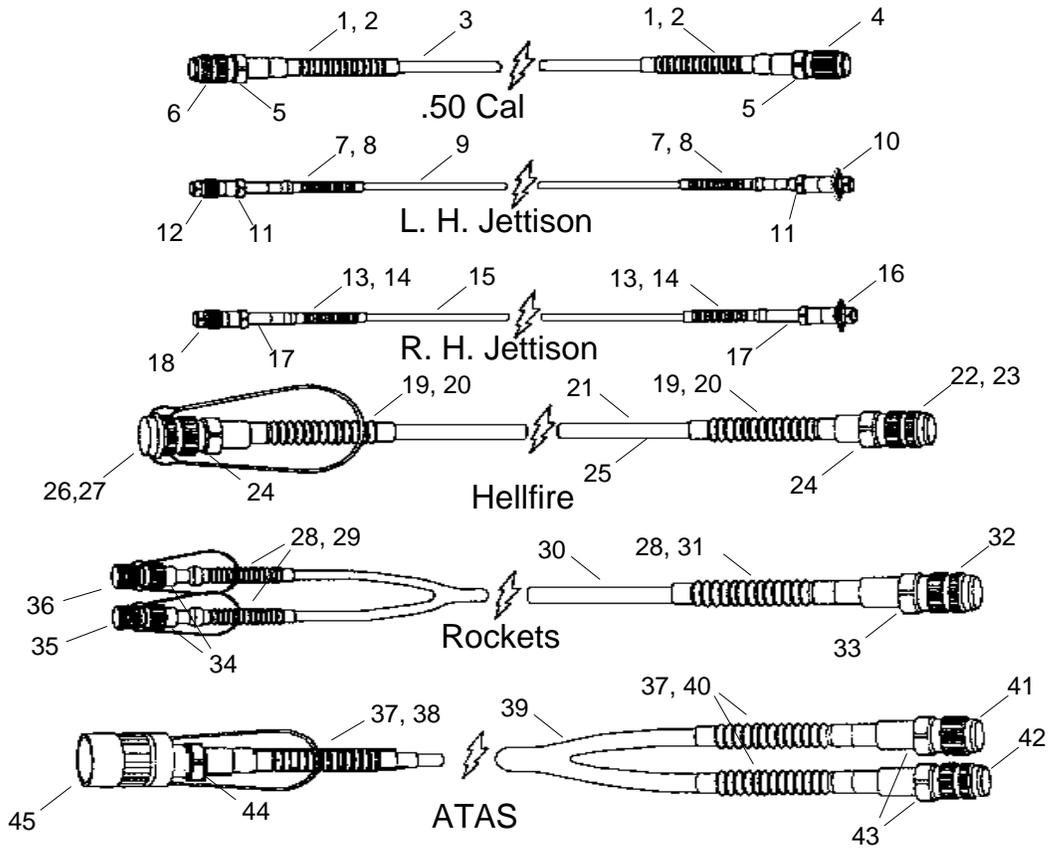


Figure C-24. Umbilical Harness Assemblies .50 cal. MG (406-075-192-107), Left Hand Jettison (406-075-192-109), Right Hand Jettison (406-75-192-111), Hellfire Missile (406-075-192-101), 2.75-Inch Rockets (406-075-192-103), and Air-to-Air Stinger (406-075-192-105)

## ACALA PAMPHLET 750-1-2

ITEM NO	SMR CODE	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODES (UOC)	QTY
GROUP 07					
Figure C-24. Umbilical Harness Assemblies .50 cal. MG (406-075-192-107), Left Hand Jettison (406-075-192-109), Right Hand Jettison (406-075-192-111), Hellfire Missile (406-075-192-101), 2.75-Inch Rockets (406-075-192-103), and Air-to-Air Stinger (406-075-192-105)					
1	PAFZZA	70847	A10099	BAND, MARKER	2
2	PAFZZA	06090	202C632-51	BOOT, VEHICULAR COM	2
3	XAFFFA	97499	406-075-633-109	CABLE ASSEMBLY	1
4	PAFZZA	81349	D38999/26WJ4SN	CONNECTOR, PLUG, ELECTRICAL (21A7P1)	1
5	PAFZZA	07418	SB01B6H2510X1	ADAPTER, CABLE CLAMP	2
6	PAFZZA	81349	D38999/26WJ4PN	CONNECTOR PLUG, ELECTRICAL (21P1)	1
7	PAFZZA	70847	A10099	BAND, MARKER	2
8	PAFZZA	06090	202C611-51	INSULATION SLEEVING (BOOT)	2
9	XAFFFA	97499	406-075-633-105	CABLE ASSEMBLY, SPECIAL	1
10	PAFZZA	96906	MS3475W10-6P	CONNECTOR PLUG, ELECTRICAL (21P3)	1
11	PAFZZA	07418	SB01A1H1004X1	ADAPTER, CABLE CLAMP	2
12	PAFZZA	96906	MS3470W10-6S	CONNECTOR, RECEPTACLE (21J5)	1
13	PAFZZA	70847	A10099	BAND, MARKER	2
14	PAFZZA	06090	202C611-51	INSULATION SLEEVING, (BOOT)	2
15	XAFFFA	97499	406-075-633-107	CABLE ASSEMBLY, SPECIAL	1
16	PAFZZA	96906	MS3475W10-6P	CONNECTOR PLUG, ELECTRICAL (21P4)	1
17	PAFZZA	07418	SB01A1H1004X1	ADAPTER, CABLE CLAMP	2
18	PAFZZA	96906	MS3470W10-6S	CONNECTOR, RECEPTACLE (21J6)	1
19	PAFZZA	70847	A10099	BAND, MARKER	2
20	PAFZZA	06090	202C642-51	BOOT, DUST AND MOISTURE	2
21	XAFFFA	97499	406-075-634-103	CABLE ASSEMBLY	1
22	PAFZZA	49367	T3W-1225-92PN	CONNECTOR PLUG, ELECTRICAL (22P6/7)	1
23	PAFZZA	81349	M39029/76-424	.CONTACT, ELECTRICAL	2
24	PAFZZA	07418	SB01B6H2516X1	ADAPTER, CABLE CLAMP	2
25	PAFZZA	97499	100-075-5W	PLATE, MARKING, BLANK	V
26	PAFZZA	81349	D38999/30WJ4LN	CONNECTOR PLUG, ELECTRICAL (24A2/3P1)	1
27	PAFZZA	81349	M39029/77-428	.CONTACT, ELECTRICAL	2
28	PAFZZA	70847	A10099	BAND, MARKER	3
29	PAFZZA	06090	202C621-51	INSULATION SLEEVING (BOOT)	2
30	XAFFFA	97499	406-075-633-111	CABLE ASSEMBLY, SPECIAL	1
31	PAFZZA	06090	202C632-51	BOOT, VEHICULAR COM	1
32	PAFZZA	49367	T3W-1225-92PN	CONNECTOR PLUG, ELECTRICAL (22P6/7)	1
33	PAFZZA	07418	SB01B6H2510X1	ADAPTER, CABLE CLAMP	1
34	PAFZZA	07418	S3367A-15060701	ADAPTER, CABLE CLAMP	2
35	PAFZZA	97499	30-039F16-26S	CONNECTOR PLUG, ELECTRICAL (21A9/10P2)	1
36	PAFZZA	97499	30-039F16-23S	CONNECTOR PLUG, ELECTRICAL (21A9/10P1)	1
37	PAFZZA	70847	A10099	BAND, MARKER	3
38	PAFZZA	06090	202C642-51	BOOT, DUST AND MOISTURE	1
39	XAFFFA	97499	406-075-632-103	CABLE ASSEMBLY, SPECIAL	1
40	PAFZZA	06090	202C632-51	BOOT, VEHICULAR COM	2
41	PAFZZA	81349	D38999/26WJ4PN	CONNECTOR PLUG, ELECTRICAL (21P1/2)	1
42	PAFZZA	49367	T3W-1225-92PN	CONNECTOR PLUG, ELECTRICAL (22P6/7)	1
43	PAFZZA	07418	SB01B6H2512X1	ADAPTER, CABLE CLAMP	2
44	PAFZZA	07418	SB01B6H2518X1	ADAPTER, CABLE CLAMP	1
45	PAFZZA	13556	CN1079WJ61BSN	CONNECTOR PLUG, ELECTRICAL (21A5/6P1)	1

## ACALA PAMPHLET 750-1-2

1. Page D-2, Expendable And Durable Items List, add the following items:

Item No.	Lvl	National Stock Number	Description	(U/M)/ (U/I)
4a	O	8040-01-239-6828	ADHESIVE RTV 123 (3 oz Black)	TU
6a	O	8030-01-244-7179	ANTISEIZE COMPOUND	CN
9a	O	7920-00-900-3577	BRUSH, STAINLESS STEEL, FILLED	EA
9b	O	6850-00-965-2332	CARBON REMOVING COMPOUND P-C-III TYPE II (5 gal)	CN
21a	F	9150-00-145-0161	GREASE, SILICON MIL-G-46886	TU
43a	O	8030-00-081-2326	SEALING COMPOUND MIL-S-22473	BX

### Section IV General

**1. TM 9-1055-406-23&P, AVUM and AVIM Manual for M130 Dispenser.**

a. Pages 2-3 and 2-4, paragraph 2-7, table 2-1. We are changing the recommended 250-hours phase inspection to 25 hours or monthly for the power-up inspection of the M130 General Purpose Dispenser and will add to the preventive maintenance checks and service (PMCS). This will be added as item 5 of table 2-1 and will read: Perform "power up" check (MOC) phase inspection on all aircraft every 25 hours or monthly, whichever comes first."

b. The dispenser manual is currently undergoing a revision separating the manual between the Unit and Intermediate Maintenance Levels. The two manuals will be comprised of -12&P for Unit and -30&P for Intermediate. The revised dispenser manual is tentatively scheduled for release to the field by 4th Qtr FY 95.

**2. TM 9-1055-260-13&P, Operator, Aviation Unit and AVIM for Hydra 70 Rocket Launchers.** All boresighting for the AH-64 and AH-1 Series Helicopters will be removed from subject manual.

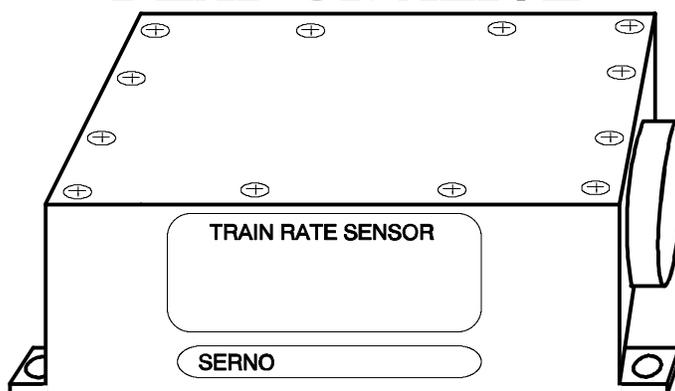
## Chapter III

### SUPPLY BRIEFS

*This information contains update and supplemental information pertaining to Aircraft Armament/Fire Control Systems, Support Equipment, and Supply Publications until a formal change or revision is published. Annotate these changes in your manual.*

- 1. AH-64A Apache Circuit Card Assemblies.** Too many circuit cards are incurring additional damage during shipping because they are not shipped in anti-static containers. Help save the Army money, ship circuit cards in the approved plastic anti-static containers, NSN 8145-01-014-0440, noun is Shipping and Storage. This item is managed by the Navy at N35.
- 2. Apache Train Rate Sensors/Gyroscopes.** We need your help in returning all excess and unserviceable Train Rate Sensors as soon as possible as they are in short supply (NSNs 6615-01-220-8531 and 6615-01-381-1678). To date, the total supply support for the Train Rate Sensor has been from unserviceables repaired/modified at the contractor's plant; however, the demands have far exceeded the unserviceable returns. **THIS ITEM IS IN A CRITICAL SUPPLY POSITION AND CURRENT DEMANDS CANNOT BE MET.** The sooner that excess or unserviceable Train Rate Sensors are turned in, the sooner we can repair and fill outstanding requisitions. Please contact Ms. Jeannine Jones, ACALA Apache/Longbow Team for Disposition Instructions at DSN 793-4164, Commercial (309) 782-4164.

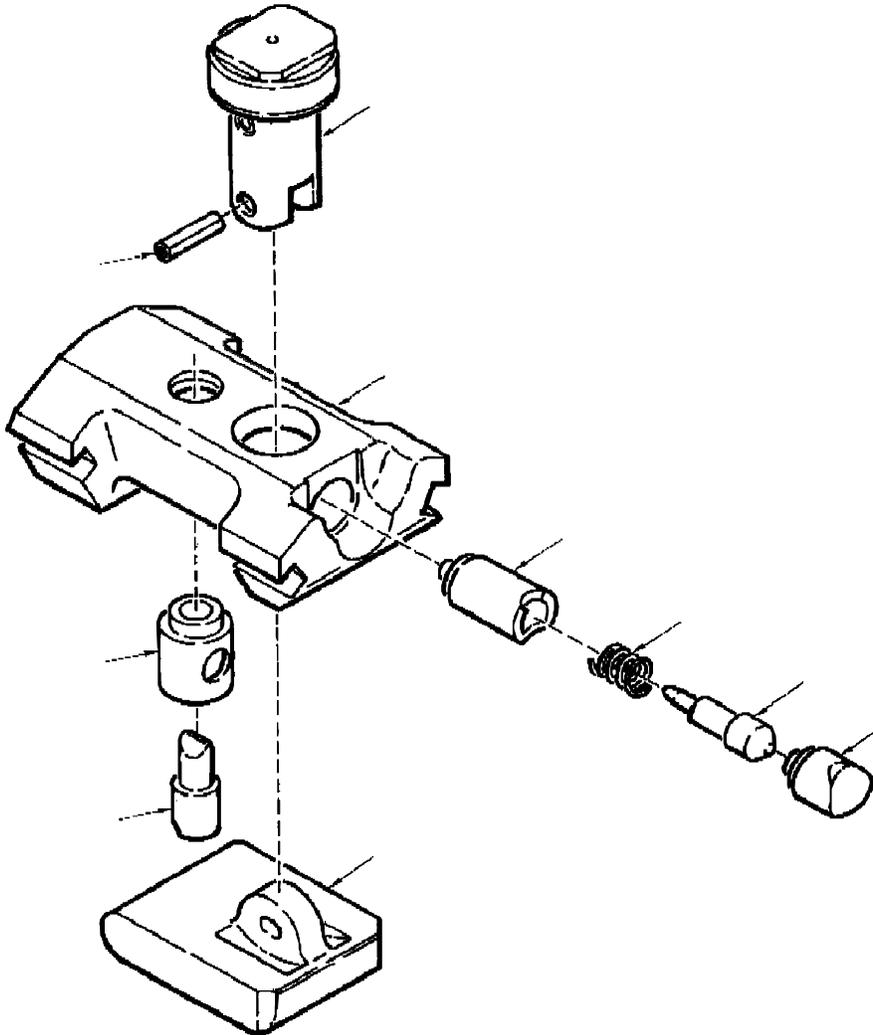
## WANTED DEAD OR ALIVE



**Apache Train Rate Sensors**

## ACALA PAMPHLET 750-1-2

3. **AH-1 Cobra M197 gun breech bolt parts.** Breech bolt parts on the M197 gun are now replaced as a parts kit, PN 8838329, NSN 1005-01-310-7394. All parts except the breech bolt body are replaced at the same time.



COMPRESSION

1 PARTS KIT (883829)  
SHAFT, BOLT, BREECH ASSEMBLY  
INSULATOR, BREECH, HORIZONTAL  
SPRING, BREECH ASSEMBLY

PIN, FIRING  
PLUG, BREECH  
LOCK, BREECH MACHINE  
PIN, CAM  
INSULATOR, VERTICAL  
PIN, SPRING  
2 BODY, BREECH BOLT (11691423)

## Chapter IV

### QUESTIONS FROM THE FIELD

*This chapter contains pertinent questions from the field and answers which other units may need.*

#### **AH-64A Questions:**

QUESTION: The demil code for the M230 receiver is listed as an a "A" in the AMDF. Is this correct?

ANSWER: No, the demil code for the M230 receiver is "D"- Destroy by cutting, mutilation, etc. Efforts are underway to rectify the AMDF entries. In the meantime, use the PN/NSN/Demil code cross reference listed below.

NOMENCLATURE	PN	NSN	Demil Code
Receiver, Cartridge	387-3546-9	1005-01-289-5262	D
Receiver, Cartridge	387-3601-1	1005-01-342-5185	D
Receiver, Cartridge	387-3601-3	1005-01-386-2769	D

#### **AH-1 series Questions:**

QUESTION 1: When we received AH-1Fs, the DA form 2408-4s were missing. What is the recommended solution to initiate new DA form 2408-4s?

ANSWER is in three parts:

Part one: Any time actual records are lost on rounds dependent equipment and a calculation is substituted, there is a double risk taken, i.e., you calculate high and lose some life expectancy of the equipment, or calculate low and run the risk of equipment failure/damage by using equipment past its rebuild/reliability criteria. The following four step procedure is offered to assist units in determining the number of rounds fired/remaining which should be assigned to the reconstructed DA Forms 2408-4 for the M197 20 mm Gun:

Step 1. The first indication to be considered is the breech bolts. Visually check the breech bolts for rebuild markings. If the breech bolt contains the following rebuild markings, the rounds fired listed must be considered. This calculation will always be performed using the highest rounds count expected e.g., if the breech bolt has a marking of R1, then 30,000 (30K) rounds will be assumed and the next service will be performed and the bolts marked with R2.

## ACALA PAMPHLET 750-1-2

Breech Bolt P/N 11010157 is replaced at 45,000  
R1 = 15K to 30K rounds have been fired (30K is used)  
R1&R2 = 30K to 45K rounds have been fired (45K is used)

Breech Bolt P/N 11691422  
L1 = 15K to 30K rounds have been fired (30K is used)  
L1&L2 = 30K to 45K rounds have been fired (45K is used)  
R1 (added to identify the 45K service).  
L1&L2 45K to 60K rounds have been fired (60K is used)

R1  
L1&L2 60K to 75K rounds have been fired (75K is used)

R1  
L1&L2 75K to 90K rounds have been fired (90K is used)

Example, if a breech bolt has the rebuild markings of  
L1&L2&R1, the rounds fired is 45K to 60K rounds. (use 60K)

Step two: Visually check the barrels for pitting and perform  
barrel erosion measurements. Using the table below determine  
the estimated rounds fired (ERF) and the expected barrel life  
(EBL). Example, if the bore erosion gage shows a measured  
bore erosion (MBE) reading of 0.020, the EBL is 20K and the  
ERF is 10K.

NOTE: The worst MBE of the three barrels will be used.

### Estimated Rounds Fired Table

MBE	EBL	ERF
0.0	26K	4k
0.010	23K	7K
0.020	20K	10K
0.030	16.5K	13.5K
0.040	11.5K	18.5K
0.050	0	30K (Replace Barrels)

Step three: Add the rounds for the bolt (step 2) to the  
rounds that the barrels fired (step 3).

#### Example:

45K Rounds fired (bolts marked L1&L2 \*)  
+10k Rounds fired (MBE=20K)  
55k Rounds fired to assign DA Form 2408-4

\* The next service must be performed and the bolts marked with  
R2.

Part two: Loss of historical information for M89E1 feeders  
requires the following solution: To ensure equipment  
readiness is maintained, it is recommended that all rounds-  
dependent  
checks be performed, (TM 9-1090-206-20-1 w/C3, page 3-6, para  
3-7).

## ACALA PAMPHLET 750-1-2

Part three: Loss of historical information for M97 Turret requires the following solution: The rounds count information found on the turret rounds counter will be used.

QUESTION 2: Are all the Round-dependent Checks and Services in TM 9-1090-206-20-1, w/change 3, March 86, Pg 3-5 thru 3-14, still required?

ANSWER: Yes, the rounds dependent checks are still required.

QUESTION 3: Have the recommended changes in Aircraft Armament Update, Volume 10, and the change in paragraph 4 above, been initiated?

ANSWER: Yes. The information provided in TM 5-1520-244-PM is used for normal phase maintenance/preventive maintenance checks and services (PMCS). However, the 2408-4 is used for scheduling and recording rounds dependent requirements which have not changed and are in fact preventive maintenance. As for the Rocket Launchers, they must be cleaned after each operational day and/or if the rocket system will not inventory during the operational day. They should also be cleaned every 25 hrs. No changes will be made to the rocket launcher TM as it is being phased out. All PMCS requirements will be added to the armament system/aircraft manual that they are used on.

Insufaras possible, we have scheduled the Armament Systems PMCS intervals to be the same as the aircraft's. If followed, the Cobra Armament PMCS program is an effective one as it schedules only those tasks necessary to meet stated objectives and does not increase maintenance costs without increasing materiel protection.

Question 4: The main or clearing cam paths in the rear housing of the M197 gun appear excessively worn. What should the unit do?

Answer: Replace the rear housing assembly. This will prevent possible firing stoppages or double feeds.

# ACALA PAMPHLET 750-1-2

English Calendar for 1998

**JANUARY**

SU	MO	TU	WE	TH	FR	SA
					1	2
4	5	6	7	8	9	10
11	12	13	14	15	16	17
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**FEBRUARY**

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**MARCH**

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**APRIL**

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**MAY**

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**JUNE**

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**JULY**

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**OCTOBER**

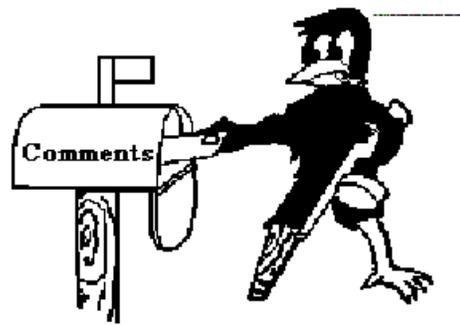
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**NOVEMBER**

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**DECEMBER**

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