

ROYAL CANADIAN AIR FORCE



**REPAIR & OVERHAUL  
INSTRUCTIONS**

**D-C CARBON PILE  
VOLTAGE REGULATOR  
PART 1042-17-A**

**(ECLIPSE-PIONEER)**

**ISSUED ON AUTHORITY OF THE CHIEF OF THE AIR STAFF**

RCAF Reprint of  
USAF TO 03-5AA-49

**1 AUG 54**

## LIST OF RCAF REVISIONS

| <b>DATE</b> | <b>PAGE NO</b> | <b>DATE</b> | <b>PAGE NO</b> |
|-------------|----------------|-------------|----------------|
|-------------|----------------|-------------|----------------|

"This EO is a Reprint of a USAF  
Technical Order. All references  
to USAF Tool and/or part numbers  
may be referred to CAP 10".

## TABLE OF CONTENTS

| Section |   | Page |
|---------|---|------|
| I       | INTRODUCTION . . . . .                        | 1    |
|         | 1-1. General . . . . .                        | 1    |
|         | 1-5. Purpose . . . . .                        | 1    |
|         | 1-7. Table of Leading Particulars . . . . .   | 1    |
| II      | OVERHAUL INSTRUCTIONS . . . . .               | 2    |
|         | 2-1. Special Tools . . . . .                  | 2    |
|         | 2-2. Disassembly . . . . .                    | 2    |
|         | 2-5. Cleaning . . . . .                       | 2    |
|         | 2-7. Inspection . . . . .                     | 2    |
|         | 2-19. Testing . . . . .                       | 4    |
|         | 2-36. Repair or Replacement . . . . .         | 6    |
|         | 2-50. Lubrication . . . . .                   | 7    |
|         | 2-51. Reassembly . . . . .                    | 7    |
| III     | TEST PROCEDURE . . . . .                      | 11   |
|         | 3-1. General . . . . .                        | 11   |
|         | 3-3. Test Equipment . . . . .                 | 11   |
|         | 3-11. Preparation of Test Equipment . . . . . | 11   |
|         | 3-12. Adjustment Procedure . . . . .          | 11   |
|         | 3-15. Final Assembly . . . . .                | 13   |

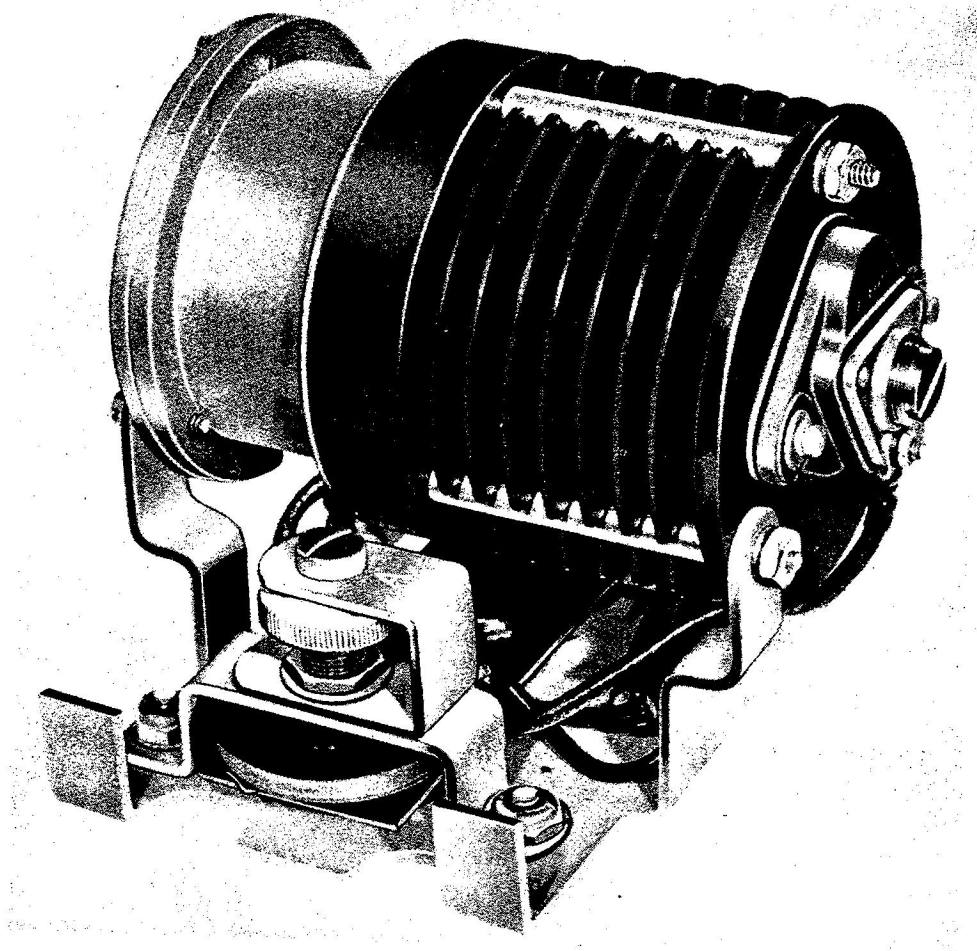


Figure 1-1. Three-Quarter View - D-C Carbon Pile Voltage Regulator - Eclipse-Pioneer Type 1042-17-A



## SECTION I

## INTRODUCTION

## 1-1. GENERAL.

1-2. This handbook contains descriptive data and instructions for the overhaul and test procedure of the d-c carbon pile voltage regulator, Eclipse-Pioneer type 1042-17-A. This equipment is manufactured by the Eclipse-Pioneer Division of Bendix Aviation Corporation, Teterboro, New Jersey.

1-3. Overhaul and test instructions for types other than the 1042-17-A will be provided in section IV by the use of Difference Data Sheets.

1-4. Overhaul and test procedures for types to be included in section IV will be the same as the procedures given in sections II and III, except for the specific differences noted by the applicable Difference Data Sheets.

## 1-5. PURPOSE.

1-6. The d-c carbon pile voltage regulator is used to maintain a substantially constant generator voltage despite variations in generator speed and load conditions.

## 1-7. TABLE OF LEADING PARTICULARS.

TABLE I

## ELECTRICAL CHARACTERISTICS

|   |   |
|---|---|
| Nominal Voltage Setting   | 28.0 volts  |
| Tolerance of Voltage Regulation (hot)                                 | $\pm 0.7$ volt  |
| Voltage Adjustment by means of Potentiometer:<br>Maximum<br>Minimum   | 30.0 volts<br>26.0 volts                                |
| Normal Operating Resistance of the Carbon Pile:<br>Maximum<br>Minimum | 40.0 ohms<br>1.5 ohms*                                  |
| Maximum Power Dissipation of the Carbon Pile                          | 75.0 watts at<br>25.0°C (77.0°F)<br>ambient temperature |
| Wiring  | Insulated   |
| Shielding   | None  |

\*Minimum resistance is 1.0 ohm

SECTION II  
OVERHAUL INSTRUCTIONS

2-1. SPECIAL TOOLS. No special tools required.

2-2. DISASSEMBLY.

2-3. DISASSEMBLY OF MAIN ASSEMBLY.

(See figure 2-1.)

a. Hold the regulator so that adjusting screw cover (1, figure 2-4) is uppermost. Insert a screwdriver blade into slot at bottom of cover and pry cover off adjusting screw (8).

b. Remove adjusting screw assembly (7, figure 2-4).

c. Insert a thin rod (less than 3/16-inch in diameter) into hole in carbon pile (20, figure 2-4). (See figure 2-2.) Invert regulator so that carbon discs fall onto rod. (See figure 2-3.)

d. Remove nut (11, figure 2-4) and lockwasher (12), and release lug (28, figure 2-1) of lead assembly (26) from carbon pile regulator assembly (1).

e. Remove two nuts (2, figure 2-1), lock washers (3), and washers (4). Then remove two screws (5), lock washers (3), and washers (4). Disengage carbon pile regulator assembly (1) from base assembly (30).

f. Remove two nuts (7) and screws (8). Unsolder all leads from terminal contacts of potentiometer assembly (9), terminal lugs of base assembly (30), and terminal contacts of resistor (21). Disengage carbon pile regulator assembly (1) and potentiometer and adjusting nut assembly (6) completely from base assembly (30).

g. Remove lead (22), resistor (23), lead assembly (26), and lead (29). Remove sleeving (24 and 25) from resistor (23). Remove sleeving (27) and lug (28) from wire of lead assembly (26).

h. Unsolder nut (17) from end of screw (20). Remove nut (17), washer (18), resistor (21), washer (18), and washer (19) from screw (20). Remove screw (20) from base assembly (30).

i. To disassemble potentiometer and adjusting nut assembly (6), unscrew nut (10), and slip adjusting nut assembly (14), potentiometer assembly (9), washer (12), and washers (11) out of bracket and clip assembly (15). Lift washer (13) off shaft of potentiometer assembly (9).

j. Do not disassemble base assembly (30). If any part is damaged, replace with a new assembly.

2-4. DISASSEMBLY OF CARBON PILE REGULATOR ASSEMBLY. (See figure 2-4.)

a. Mount adjusting screw assembly (7), previously removed, in fixture (figure 2-5) so that contact plug (9) fits inside hole. Insert a short piece of drill rod (3/64-inch in diameter) into hole in slot of adjusting screw (8). Gently tap contact plug (9) out of adjusting screw (8) with a hammer. (See figure 2-6.)

b. Remove in order, two screws (3), lock washers (4), washers (5), and washers (6). Remove adjusting screw bracket assembly (2), bushings (18), and insulator (19) from carbon pile housing (24).

c. Unscrew three screws (14 and 15) and remove three lock washers (13). Separate adjusting screw plate (10) from adjusting screw bracket (17) and slide out adjusting screw spring (16). Nut (11) and lock washer (12) were removed previously.

d. Unscrew screws (22), remove clips (23), and slide carbon pile tube (21) out of carbon pile housing (24).

e. Unscrew remaining nut (25), and lift lock washer (26) and washer (27) from stud (52). Pull carbon pile housing (24) free from studs (52).

f. Lift armature assembly (28) out of magnet case assembly (38), and pull red lead, which is permanently attached to ferrule assembly (30), through hole in magnet case (51). Remove packing shim (37) from magnet case (51).

g. Mount armature assembly (28) on fixture (figure 2-5) so that contact plug (29) fits inside hole. Insert a short piece of drill rod (3/64-inch in diameter) into hole in armature and diaphragm assembly (36) and gently tap contact plug (29) out of ferrule assembly (30).

NOTE

Do not disassemble armature assembly (28) further unless inspection and test indicate the necessity for repairs. (Refer to paragraph 2-39.)

h. Remove remaining screw (40), lock washer (41), and washer (42) from magnet case (51). Separate end plate (39) from magnet case (51).

i. Cut safety wire binding two screws (44), remove screws (44) and washers (45), and unscrew core (43) from end plate (39).

j. Press out of magnet case (51), washer (46), coil assembly (47), washer (46), spring (48), and temperature compensating ring (49).

k. Unscrew three studs (52) from magnet case (51).

l. Do not disassemble coil assembly (47). If any part is damaged, replace with a new assembly.

2-5. CLEANING.

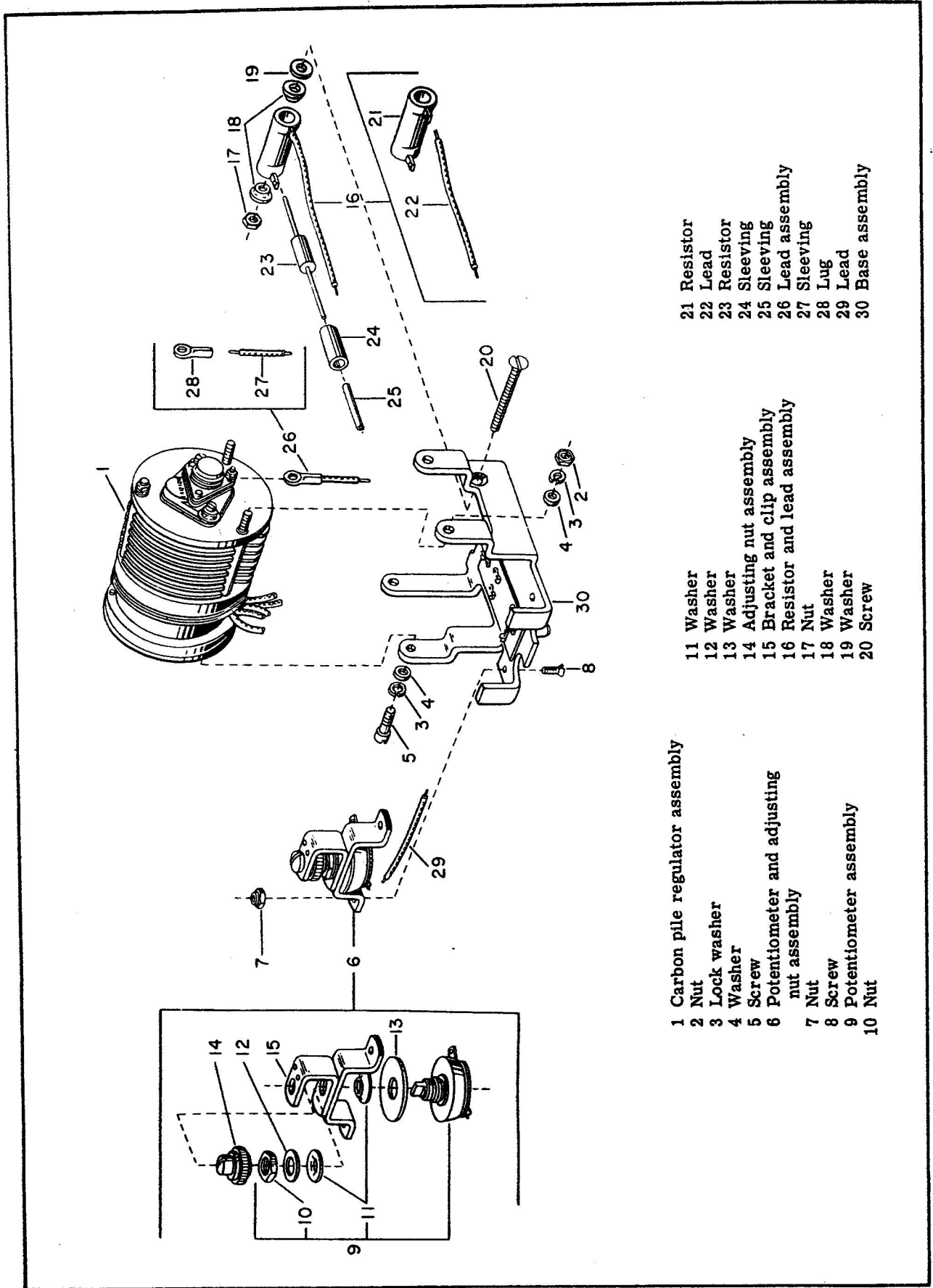
2-6. Thoroughly clean all parts of regulator except carbon pile, contact plugs, and coil assembly in unleaded gasoline or other suitable cleaning fluid. In a rare case, if coil assembly requires cleaning, it may be dipped in unleaded gasoline.

CAUTION

Do not use carbon tetrachloride.

2-7. INSPECTION.

2-8. GENERAL. Inspect all parts for cracks, bends, breaks, excessive corrosion, or burns. Inspect all threads and slots for defects. Inspect mica insulators for excessive flaking.



- 1 Carbon pile regulator assembly
- 2 Nut
- 3 Lock washer
- 4 Washer
- 5 Screw
- 6 Potentiometer and adjusting nut assembly
- 7 Nut
- 8 Screw
- 9 Potentiometer assembly
- 10 Nut

- 11 Washer
- 12 Washer
- 13 Washer
- 14 Adjusting nut assembly
- 15 Bracket and clip assembly
- 16 Resistor and lead assembly
- 17 Nut
- 18 Washer
- 19 Washer
- 20 Screw

- 21 Resistor
- 22 Lead
- 23 Resistor
- 24 Sleeving
- 25 Sleeving
- 26 Lead assembly
- 27 Sleeving
- 28 Lug
- 29 Lead
- 30 Base assembly

Figure 2-1. Exploded View - Main Assembly - D-C Carbon Pile Voltage Regulator - Eclipse-Pioneer Type 1042-17-A

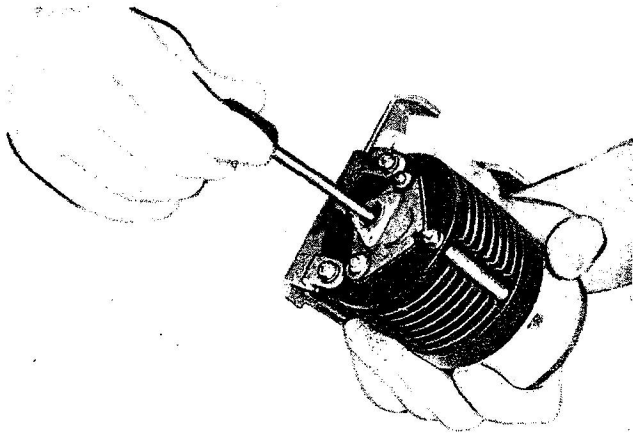


Figure 2-2. Inserting Thin Rod into Hole in Carbon Pile

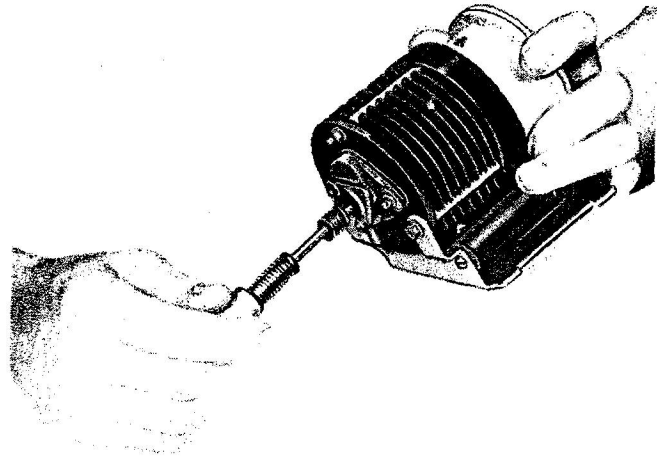


Figure 2-3. Removing Carbon Pile from Regulator Assembly

2-9. **ADJUSTING SCREW SPRING.** Inspect this spring for cracks, breaks, excessive corrosion, and for scored inner edges.

2-10. **ARMATURE ASSEMBLY.** Inspect armature assembly to see if diaphragm is broken; if mica insulation is cracked, broken, or otherwise unserviceable; if ferrule is bent or broken; or if screws holding assembly together are loose.

2-11. **ARMATURE PACKING SHIM.** Inspect this shim for dents or other types of distortion.

2-12. **BASE ASSEMBLY.** Inspect base assembly for burned or cracked insulators; for loose, bent, broken, pitted, corroded, or discolored contacts; for contacts with worn off silver plating; and for broken terminal lugs.

2-13. **CARBON PILE TUBE.** Inspect carbon pile tube to see if it is chipped, cracked, broken, or is scored or rough on the inside.

2-14. **COIL ASSEMBLY.** Inspect coil for broken leads and burned, worn, or cracked insulation.

2-15. **LEADS.** Inspect leads for proper insulation. Inspect lead assembly to see if lug is loose or broken.

2-16. **RESISTOR.** Inspect resistor for burns and broken leads.

2-17. **RESISTOR AND LEAD ASSEMBLY.** Inspect this assembly for cracked enamel and for burns.

2-18. **POTENTIOMETER.** Inspect potentiometer for burned windings and for broken terminals. Be sure sliding contact is not burned, bent away from the windings, or loose.

2-19. **TESTING.**

**NOTE**

In the following tests, use a 110-volt a-c test lamp circuit for ground tests, continuity tests,

and tests for shorts. For resistance tests, use Wheatstone bridge or similar resistance-measuring device.

2-20. **ARMATURE ASSEMBLY.**

2-21. **GROUND TEST.** Touch one terminal of test lamp circuit to armature while touching other terminal to contact plug ferrule. If test lamp flickers or lights, armature assembly is defective.

2-22. **CONTINUITY TEST.** Touch free end of red lead with a terminal of test lamp circuit, and touch lug at opposite end of red lead with other terminal. If lamp flickers or fails to light, armature assembly is defective.

2-23. **BASE ASSEMBLY.**

2-24. **GROUND TEST.** Touch one terminal of test lamp circuit to a terminal contact and touch other terminal to the base. If lamp lights, base assembly is defective. Repeat this operation for every terminal contact.

2-25. **COIL ASSEMBLY.**

2-26. **RESISTANCE TEST.** Check resistance of shunt and equalizer windings. The resistance of shunt windings measured between terminals of black and white leads must be between 8.65 and 9.35 ohms. The resistance of equalizer coil measured between terminals of yellow and green leads must be between 0.32 and 0.40 ohm. If either value falls outside limits given, coil assembly is defective.

2-27. **TEST FOR SHORTED WINDINGS.** Touch the terminals of test lamp circuit to ends of black and yellow coil leads. If lamp flickers or lights, coil assembly is defective.

2-28. **LEADS.**

2-29. **CONTINUITY TEST.** Test all leads by touching terminals of test lamp circuit to both ends of each lead. If lamp flickers or does not light, lead is defective.

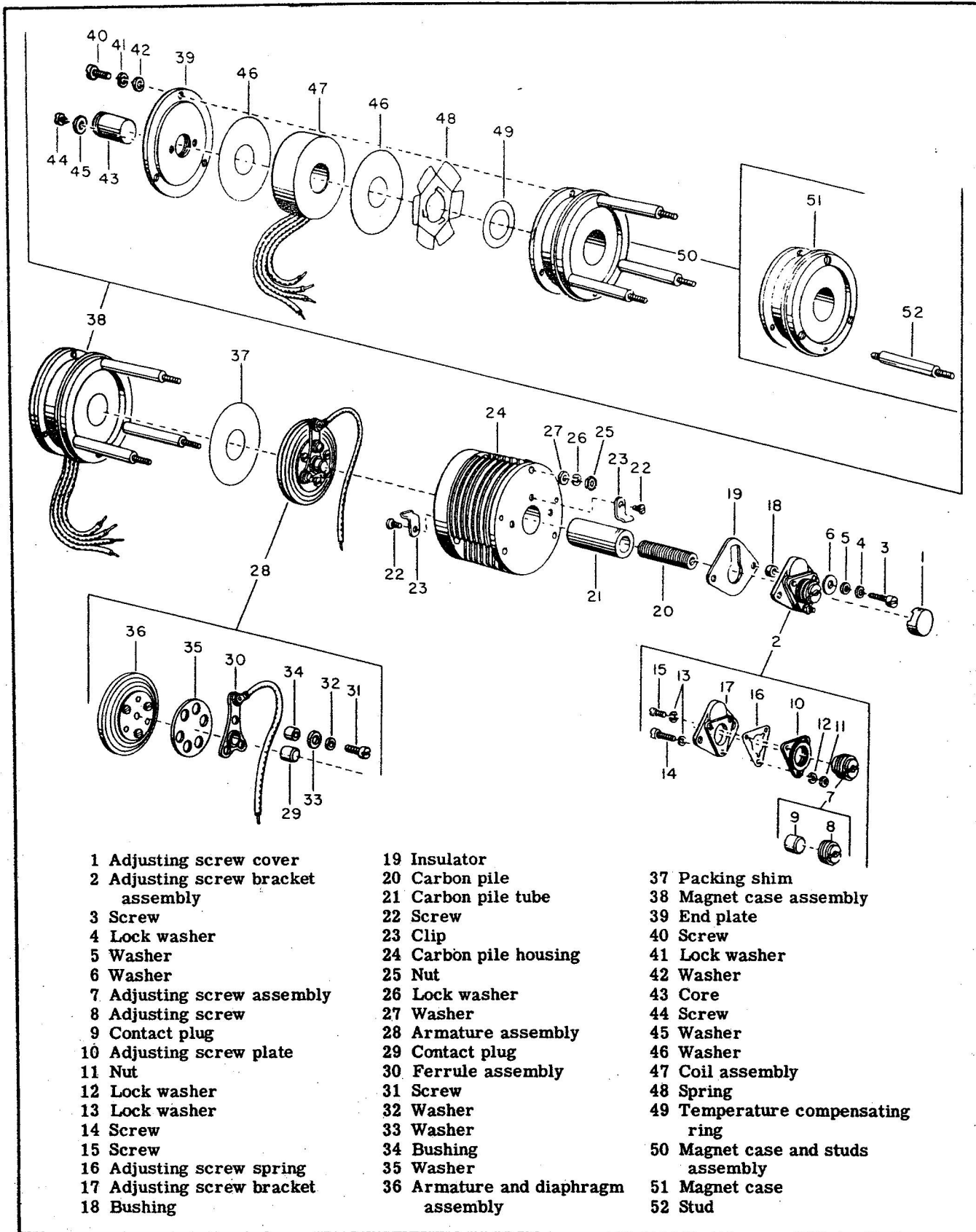


Figure 2-4. Exploded View - Carbon Pile Regulator Assembly - D-C Carbon Pile Voltage Regulator - Eclipse-Pioneer Type 1042-17-A

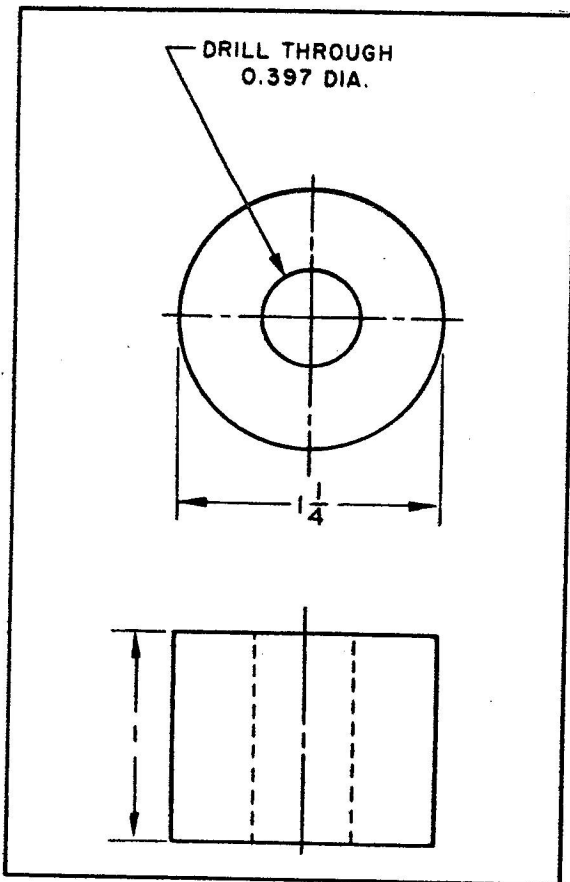


Figure 2-5. Fixture for Removing Contact Plug

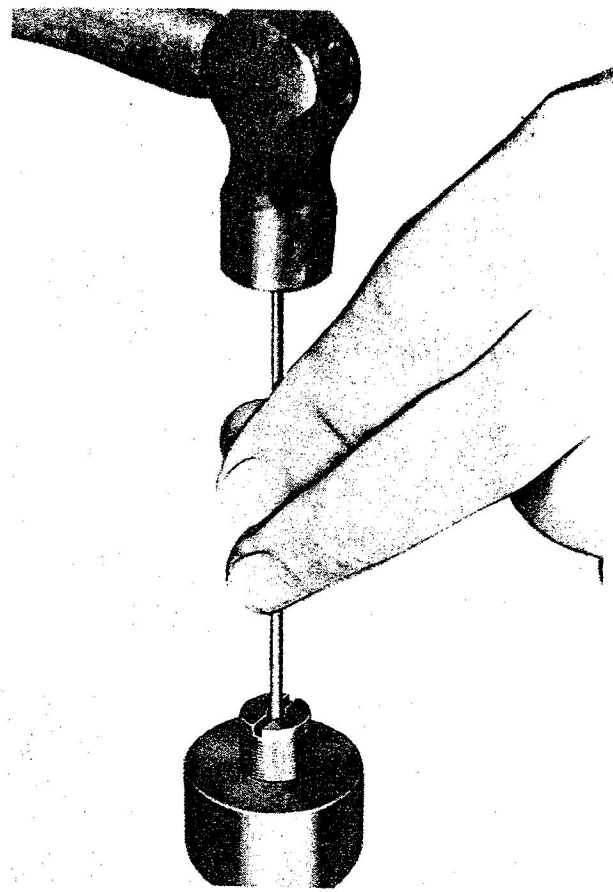


Figure 2-6. Removing Contact Plug from Adjusting Screw

2-30. RESISTOR. (See 23, figure 2-1.)

2-31. RESISTANCE TEST. Check resistance value between ends of resistor leads. Resistance must measure between 297 and 363 ohms. If resistance is not within these limits, resistor is defective.

2-32. RESISTOR AND LEAD ASSEMBLY.  
(See 16, figure 2-1.)

2-33. RESISTANCE TEST. Check resistance value between terminals of resistor. Resistance must measure between 19.0 and 21.0 ohms. If resistance is not within these limits, resistor and lead assembly is defective.

2-34. POTENTIOMETER.

2-35. RESISTANCE TEST. Turn potentiometer adjusting screw so that slider is against stop nearest two shorted terminals. Measure resistance of potentiometer between two outside terminals. Resistance must measure between 9 and 11 ohms. If resistance is not within these limits, potentiometer is defective.

2-36. REPAIR OR REPLACEMENT.

2-37. GENERAL. Replace any part that is cracked, bent, broken, excessively corroded, or burned. Re-

place any part that has defective threads or slots. Replace mica insulators if flaked excessively.

2-38. ADJUSTING SCREW SPRING. Replace a cracked, broken, or excessively corroded spring, or one with scored inner edges.

2-39. ARMATURE ASSEMBLY. If inspection reveals any faults, repair armature assembly as follows: Unscrew three screws (31, figure 2-4) and remove in turn from armature and diaphragm assembly (36), washers (32), washers (33), bushings (34), ferrule assembly (30), and washer (35). Replace any parts that are cracked, bent, broken, excessively corroded, or burned. If armature and diaphragm assembly (36) is faulty, replace entire armature assembly (28). Reassemble armature assembly (28) as follows: Coat screws (31) carefully with General Electric Company No. ZV-903 Purple Glyptal Lacquer. Replace washers (32 and 33) on screws (31). Position ferrule assembly (30) and washer (35) on armature and diaphragm assembly (36) so that three bushings (34) may be pressed into holes to receive screws. Make sure bushings (34) are aligned properly. Fasten armature assembly (28) together by tightening the screws (31).

NOTE

Screw in screws (31) uniformly and not too tightly, in order to prevent breakage of the



porcelain bushings. Replace the armature assembly if, after reassembly, it fails ground and continuity tests. (Refer to paragraphs 2-21 and 2-22.)

**2-40. ARMATURE PACKING SHIM.** If this shim is dented or in any way distorted, replace it.

**2-41. BASE ASSEMBLY.** Replace base assembly if any insulators are burned or cracked; if contacts are loose, bent, or broken; if terminal lugs are broken; if silver plating is worn off contacts; or if it fails the ground test. (Refer to paragraph 2-24.) If contacts are pitted, corroded, or discolored, polish them lightly with No. 0000 sandpaper.

**2-42. CONTACT PLUGS.** At every overhaul, replace carbon contact plugs that fit into armature ferrule and pile adjusting screw.

**2-43. CARBON PILE.** At every overhaul, replace carbon pile.

**2-44. CARBON PILE TUBE.** Replace a chipped, cracked, or broken tube, or one which is scored or rough on the inside.

**2-45. COIL ASSEMBLY.** Replace coil assembly if its leads are broken; if the insulation is burned, worn, or cracked; or if it fails the resistance test or test for shorted windings. (Refer to paragraphs 2-26 and 2-27.)

**2-46. LEADS.** Replace a lead if its insulation is unserviceable or if it fails the continuity test. (Refer to paragraph 2-29.) Replace a loose or broken terminal lug on lead assembly.

**2-47. RESISTOR.** Replace resistor if it appears burned, if leads are broken, or if its resistance is not within specified limits. (Refer to paragraph 2-31.)

**2-48. RESISTOR AND LEAD ASSEMBLY.** Replace this assembly if enamel is cracked, if it appears burned, or if its resistance is not within specified limits. (Refer to paragraph 2-33.)

**2-49. POTENTIOMETER.** Replace potentiometer if windings appear burned; if terminals are broken; if sliding contact is burned, bent away from the windings, or loose; or if its resistance is not within specified limits. (Refer to paragraph 2-35.)

**2-50. LUBRICATION.** No lubrication required.

**2-51. REASSEMBLY.**

**2-52. REASSEMBLY OF CARBON PILE REGULATOR ASSEMBLY.** (See figure 2-4.)

a. Screw three studs (52) into magnet case (51).  
b. Place unthreaded end of core (43) through large hole in center of end plate (39), and partially screw core into end plate. Place washers (45) on two screws (44) and assemble two screws loosely into two holes near center of end plate (39).

c. Assemble washer (46), coil assembly (47), another washer (46), spring (48), and temperature compensating ring (49) on core (43). Be sure fingers of

spring (48) will rest against magnet case (51) and against temperature compensating ring (49). Assemble all these parts as a unit into magnet case (51), allowing the four coil assembly leads to protrude from slot in magnet case.

d. Align screw holes in end plate (39) and magnet case (51). Assemble screw (40), lock washer (41), and washer (42) in hole directly opposite slot in magnet case.

e. Adjust core (43) so that it is flush with bottom of armature assembly recess of magnet case (51). (See figure 2-7.) Then tighten core locking screws (44).

f. Carefully insert free end of lead of armature assembly (28) through hole in rim of magnet case (51), from side nearest studs (52). Push approximately half of lead through hole.

g. Place magnet case and studs assembly (50) on a flat surface so that studs (52) are pointing upward. Place packing shim (37) in bottom of magnet case recess.

h. Press silver-coated end of a new contact plug (29) into ferrule of armature assembly (28). Use a clean piece of paper to protect contact plug when handling it and when pressing it into ferrule. Assemble armature assembly (28) in magnet case recess so that contact plug (29) points up. Align armature so that tip of ferrule to which red lead is fastened lies at approximately 130 degrees from lead hole in magnet case rim. (See figure 2-8.)

i. Slide carbon pile tube (21) into carbon pile housing (24) and fasten two clips (23) to housing with screws (22).

j. Thread adjusting screw (8) into adjusting screw plate (10). If screw sticks or jams during assembly, correct condition by cleaning any possible metal particles from screw threads with a scribe or knife point. Pencil lead rubbed on threads will act as a lubricant to prevent seizure. Assemble adjusting screw spring (16) tightly on threads of adjusting screw. Then back off spring just until holes in spring line up with holes in plate. This position will provide minimum locking effect of spring. Additional locking effect can be obtained by backing off spring an additional one-third turn.

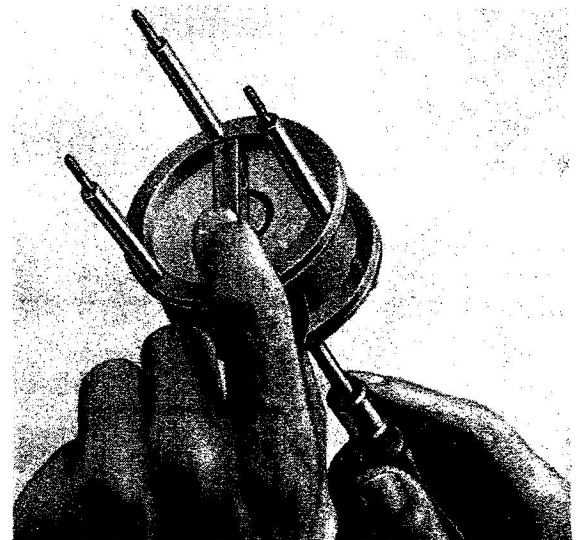


Figure 2-7. Aligning Core Flush with Magnet Case

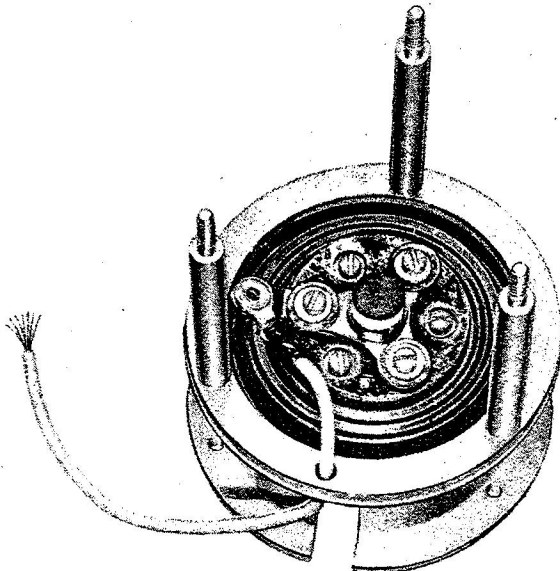


Figure 2-8. Alignment of Armature Assembly in Magnet Case

k. Mount assembled parts on adjusting screw bracket (17), securing them in place with three screws (14 and 15) and lock washers (13). Assemble longest screw (14) opposite the boss on bracket. Heads of the three screws must be on inside of bracket. Loosely assemble lock washer (12) and nut (11) on screw (14).

l. Make sure that adjusting screw (8) can be turned readily with a screwdriver, but that there is enough resistance to its movement to prevent accidents, such as jarring of regulator, from changing any set position. Then remove adjusting screw (8).

m. Place insulator (19) over carbon pile tube (21), clip (23), and screw (22), so that entire surface of insulator contacts carbon pile housing (24). Fit bushings (18) into holes of insulator (19). Make certain they are flush with carbon pile housing (24).

n. Position adjusting screw bracket assembly (2) on insulator (19) so that bushings (18) fit through mounting holes in bracket. Assemble a lock washer (4), washer (5), and washer (6) on each of two screws (3). Secure adjusting screw bracket assembly (2) to carbon pile housing (24), by tightening screws (3) into housing, making certain that they pass through bushings (18).

#### CAUTION

Bushings (18) must be fully seated and flush with carbon pile housing (24), or they will crack.

o. Test adjusting screw bracket assembly (2) for possible grounded condition. Touch one terminal of a 110-volt a-c series test lamp circuit to bracket and touch other terminal to carbon pile housing (24). If lamp lights, insulators of adjusting screw bracket assembly (2) are defective and must be replaced.

p. Assemble carbon pile housing (24) on magnet case studs (52) so that lead connection screw (14) is on same side of regulator as slot in magnet case (51).

Secure carbon pile housing (24) to stud (52) located directly opposite screw (14), using washer (27), lock washer (26), and nut (25).

#### NOTE

Carbon pile (20), adjusting screw assembly (7), and adjusting screw cover (1) will be replaced after reassembly of main assembly. (Refer to paragraph 2-53 r to u inclusive.)

#### 2-53. REASSEMBLY OF MAIN ASSEMBLY.

(See figure 2-1.)

a. Insert adjusting nut assembly (14) through hole in top of bracket and clip assembly (15). Thrust shaft of potentiometer assembly (9) through washer (13) and washer (11), and then through hole in bottom of bracket and clip assembly (15). Assemble second washer (11) on shaft of potentiometer assembly (9). Be sure flanged side of washers (11) fits into hole in bracket and clip assembly (9). Assemble washer (12) and nut (10) on shaft of potentiometer assembly (9). Insert shaft into recess at end of adjusting nut assembly (14). Thread nut (10) onto shaft and pin stake it in place.

b. Touch one terminal of a 110-volt a-c series test lamp circuit to a terminal contact of potentiometer assembly (9), and touch other terminal to bracket and clip assembly (15). If lamp lights, disassemble potentiometer and adjusting nut assembly (6) and replace all insulators.

c. Slip sleeving (24) over resistor (23) and fit remaining sleeving (25) over one of two bare wires extending from resistor.

d. Place screw (20) through hole in base assembly (30). Assemble following items on screw (20) in order given: Washer (19), washer (18), resistor and lead assembly (16), washer (18), and nut (17). The depressed center of each washer (18) should point toward resistor (21). Assemble resistor and lead assembly (16) so that terminal having lead (22) attached is nearer mounting hole in base assembly (30). Terminals of resistor (21) should point toward terminal lugs on base assembly (30) and should be parallel to bottom of base assembly. Tighten nut (17) and flood solder it to screw (20).

#### NOTE

In all cases where soldering of electrical connections is necessary, use solder composed of 33 per cent tin and 67 percent lead, conforming to Federal Specification No. QQ-S-571. Use rosin as a flux, and clean all soldered connections with alcohol to prevent corrosion.

e. Touch one terminal of a 110-volt a-c series test lamp circuit to screw (20) or nut (17). Touch other terminal, in turn, to each of two terminals of resistor (21). Make certain that free end of lead (22) is not touching anything. If test lamp lights, resistor is defective and must be replaced.

f. Solder unattached red lead assembly (26) and sleeved wire from resistor (23) to contact of "A" terminal lug of base assembly (30). (See figure 2-9.)

g. Position potentiometer and adjusting nut assembly (6) on base assembly (30) so that mounting holes



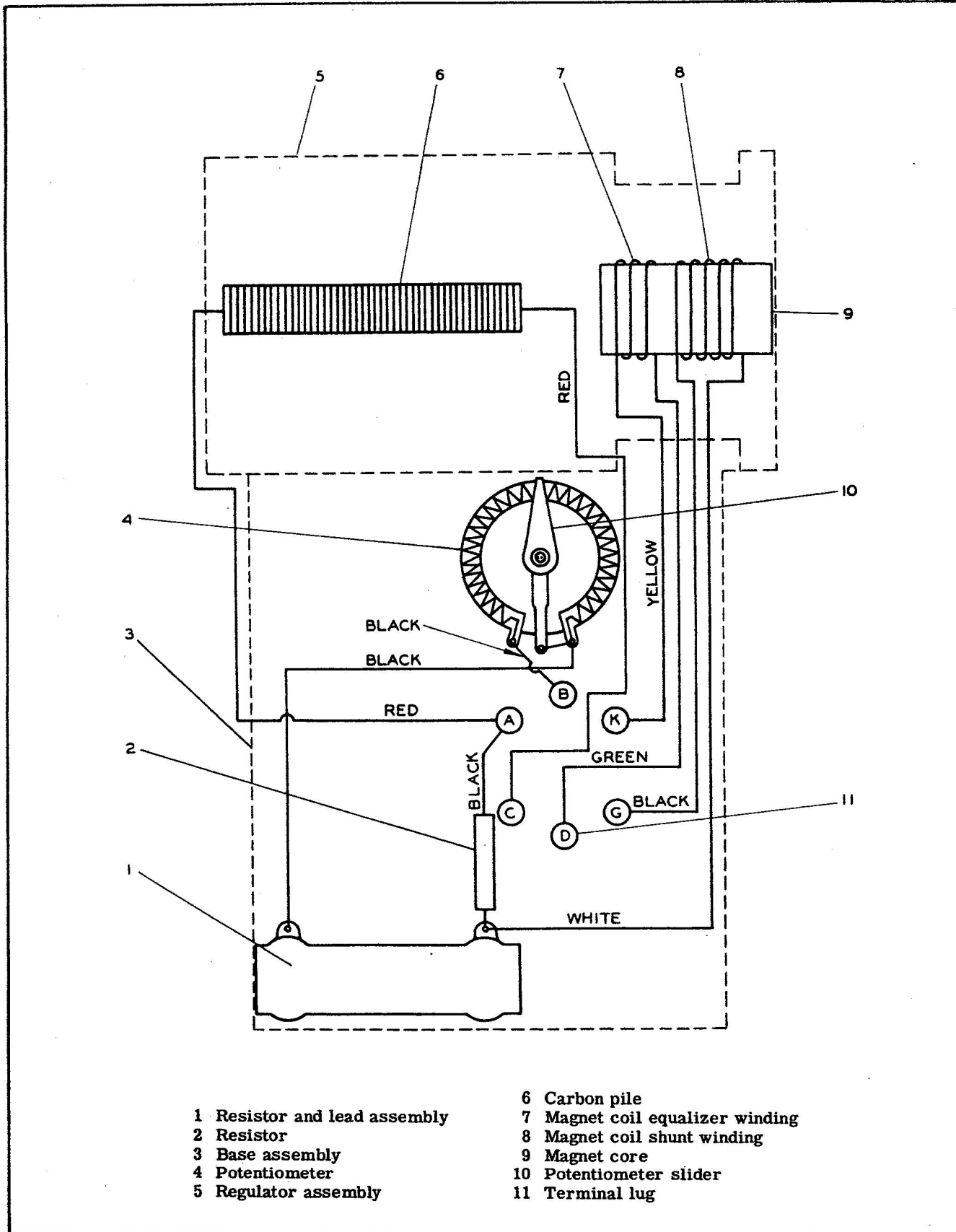


Figure 2-9. Schematic Internal Connection Diagram

in bracket and clip assembly (15) line up with those in base assembly, and terminals of potentiometer assembly (9) point toward terminal lugs of base assembly.

h. Hold base assembly (30) so that terminal of potentiometer assembly (9) located directly over "K" terminal lug of base assembly is on the left. Thread bare end of lead (22) through center terminal and to left terminal of potentiometer assembly (9). Solder lead (22) to these two terminals. (See figure 2-9.)

i. Solder one end of short black lead (29) to contact of "B" terminal lug of base assembly (30). Solder other end of this lead to remaining free terminal of potentiometer assembly (9). (See figure 2-9.)

j. Position carbon pile regulator assembly (1) directly over base assembly (30), so that carbon pile tube (21, figure 2-4) is parallel to resistor (21, figure 2-1) and slot in magnet case (51, figure 2-4) is adjacent to and facing base assembly (30, figure 2-1).

k. Solder end of bare wire from resistor (23) and end of white lead of coil assembly (47, figure 2-4) to remaining free terminal of resistor and lead assembly (16, figure 2-1).

l. Solder end of red lead from armature assembly (28, figure 2-4), which extends through hole in magnet case rim, to contact of "C" terminal lug on base assembly (30, figure 2-1). (See figure 2-9.)

m. Solder remaining magnet coil leads to contacts of terminal lugs of base assembly (30), as shown in figure 2-9.

n. Mount carbon pile regulator assembly (1) in base assembly (30) by inserting ends of two unsecured studs in two mounting holes in side of base assembly. The carbon pile housing should be above resistor and lead assembly (16).

o. Line up two remaining mounting holes in side of base assembly (30) with two remaining holes through end plate (39, figure 2-4) and magnet case (51). Assemble lock washer (3, figure 2-1) and washer (4) on each of two screws (5), and insert screws into holes and securely tighten them. Assemble and secure a washer (4), lock washer (3), and nut (2) on each of two studs protruding through base assembly (30).

p. Insert a screw (8) into each of two potentiometer mounting holes in base assembly (30) and through mounting holes in bracket and clip assembly (15). Assemble and tighten a nut (7) on each screw (8).

#### NOTE

Terminals of potentiometer (9) must not touch contacts of terminal lugs of base assembly (30). If they do, or if clearance is small, carefully bend terminals of potentiometer upward until a safe clearance is obtained.

q. Remove nut (11, figure 2-4) and lock washer (12). Attach lug (28, figure 2-1) of red lead assembly (26) to long screw (14, figure 2-4) with lock washer (12) and nut (11).

r. Press silver-coated end of a new contact plug (9, figure 2-4) into adjusting screw (8). Use a clean

piece of paper to protect contact plug when handling it and when pressing it into adjusting screw.

s. Assemble a new carbon pile (20, figure 2-4) into pile tube (21), as follows: Slide a rod (less than 2/16-inch in diameter) through pile while it is still in its container. (See figure 2-10.) Then invert container and allow carbon discs to slide out onto rod. Hold carbon pile regulator assembly so that tube axis is horizontal and insert rod carrying discs through adjusting screw bracket and into tube. (See figure 2-3.) Turn housing to a vertical position so that discs can fall off rod and into tube. (See figure 2-11.) Carefully remove rod from tube.

t. Immediately screw pile adjusting screw assembly (7, figure 2-4) into adjusting screw bracket assembly (2) so that carbon discs cannot fall out of tube. Tighten adjusting screw slowly until resistance to further turning is felt.

u. Slip adjusting screw cover (1, figure 2-4) over pile adjusting screw (8).

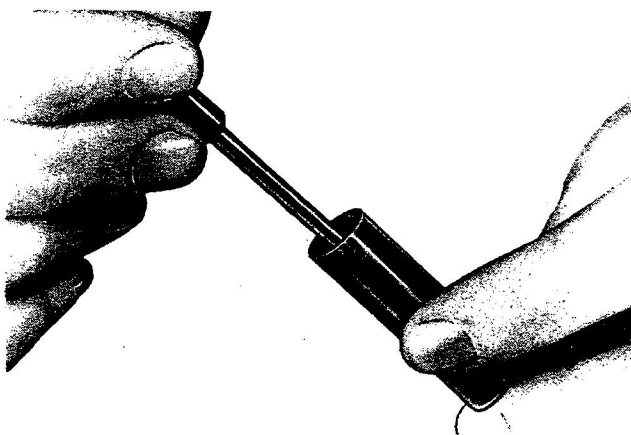


Figure 2-10. Inserting Thin Rod Into Pile Container

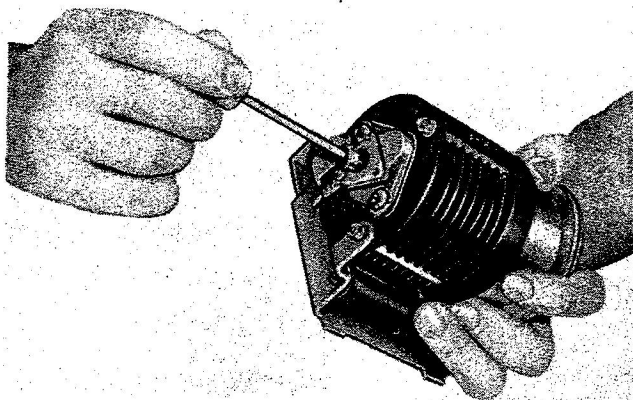


Figure 2-11. Assembling Pile Into Regulator

## SECTION III

## TEST PROCEDURE

## 3-1. GENERAL.

3-2. If there is any evidence of unsatisfactory operation during the test procedure, discontinue the test immediately and make a thorough check for the sources of trouble. Do not continue the test procedure until the trouble has been located and remedied. Repeat the overhaul procedure if the regulator cannot be adjusted.

## 3-3. TEST EQUIPMENT. (See figure 3-1.)

3-4. GENERATOR. Use generator, Eclipse-Pioneer type 1273. (Refer to table II.) If this generator is not available, use a generator of the type normally installed with the regulator.

3-5. GENERATOR TEST STAND. Use a U. S. Vari-drive Aero Test Stand in driving the generator during the adjustment and test of the regulator.

3-6. CABLE SIZE. Use Awg. size 12 cable for all circuits, as shown in figure 3-1, except those designated by heavy black lines, for which use Awg. size 8.

3-7. LOADBANK. Use a load bank that has graduated load steps and a continuous rating at least equal to the full load rating of the test generator.

3-8. MOUNTING BASE. Use the Eclipse-Pioneer type 1305 mounting base assembly or equivalent. If the Army Base No. 40D8445 is used, modify it by removing the strap between the terminals "B" and "C" and connecting a lead between terminal "C" and the point to which the lead from terminal "B" is connected.

3-9. INSTRUMENTS. Use a d-c load ammeter without an internal shunt so that it may be used with a suitable external shunt for a wide range of applications. Make certain that the millivolt-drop rating of the ammeter and shunt correspond, and use calibrated shunt leads. Connect a voltmeter, as shown in figure 3-1, directly to the "B" and "G" terminals of Army Base No. 40D8445 or, if the type 1305 base is used, to the "G+" and "L-" terminals. Do not connect the voltmeter to the load cables, since even a slight voltage drop in these cables will prevent obtaining the proper regulator setting.

3-10. EARPHONES. Use a pair of earphones when testing the regulator to detect instability. Connect a 2-microfarad condenser in series with the earphones to prevent damage to the earphones and interference with regulator operation. Listen intently to the sounds in the earphones as the regulator is adjusted and tested. A stable regulator produces a humming noise or steady roar. A rapid series of popping noises indicates instability. Never operate the regulator in an unstable

condition, since instability causes arcing between the discs of the carbon pile, resulting in burned or pitted discs and plugs. If the regulator becomes unstable during any part of the test adjustment procedure, screw the pile adjusting screw counterclockwise immediately until stability is obtained.

## NOTE

Do not confuse the single thud heard each time the generator load is changed with instability since the noise will occur with stable voltage regulators.

## 3-11. PREPARATION OF TEST EQUIPMENT.

- a. Mount the generator on the test stand.
- b. Place the mounting base on a table as close to the generator as possible, so that when the regulator is fitted into the base, the carbon pile will be horizontal.

## NOTE

Arrange the equipment so that the lengths of all leads are kept at a minimum.

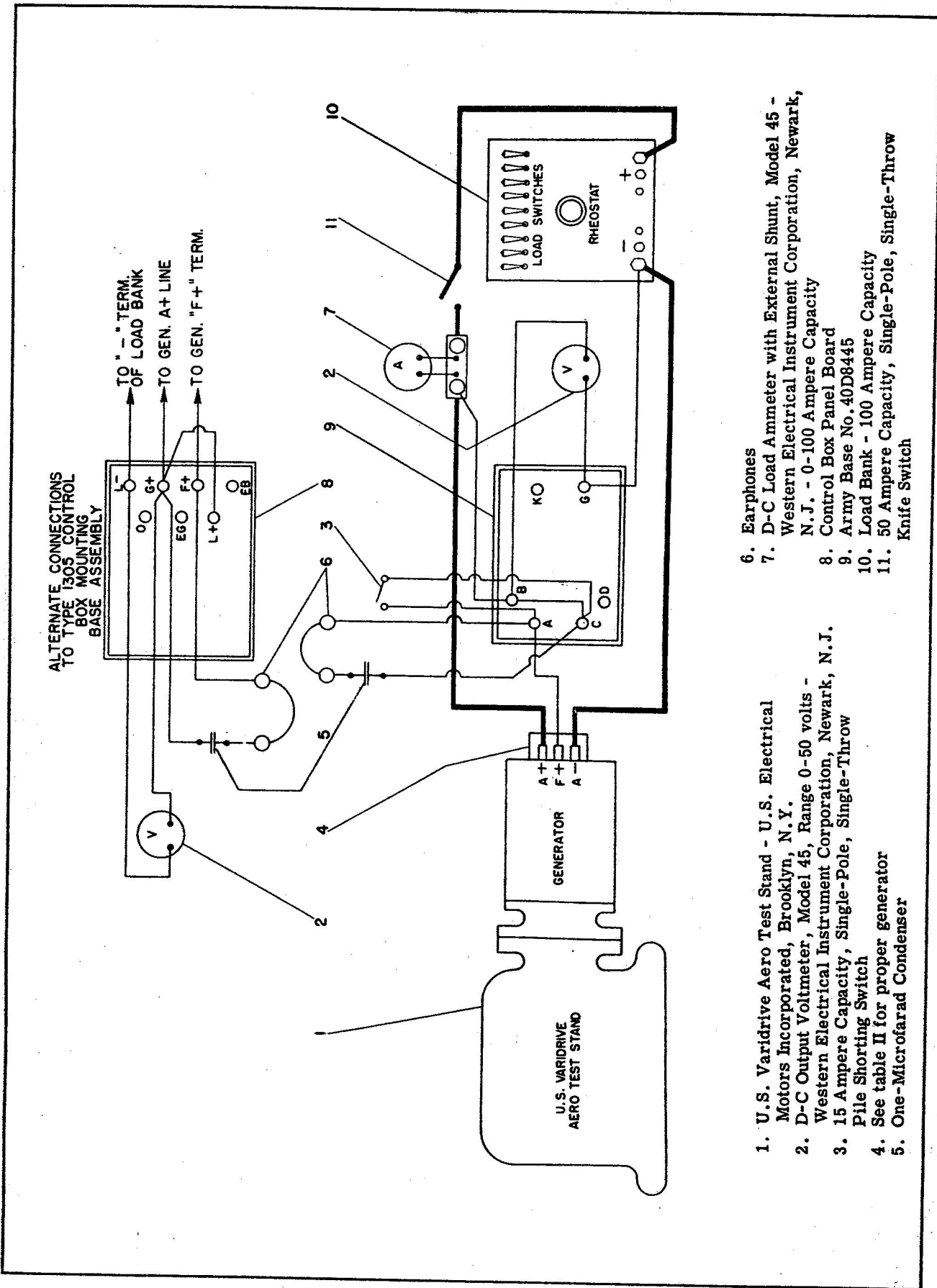
- c. Snap the regulator into the base.
- d. Remove the cover (1, figure 2-4) from the pile adjusting screw.
- e. Using the equipment shown in figure 3-1, complete all electrical connections as shown.

## 3-12. ADJUSTMENT PROCEDURE.

3-13. PRIOR TO OPERATION OF GENERATOR. With the core (43, figure 2-4) adjusted flush with the inside face of the magnet case (51) and the adjusting screw (8) loose, turn the slider arm of the potentiometer (9, figure 2-1) as far as it will go in a clockwise direction. Mount the regulator in the test set-up shown in figure 3-1.

## 3-14. WITH GENERATOR IN OPERATION.

- a. Operate the generator at 3000 rpm, no-load.
- b. Slowly turn the pile adjusting screw inward (clockwise). As the pile adjusting screw is tightened the regulated voltage will rise to a maximum point and then decrease. (See figure 3-2.)
- c. When the regulated voltage has dropped about 1 volt from the maximum, adjust the core to obtain 30 volts regulated output. Turning the core counterclockwise (out) will increase the output voltage. Apply and remove full load several times. The output voltage should dip and return to the no-load reading. If it fails to do so, continue to shock-load the regulator and adjust the pile adjusting screw until the point of best regulation is obtained. Then reduce the output voltage to 28.0 volts by turning the slider arm of the potentiometer counterclockwise.



- 1. U.S. Varidrive Aero Test Stand - U.S. Electrical Motors Incorporated, Brooklyn, N.Y.
- 2. D-C Output Voltmeter, Model 45, Range 0-50 volts - Western Electrical Instrument Corporation, Newark, N.J.
- 3. 15 Ampere Capacity, Single-Pole, Single-Throw Knife Switch
- 4. See table II for proper generator
- 5. One-Microfarad Condenser
- 6. Earphones
- 7. D-C Load Ammeter with External Shunt, Model 45 - Western Electrical Instrument Corporation, Newark, N.J. - 0-100 Ampere Capacity
- 8. Control Box Panel Board
- 9. Army Base No. 40D8445
- 10. Load Bank - 100 Ampere Capacity
- 11. 50 Ampere Capacity, Single-Pole, Single-Throw Knife Switch

Figure 3-1. Schematic Test Diagram

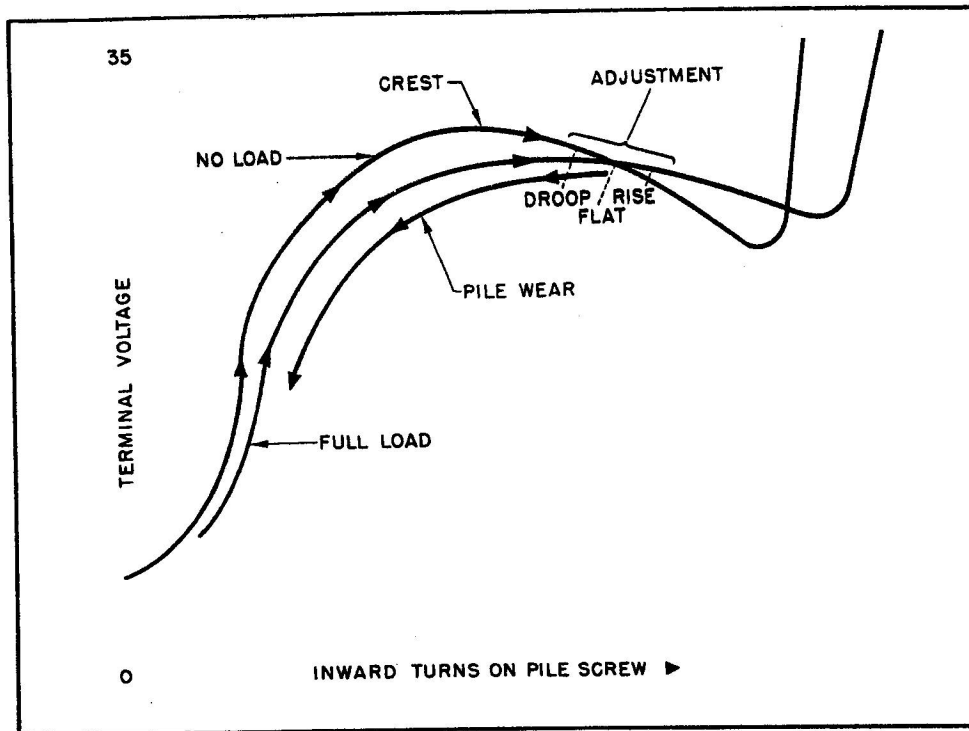


Figure 3-2. Operating Curve

d. Remove all load. Connect a voltmeter across the pile (terminals "A" and "C" on the Army base, or "F+" and "G+" on type 1305 base) and decrease the generator speed until the voltmeter reads 14.0 volts. Then, with the generator at this reduced speed, heat the regulator for 30 minutes. This condition of operation will assure the maximum heating of the regulator.

e. Immediately after the heat run, operate the generator at 2500 rpm, disconnect the voltmeter from across the pile, and close and open the pile shorting switch slowly five or six times to flex the armature and diaphragm assembly. Make the final adjustments by adjusting the pile screw in small increments and performing the regulation run shown in table II until the regulation is approximately flat. The regulator must show no signs of instability at any time. Adjust the core to obtain 28.0 volts. Then repeat the regulation run shown in table II and check for flat regulation. Make the pile screw and core adjustments alternately until flat regulation is obtained at 28.0 volts.

f. Immediately after the heat run and final adjustment, check the operation of the regulator over the entire speed and load range of the generator. Then cool the regulator to room temperature and repeat the tests. Table II indicates the generator speeds and loads at which voltmeter readings should be taken, and also indicates the order of testing. During the entire procedure, the difference between the maximum and minimum voltage obtained must not exceed 1.4 volts. The maximum voltage obtained must not exceed 28.7 volts. If the voltage falls outside these limits, overhaul the regulator again and repeat the entire test procedure.

### 3-15. FINAL ASSEMBLY.

3-16. After the regulator has been removed from the mounting base, safety wire the core locking screws without upsetting the adjustment of the core, and replace the cover over the pile adjusting screw. The regulator is now ready for installation in the airplane.

TABLE II  
REGULATION TEST

| Type 1042-17-A<br>Using Generator, Eclipse-Pioneer Type 1273 |                       |
|--|-----------------------|
| LOAD CURRENT   | GENERATOR SPEED (RPM) |
| No-Load<br>Half-Load<br>Full-Load<br>No-Load                 | 2000                  |
| No-Load<br>Half-Load<br>Full-Load<br>No-Load                 | 3000                  |
| No-Load<br>Half-Load<br>Full-Load                            | 4000                  |
| Full-Load<br>No-Load<br>No-Load                              | 2000<br>2000<br>4000  |

