

ARMOUR

**V
OLUME 7**

USER MANUAL – COUGAR

PART 3

**COMMANDER'S EQUIPMENT
READINESS CHECKLIST**

(BILINGUAL)

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FOREWORD

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1. B-GL-305-007/MS-003, Armour, Volume 7, User Manual - COUGAR Part 3, Commander's Equipment Readiness Checklist, is issued on authority of the Chief of Defence Staff.
2. This publication supersedes B-GL-305-007/MS-003 Interim 1 dated 1986-03-20 and is effective on receipt.
3. Suggestions for changes shall be forwarded through normal channels to FMC HO, Attention: SSO Armour.

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CHAPTER 1

CHAPTER 1

SERVICING THE RECOIL SYSTEM

EQUIPMENT REQUIRED

1. The following equipment is required:
 - a. oil 3GP 26;
 - b. injector oil and petrol;
 - c. Allen key 1/4 in;
 - d. Allen key 3/8 in;
 - e. plumb bob brass 8 oz;
 - f. oil 3GP 335; and
 - g. cloth.
2. During servicing of the recoil system and at all times, except when firing, the stop running back must be fitted.
3. Before removing any filler plug, ensure the area surrounding it is free from dirt by wiping it with a clean cloth.
4. Oil 3GP 26 is the correct oil to use in the recoil system. In an operational theatre, if 3GP 26 is not available, 3GP 335 lubricating oil may be used as an emergency substitute.

TOPPING UP THE BUFFER AND EXPANSION TANK

5. To top up the buffer and expansion tank:
 - a. check that the recuperating assembly nitrogen pressure is not less than 200 psi;
 - b. ensure the gun is fully run-out;
 - c. level the gun using the gun controls and Quadrant Fire Control (QFC). Remove the buffer cylinder and expansion tank assembly filling plugs;
 - d. depress the gun approximately between 40 to 80 mils and top up at the buffer cylinder filler hole until oil overflows at both the buffer and expansion tank filler plugs;

- e. without replacing the filler plugs, level and fully depress the gun several times to surge the oil, taking care not to elevate the gun above the horizontal as this could induce air into the system;
- f. level the gun and top up, if necessary, until oil again flows from both the buffer cylinder and expansion tank assembly filler holes. After ensuring that the sealing washers are serviceable, replace and tighten the buffer and expansion tank assembly filler plugs; and
- g. check the system for cleanliness, leaks and security.

NOTE

- 1. When the buffer cylinder oil is cold, normal protrusion of the tell-tale rod is approximately 4-1/2 inches as measured from the end of the rod to the rear face of the cylinder.
- 2. During firing, due to heat expansion, the oil in the buffer expands into the expansion tank assembly. This action reduces the amount of protrusion of the expansion tank tell-tale rod. On subsequent cooling, the oil contracts and oil returns from the expansion tank to the buffer cylinder. This action increases the amount of protrusion of the tell-tale rod on the expansion tank assembly.
- 3. It must be clearly understood that the tell-tale rod on the expansion tank assembly only indicates the presence of heat expanded oil in the buffer/expansion tank system. The tell-tale rod does not and will not indicate insufficient oil in the system.
- 4. The only way to ensure that the buffer/expansion tank assemblies are properly charged with oil is to follow the procedure as indicated above.

CHECKING THE RECUPERATOR

- 6. To check the recuperator:
 - a. check that the recuperator nitrogen pressure is not less than 200 psi. If it is, report to a weapon technician;
 - b. check the tell-tale rod at the rear of the HP cylinder. If it has reached the CEASE FIRE position, report to a weapon technician; and
 - c. check the system generally for leaks, security and cleanliness.

SETTING THE RECOIL INDICATOR

7. To set the recoil indicator:
 - a. clean and lubricate the indicator;
 - b. push the slide until the white line of the slide is in line with the line marked **NORMAL** on the bracket; and
 - c. loosen the three retaining bolts, slide the bracket until 28 cm (11 ins) is obtained from the rear face of the breech ring to the end of the lug on the slide, and tighten the retaining bolts.

8. After firing the first round and frequently thereafter, check the relative positions of the lines on the slide bracket. If the line on the slide is on or beyond the **CEASE FIRE** line, the gun must not be fired until the recoil system has been checked.

MONTHLY SERVICING

9. The recoil system is checked by a weapons technician at monthly intervals (or every 250 rounds). The gun is pulled back and the buffer piston rod is checked for scoring and free rotation.

SERVICING THE MOUNTING

10. To service the mounting:
 - a. lubricate the nipples for the two phosphor bronze bushes and the SA cam pivot pin with grease 3GP 641;
 - b. ensure that the four bolts securing the cradle to the mantlet are tight;
 - c. clean and wipe with an oiled cloth the anti-rotation key and the SA camp spring; and
 - d. lubricate the anti-rotation keyway nipples.

FAULT REMEDY CHART

Fault	Cause	Remedy
1. Gun fails to fully run out.	a. Obstruction between beating faces. b. burred or distored.	a. Remove. b. Report to technician.
2. Violent recoil or run out.	Insufficient oil in buffer.	Top up buffer with oil.
3. Recoil violent and failure to run out.	Insufficient nitrogen pressure in recuperator.	Report to technician.
4. Short recoil violent run out.	Excess nitrogen pressure in recuperator.	Report to technician.
5. Run out jerky.	a. Dry liners. b. Grit between liners and barrel, burrs.	a. Lubricate. b. Clean and lubricate.
6. Recoil normal, failure to run out.	Air lock in system.	Report to technician.
7. Recoil normal, no control to run out during last 3 in.	Worn control chamber washer.	Report to technician.

CHAPTER 2

CHAPTER 2
GUN CONTROL EQUIPMENT

SECTION 1
OPERATION

MANUAL TRAVERSE

1. To operate the manual traverse system:
 - a. pull the hand traverse handle fully down;
 - b. rotate the hand traverse handle clockwise to traverse right; and
 - c. rotate the hand traverse handle counter-clockwise to traverse left.

POWER TRAVERSE

2. To operate the power traverse system:
 - a. ensure that there are no external or internal obstructions to interfere with rotation of the turret;
 - b. turn on the hull master switch;
 - c. start the engine; however, the system can be operated for short periods of time if the batteries are well charged;
 - d. close the driver's hatch;
 - e. turn on the turret master switch;
 - f. rotate the hand traverse handle to the 9 o'clock position and push fully up; and
 - g. operate the system by using the gunner's or commander's controller.

TESTING OPERATION

3. Prior to testing, prepare the system for operation and ensure the vehicle is on level ground.
4. **Driver's Traverse Safety Switch.** To test the driver's traverse safety switch:

- a. open the driver's hatch and check that the system will not operate; and
 - b. close the driver's hatch and pull the traverse handle to the DOWN position. Check that the system will not work when using the power controller.
5. **Response.** To test the system for response:
- a. rotate the gunner's power controller to the right and check that the turret moves right; and
 - b. repeat in opposite direction.
6. **Speed of Traverse.** To test the speed of traverse:
- a. move each controller, in turn, up to a maximum of 500 mils from the centre, in each direction and check that the speed of traverse progressively increases as the controller is rotated outward, and decreases when rotated back to the centre; and
 - b. check that the speed for one revolution is less than 16 seconds with the controller at maximum movement.
7. **Commander's Override Controller.** To test the commander's override controller:
- a. have the gunner traverse right or left;
 - b. operate the commander's override in the opposite direction (the commander should gain control and the turret should rotate in the direction opposite to the gunner's); and
 - c. repeat for the opposite direction.
8. Should any of the above tests fail, the fault must be reported to a technician.

SECTION 2

SERVICING

TRAVERSE GEARBOX

9. The crew is required to check the three mounting bolts, keep the equipment clean, lubricate the traverse handle (3GP 335) and grease the turret ring. Servicing of the gearbox is carried out by a weapons technician.

ELEVATING GEAR

10. To service the elevating gear:
- a. check the security of the four mounting bolts;
 - b. check the security and the serviceability of the rubber gaiter; and
 - c. check that the gearing operates smoothly throughout the complete arc of movement.

TESTING THE 76 MM FIRING GEAR

1. To test the 76 mm firing gear:
- a. prove the gun and close the breech - do not ease springs;
 - b. set the hull and turret master switches to the ON position;
 - c. set the gun selector switch to MAIN. Ensure that the indicator light illuminates. If the light does not illuminate, inspect the bulb and fuse F8;
 - d. turn off loader's safety switch and ensure that the GUN READY light illuminates. If the light does not illuminate, inspect the bulb;
 - e. press the firing switch on the elevating handwheel. Check that the striker has been released;
 - f. if the striker has not been released, press the firing switch and, at the same time, check that the solenoid is being energized;
 - (1) if the solenoid is not being energized, check the electrical connections. If the connections are correct, report to a technician,
 - (2) if the solenoid is energized, adjust the firing gear as detailed in paragraph 12, and

- g. cock the gun using the recocking lever;
- h. press the foot firing pedal and check that the striker has been released; and
- j. if the striker has not been released, adjust the firing gear as detailed in paragraph 12.

ADJUSTING THE 76 MM GUN FIRING GEAR

12. To adjust the 76 mm firing gear:
- a. prove the gun and close the breech - do not ease springs;
 - b. ensure that the solenoid is fully forward. If it is not, loosen the solenoid clamp bolts and move the solenoid forward to the end plate. Tighten the solenoid clamp;
 - c. loosen the lock nut on the Bowden cable;
 - d. use the adjusting nut to adjust the cable until the firing lever is just clear of the firing plunger;
 - e. tighten the lock nut on the Bowden cable;
 - f. press the foot firing pedal the gun should fire;
 - g. set the hull and turret master switches to the ON position;
 - h. set the gun selector switch to MAIN;
 - j. cock the gun using the recocking lever;
 - k. turn off loader's safety switch and ensure that the GUN READY light illuminates;
 - m. press the firing switch on the elevating handwheel; and
 - n. if either the electrical or mechanical gears fail to operate correctly, report to a technician.

TESTING THE COAXIAL MG FIRING GEAR

13. To test the coaxial firing gear:
- a. ensure that the procedure for mounting the MG has been completed correctly;
 - b. set the hull and turret master switches to the ON position;

- c. prove the machine gun - do not fire the action;
- d. set the selector switch to CO-AX. Ensure that the indicator light illuminates. If the light does not illuminate, inspect the bulb and fuse F8;
- e. press the firing switch. The solenoid should energize and fire the gun;
- f. if the solenoid is not energized, check that the electrical connectors are tight; if they are, report to a technician; and
- g. cock the MG, place the selector switch to MAIN and fire using foot firing pedal.

ADJUSTING THE COAXIAL MG FIRING GEAR

14. To adjust the coaxial firing gear:
- a. loosen the lock nut on the solenoid adjusting bar;
 - b. loosen or tighten the adjusting nut until it just clears the trigger bar;
 - c. tighten the lock nut;
 - d. test both the foot firing pedal and the firing switch on the elevating handwheel;
and
 - e. if the solenoid does not energize, check the electrical leads and fuse F8 and then report to a technician.

CHAPTER 3

CHAPTER 3
FIRE CONTROL SYSTEMS

SECTION 1

COMMANDER'S SIGHTS

COMPONENT ADJUSTMENT AND OPERATION OF THE NO. 71 SIGHT

1. **Face Mask.** To adjust the face mask and interocular setting:
 - a. remove the eyepiece cap; and
 - b. position the forehead against the mask then adjust the mask until the most comfortable position is obtained as follows:
 - (1) unlock the locking nuts, situated on the top right and top left of the metal frame of the mask,
 - (2) rotate the three adjusters until the desired position is obtained; and
 - (3) lock the locking nuts to secure the face mask.
2. **Switching on the Sight.** To switch on the sight:
 - a. set the hull and turret battery master switches to the ON position; and
 - b. turn the graticule lamp dimmer clockwise and adjust the brilliance as required.
3. **Eyepiece Heater.** To operate the eyepiece heater, set the heater switch on the ON position; the warming lamp beside the switch should illuminate.
4. **Traverse the Sight.** To traverse the sight:
 - a. unclamp the sight mounting by moving the clamp lever clockwise;
 - b. if the sight is in the lined-up position, pull the plunger to the left and rotate the sight as required; and
 - c. if line-up is required, rotate the sight until the plunger engages in the recess of the traverse arc. The amount of traverse of the sight can be read off the scale positioned on the underside of the turret roof. The sight can be re-clamped in any position by moving the clamp anti-clockwise.

COMPONENT ADJUSTMENT AND OPERATION OF THE COMMANDER'S RADNIS

5. **To Switch on Day.** To switch on the sight for day use:
 - a. ensure the daylight protection shutter is closed;
 - b. put the day/night selector to DAY;
 - c. switch on the power at the Radnis Control Unit;
 - d. select X1;
 - e. rotate the lamp brightness control knob to check the illumination of the field defining graticule seen in the X1 unity window;
 - f. select X10; and
 - g. check the illumination of the ballistic graticule.
6. **To Switch Off Day.** Switch the power off at the Radnis Control Box.
7. **To Switch on Night.** The night system may be checked in day-light providing that the pin hole mask or filter is taped to the front of the sights. To switch on the sight:
 - a. put daylight protection shutter to open position (rear);
 - b. put day/night selector to NIGHT (forward);
 - c. select X9;
 - d. switch on power at the Radnis Control Unit;
 - e. focus using the focus lever; and
 - f. adjust the ballistic graticule.

NOTE

For best operation, ensure X9 magnification is selected and that the graticule pattern is as dim as possible.

8. **To Switch Off Night.** To switch off the sight:
 - a. return the day/night selector to DAY position;
 - b. close the daylight protection shutter; and

- c. switch off power at the Radnis Control Box.

WARNING

Before any operating procedures are carried out on the Commander's Radnis, ensure the Gunner's Radnis day/night selector is at DAY.

NOTE

During day or night operations if there is too much glare in the sight, close the anti-glare filter.

GENERAL INSPECTION OF OPTICAL AND SIGHTING EQUIPMENT

- 9. Inspect and check for the following:
 - a. missing, loose or damaged screws;
 - b. damage on seating and locating faces;
 - c. conditions of external finish;
 - d. condition of electrical fittings and switches, etc;
 - e. condition of engraving on scales and readers;
 - f. condition of external glass surfaces;
 - g. condition of face masks;
 - h. efficiency of locking devices and safety catches;
 - j. sharpness and clear definition of graticules; and
 - k. condition of the internal optics (which can be viewed from the object end of the instrument). They should be clean, unfilmed and free from fungus or cracks.

- 10. Whenever hand-operated controls are fitted to an equipment, they should only be used by-hand. Under no circumstances must mechanical aids be used to force them. A technician should be informed immediately of any difficulty or malfunction.

CHANGING THE GRATICULE LAMP

11. To change the graticule lamp:
 - a. set the graticule illumination switch to the OFF position;
 - b. slacken the screw on the lamp unit cover plate;
 - c. remove the unserviceable lamp and replace it with a new one; and
 - d. close the cover and secure it.

SERVICING THE SIGHT WASHER SYSTEM

12. To service the sight washer system:
 - a. keep the reservoir filled to the correct level with water, during cold weather, use anti-freeze;
 - b. check the operation of the system;
 - c. check for clogged or leaking connections; and
 - d. report any defects to a technician.

NOTE

It is important in dry conditions to operate the washer system before using the sight wiper. This will prevent the glass surface from becoming scratched.

TESTING FOR PARALLAX

13. Testing for parallax should be carried out on all sights that have a graticule pattern and are used when direct fire is employed. To test for parallax:
 - a. lay on to an aiming mark at not less than 600 metres; and
 - b. move the head while looking at the aiming mark. Should the graticule move with the head, then parallax is present in the sight and must be reported to a technician.

SECTION 2

GUNNER'S SIGHTS

COMPONENT ADJUSTMENT AND OPERATION OF THE NO. 54 SIGHT

14. **Face Mask.** The face mask may be mounted to give either left or right eye vision through the X10 eyepiece. To change the position of the face mask and focus the eyepiece:

- a. unscrew the face mask by means of the bottom two and top centre knurled wheels under the mask to the left or right, as required;
- b. re-secure the face mask by means of the three knurled wheels;
- c. select an aiming mark at approximately 600 metres and rotate the focusing adjustor until the graticule pattern and the aiming mark are sharp and clear.

15. **Graticule Illumination.** To illuminate the graticule:

- a. set the switch to the ON position;
- b. rotate the dimmer control until the required brilliance is obtained; and
- c. if the graticule fails to illuminate, check fuse Fl.

16. **Washer and Wiper.** To operate the wiper:

- a. if it is not raining, first operate the washer to avoid scratching the window surface; and
- b. set the left hand of the two switches on the underside of the sight mounting to the ON position.

MOVING THE NO. 54 SIGHT TO THE STOWED POSITION

17. To move the sight to the stowed position:

- a. ensure that all sight switches are set to OFF and that the blackout shutter control is set to SHUT;
- b. release the sight link bar and stow; and
- c. swing the sight forward and retain it in the stowed position by engaging the spring catch with the right side of the sight.

RELEASING THE NO. 54 SIGHT FROM THE STOWED POSITION

18. To release the sight from the stowed position:
 - a. support the sight and pull the spring catch to the right; and
 - b. carefully swing the sight down and lift the sight link bar into alignment with the sight connection lug. Turn the turnbuckle connection lever a quarter turn clockwise to engage it with the sight.

DISMOUNTING THE NO. 54 SIGHT

19. To dismount the No. 54 sight:
 - a. ensure that the turret master switch is set to OFF;
 - b. disconnect the electrical connections from the sight;
 - c. rotate the turnbuckle connection lever a quarter turn anticlockwise with the right hand; pull the link bar out of the sight connection lug and stow the link bar;
 - d. elevate the gun;
 - e. support the sight; push up on the locking lever safety catch; push the lever forward to release the trunnion pins; and
 - f. lower the sight with care.

MOUNTING THE NO. 54 SIGHT

20. To mount the No. 54 sight:
 - a. ensure that the mounting and the sight connection lug on the sight are clean, undamaged and lightly lubricated;
 - b. elevate the gun. Ensure that the trunnion locking lever is in the forward position. Lift the sight into the mounting aperture;
 - c. support the sight. Pull the trunnion locking lever to the rear to engage the trunnion pins, listen for the engagement of the safety catch;
 - d. lift the sight link bar into alignment with the sight connection lug. Turn the turnbuckle connection lever a quarter turn clockwise to engage it with the sight;
 - e. ensure that the turret master switch is set to OFF; connect the electrical supply to the sight; and

- f. elevate and depress the main armament to ensure that the sight linkage is working correctly.

COMPONENT ADJUSTMENT AND OPERATION OF THE GUNNER'S RADNIS

- 21. **To Switch on Day.** To switch on the sight for day use:
 - a. ensure daylight protection lever is closed;
 - b. day/night selector to DAY;
 - c. switch on the power at the Radnis Control Unit;
 - d. select X1;
 - e. rotate the lamp brightness control knob to check the illumination of the field defining graticule seen in the X1 unity window;
 - f. select X10; and
 - g. check the illumination of the ballistic graticule.
- 22. **To Switch Off Day.** Switch the power off at the Radnis Control Box.
- 23. **To Switch on Night.** The night system may be checked in daylight providing that the pin hole mask or filter is taped to the front of the sight. To switch on the sight:
 - a. move the daylight protection shutter to open position (rear);
 - b. move the day/night selector to NIGHT (forward);
 - c. select X9;
 - d. switch on power at the Radnis Control Unit;
 - e. focus using the focus lever; and
 - f. adjust the ballistic graticule.

NOTE

For best operation, ensure X9 magnification is selected and that the graticule pattern is as dim as possible.

- 24. **To Switch Off Night.** To switch off the sight:

- a. return the day/night selector to DAY position;
- b. close the daylight protection shutter; and
- c. switch off the power at the Radnis Control Unit.

WARNING

Before any operation procedures are carried out on the Gunner's Radnis, ensure the Commander's Radnis day/night selector is at DAY.

NOTE

During day or night operations if there is too much glare in the sight, close the anti-glare filter.

SECTION 3

GUN LAYING INSTRUMENTS

APPLYING LINE CORRECTIONS

25. To apply a line correction:
- a. zero the pointers;
 - b. repeat the ordered correction;
 - c. apply ordered correction against the outer scale; and
 - d. rezero the pointers.

MEASURING A LINE SWITCH

26. To measure a line switch:
- a. lay on the Distant Aiming Point, (Flank, Aiming Point or Gun Aiming Point);
 - b. record the zero line by zeroing the pointer; and
 - c. traverse onto the target and read the measurement from the inner and outer scale.

APPLYING A MEASURED LINE SWITCH

27. To apply a measured line switch:
- a. lay on the recorded zero line;
 - b. traverse the required line switch; and
 - c. zero the pointers.

MEASURING AN ANGLE OF SIGHT

28. To measure an angle of sight, the commander orders "Set angle of sight". The gunner then:
- a. lays the MBS 76 mm mark of the sight graticule on to the target;
 - b. unlocks the range drum adjuster;

- c. rotates the range drum adjuster until the bubble is within the two large scribe marks;
- d. slips the HE/HESH scale until ZERO is under the cursor line;
- e. securely locks the range drum adjuster (ensuring that the bubble or the mil scale are not disturbed); and
- f. reports "Set".

NOTE

If the angle of sight is only required for a range card, delete Art e, f and g.

APPLYING AN ANGLE OF SIGHT

- 29. To apply an angle of sight:
 - a. repeat the angle ordered by the commander;
 - b. unlock the range drum adjuster;
 - c. rotate the range drum adjuster until the required angle corresponds to the cursor line;
 - d. slip the HE/HESH scale to ZERO;
 - e. securely lock the range drum adjuster; and
 - f. report "Set".

OBTAINING QUADRANT ELEVATION (QE) (FIXED LINE BELOW 2000 M)

- 30. Normally fixed line firing is carried out under 2000 metres. When this is the case use the following procedure to obtain QE:
 - a. the commander determines the type of ammunition to be recorded and uses one of the following methods to determine the range to the target or target area -
 - (1) laser range finder,
 - (2) registration by fire,
 - (3) measure from a map, or

- (4) estimation;
- b. the gunner using the corresponding range on his ballistic sight:
 - (1) lays on to the centre of the target or target area,
 - (2) level the bubble using the range adjuster, and
 - (3) read off the mil scale; and
- c. the commander records the reading on the range card.

OBTAINING QUADRANT ELEVATION (QE) (FIXED LINE ABOVE 2000 M)

31. To obtain quadrant elevation above 2000 metres:
 - a. lay the MBS 76 mm on to the centre of the target or target area;
 - b. unlock the range drum adjuster;
 - c. rotate the range drum adjuster until the bubble is within the two large scribe marks;
 - d. slip the HE/HESH scale to ZERO;
 - e. securely lock the range adjuster;
 - f. apply the ordered range given by the commander; and
 - g. read off the mil scale.
32. When this is done the commander records the reading on the range card.

APPLYING QUADRANT ELEVATION

33. To apply quadrant elevation:
 - a. repeat the quadrant elevation ordered by the commander;
 - b. rotate the range drum adjuster until the required quadrant elevation is under the line in the cursor;
 - c. level the gun using the gun controls; and
 - d. report level.

FIRING SMOKE 0 - 3700, HE/HESH OVER 2000 METRES

34. Due to the sight marking limitations, it may be necessary to fire smoke or engage a target with HE/HESH beyond 2000 metres without an angle of sight. In either case:

- a. repeat zero-scales;
- b. set both scales to zero;
- c. apply the range to the applicable range scale;
- d. level the gun with the gun control; and
- e. report level.

LAYING SEMI-INDIRECT AND INDIRECT

35. Using range and angle of sight:

- a. unlock the range drum adjuster;
- b. rotate the range drum adjuster until the angle of sight required is directly below the cursor line;
- c. slip the HE/HESH scale until zero is under the cursor line;
- d. securely lock the range drum adjuster;
- e. rotate the range drum adjuster until the range marking required is directly below the cursor line;
- f. elevate the gun until the bubble is within the two large scribe marks (ending the lay in depression); and
- g. report level.

DETERMINING MINIMUM SAFE RANGE (MSR)

36. To determine minimum safe range (MSR):

- a. the gunner zeros the QFC scales and levels the gun and the commander looks through the bore from the top of the breech to the bottom of the muzzle and orders the gunner to elevate until the bore is clear of any obstructions;

- b. the gun is traversed through the arc of responsibility. Each time the bore is fouled, the gun is elevated until the bore is clear. In this way, the lowest point is found, at which the gun can be depressed without fouling the crest within the arc; and
- c. the gunner levels the bubble on the QFC using the range drum adjuster. He then reports the range to the commander.

SERVICING

37. Check the traverse indicator for security and cleanliness. If a bulb requires replacement:

- a. unscrew the adaptor and withdraw the bulb from it; and
- b. insert a new bulb 28V .04A and secure the adaptor.

38. **Testing Accuracy of the Traverse Indicator.** To test the accuracy of the traverse indicator the following are done:

- a. illuminate the scales of the indicator;
- b. lay the MBS 76 mm mark on to an aiming mark at not less than 600 metres;
- c. zero both pointers;
- d. traverse right 100 mils and then look through the sight and traverse left until the MBS 76 mm mark is laid on to the aiming mark again. Do not over run or the test will have to be re-done;
- e. note the reading on the pointers. The reading should be within one mil of zero; and
- f. repeat the test in the opposite direction. If the error is greater than one mil in either direction, report to a technician.;

39. **Checking Quadrant Fire Control.** Check the quadrant fire control for security, cleanliness and be sure that the range drums are clean and dry. Inspect the trilux lamps for cracks or damage.

40. **Testing Quadrant Fire Control Drive.** To test the drive in the quadrant fire control:

- a. rotate the range drum adjuster until zero on the mils scale is directly below the cursor line;
- b. elevate the gun until the bubble in the clinometer is within the two large scribe marks;

- c. rotate the range drum adjuster and check that the clinometer bubble moves immediately; and
- d. continue to rotate the range drum adjuster and ensure that the clinometer arm is being moved smoothly and continuously.

41. **Zeroing Quadrant Fire Control.** To zero the quadrant fire control:

- a. lay the plumb line, of the brass plumb bob over the back of the 76 mm breech ring;
- b. elevate or depress the gun until the plumb line is lying evenly against the back of the breech ring from top to bottom;
- c. rotate the range drum adjuster until the bubble in the clinometer is within the two large scribe marks;
- d. ensure that the zero mark on the mils is directly below the cursor line;
- e. if not, slacken the four clamping screws and slide the cursor until the line is directly above zero on the mils scale;
- f. tighten the clamping screws; and
- g. if the movement on the cursor is insufficient, report to a technician.

PREPARATION BEFORE BORESIGHTING

42. The following preparations must be made before attempting to boresight:

- a. complete servicing tests of the sighting equipment; this is essential;
- b. place the vehicle on firm, level ground if possible;
- c. prove all guns and leave the main armament breech open;
- d. place the gun to the side of the vehicle;
- e. ensure that the vehicle engine is switched off (leave master switches ON);
- f. position the boresighting screen 600 metres from the AFV; under service conditions a suitable target should be selected at a range of 600 metres;
- g. ensure the laser filter is either all the way in or out on the AV 54 gunner's sight; and

- h. insert the boresight No. 3 into the muzzle of the 76 mm gun with the eyepiece on the sight box to the left.

NOTE

If the laser filter is not completely in or out, an error in boresighting will occur.

METHOD OF BORESIGHTING

- 43. The method used to boresight is detailed below:
 - a. order the gunner to lay the MBS 76 mark of the sight graticule onto the aiming circle of the screen;
 - b. look through the boresight eyepiece and order the gunner to traverse and elevate as required until the boresight dot is laid on to the centre of the aiming circle; the final movement of the gun being one of elevation;
 - c. order the gunner to adjust his sight graticule with the graticule adjusters so that the MBS 76 mark of the graticule is again in the centre of the aiming circle;
 - d. the gunner will now ensure that the graticule adjusters are firmly locked;
 - e. order the gunner to traverse and elevate off the target and then relay the MBS 76 mark of the sight graticule on to the centre of the aiming circle, ending the lay in elevation;
 - f. check that the boresight dot is again in the centre of the aiming circle;
 - g. if the boresight dot is not in the centre of the aiming circle, then -
 - (1) the gunner has made an incorrect adjustment,
 - (2) the gunner's lay is inconsistent, or
 - (3) the fire control equipment is faulty;

NOTE

If any fault is discovered in subparagraph g, it will be rectified immediately and the boresighting procedure will be continued.

- h. if no fault as stated in subparagraph g above is found, the gunner will record the readings on the graticule adjusters and report the readings to the commander;

- j. the commander will remove the boresight from the gun, rotate it through 3200 mils and reposition it in the bore (eyepiece to the right);
- k. order the gunner to lay the MBS 76 mark on the centre of the aiming circle of the screen. Looking through the eyepiece, the commander will note the position of the boresight dot. If the boresight dot is in the centre of the aiming circle, sight adjustment is completed;
- m. if the boresight dot is not in- the centre of the aiming circle, the commander will realign the boresight as subparagraph b above and order the gunner to readjust the sight graticule as in subparagraphs c, d and e above;
- n. the gunner will once again record the readings on the graticule adjusters and report them to the commander;
- p. the commander, having now obtained two sets of readings, will calculate the mean readings and order the gunner to apply these mean readings to the graticule adjusters. If the difference between the two readings are greater than one mil in elevation and half a mil in line, the boresight error is unacceptable and the instrument requires calibration; and
- q. remove the muzzle boresight from the gun and stow it.

VISUAL BORESIGHTING (NO BORESIGHT)

44. **Procedure.** It is essential that the servicing and tests of the sighting equipment have been completed before proceeding with the following steps:

- a. place the vehicle on firm, level ground if possible;
- b. prove all guns, leave the breech open;
- c. ensure that the vehicle engine is switched off (master switches on);
- d. ensure the laser filter is either all the way in or out on the AV 54 gunner sight;
- e. select an object with a well defined right angle at a range of 600 metres;
- f. place a piece of greased cotton or thread accurately into the vertical scribe marks on the muzzle of the 76 mm gun and another into the horizontal scribe marks. Secure them in position with grease or tape;
- g. remove the striker mechanism assembly from the 76 mm gun;
- h. align the bore roughly on to the corner of the object selected. Close the breech;

- j. place the left tube of a pair of binoculars, i.e., the tube without the graticule pattern, against the recess in the breech block which holds the striker mechanism assembly. Focus the binoculars until the cross threads at the end of the muzzle are clear and the object is clear and sharply defined;
- k. order the gunner to traverse and elevate/depress until the cross threads are laid onto the right angle of the object ensuring that the final movement of the gun is one of depression;
- m. order the gunner to adjust the sight graticule with the graticule adjusters so that the MBS 76 of the graticule is aligned on to the same corner of the object. Having done this, the gunner will ensure that the adjusters are firmly locked;
- n. order the gunner to traverse and elevate off the object and then relay ensuring that the final movement of the gun is one of depression;
- p. the commander will now check that the cross threads on the muzzle are correctly positioned on the object. If they are, the sight is adjusted correctly; if they are not, the adjustment must be carried out again; and
- q. replace the striker mechanism assembly.

CONVERGING THE COMMANDER'S SIGHT

45. **Preparation.** To converge the commander's sight to the gunner's, use the following procedure:

- a. select a well defined object at a range of not less than 2000 metres, order the gunner to lay the MBS 76 mm mark of the sight graticule on to a specific point on to the object and maintain the lay throughout the period of adjustment;
- b. move the commander's sight to the line-up position ensuring that the plunger is engaged in the recess (for Radnis ensure graticule adjusters are at the centre of their run). Adjust the tilting mirror in the commander's sight so that the object is visible through the X10 eyepiece;

46. **Sight AV No. 71.** If the MBS 76 mark is not correct for line, adjust the position of the sight mounting as follows:

- a. loosen the two plunger assembly securing bolts;
- b. loosen the two lock nuts securing bolts;
- c. rotate the adjusting bolts until the MBS 76 mark is on the same point of aim as the gunner;

- d. tighten the lock nuts and plunger assembly securing bolts;
- e. having established the correct line-up position, pull out the plunger and rotate the sight away from the object; and
- f. rotate the sight back to the line-up position and check that the MBS 76 mark has returned to the object.

47. **Commander's Radnis.** If the MBS 76 mark is not correct for line, adjust the graticule using the azimuth graticule adjustor. If there is insufficient adjustment, report it to a technician.

SECTION 4

BORESIGHTING

PREPARATION BEFORE BORESIGHTING

48. It is essential that the servicing tests of the sighting equipment have been completed then:
 - a. place the vehicle on firm, level ground if possible.
 - b. prove all guns and leave the main armament breech open:
 - c. gun should be to the side of the vehicle:
 - d. ensure that the vehicle engine is switched off (leave master switches ON);
 - e. the boresighting screen should be positioned 600 metres from the AFV. under service conditions a suitable target should be selected at a range of 600 meters:
 - f. ensure the laser filter is all the way in or out on the AV 54 gunner's sight: and
 - g. insert the boresight mark 3 into the muzzle of the 76mm gun with the eyepiece on the sight box to the left.

NOTE

If the laser filter is not completely in or out. an error in boresighting will occur.

METHOD OF BORESIGHTING

49. The following method is used to boresight:
 - a. order the gunner to lay the MBS 76 mark of the sight graticule onto the aiming circle of the screen:
 - b. look through the boresight eye piece and order the gunner to traverse and elevate as required until the boresight dot is laid on to the centre of the aiming circle, the final movement of the gun being one of elevation,
 - c. order the gunner to adjust the sight graticule with the graticule adjusters so that the MBS 76 mark of the graticule is again in the centre of the aiming circle:
 - d. the gunner will now ensure that the graticule adjusters are firmly locked:
 - e. order the gunner to traverse and elevate off the target and then relay the MBS 76

mark of the sight graticule on to the centre of the aiming circle, ending the lay in elevation;

- f. check that the boresight dot is again in the centre of the aiming circle; and
- g. if the boresight dot is not in the centre of the aiming circle. then:
 - 1) the gunner has made an incorrect adjustment. or
 - 2) the gunner's lay is inconsistent. or
 - 3) the fire control equipment is faulty.

NOTE

If any fault stated in sub paragraph g is discovered, it will be rectified immediately and the boresighting procedure will be repeated.

- h. if there is no fault as stated in sub paragraph g. above, the gunner will record the readings on the graticule adjusters and report the readings to the commander:
- j. the commander will remove the boresight from the gun, rotate it through 3200 mils and reposition it in the bore (eye piece to the right);
- k. order the gunner to lay the MBS 76 mark on the centre of the aiming circle of the screen. Looking through the eye piece, the commander will note the position of the boresight dot. If the boresight dot is in the centre of the aiming circle, sight adjustment is completed;
- m. if the boresight dot is not in the centre of the aiming circle, the commander will realign the boresight as in sub paragraph b. above and order the gunner to readjust the sight graticule as in sub paragraphs c., d., e. above;
- n. the gunner will once again record the readings on the graticule adjusters and report them to the commander:
- p. the commander, having now obtained two sets of readings. will calculate the mean readings and order the gunner to apply these mean readings to the graticule adjusters, if the difference between the two readings is greater than one mil in elevation and half a mil in line, the boresight error is unacceptable and the instrument requires calibration: and
- q. remove the muzzle boresight from the gun and stow it.

VISUAL BORESIGHTING PROCEDURE (NO BORESIGHT)

50. It is essential that the servicing and tests of the sighting equipment have been completed then:

- a. place the vehicle on firm, level ground if possible,
- b. prove all guns. leave the breech open:
- c. ensure that the vehicle engine is switched off (master switches on).
- d. ensure the laser filter is either all the way in or out on the AV 54 gunners sight:
- e. select an object with a well defined right angle at a range of 600 metres;
- f. place a piece of greased cotton or thread accurately into the vertical scribe marks on the muzzle of the 76mm gun and another into the horizontal scribe marks. and secure them in position with grease or tape:
- g. remove the striker mechanism assembly from the 76mm gun:
- h. align the bore roughly on to the corner of the object selected. close the breech,
- j. place the left tube of a pair of binoculars, ie, the tube without the graticule pattern, against the recess in the breech block which holds the striker mechanism assembly, and focus the binoculars until the cross threads at the end of the muzzle are clear and the object is clear and sharply defined'.
- k. order the gunner to traverse and elevate/ depress until the cross threads are laid onto the right angle of the object ensuring that the final movement of the gun is one of depression:
- m. order the gunner to adjust the sight graticule with the graticule adjusters so that the MBS 76 mark of the graticule is aligned on to the same corner of the object: having done this the gunner will ensure that the adjusters are firmly locked:
- n. order the gunner to traverse and elevate off the object and the relay ensuring that the final movement of the gun is one of depression -.
- p. the commander will now check that the cross threads on the muzzle are correctly positioned on the object (if they are. the sight is adjusted correctly: if they are not, the adjustment must be carried out again); and
- q. replace the striker mechanism assembly.

PREPARATION OF CONVERGING THE COMMANDER'S SIGHT

51. To converge the commander's sight to the gunner's, the following procedure will be followed:

- a. select a well defined object at a range of not less than 2000 metres. order the gunner to lay the MBS 76mm mark of the sight graticule on to a specific point on the object and maintain the lay throughout the period of adjustment:
- b. move the commander's sight to the line-up position ensuring that the plunger is engaged in the recess (for RADNIS ensure graticule adjusters are at the centre of their run): adjust the tilting mirror in the commander's sight so that the object is visible through the X 10 eye piece.

SIGHT AV NO. 71

52. If the MBS 76 mark is not correct for line, adjust the position of the sight mounting as follows:

- a. loosen the two plunger assembly securing bolts;
- b. loosen the two lock nuts securing the adjusting bolts;
- c. rotate the adjusting bolts until the MBS 76 mark is on the same point of aim as the gunner;
- d. lighten the lock nuts and plunger assembly securing bolts;
- e. having established the correct line-up position, pull out the plunger and rotate the sight away from the object;
- f. rotate the sight back to the line-up position and check that the MBS 76 mark has returned to the object.

COMMANDER'S RADNIS

53. If the MBS 76 mark is not correct for line, adjust the graticule using the azimuth graticule adjuster. If there is insufficient adjustment, report to a technician.

SECTION 5

ZEROING

ZEROING PROCEDURE FOR COUGAR AVGP

54. Complete boresighting procedures IAW B-GL-305-007 MS-002. Chapter 9, and record values on registration form. Lay HESH 900 aiming mark on centre of zeroing screen. Then fire 3 rounds at the centre of the zeroing screen at 900 m ensuring that the same point of aim is used for each round fired. If first round does not hit the zeroing screen adjust the graticule by doing the following:

- a. if the round is minus move the graticule using the graticule adjuster, from the center of the zeroing screen to where the projectile hit the ground',
- b. if round is plus move the graticule using the graticule adjuster. from the centre of the zeroing screen to the spot where the tracer flew over the zeroing screen.

55. Proceed down range and measure the distance in cm, from the centre of the circle on the zeroing screen to each round, both in Azimuth and elevation. Record the readings on the registration form and then:

- a. calculate the MPI cm by adding the columns. determining the difference and dividing by three to find the MPI cm for both azimuth and elevation:
- b. mark the MPI on the zeroing screen with red paint, mark or cover the previous shots on the screen and return to the Cougar:
- c. have the gunner lay 900 m aiming mark on to the centre of the zeroing screen using the hand traverse and elevation: unlock the graticule adjusters and move the graticule using the graticule adjusters to the MPI on the zeroing screen and lock the graticule adjuster once completed.

56. Confirm that the difference between total column and physical reading column at No. 7 on registration form is no greater than 0.2 mils otherwise repeat paragraph 55 a. b. c.

57. Relay the 900 m aiming mark on the centre of the zeroing screen using the gun controls and fire one confirming round: the confirming round should be close to the centre of the tgt or at least on the shooting in screen.

NOTE 1

It the zeroing round only can be fired the following procedure will be followed:

- a. boresighting as per 1;

- b. add standard values (difference between boresighting and zeroing values); and
- c. fire 1 round as per 9 and if the projectile hits the zeroing screen, the gun is considered zeroed.

NOTE 2

Last lay always in depression with a round in the chamber; and last lay always in elevation with the boresight in the muzzle end.

58. To check boresighting:

- a. return to pre-recorded boresighting values;
- b. order the gunner to lay MBS 76; mark of the sight graticule on the centre of the aiming circle, ending the last lay in elevation.
- c. check that the Foresight dot is again in the centre of the aiming circle; and
- d. it not re-boresight as per complete procedure stated in B-GL-305-007 MS-002.

NOTE 3

When confirming if the round misses the zeroing screen the crew will check the following:

- a. gunner's actions,
- b. settings on graticule adjusters,
- c. boresighting, and
- d. if no fault is found, re-zero.

CHAPTER 4

CHAPTER 4
SECONDARY ARMAMENT

SECTION 1

MG PREPARATION FOR FIRING

SEVEN POINT CHECK

1. **Buffer Disc Assembly:**
 - a. fully tighten the adjusting screw;
 - b. ensure that part of last thread on the adjusting screw is still visible;
 - c. if no threads are visible on the adjusting screw, add fibre discs ensuring that no more than three threads are visible; and
 - d. turn the adjusting screw back until it engages in the nearest lock position.

2. **Headspacing:**
 - a. cock the gun; do not fire the action;
 - b. pull the bolt to the rear about 2.5 cm and raise the link guide;
 - c. working from the right side of the gun, using a screwdriver, screw the barrel all the way into the barrel extension;
 - d. insert the Headspace Gauge 0.127 in. into the "T" slot;
 - e. working from the left side of the gun, screw the barrel out one notch. Release the bolt and check to see if the recoiling parts close, clamping the gauge between the rear face of the barrel and cartridge seat on the face of the bolt. If the recoiling parts do not close repeat the process until they do; and
 - f. once the recoiling parts close, clamp the gauge between the rear face of the barrel and the cartridge seat on the face of the breech block: headspacing is the correct.

3. **Timing:**
 - a. cock the gun and ease the working parts forward onto the NO FIRE timing gauge;
 - b. raise the trigger; the firing pin should not release. If it does release, replace the

trigger and repeat the test;

- c. remove the NO FIRE timing gauge and insert the FIRE gauge and fire the action. If it does not fire, change the trigger and repeat the test; and
- d. remove the FIRE gauge.

4. **Firing Pin Protrusion:**

- a. cock the action;
- b. look down the face of the bolt and fire the action; and
- c. ensure firing pin protrudes 1.5 mm and is well-rounded.

5. **Feed Mechanism:**

- a. feed lever, pivot bushing screw, shakeproof washer;
- b. cover extractor spring;
- c. cover extractor cam;
- d. feed pawl (finger and spring);
- e. cartridge guide spring;
- f. belt holding pawl;
- g. link guide;
- h. extractor (extractor cam plunger, extractor claw);
- j. cam groove on bolt; and
- k. cover latch spring.

6. **Feed Slide Test.** With the cover closed, the feed slide is pushed fully to the left. The slide should protrude from the right at least 0.79 mm (the thickness of the FIRE gauge to a maximum of double the thickness). If the position is incorrect, the items changed, in turn, are the feed lever and the feed slide. If the test is not correct, the fault is reported to a weapons technician.

7. **Barrel Jacket, Front Barrel Bearing and Plug and Sights:**

- a. check that the barrel jacket is rigidly fastened to the gun body;

- b. lock the securing screw in place;
- c. ensure no cracks or bends;
- d. tighten front barrel bearing and plug and see that the locking ring has been punched into the front barrel bearing and plug and barrel jacket;
- e. ensure that the front barrel bearing and plug is free of oil and carbon;

NOTE

If the barrel jacket is bent, the front of the barrel will bind on the inside of the front bearing and plug.

- f. check front sight -
 - (1) screws tight and not burred,
 - (2) plunger mechanism holds sight upright,
 - (3) bracket is attached firmly to front of receiver; and
 - g. rear sight -
 - (1) no excessive play in elevating screw,
 - (2) no bend in windage gauge screw,
 - (3) windage gauge readable and set pins in place, and
 - (4) range scale readable.
8. Any faults found are to be reported to a weapons technician.

SECTION 2

OPERATION OF THE MBSGD

LOADING

9. To load the grenades, complete the following:
 - a. remove the rubber cups;
 - b. test the electrical circuit, if time is available;
 - c. ensure that the Hull and Turret Master Switch is off;
 - d. insert the grenade from the top of the turret from the outside to the inside, push the grenade until you feel the grenade engage in the first female clip, push the grenade fully home until it engages with the second female clip and give a half turn to ensure positive contact;
 - e. replace the rubber cups; and
 - f. ensure there are no personnel in the danger area and turn the master switches on.

CAUTION

1. Do not expose any part of your body in front of dischargers during loading or unloading or when the master switch is turned on.
2. Grenades will not be loaded or unloaded from the discharger if a radio antenna is in the transmit mode two metres or less from the dischargers.

FIRING

10. Press either one or both firing buttons as required.

UNLOADING

11. To unload the grenades, the following are done:
 - a. ensure the turret and hull master switches are off;
 - b. remove the rubber cups from the barrels;

- c. remove the grenades from the top of the turret from the inside towards the outside and stow them; and
- d. replace the rubber cups.

MISFIRE DRILL

12. The drill for misfired grenades is as follows:
- a. wait 30 minutes;
 - b. unload;
 - c. replace in containers; and
 - d. transport to disposal area, dispose as per Range Standing Orders.

NOTE

This applies to all grenades; the L5, L7 and L8.

SECTION 3

SERVICING THE MBSGD

CIRCUIT TEST

13. To test the electrical circuit:
 - a. equipment required -
 - (1) 12 inch screwdriver,
 - (2) 24 volt bulb, or
 - (3) a circuit tester; and
 - b. to test -
 - (1) turn the Hull and Turret Master switches on,
 - (2) hold the screwdriver on the upper part of the male jack connector,
 - (3) ground the bulb against the side of the discharger barrel and touch the centre contact of the bulb with the screwdriver,
 - (4) ensure the bulb lights when the appropriate firing button is pressed,
 - (5) if it does, press the other button to ensure that it does not light, and
 - (6) test each barrel in turn on both banks.

NOTE

If during the test any of the circuits are faulty, it is to be reported to a technician.

CLEANING

14. Cleaning occurs at the following times:
 - a. weekly -
 - (1) check for foreign material in the barrels,
 - (2) check that the male jackets are bright and clear of fouling, if not, clean with steel wool or other abrasive material to ensure proper contact,

- (3) ensure that the drain holes in each barrel are clear,
 - (4) dry clean and lightly re-oil with 3GP 335, and
 - (5) replace the rubber cups;
- b. before firing - remove all oil from the barrels prior to loading; and
- c. after firing -
- (1) remove deposits left from firing, ensuring that no female clips have remained,
 - (2) dry clean and re-oil the barrels with 3GP 335, and
 - (3) replace the rubber cups.

CHAPTER 5

CHAPTER 5

LASER RANGE FINDER GVS/5

PREPARING FOR USE

1. To prepare the laser range finder for use:
 - a. remove the range finder from the carrying case and perform a visual inspection for physical damage;
 - b. determine if a battery is installed or if the battery requires replacement, by -
 - (1) removing the eyepiece lens cover,
 - (2) setting the PWR ON switch to on,
 - (3) pressing and holding the MIN RNG switch,
 - (4) looking into the eyepiece and observing the RANGE METRES display and the LOW BATT indicator -
 - (a) if any numbers are displayed on the RANGE METRES display and the LOW BATT indicator is NOT illuminated, the battery is probably good and the range finder is ready for use, or
 - (b) if the LOW BATT indicator is illuminated and the numbers are displayed on the RANGE METRES, proceed to Step 5,
 - (5) setting the PWR ON switch to OFF, remove the battery cover and install a new battery, inserting the positive (+) terminal into the compartment first install the battery cover, return the removed battery to be charged then repeat steps (1) to (4), and
 - (6) setting PWR ON switch to OFF.

OPERATING THE LASER RANGE FINDER

2. To operate the laser range finder following these procedures:
 - a. remove the objective and eyepiece lens covers;
 - b. set the PWR ON switch to ON and set the MIN RNG SET fully counter-clockwise;

- c. position the range finder as firmly as possible and while looking at a target through the telescope, adjust the focus for the sharpest image possible;
- d. locate the target and place the one MIL circle on the centre of the visible mass (see Figure 12-5-3); and
- e. while keeping the one MIL circle centred on the target, press and hold the FIRE switch until the target range is displayed and noted.

DISPLAY INDICATIONS

3. The following displays are possible:
 - a. three "O"s indicates -
 - (1) no target was ranged,
 - (2) the range finder was moved off the target while ranging, or
 - (3) the target was closer than the MIN RNG setting;
 - b. the MULT TGT indicator illuminates and targets range indicates that more than one target is located within the MIL circle -
 - (1) carefully observe for the presence of an object other than targets in the one MIL circle,
 - (2) note the target range, press the MIN RNG switch and adjust the MIN RNG SET to slightly more (at least 20 metres) than the target range noted,
 - (3) repeat ranging to get the range to the second target, and
 - (4) after ranging, return the MIN RNG SET fully counter clockwise; and
 - c. the LOW BATT indicator illuminates during ranging and the range is displayed. A few more rangings are possible but the battery must be replaced as soon as possible.

POWER CABLE

4. The power cable replaces the battery and allows the range finder to be operated on an external power source.
5. To install the power cable:
 - a. remove the power cable from its stowed position in the equipment case;

- b. remove and stow the battery cover and the battery;
 - c. ensure the power cable is not attached to the power source;
 - d. install the adapter into the range finder and thread the power cable captive cover onto the battery compartment; and
 - e. ensure that the power cable leads are connected to the correct polarity and connect the power alligator clips to the power source (turret batteries).
6. The laser range finder with power cable can operate in the same manner as with battery except that mobility is limited to length of the power cable.

NOTE

Disregard the LOW BATT indicator when using the power cable unless range finder does not range; check the external source voltage.

PREVENTIVE MAINTENANCE

7. Preventive maintenance for the laser range finder before operation is as follows:
- a. check for completeness,
 - b. check for dirt and moisture on external surfaces and parts, and
 - c. check that a sharp focus can be obtained while looking through the eyepiece.

LASER RANGE FINDER FAULT REMEDY CHART

Malfunction	Tester Inspection	Corrective Action
a. LOW BATT indicator illuminates after the PWR ON switch is set to ON and either the FIRE switch or the MIN RNG switch is pressed.	Check to be sure a charged battery is installed.	Replace the battery.
b. The image is blurred when sighting.	Check to be sure the eyepiece can be adjusted.	Adjust the eyepiece for best focus.
c. No illumination of the graticule after the PWR ON switch is set to ON and the RET switch is pressed.	The RET BRIT Control is not adjusted for brightness.	Turn the RET BRIT until the graticule is illuminated to the desired brightness.

CHAPTER 6

GUN DRILLS

SECTION 1

76 MM MISFIRE DRILL

IMMEDIATE ACTION

Serial	Indication	Action by Gunner	Action by Commander	Remarks
(a)	(b)	(c)	(d)	(e)
1	1. The gun fails to fire on pressing the electrical firing switch.	2. Report MISFIRE WAIT relay, report FIRE NOW and attempt to fire using the foot firing pedal.	3. Nil. The gun must not be handled during this phase of drill.	If the gun fires when using the foot firing pedal continue to fire using this method until the electrical circuit can be checked.
2	1. Gun fails to fire on pressing the foot firing pedal.	2. Report MISFIRE, RECOCK, check that the switch is set to MAIN and whether the indicator light is illuminated.	3. Check that the gun is fully run out and that the breech is closed. 4. Recock using the recocking lanyard. 5. Make the loader,s safety switch and report LOADED.	If a fault is found at 3, it should be rectified and the action at 4 omitted. On no account any part of the body be placed in the path of recoil.
		6. a. Guns Ready Light Illuminated. Relay report FIRING NOW and attempt to fire using the electrical firing switch. b. If Indicator Light or Gun Ready Light Not Illuminated. Relay, report FIRING NOW and		

		attempt to fire using the foot firing pedal.		
3	1. Gun still fails to fire.	2. Report MISFIRE.	3. Stand by fifteen minutes and made safe.	On Range: Change flag to YELLOW inform control and keep gun pointed down range. Both crew members are to keep clear of the path of recoil during the waiting period.

SECONDARY ACTION

Serial	Indication	Action by Gunner	Action by Commander	Remarks
(a)	(b)	(c)	(d)	(e)
1			<p>1. After fifteen minutes unload the gun and examine the cap of the primer.</p> <p>a. If the cap has been struck:</p> <p>(1) In Action.</p> <p>Throw the misfired round from the AFV and reload.</p> <p>(2) During Training.</p> <p>Deal with it in accordance with range Standing Orders and reload.</p> <p>b. If the cap has not been struck, remove the striker assembly, check for obstruction in the striker recess, change the striker, reload.</p>	
		3. Relay, report FIRING NOW and fire.		

SECTION 2

7.62 MM C5 IA's AND STOPPAGES

IMMEDIATE ACTION

Serial	Primary Indication	Action by Gunner	Secondary Indication	Action by Commander	Cause
(a)	(b)	(c)	(d)	(e)	(f)
1	1. Gun fails to fire on pressing the firing switch for initial burst.	2. Report STOPPAGE and check selector switch. 4. Select co-ax, relay report FIRING NOW and fire.	3. Selector switch set to OFF.	Nil.	Incorrectly set selector switch.
2	1. Gun fails to fire on pressing firing switch for initial burst.	2. Report STOPPAGE and check selector switch.	3. Selector switch.	Nil.	Partial electrical failure.

Serial	Primary Indication	Action by Gunner	Secondary Indication	Action by Commander	Cause
(a)	(b)	(c)		(d)	(e)
		4. Select MAIN, relay report FIRING NOW and fire using the foot firing pedal.			
3	1. Gun fails to fire on pressing MG foot firing pedal.	2. Report CIRCUIT FAILURE, relay and report FIRING NOW.	Nil.	3. Fire using the MG trigger in controlled bursts.	Complete firing circuit failure.
4	1. Gun stops firing during an engagement.	2. Report STOPPAGE. 4. Relay report FIRING NOW and fire.		3. Cock, check feed and report LOADED (IA).	Misfired round or failure to feed.

Serial	Indication	Action by Gunner	Action by Commander	Remarks
(a)	(b)	(c)	(d)	(e)
5	1. Gun still fails to fire after IA.	2. Report PROLONGED STOPPAGE. 4. Relay report FIRING NOW and fire. 6. Relay report FIRING NOW and fire.	3. Make safe, check belt and rounds correct and check for trapped links. If incorrect, straighten them, load and report LOADED. 5. If no fault is found at 3, unload, check spent link has not fouled the extractor or feed slide; if not, remove and examine first round in the belt. If defective, reload and report LOADED.	trapped belt and/or rounds and/or links. Defective round or fouled link.

Serial	Indication	Action by Gunner	Action by Commander	Cause
(a)	(b)	(c)	(d)	(e)
		<p>8. Relay report FIRING NOW and fire.</p> <p>10. Relay report FIRING NOW, fire.</p>	<p>7. If no fault is found at 5, check for obstructions in the gun body and for a separated case. If found, clear obstruction or separated case, reload and report LOADED.</p> <p>9. If no fault is found at 7, allow bolt forward under control, check the feed slide, test, replace defective components if any are found, reload and report LOADED.</p> <p>11. If no faults are found at 9, change the bolt, redo headspacing and timing, reload and report LOADED.</p>	<p>Obstruction in the gun or separation in the chamber.</p> <p>Defective feed mechanism.</p>

Serial	Indication	Action by Gunner	Action by Commander	Remarks
(a)	(b)	(c)	(d)	(e)
		12. Relay report FIRING NOW AND fire.	13. If gun still fails to fire, report to a weapon technician.	

CHAPTER 7

CHAPTER 7
SERVICING GUIDE

LUBS: O = 3GP 335 W = 3GP 685 Y = 3GP 641 M = 3GP 26 S = Moly kote L = 3GP 304

WEEKLY SERVICING

1. **Main Armament.** To service the main armament:
 - a. bore and chamber - clean, inspect (re-oil if no firing is expected within 72 hrs);
O
 - b. breech block and striker - strip, clean, inspect, lubricate; O
 - c. striker protrusion - test. Reassemble breech block to breech ring;
 - d. breech closing springs - test;
 - e. firing gears - clean, inspect, lubricate. Test operation of electrical and mechanical;
and O
 - f. phosphor bronze brush - clean and grease. Y

2. **Machine-Gun.** To service the machine-gun:
 - a. remove MG if mounted; and
 - b. gun - strip, clean, inspect, lubricate, carry out 7 point check during reassembly.
O

3. **Smoke Grenade Dischargers.** To service smoke grenade dischargers: service and test circuits.

4. **Gun Controls and Mounting.** To service the gun controls and mounting:
 - a. electrical connections - check for security and damage;
 - b. traverse gear - clean, inspect, check security. Test operation over full movement;
 - c. traverse indicator - clean, inspect, check security and operation. Carry out test;
 - d. elevation gear - clean, inspect including gaitor, check security. Test operation over full movement;
 - e. cradle - clean, inspect, check security. Lubricate where necessary -

- (1) deflector guard, and
 - (2) recoil indicator - check setting; O
 - f. recoil system - clean, inspect and check security:
 - (1) check recuperator air pressure (200 psi),
 - (2) top up buffer, M
 - (3) check position of recuperator tell-tale rod, and
 - (4) check system for leaks; and
 - g. quadrant fire control - clean, inspect, check security. Zero and test the operation over full movement.
5. **Periscopes and Sights.** To service the periscopes and sights:
- a. washers - check reservoir, clean nozzles, test operation; O
 - b. wipers - clean, inspect blades. Test operation;
 - c. periscopes - clean, inspect, check security. Test operation of the blackout shutters; O
 - d. sunvisor (gunner's) - test operation;
 - e. sights no. 71, no. 54, Radnis and mountings - clean, inspect, lubricate, check security. Test operation of: heaters, filters graticule illumination, graticule adjusters, face mask and focus. Test for parallax; and
 - f. sight adjustment - carry out complete boresighting procedure including adjustment of commander's sight.
6. **Ammunition Stowage.** Inspect condition of all ammunition and stowage containers and clean if necessary.
7. **Hatches, Seats, Internal Lights.** Test operation.
8. **Stowage.** Check internal and external stowage.
9. **Heating and Ventilation Unit.** Check operation.

MONTHLY SERVICING

10. This servicing is carried out:
 - a. on receipt of a new or overhauled vehicle (including 4 monthly tasks);
 - b. at least once a month;
 - c. before a period of firing or possible firing; and
 - d. after firing.

11. **Main Armament.** Proceed as follows:
 - a. bore and chamber - clean, inspect (re-oil if no firing is expected within 72 hrs); O
 - b. breech block and striker - strip, clean, inspect, lubricate; O
 - c. striker protrusion - test. Reassemble breech block to the breech ring;
 - d. breech closing spring - test;
 - e. firing gears - clean, inspect, lubricate. Test operation of electrical and mechanical; O
 - f. phosphor bronze bush - clean and grease; and Y
 - g. gauge plug bore - pass the gauge through the bore.

12. **Machine Gun.** Proceed as follows:
 - a. remove MG if mounted;
 - b. mounting - clean, inspect, lubricate, check security including exit chutes and trunking;
 - c. gun - strip, clean, inspect, lubricate, carry out seven point check during reassembly; and
 - d. firing gear - mount MG. Test Operation.

13. **Smoke Grenade Dischargers.** Service and test circuits. O

14. **Gun Controls and Mounting.** Proceed as follows:

- a. turret floor rollers - clean, inspect and lubricate; L
- b. electrical connections - check for security and damage;
- c. traverse gear - clean, inspect, check security and operation. Carry out test; Y
- d. elevation gear - clean, inspect including gaiter, check security. Test operation over full movement; Y
- e. cradle - clean, inspect, check security. Lubricate where necessary - Y
 - (1) gun cradle liners (2 nipples), Y
 - (2) SA can and spring, O
 - (3) anti-rotation key and keyway, O
 - (4) deflector guard, and
 - (5) recoil indicator - check setting;
- f. recoil system - clean, inspect, check security -
 - (1) check recuperator air pressure (200 psi),
 - (2) top up buffer, M
 - (3) check position of recuperator tell-tale rod,
 - (4) check system for leaks, and
 - (5) pull back gun, inspect buffer piston rod; and
- g. quadrant fire control - clean, inspect, check security. Zero and test the operation over full movement.

15. **Periscopes and Sights.** Proceed as follows:

- a. washers - check reservoir, clean nozzles, test operation;
- b. wipers - clean, inspect blades, test operation;
- c. periscopes - clean, inspect, check security. Test operation of blackout shutters; O
- d. sunvisor (gunner's) - test operation;

- e. sights no. 71, no. 54, RADNIS and mountings - clean, inspect, lubricate, check security. Test operation of: Heaters, filters, graticule illumination, graticule adjusters, face mask and focus. Test for parallax; and O
 - f. sight adjustment - carry out complete boresighting procedure including converging of the commander's sight.
16. **Ammunition Stowage.** Clean, inspect condition of all ammunition and stowage containers. L
17. **Hatches, Seats, Internal Lights.** Clean, inspect, lubricate. Test operation. L
18. **Spares and Tools.** Clean, inspect, lubricate, check and restow. L
19. **Stowage.** Check internal and external stowage.
20. **Hosting and Ventilation Unit.** Check operation.

SERVICING IMMEDIATELY BEFORE FIRING

21. This is the daily servicing required to keep the equipment operationally fit in active service conditions and during a period of open range firing.
22. The before and after firing servicing is not intended to be an alternative to the monthly servicing but complementary to it.
23. **Main Armament.** Proceed as follows:
- a. bore and chamber - dry clean;
 - b. breech block and striker - dry clean face of breech block, striker recess and firing pin;
 - c. firing pin - gauge protrusion;
 - d. breech closing spring - test; and
 - e. firing gears - test.
 - f. foot firing cable - check that it is correctly routed, secure and free of kinks, etc.
24. **Machine Gun.** Proceed as follows:
- a. bore and chamber - dry clean; and

- b. firing gear - test operation.
25. **Smoke Grenade Dischargers.** Test circuits.
26. **Gun Controls and Mounting.** Proceed as follows:
- a. traverse gear - test operation;
 - b. elevation gear - test operation;
 - c. cradle -
 - (1) deflector guard - check security, and
 - (2) recoil indicator - check setting; and
 - d. recoil system -
 - (1) check recuperator air pressure (200 psi),
 - (2) check for oil leaks, and
 - (3) check position of recuperator tell-tale rod.
27. **Periscope and Sights.** Proceed as follows:
- a. external - clean;
 - b. internal - clean and check security;
 - c. test operation of washers, wipers, heaters, filters, graticule illumination, graticule adjusters, face mask, focus. Test for parallax; and
 - d. sight adjustment - carry out boresighting procedure.
28. **Stowage.** Check internal and external stowage.
29. **Extractor Fan.** Check operation of fan.

SERVICING DURING FIRING

30. **Main Armament.** Proceed as follows:
- a. breech block and striker - remove any dirt or fouling, re-oil as necessary; and O
 - b. crank stop retaining screw - check prior to each day's firing.

31. **Machine-Gun.** Proceed as follows:
- a. receiver - remove any fouling, re-oil. O

SERVICING IMMEDIATELY AFTER FIRING

32. **Main Armament.** Proceed as follows:
- a. bore - clean and re-oil if no more firing is expected within 72 hours; O
 - b. chamber - clean and oil; O
 - c. breech block and striker. Clean, inspect, re-oil; and O
 - d. firing gears - test operation.

33. **Machine Gun.** Proceed as follows:
- a. remove MG from mounting;
 - b. gun - strip, clean, inspect, lubricate, carry out 7 point check during assembly; and
O
 - c. firing gear - mount MG, test operation.

34. **Smoke Grenade Dischargers.** Service if fired.

35. **Periscopes and Sights.** Proceed as follows:
- a. external - clean; and
 - b. internal - clean and check security.

QUARTERLY SERVICING

36. This servicing is carried out:
- a. on receipt of a new or overhauled vehicle; and
 - b. at least once every four months.
37. **Tuffet Rack and Traverse Gearbox Pinion.** Clean, inspect and lightly grease. Y
38. **Periscope and Mountings.** Remove periscopes, clean, inspect, lubricate. Replace and check security. O

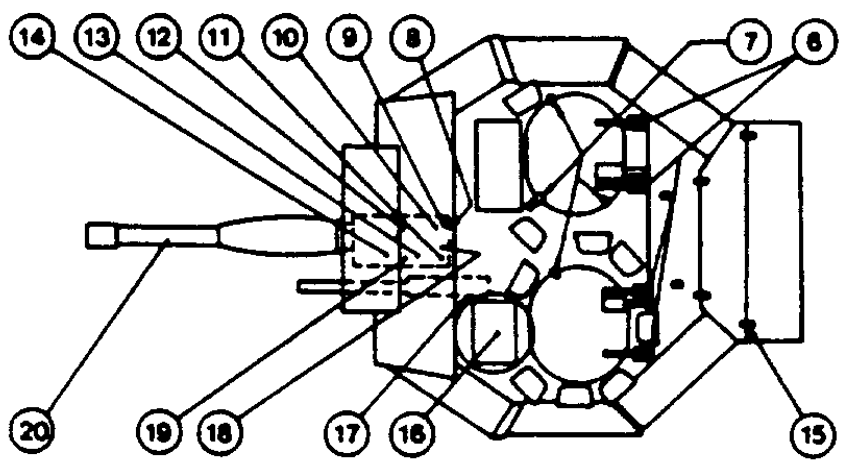
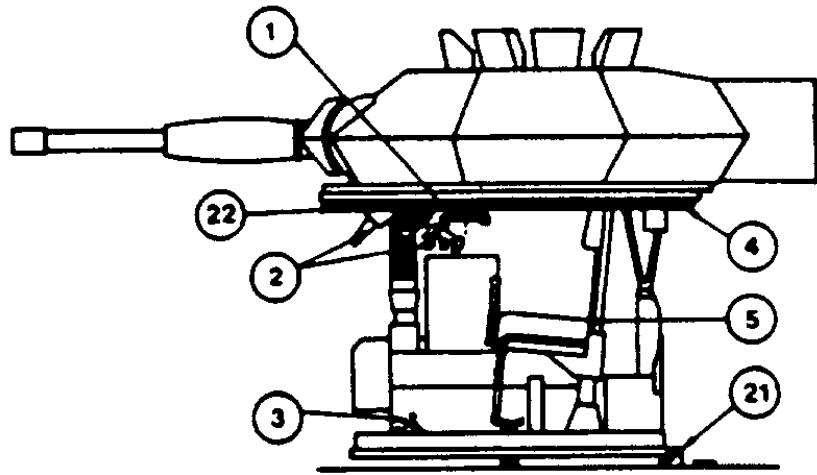


Figure 7-1 (Sheet 1 of 3) Cougar Turret Lubrication Chart

No.	Item	Lubricant
1	TRAVERSE GEAR BOX (MANUAL)	3GP 685 GREASE
2	ELEVATING GEAR	3GP 641 GREASE
3	FOOT FIRING SYSTEM	3GP 335 OIL
4	ROBALLO RING	9150-21-879-9637 MOLY-KOTE SPRAY
5	SEAT CATCHES & PILLARS	3GP 304 OIL
6	HATCH HINGES	3GP 304 OIL
7	HATCH LOCKS	3GP 304 OIL
8	FIRING GEAR & RECOIL INDICATOR	3GP 335 OIL
9	BREECH (MAIN GUN)	3GP 335 OIL
10	GUN CRADLE GREASE NIPPLE (MAIN GUN)	3GP 641 GREASE
11	SEMIAUTO, CAM — GREASE NIPPLE	3GP 641 GREASE
12	RECUPERATOR	3GP 26D OIL
13	BUFFER	3GP 26D OIL

Figure 7-1 (Sheet 2 of 3) Cougar Turret Lubrication Chart

No.	Item	Lubricant
14	REPLENISHER	3GP 26D OIL
15	TURRET SPARES, TOOLS AMMO RACKS, HINGES & LOCKS	3GP 304 OIL
16	COMMANDER'S SIGHT MOUNT	9150-21-879-9637 MOLY-KOTE SPRAY
17	MACHINE GUN MOUNTING BRACKET	3GP 335 OIL
18	ANTIROTATION KEY AND GROOVE	3GP 641 GREASE
19	SEMIAUTO, CAM SPRING	3GP 335 OIL
20	BARREL MAIN GUN	3GP 335 OIL
21	TURRET ROLLERS	3GP 304 OIL
22	TURRET RING	3GP 641 GREASE
NOTE:	FOR ARTIC CONDITIONS USE 3GP 343 INSTEAD OF 3GP 304	

Figure 7-1 (sheet 3 of 3) Cougar Turret Lubrication Chart