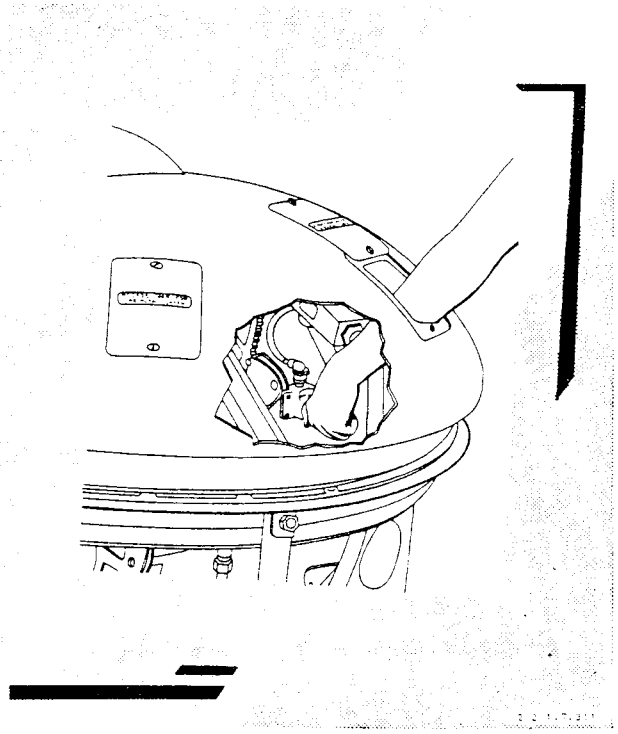


Figure 2–27. Unlatching Elevation Latching Solenoid

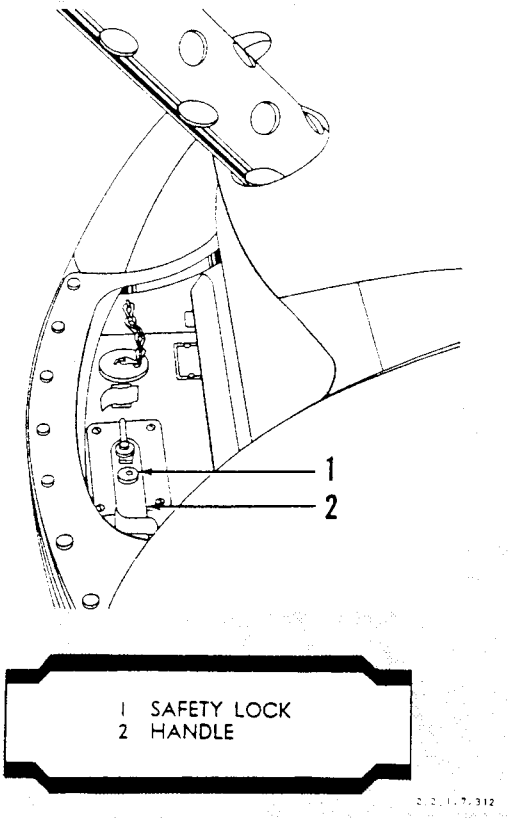


Figure 2–28. Turret Dome Locking Handle

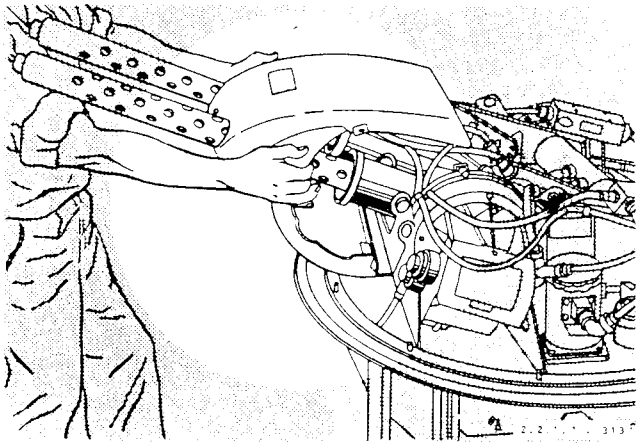


Figure 2–29. Removing Gun Enclosure

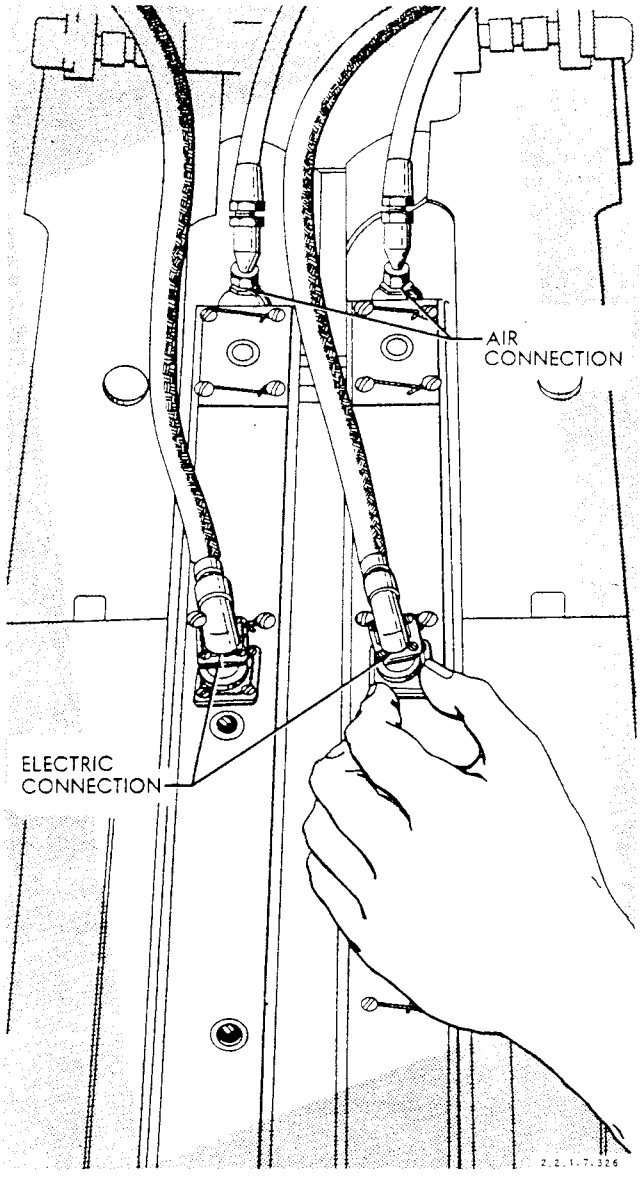


Figure 2–30. Electric and Air Hose Connections to Gun Chargers

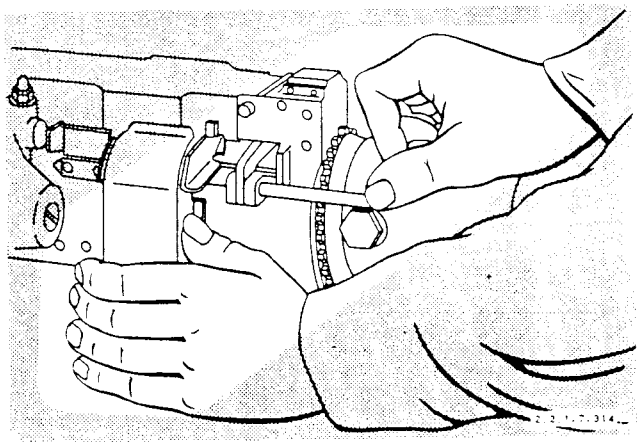


Figure 2–31. Removal of Link Chute

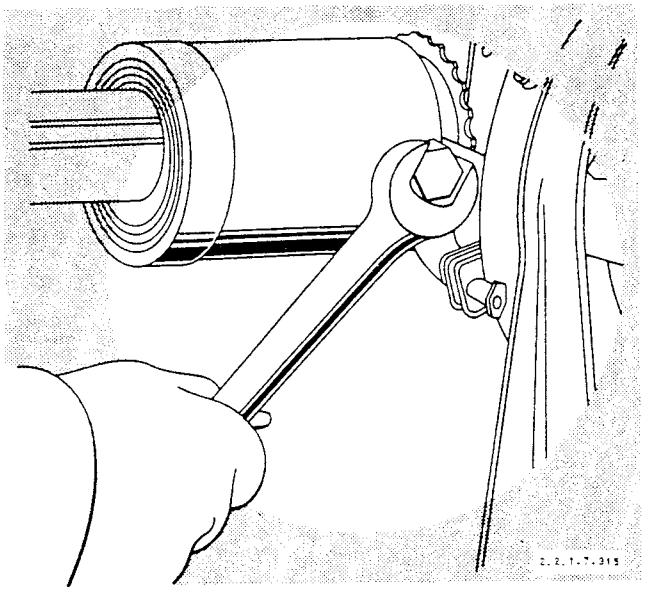


Figure 2–32. Removal of Trunnion Bolts

2–71. REMOVAL. (UPPER TURRET GUNS.)

a. Open dome access door and unlock elevation latching solenoid located on inside of elevation saddle support. (See figure 2–27.)

b. Position guns at about 30 or 40 degrees elevation.

c. Release safety lock on dome and turret handles (figure 2–28) and remove dome.

d. Remove gun enclosure by releasing four locks and sliding gun enclosure off gun barrels. (See figure 2–29.)

e. Exhaust air supply by opening valve at base of pressure cylinder.

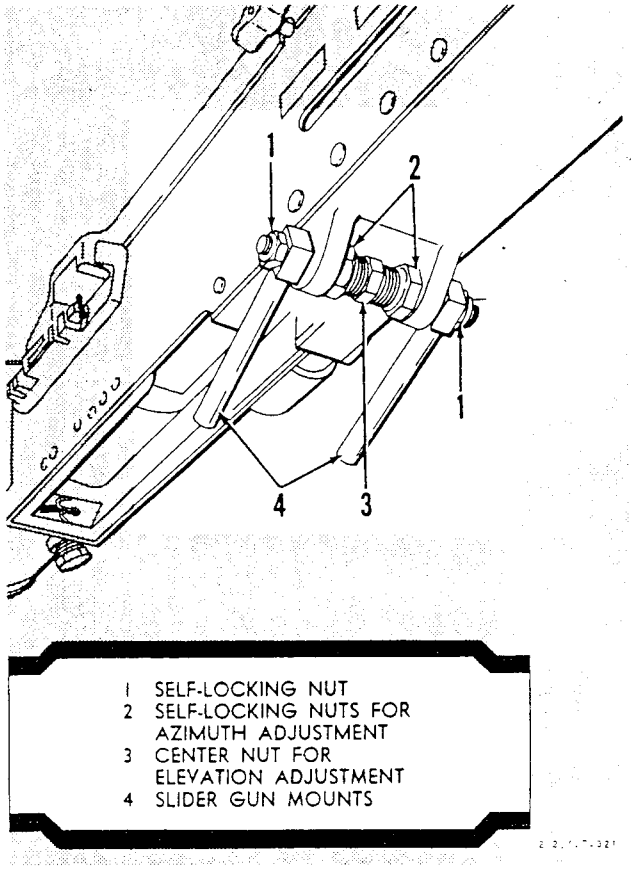


Figure 2–33. Slider Gun Mount

f. Release elevator latch solenoid. Position guns horizontally.

g. Detach electric and air connections. (See figure 2–30.)

h. Remove link chute (figure 2–31) by disengaging pawl pin.

i. Cut safety wire and loosen trunnion bolts on adapter of gun. Lift muzzle of gun, disengaging trunnion bolts (figure 2–32) from front gun support.

j. Holding muzzle of gun up, push gun back, disengaging slides of slider gun mount assembly (figure 2–33) from slider bushings in saddle.

k. Lift out gun.

2–72. MINOR REPAIR. Replace worn or damaged parts as necessary. For lubrication of guns refer to paragraphs 1–7, 1–7A, 1–7B and 1–7C.

2–73. INSTALLATION.

a. If gun has not been previously used on an upper or lower turret, remove original trunnion adapter by releasing spring lock and unscrewing.

b. Replace original trunnion adapter with an Edgewater adapter, type E-10 (figure 2–34), screwing adapter on barrel jacket with a spanner wrench.

c. Remove pawl pin and open cover of gun.

d. Place link chute on inboard side of gun, attaching it by inserting pawl pin through hole in link chute.

e. Lock pawl pin in place with a cotter pin.

f. Attach slider gun mount assembly through rear mounting holes of gun.

g. Mount gun chargers on gun. (Refer to paragraph 2-83.)

h. Loosen and back off three or four threads of trunnion bolts on recoil adapter.

i. Release elevation latching solenoid and position saddle of turret in horizontal.

j. Remove dome.

Note

One man holds up barrel of gun while another inserts slides of slider gun mount assembly into the slider bushings of saddle.

k. Pull forward on barrel of gun until trunnion bolts can be lowered into front gun support.

CAUTION

Make sure that lower end of link chute does not jam in chute extension opening in the saddle.

l. Tighten and safety wire trunnion bolts.

m. Make electric and air connections to gun charger.

n. Turn on gun fire safety switch on control box and check for leaks by placing soapy water around air hose connection. Turn switch off when check is complete.

CAUTION

Do not use sealing compound on air hose connections to gun charger.

o. Install gun enclosure by fastening four gun enclosure locks.

p. Install dome and fasten latch.

2-74. REMOVAL (LOWER TURRET GUNS). (See figure 2-35.)

a. Open access door and release elevation latch solenoid.

b. Position guns about 30 or 40 degrees below horizontal.

c. Release safety locks on dome handle and turn handle to release dome. (See figure 2-28.)

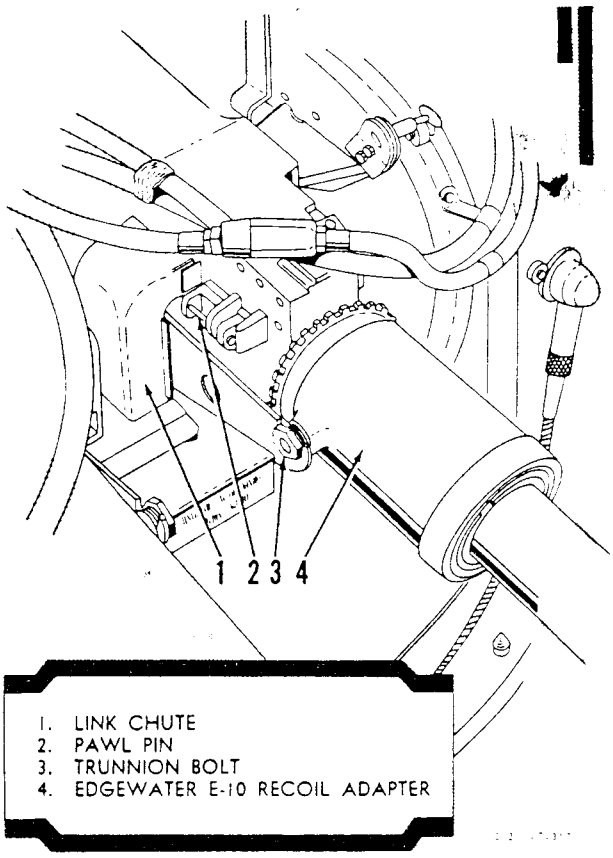


Figure 2-34. Edgewater Recoil Adapter

d. Remove dome.

e. Remove gun enclosure by first releasing two Dzus fasteners and then four locks.

f. Exhaust air pressure by opening valve at base of pressure cylinder.

g. Detach electric and air connections from gun charger. Depress guns sufficiently to make connections accessible.

h. Remove link chute by disengaging pawl pin. (See figure 2-31.)

i. Position guns 45 degrees below horizontal.

j. Loosen trunnion bolts on adapter of gun. Lift muzzle of gun, disengaging trunnion bolts from the front gun support.

Note

One man must hold the rear of the gun, while another lifts the muzzle and pushes back and removes the slides of the slider gun mount assembly from the slider bushings of the saddle.

2-75. MINOR REPAIR. Replace worn or damaged parts as necessary. For lubrication of guns refer to paragraphs 1-7, 1-7A, 1-7B and 1-7C.

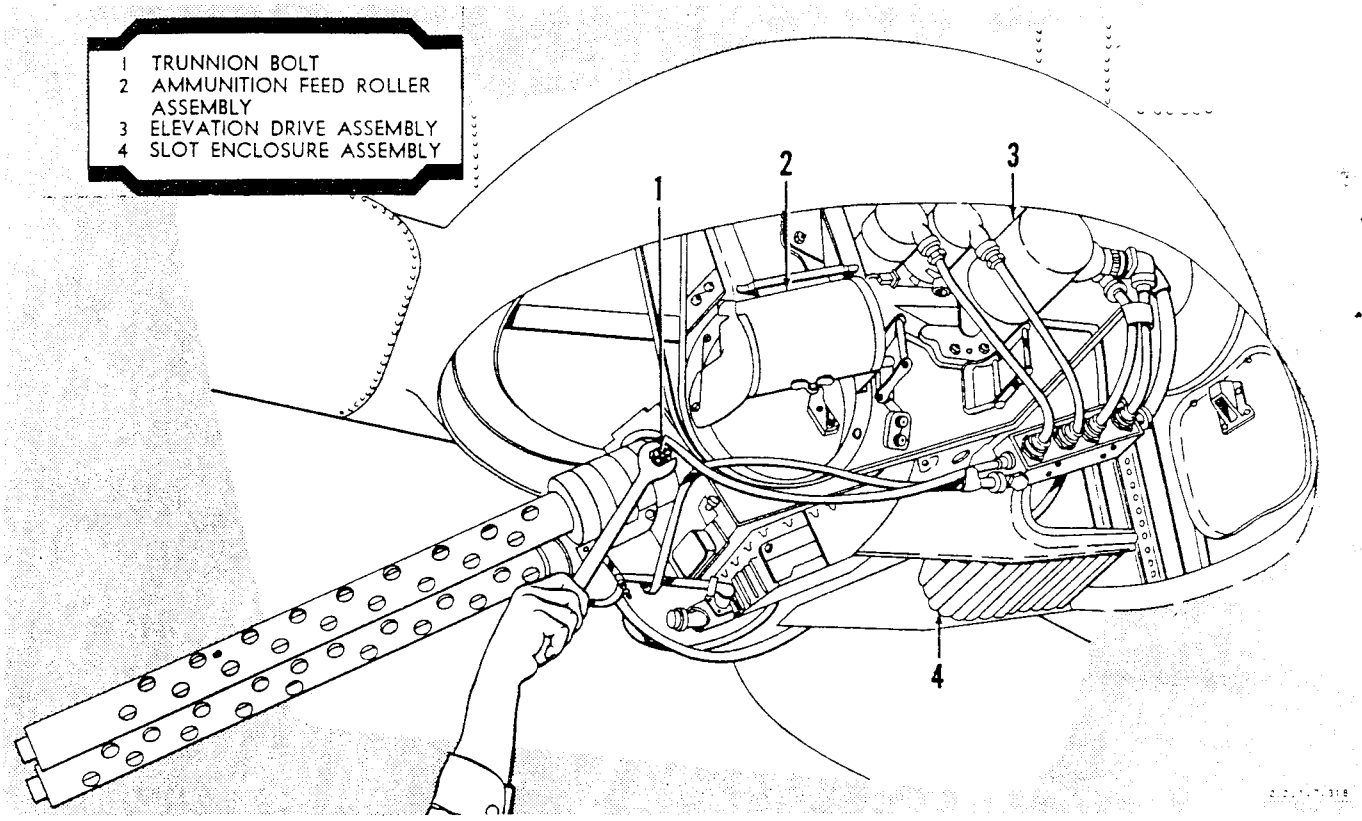


Figure 2–35. Lower Turret Guns Installation and Removal (View 1 of 3)

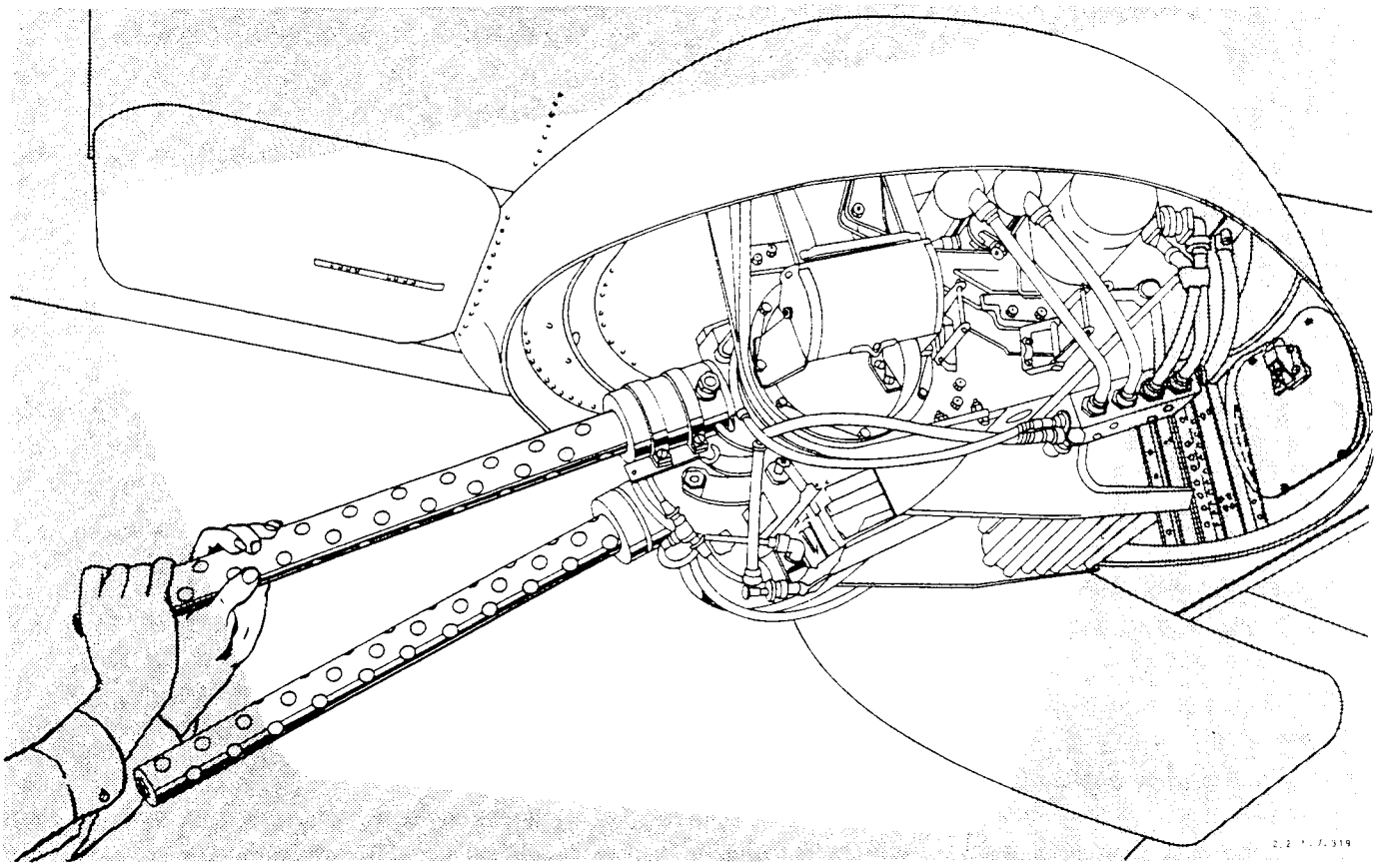


Figure 2–35. Lower Turret Guns Installation and Removal (View 2 of 3)

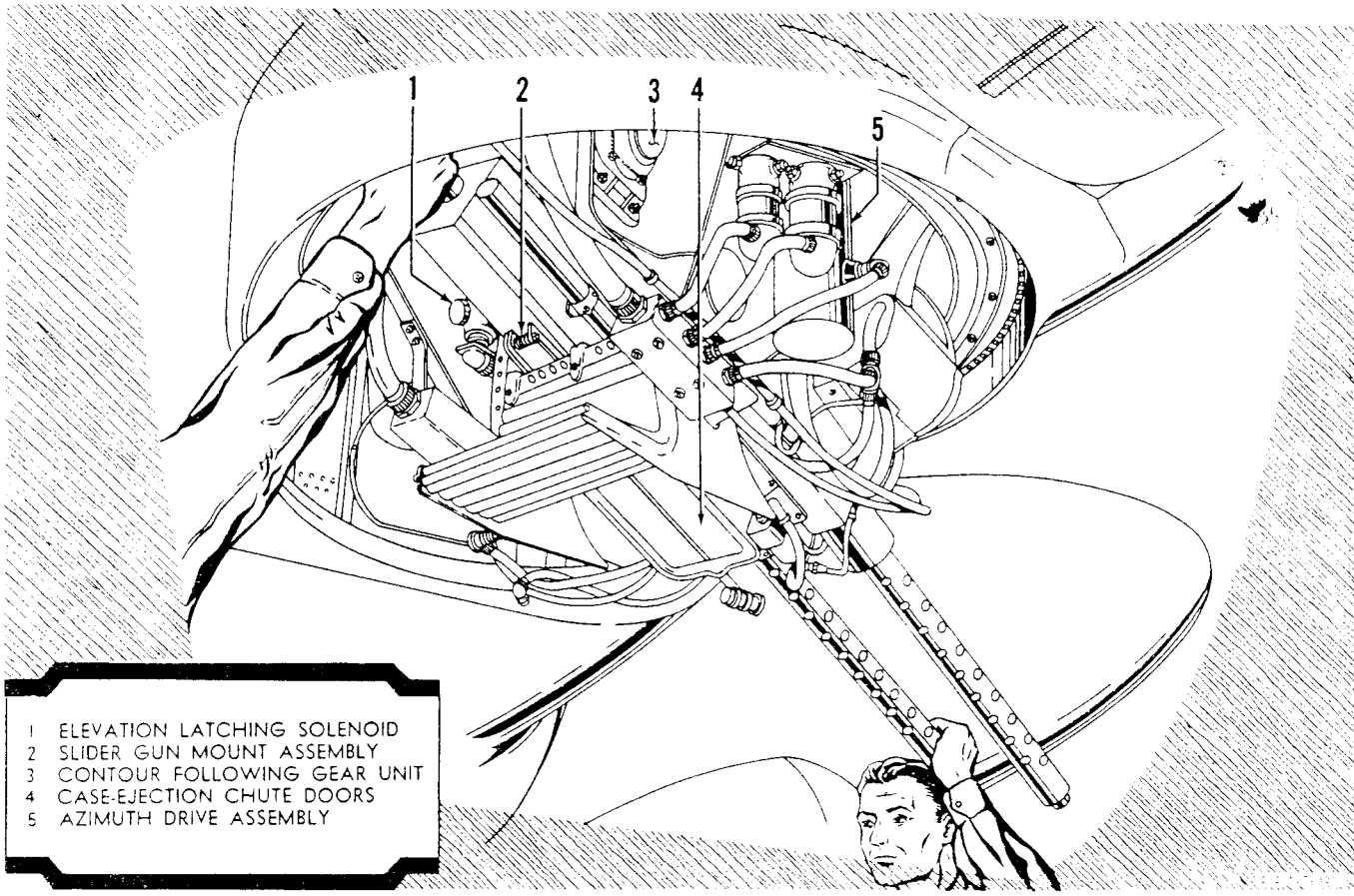


Figure 2–35. Lower Turret Guns Installation and Removal (View 3 of 3)

2–76. INSTALLATION. (See figure 2–35.)

a. Perform steps a. through g., paragraph 2–73.

b. Loosen and back out trunnion bolts on recoil adapter three or four threads.

c. Release dome safety lock.

d. Remove dome.

e. Disengage latch solenoid and position guns about 45 degrees below horizontal.

Note

Two men are needed to install the lower turret guns. One man must hold the rear of the gun and guide it so that the link chute does not jam against the spring of the door assembly. The other man lifts up on the muzzle and slides the gun into the turret so that the slider mount assembly can be inserted into the slider bushings on the saddle.

f. Hold muzzle of gun up and pull forward to seat sliders.

g. Lower gun and seat trunnion bolts into support on the saddle.

h. Make electrical and air connections to gun charger.

i. Turn on gun fire safety switch on control box and check for leaks by placing soapy water around air hose connections. Turn switch off when check is complete.

CAUTION

Do not use a sealing compound on air hose connections to gun charger.

Note

If only one gun on turret has been replaced, align replaced gun with the other turret gun. (Refer to paragraph 2–78.) If both guns have been replaced, harmonize turrets and sights. (Refer to paragraph 2–79.)

j. Install gun enclosure, fastening two Dzus fasteners and then four locks.

k. Release elevation latch solenoid and position guns about 30 to 40 degrees below horizontal.

l. Install dome and fasten with dome latch.

2–77. ADJUSTMENT (TURRET GUNS).

2–78. GUN ALIGNMENT.

a. Insert a boresight tool in barrel of one gun.

b. Position turret so that gun is boresighted on appropriate mark on target.

c. Lock turret in azimuth and elevation.

d. Place boresighting tool in second gun and observe whether or not it is aligned as marked on the target.

e. If gun is not properly aligned, loosen all four self-locking nuts on gun slider mount assembly on rear of gun (figure 2–36). Turn center nut until gun is properly aligned in elevation. Shift gun in azimuth until it is aligned on the target mark by screwing the two large self-locking nuts in one direction or the other.

Note

The self-locking nuts should not be overtightened.

2–79. HARMONIZING.

a. The vertical axis of lower turret and sighting station must be parallel to that of upper turret.

b. The bore axis of guns must be parallel to each other and perpendicular to horizontal axis about which guns rotate in elevation.

c. Zero selsyn. (Refer to paragraph 2–9.)

d. Align guns. (Refer to paragraph 2–78.)

e. Locate distant object at least one mile away, near horizon.

f. Close a-c power switch, d-c turret power switch and action switch on the sight.

g. Operate both upper and lower turrets in azimuth and elevation. Visually check that turrets follow sight in approximate correspondence.

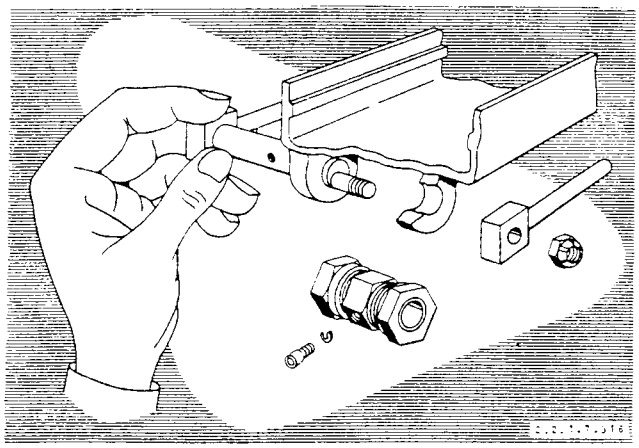


Figure 2–36. Slider Gun Mount Adjustment

h. Rotate sight and turrets to approximate location of distant object and turn off a-c and d-c switches.

i. Transfer line of sight to upper head of periscope and align line of sight and bore axis of one of upper turret guns directly on target. Latch turret and sight in this position.

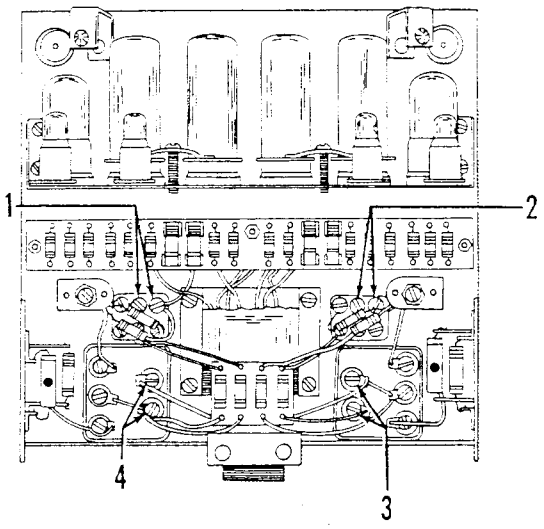
j. Place a voltmeter, using a 10-volt scale, across terminals 1 and 2 of azimuth 31-speed transformer T5 in upper turret servo amplifier. (See figure 2–37.)

k. Adjust corresponding azimuth 31-speed selsyn control transformer on upper turret until voltage across terminals 1 and 2 of transformer T5 is zero.

l. Place a voltmeter, using 10-volt scale, across terminals 1 and 2 of azimuth one-speed transformer T4 in upper turret servo-amplifier. (See figure 2–37.)

m. Adjust corresponding azimuth one-speed selsyn control transformer on upper turret until voltage is zero at transformer T4.

n. In turn, measure and adjust to zero voltages across terminals 1 and 2 of the elevation 31- and one-speed transformers, T3 and T2, (figure 2–37) by adjusting corresponding selsyn control transformer on upper turret.



1 TERMINALS 1 AND 2 OF ELEVATION 31 SPEED TRANSFORMER
2 TERMINALS 1 AND 2 OF AZIMUTH 31 SPEED TRANSFORMER
3 TERMINALS 1 AND 2 OF AZIMUTH 1 SPEED TRANSFORMER
4 TERMINALS 1 AND 2 OF ELEVATION 1 SPEED TRANSFORMER

Figure 2–37. Servo-Amplifier (Cover Removed)

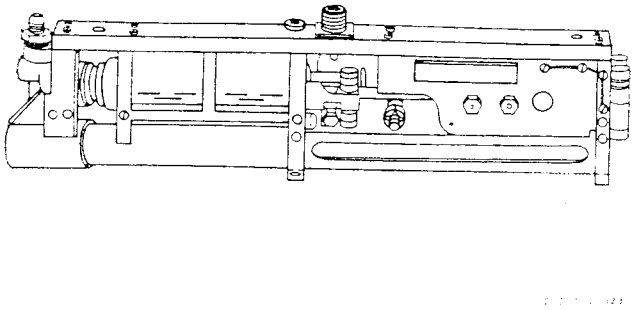


Figure 2–38. Automatic Gun Charger

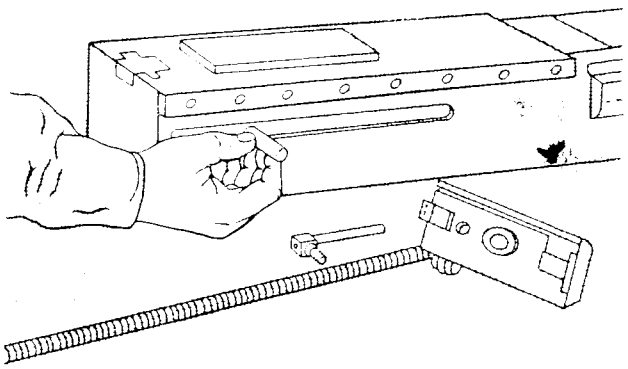


Figure 2–39. Inserting Bolt Stud of Gun Charger Into Gun Bolt of Machine Gun

2–80. AUTOMATIC GUN CHARGERS. (See figure 2–38.)

2–81. DESCRIPTION. A General Electric automatic gun charger is used on each .50 caliber turret machine gun, type M-2. The charger is electrically controlled. When the gunner closes firing trigger, the gun either fires in normal manner or, in event that the gun fails to fire, the charger operates within 0.4 second to charge gun. Should gun fail to fire five or six times in succession, the charger will stop operating, since it is assumed that continuous faulty operation is caused by something other than defective rounds. A reset button, extending through the top cover of charger, is used to reset charger to operating condition. The air pressure for these chargers is supplied by two motor-driven compressors, one mounted on each turret.

2–82. REMOVAL.

CAUTION

Remove ammunition belt from gun and live rounds from firing chamber.

a. Release pressure from air pressure tank.

b. Remove air hose and electrical connection from charger. (See figure 2–30.)

c. Remove safety pin and loosen castle nut on clamping bolt.

d. Remove clamping wedge on mounting bar from slot.

e. Lift gun charger from mounting bar.

2–83. MINOR REPAIR. Clean charger unit of all oil, dirt and grease with a cloth saturated with gasoline or naphtha.

Note

Do not use carbon tetrachloride for cleaning charger unit. Do not use any oil, grease or lubrication on the gun charger.

2–84. INSTALLATION.

a. Check that sear slide of gun is set for operation on side of gun on which charger is to be installed.

b. Check that mounting bar is on proper side of charger.

c. Remove bolt stud from end of charger and insert in gun bolt. (See figure 2–39.)

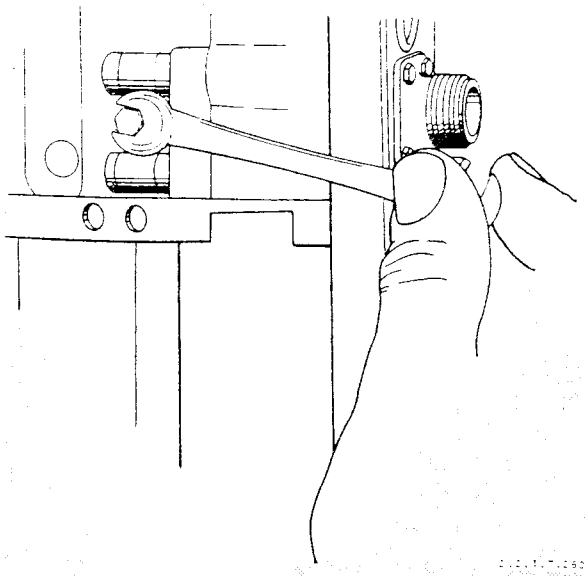


Figure 2–40. Adjusting Sear-Pin of Gun Charger to Non-Firing Position

d. Replace safety wire on screw which fastens spare stud to end of charger.

e. Withdraw sear-pin into mounting bar (non-firing position) by turning sear-pin adjuster clockwise, as far as possible. (See figure 2–40.)

f. Remove safety pin from clamping bolt and loosen castle nut to end of bolt thread. Clamping bolt may now be extended beyond mounting bar for engagement with holding slot in side plate of gun.

g. Attach charger to gun by first inserting head of clamping bolt in slot then fit clamping wedge on mounting bar into slot. (See figure 2–41.) The stud must extend through guide slot in wall of cylinder. (See figure 2–42.)

CAUTION

Mounting bar must rest flat against gun side plate at all times.

h. Tighten castle nut on clamping bolt to fit snugly and replace safety pin.

CAUTION

Do not overtighten castle nut.

i. Fasten hose from pressure cylinder to nipple at end of charger. Check that connection is airtight by turning hand valve on pressure cylinder to admit air and listening for audible leakage. Do not attach firing lead to electrical connector on cover at this time.

2–85. TIMING ADJUSTMENT.

WARNING

Check that ammunition belt has been removed from gun and that no live rounds are in gun chamber.

a. Open hand valve on pressure cylinder.

b. Insert screwdriver in SOCKET C, identified on charger cover, resting end on bushing, and move handle toward muzzle of gun.

Note

This simulates action of the charging solenoid so that air enters cylinder moving piston to charge the gun.

c. Insert screwdriver in SOCKET F, identified on charger cover, resting end of screwdriver against center of firing solenoid plunger. Move handle of screwdriver toward breech end of gun.

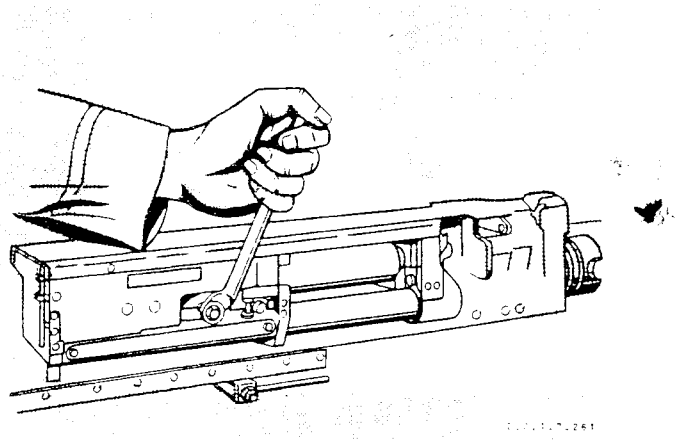


Figure 2–41. Turning Castle Nut to Loosen Clamping Bolt on Gun Charger

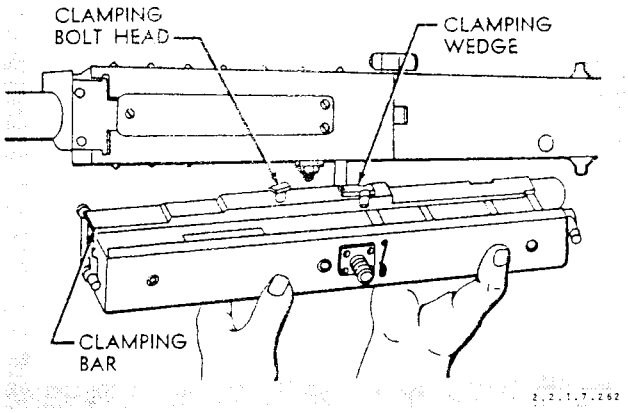


Figure 2–42. Applying Gun Charger to Machine Gun

Note

This simulates action of the firing solenoid, and moves sear-pin laterally into gun to engage sear slide and release firing pin.

d. If firing action is not accomplished, as evidenced by audible click when firing pin is released, turn sear-pin adjuster one notch counterclockwise and repeat firing action by inserting screwdriver in SOCKET F. Repeat one notch at a time until firing action is accomplished.

e. Advance sear-pin adjuster counterclockwise two more notches (1/3-revolution) to make certain firing action will continue.

f. Connect electrical firing circuit by plugging in lead and screwing cap tight to connector on cover.

g. Move reset-button projecting above cover to extreme end of slot away from START position.

h. Fire gun electrically by closing firing key.

2–86. TESTING GUN CHARGER TIMER.

a. Mount charger on spare gun.

b. Set timing of gun as slow as possible.

c. Apply 24 volts d-c and 1000 psi air pressure to charger.

d. Fire gun with live ammunition. If charger ejects live rounds, adjust timing. (Refer to paragraph 2–85.)

Note

Ejection of live rounds means that the timer does not give the gun time to fire before operating charger. A time interval of approximately 0.2 to 0.4 seconds is required to see if the gun is going to fire, before the solenoid switch lever arm engages the solenoid-switch lever to operate switch energizing the charging solenoid. If timer operates satisfactorily on a slowly-timed gun, it will always operate on a gun which is timed normally.

e. After adjustment, if gun charger continues to eject live rounds, remove ammunition belt and any live round from firing chamber.

f. Remove air pressure lines and firing lead from connector of charger.

g. Remove drive spring from gun and position gun bolt in battery position.

h. Move solenoid switch lever arm to operate solenoid switch by inserting screwdriver into cylinder and pushing the lever arm.

Note

Switch is not in position to energize charging solenoid.

i. Manually move gun bolt back slowly until solenoid switch operates, as evidenced by audible click.

j. Measure position of gun extractor and see that it is within 1/16-inch of the point where it drops to its lower position. If distance exceeds this, adjust timer. (Refer to paragraph 2–85.)

Note

This check determines that charger will apply pressure to bolt stud long enough to complete the charging cycle, so that gun bolt will insert the round which has been withdrawn from the ammunition belt into the firing chamber and not return it to jam the ammunition belt.

2–87. TESTING.

a. Apply 24 volts d-c to charger. Check that the motor runs freely, sear-pin operates and motor circuit is opened in approximately four to eight seconds.

b. Check seating of valve for leakage by applying 1000 psi air pressure to charger and listening for air escape; check for leakage between valve and valve seat. If air leaks, check clearance between nut and charging plunger bushing. Clearance should be 0.015 inch. If air still leaks, a new valve assembly and valve compression spring should be installed.

c. Check for leakage between valve assembly and exhaust port when charger operates.

d. Mount charger on spare gun.

e. Apply 1000 psi air pressure and 24 volts d-c to charger.

f. Block gun bolt with a two-inch fiber plug or equivalent, inserted between gun bolt and buffers.

g. Set timer button to START position (indicated on charger cover) and operate charger electrically through firing key. Keep firing key depressed so that timer motor circuit opens. Fiber plug will prevent gun bolts from resetting timer switches so that tapered surface of valve will close exhaust port until timer motor circuit opens in approximately four to eight seconds.

h. Listen for leakage of air through exhaust port during this period. A small amount of air may leak, but leakage should not be so excessive that speed of charging action is impaired.

i. If clearance is over 0.015 inch, adjust to 0.015 inch by inserting a screwdriver into charging-plunger bushing and wedging nut so that both nut and bushing may be rotated on stem of valve.

j. Retest leakage through exhaust by following steps g. and h.

Note

Excessive leakage may not be a valve defect. It may also be an electrical defect in the charging solenoid. Before proceeding, operate the valve manually at SOCKET C. If manual operation produces no excessive leakage, check operation of charging solenoid at 24 volts, d-c.

k. If leakage through exhaust port is still excessive, adjust clearance between nut and charging-plunger bushing to 0.010 inch.

l. Again test leakage through exhaust port by following steps g. and h.

m. If leakage through exhaust port is still excessive, unstake charging-plunger bushing from plunger.

n. Remove nut from stem valve.

o. Remove valve and valve bushing from valve block.

p. Remove two of sealing washers. Each washer is 0.005 inch thick.

q. Reassemble valve and valve bushing on valve block, lubricating bushing threads with Parker Thread-lube. Tighten bushing on block.

r. Thread charging-plunger bushing on plunger and stake.

s. Adjust clearance between nut and charging-plunger bushing to 0.015 inch.

2-88. TURRET AIR COMPRESSOR SYSTEM. (See figure 2-43.)

2-89. DESCRIPTION. The air compressor system, mounted on each turret, supplies compressed air to the two automatic gun chargers and consists of a compressor and motor, valve block and pressure cylinder. The compressor (figure 2-43) has a low pressure cylinder and a high pressure cylinder and is driven by an electric motor. Air is admitted to and compressed in the low pressure cylinder, cooled in the inter-cooler line, further compressed in the high pressure cylinder and sent out of compressor to valve block and pressure cylinder. The valve block assembly is a series of valves that controls flow of air from compressor to gun chargers. Also on the valve block is a pressure switch which opens to stop the compressor motor when the pressure in the pressure cylinder reaches approximately 1050 psi. When pressure in the pressure cylinder drops to approximately 950 psi, the switch closes and the compressor motor starts. The air compressor system supplies compressed air at 1000 psi and is capable of completely refilling the pressure cylinder in four minutes at sea level and in 25 minutes at 40,000 feet altitude. The compressor is set for operation when the SHUT-OFF valve handle on the valve block is turned as far as possible in counterclockwise direction.

2-90. REMOVAL.

a. Disconnect electrical connection from motor.

b. Relieve air pressure, disconnect and cap lines.

c. Remove bolts attaching compressor and pressure cylinder to shock mounting bracket and remove unit.

2-91. MINOR REPAIR.

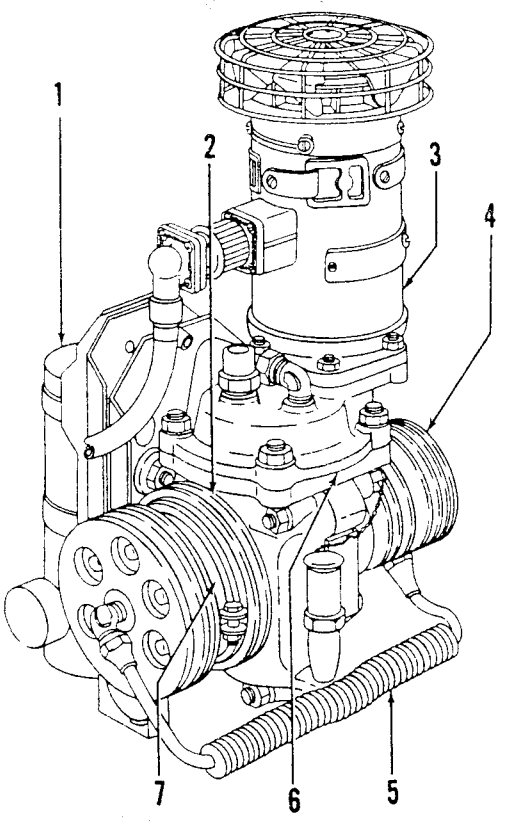
2-92. CLEANING COMPRESSOR SYSTEM.

a. With airplane's power supply off, pull up on the BLOW OFF valve handle and release all air.

WARNING

Do not allow compressed air to blow on any part of the human body.

b. Remove anti-freeze plug in the top of valve block assembly.



1 PRESSURE CYLINDER AND SWITCH ASSEMBLY
2 LOW PRESSURE CYLINDER
3 DRIVE MOTOR
4 HIGH PRESSURE CYLINDER
5 INTERCOOLER LINE
6 COMPRESSOR
7 AIR INLET FILTER

Figure 2-43. Turret Air Compressor

c. Pour in one ounce of ethylene glycol anti-freeze.

d. Replace plug.

Note

The reason for the above procedure is to blow out air, water, oil and anti-freeze which has collected during last flight. The addition of new anti-freeze is to prevent moisture in the air, which will collect in the bottle during next flight, from freezing. If water were left in the bottle, it would freeze and ice would plug up the end of air inlet to the pressure cylinder, rendering air compressor equipment useless.