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DEPARTMENT OF THE ARMY
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**Organizational Maintenance Manual:
GUN, AIR DEFENSE ARTILLERY, SELF-PROPELLED
20-MM, XM163
(2350-999-4392)
CANNON M168, MOUNT M157, SIGHT M61,
AND RADAR AN/VPS-2**

TM 9-2350-300-20/1, 31 August 1971 is changed as follows:

1. New or changed material is indicated by a vertical bar in the margin of the page.
2. Added or revised illustrations are indicated by a vertical bar adjacent to the identification number.
3. Remove old pages and insert new pages as indicated below:

Remove pages

iii and iv
vii and viii
2-9 and 2-10
6-59 and 6-60
6-65 thru 6-70
6-107 and 6-108

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iii and iv
vii and viii
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6-65 thru 6-70.2
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4. File this change sheet in front of the publication for reference purposes.

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To be distributed in accordance with DA Form 12-37, (qty rqr block no. 857) Organizational maintenance requirements for Antiaircraft, Artillery 20MM, XM163, Chassis XM741.

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Table 2-3. Preventive Maintenance Time-Dependent Checks and Services.

Interval	Item checked	Procedure	Reference
		CAUTION Do not use containers or syringes that have been used for servicing lead-acid batteries. Do not allow chassis lead-acid batteries to be inspected or serviced while mount nickel-cadmium battery cells are open.	
		NOTE If excessive spewage has occurred, clean batteries before performing weekly checks and services.	
Weekly	M157 mount batteries	Inspect and charge batteries, and check electrolyte level when batteries are fully charged. Perform charging circuit and electrical leakage tests.	Para 6-63
Weekly	M163 system (includes AN/VPS-2 radar and M61 sight).	Perform system checkout using 300 M-A multimeter in conjunction with table 4-1.1.	Ch 4, para 4-2a
Monthly	M163 system (includes AN/VPS-2 radar and M61 sight).	Perform system checkout using Test Set, Antiaircraft Artillery Gun, AN/MWM-2, as required.	Ch 4, para 4-2b
Monthly*	M168 cannon	Disassemble cannon, clean and lubricate in accordance with LO-9-2350-300-10 and reassemble.	LO 9-2350-300-10
		CAUTION Do not attempt to operate radar set without the spark gap tube; extensive damage to the transmitter-receiver can result.	
Monthly*	Klystron spark gap	Clean spark gap and electrical cap and spark gap receiving cavities.	Para 6-45d (12)
Monthly	Radar reflector and feed assembly	Check reflector and feed assembly for damage.	Para 6-44
Monthly	Radar tuning tool	Inspect radar tuning tool.	Para 6-45b (5)
Monthly	M157 mount batteries	Clean batteries.	Para 6-63
Quarterly*	RF (crystal) oscillator subassemblies	Clean all six RF (crystal) oscillator subassemblies housed in the transmitter-receiver (unit 2).	Para 6-45b (6).

Table 2-3. Preventive Maintenance Time-Dependent Checks and Services.

Interval	Item checked	Procedure	Reference
Quarterly	Radar AN/VPS-2	Inspect all radar units and accessories for damage, wear, and completeness.	Table 6-5
Quarterly** Semi-annually	M61 sight Drum assembly	Purge sight and recharge with dry nitrogen. Request direct support maintenance to remove for inspection, cleaning, and lubrication (and reinstall).	Para 6-54 TM 9-2350-300-34 LO 9-2350-300-10
Semi-annually	Gun drive assembly	Return to direct support for servicing	TM 9-2350-300-34

*Interval is dependent upon environmental conditions; intervals should be adjusted accordingly.

**Perform more often if moisture is detected in the sight.

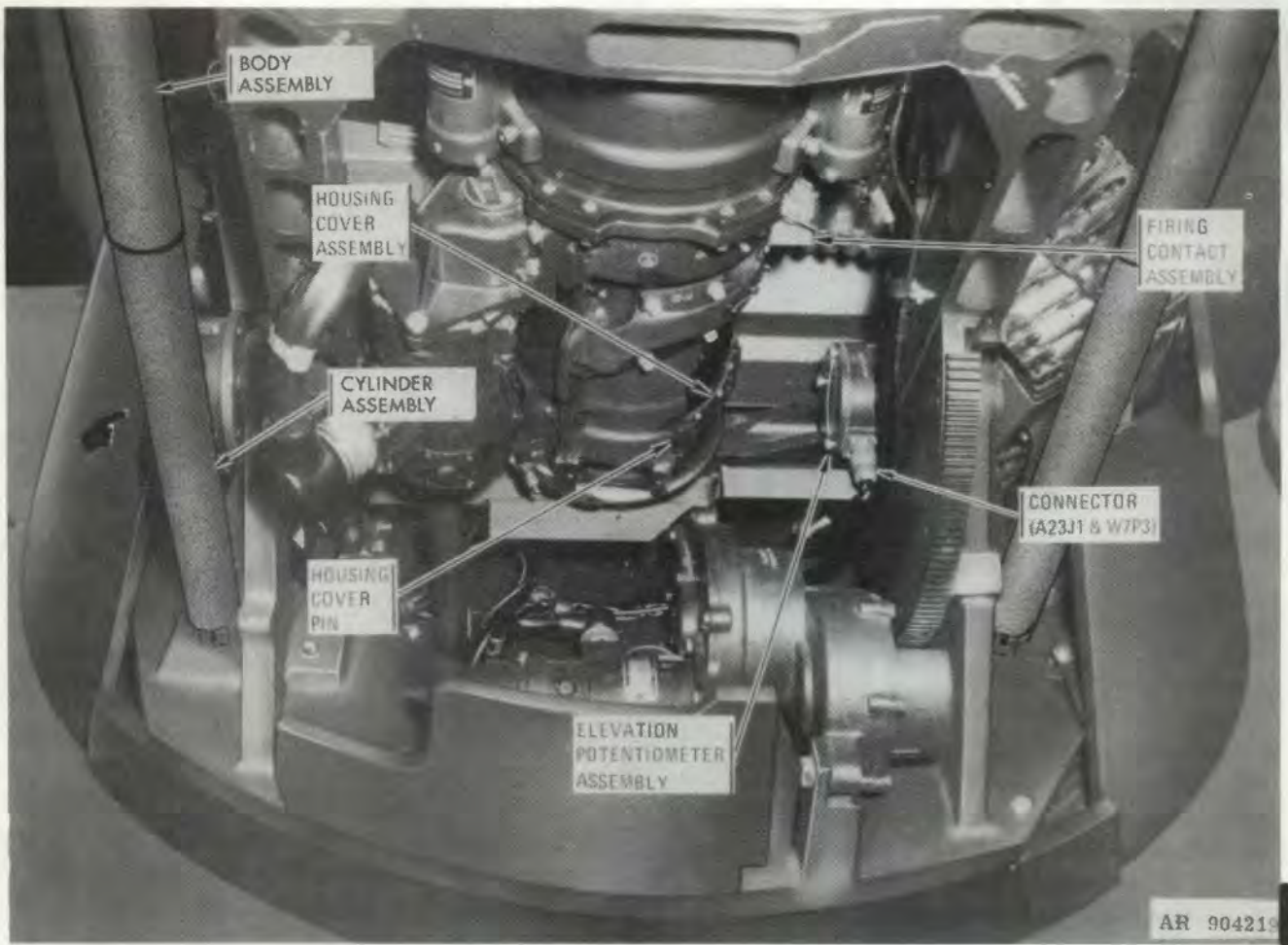


Figure 6-52. M168 cannon M157 mount, view with cannon in raised position parts location.

c. Disassembly.

- (1) Remove aligning pin (10, fig. 6-53).
- (2) Loosen screws (14) and hold-down clamps (13), and lift out variable resistor (4).
- (3) Tag and unsolder leads from variable resistor.
- (4) Remove O-ring (5) from variable resistor shaft.
- (5) Remove screws (9) securing connector (8) to potentiometer housing and pull connector out of housing.

d. Assembly of Elevation Potentiometer.

- (1) Orient connector (8, fig. 6-53) with wide keyway to the right, and install.
- (2) Insert O-ring (5) on variable resistor (4) shaft.
- (3) Solder connector leads to variable resistor (fig. 6-54).
- (4) Place variable resistor in potentiometer assembly housing. Engage retaining clamps (13, fig.

6-53) and tighten screws (14) until variable resistor remains in position, but can be turned by hand. Do not install cover at this point.

(5) Install aligning pin (10) so that it does not protrude from opposite side of potentiometer shaft.

e. installation

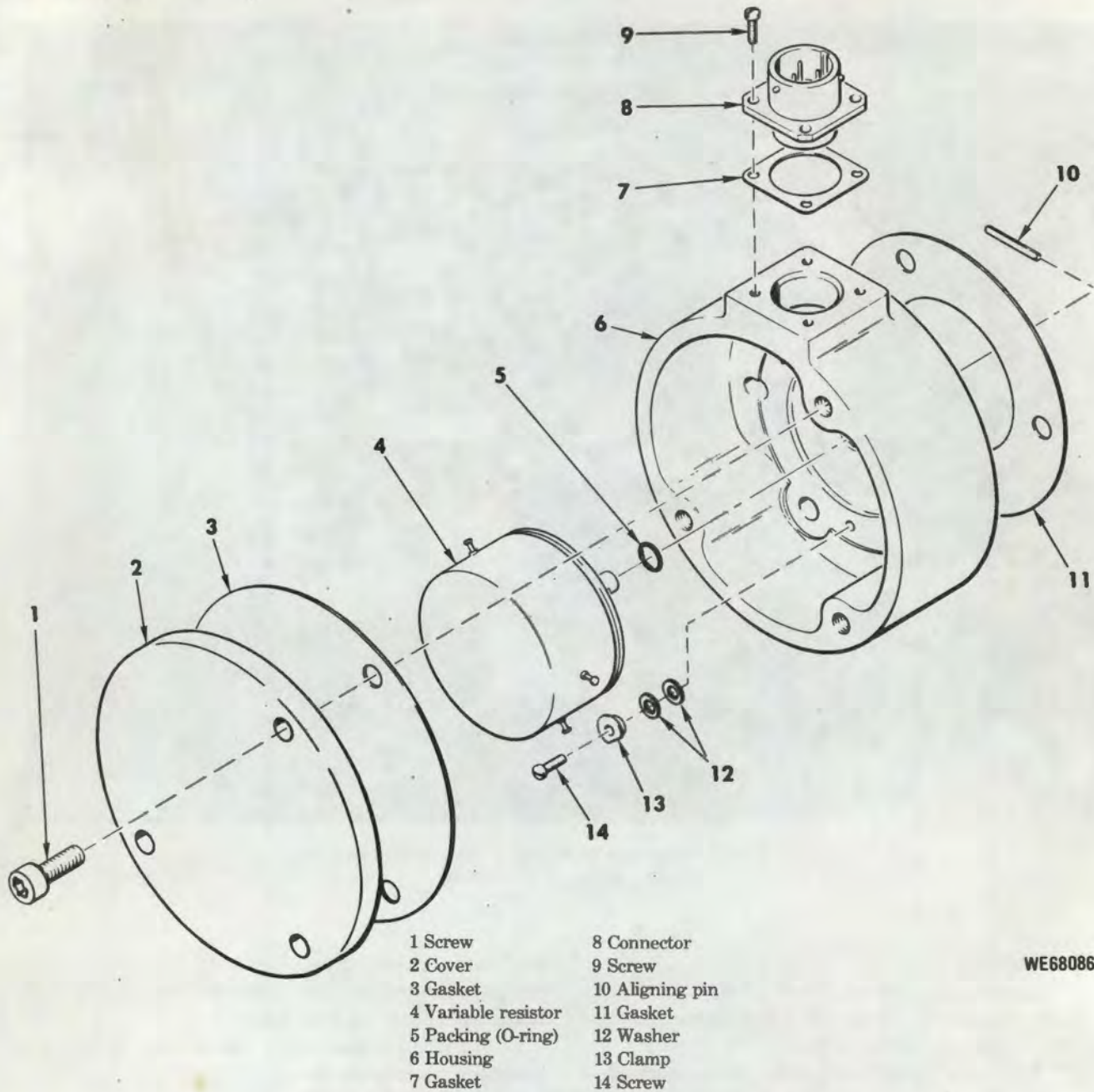
NOTE

The following procedures will be facilitated if the cannon is positioned to the rear of the chassis. Test set AN/MWM-2 is placed on the chassis deck, and the interconnecting cable is routed through the open commander's hatch.

NOTE

The elevation potentiometer assembly cover must be removed and the variable resistor loosely secured (d(4) preceding) prior to installing the assembly.

- (1) Attach AN/MWM-2 cable W32 between sight current generator J7 connector and AN/MWM-2 J3 connector. Connect multimeter 300M-A (set polarity switch to REVERSE) to AN/MWM-2, and set multimeter to measure 15 Vdc in search mode.



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Figure 6-53. Elevation potentiometer assembly, exploded view.

- (2) Position AN/MWM-2 controls as follows:
 METER SELECTOR switchSCG-1
 SCG-1 switch14
 METER POLARITY switchup(+)

(3) Connect cable connector W7P3 to elevation potentiometer assembly.

(4) Verify that distribution box NORM-STATIC-TEST switch (fig. 6-11) is at STATIC position.

(5) Set SYSTEM POWER switch to ON (fig. 6-1)

and gunner control panel MODE switch to MAN.

(6) Turn elevation potentiometer variable resistor shaft so that aligning pin is aligned with line A on bottom of elevation potentiometer assembly housing.

(7) Hold variable resistor shaft so that aligning pin remains aligned with line A, and turn variable resistor body until voltmeter indicates approximately 15 Vdc.

(8) Accurately align aligning pin with line B.

(2) Turn mount so that cannon is positioned over commander's hatch, and both azimuth switches are actuated on a hatch cam.

(3) Verify that GUN POWER and SYSTEM POWER switches (fig. 6-1) are in their OFF positions.

(4) Verify that distribution box NORM-STATIC-TEST switch (fig. 6-11) is at STATIC position, and that arming connector (fig. 6-2) is disconnected.

(5) Connect an ohmmeter between pins F and L of distribution box cable connector W8P1.

(6) Position cannon at an elevation of approximately 45 degrees. Meter should indicate continuity.

(7) While observing ohmmeter, slowly lower cannon muzzle until meter indicates an open circuit. Stop lowering cannon at this point.

(8) Measure distance between stop on saddle assembly and stop on base support assembly (points A and B, fig. 6-59). Measurement should be between

2-7/8 inches and 3-1/8 inches. If measurement is out of tolerance, perform (9) through (14) following. If measurement is within range specified, proceed to (15).

(9) Remove cover from elevation limit switch assembly (fig. 6-5).

(10) Elevate cannon to maximum elevation and loosen screw on actuating cam for switches A18S1 and A18S2 (fig. 6-60) enough to permit movement of cam by tapping with drift pin.

(11) Position cannon so that measurement between points A and B (fig. 6-59) is 3 inches. Tap cam until meter indicates that switch has actuated.

(12) Elevate cannon to maximum elevation and tighten screw on actuating cam.

(13) Repeat (7) and (8) preceding.

(14) Install cover.

(15) Disconnect ohmmeter, and connect W8P1 (6, fig. 6-58) to distribution box.

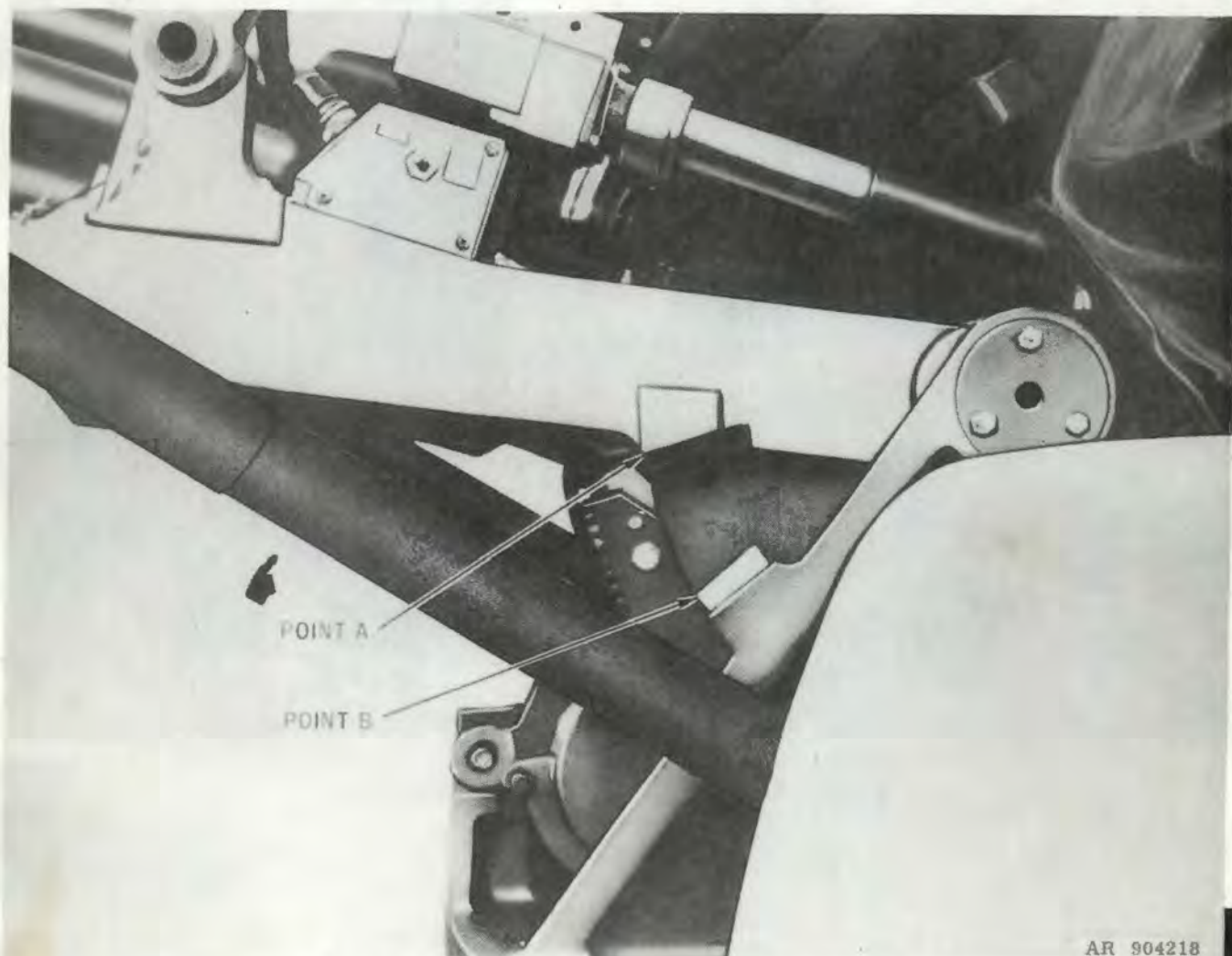
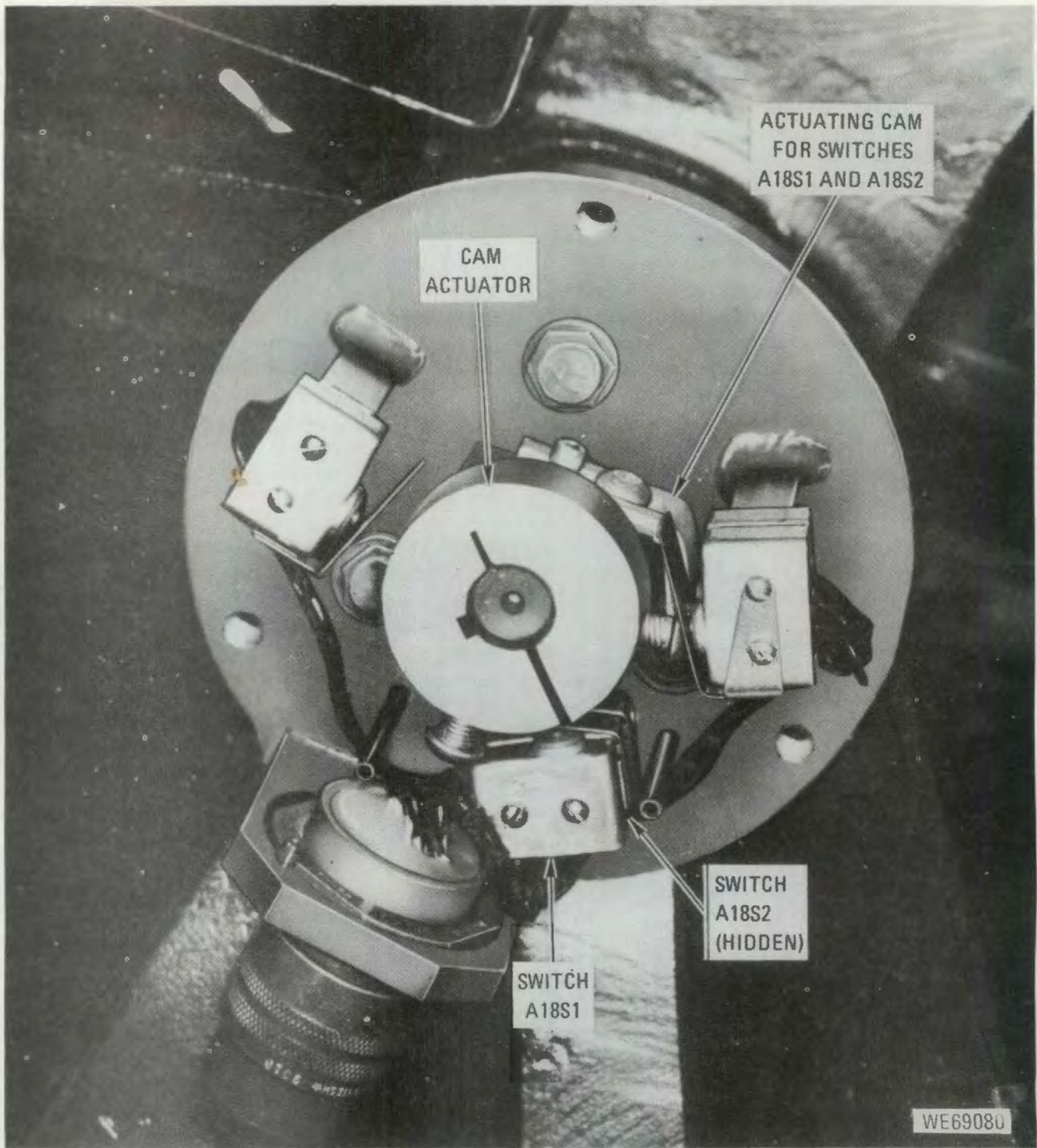


Figure 6-59. M157 mount, points measurements for testing elevation limit switches A18S4, A18S2, A18S3.

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Figure 6-60. Elevation limit switch assembly, cover removed, orientation of actuating cam with cannon at maximum elevation angle.

e. Lower Limit Switch A18S3 After-Installation Check.

(1) Perform (1) through (4) in d. preceding.
 (2) Connect an ohmmeter between pins J and L of connector W8P1.

(3) Manually raise cannon muzzle until cannon is at an elevation of approximately 45 degrees. Meter should indicate continuity.

(4) While observing ohmmeter, slowly lower cannon muzzle until meter indicates an open circuit. Stop lowering cannon at this point.

(5) Measure distance between stop on saddle assembly and stop on base support assembly (points A and B, fig. 6-59). Measurement should be between 1/4 inch and 3/16 inch. If measurement is out of tolerance, perform (6) through (9) following. If measurement is within range specified, proceed to (10).

(6) Remove cover from elevation limit switch assembly (fig. 6-5).

(7) Manually raise cannon to gain access to A18S3 actuating screw (fig. 6-61) and turn screw as required to bring switch actuating point within tolerance. (Turn screw clockwise to lower actuating point).

(8) Repeat (4) and (5) preceding.

(9) Install cover.

(10) Disconnect ohmmeter, and connect cable connector W8P1 to distribution box.

f. Upper Limit Switches A18S4 and A18S5 After-Installation Check.

(1) Perform (1) through (4) in d. preceding.

NOTE

Switches A18S4 and A18S5 share a common actuator. Adjustment of the actuating point for A18S4 affects the actuating point of A18S5. To check actuation of switch A18S5, refer to figure 3-7 to determine switch condition and pin connections.

(2) Connect an ohmmeter between pins B and c of connector W8P1 (6, fig. 6-58) to check switch A18S4.

(3) Manually position cannon so that barrels are approximately horizontal. Meter should indicate continuity.

(4) While observing ohmmeter, slowly raise cannon muzzle until indication of open circuit is seen on meter. Stop raising cannon at this point.

(5) Measure distance between stop on sector gear and lower stop on base support assembly (points C and D, fig. 6-62). Measurement should be between

1/4 inch and 3/16 inch. If measurement is out of tolerance, perform (6) through (8) following. If measurement is within range specified, proceed to (9).

(6) Remove cover from elevation limit switch assembly (fig. 6-5).

(7) Manually lower cannon to gain access to actuating screw for switch A18S4 (fig. 6-61), and turn screw as required to bring switch actuating point within tolerance. (Turn screw clockwise to lower actuating point.)

(8) Repeat (4) and (5) preceding.

(9) Install cover if removed in (6) preceding.

(10) Disconnect ohmmeter, and connect cable connector W8P1 to distribution box.

6-33. Equilibrator Assembly (Old)

The M157 mount contains two equilibrator assemblies.

a. Removal.

(1) Verify that GUN POWER and SYSTEM POWER switches (fig. 6-1) are in their positions.

(2) Place distribution box NORM-STATIC-TEST switch (fig. 6-11) at STATIC position, and verify that arming connector (fig. 6-2) is disconnected.

(3) Release elevation drive motor brake, raise cannon muzzle to maximum elevation, and reapply brake (fig. 6-5).

WARNING

There are approximately 150 pounds of spring force left in each equilibrator at +80 degrees elevation. The following operation requires at least two men to perform.

(4) Using a socket-head screw key, loosen setscrew that secures equilibrator guide to saddle assembly. Refer to figures 6-12 and 6-52.

WARNING

Make sure equilibrator assembly is held firmly when disengaging equilibrator guide from saddle assembly.

(5) Push or pull down and outward on equilibrator guide, tapping on guide with soft faced hammer if necessary to free it. Use caution not to dent guide.

NOTE

If equilibrator assembly being removed is on right side of mount, it will be necessary to pivot equilibrator support down to chassis deck in order to gain access to spring pin. Refer to figure 6-63 for identification of equilibrator assembly components.

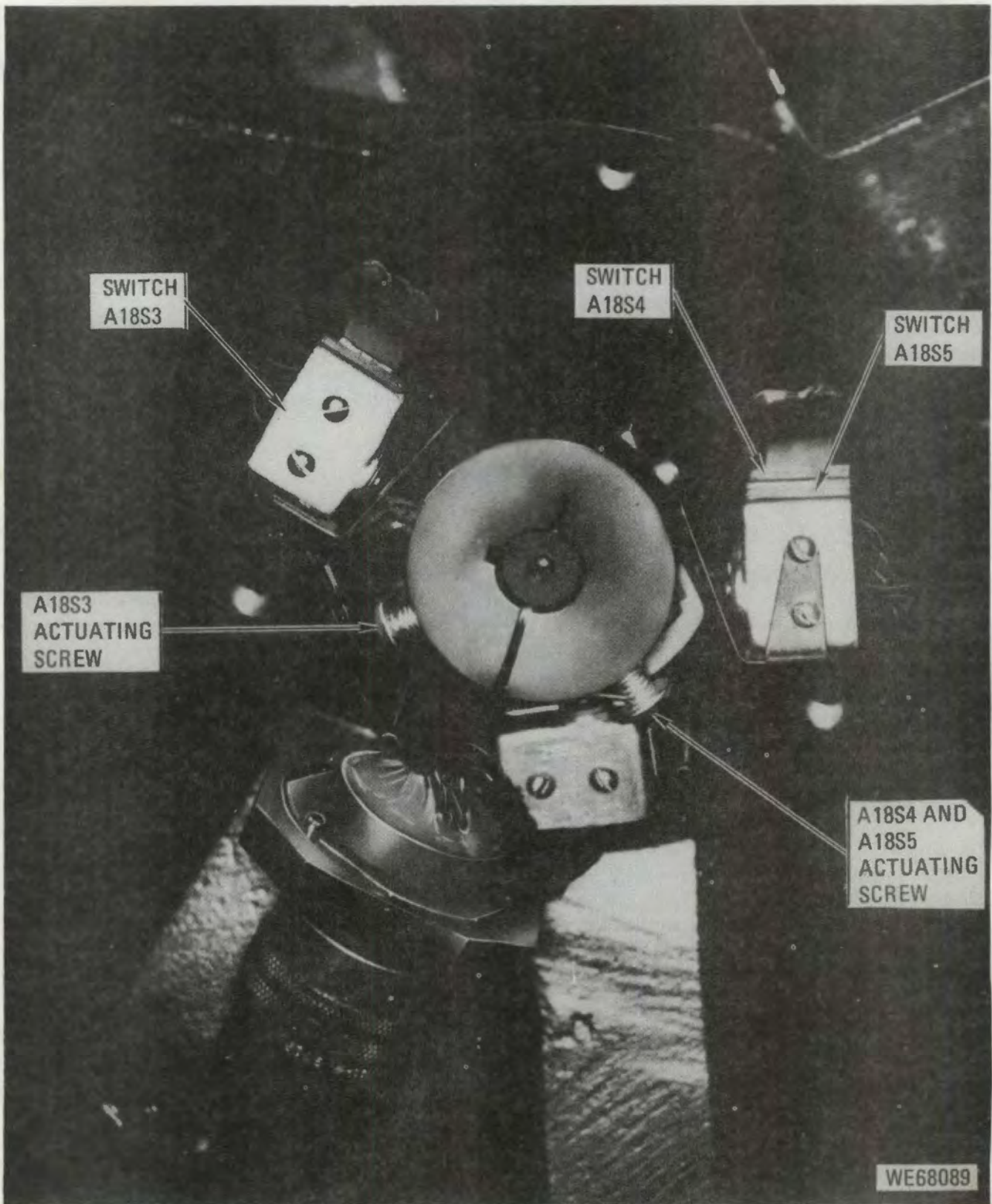
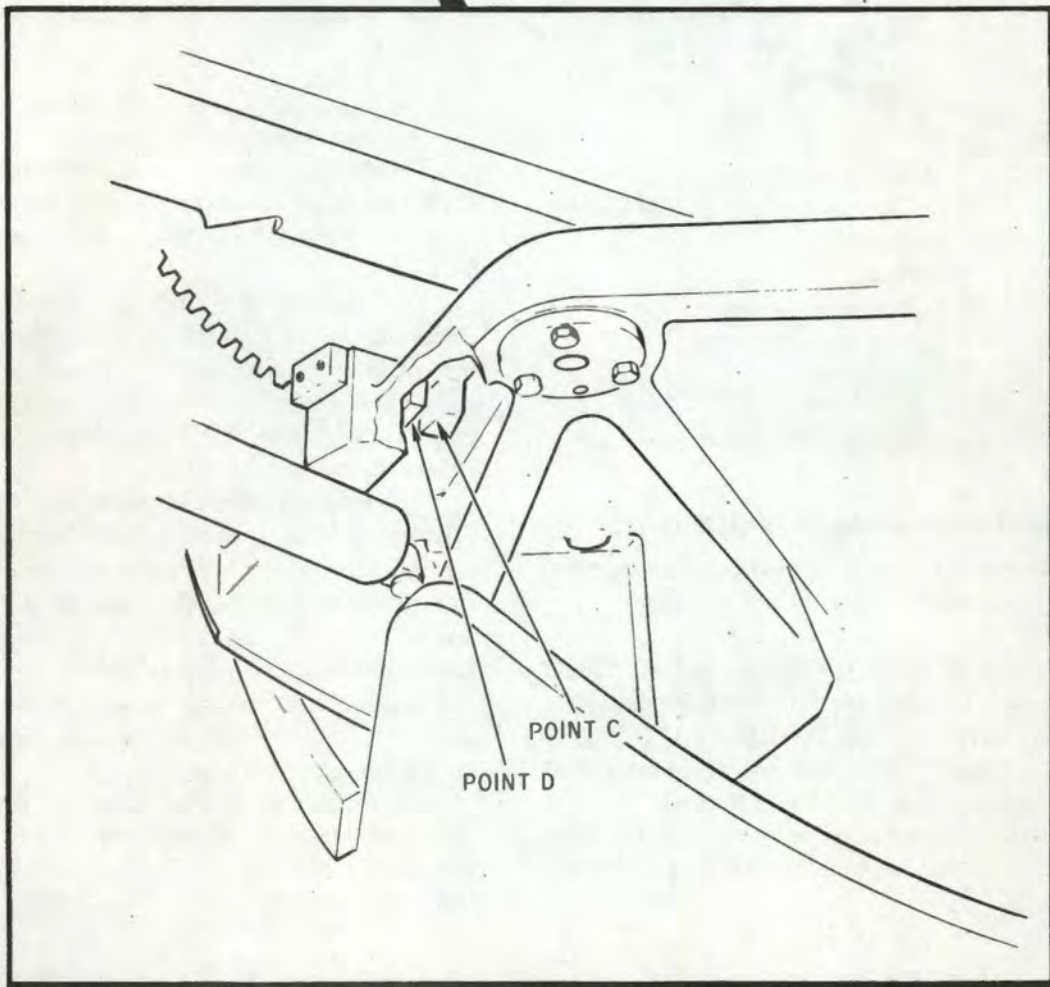
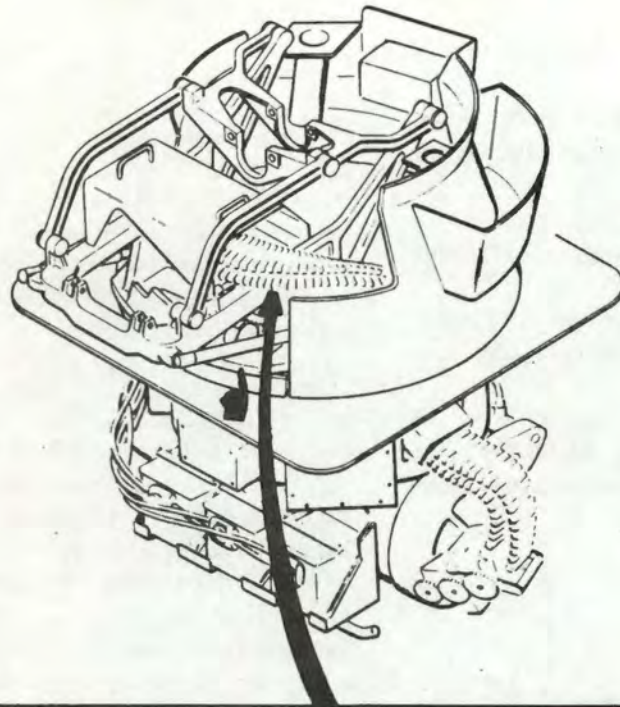


Figure 6-61. Elevation limit switch assembly, cover removed, orientation of switch actuating screw with cannon at elevation of approximately 30 degrees.



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Figure 6-62. M157 mount, points of measurements for testing upper limit switches A18S4 and A18S5.

(6) Remove guide (1, fig. 6-63) and springs (3 and 4).

(7) At base of equilibrator support (5, fig. 6-63), drive out spring pin (6) that secures headed pin (7) in mount bracket.

(8) Pull outward on equilibrator support near its base, and remove equilibrator support (5) and headed pin (7).

b. Inspection. Inspect equilibrator assembly components for distortion, cracks, breaks, or dirt and corrosion and scoring.

c. Installation. Installation is the reverse of removal. Assure that setscrew (2, fig. 6-63) is in groove of guide (1). Tighten setscrew until it is tight and then back off 3/4 to 1-1/4 turn.

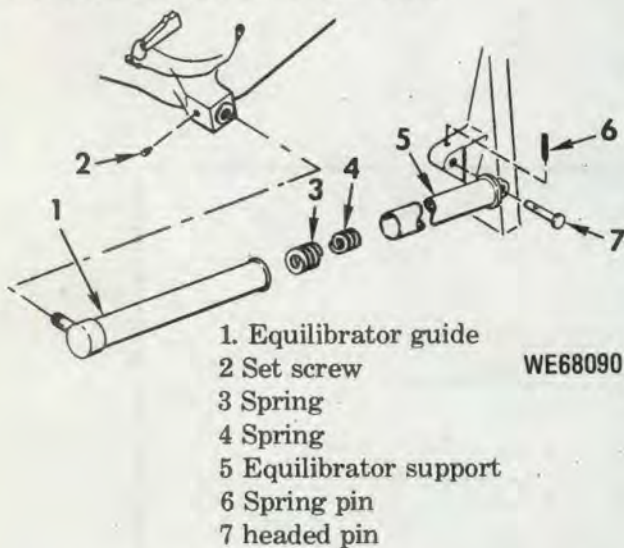


Figure 6-63. Equilibrator assembly, exploded view.

6-33.1. Equilibrator Assembly (New)

The M157 mount contains two equilibrator assemblies (1, fig 6-63.1).

a. Removal.

(1) Verify that GUN POWER and SYSTEM POWER switches (fig 6-1) are in their OFF positions.

(2) Place distribution box NORM-STATIC-TEST switch (fig 6-11) at STATIC position, and verify that arming connector (fig 6-2) is disconnected.

(3) Release elevation drive motor brake, raise cannon muzzle to maximum elevation, and reapply brake (fig 6-5).

WARNING

There are approximately 350 pounds of spring force left in each equilibrator at +80 degrees elevation. The following operation requires at least two men to perform.

(4) To facilitate removal (fig 6-63.1) loosen the two setscrews (3) and unscrew cap (4) sufficiently to relieve excessive spring load.

(5) Using a socket-head screw key, loosen setscrew (2) that secures equilibrator body assembly to saddle assembly.

NOTE

For equilibrator assembly being removed on left side of mount perform the following:

(6) At base of equilibrator clevis assembly (7) drive out spring pin (5) that secures headed pin (6) in mount bracket support.

(7) Pull outward on equilibrator clevis assembly (7) and top of body assembly (8) *simultaneously* tapping clevis assembly with soft faced hammer if necessary to free headed pin (6).

(8) Remove equilibrator and headed pin *simultaneously*.

NOTE

For equilibrator assembly being removed on right side of mount, perform the following:

(9) In order to gain access to spring pin (5) release elevation drive motor brake, raise cannon muzzle to approximately 50° elevation, and reapply brake (fig 6-5).

(10) at base of equilibrator clevis assembly (7) drive out spring pin (5) that secures headed pin (6) in mount bracket support.

(11) Release elevation drive motor brake, raise cannon muzzle to maximum elevation, and reapply brake (fig 6-5).

(12) Pull outward on equilibrator clevis assembly (7) and top of body assembly (8) *simultaneously*. Tap equilibrator assembly with soft faced hammer if necessary to free headed pin (6) and guide from saddle assembly and remove equilibrator assembly and headed pin *simultaneously*.

b. Inspection. Inspect body assembly and clevis assembly for distortion, cracks, breaks, dirt or corrosion, and scoring.

c. Installation. Installation is the reverse of removal. Assure that setscrew (2) is in the groove of the body assembly (1). Tighten setscrew until it is tight and then backoff to 1-1/4 turns.

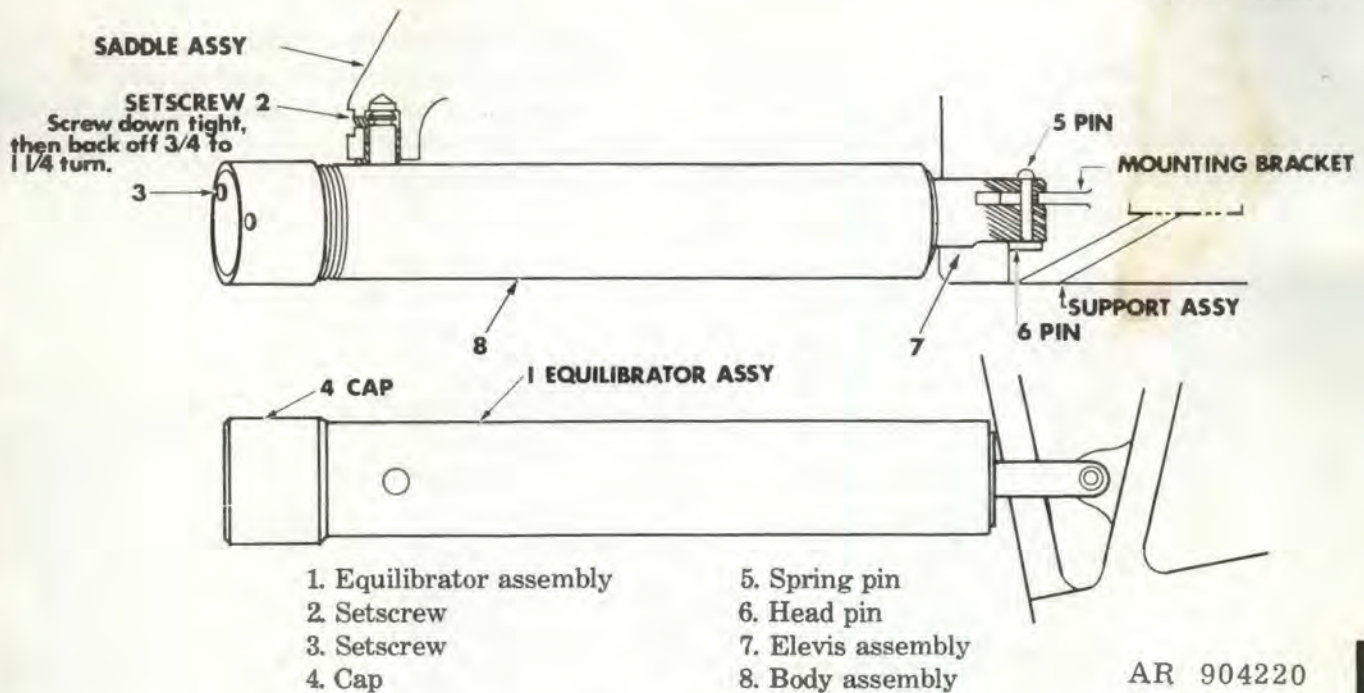


Figure 6-63.1. Equilibrator assembly (new).

6-34. XM61 Sight Mounting and Support Shafts.

The XM157 mount contains four XM61 sight mountings and two support shafts. Replacement sight mountings are a matched set supplied in a sight mounting kit.

a. Removal.

(1) Verify that GUN POWER and SYSTEM POWER switches (fig. 6-1) are in their OFF positions.

(2) Place distribution box NORM-STATIC-TEST switch (fig. 6-11) at STATIC position, and verify that arming connector (fig. 6-2) is disconnected.

(3) Assure that sight is mechanically caged (fig. 6-64) by aligning white marks on knob and sight.

(4) Disconnect cable connector W6P2 from sight (fig. 6-65).

(5) Disconnect ground strap from sight (fig. 6-66).

(6) Remove screws securing sight to sight support shafts (fig. 6-65) and remove sight.

(7) Remove both rear sight support shaft bolts and washers (fig. 6-64).

(8) At forward end of each sight support shaft remove sight mount adapters attaching screws (fig. 6-67).

(9) Slowly withdraw (from front end) each sight support shaft from its rear mounting, leaving forward mounting and sight mount adapter attached to sight support shaft.

(10) Remove forward sight support shaft bolts and washers, and separate support shafts, forward sight mountings, and sight mount adapters.

(11) Press each forward mounting out of its associated adapter.

(12) Remove each rear mounting (fig. 6-64).

b. *Inspection.* Inspect sight mountings and support shafts for distortion, cracks, breaks, or corrosion.

c. *Installation.*

NOTE

The four sight mountings supplied in each sight mounting kit are a matched set. They must be used together, and must not be mixed with mountings from other kits.

(1) Insert sight mountings into two sight mount adapters.

(2) Attach assembled mountings and adapters onto forward ends of sight support shafts (support shafts are marked — FWD→7).

(3) Seat sight mountings in rear mountings in sight support assembly (fig. 6-64).

(4) Insert sight support shafts, with attached mountings and adapters, in openings of sight support assembly (from front end) and mate with rear sight mountings.

(5) Install support shaft bolts and washers, and mount adapters attaching screws.

(6) Install sight (fig. 6-65).

(7) Connect sight ground strap (fig. 6-66).

(8) Connect cable connector W6P2 to sight.

6-35. Saddle Assembly.

Repair of the saddle assembly consists of replacing the gun mounting ball, and quick release pins. Removal of quick release pins is obvious by reference

to fig. 6-68.

a. Removal of Mounting Ball.

- (1) Verify that GUN POWER and SYSTEM POWER switches (fig. 6-1) are in their OFF positions.
- (2) Place distribution box NORM-STATIC-TEST

switch (fig. 6-11) at STATIC position, and verify that arming connector (fig. 6-2) is disconnected.

- (3) Position cannon at approximately 0 degrees elevation (fig. 6-56) over travel lock.
- (4) Remove gun shield.

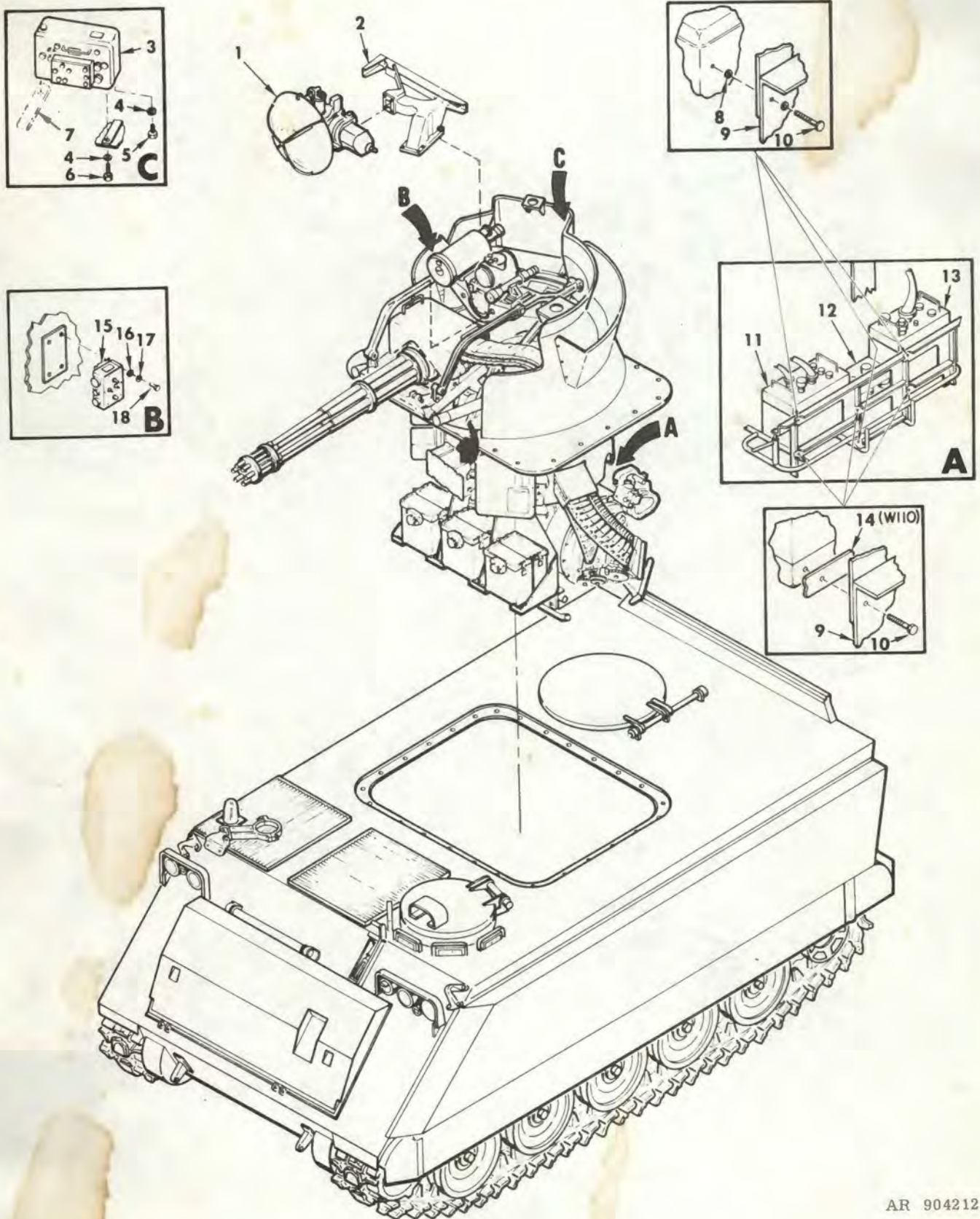
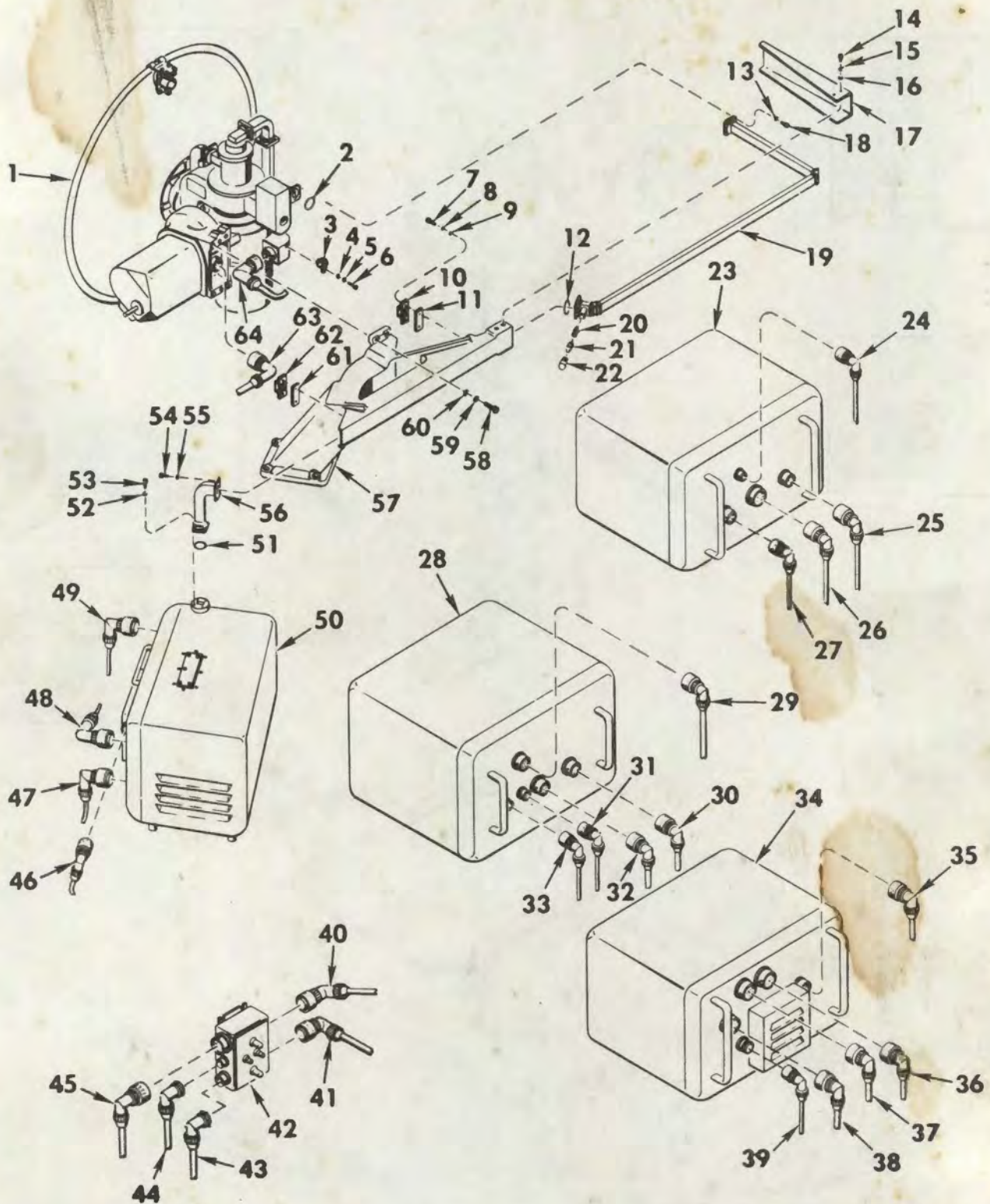


Figure 6-94. Radar set ANVPS, removal/installation details.



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Figure 6-95. Radar set ANVPS-2, exploded view.