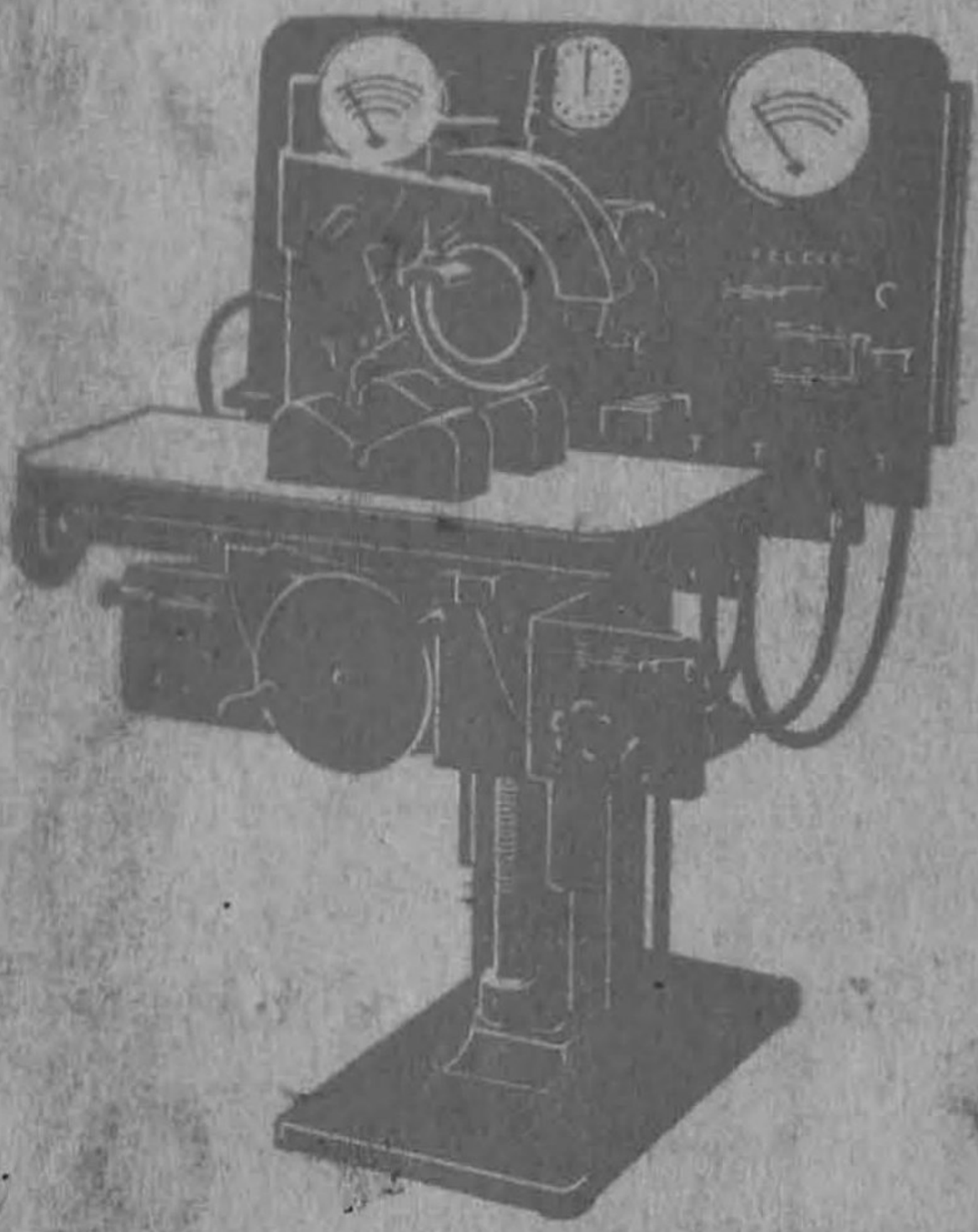
OPERATING MANUAL

WEIDENHOFF

MODELS 500 and 501

GENERATOR TEST BENCH



AUTOMOTIVE SERVICE EQUIPMENT AVIATION
WEIDENHOFF

JOSEPH WEIDENHOFF, INC.,
CHICAGO 24, ILL.

SPECIFICATIONS

Model 501 Master Cyclone Test Bench

1. **Motor:** Maximum h.p. developed, 7.1. Intermittent duty rating: 5 h.p. developed on transmission output shaft at 1150 r.p.m. in low gear (ratio 22:36) or at 2100 r.p.m. in high gear (ratio 31:17). Testing generators by belt drive, with 2:1 pulley ratio, peak h.p. is reached at generator speed of 2300 r.p.m. in low gear, at 4200 r.p.m. in high gear. Testing generators directly coupled to transmission output shaft, 5 h.p. or more is available for generator speeds of 450 to 4050 r.p.m. Testing belt driven with 2:1 pulley ratio, 5 h.p. or more is available for speeds of 900 to 8100 r.p.m. Directly coupled 3 h.p. or more is available for speeds of 300 to 5800 r.p.m. belt driven with 2:1 pulley ratio for speeds of 600 to 11,600 r.p.m. Motor four pole brush shifting type for 220 volt, 60 cycle, 1 phase A.C.

2. **Transmission:** Specially designed for this test bench. Cast integrally with drive end housing of motor. Gears shifted by self-locking lever mounted on side of case, easily accessible. Neutral position provided, also large ball bearings lubricated by oil bath.

3. **Speed Control:** Motor brushes shifted to control speed. Shift lever located above transmission in front of panel.

4. **Chasis:** Entire assembly supported by heavy cast iron pedestal. Movable table raised and lowered by screw control on accurately machined "V" ways with gib to adjust for wear. Horizontal movement of table top controlled by lead screw.

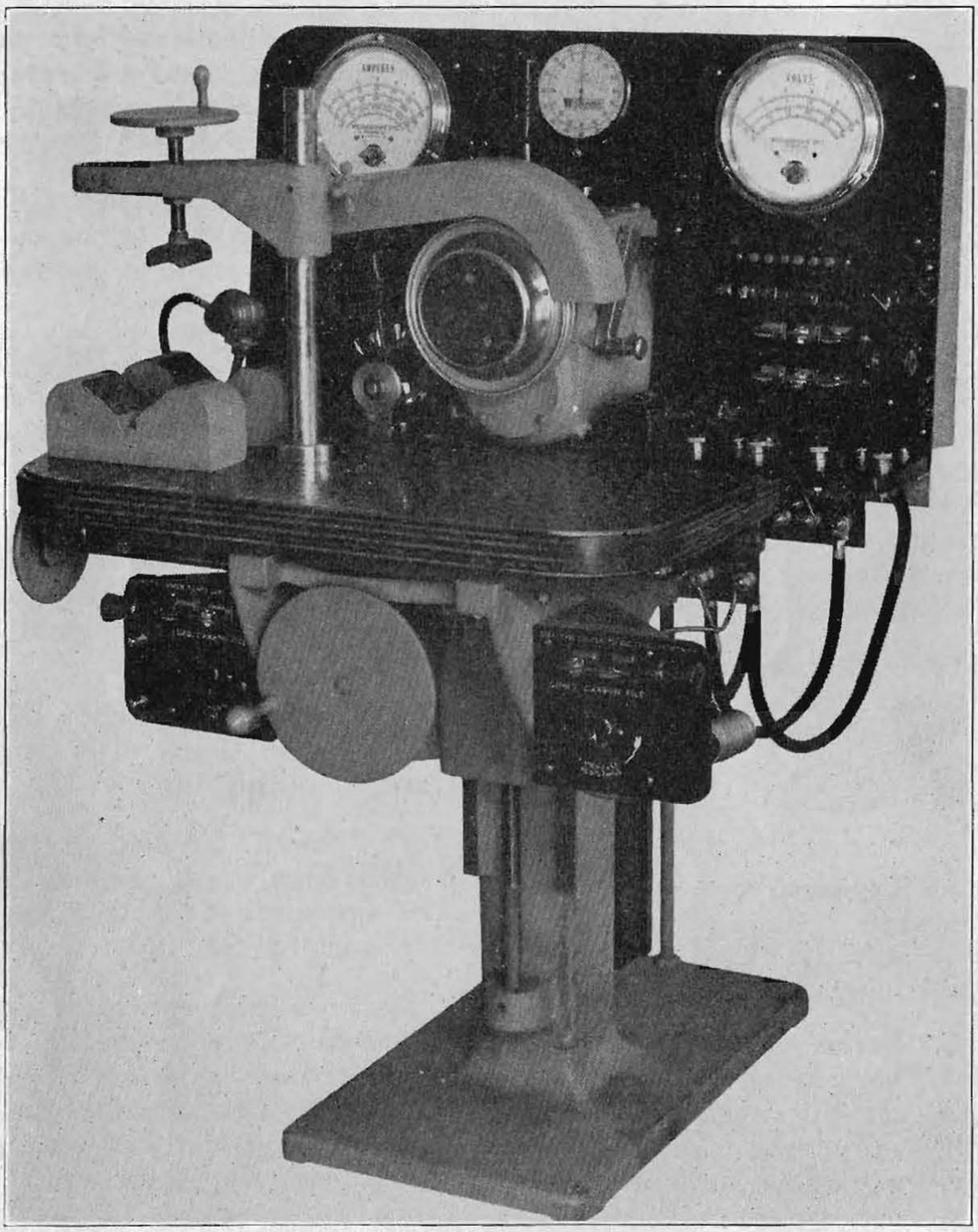
5. **Bench Top:** 1½-inch ply die stock, first quality hardwood. Steel upper plate protects table top and contains dowel pin holes for aligning "V" blocks.

6. **Mounting:** Clamp arm holds generators and starters up to 10 inch diameter in "V" blocks for testing. 1½-inch cold rolled steel post supports clamp arm. Two rows of dowel pin holes are used: one for mounting for direct drive, the other for belt drive.

7. **Drive:** Generators tested both directly coupled to output shaft of transmission or by belt drive. Direct coupling is made with a self-centering "dog" which clamps on generator armature shaft. Belt driven generators are tested by means of a pulley permanently mounted on output shaft of transmission.

Two pulleys with demountable hubs furnished for mounting on generator shafts not equipped with pulley for testing belt driven if desired. Large pulley 7.4 inch pitch diameter for "B" section belt, small 3.6 inch pitch diameter. Nine assorted pulley hubs are furnished for mounting pulleys on generator shafts not equipped with pulleys. Special adapters can easily be made by purchaser at small cost.

8. **Tachometer Coupling:** Coupling connects tachometer cable to generator shaft, showing true generator speed. Contact with shaft is made by sponge rubber disc held in cup adapter. Tension by coil spring. Unit is self-centering;



Model 501 Master CYCLONE Test Bench

no cumbersome adjustment. When testing generators directly coupled to transmission output shaft, tachometer cable is driven by an endless belt. Take-off is from transmission output shaft.

9. **Motor Switch:** Start stop switch integral with speed control lever.

10. **Panel:** Constructed of heavy "Masonite", with screened lettering and decorations. Modern design.

11. **Voltmeters:** D'Arsonval heavy-duty, jewel or glass bearing type with knife-edge pointer. Meter face, 7 inch diameter; bezel 8½ inch diameter. Calibrated 0-10 volts in 1/10 volt graduations, 0-20 volts in 1/5 volt graduations and 0-50 volts in 1/2 volt graduations. Metal, non-warping dial.

12. **Ammeter:** D'Arsonval heavy-duty, jewel-bearing type with knife-edge pointer. Meter face and bezel same diameter to match voltmeter. Calibrated 2-0-10 amps. in 1/5 amp. graduations, 10-0-50 amps. in 1 amp. graduations, 40-0-200 amps, in 4 amp. graduations and 200-0-1000 amps. in 20 amp. graduations. Metal, non-warping dial.

13. **Tachometer:** 5 inch face, calibrated 0-8000 r.p.m. Right and left rotation. Zero adjustment provided. Flexible cable drive. Indicates actual generator speeds. Metal, non-warping dial.

14. **Series Test Lamp:** Mounted back of panel. Ruby lens in panel illuminated when lamp burns. Telephone jack with test prods furnished to plug into panel for tests.

15. **Terminal Connections:** Six screw-type binding posts. All plainly marked for making proper connections.

16. **Series Carbon Pile Rheostat:** For placing variable resistance in series with generator. With load carbon pile rheostat provides load on generator without need of batteries. With series carbon pile it is possible to apply gradual voltage for starting motor tests or exact voltage desired at starting motor terminal. Heavy-duty carbons used in construction. Ruggedly built.

17. **Load Carbon Pile Rheostat:** Places load across batteries to simulate low-voltage conditions. Also used with Series Carbon Pile Rheostat.

18. **Field Control Rheostat:** For adjusting field current for manual control of generator on test at all speeds. Field circuit protected by overload relay to prevent damage by overload to ammeter and rheostat.

19. **Voltage Selector Switch:** Four positions to select proper voltage for unit being tested—6, 12, 24, and 32 volts.

20. **Series Carbon Pile Rheostate Switch:** Single pole single throw, 100 ampere constant duty rating for connecting series carbon pile in or out of circuit.

21. **Load Carbon Pile Rheostat Switch:** Single pole, single throw, 100 ampere constant duty rating.

22. **Polarity Switch:** Double pole, double throw, 100 ampere constant duty rating.

23. **Field Circuit Selector Switch:** Single pole, double throw, 35 amp. constant duty rating for mechanical strength.

24. **Voltmeter Scale Selector Switches:** Six push button type. For selecting proper scale and polarity—10, 20, 50 volts, positive or negative ground. Has six pilot lights, indicating scale selected; 3 green for negative, 3 red for positive.

25. **Ammeter Scale Selector Switches:** Eight push button type. For selecting proper scale and polarity—1000, 200, 50, 10 amps. positive or negative ground. Has eight pilot lights, indicating scale selected; 4 green for negative, 4 red for positive.

26. **Shunts:** Laminated "Manganin" for 1000 and 200 amps. scales. Other shunts, strip or wire "Manganin", mounted on back of panel.

27. **Starter Test:** Starter test by special binding post which automatically places the 1000 amp. meter shunt in circuit. Starter voltage and current may be controlled by carbon rheostat to obtain correct values.

28. **Leads:** Two sets furnished, one for starter and high output generators, one for standard generators and regulators.

29. **Voltage Regulator Mounting Bracket:** Universal bracket furnished as standard equipment. Adjustable for testing regulators in vertical or horizontal position or at points between.

30. **Net Weight:** Approximately 1000 net or 1200 pounds domestic shipping weight.

Operating Manual

WEIDENHOFF

Models 500 and 501

GENERATOR TEST BENCH

First Edition

(Issued November 1943)

PRICE $1.00

JOSEPH WEIDENHOFF, INC., CHICAGO, ILLINOIS

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Preface

The Weidenhoff Models 500 and 501 Series Test Benches are skillfully designed, engineered and constructed of the best material obtainable and it is therefore, suggested that the purchaser read this operating manual carefully in order to become thoroughly acquainted with all of the operating details of the bench. In this way, the purchaser will get the utmost service and uniformly consistent good results over long periods of operation.

With this test bench generators can be driven under loads at speeds in excess of actual operation on a motor vehicle. This provides a factor of safety which guarantees proper performance when the generator is again installed on the engine. Everything possible has been done to make the work of testing electrical units as simple as possible in order to eliminate the chance of human error.

For example, the simplified method of connecting to the generator under test eliminates repeated reference to a manual. Testing is purely mechanical and once the operator becomes familiar with the panel units and switches, the "electrical" results are easily understood.

AUTOMOTIVE SERVICE WEIDENHOFF EQUIPMENT AVIATION

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OPERATING MANUAL

WEIDENHOFF

MODELS 500 & 501

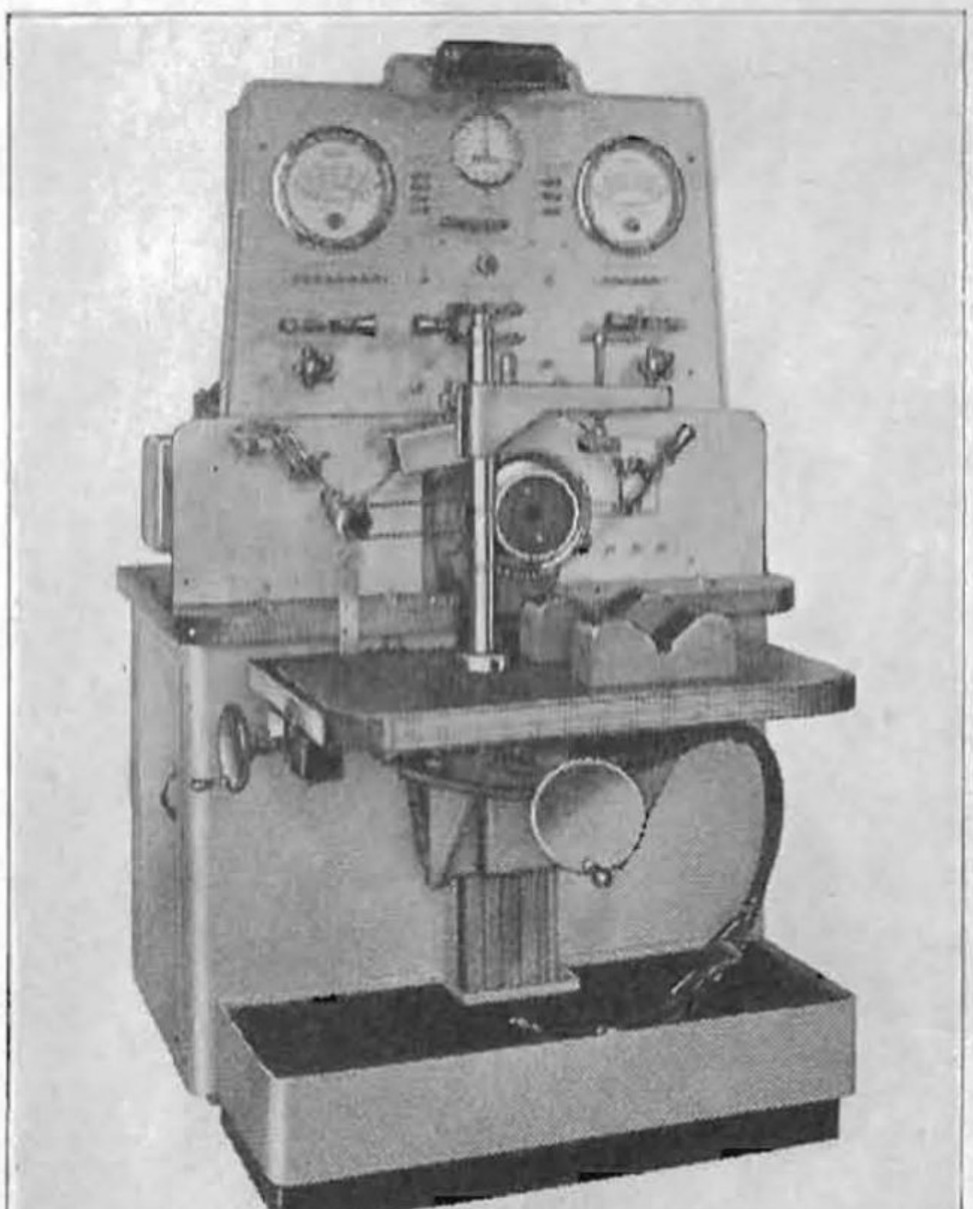
GENERATOR TEST BENCH

SECTION 1

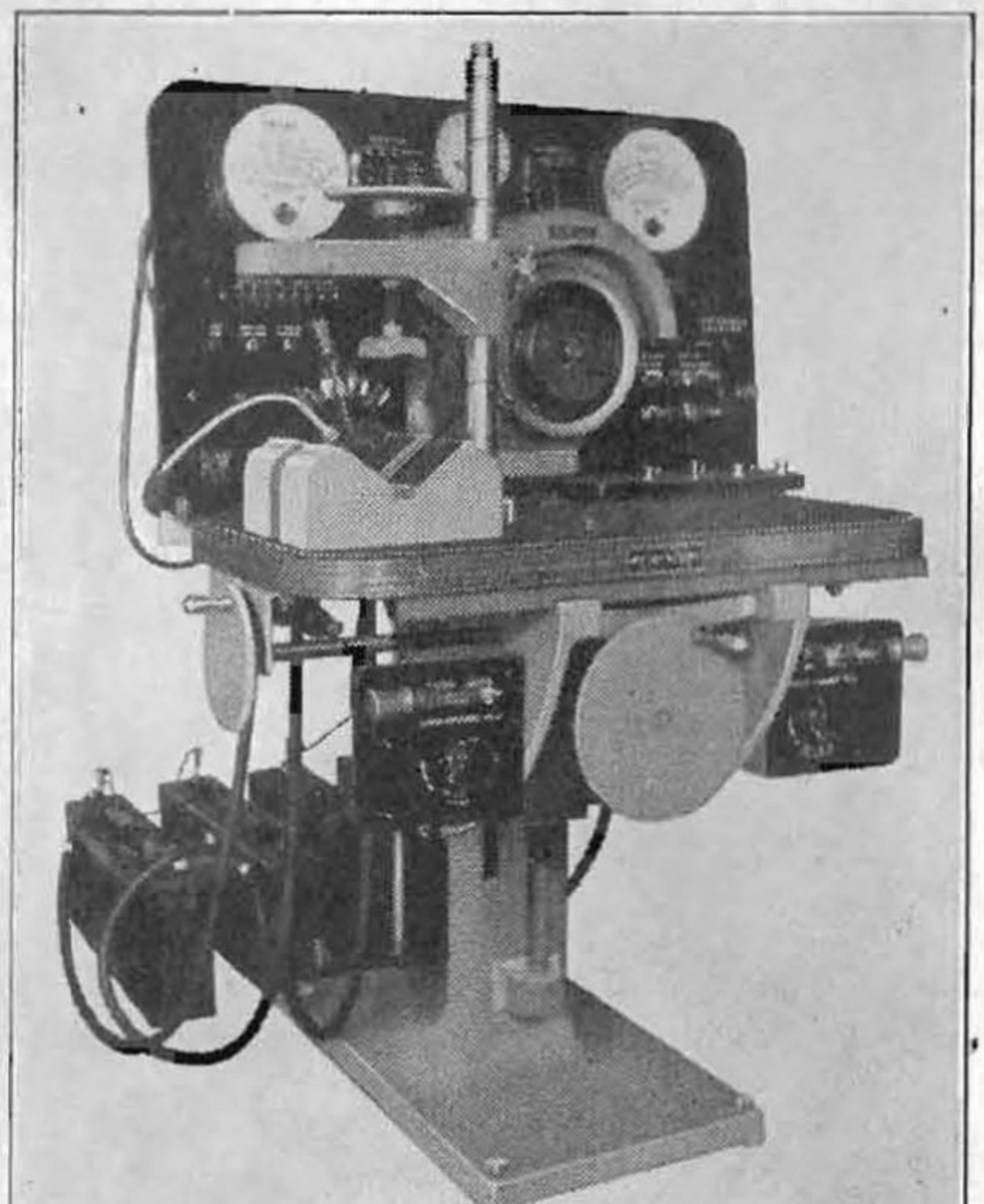
General Description

The Model 500 & 501 Test Benches have been engineered and built to test completely and correctly all types and models of generators up to the limit of the capacity of the motor. Tests and adjustments on voltage regulators and current regulators are made easily. Other units like starting motors and magnetos (special adapter required) also can be tested and adjusted.

In testing generators it is well for the operator to bear in mind that the test bench actually represents the motor vehicle's wiring and a generator and regulator connected to the bench terminals are hooked up exactly as they would be on a motor vehicle. This



MODEL 500 TEST BENCH



MODEL 501 TEST BENCH

Weidenhoff Model 500 Test Bench

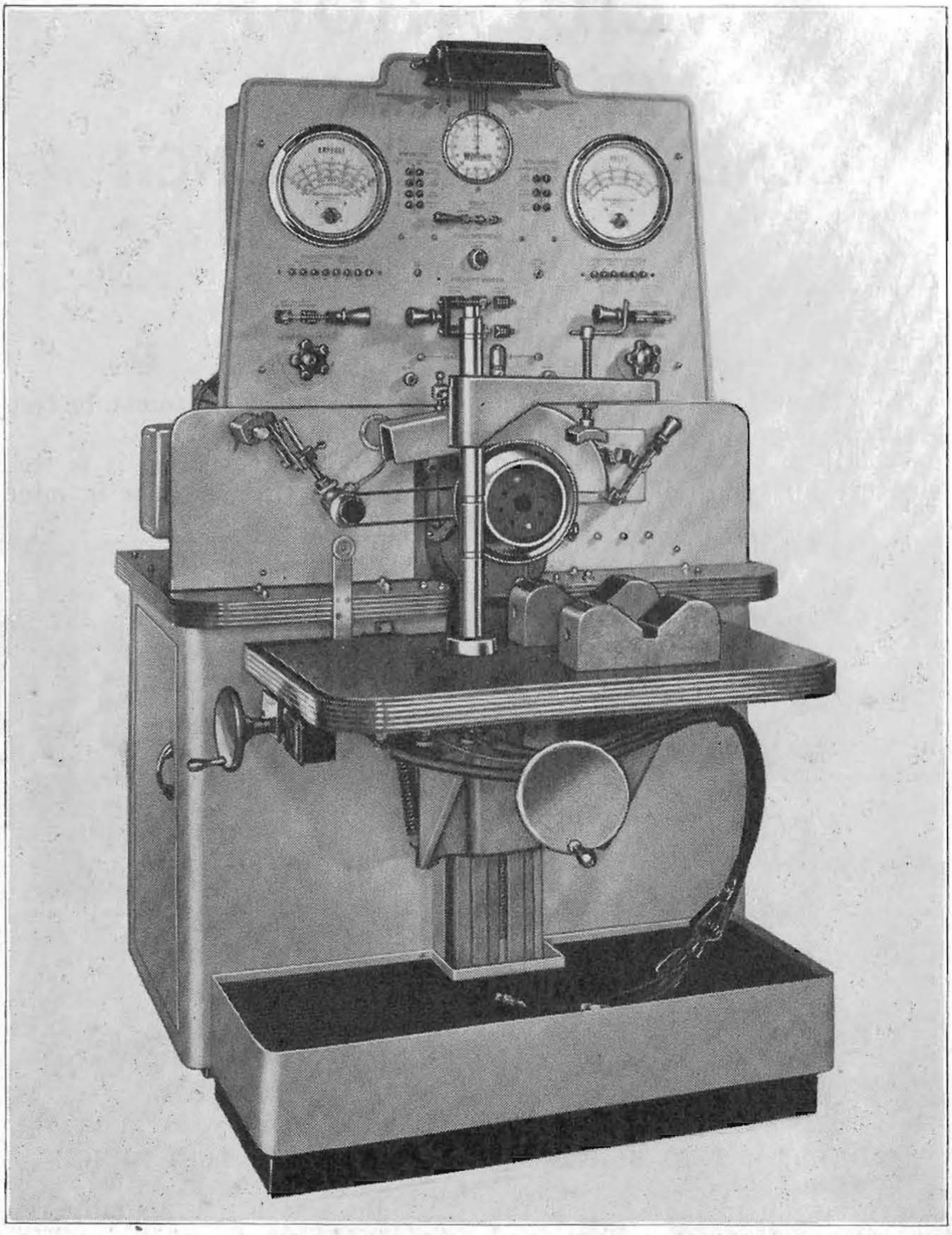


Fig. 1—The Model 500 Weidenhoff Generator Test Bench, illustrated above, differs in general appearance from the Model 501 test bench, but units like ammeter, voltmeter, switches, carbon piles, etc., are identical. For all practical purposes, tests are made exactly alike on either bench.

greatly simplifies the testing procedure.

Either the Model 500 or 501 bench combines power for testing the largest truck, bus and aircraft generators, with high speed available for testing smaller modern

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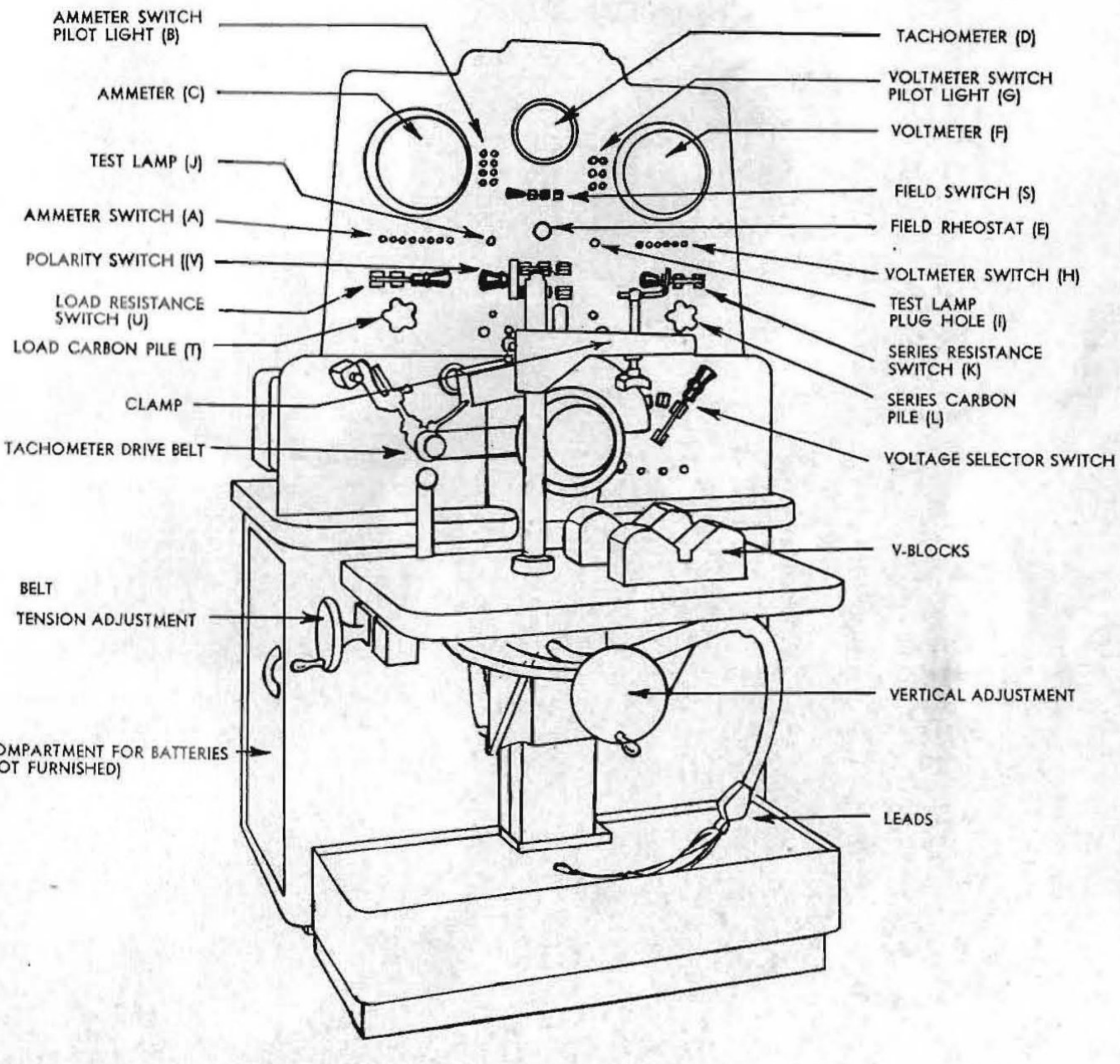

Fig. 2—Explanatory diagram for identifying the various parts of the Model 500 test bench.

passenger car types.

Heavy-duty generator characteristics vary over a broad range. Those of large diameters operate at low speeds. Power for driving them in testing, therefore, must be available at these low speeds. The smaller diameter heavy-duty units operate at fairly high speeds and driving power for this type must be available at a higher speed. To meet this demand the two-speed transmission of the Model 500 and 501 benches provide maximum power at the speeds needed.

Voltage regulators, current regulators and relays are quickly tested and easily adjusted.

Weidenhoff Model 501 Test Bench

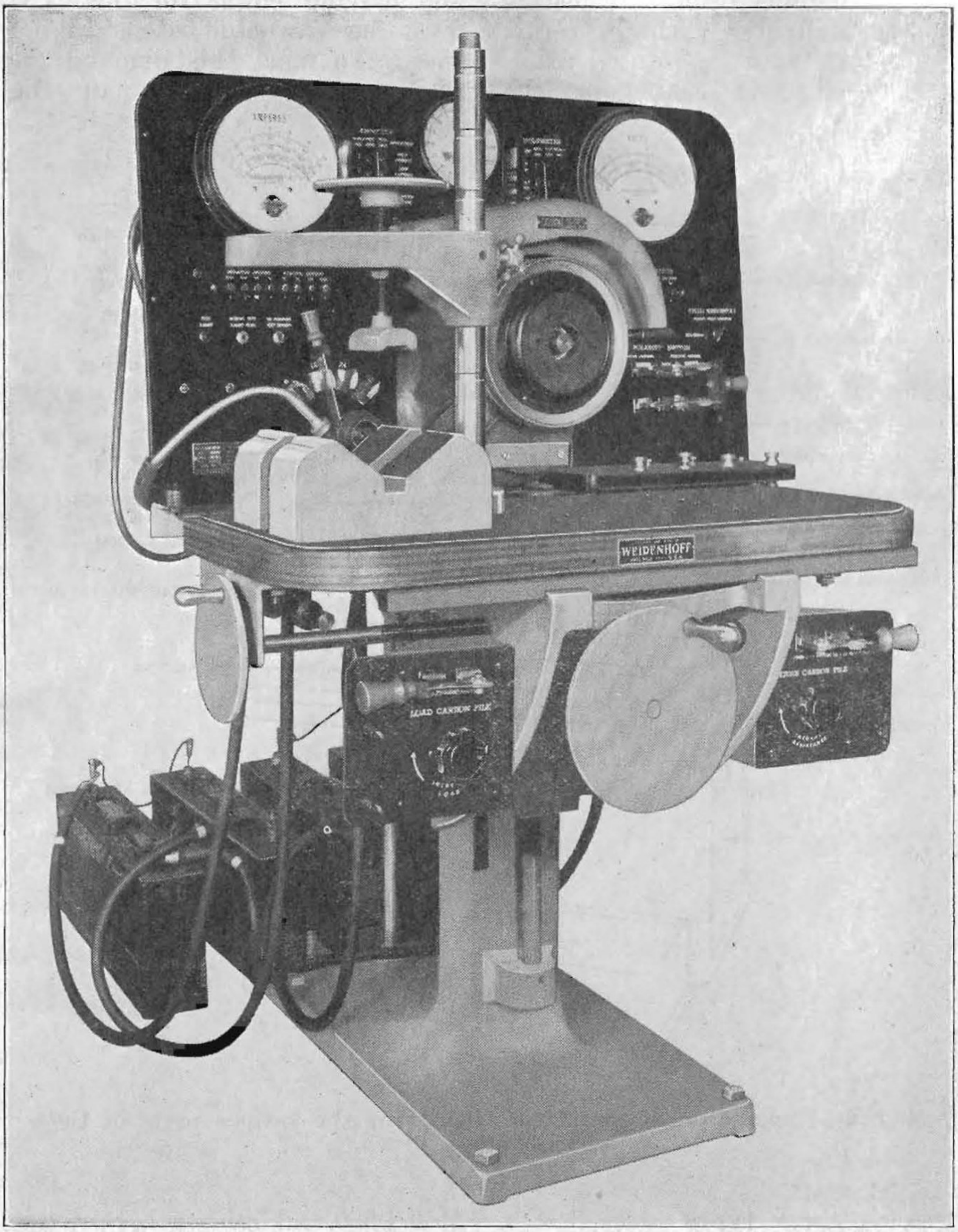

Fig. 3—The Model 501 Weidenhoff Generator Test Bench. As in the Model 500, the method of connecting the generator to be tested has been simplified and complicated "hook-ups" are eliminated. A two-speed gear transmission on both models provides maximum power for all generator testing speeds.

Starting motors are tested, both free running and locked torque for electric resistance and mechanical condition. Magnetos are tested by use of special magneto equipment available at purchaser's option.

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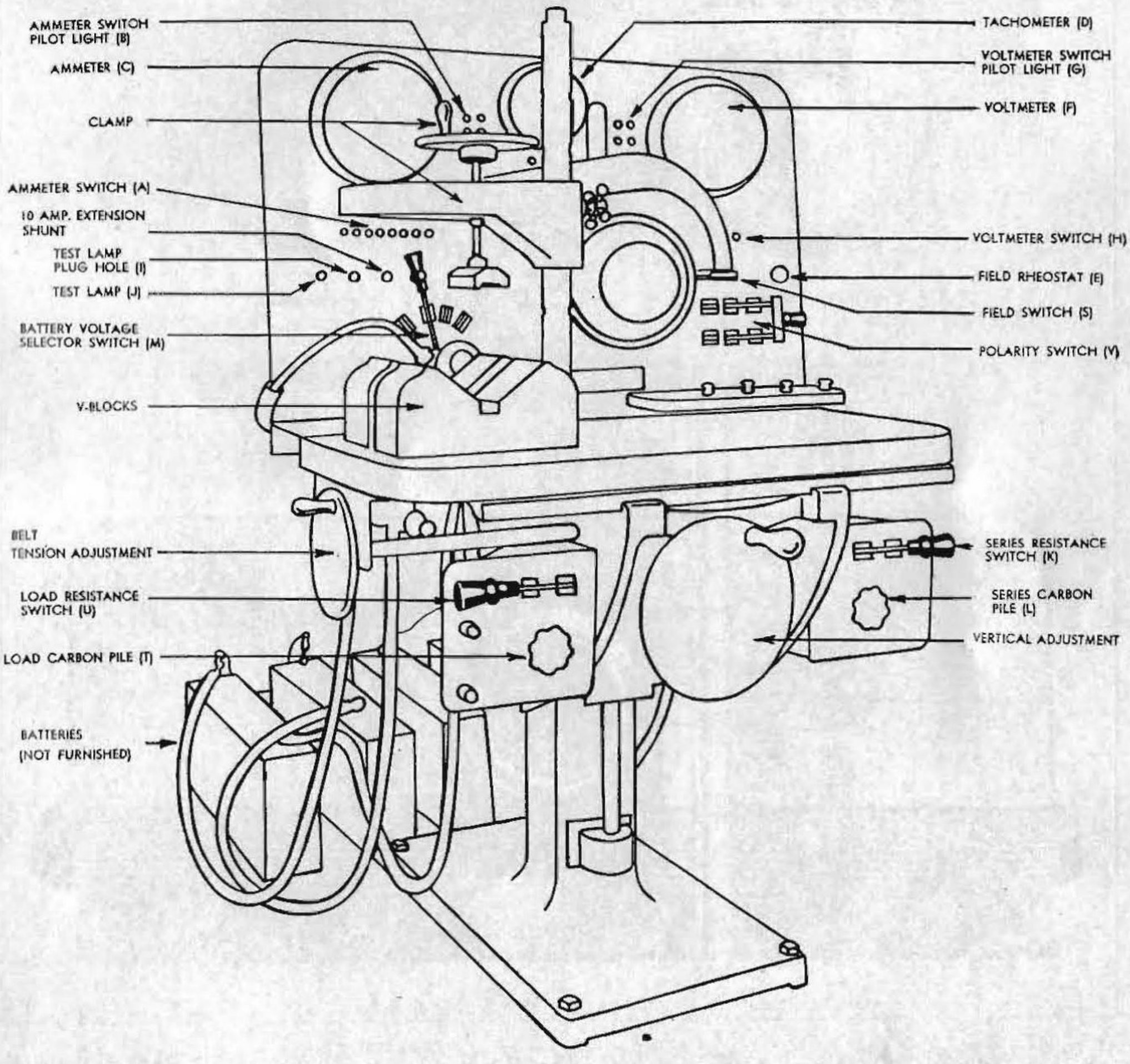

Fig. 4—Explanatory diagram for identifying the various parts of the Model 501 test bench.

The method of connecting to generator has been simplified, and complicated "hook-ups" are eliminated. Field control rheostat and field selecting switch for connecting readily all types of generators regardless of the type of field connections used. Duplicate sets of connecting terminals permit use of short leads and are conveniently located: one set on panel, the other under edge of movable table top. Only two connections are made to third-brush regulated generators and only three to externally controlled units. All other connections are incorporated in instrument panel and are made by an easily under-

Weidenhoff Model 500 Test Bench

PANEL DETAILS

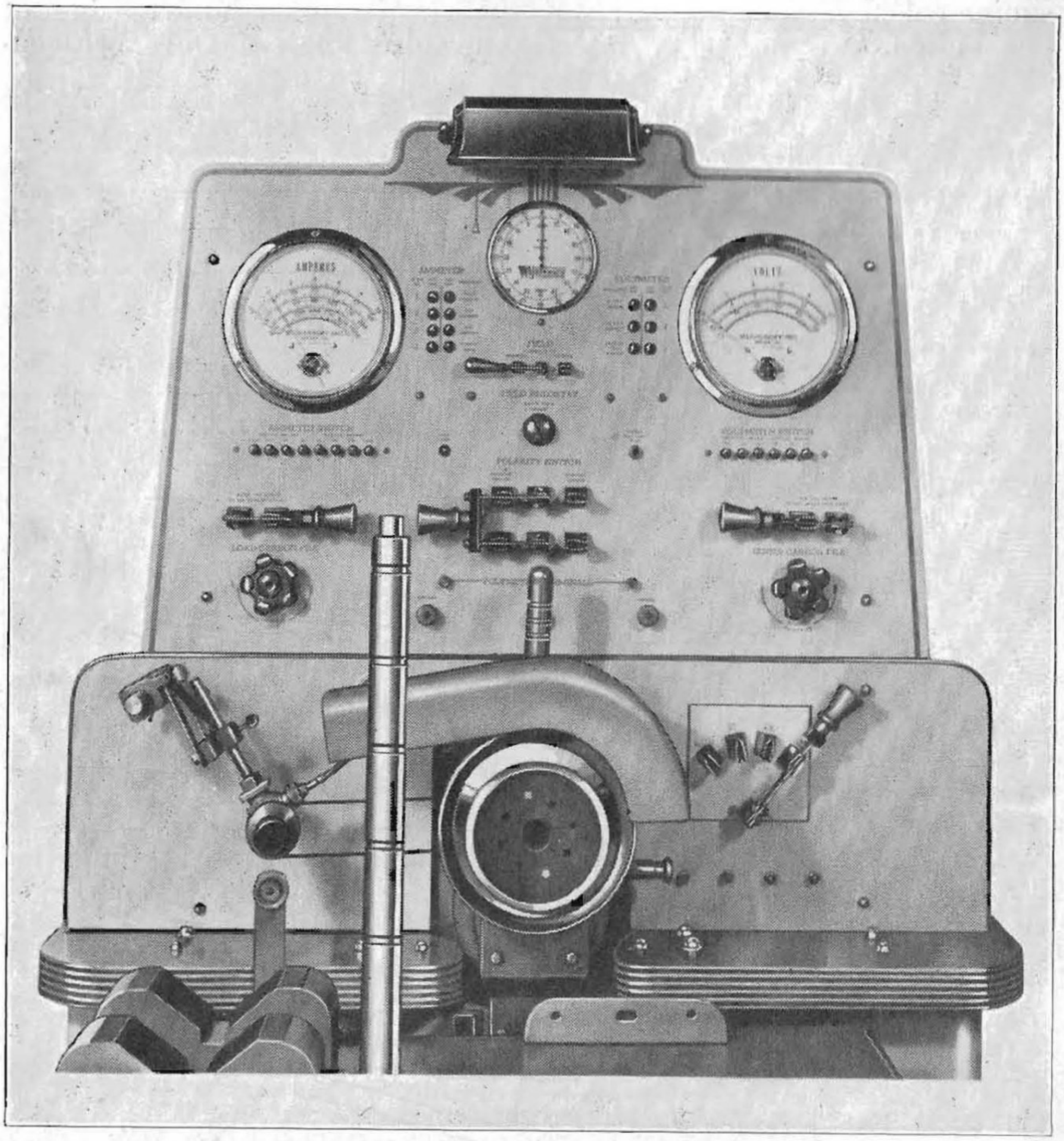

Fig. 5—Close-up view of the panel units showing their location (Model 500).

stood system of switches. Push-button type switches are used, in conjunction with pilot lights, to select and indicate ammeter and voltmeter scales. Current carrying switches are heavy-duty type and will withstand severe overloads. Number 3 solid copper bus is used throughout for conducting generator and starting motor currents; Number 10 solid copper wire for field circuits. Panel is designed to provide the easiest and simplest possible means of

connecting instruments and controls in circuit. Each switch and control is marked to explain its function and operation.

The operator of a Weidenhoff test bench is urged to become familiar with the wiring diagrams shown on pages 39, 42, 43, 44, 45, 46 and 47 of this manual in order to better understand the nature of the tests to be made.

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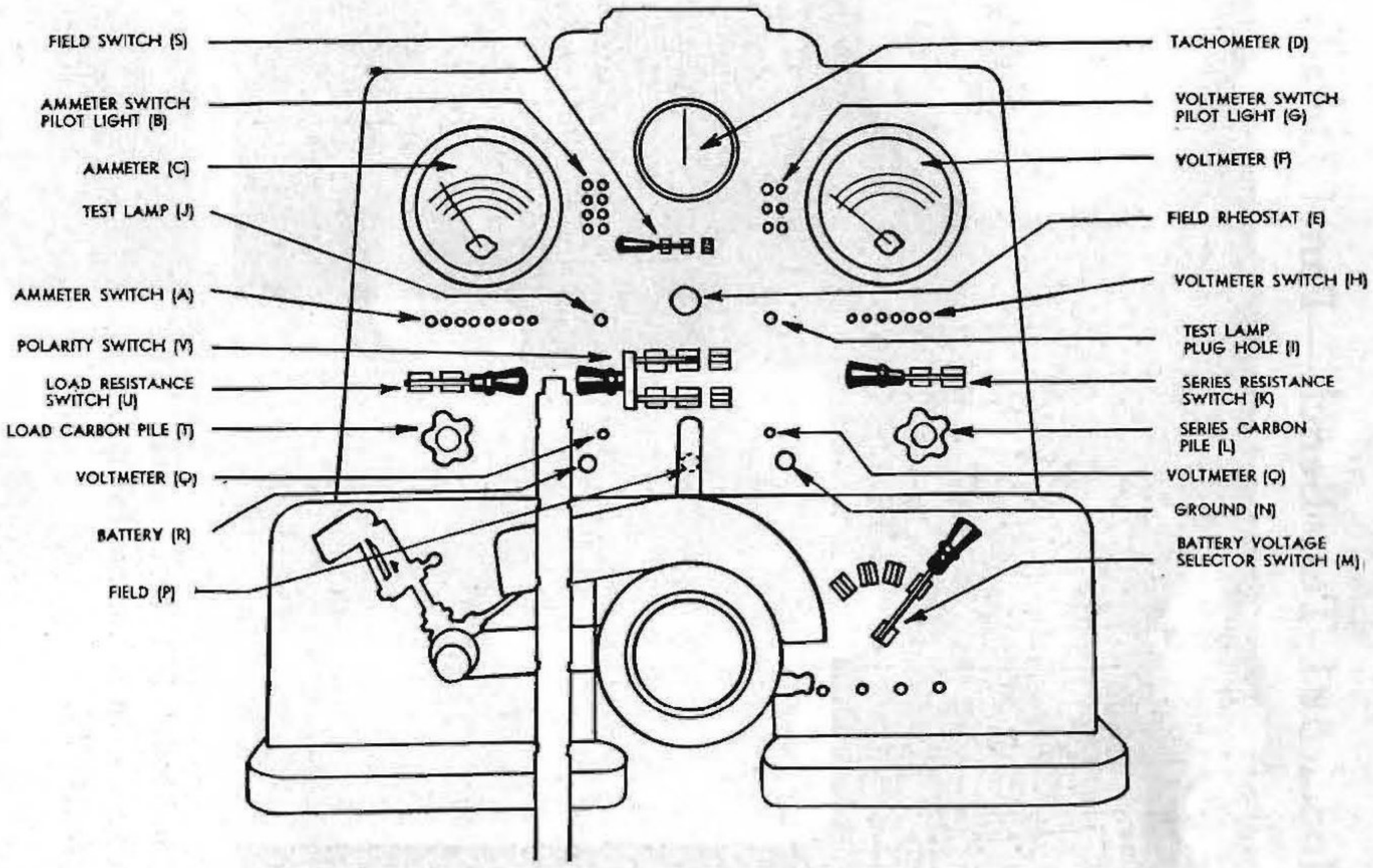

Fig. 6—Explanatory diagram for identifying the various panel parts of the Model 500 bench.

It will be noted from pages 12, 13, 14, 15, 16, 17, 18 and 19, that a similarity exists between the models 500 and 501 Weidenhoff Generator Test Bench. While the design and structure of the two models differ, the operation of each bench is virtually the same. Consequently what follows in this manual applies to both benches when it comes to testing generators, starting motors, and voltage regulators. Thus, if an illustration shows a test made on the Model 501, for example, the same thing applies to the Model 500 although the location of the various bench units may differ.

Weidenhoff Model 501 Test Bench—Panel Details

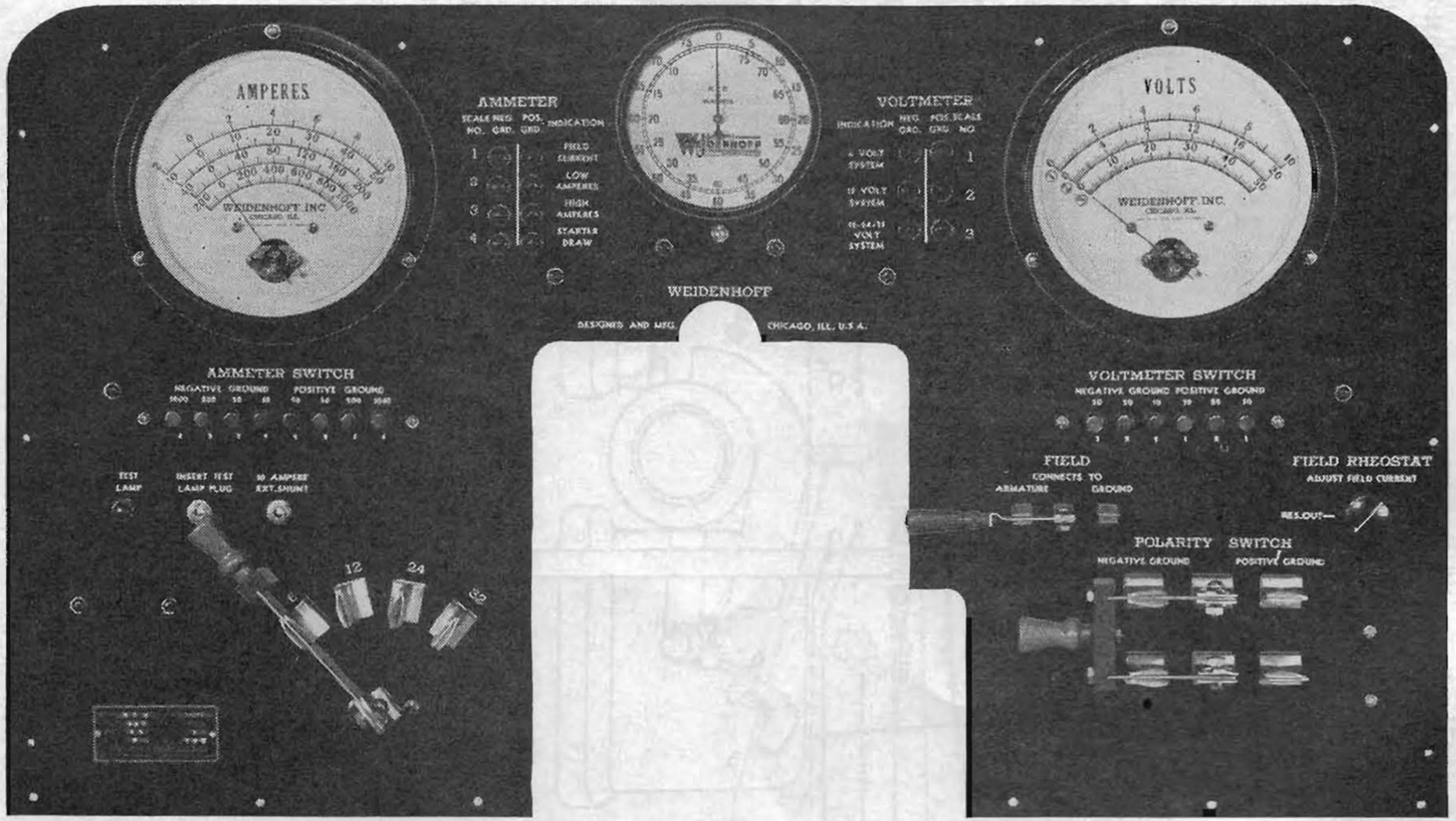

Fig. 7—Close-up view of the panel used on the Model 501 test bench. The binding post panel, shown at lower right, normally lies in a horizontal position, but is shown vertically for clarity.

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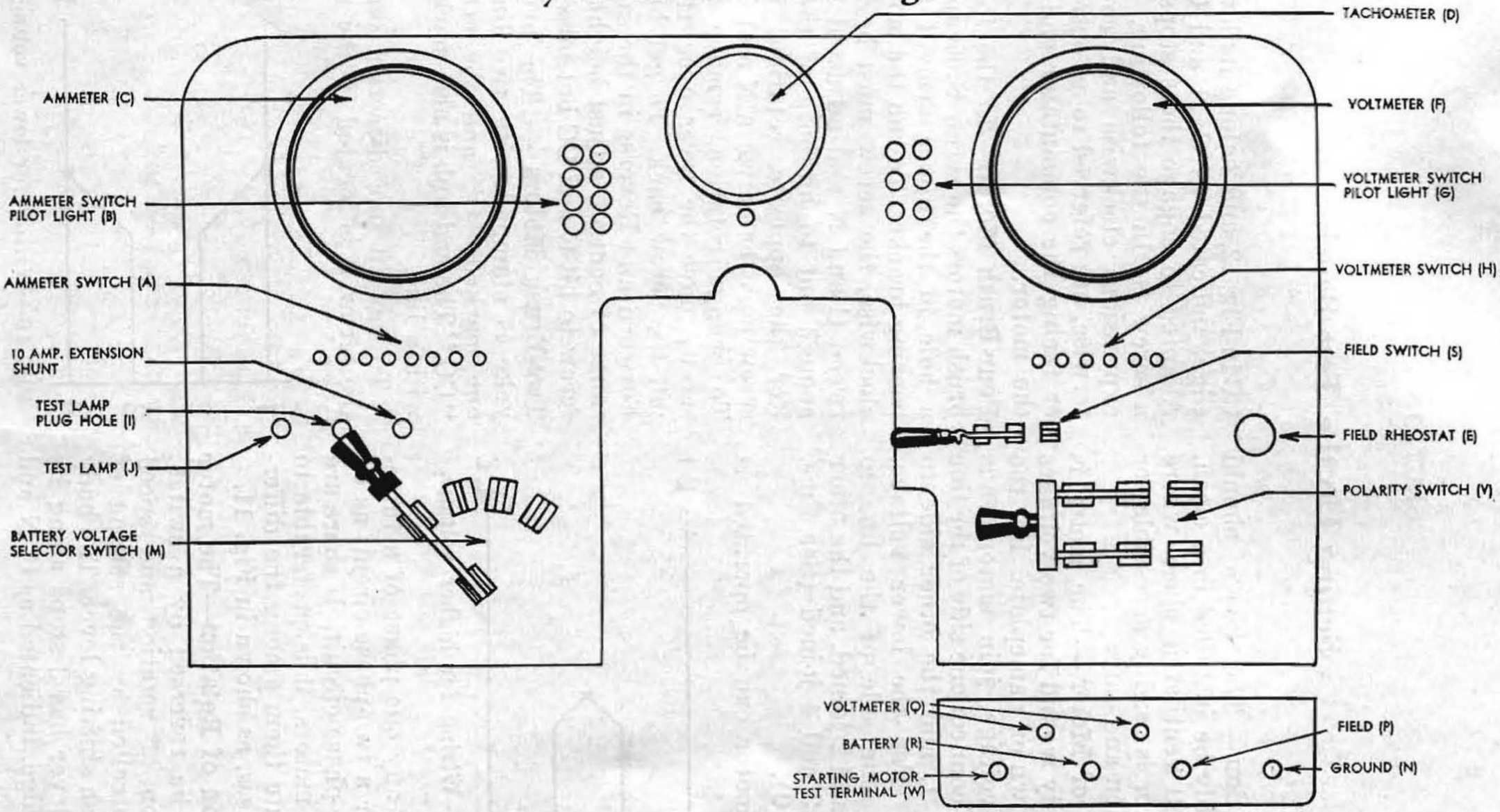


Fig. 8—Explanatory diagram for identifying the various parts of the Model 501 bench. This panel is not as high as that used on the Model 500, nor does it contain the load and series carbon pile units. These are under the bench top on the Model 501.

SECTION 2.

Setting Up the Test Bench

Installation — The bench should preferably be installed in a clean, dry, well ventilated place, where the motor is readily accessible for inspection and care.

Wiring of Motor — The motor is ordinarily wound for two voltages as is shown on nameplate. For the higher voltage, join motor leads 2 and 3, connect one side of the line to lead 1, and the other side to lead 4. For the lower voltage, connect one side of the line to leads 1 and 2 joined, and the other side to 3 and 4 joined (See Figs. 9 and 10).

The motor can be operated as

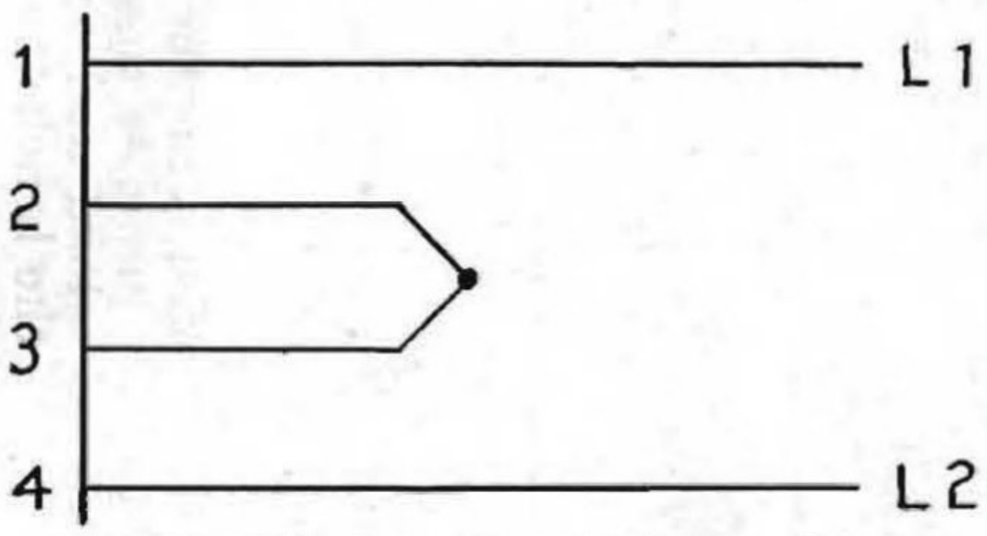


Fig. 9—Wiring for higher voltage.

well on any one phase of a three-phase or a two-phase circuit as on a single phase circuit. If there are several motors, it is preferable to distribute them among the different phases, as shown in Fig. 11.

Direction of Rotation—The motor cannot be reversed by a switch. Direction of rotation and speed are controlled by the setting of the brush shifting lever. The body of the lever has 3 stops along its upper edge, indicated as C, N and CC in Fig, 12, and 3 along its lower edge, indicated as C, N and CC. Adapted to engage these stops is a screw S. In the following, the expressions clockwise and counterwise, are referred to an observer facing the commutator end of the motor.

Four-Brush Motors—In the four-brush motors the screw S occupies a hole in the upper arm of the bearing bracket. To run the motor clockwise, the screw must be between C and N and adjusted far enough out to hit both of them. For the opposite rotation, the screw must be between N and CC. To change rotation, remove the screw, move the lever over, then put the screw back. To get both Forward and Reverse in the same range of control, adjust height of screw to hit C and CC but miss N.

Two-Brush Motors — The brush yoke is stamped with two lines, one marked "C" and the other "CC." The end hub is also marked with a line.

To run in one direction only, the screw S is located in the up-

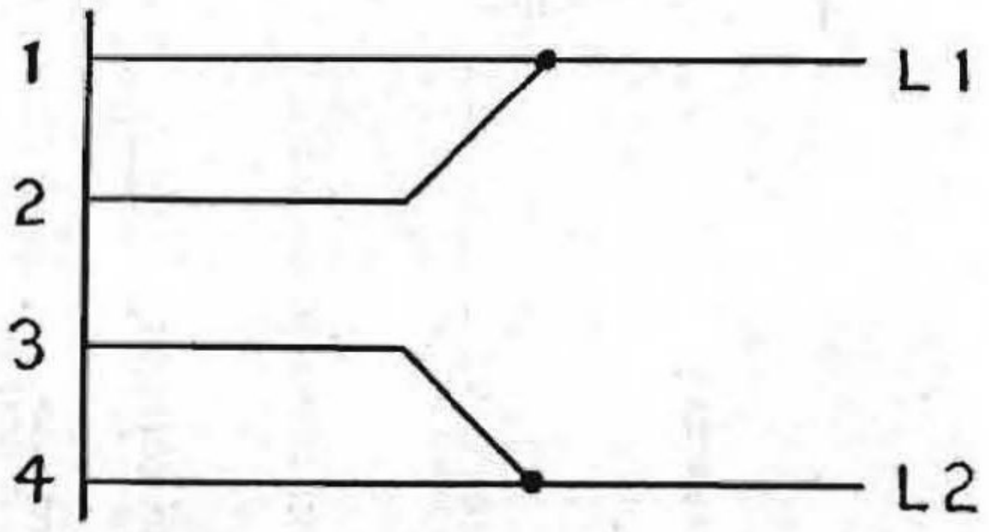


Fig. 10—Wiring for lower voltage.

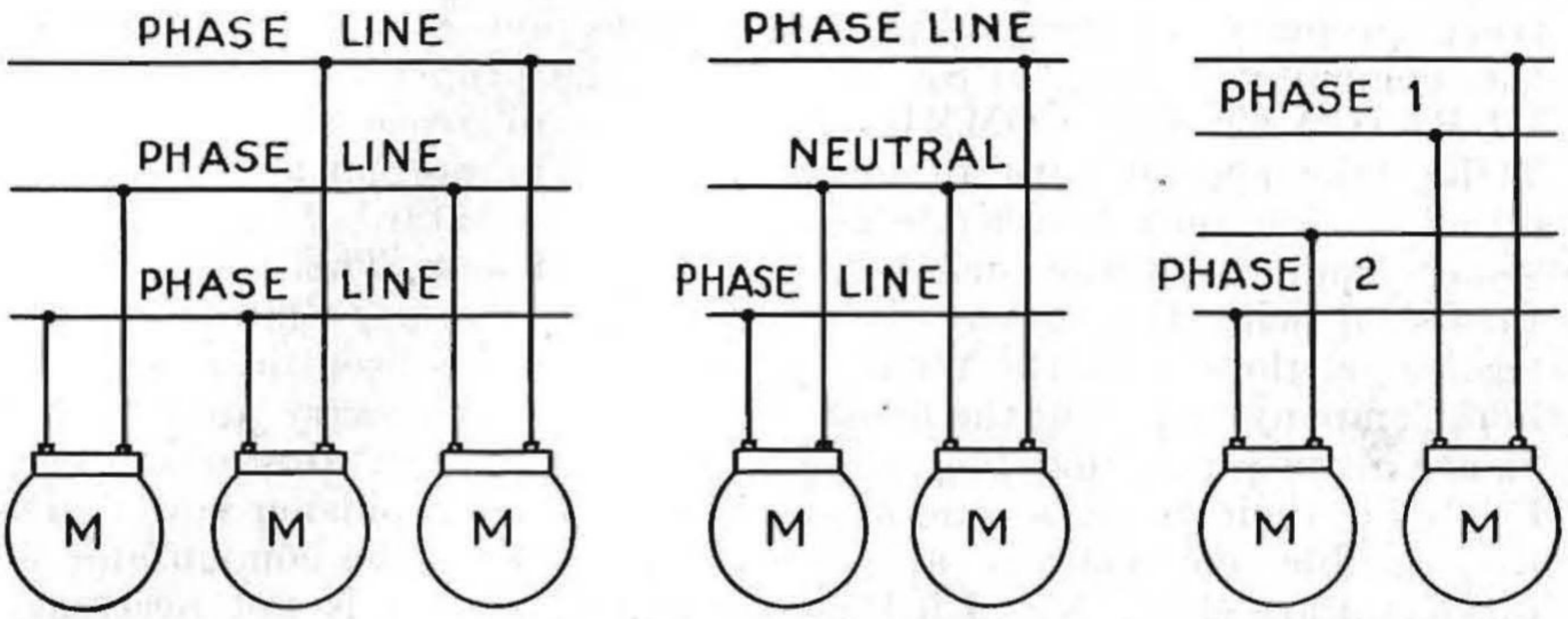


Fig. 11—Several motors should be distributed among the different phases.

per arm and its height adjusted to hit C and CC but miss N. For clockwise rotation, move handle so that stop C rests against upper screw S. If line "C" on brush yoke is not in line with mark on end, loosen set screws and revolve brush yoke until alignment is secured. For counter-clockwise rotation, move handle so that stop CC rests against upper screw S and make sure line "CC" on yoke coincides with mark on end. If necessary revolve yoke to secure alignment.

To get both Forward and Reverse in the same range of control, place the screw S in the lower hole of the bracket, and adjust its height to hit C and CC but miss N. For clockwise rotation with stop C against lower screw S, mark "C" on brush yoke should coincide with mark on end. For counter-clockwise rotation with stop CC against lower screw S, mark "C" should coincide with mark on end. If these conditions are not fulfilled, loosen brush yoke set screws and revolve yoke to secure alignment. Restriction to one direction only can be had by adjusting lower screw S to hit N and either C or CC as desired, but the handle will be practically horizontal at full brush shift.

Important — Speed Limitation — THE GUARANTEED MAXIMUM SAFE OPERATING SPEED OF THE MOTOR IS 25% ABOVE THE MAXIMUM NAMEPLATE SPEED RATING. If the motor speed should rise above the maximum safe operating speed, it is an indication of either excessively high motor voltage or an excess of power over load requirements. In the latter case, a smaller motor is recommended.

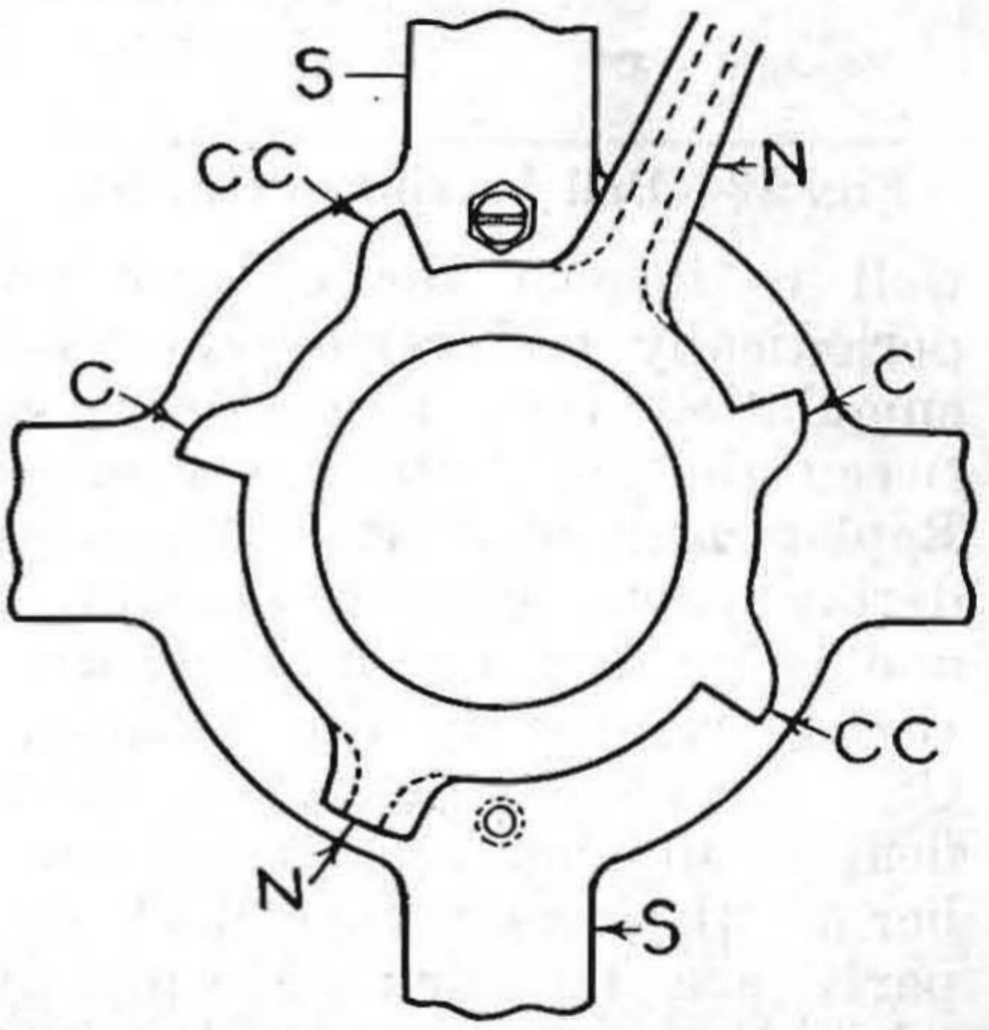


Fig. 12—Direction of rotation of motor is governed by brush-shifting lever.

Care — COMMUTATOR AND BRUSHES: Use care not to bruise commutator. See that brushes

track properly on the middle of the commutator face. USE NO LUBRICANT ON COMMUTATOR; take special care to keep oil off it. Use only brushes of the same grade as those originally furnished with the motor. It is best to get these from the Weidenhoff Company. See that the brushes are all in place, that they slide freely in their holders, and that the flexible connections are in place and are clear. NEVER USE A BRUSH WITH THE FLEXIBLE CONNECTION BROKEN OR MISSING. In service, it is well to inspect the commutator periodically and remove any accumulation that may form between the commutator segments.

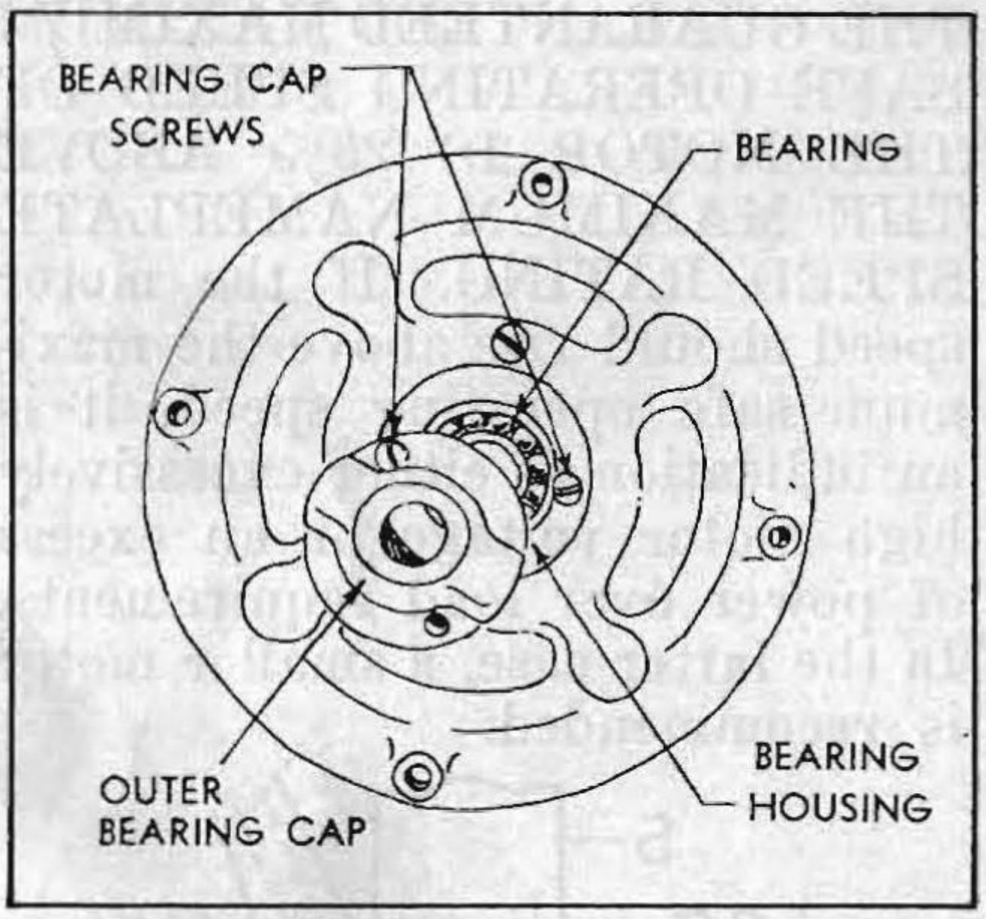


Fig. 13—Ball bearings of motor.

Replacement of Parts—When ordering parts, give a description and state the quantity desired. (See parts list in this manual.) Give the nameplate rating, specification number and serial number of the motor for which the parts are intended. Frequently when the motor is first put into service on these benches there will be a slight arcing at the commutator, at extremely low speeds, and at extremely high speeds. It does not in any way detract from the proper operation of the unit, or decrease the life of the motor. The normal appearance of the commutator of the driving motor is black. This is due to the chemicals that are contained within the brushes used on this bench which are necessary due to the fact that it is an alternating current type of repulsion motor. Do not sandpaper the commutator of this motor as it is not necessary and the sand particles imbed themselves in the carbon brushes, producing considerable damage to its normal operation.

Care of Motor and Gear Housing

—(Very Important. Read Carefully.) LUBRICATION INSTRUCTIONS FOR BALL-BEARING MOTOR. The bearings of the motor used on the Model 500 and 501 Weidenhoff Test Benches are packed with grease upon assembly at the factory. The initial pack is sufficient for approximately one year under ordinary operating conditions. Periodic inspection is, however, advisable.

After each year of service, the bearing caps should be removed and the bearings, housings and housing caps thoroughly cleaned with carbon tetrachloride. All grease and cleaner should be wiped from the windings.

After cleaning, apply the CLEAN grease by hand over and between the balls. The use of too much grease will cause excessive bearing temperature and grease leakage into the motor. Grease deteriorates insulation; care must be exercised to prevent contact of grease with the windings.

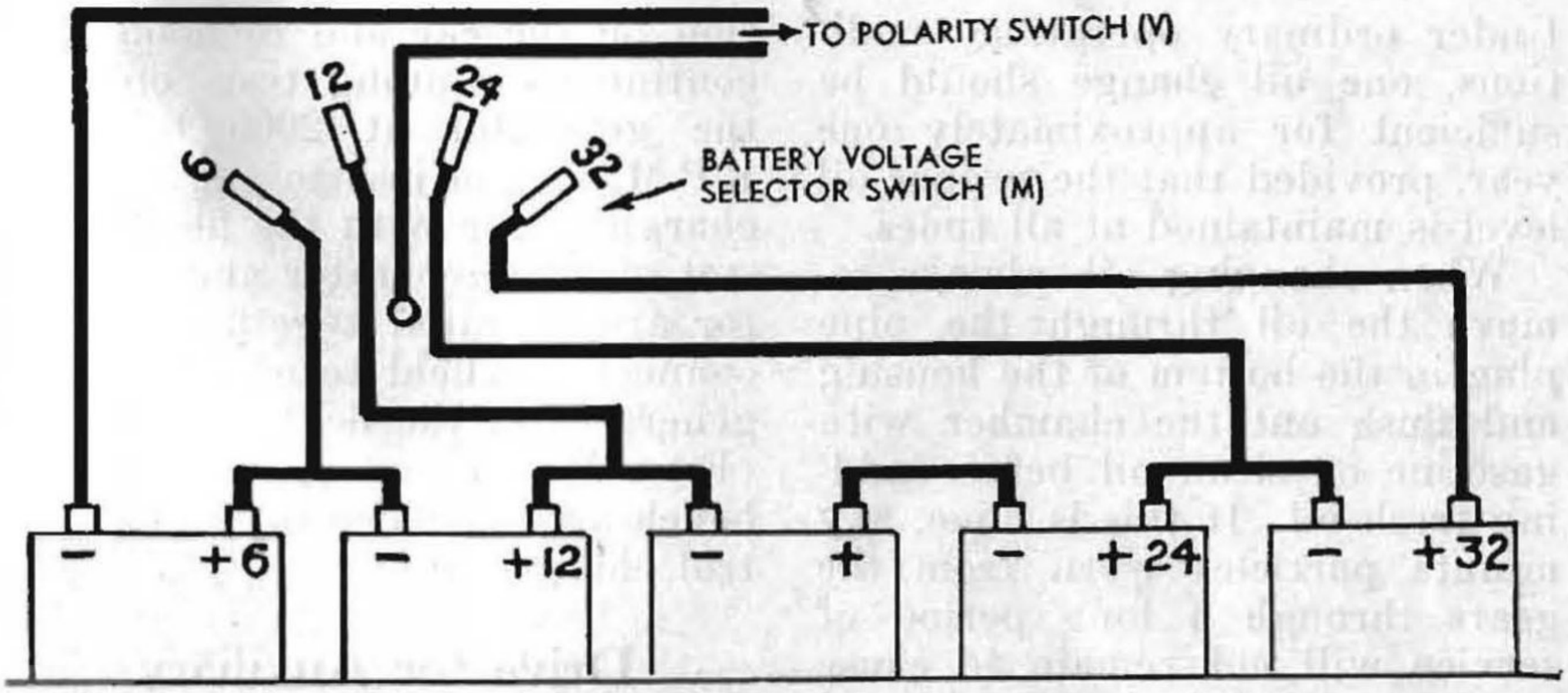


Fig. 14—Diagram showing how batteries are connected to the test bench.

ENOUGH GREASE TO PACK THE EXTERNAL CHAMBER OF THE BEARING HOUSING ONE-THIRD TO ONE-HALF FULL IS AMPLE.

NEVER FORCE GREASE INTO THE BEARING ASSEMBLY. This results in the chamber being overpacked. With a rise in bearing temperature inevitably following, the grease is thinned out and is forced through the bearing, through the internal grease seal along the shaft into the motor where it is thrown onto all adjacent parts of the motor.

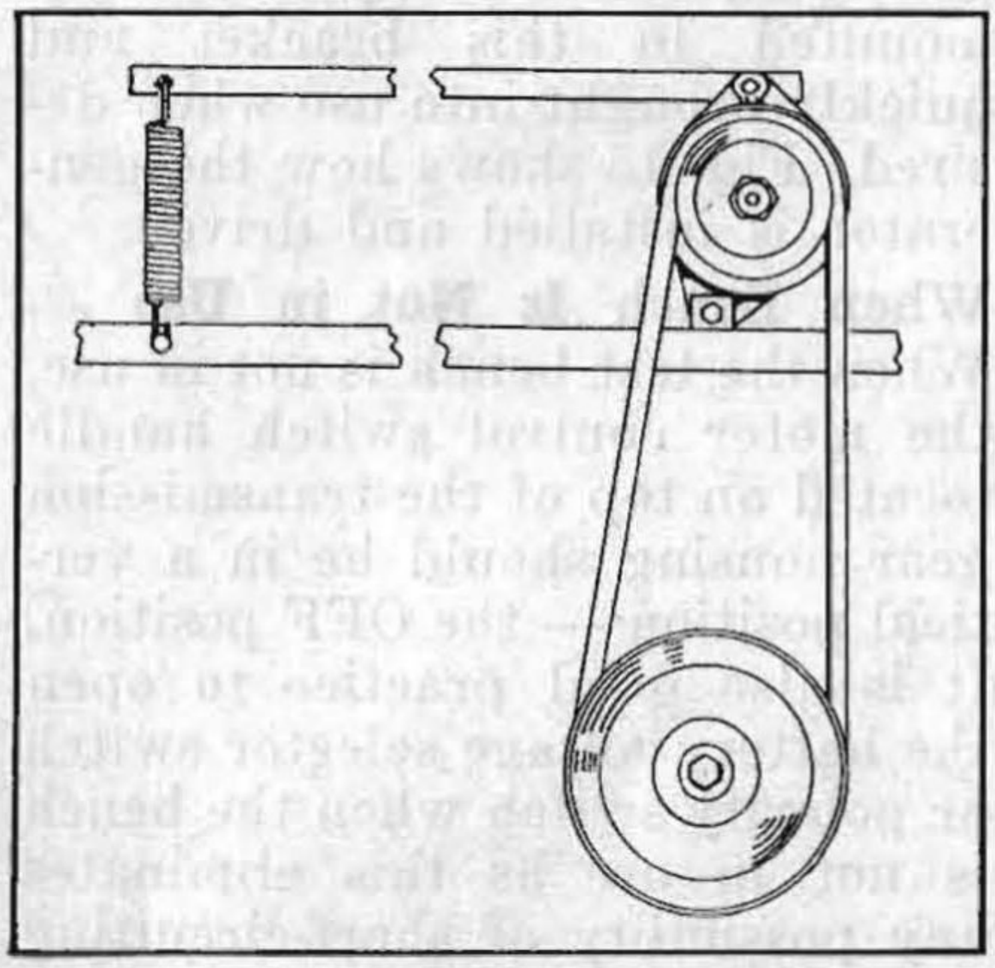


Fig. 15—Auxiliary generator drive (Model 500 only).

GEAR HOUSING. Before the unit is operated inspect the gear housing to make sure that the gears are lubricated. The housing is filled with lubricant at the factory but in the event that lubricant may have been lost in transit or for some other reason the housing is dry, proceed as follows:

Add enough oil (SAE 50 Motor Oil) to bring the level in the chamber near the top of the oil cup. This will allow the large gear on the armature shaft to dip into about ½ in. of oil. The small gear will receive the greater portion of its lubrication from the oil picked up by the large gear, although its teeth will just skim the oil, if the level is kept normal.

The following greases are satisfactory for ball bearing motors having maximum speeds of 2400 R.P.M. or less. For example:

Sinclair Refining Company's
Bearing Grease Grade "AF,"
Standard Oil Company's Grand
"SUPERLA 4X"

For other greases, obtain recommendations from the grease manufacturers.

The oil should be changed whenever it appears to lose its body or becomes too thick or gummy.

Under ordinary operating conditions, one oil change should be sufficient for approximately one year, provided that the proper oil level is maintained at all times.

When changing oil, always remove the oil through the pipe plug in the bottom of the housing and flush out the chamber with gasoline or clean oil before adding fresh oil. If this is done, any minute particles worn from the gears through a long period of service will not remain to cause possible mechanical difficulties.

The standard motor used on the Model 500 and 501 Test Benches can be connected to either 110 or 120 volt power lines, whereas the lighting system used in conjunction with the bench is designed for use on 110 volt light circuits. It is important that the benches be wired properly, and it is therefore, suggested that a local electrician be employed for such work.

If the benches are to be used on 6, 12, 24 and 32 volt systems, the batteries provided for these voltages should be connected to the leads as marked (Fig. 14). It is, of course, possible for the operator of the benches to use other voltage combinations than these particular ones. In other words, the battery leads can be connected to 6, 12, 18 and 24 volts or any other combination desired. It means that the battery voltage selector switch, M, (Figs. 5, 6, 7 and 8) will give whatever voltages are connected to the corresponding terminals.

Caution: Avoid Operating Motor at Low Speeds for More Than Two to Three Minutes—Occasionally it is necessary to operate a generator for several minutes with a low output. To simulate operation on the car and to make the continuous running tests operate the generator at 2000 to 3000 R.P.M. and adjust to the desired charging rate with the field rheostat. If the generator and regulator are operated together simply connect the field terminal on the generator to the field terminal P, (Figs. 5, 6, 7 and 8), on the test bench and use rheostat E, to control charge rate.

Drive for Auxiliary Generator

(Applies to Model 500 Bench Only. Not furnished with Model 501 Bench.)—A flanged pulley is mounted at the extreme rear end of the motor shaft to accommodate a V-belt for driving an auxiliary generator (generator not furnished with bench). This generator can be mounted on the special bracket located at the rear of the table top.

Providing this drive for an auxiliary generator makes it possible to test voltage and current regulators with the generator. The generator can be permanently mounted in this bracket and quickly brought into use when desired. Fig. 15 shows how the generator is installed and driven.

When Bench Is Not in Use — When the test bench is not in use, the motor control switch handle located on top of the transmission gear housing should be in a vertical position — the OFF position. It is also good practice to open the battery voltage selector switch or polarity switch when the bench is not in use as this eliminates any possibility of short-circuiting the batteries used in conjunction with the bench.

When the voltmeter and ammeter are not being used it is advisable to have all of the push button switches in the "OFF" position. NOTE: To place push buttons in "OFF" position, press one button in each group lightly until the button that is IN is released. Push buttons are all in "OFF" position when all buttons are OUT. This provides protection to the meters in the event that the operator leaves the voltage selector switch in the closed position and short circuits the wires connected to the generator.

A number of spare rubber discs are provided as replacement parts for the tachometer assembly. These rubber discs should last a considerable number of years, if used properly. They can easily be replaced since any ordinary sponge rubber kneeling pad (sold at most 10-cent stores) can be cut to provide an additional number of discs when necessary.

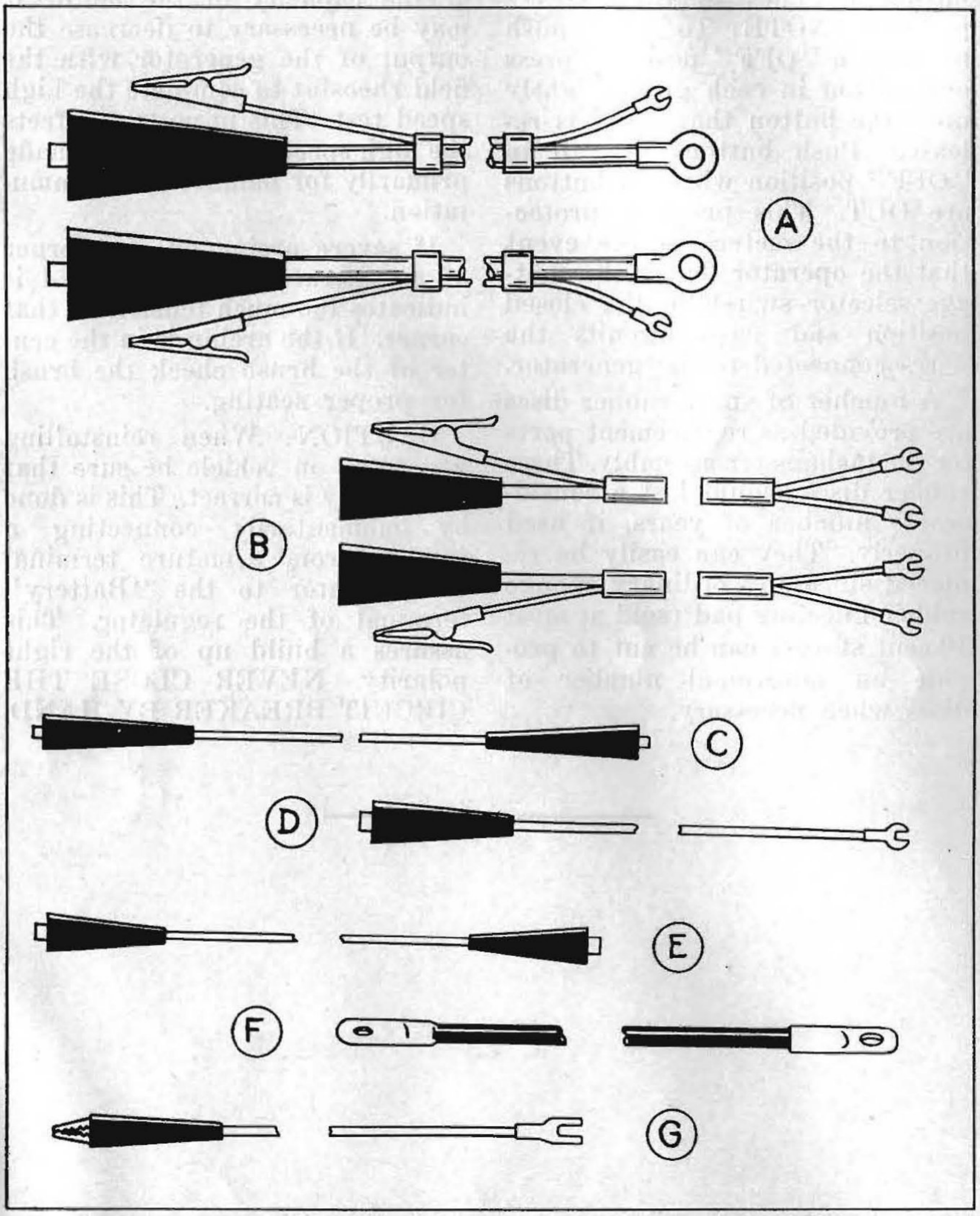
Important Points to Observe — When testing a high output generator which approaches the limit of the capacity of the motor it may be necessary to decrease the output of the generator with the field rheostat to complete the high speed test. This in no way affects the high speed test since it is made primarily for balance and commutation.

If severe arcing on one corner of a generator brush is noted it indicates too much tension on that corner. If the arcing is in the center of the brush check the brush for proper seating.

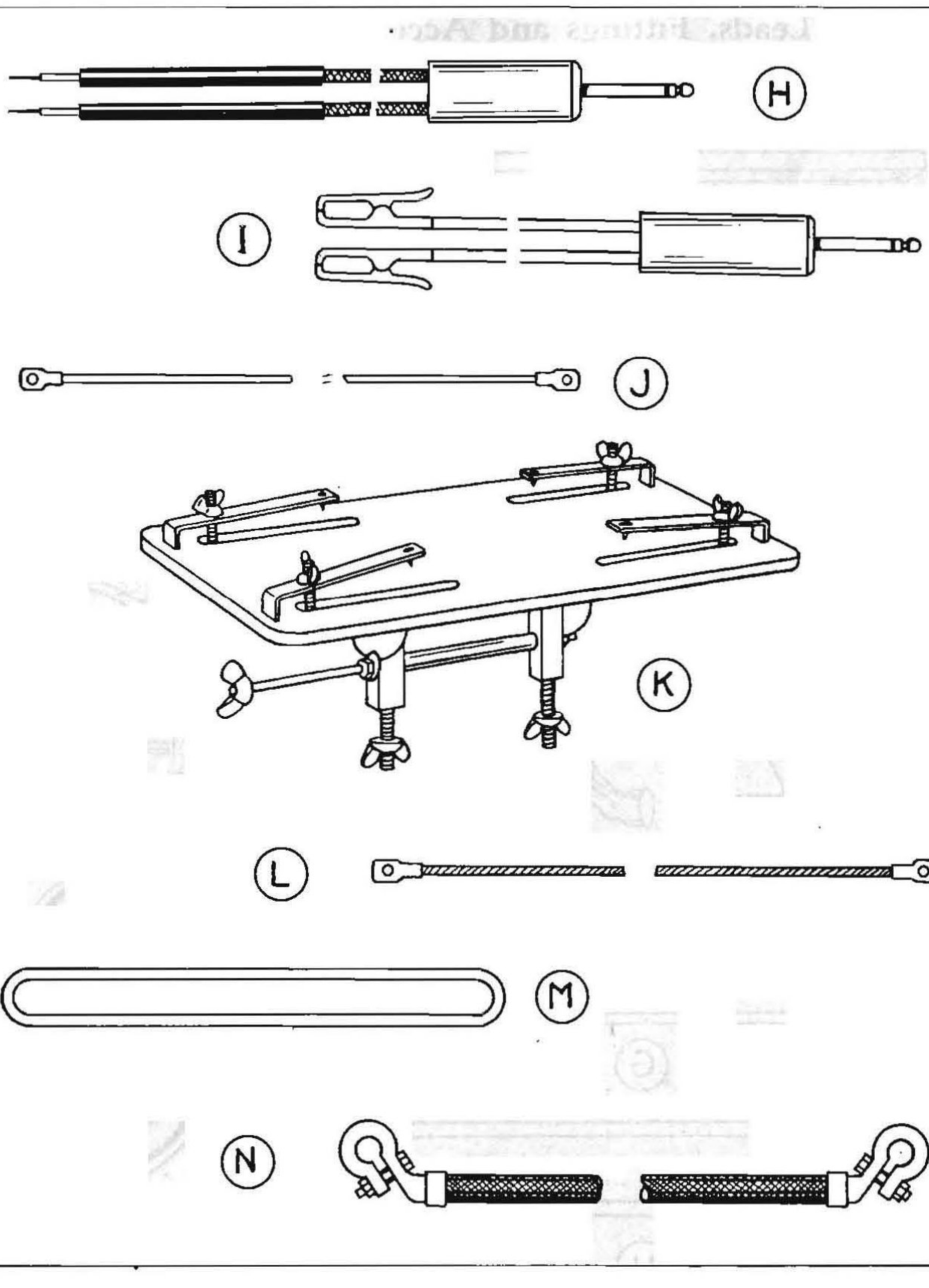
CAUTION: When reinstalling generator on vehicle be sure that its polarity is correct. This is done by momentarily connecting a jumper from armature terminal of generator to the "Battery" terminal of the regulator. This assures a build up of the right polarity. NEVER CLOSE THE CIRCUIT BREAKER BY HAND.

SECTION 3.

Leads, Fittings and Accessories



A—Two main leads, heavy duty (with voltmeter leads attached).
B—Two main leads, for small generators (voltmeter leads attached).
C—Five attaching leads, 28 inches long.
D—One 5-foot lead for making field terminal connection.
E—One short test lead for making "jumper" connections.
F—One heavy lead for making starting motor tests.
G—Two voltmeter test leads, for various voltage tests.



H—Two 110-volt test leads, with attaching plug.

I—Two 10-ampere extension scale test leads with attaching plug.

J—Four leads for battery connections.

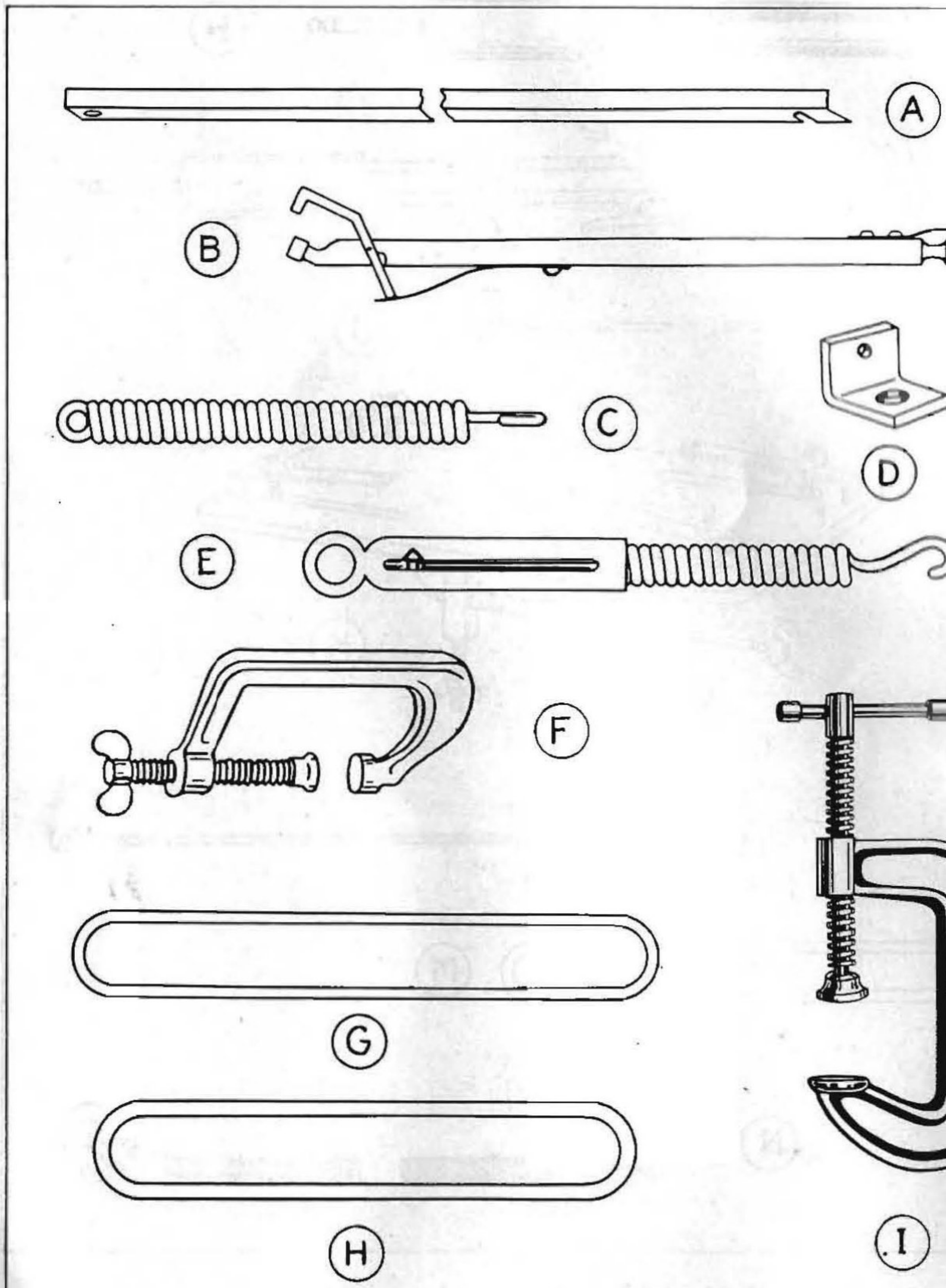
K—Adjustable fixture for testing voltage regulators.

L—Two general purpose leads, 15 inches long.

M—Round endless belt for driving tachometer.

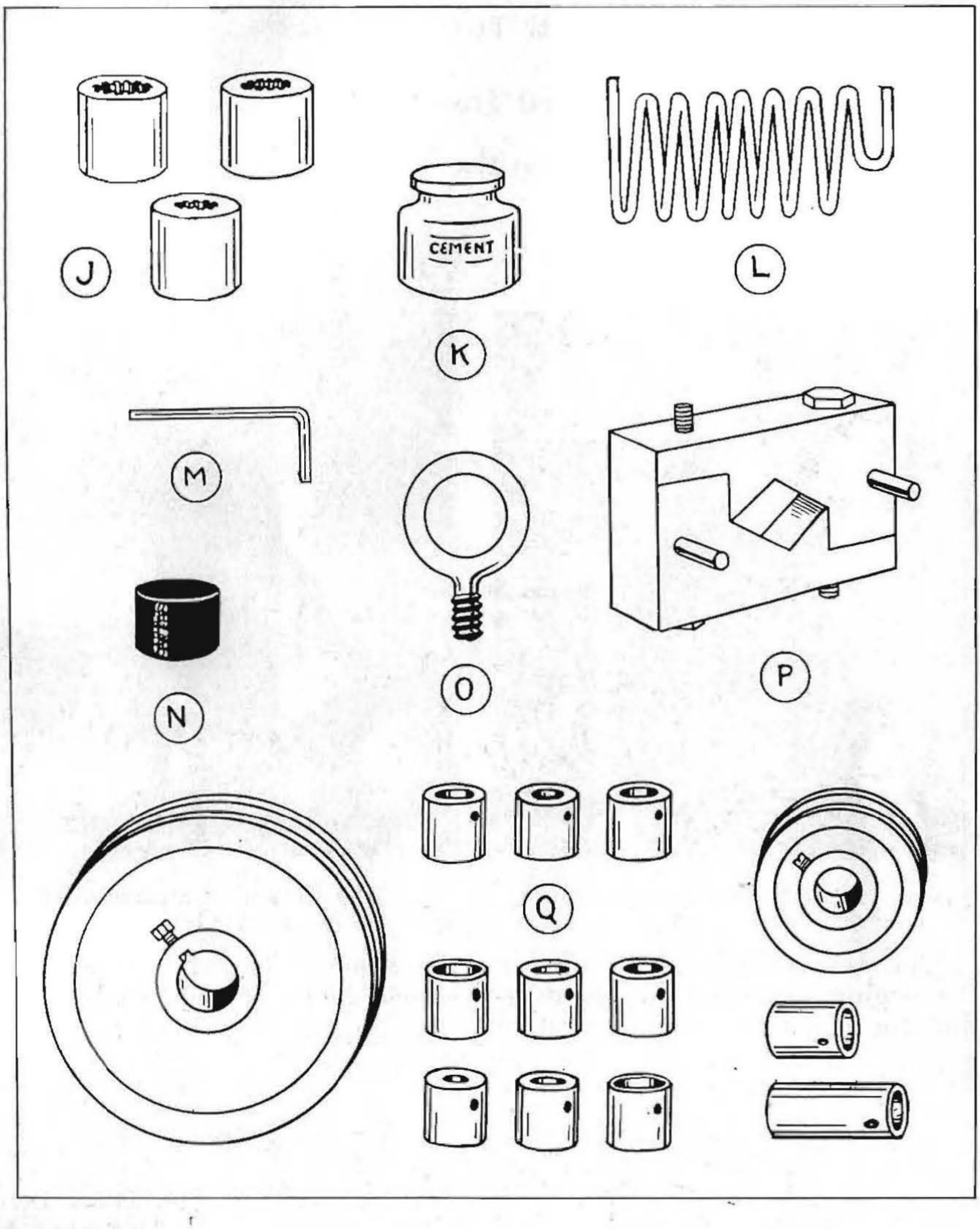
N—Four battery connecting leads.

Leads, Fittings and Accessories (Cont.)



A—Angle iron lever for auxiliary generator drive (model 500 only).
B—Torque arm for making starting motor tests.
C—Spring for auxiliary generator drive (model 500 only).
D—Two angle anchors, auxiliary generator drive (model 500 only).
E—Starting motor torque test scale.
F—Clamp for starting motor torque test.
G—V-belt, auxiliary generator drive (model 500 only).
H—V-belt for driving generator (when belt drive is used).
I—Clamp for auxiliary generator (model 500 only).

WEIDENHOFF GENERATOR TEST BENCH



J—Spline adapters for driving generators.
K—Rubber-to-Metal cement for tachometer drive rubber discs.
L—Resistor for load carbon pile.
M—Allen wrenches for various size set screws.
N—Rubber discs for tachometer drive cup.
O—Eye for lifting motor of test bench.
P—Dog for driving generators in direct drive.
Q—Left, generator drive pulley; right, generator pulley; center, pulley adapters.

SECTION 4.

Detailed Instructions
How to Use the Vise Blocks

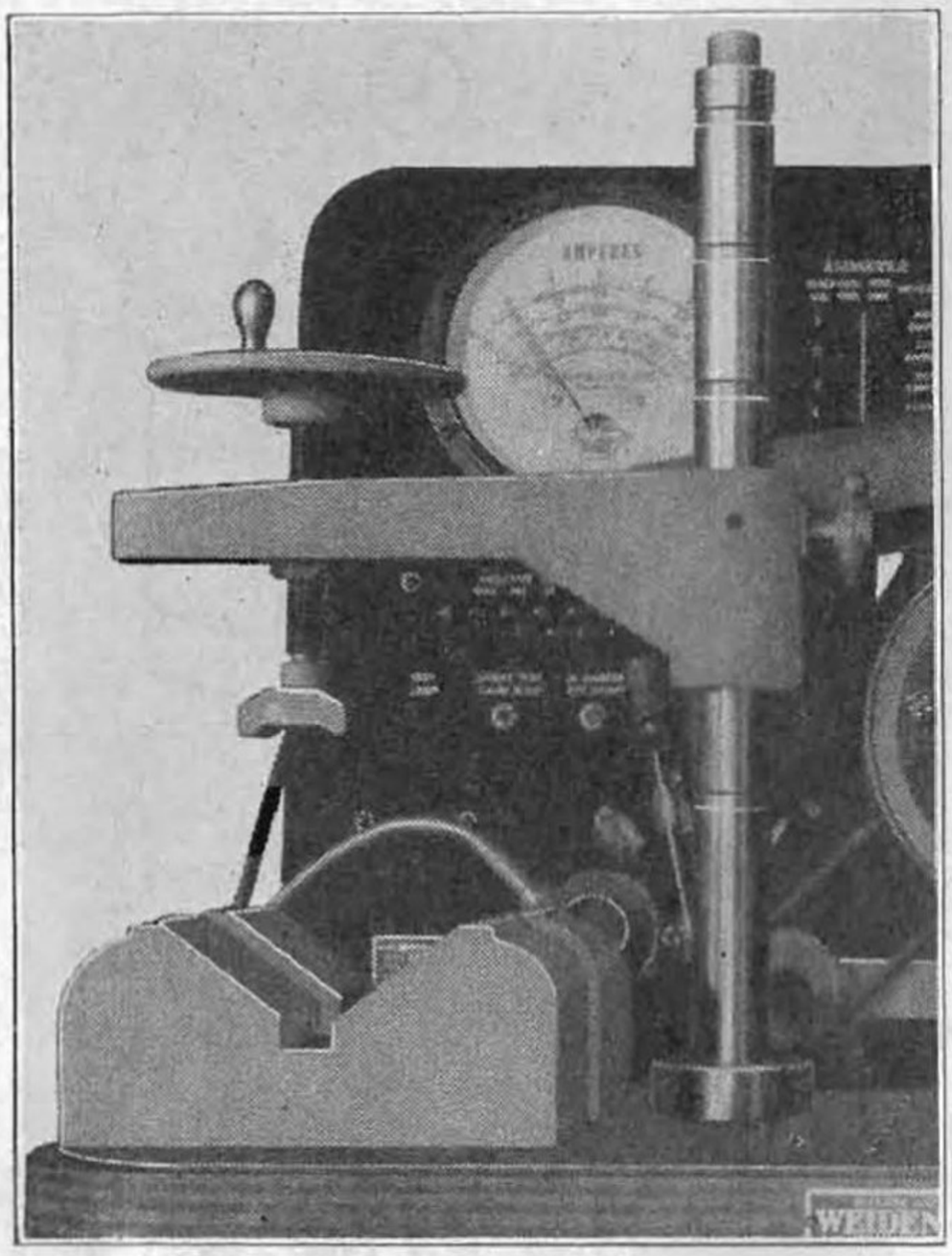


Fig. 16—Vise blocks and clamp details.

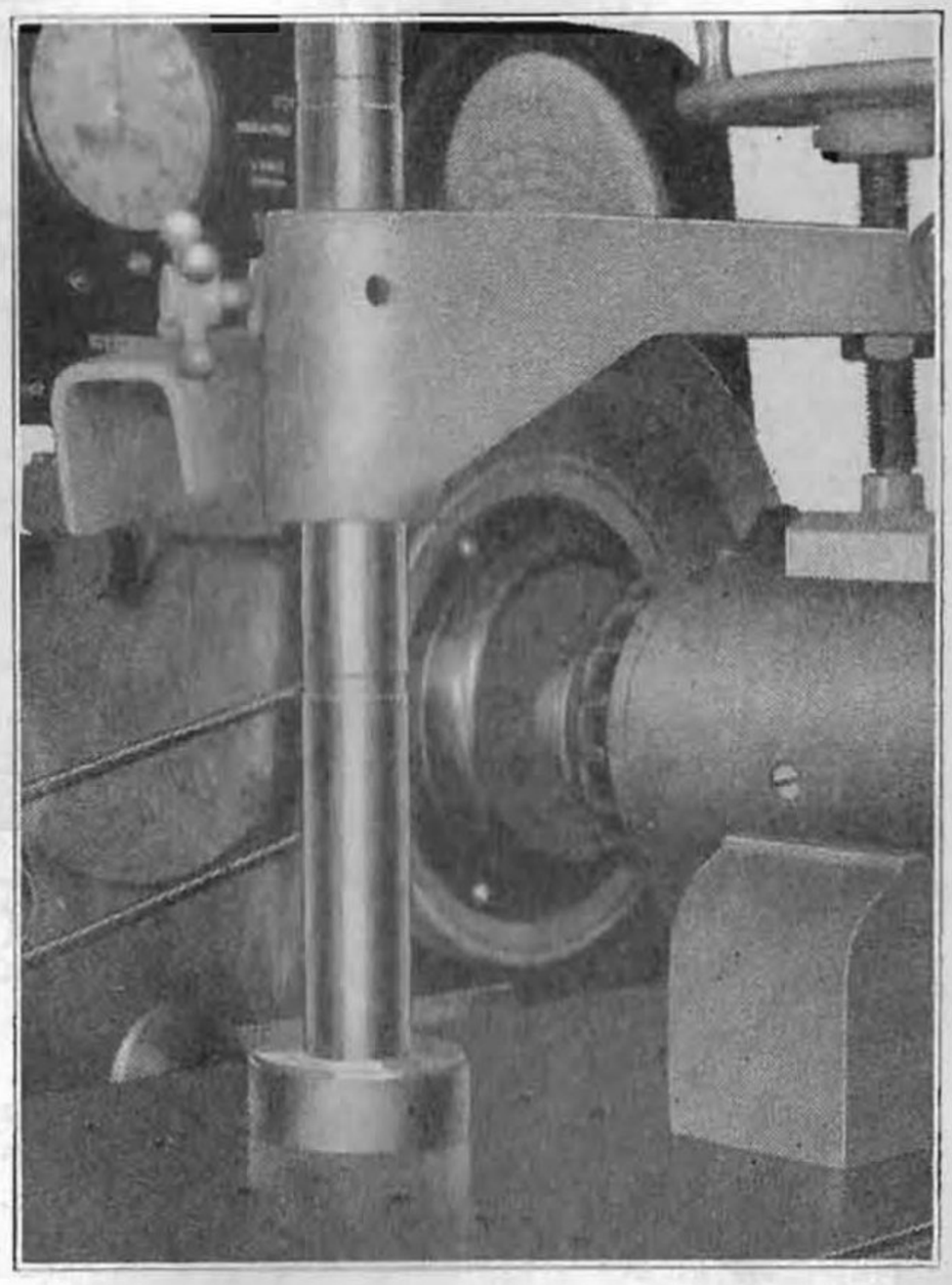


Fig. 18—Clamping a direct-driven generator.

The vise blocks, made with a V-opening are used for supporting the generator to be tested in the bench. These blocks are machined in pairs and numbered so that in use the blocks can be

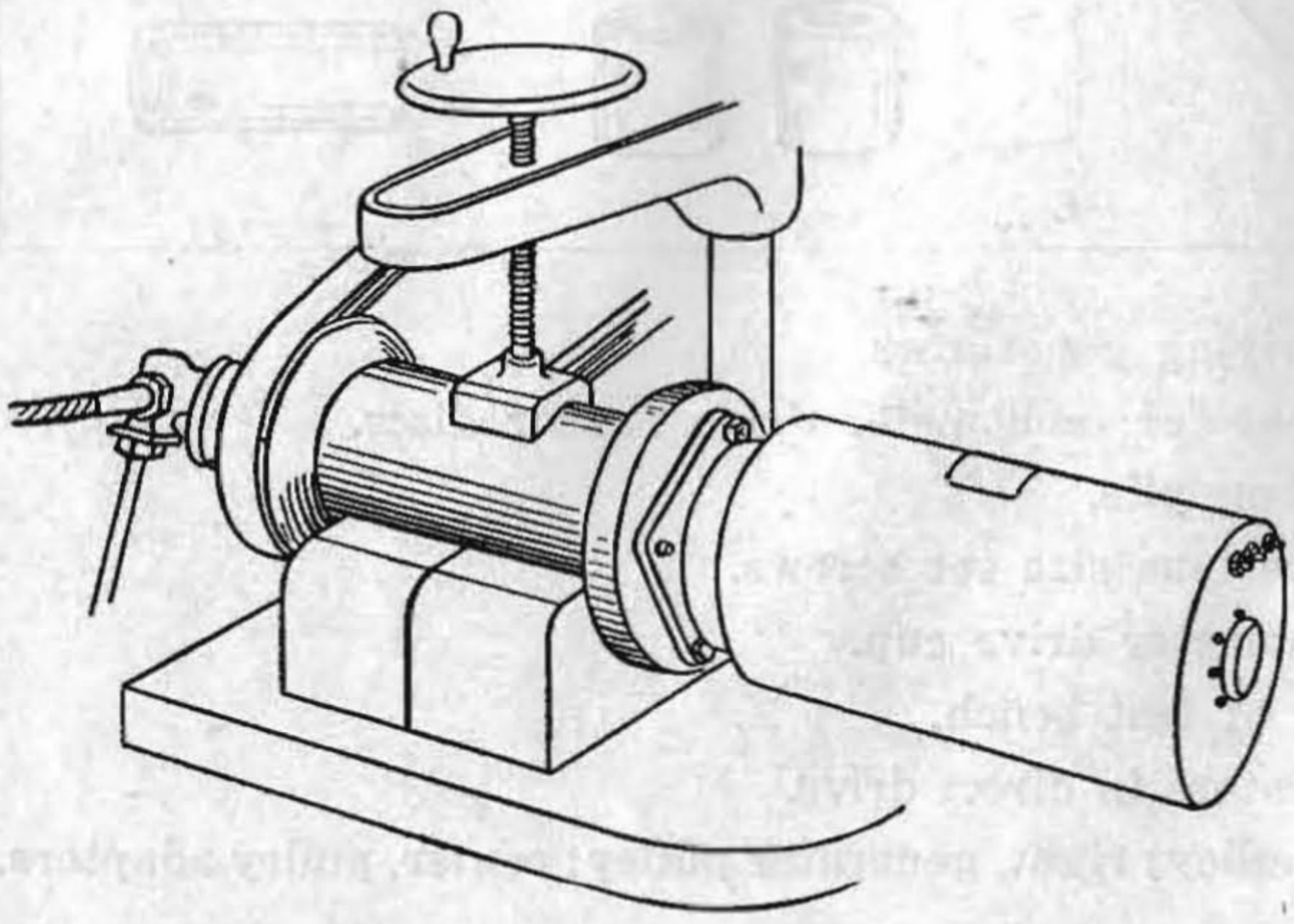


Fig. 17 — Left, showing special adapter (furnished special), placed in the vise blocks, for driving by belt, certain makes of generators which are flange — mounted to the engine and not conventionally driven by belt.

positioned with the numbers on the same side. This is important as it insures proper alignment and clamping of the generator. The steel protecting plate on top of the plywood bench top is provided with two rows of dowel pin holes for the dowels on the bottom of the vise blocks.

Details of the vise blocks, post and clamping arm are shown in Figs. 16 and 18. The clamp arm holds generators and starting motors up to 14 in. in diameter. The vise blocks are placed to the right or left of the clamping post, (depending on whether direct or belt drive is used), the clamp adjusted to proper height on the post and locked by the hand wheel, after which the generator on the vise blocks is securely locked in place with the vertical clamping screw.

Vertical and Lateral Adjustments

The bench top with vise blocks, generator and clamping mechanism can be adjusted for height vertically and laterally in order to get proper alignment of the generator and motor of the bench as well as for proper belt tension when belt drive is used. The belt tension and vertical adjustment wheels are shown in Figs. 19 and 20.

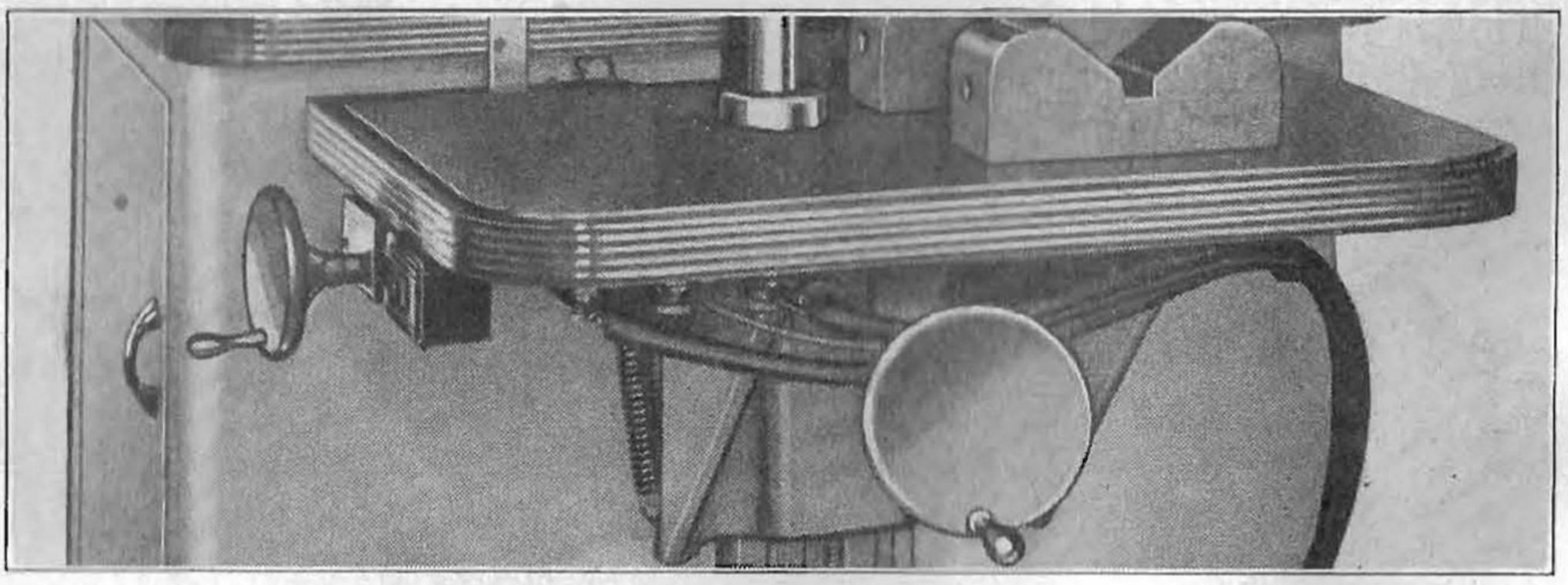


Fig. 19—Belt-tension wheel, left, and vertical bench adjustment wheel of Model 500 bench.

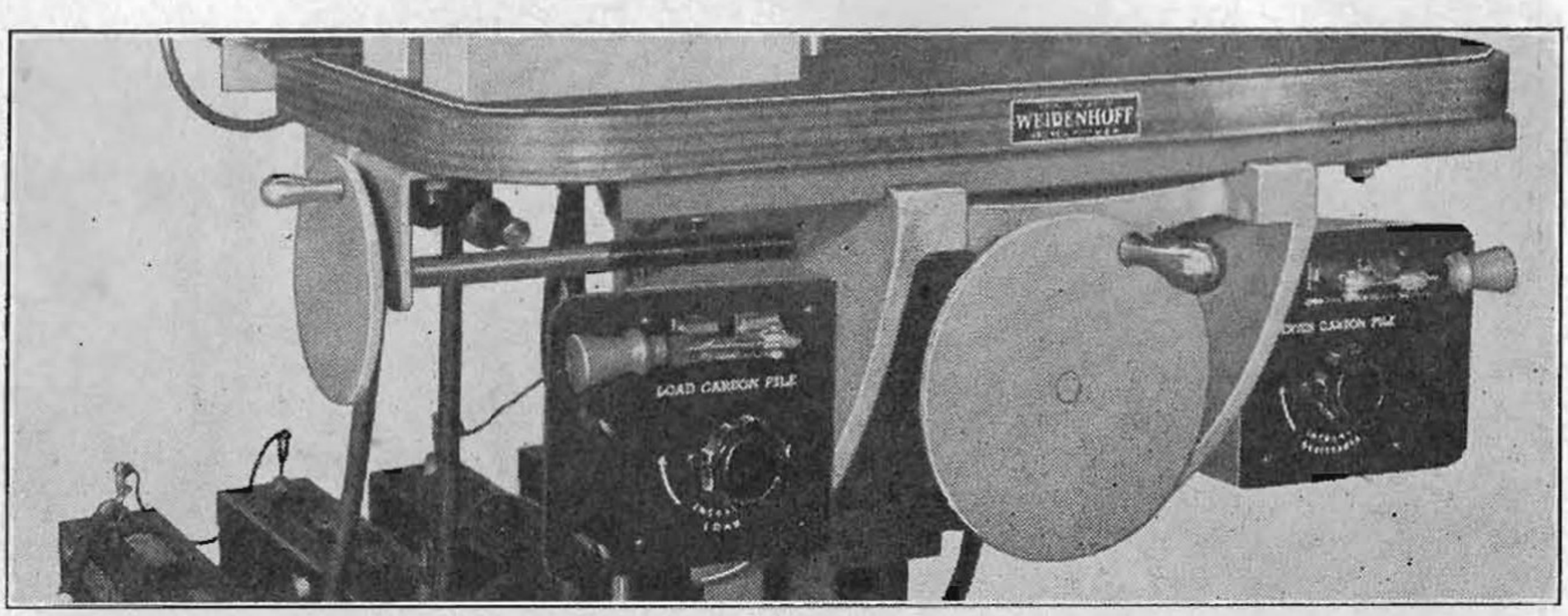


Fig. 20—Belt-tension and vertical bench adjustments of the Model 501 bench.

How to Use the Motor Control Switch

The illustrations in Figs. 21 and 22 show the use of the motor control switch handle located on top of the transmission case. The vertical position of the handle (facing the test bench) is the OFF position. The handle is turned to the left for the starting or ON position. If the generator on test rotates in the opposite direction the handle is turned to the right or reverse direction. Movement of the handle shifts the motor brushes for speed control.

To increase the speed of the generator it is only necessary to pull the control handle slowly towards the operator, Fig. 21. (Note: This is for low speed only. Do not hold handle out for more than a few seconds at a time).

Fig. 21—Foreward movement of lever.

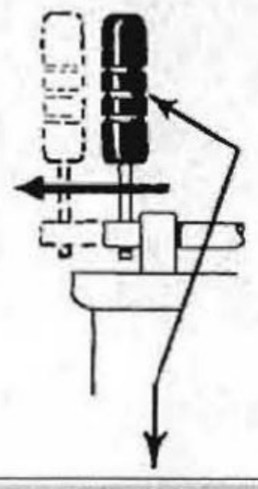
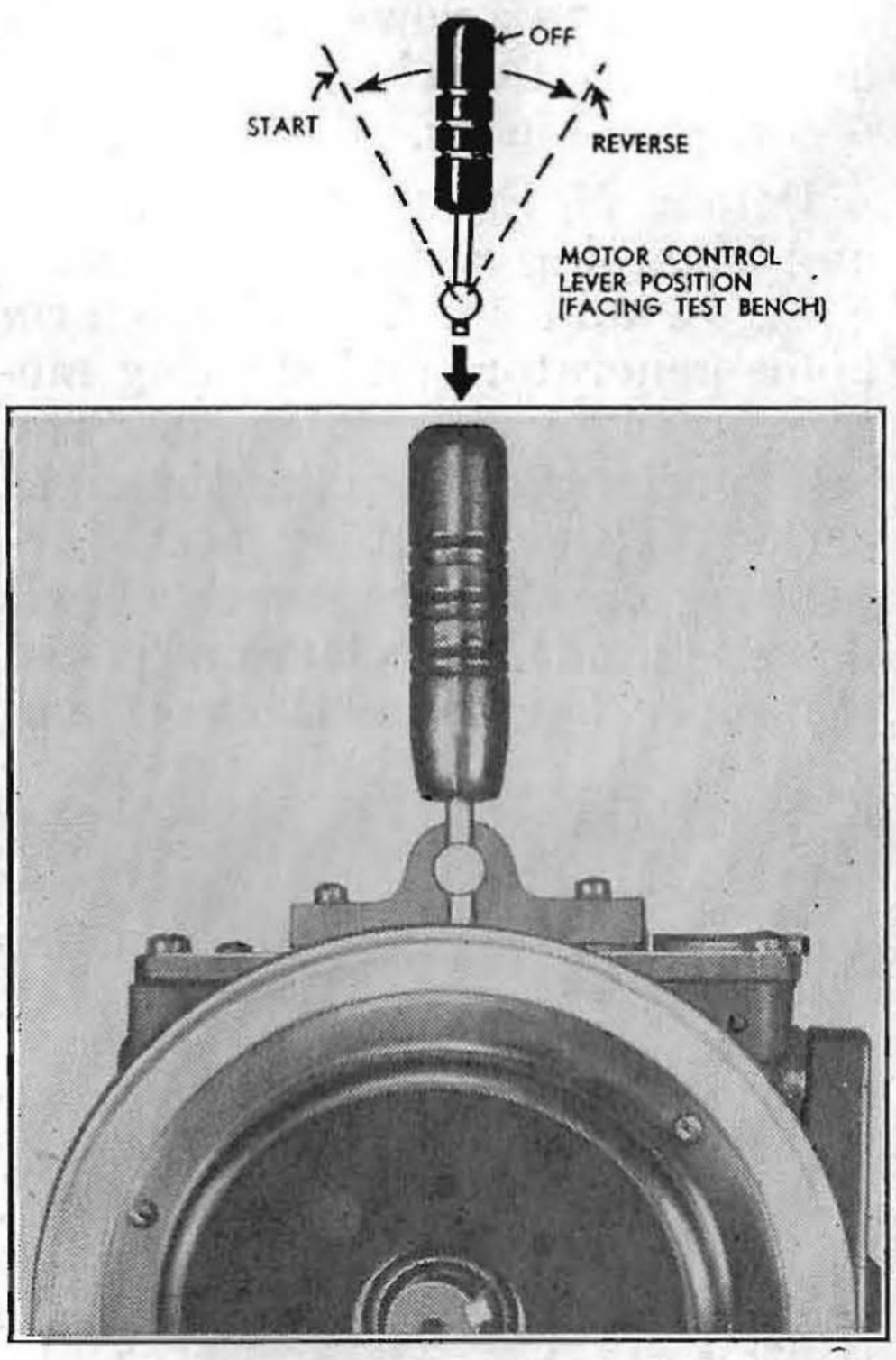
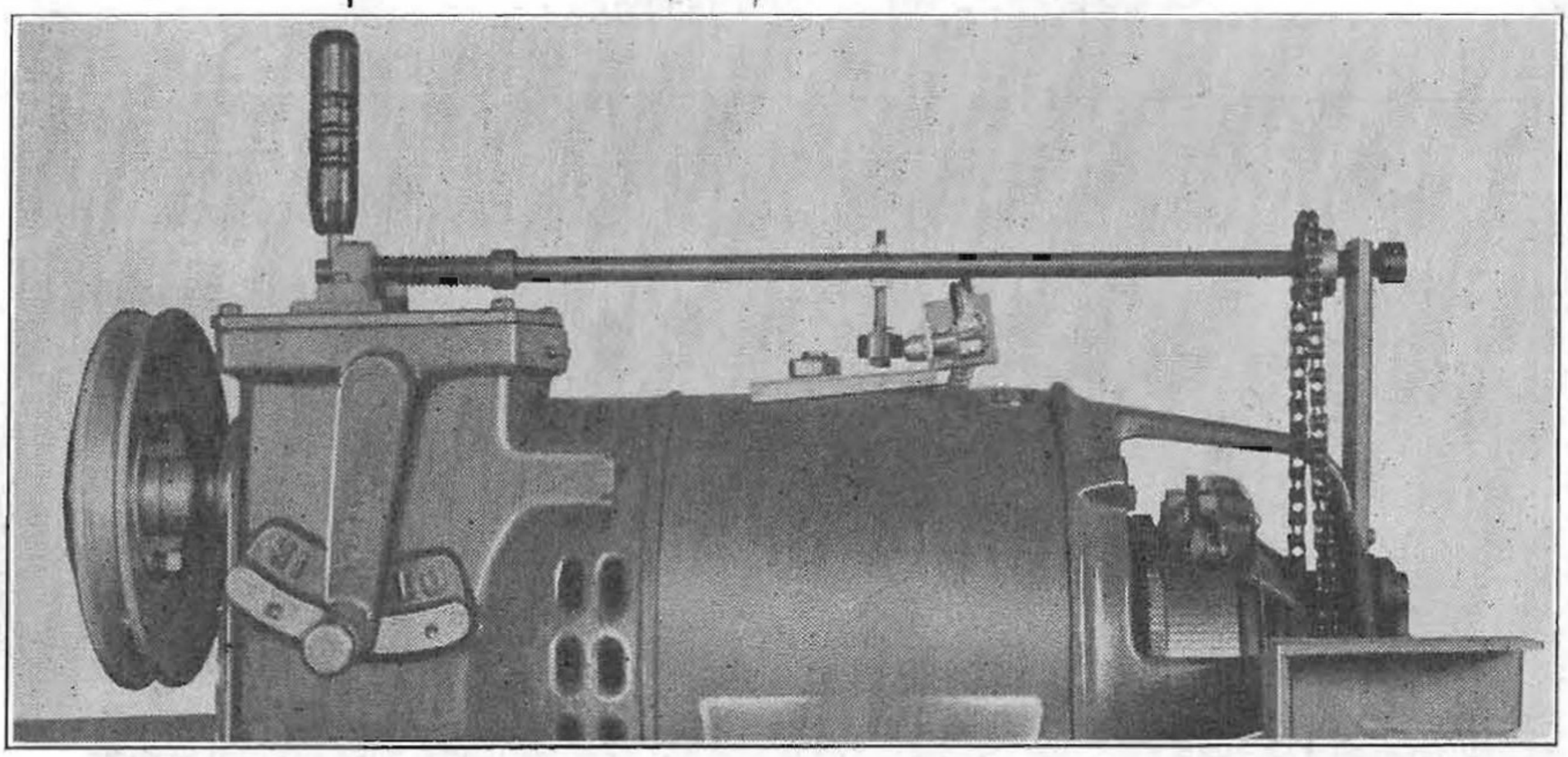
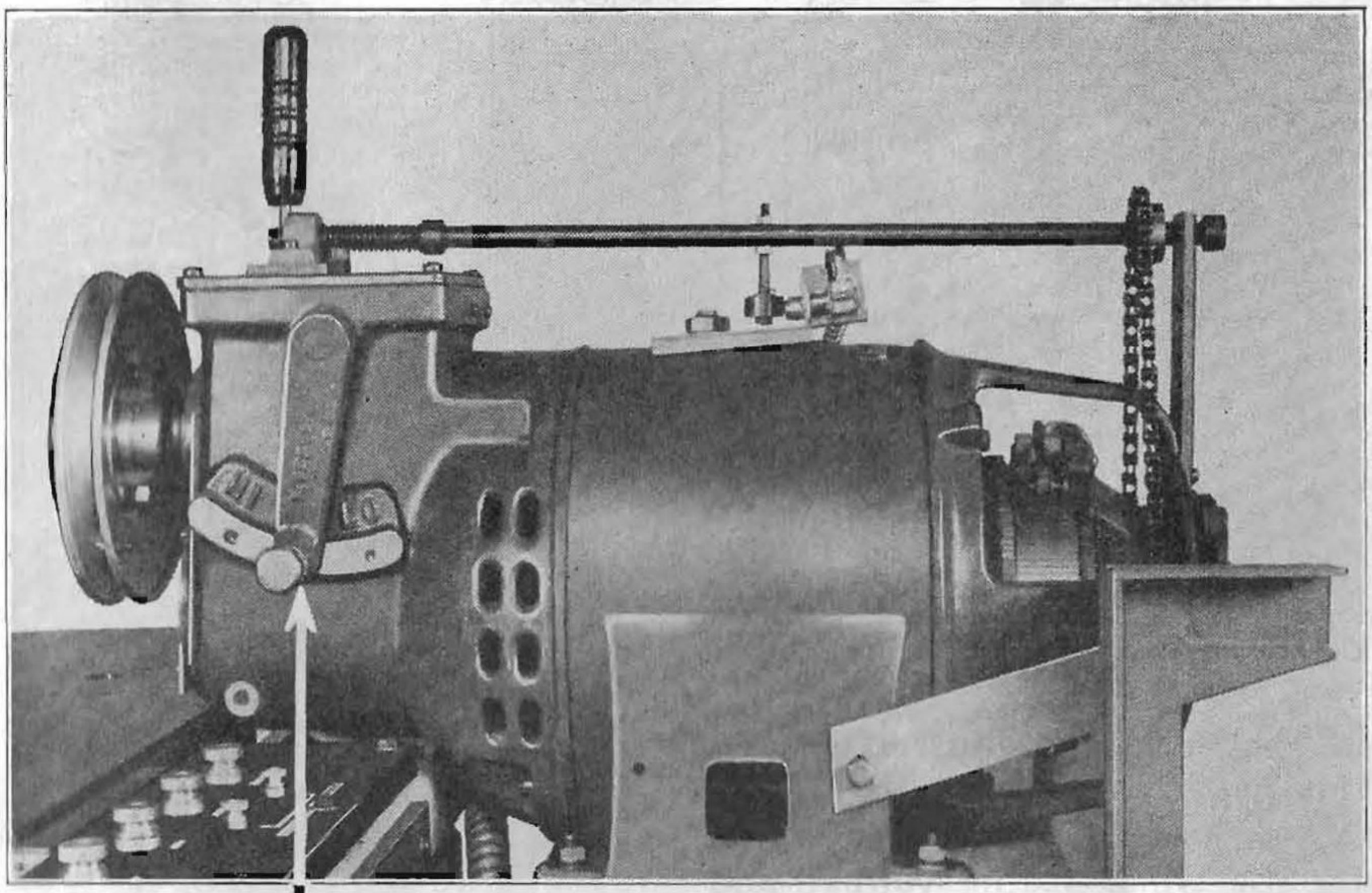


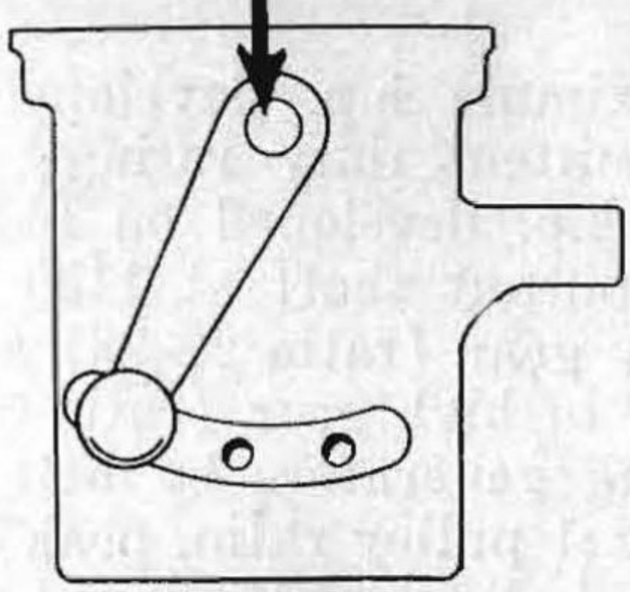
Fig. 22 — Below is illustrated the method of using the motor switch handle.





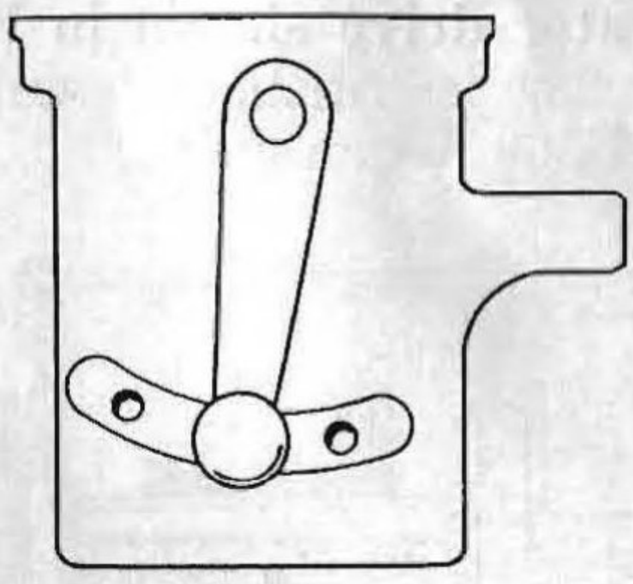
How to Use the Gear Transmission





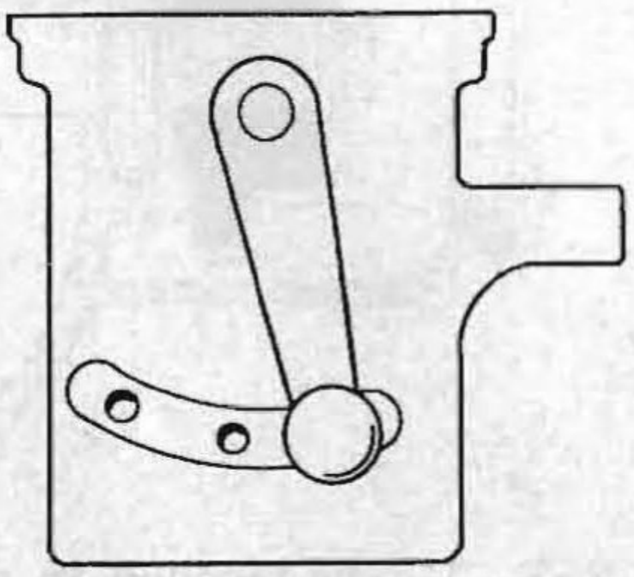
HIGH GEAR

SELF LOCKING GEAR SHIFTING LEVER POSITIONS



NEUTRAL

Figs. 23, 24 and 25—Diagram showing the transmission gear lever in high, neutral and low gear positions.



LOW GEAR

The gear transmission has been specially designed for this generator test bench, and its case is cast integrally with the drive end housing of the motor. The gears are shifted by a self locking lever mounted on the side of the case

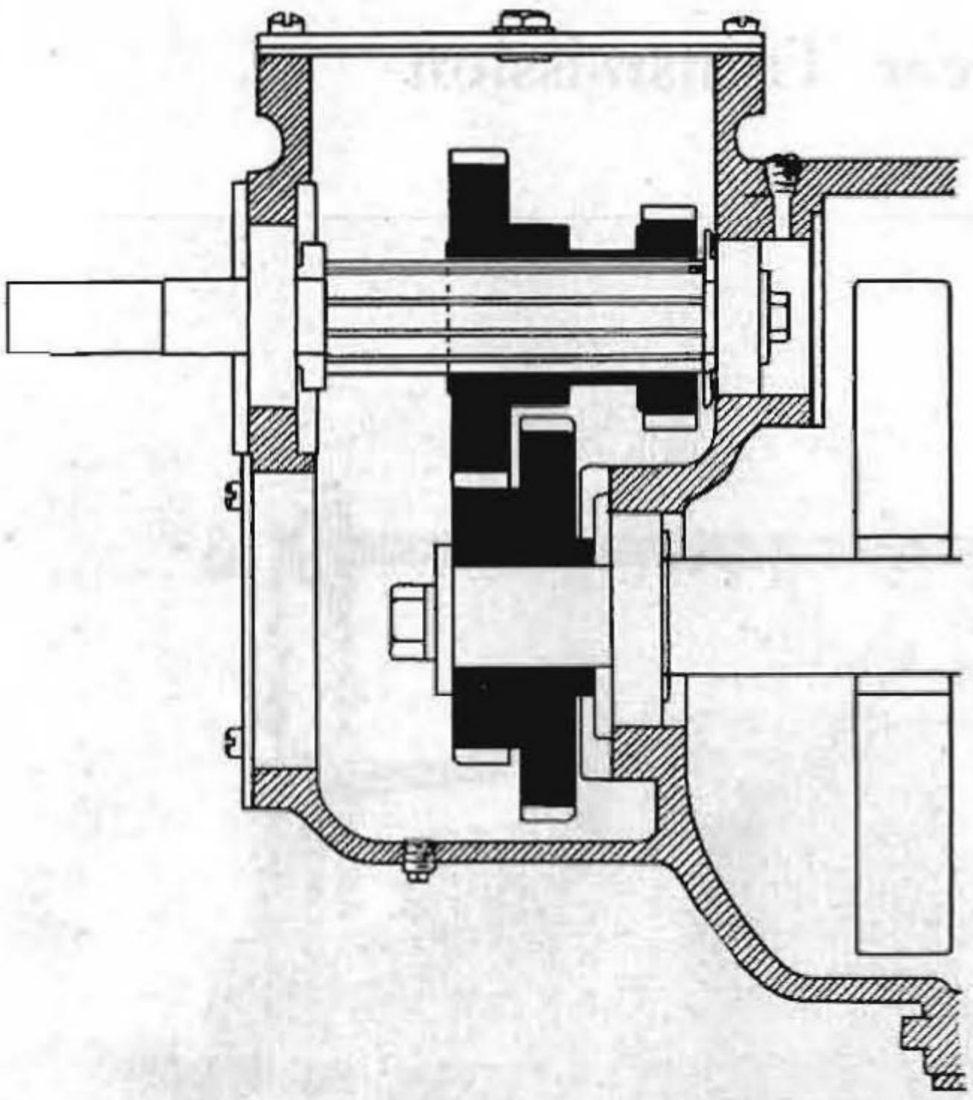


Fig. 25A—Gears meshed in low speed.

as shown in the illustrations on this page.

A neutral position is provided for use when testing voltage and current regulators by means of an auxiliary generator. (Auxiliary generator drive shown in Fig. 15, page 23, is furnished with the Model 500 bench only).

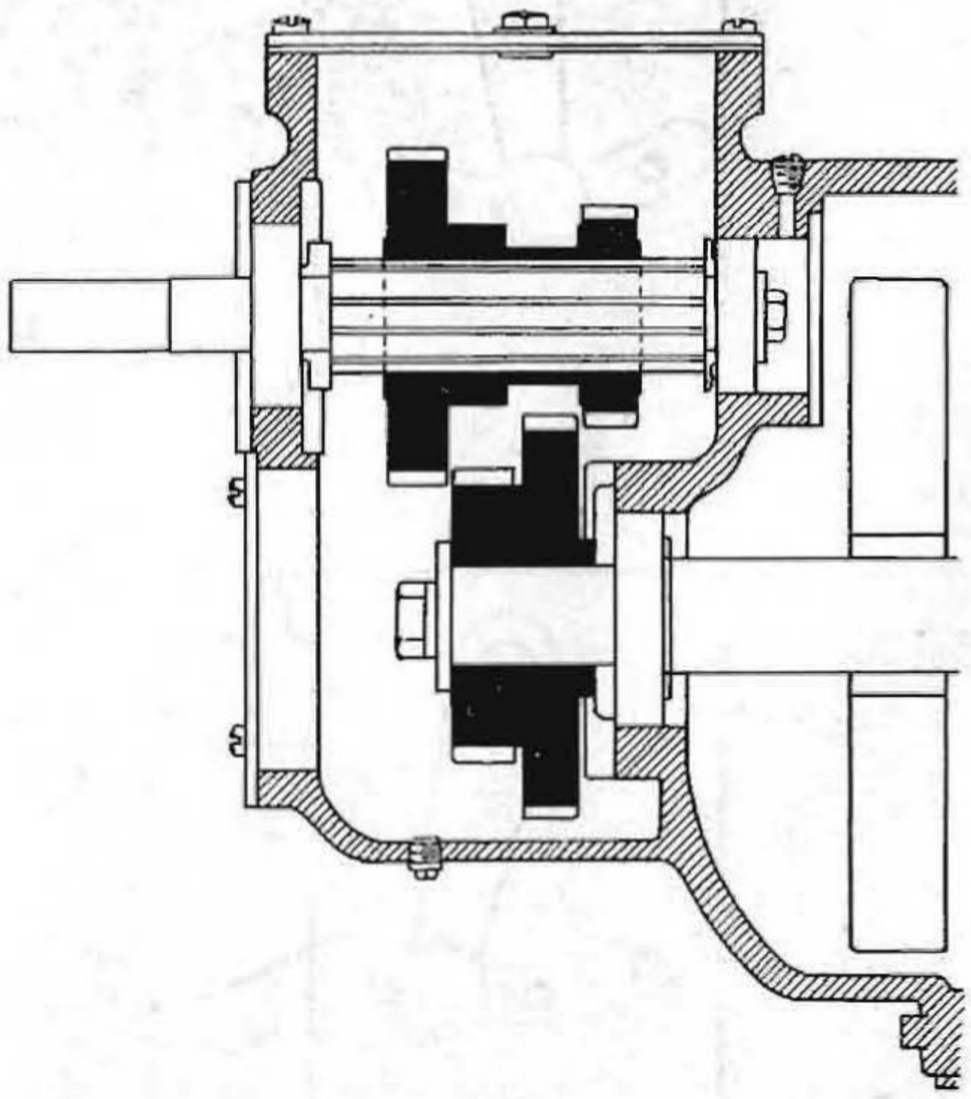


Fig. 25B—Gears meshed in neutral position.

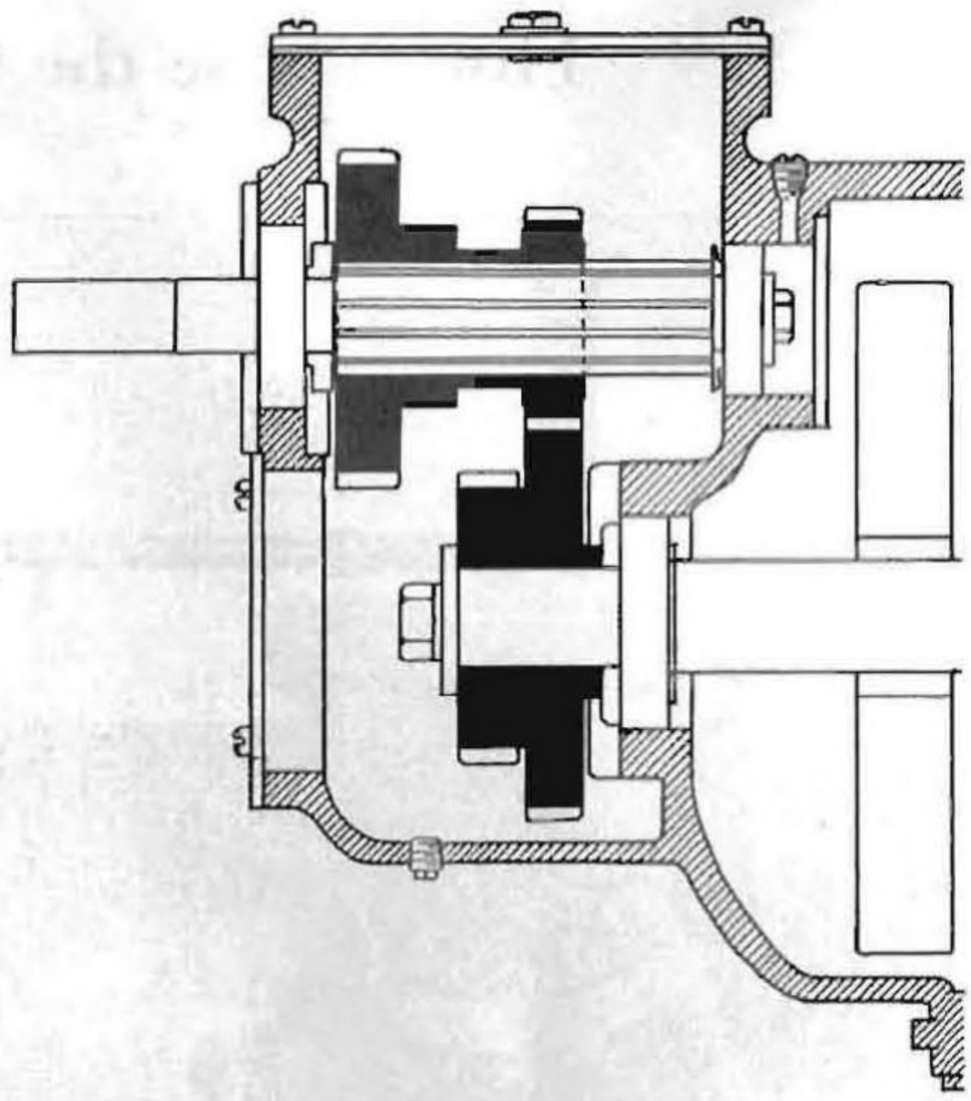


Fig. 25C—Gears meshed for high speed. In these illustrations, the lower gears are on the motor and the countershaft gears on generator drive shaft.

The following specifications apply to the motor and transmis sion:

Maximum h.p. developed, 7½. Intermittent duty rating: 5 h.p. Peak h.p. developed on transmission, output shaft at 1150 r.p.m. in low gear (ratio 22:26) at 2100 r.p.m. in high gear (ratio 31:17). Testing generators by belt drive, with 2:1 pulley ratio, peak h.p. is reached at generator speed of 2300 r.p.m. in low gear, at 4200 r.p.m. in high gear. Testing generators directly coupled to transmission output shaft, 5 h.p. or more is available for speeds of 450 to 4050 r.p.m. Testing belt driven with 2:1 pulley, ratio 5 h.p. or more is available for speeds of 900 to 8100 r.p.m. Directly coupled 3 h.p. or more is available for speeds of 300 to 5800 r.p.m. belt driven with 2:1 pulley ratio for speeds of 600 to 11600 r.p.m.

How to Drive Generator

(DIRECT DRIVE)

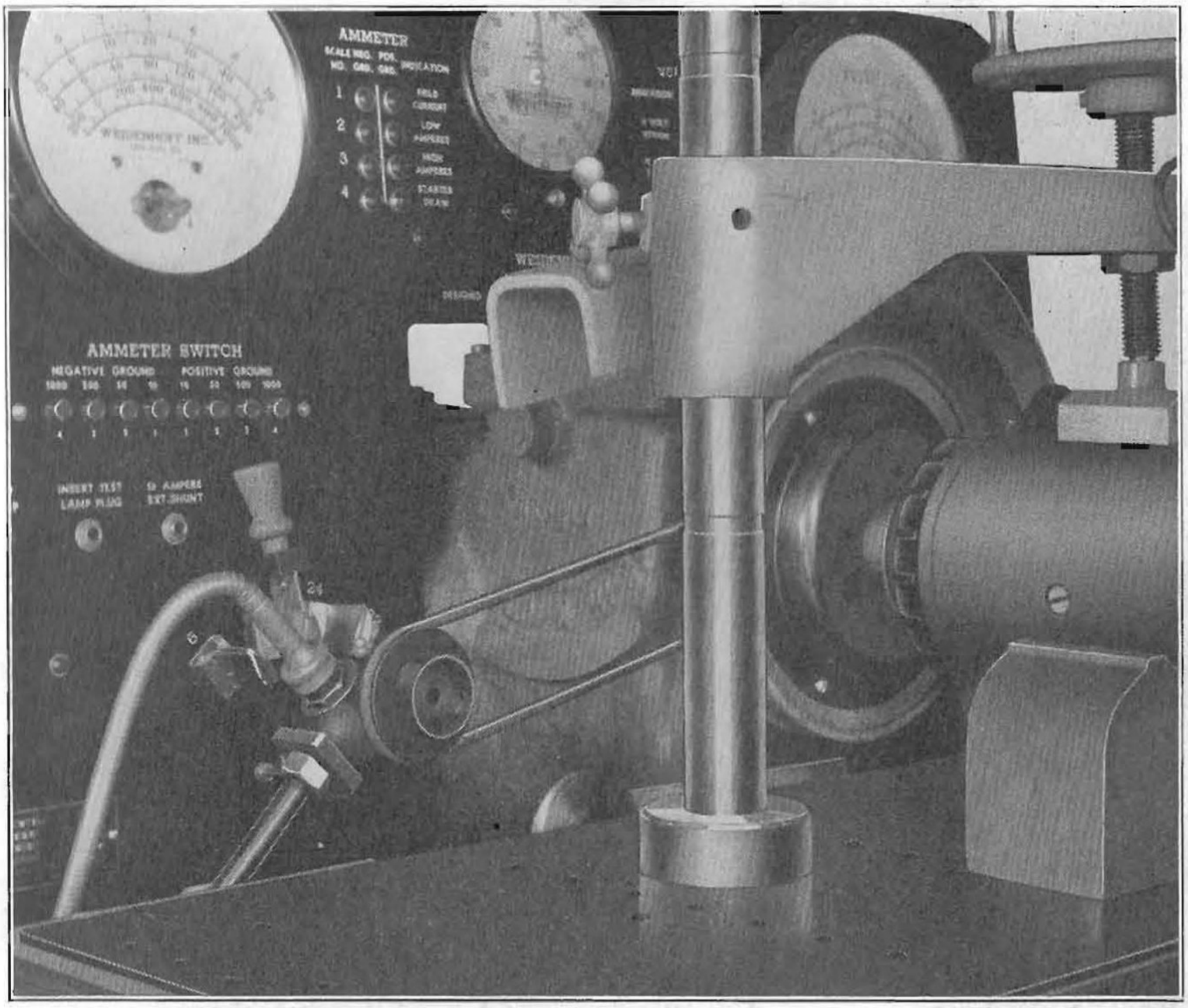


Fig. 26—This shows how a generator is mounted in the test bench for direct drive. Guide pins on the bottom of the vise blocks are placed in holes in the bench top. With direct drive, the tachometer is driven by a belt, as shown.

With direct drive, Fig. 26, the proper adapter is placed on the generator shaft for engagement with the slots in the face plate. The V-block or vise is placed in the center of the table top, the generator being centered by the vertical adjustment wheel at the front of the bench and below the table top. The generator is then firmly clamped in position.

NOTE: The V-blocks on which the generator is mounted are machined in pairs and numbered. The blocks must always be positioned so that the numbers are on the same side. This insures proper alignment and clamping of generator.

How to Drive Generator

(BELT DRIVE)

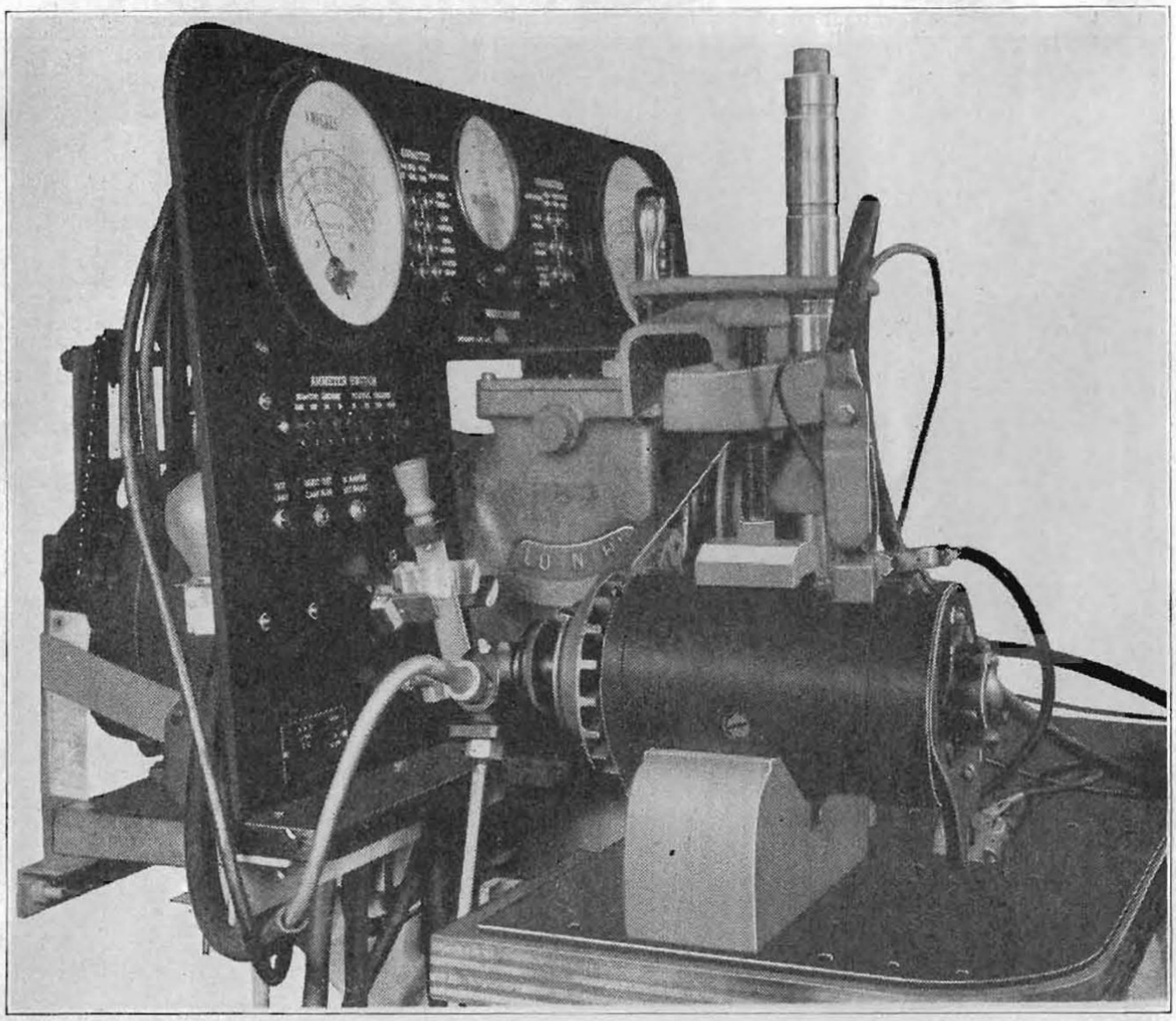
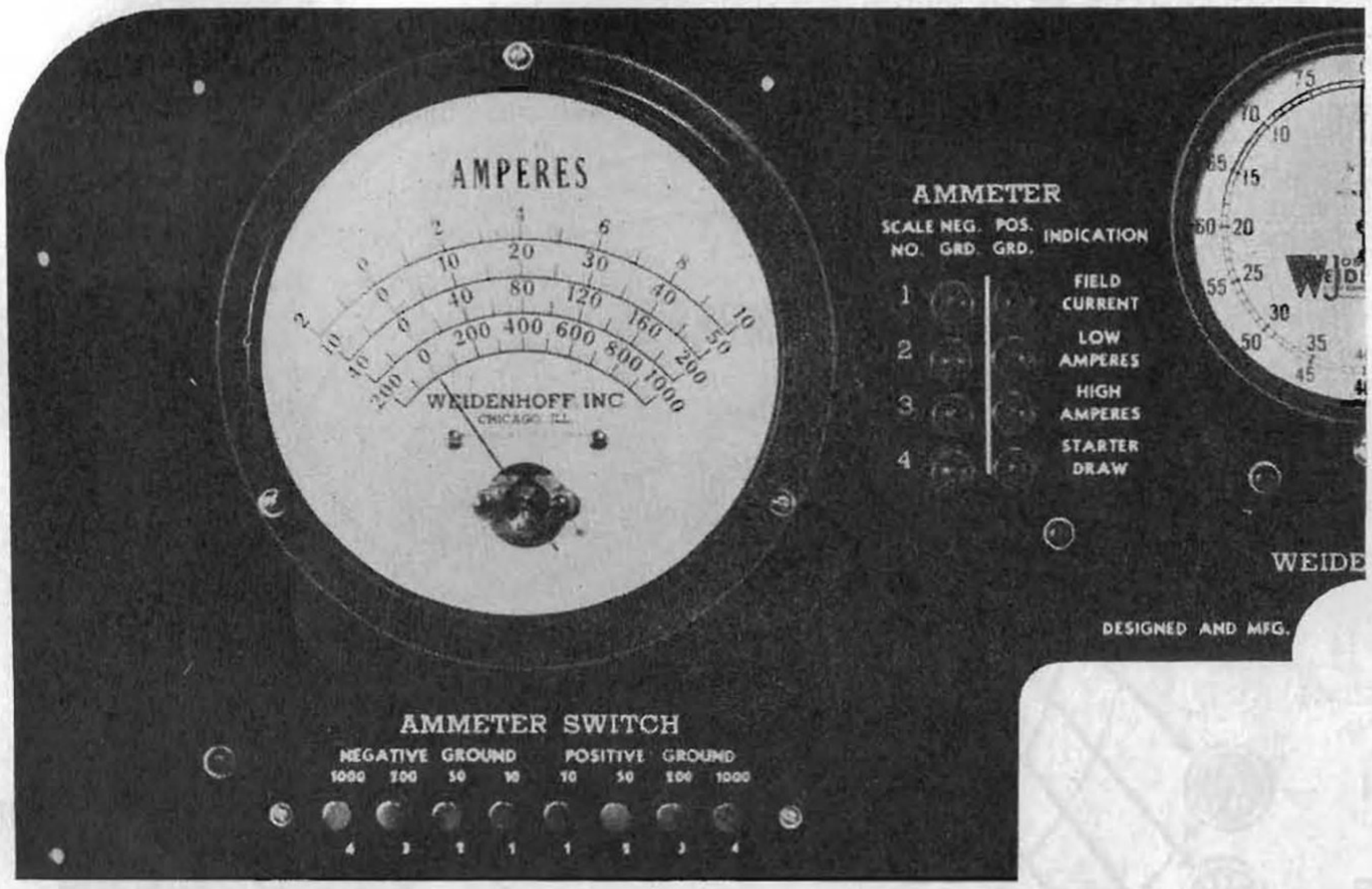


Fig. 27—Belt-driven generators are placed in the vise blocks, which (with belt-drive) are located on the left side of the bench top. In this case the tachometer is driven directly from the end of the generator shaft as explained on pages 48 and 49.

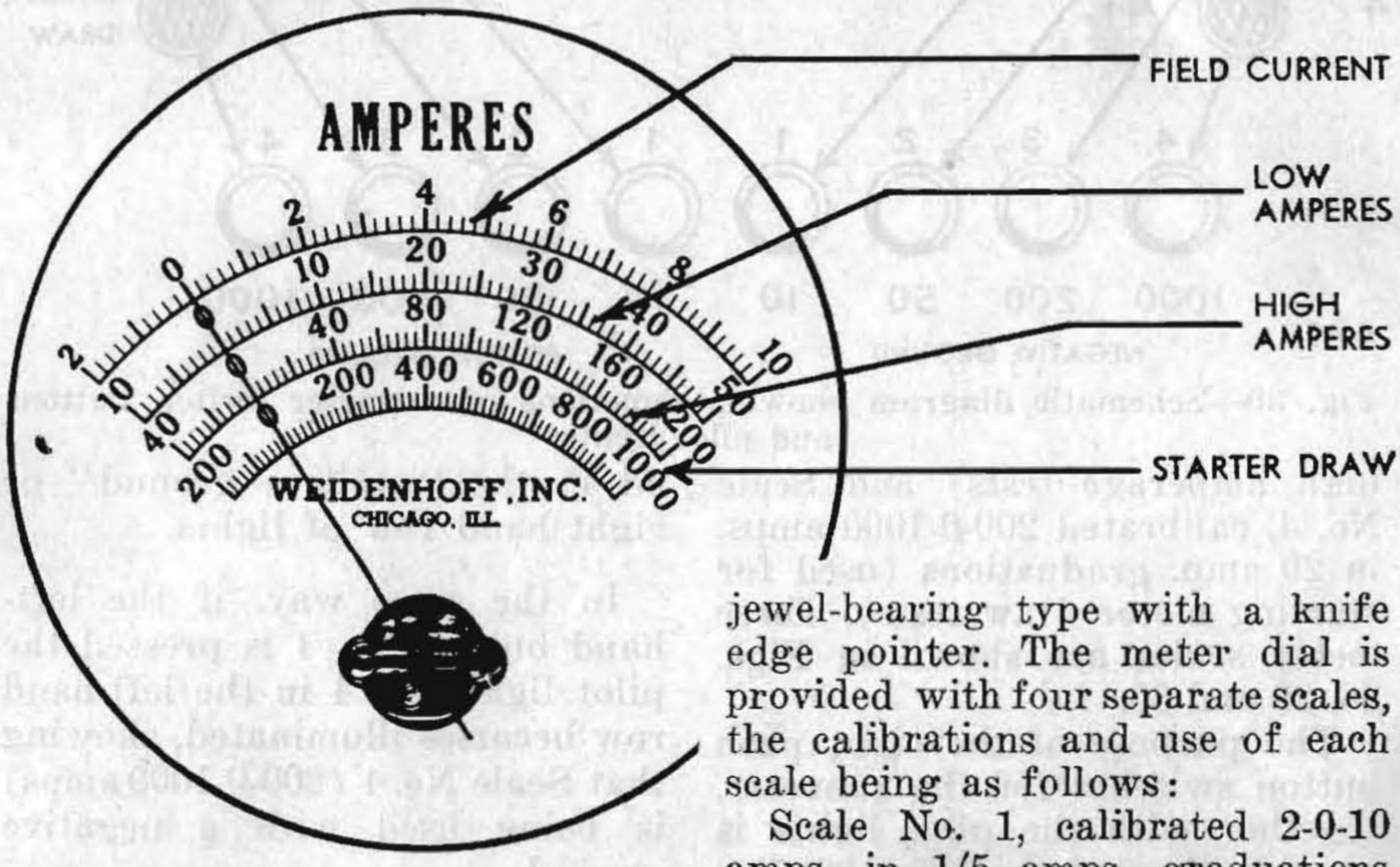
The Model 500 and 501 Test Benches completely duplicate the wiring existing when the generator is in normal service on the motor vehicle. With this knowledge the testing process becomes simple. In Fig. 27, the manner of mounting a belt-driven generator is shown. In the case of the belt-driven method, Fig. 27, the generator is mounted in the V-block or vise and the pulley lined up with the motor drive pulley. The belt tension is then adjusted by the control wheel on the left hand side of bench.

IMPORTANT: If the belt tension is too tight, it over-loads the motor and generator bearings. It also may damage the belt. The belt should not be too loose as slippage will occur at high speeds.

How to Use the Ammeter



Figs. 28 and 29—Above, location of ammeter switch. Below, close-up of ammeter scales.



The ammeter of the Weidenhoff Models 500 and 501 test benches is of the D'Arsonval heavy-duty, jewel-bearing type with a knife edge pointer. The meter dial is provided with four separate scales, the calibrations and use of each scale being as follows:

Scale No. 1, calibrated 2-0-10 amps. in 1/5 amps. graduations

(used for field current tests). Scale No. 2, calibrated 10-0-50 amps. in 1 amp. graduations (used for low amperage tests). Scale No. 3, calibrated 40-0-200 amps. in 4 amp. graduations (used for high amperage tests) and Scale No. 4, calibrated 200-0-1000 amps. in 20 amp. graduations (used for starting motor draw tests). These meter scales are shown in Figs. 28, 29 and 30.

The purpose of the eight push button switches for the ammeter, together with the pilot lights is graphically shown in Fig. 30. For example, if with a generator connected to the bench, the right hand push button, 2, is pressed, a reading is obtained on Scale No. 2 and the pilot light, indicating "low amperes" will be illuminated in the "positive ground" or right hand row of lights.

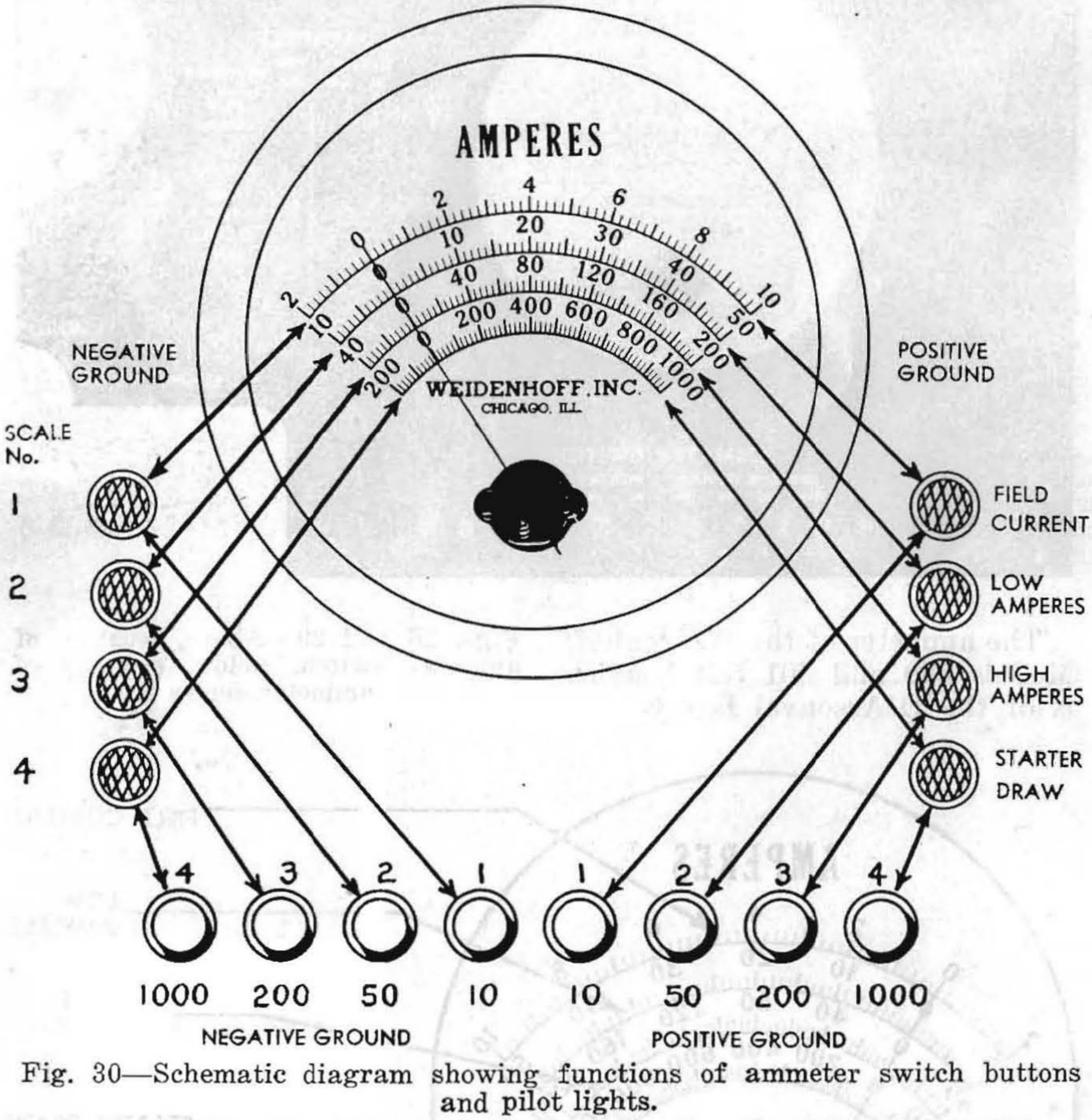


Fig. 30—Schematic diagram showing functions of ammeter switch buttons and pilot lights.

In the same way, if the left-hand button No. 4 is pressed the pilot light, No. 4 in the left-hand row becomes illuminated, showing that Scale No. 4 (200-0-1000 amps) is being used with a negative ground.

Ammeter Shunts

The function of the ammeter shunts and switches is illustrated in Fig. 31. Only the negative ground switches are shown connected, however, the positive ground switches are connected the same way.

A 10-amp. meter shunt is provided, which is isolated from all other circuits and can, therefore, be used for a great variety of testing.

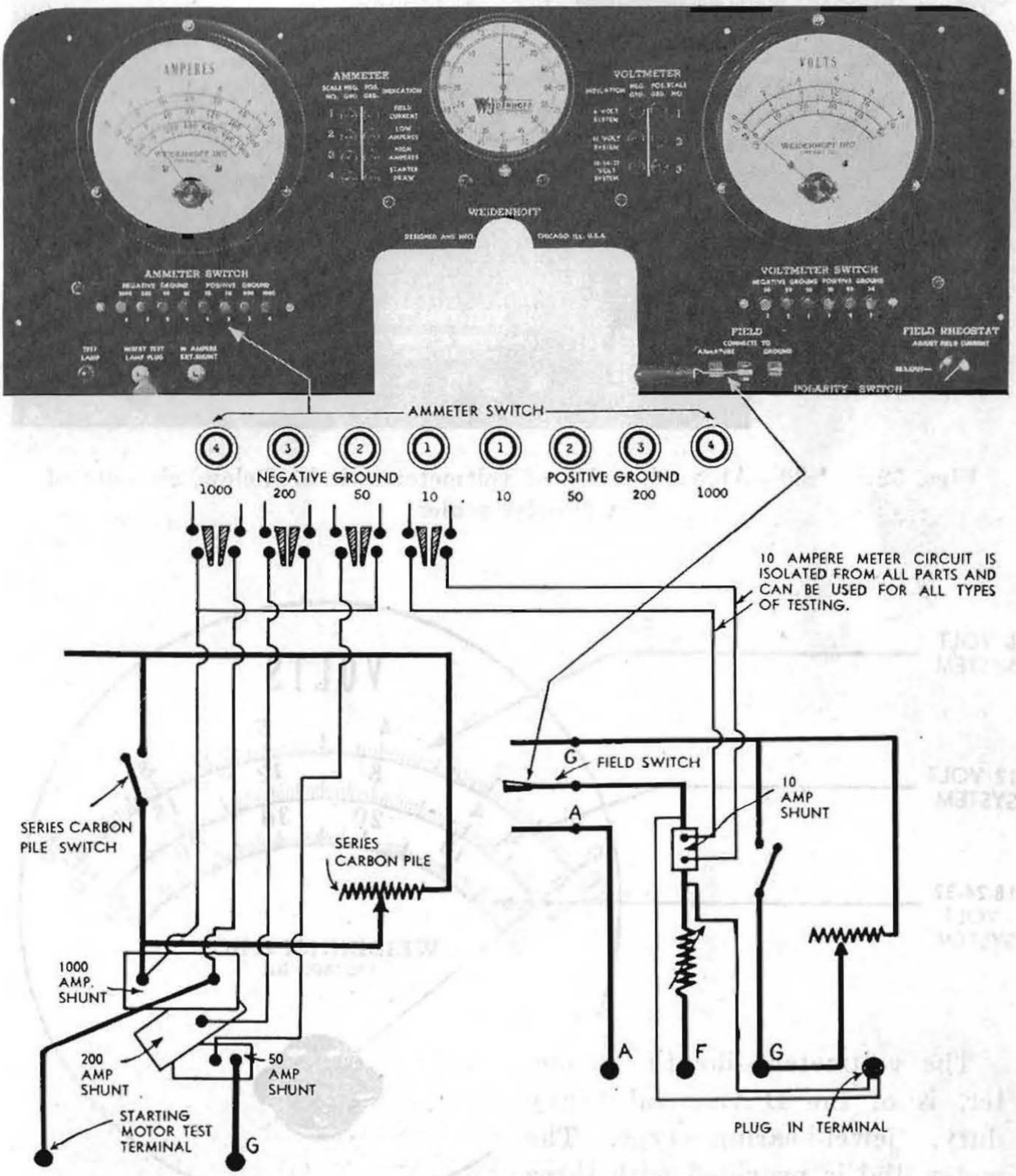
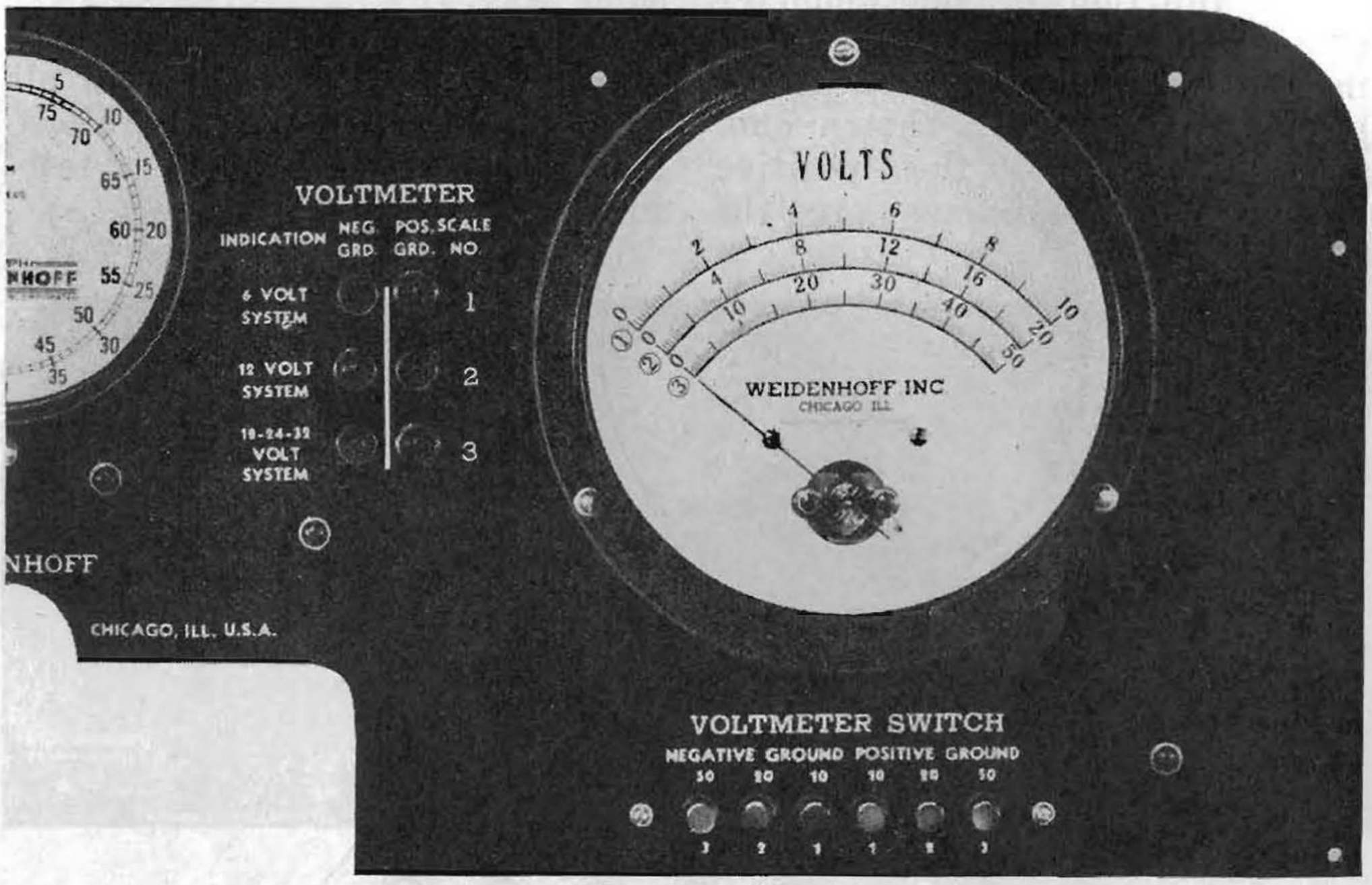
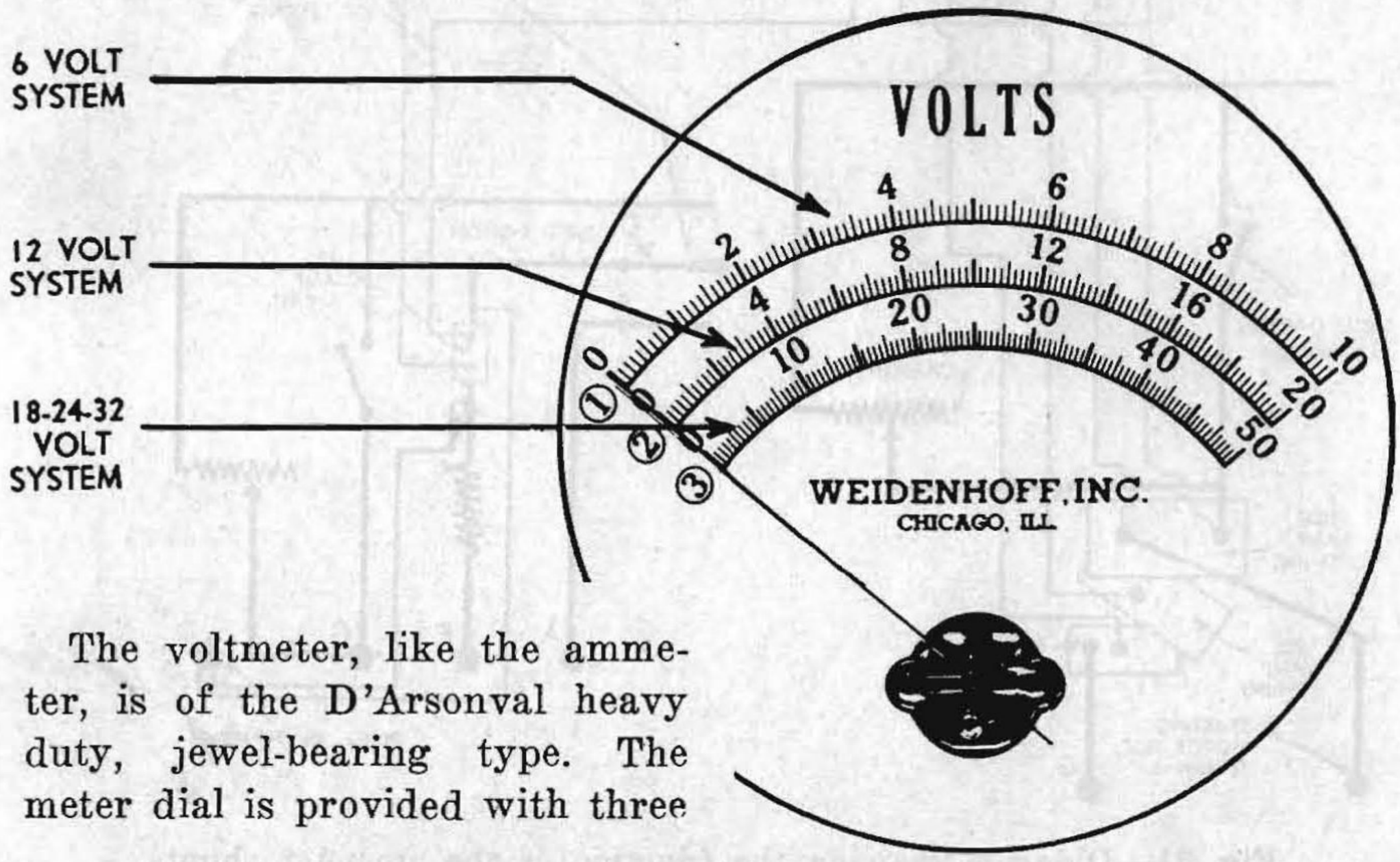


Fig. 31—Diagram showing the function of the ammeter shunts.

How to Use the Voltmeter



Figs. 32 and 33—Above, location of voltmeter switch. Below, close-up of voltmeter scales.



The voltmeter, like the ammeter, is of the D'Arsonval heavy duty, jewel-bearing type. The meter dial is provided with three

separate scales, the calibrations and use of each scale being as follows:

Scale No. 1, calibrated 0-10 volts, in 1/10 volt graduations (used for when testing 6-volt systems). Scale No. 2, calibrated 0-20 volts, in 1/5 volt graduations (used when testing 12-volt systems). Scale No. 3, calibrated 0-50 volts in 1/4 volt graduations (used for testing 18-24 and 32-volt systems). The meter scales are shown in Figs. 32, 33 and 34.

The purpose of the six push button switches for the voltmeter, together with the pilot lights is graphically shown in Fig. 34. These six push buttons are used for selecting the proper scale and polarity - 10,20,50 volts, positive or negative ground. The jewels of the positive pilot lights are red—those of the negative lights, green. This holds true of the ammeter signal lights also.

The three right hand push buttons are used with positive grounded generators and the three left-handed buttons with negative grounded generators.

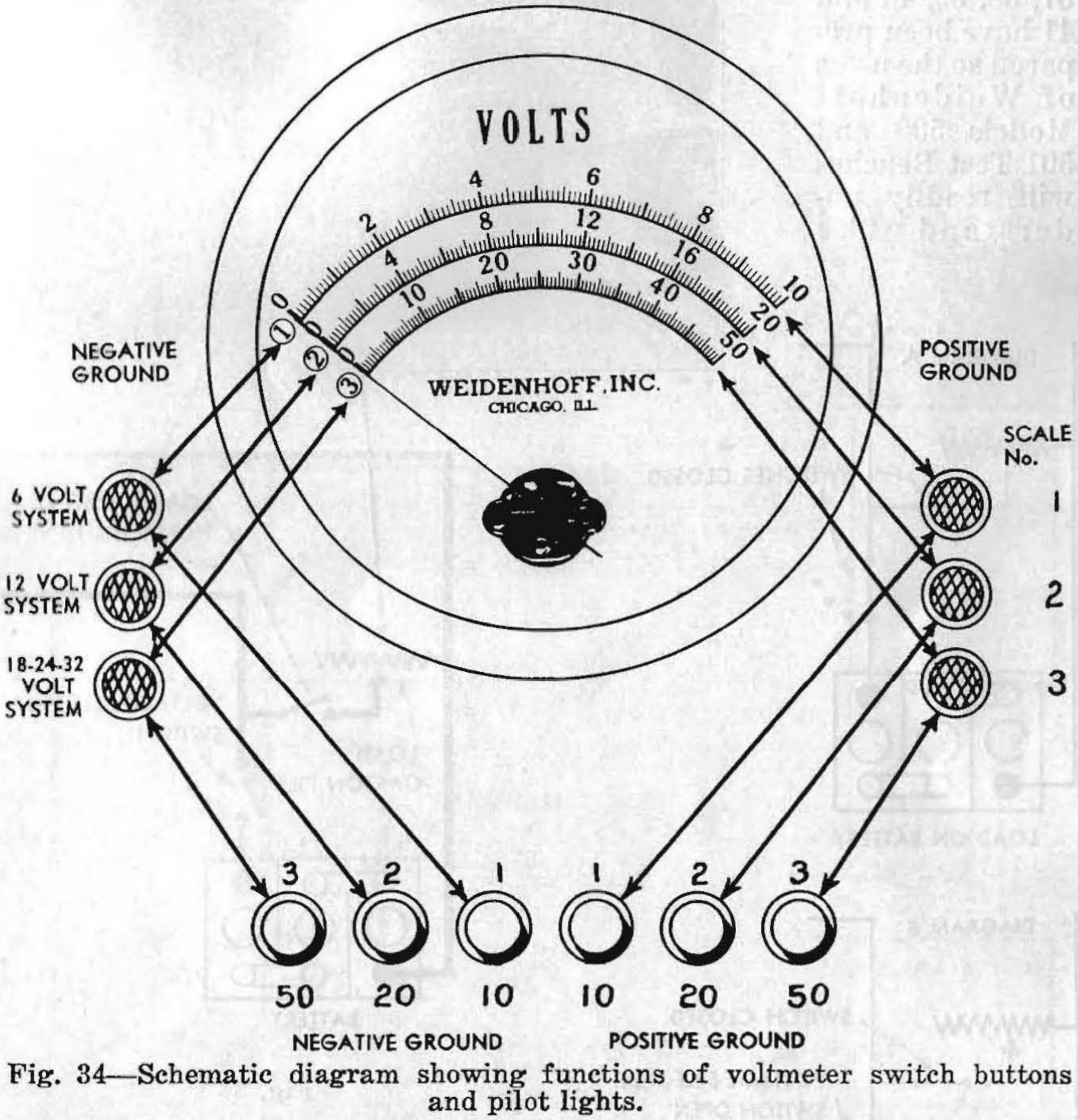
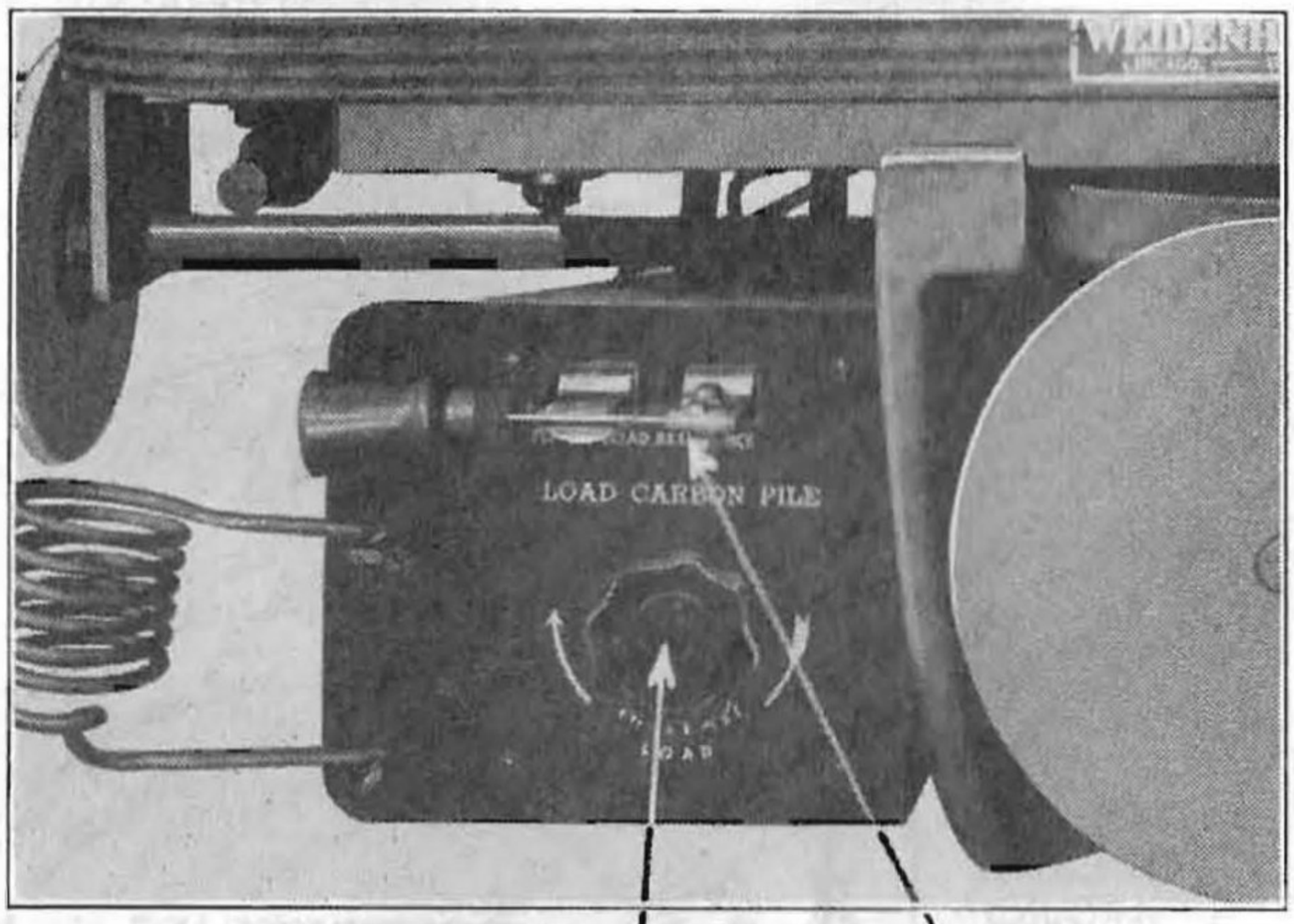


Fig. 34—Schematic diagram showing functions of voltmeter switch buttons and pilot lights.

How to Use the Load Carbon Pile

The diagrams, Figs. 31, 35, 36, 37, 38, 39, 40 and 41 have been prepared so the users of Weidenhoff Models 500 and 501 Test Benches will readily understand the "build-up" of the various electrical circuits of the bench in connection with generator testing. Figure 35, for example, shows graphically the functions of the load carbon pile and series carbon pile in the battery and generator



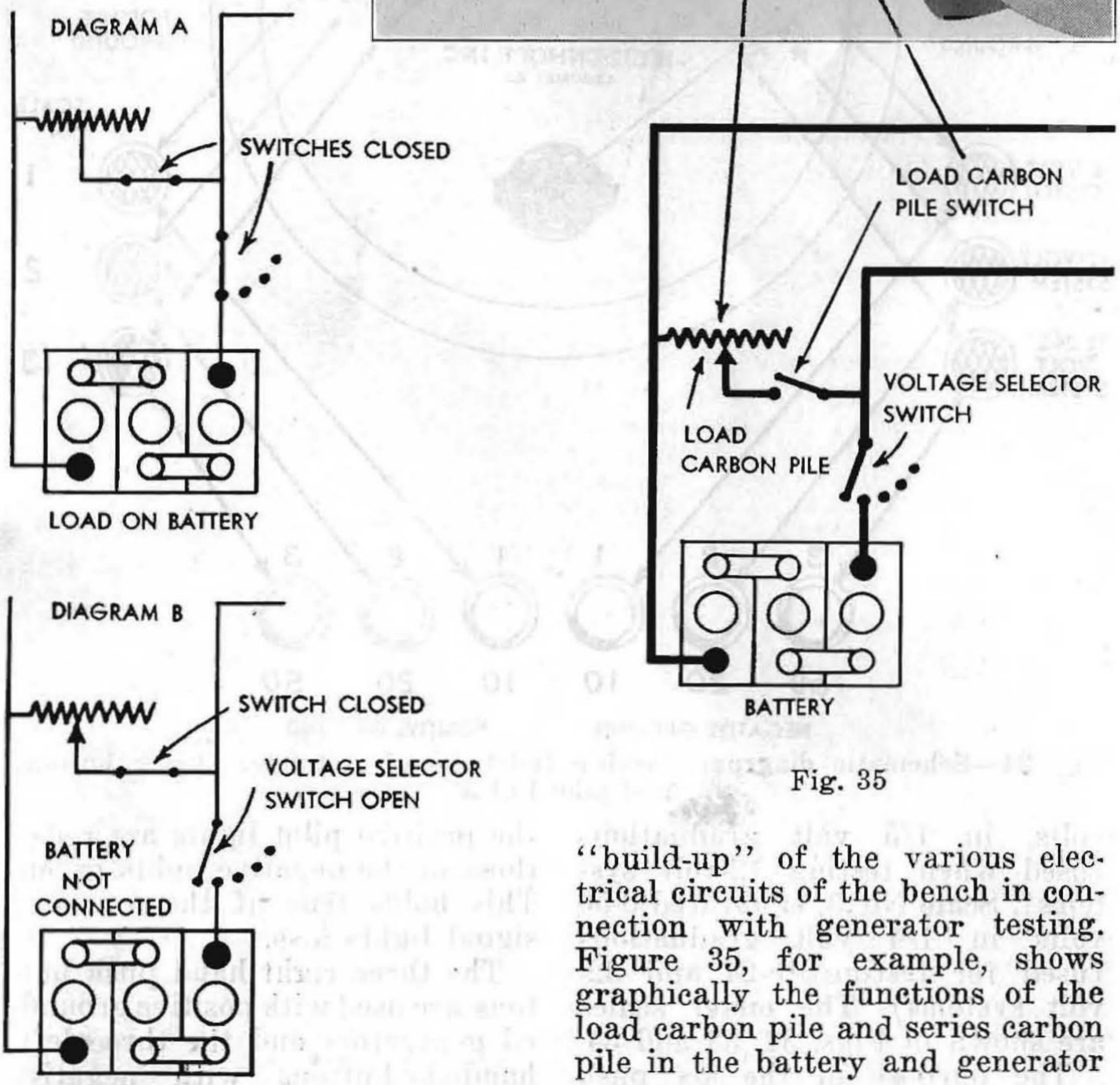
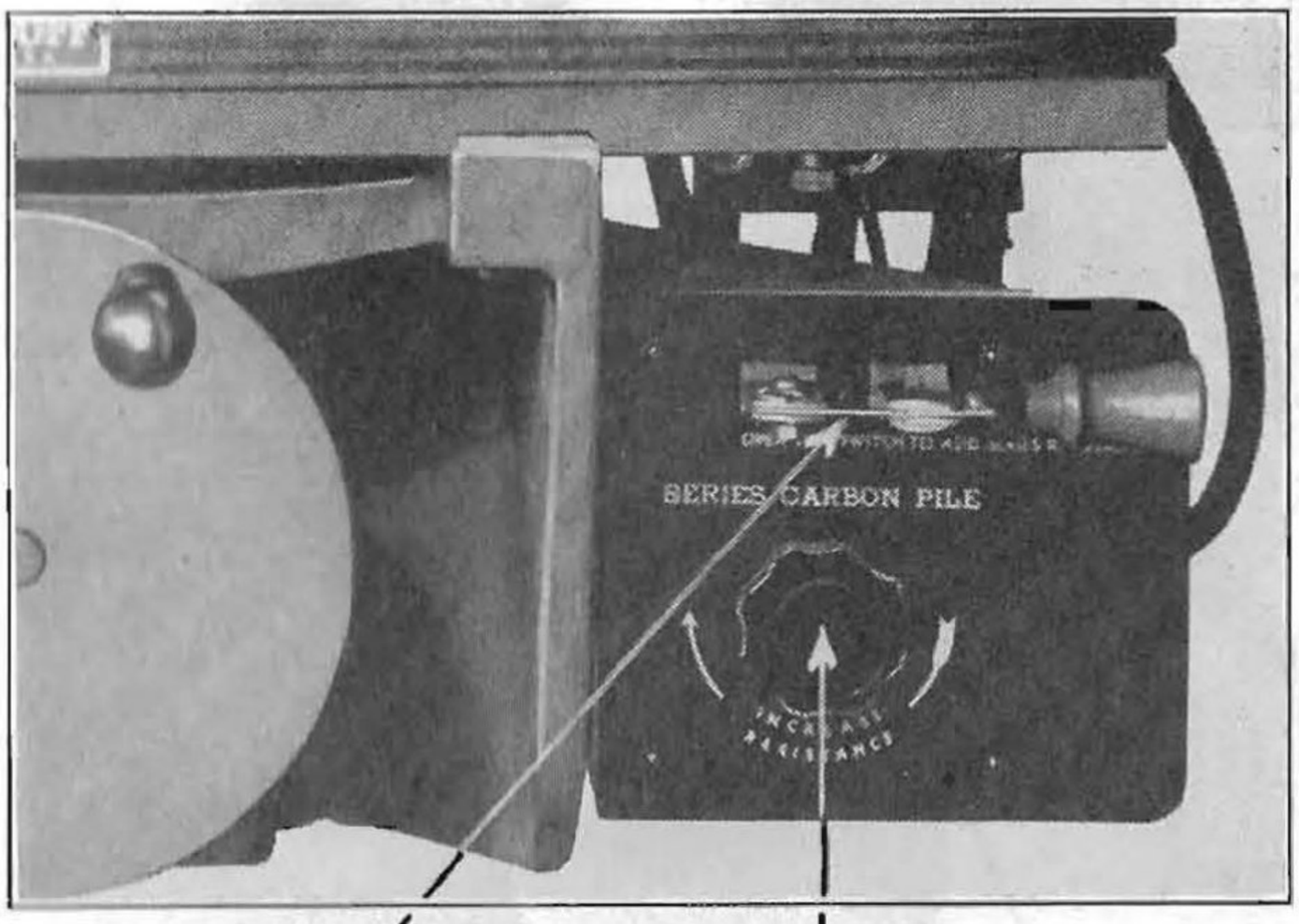


Fig. 35

How to Use the Series Carbon Pile



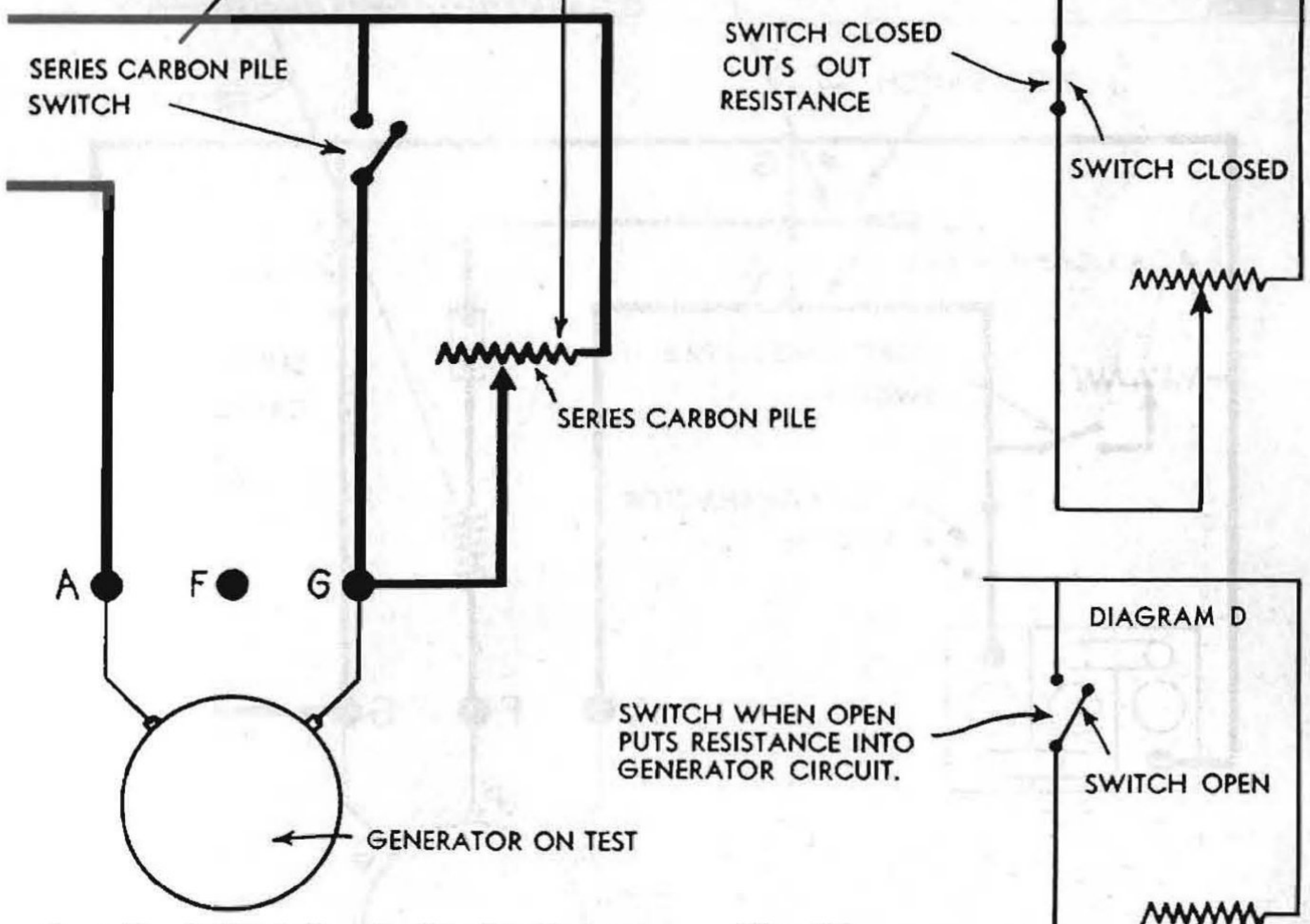


Fig. 36

circuit. When both the load carbon pile switch and battery voltage selector switch are closed a load is placed on the battery through the load carbon pile. (Diagram A.) With the voltage selector switch open, the battery is disconnected. (Diagram B.)

When the series carbon pile switch is closed resistance of the series carbon pile is cut out (Diagram C). With the series switch open resistance is put into the generator circuit (Diagram D).

How to Use the Field Switch

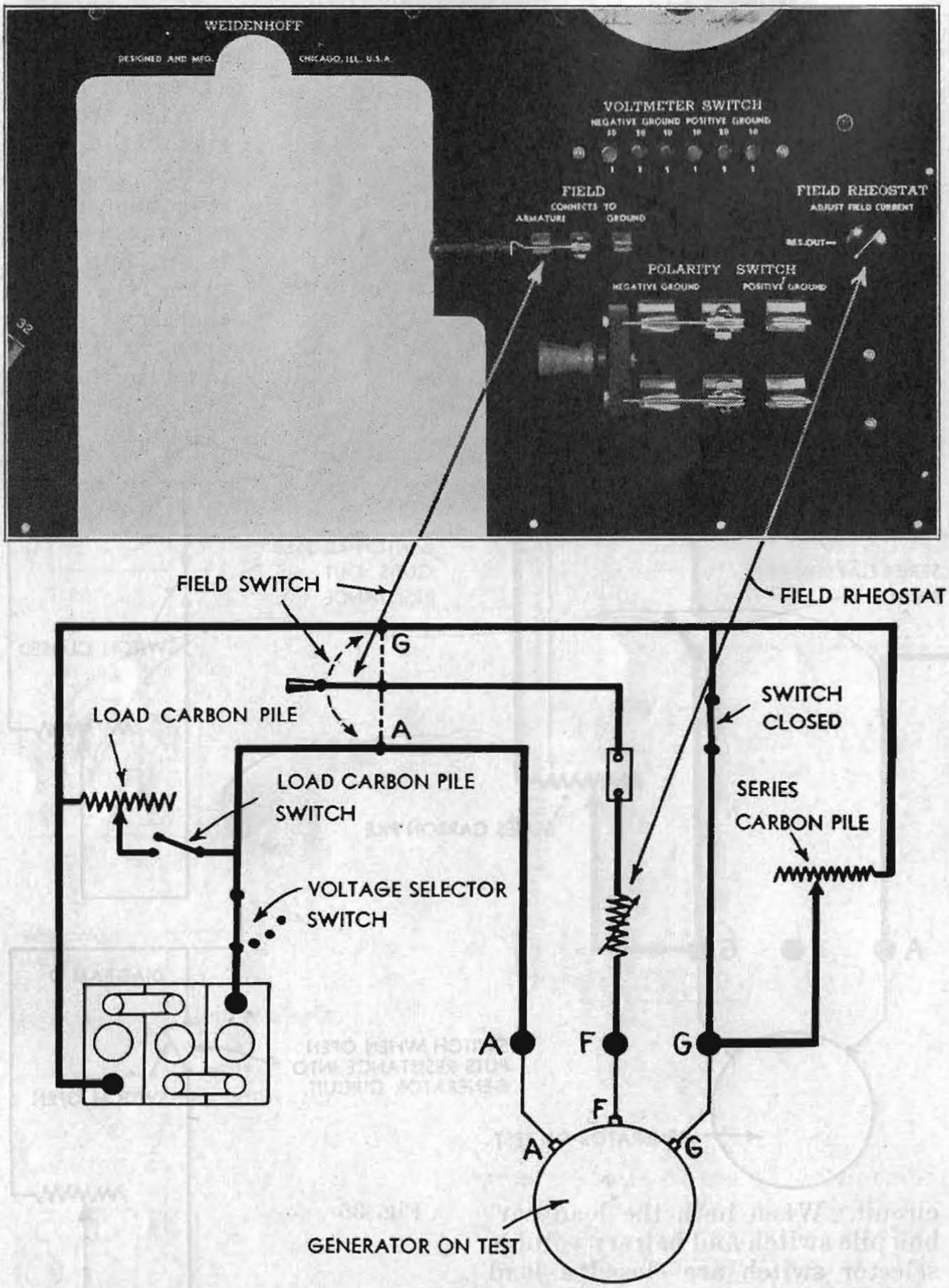


Fig. 37—Diagram showing method of using the field switch in the testing circuit.

The illustrations in Figs. 37, 38 and 39 show the use of the field switch when testing a generator. The field switch is closed in either position A or G as shown in diagrams E and F.

Position A (Diagram E) is used when the field circuit of the generator on test is completed to the armature through the voltage regulator. Position G (Diagram F) is used for the field switch when the field circuit of the generator on test is completed to ground through the voltage regulator.

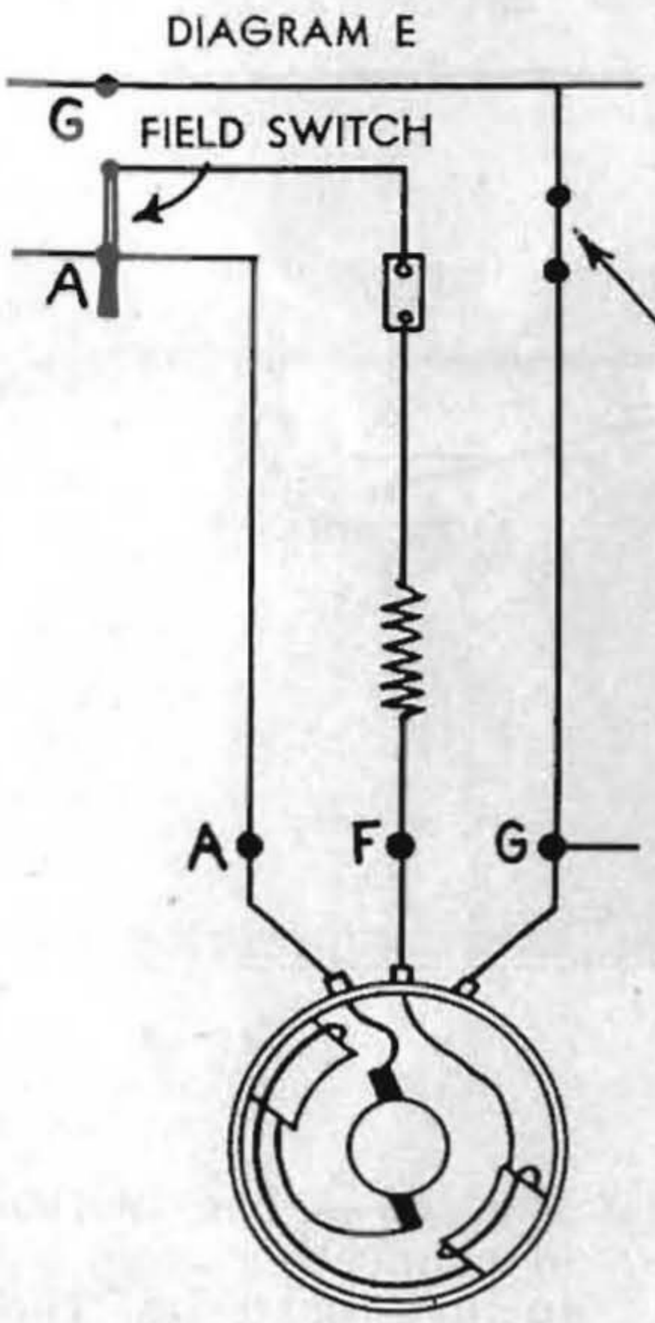
In both instances with field switch in A or G position the series carbon pile switch must, of course, be closed. The letters A, F and G indicate the three binding posts of the test bench panel on which they are marked "Battery," "Field" and "Ground" ("Battery" and "A") meaning armature, are the same.

Following is method of making field test:

1—Turn rheostat all the way to the right. This cuts out all resistance from the circuit.

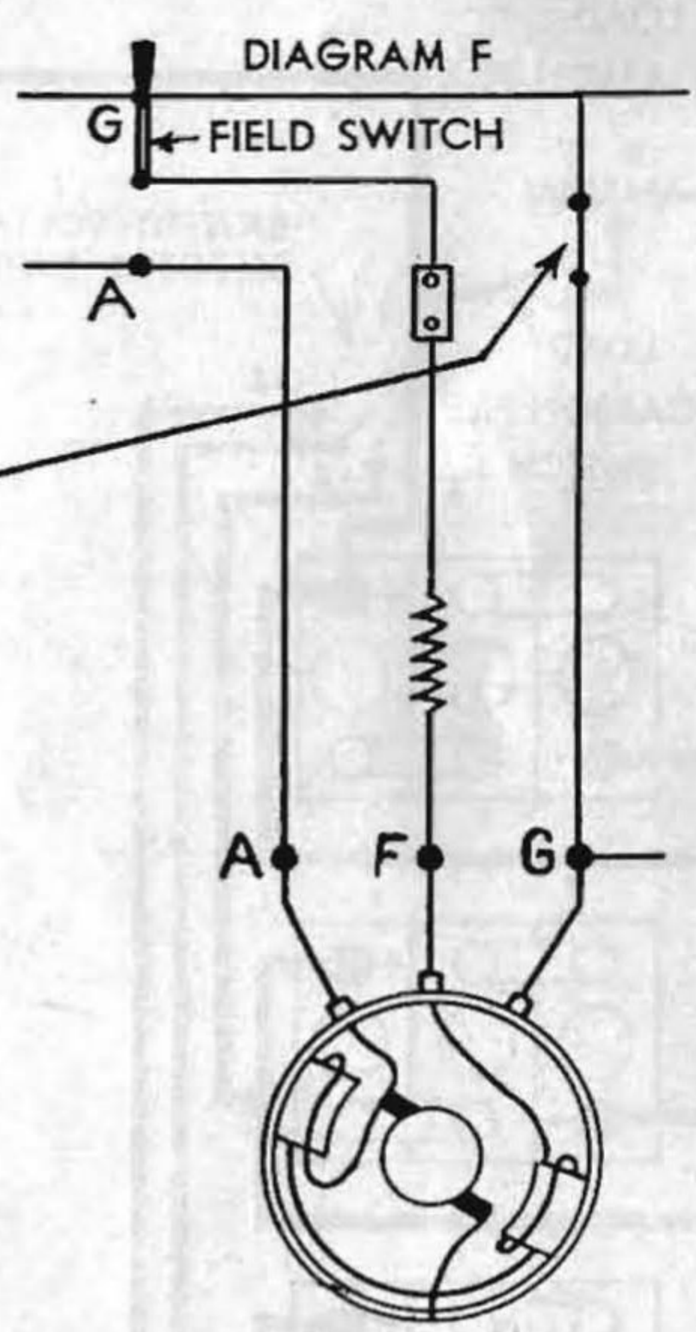
2—Close field switch to ground or armature. If field is connected through ground the generator will motorize through ground, that is, with the field switch closed in position G. If field is connected through armature the generator will motorize through armature-switch in position A.

With some makes of generators, the field connection (through ground or armature) is obtained by observing which side—A or G—takes the least amount of current.



IF FIELD CIRCUIT OF GENERATOR IS COMPLETED TO ARMATURE THROUGH REGULATOR, FIELD SWITCH IS CLOSED IN POSITION, A.

Fig. 38



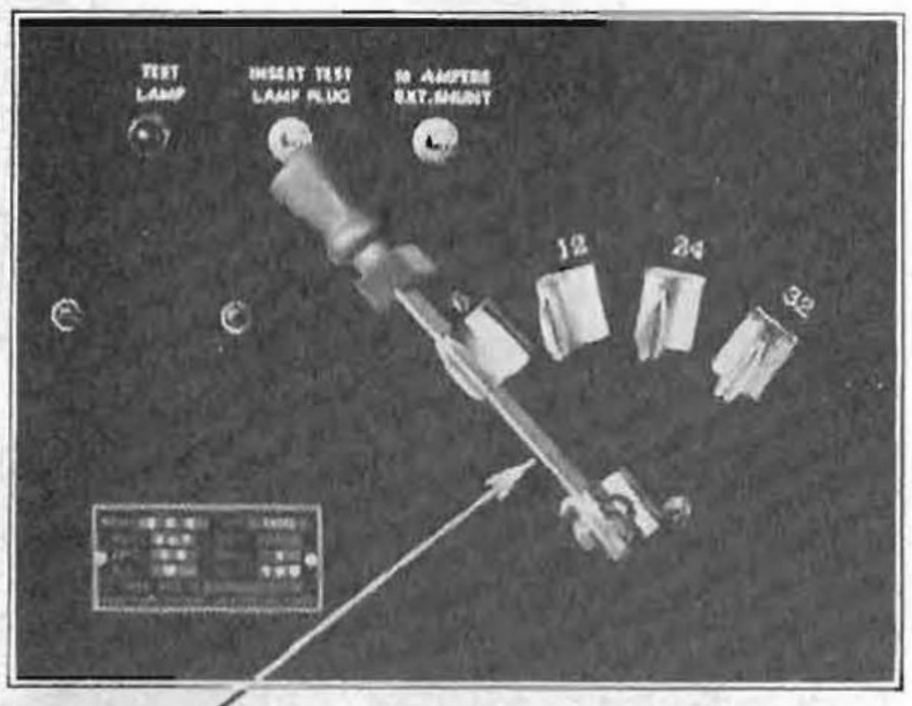
IF FIELD CIRCUIT OF GENERATOR IS COMPLETED TO GROUND THROUGH REGULATOR, FIELD SWITCH IS CLOSED IN POSITION, G.

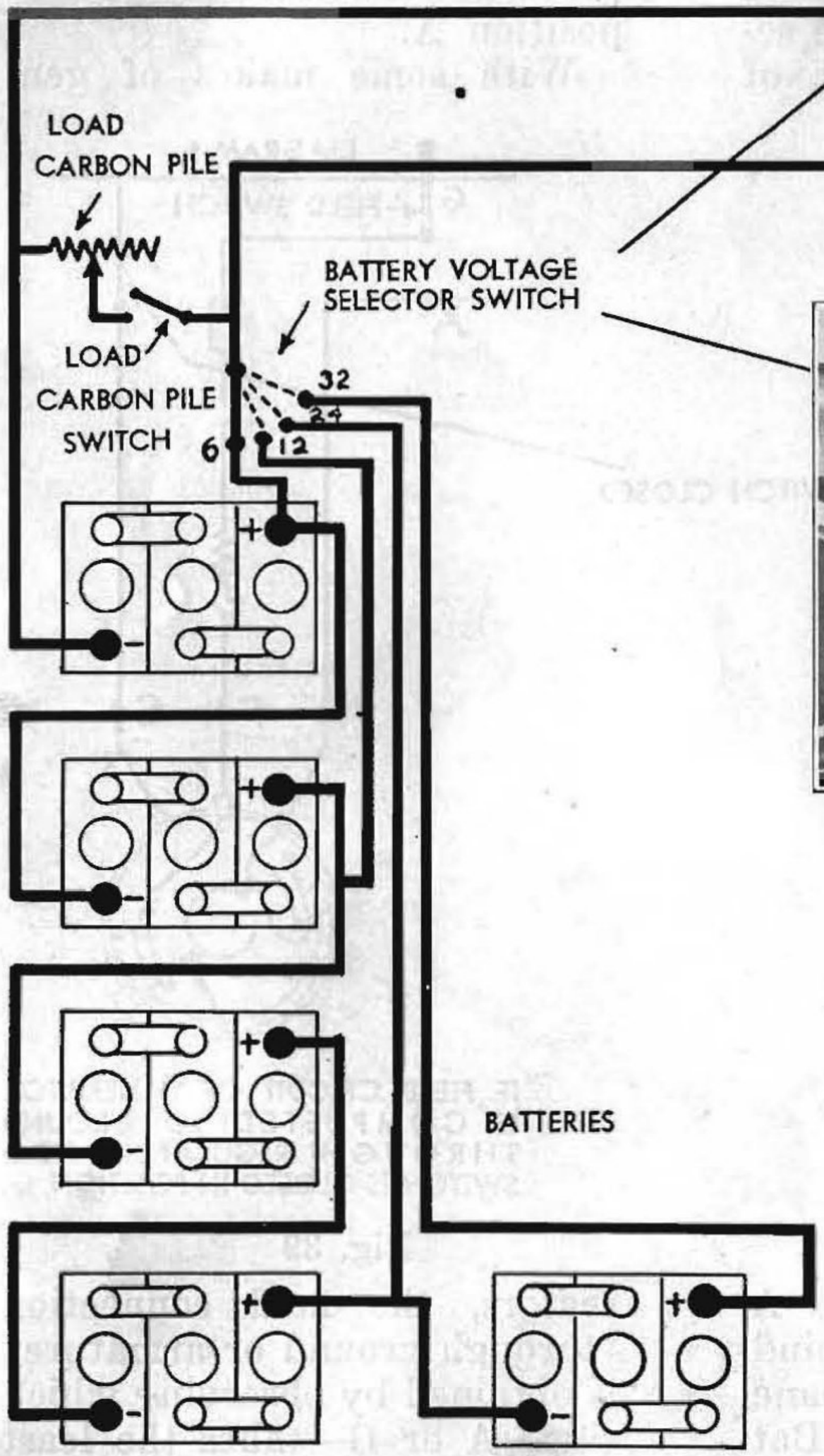
Fig. 39

How to Use Voltage Selector Switch

This diagram shows the method of connecting from one to five batteries into the circuit to furnish 6, 12, 24 and 32 volts for testing generators of corresponding voltage.

Note also the polarity switch which makes it unnecessary to





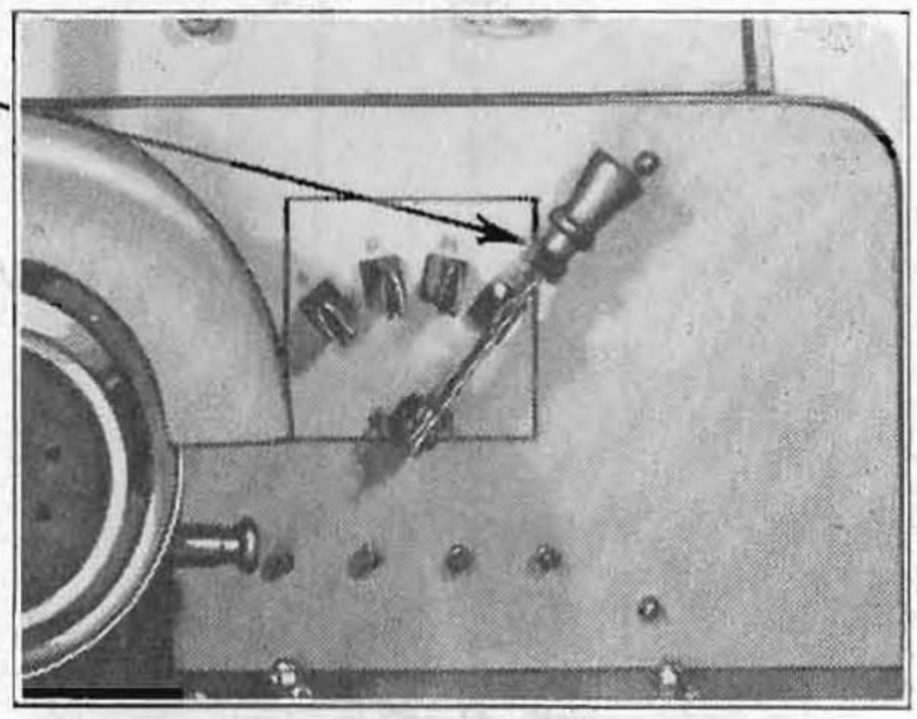
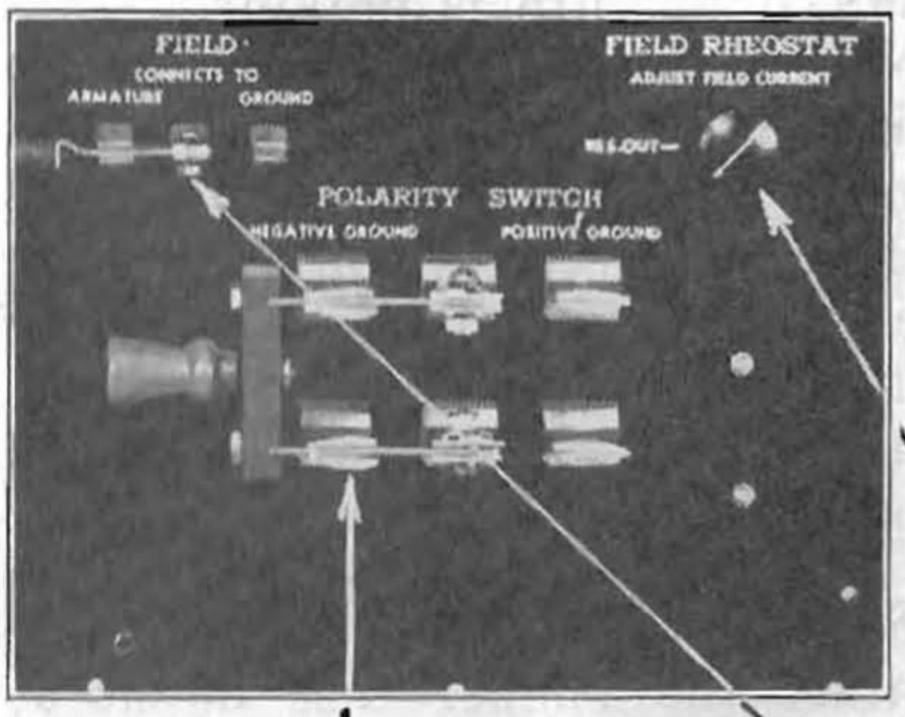


Fig. 40 — The method of connecting from one to five batteries (not furnished with the bench) is the same with both the 500 and 501 model. From the diagram it will be seen that the voltage selector switch also becomes a line switch. Thus, when the bench is not in use, it is a good plan to open this switch.

How to Use Polarity Switch



The purpose of the plug-in connection or terminal is to enable the operator to get the field current as a check on current and voltage regulating units. (See diagram on page 39.) Connection is made to the field terminal of the regulator and to the generator field terminal. This places the ammeter of the bench in series with the field and shows the current. Any erratic action of the regulation will be shown on the meter.

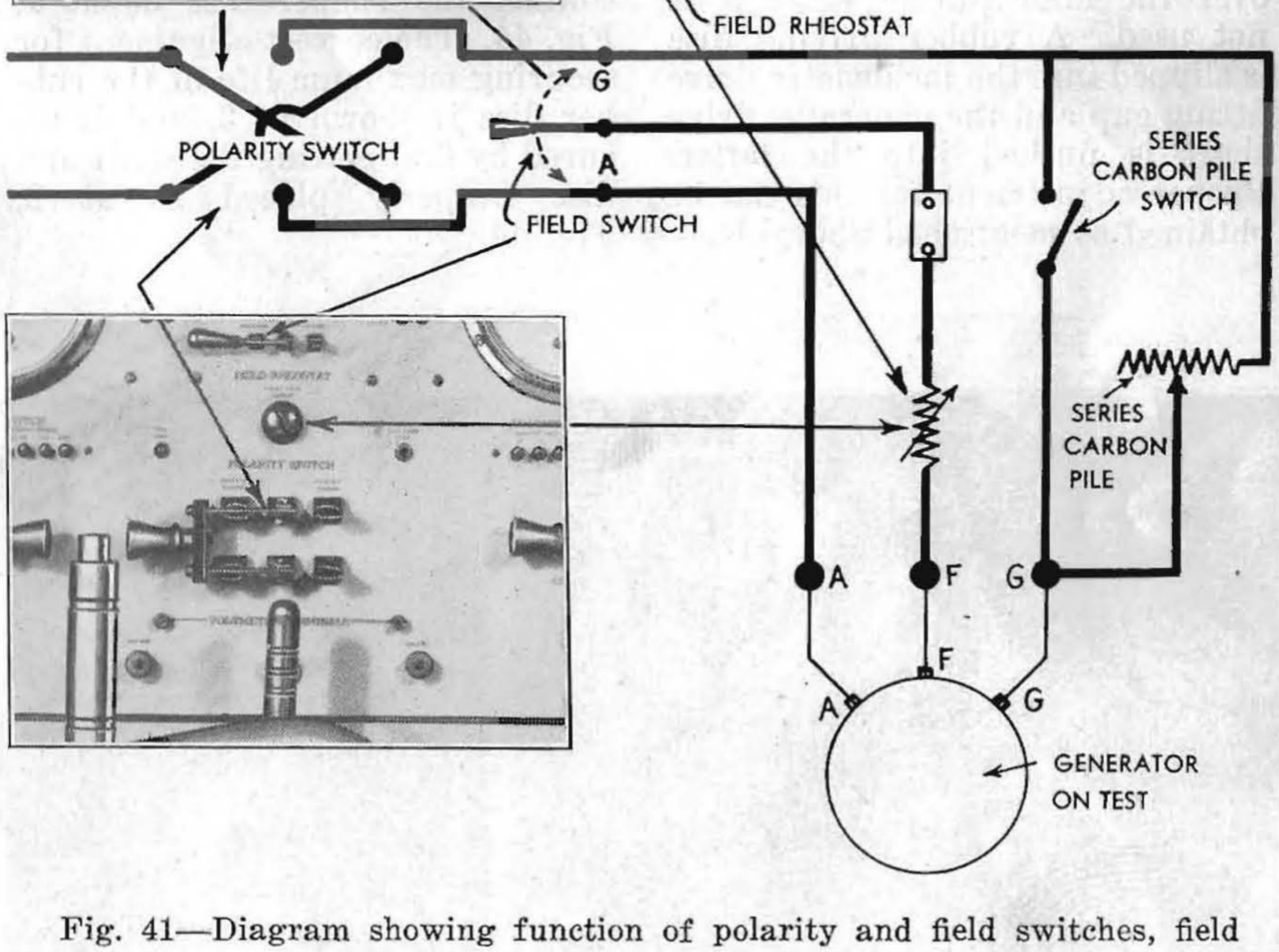


Fig. 41—Diagram showing function of polarity and field switches, field rheostat, etc.

disturb generator connections to bench binding posts if connections from the generator on test to the bench binding posts have been reversed as to polarity.

How to Use the Tachometer

Direct Drive—When the generator is driven direct in the test bench, the tachometer is driven by a round endless belt, the necessary adjustment being obtained by sliding the tachometer drive pulley bracket in its holder and locking in place with a thumb screw, Fig. 42.

Belt Driven Generator—When the generator is driven by V-belt from the bench driving head, the round tachometer drive belt is slipped over the idler pulley, since it is not used. A rubber driving disc is slipped into the tachometer drive fitting cup and the generator drive shaft is pushed into the latter. Proper adjustment for this can be obtained as mentioned above, locking the assembly and thumbscrew A, Fig. 42.

Maximum life is obtained from the tachometer drive rubber discs if it is lined up properly with the generator shaft. Precision alignment is not necessary in order that the generator drive the tachometer but the rubber drive discs will last much longer if the following is observed.

See that generator shaft does not contact the rubber disc as at 1, Fig. 44. The correct alignment for securing maximum life of the rubber disc is shown at 3, and is secured by first getting the shaft and disc properly placed as at 2, Fig. 44.

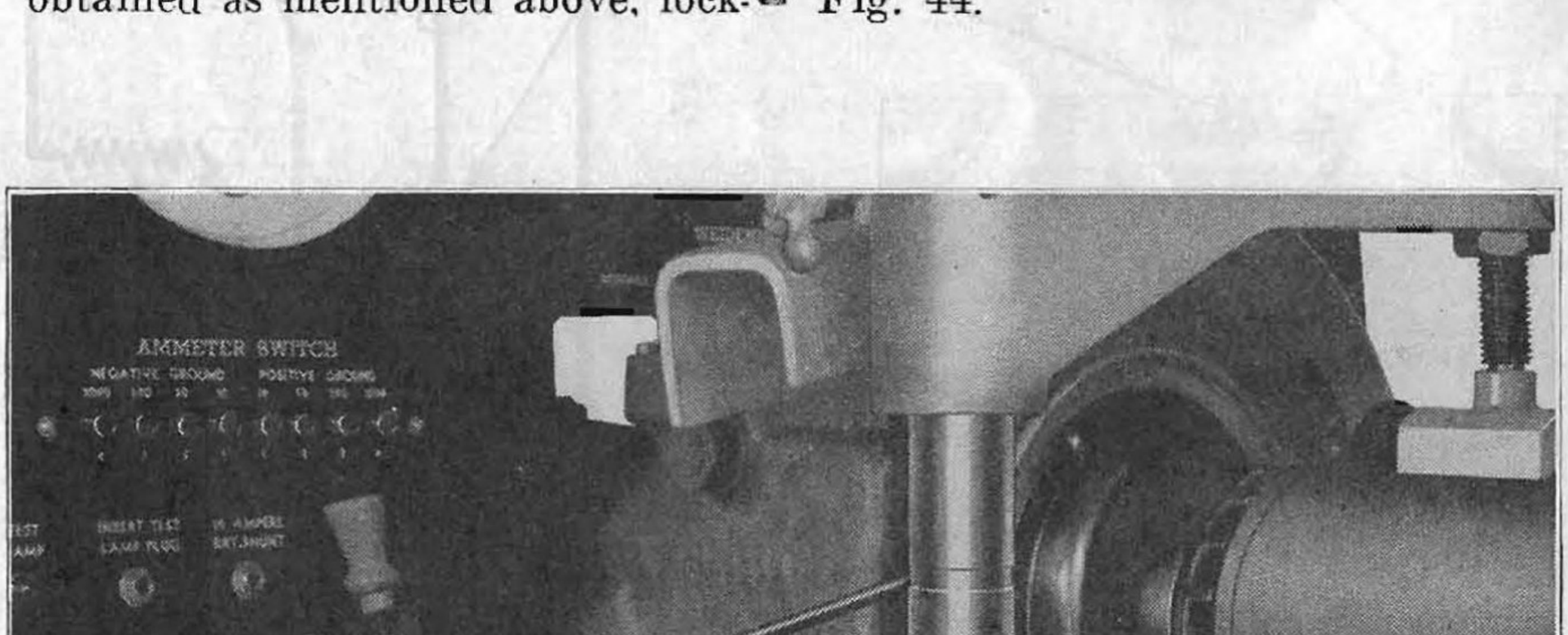


Fig. 42—A round endless belt is used for driving the tachometer when generator on test is driven direct.

WEIDENHOFF GENERATOR TEST BENCH

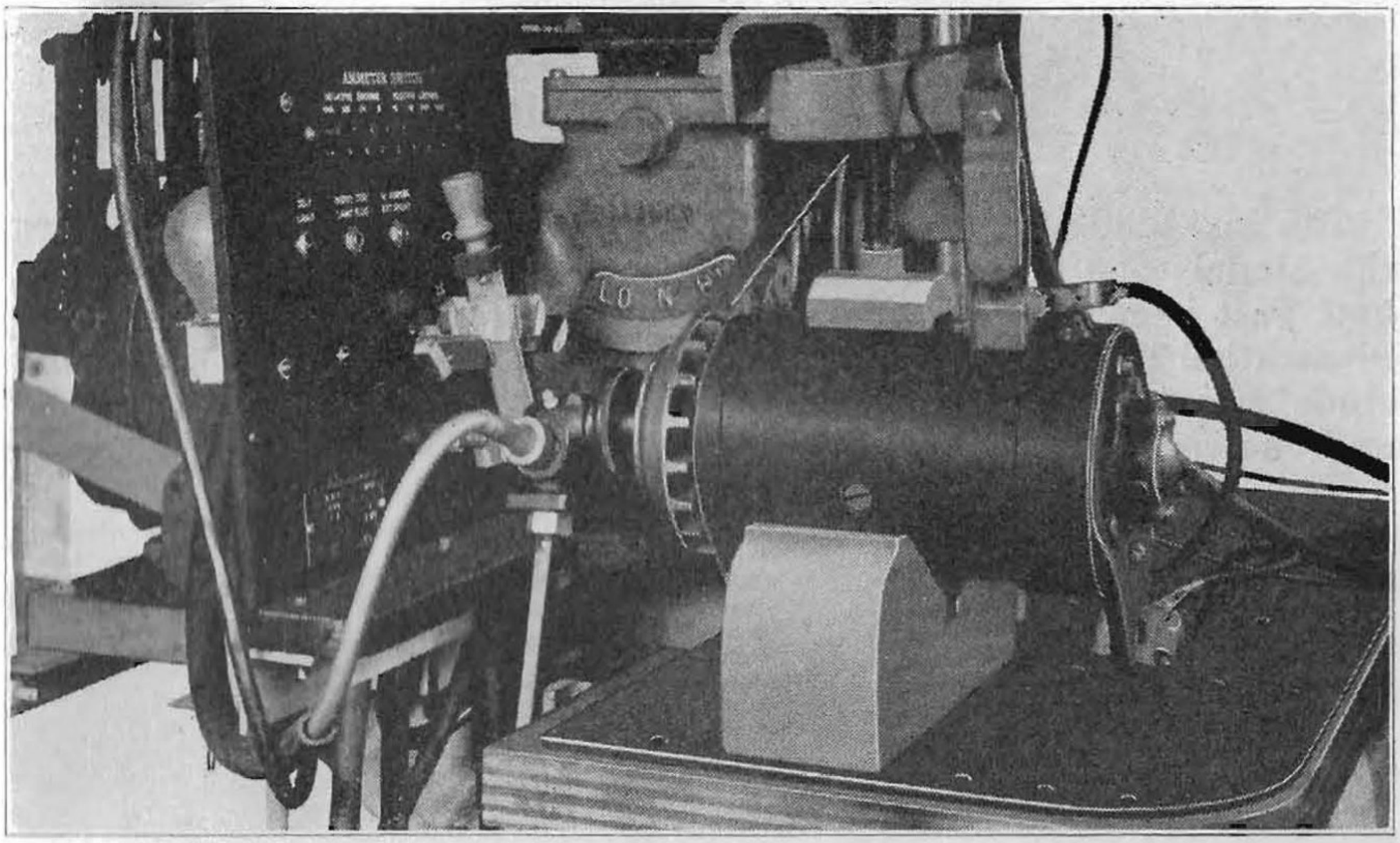


Fig. 43—When generator is belt driven, above, the tachometer is driven direct, as shown below.

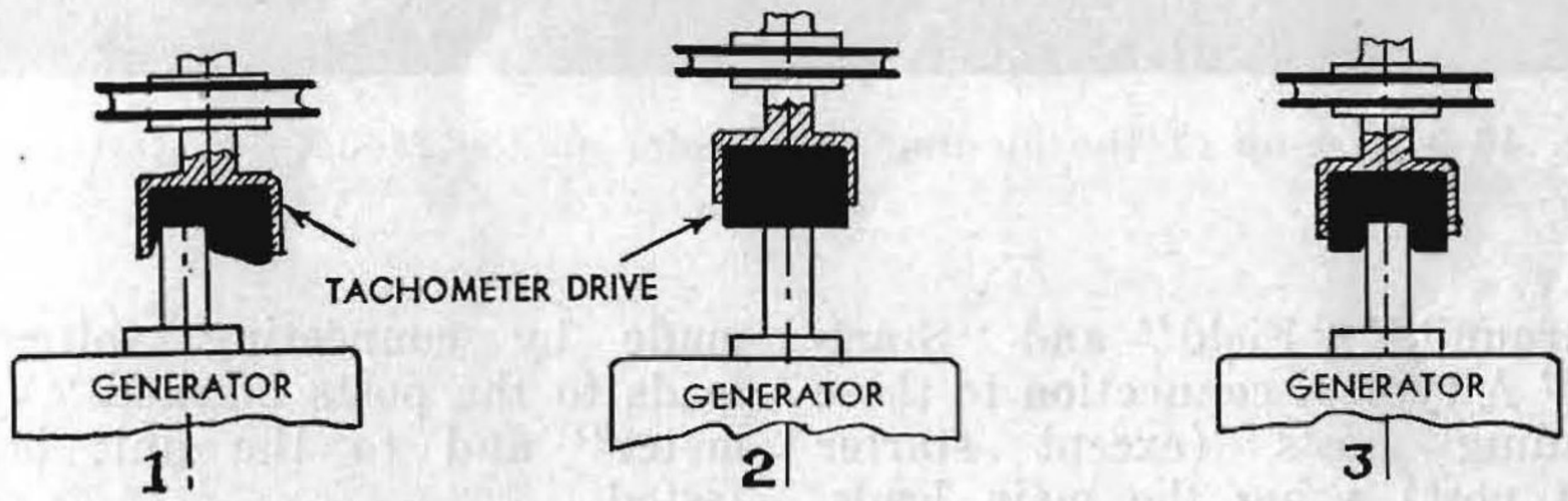


Fig. 44—Number 1 shows improper contact between generator shaft and rubber disc. The shaft and disc should first be properly positioned, as at 2 and then the generator pushed inwards to maintain correct alignment, 3.



Fig. 45 — Close-up of the tachometer dial, used on both the 500 and 501 models Weidenhoff test benches. A clockwise and counter-clockwise reading scale is provided for obtaining speeds of generators driven in either direction.

How to Make Connections to Bench Binding Posts

The six binding posts used on the Models 500 and 501 Weidenhoff Test bench are shown in the illustration below. These posts include two marked "Voltmeter," and one each, marked "Battery," "Ground," "Field" and "Starter." A typical connection to these binding posts (except starter test post) using the main leads, is shown in Fig. 48. This illustration also shows the field lead connected from the field terminal of the generator to the "Field" binding post on the bench.

Various voltage tests can be made by connecting voltmeter leads to the posts marked "Voltmeter" and to the unit being tested.

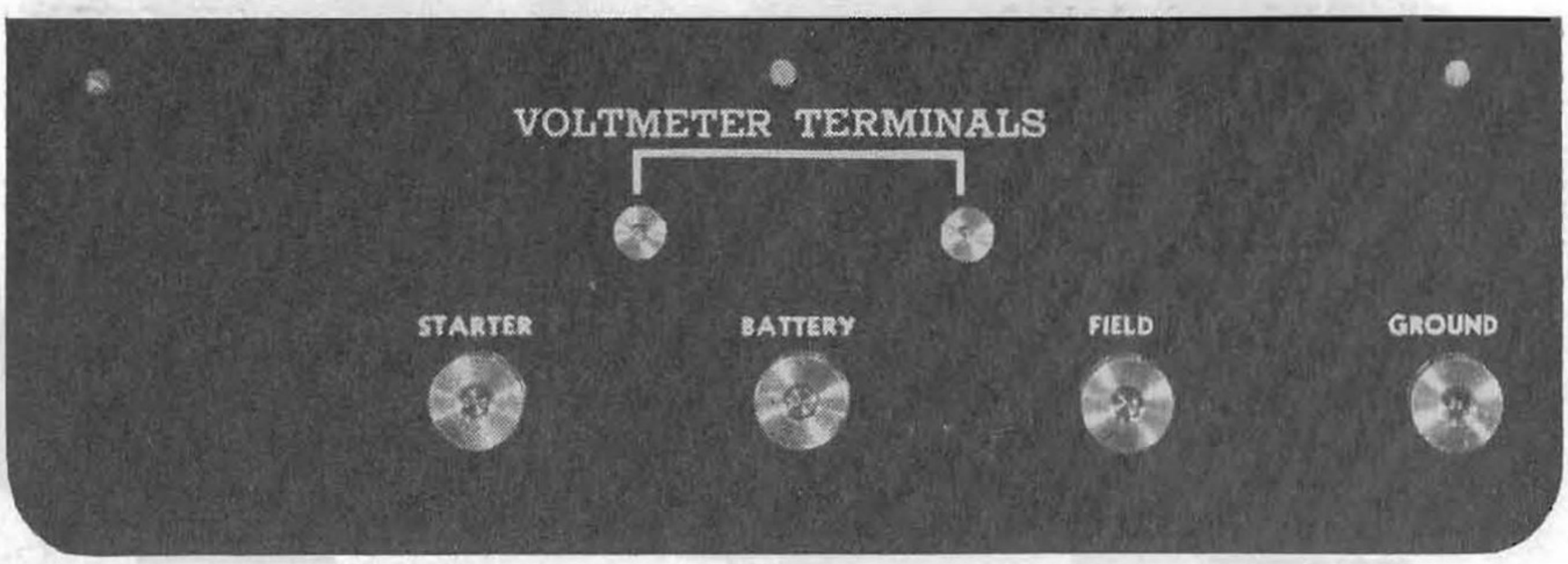


Fig. 46—Close-up of the binding post panel on the Model 501 test bench.

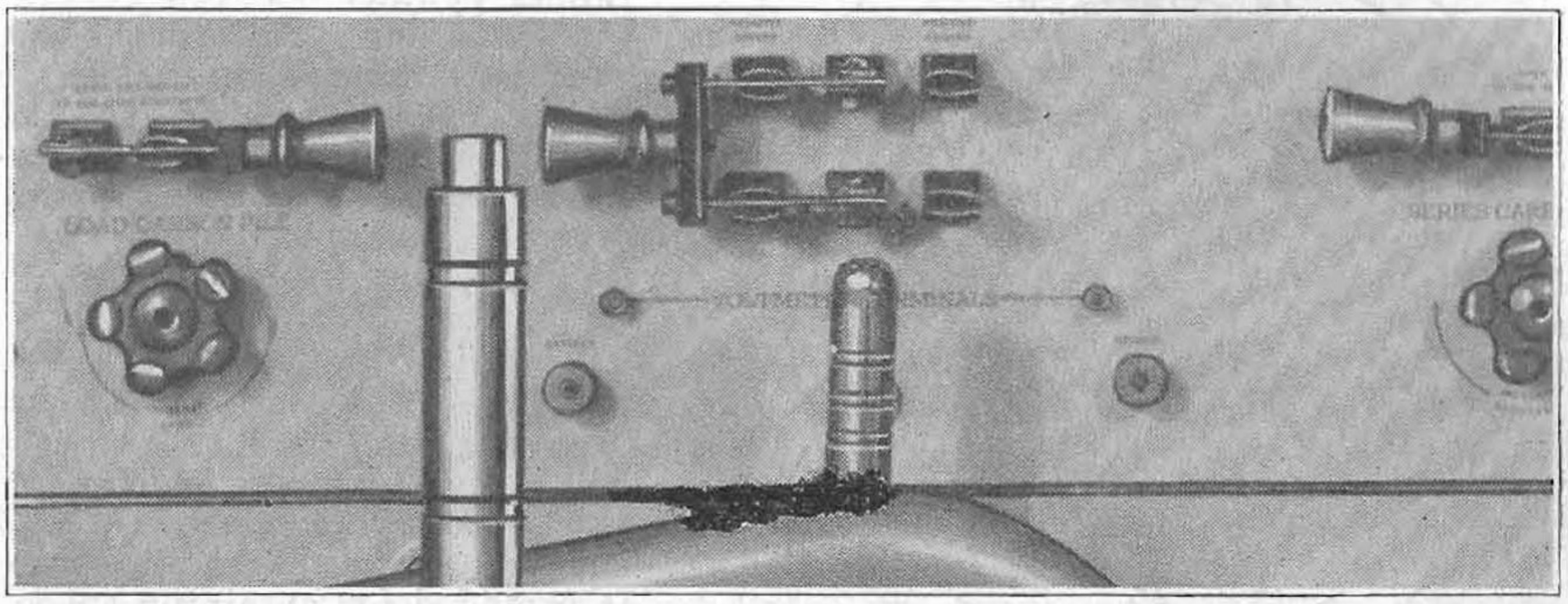


Fig. 47—Location of binding posts on Model 500 test bench. The "FIELD" post is hidden behind Motor control lever.

WEIDENHOFF GENERATOR TEST BENCH

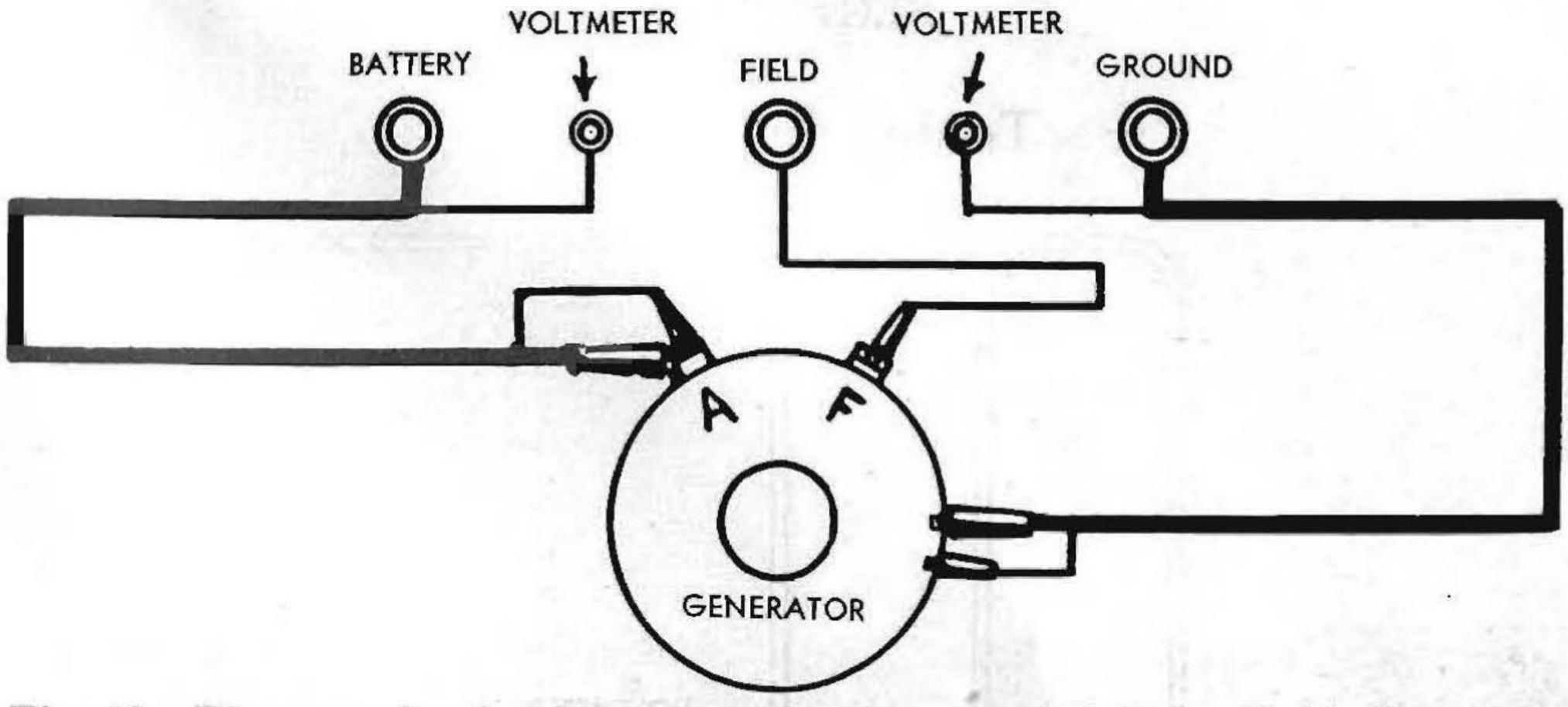


Fig. 48—Diagram showing how generator is connected to bench binding posts or terminals.

How to Use Test Lamp

By plugging the test point leads into the opening marked "Insert Test Lamp Plug" various tests can be made with the 110-volt test points. A typical test is shown in Fig. 49. Completion of the circuit is shown by the illumination of the lamp jewel on the panel of the bench.

(Note: See also pages 61, 62 and 63 on which is described the procedure of testing dismantled generators bringing into use the 110-volt test lamp).

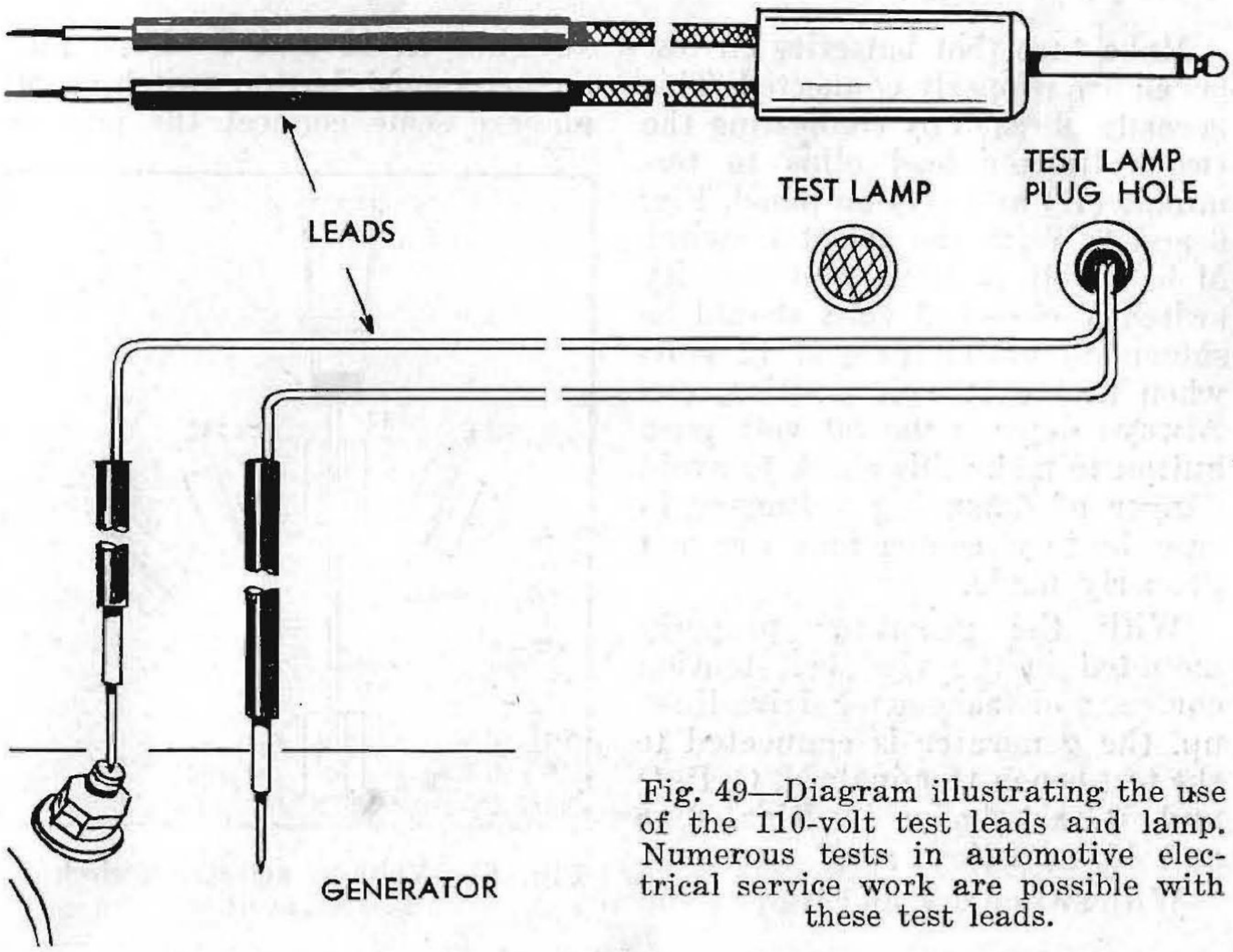


Fig. 49—Diagram illustrating the use of the 110-volt test leads and lamp. Numerous tests in automotive electrical service work are possible with these test leads.

SECTION 5.

Testing Generators

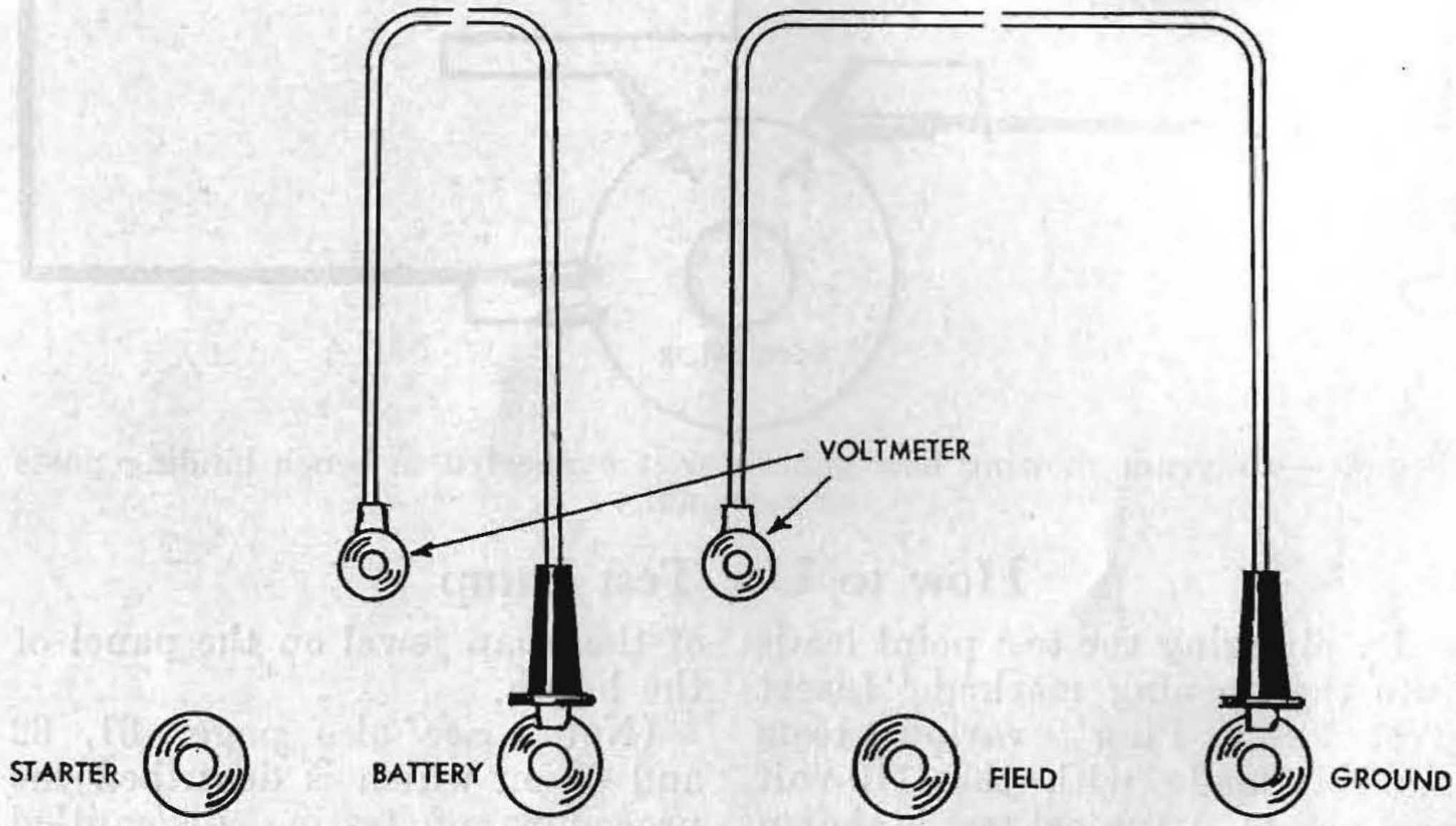


Fig. 50—Testing battery connections by connecting voltmeter leads to bench binding posts, as shown.

Make sure that batteries on test bench are properly connected. This is easily checked by connecting the two voltmeter lead clips to terminals (R) and (N) on panel, Fig. 6 and 8. With the selector switch M in 6 volt position, and polarity switch V closed, 6 volts should be shown on voltmeter and 12 volts when in the 12 volt position, etc. Always depress the 50 volt push button to make this check to avoid danger of damaging voltmeter in case battery connections are not properly made.

With the generator properly mounted in the vise, belt tension correct and tachometer drive lined up, the generator is connected to the test bench terminals N, O, P, Q and R, as shown in Figs. 6, 8 and 46, as follows:

With switches V and U open and switches K, M and S closed and ammeter push button switch on 50 ampere scale connect the ground

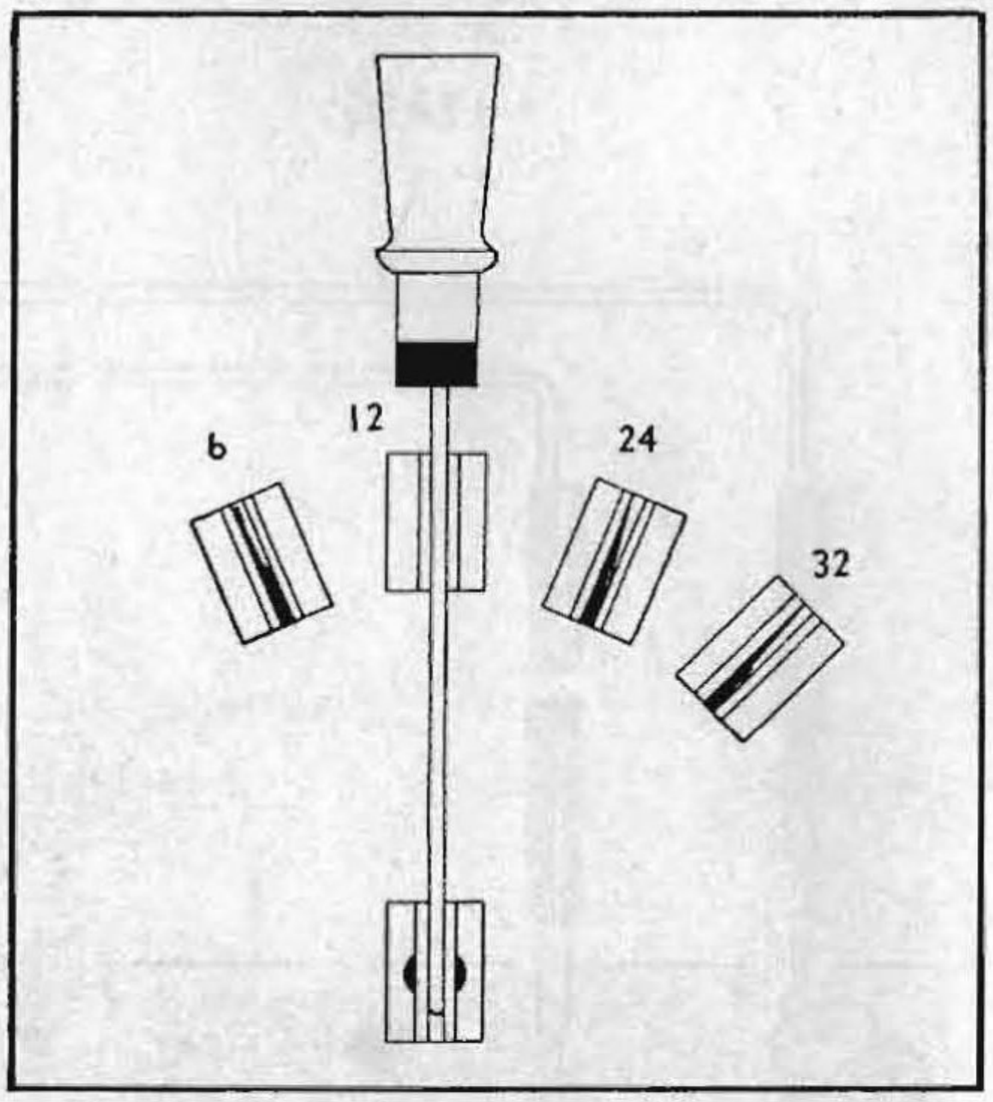


Fig. 51—Voltage selector switch in 12-volt position.

WEIDENHOFF GENERATOR TEST BENCH

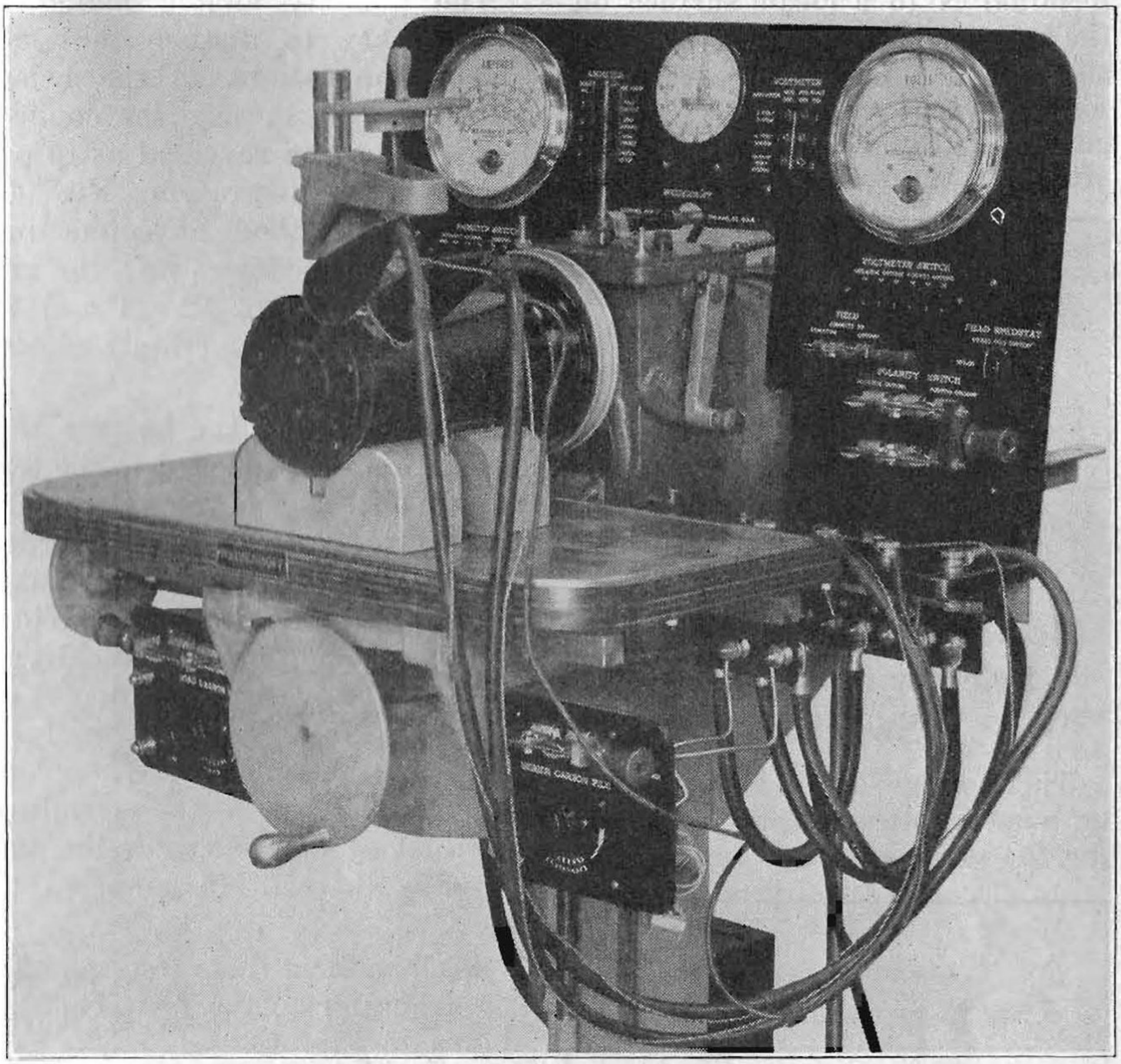


Fig. 52—Illustrating how generator to be tested is connected to the bench binding posts with necessary leads.

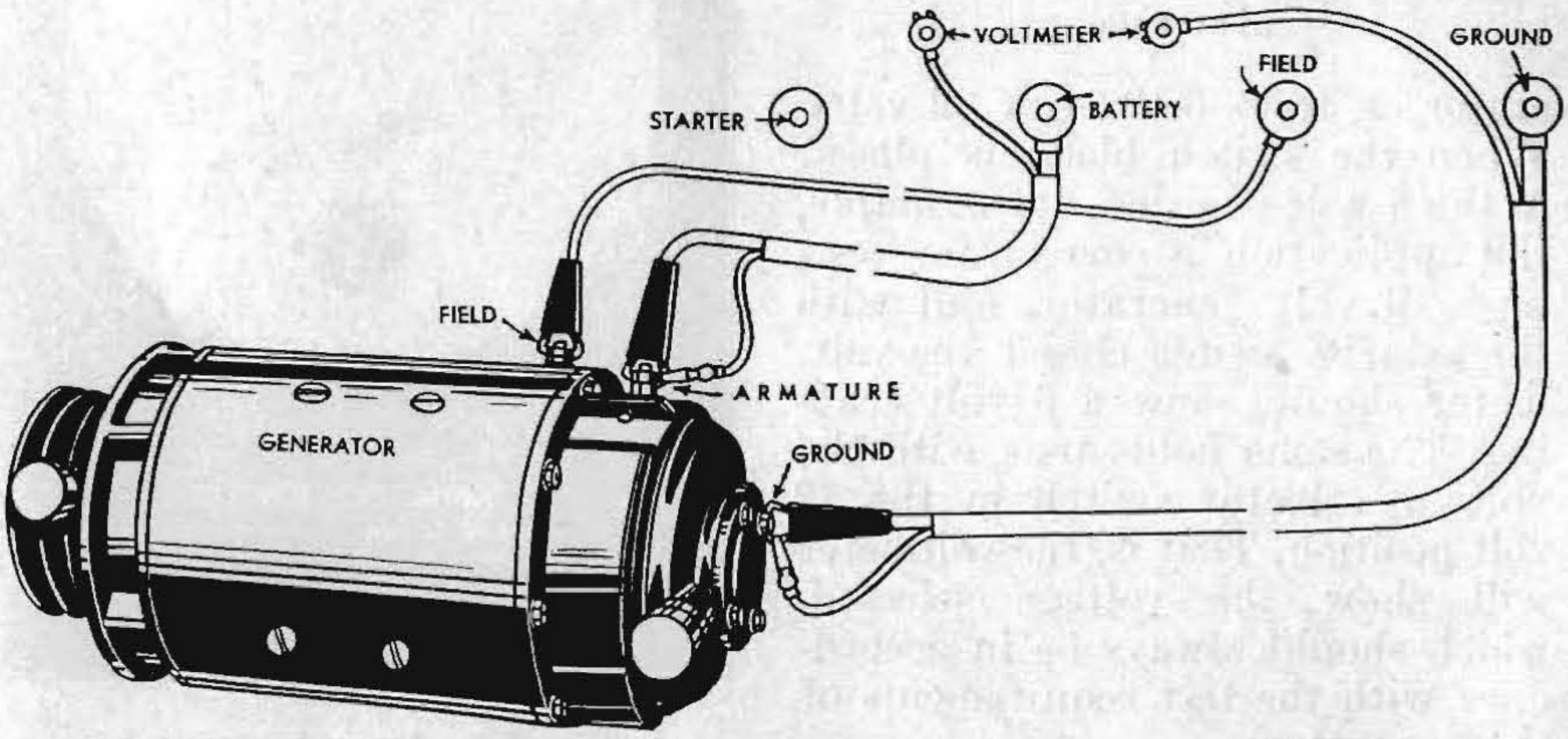


Fig. 53—Diagram showing connections between generator and test bench.

terminal N to a clean surface on the generator frame. (Note: Be sure of this connection, as with some of the wrinkle finishes on generators, the heavy coat of paint often prevents a good ground).

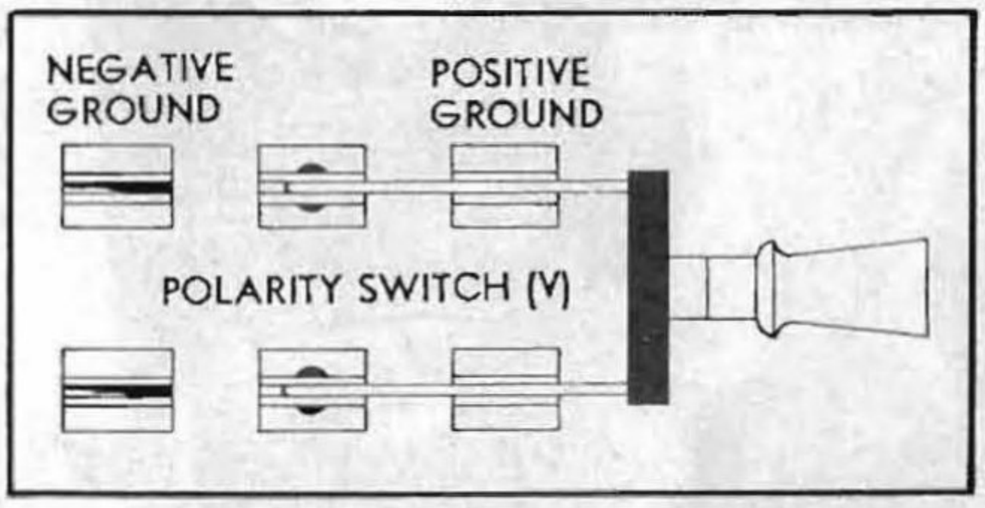


Fig. 54—Polarity switch in positive ground position.

How to Use the Voltage Selector and Polarity Switches

The voltage selector switch, as its name implies, is used for selecting the proper voltage for the gen-

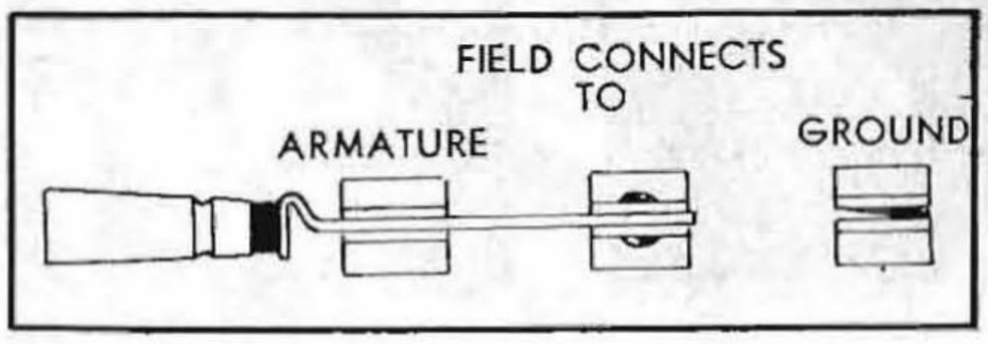


Fig. 55—Field switch in position conforming to requirements of generator with its field circuit closed to armature.

erator on test—6,12,24 or 32 volts. When the switch blade is placed in the 6 volt position, for example, the application is correct for testing a 6 volt generator, and with the polarity switch closed, the voltmeter should show a 6 volt reading. The same holds true with the voltage selector switch in the 12 volt position. That is, the voltmeter will show the voltage selected, which should always be in accordance with the test requirements of the generator.

The polarity switch makes it unnecessary to disturb the generator connections to the bench binding posts in case the connections have been reversed as to polarity. The illustration, Fig 40 shows the method of connecting from 1 to 5 batteries into the circuit to furnish 6, 12, 24 and 32 volts for testing generators of corresponding voltage.

The lead from the battery terminal R is then touched to the terminals on the generator for making continuity tests and in order to properly identify the terminals in case they are unmarked. When contact is made with the field terminal of the generator a current of from 1½ to 5 amperes will be shown on the ammeter. When contact is made with the armature terminal on the generator the ammeter will read 15 amperes or more.

After making these tests connect the generator to the test bench as shown in Fig. 48.

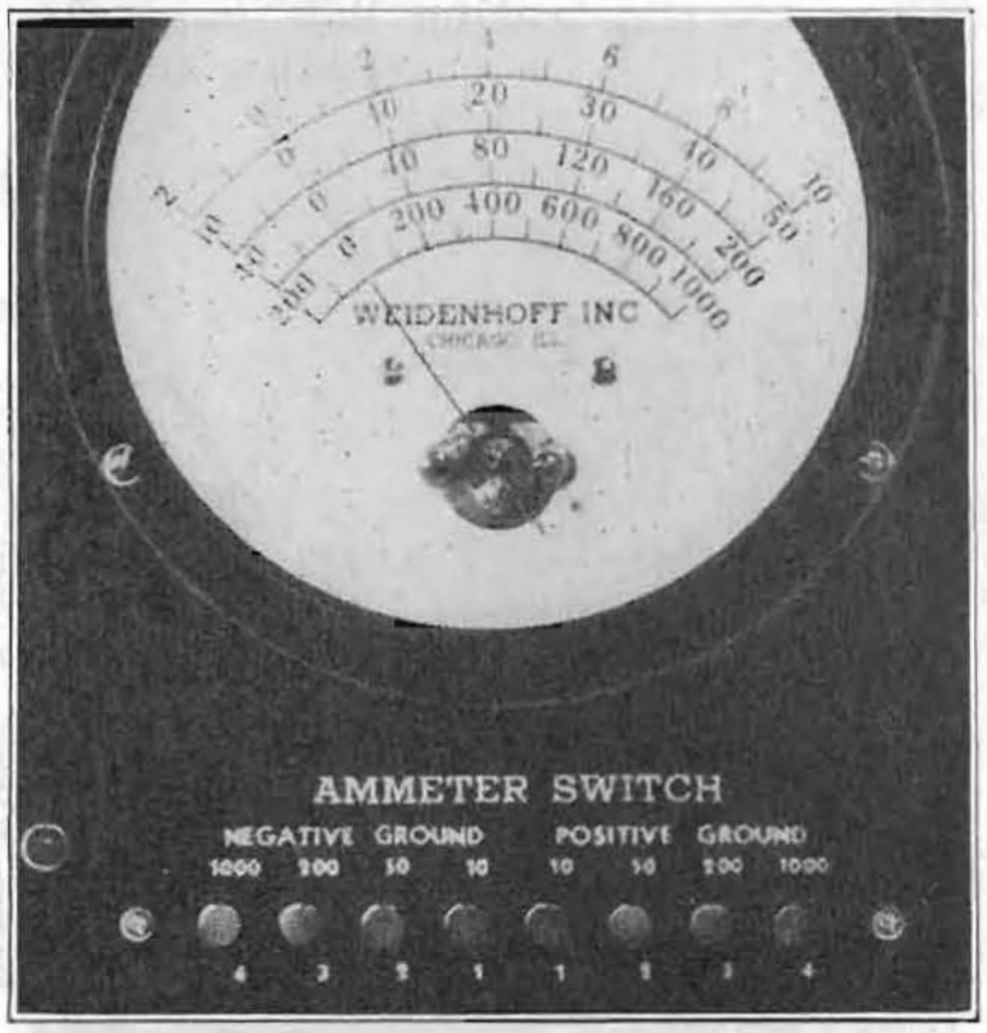


Fig. 56—Ammeter switch.

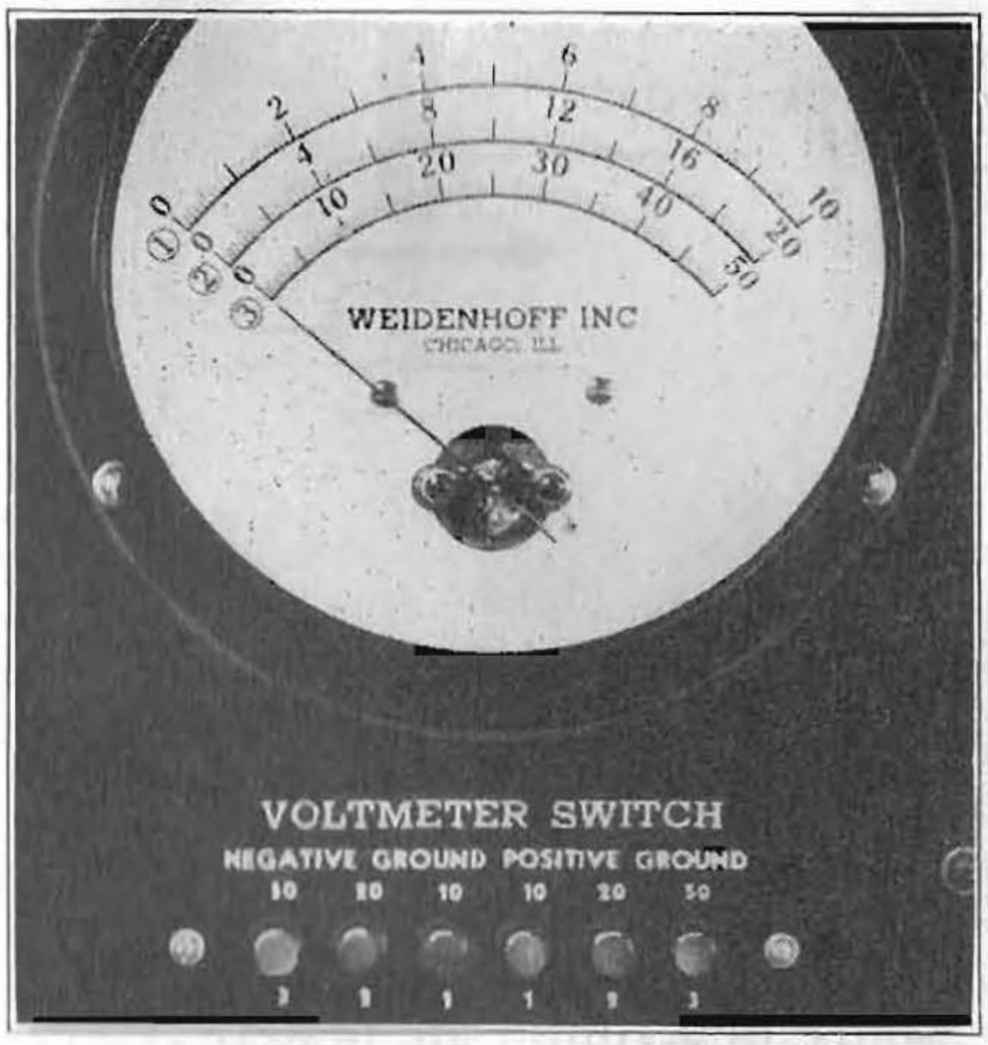


Fig. 57—Voltmeter switch.

After the above connections have been made and with the field rheostat E turned so the resistance is all out the field selector switch S is thrown first to armature position and then to ground position. The position in which the generator motors most freely with the least current draw is the correct one for the tests that follow. CAUTION: If generator does not motorize check belt tension. The belt may be too tight. To obtain motorizing current reading press proper 50 ampere push button.

Close motor switch and with field resistance all out bring motor speed up to point where ammeter reads zero. Note generator speed on tachometer. This is the "cut in" speed of the generator.

Reverse ammeter and increase speed until generator reaches maximum rated output. Note speed on tachometer. This is peak output speed.

Increase speed and hold at maximum output or slightly lower with field rheostat until maximum desired test speed is obtained. In no event should the generator output be allowed to exceed maximum generator rating.

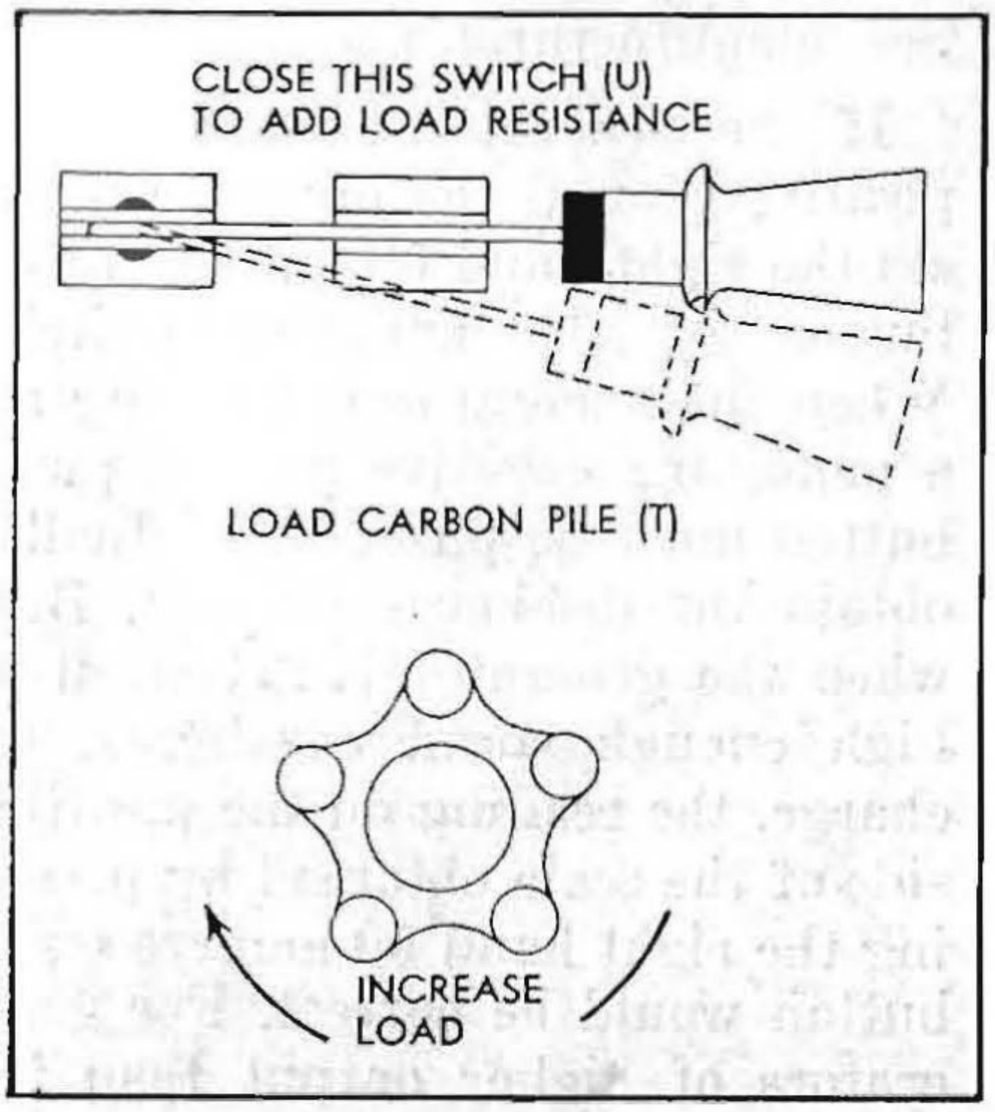


Fig. 58 — Load carbon pile switch. Dotted line shows open switch position.

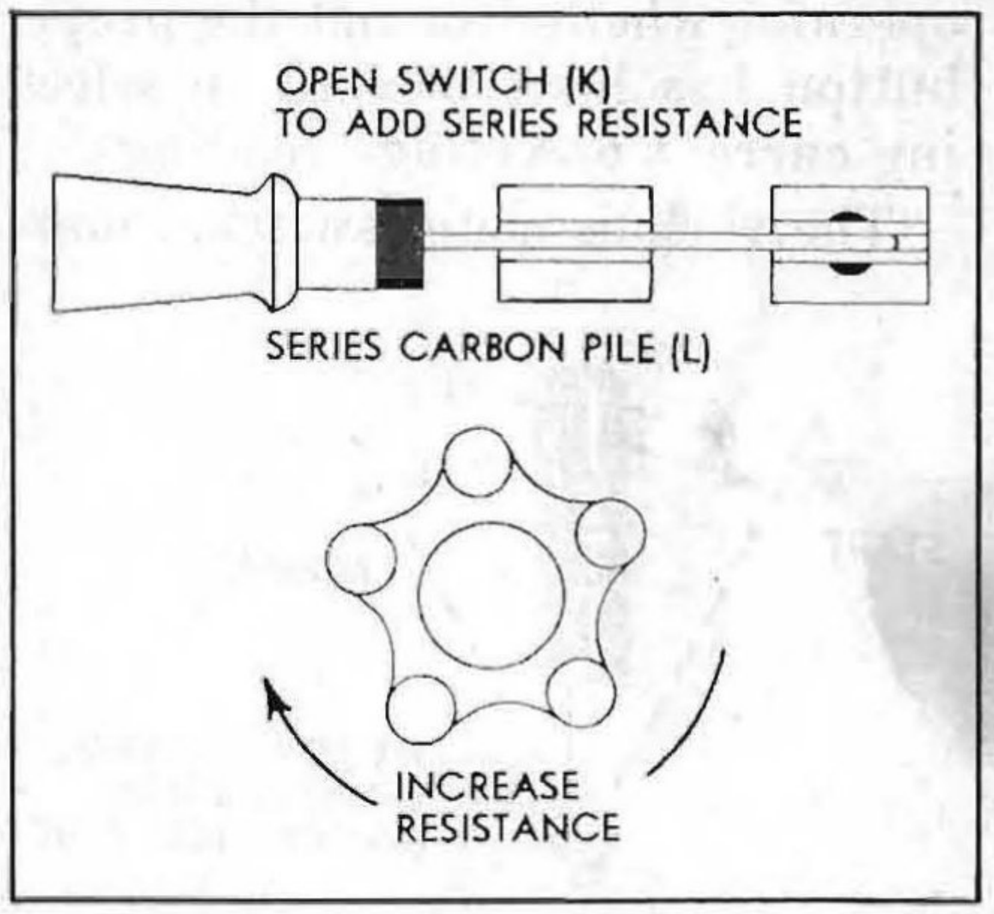


Fig. 59—Series carbon pile switch in closed position.

The series carbon pile, or series resistance switch, Fig. 59, should remain CLOSED, unless it is necessary to raise the voltage output of the generator. In like manner, the load carbon pile or load resistance switch, Fig. 58, should be left OPEN, unless an additional load is necessary on the generator.

If the generator on test is normally used on a car with a positive grounded electrical system, the polarity switch, Fig. 41, of the bench is closed to the right or to the "positive" ground position. If the generator is used on a negative grounded system, the polarity switch is closed to the left or "negative" position.

If the operator desires to read the current drawn by the field winding of the generator being tested, it is only necessary to press one of the 10 ampere push buttons of the ammeter switch, Fig. 56, (No field current is shown unless generator field circuit is connected to field switch on panel).

The pilot lights B and G, on the panel (Figs. 6 and 8) show the operator whether or not the proper button has been pressed in selecting current or voltage readings.

The various meter switches make

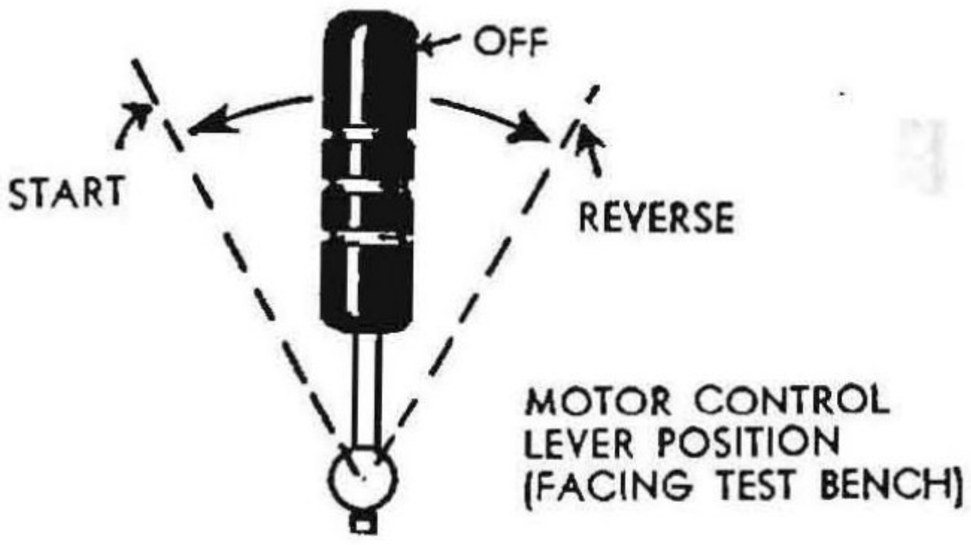


Fig. 60—Motor switch control lever.

it possible to reverse the polarity of the meters without having to transpose any wires. Also the ammeter can be placed in series with various circuits merely by pressing one of the push buttons A, (Figs. 6 and 8). For example if the operator wishes to read the field current the 10 ampere button is pressed, automatically throwing

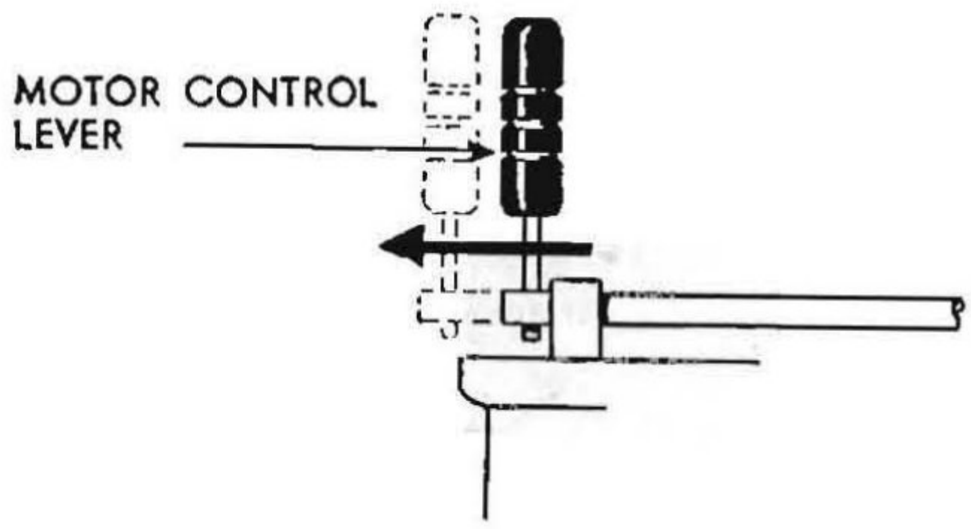


Fig. 61—Motor speed control.

the ammeter across the field circuit shunt. (Very often this makes possible locating a rather troublesome condition in the generator—short or ground in field). NOTE: Field current draw is shown on the ammeter only when generator is tested without regulator and the field is connected to field terminal P (Figs. 6 and 8).

Field current draw varies with different types of generators. The draw varies with the voltage being applied but with experience gained from testing various types of generators the operator soon learns whether or not variation is normal. See manufacturer's specifications.

If the generator on test has a positive ground the operator presses the right hand 50 ampere push button of the ammeter switch. When the generator is running as a motor the negative ground push button must be pushed to actually obtain the discharge current. But when the generator is driven at a high enough speed causing it to charge, the reading on the positive side of the scale obtained by pressing the right hand 50 ampere scale button would be correct. For generators of higher output than 50 amperes the 200 ampere scale must be used.

A similar process can be applied to the voltmeter as with the ammeter. For 6 volt system generators one of the 10 volt push buttons of the voltmeter switch is used, Fig. 57. The 10 volt button on the right hand side is used with a positive grounded generator. The left hand button is for a negative grounded generator. For 12 volt systems one of the 20 volt buttons is used and for 18, 24 and 32 volt systems one of the 50 volt push buttons is used.

The field rheostat E, (Figs. 6 and 8) is used only when testing a generator without a regulator thus enabling manual control of the generator output and also showing the field current draw. The field terminal "P", (Figs. 6 and 8) is not connected when testing a generator and its regulator at the same time, except when testing circuit breaker.

With the generator properly connected and the various switches closed the generator should in most cases rotate as a motor. This immediately gives the operator the direction of rotation of the generator.

With the motor control handle in the vertical position, Fig. 60, which is the OFF position, the handle is turned to the left or ON position. If the generator rotates in the opposite direction the motor control handle is turned to the right or reverse position. To increase the speed of the generator it is only necessary to pull the control lever slowly towards the operator. (See page 32)

The cut-in voltage and maximum current are obtained by operating the generator at various speeds. It is always necessary to test the generator at high speed before considering the test as completed. (NOTE: Do not operate generators at low speed for long periods at a time).

Many generators used on present day motor vehicles operate at speeds of 7000 r.p.m and more. It is therefore necessary to apply a light load on the generator and operate it at these high speeds. This test requires only a light load, since the test desired under these conditions is one to locate vibration, high commutator bars or any other faults apt to show at higher speeds.

To add additional load to the generator when the current regulator is being tested the Load Carbon Pile, (Figs. 35 and 36) is used. Otherwise the Carbon Pile switch remains "OPEN," inasmuch as it will discharge the battery used with the bench. The rate of discharge becomes excessive if the carbon pile knob is turned down tightly. (NOTE: The Series Carbon Pile is used to build up voltage on third brush type generator when necessary.)

When the generator is removed from the bench open voltage selector switch, Fig. 62. All other switches can be left closed if **another generator of the same** type is tested. Thus, the voltage selector switch for all practical purposes also becomes a battery line switch.

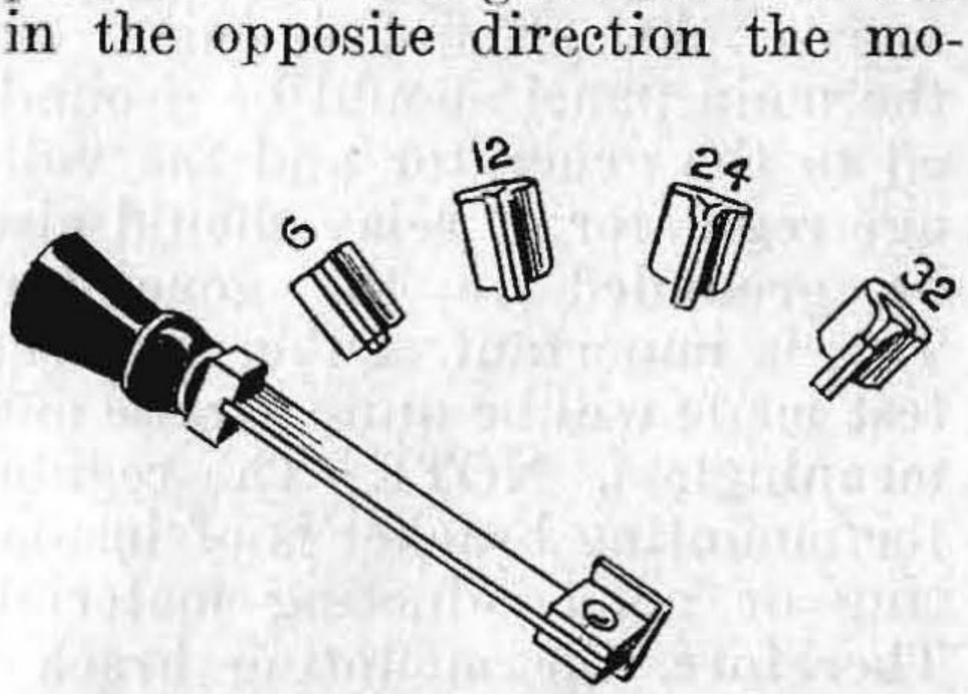


Fig. 62—Voltage selector switch in open position.

Testing Cut-Out, Voltage and Current Regulator



Fig. 63—How voltage regulator and test fixture are mounted on bench.

The voltage regulator mounting bracket is securely fastened to the bench top by placing the threaded bracket attaching lugs into the two holes of the bench top and tightening the wing nuts, Fig. 63. The regulator is then mounted on the adjustable bracket and the latter tilted and locked into a position whereby the voltage regulator is substantially in the same position as it occupies when installed on the motor vehicle.

Wiring Between Generator and Regulator

The wiring between the generator and regulator and between the regulator and the battery system should be duplicated on the bench just as it exists on the car. The field binding post, P, (Fig. 6 and 8) on the main panel is not used in this test, inasmuch as field regulation is automatically obtained through the regulator and therefore no field rheostat is necessary.

When Regulator Is Grounded

If the regulator is grounded on the motor vehicle it is important that it also be grounded to the generator on the bench. In other words, the ground terminal on the main panel should be grounded to the generator and the voltage regulator or relay should also be grounded to the generator. This is important. Otherwise, the test made will be quite erratic and meaningless. NOTE: The regulator mounting bracket is of insulating or non-conducting material. Therefore, the mounting bracket cannot be used as a ground.

Connect the armature of the

generator to the armature terminal on the regulator. This terminal is marked in a number of ways on different makes of regulators. On most Delco-Remy regulators the terminal is marked "GEN." On most Auto-Lite regulators, the terminal is marked "A."

It is advisable to connect a wire from the frame of the regulator to the ground that is placed on the generator, rather than from the terminal marked "GRD" or ground. The reason is that certain types of regulators have a ground return for a dash indicator light and this particular connection is not a true ground, under all conditions.

The "F" terminal on the regulator should connect to the field of the generator. The "B" or "BAT" terminal should connect to the battery terminal, R, (Figs. 6 and 8) of the test bench. The voltmeter leads which are brought out through the two panel leads should be connected in two different ways, depending upon the readings desired as follows:

The ground lead connects the regulator to the ground at all times, but when the operator desires the input voltage to the regulator, the voltmeter leads extending from the battery terminal, R, on the Test Bench panel should connect to the terminal on the regulator which connects to the armature of the generator, (illustrated by solid line "K," Fig. 64). When the output voltage is desired, this voltmeter connection is made on the battery side of the regulator, shown by dotted line, Y, Fig. 64.

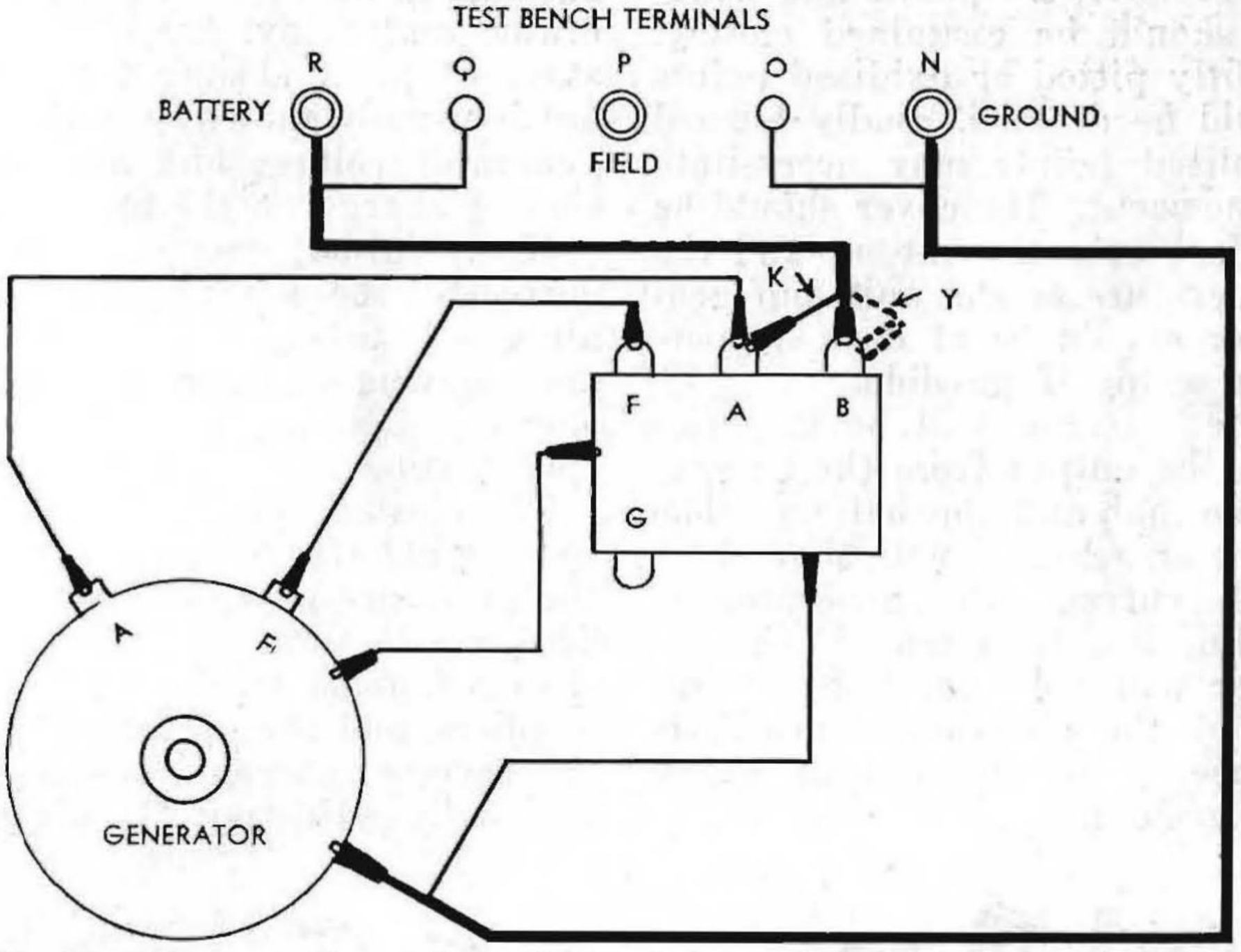


Fig. 64—Diagram showing method of connecting voltage regulator and generator to test bench.

When testing the closing voltage of a relay or cut-out, the operator is interested in obtaining the input voltage to the regulator, relay or cut-out, and, therefore, the voltmeter wire leads should connect to the input or armature connection of the device being tested. When testing the voltage regulator action of a voltage or current regulator the operator is interested in obtaining the output of this device, and therefore, the voltmeter connection is moved to the output side or the battery connection of the regulator being tested.

Before testing a cut-out or circuit breaker, the points and winding should be examined closely. Slightly pitted or oxidized points should be dressed. Badly burned or pitted points may necessitate replacement. The cover should be in place over the cut-out and the temperature of the unit and generator should be at normal operating value if possible.

The ammeter will be in series with the output from the generator cut-out and the battery. The ammeter reading will show how much current the generator is sending into the circuit. The voltmeter will show the voltage output of the generator since it is connected to the output brush and ground.

Connect the field terminal on the generator to the field terminal P and cut in all resistance. Then set generator speed at 2000 to 3000 RPM.

Gradually reduce the field resistance with rheostat E and carefully note voltage at which cut-out closes. This must be BELOW the opening voltage of the voltage regulator setting on generators equipped with voltage regulator.

Then increase resistance with the field rheostat E and note opening voltage and reverse current reading of cut-out.

The usual closing voltage for cut-outs is about 6.5 volts. (Generator and relay, hot.) The instant of point closing for a cut-out is usually shown by a drop in generator voltage and an indication of charge on the ammeter.

If the cut-out does not perform correctly, the point spacing and air gap between the magnet core and moving element should be checked against manufacturers' specifications.

The closing voltage is adjusted by varying the spring tension on the armature or moving element. This can be done by bending the spring support with a small pair of pliers, and the opening voltage or reverse current opening is varied by adjusting the air gap.

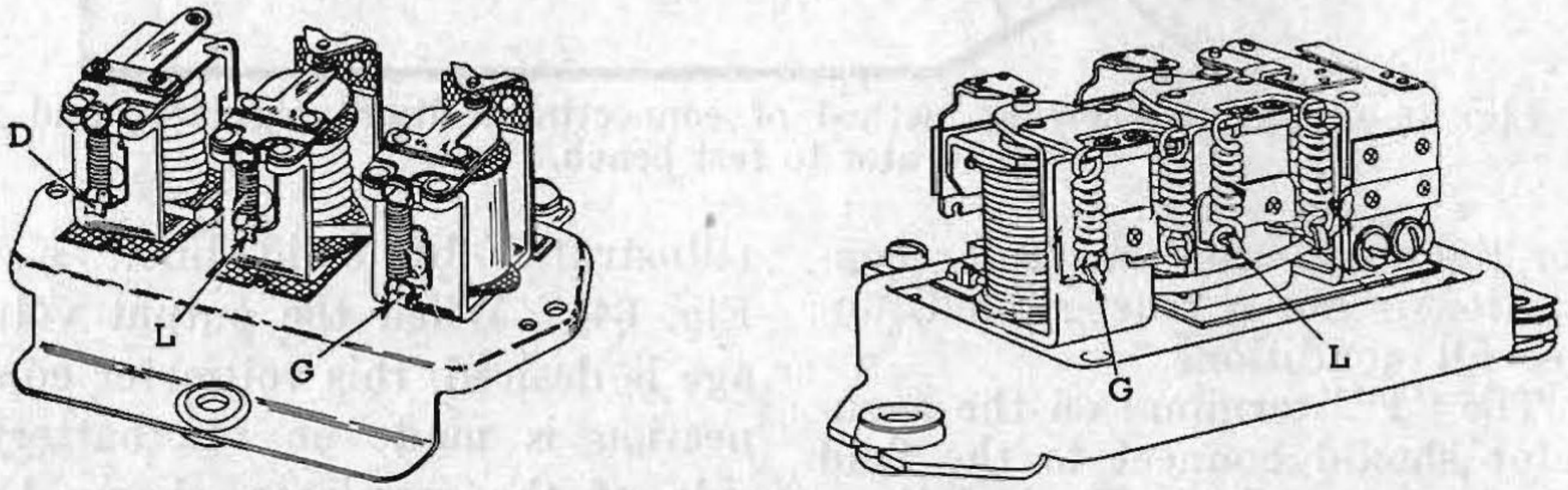


Fig. 65—Two types of voltage regulators. Hanger D, controls cut-out voltage. Hanger L, controls generator amperage and G, charging voltage.

SECTION 6

Testing Dismantled Generator

General — A generator which proves to be defective or suspected of being defective by previous tests on the test bench should be dismantled and all parts cleaned in clean gasoline or carbon tetrachloride. Blow the parts dry with

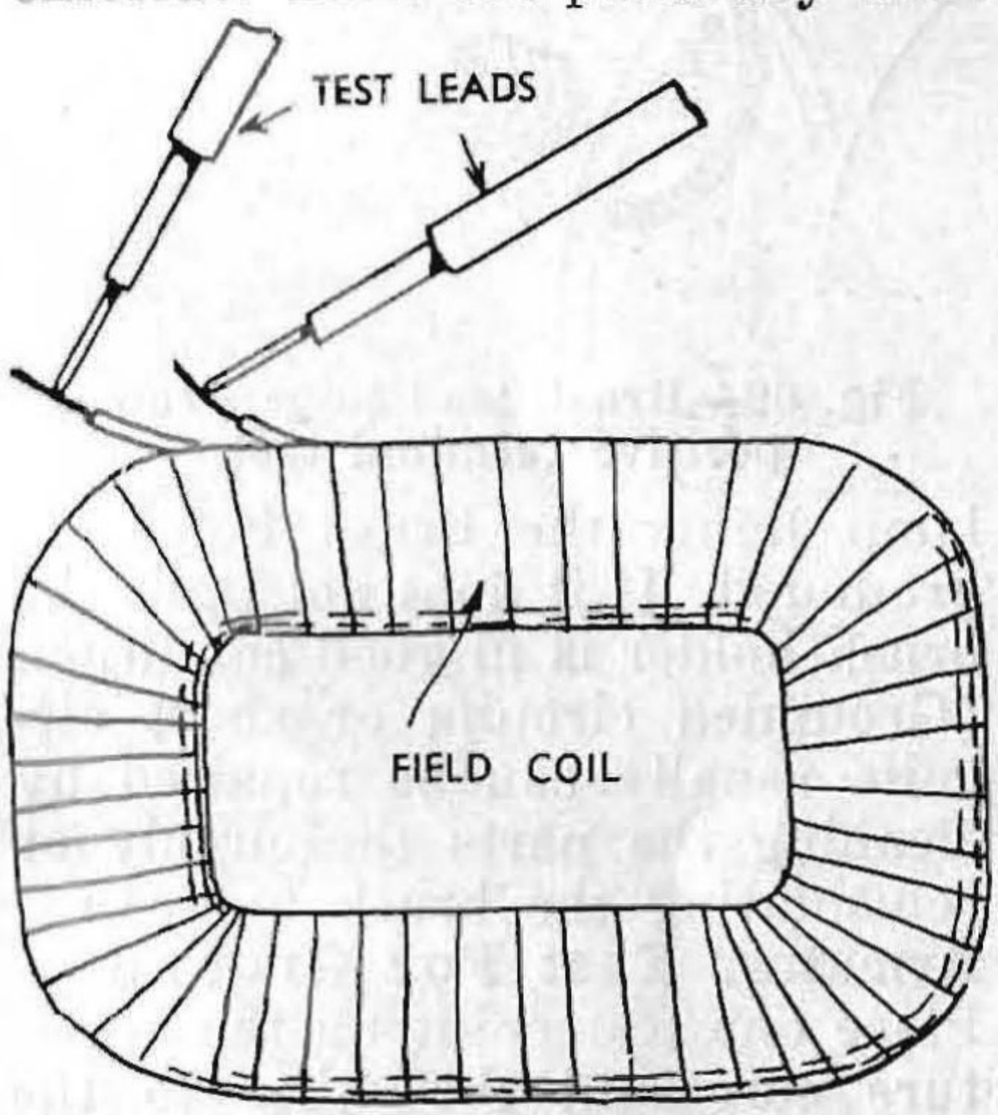


Fig. 66—Method of testing field coil.

compressed air and proceed to make the following tests, using the 110-volt test points plugged into the bench as described on page 51.

Field Coil Test — Place the test prods on the field coil leads as shown in Fig. 66. If the field coils are in proper condition the test lamp will light. If it does not light, the field coil has an open circuit and must be replaced.

Ground Test of Field Coil—Place one test point to ground and the other to the field coil terminal, Fig. 67. If the test lamp lights either the field coil is grounded or the insulation of the field coil terminal has broken down. To locate the trouble, remove the terminal from the field frame and again make the test. If the lamp does not light it shows that the field coils are in good condition but that the terminal insulation is broken down and must be replaced. Should the test lamp light however, it indicates that the field coils are grounded and replacement must be made.

Balancing Test For Field Coils—(Test Points Not Used in This Test) Remove the insulation from the soldered connection between the two field coils. In this test the 110-volt test lamp and test points are not used. Instead, connect a test lead from the battery binding post of bench to the field coil as shown in Fig. 68 and connect another lead from the field binding post of the bench to the field coil as shown at X, Fig. 68. Place field switch in position G, close voltage selector switch in 6-volt position, close polarity switch to the right and push 10 ampere button of the ammeter switch on the positive ground side.

Note the ammeter reading. Leave

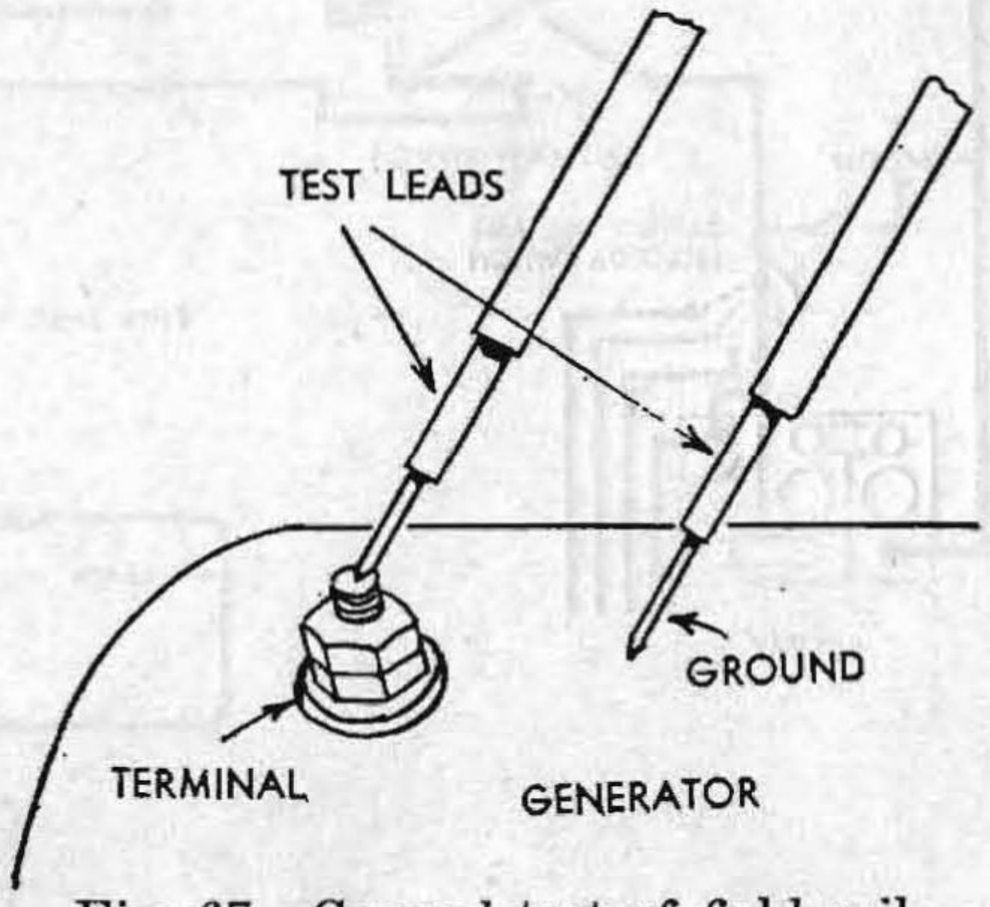


Fig. 67—Ground test of field coil.

one test point on the soldered connection and place the other test point to the end of the other coil (Y, Fig. 68) and again note the ammeter reading. If one field coil draws more current than the other, indications are of an internal short in the field and the coil which draws the most current should be replaced.

Brush Lead To Generator Positive Terminal Test — Place one test point on one end of the lead and the other test point on the terminal, Fig. 69. If the lamp lights the lead is in good condition. If not there is an open circuit and the lead must be replaced.

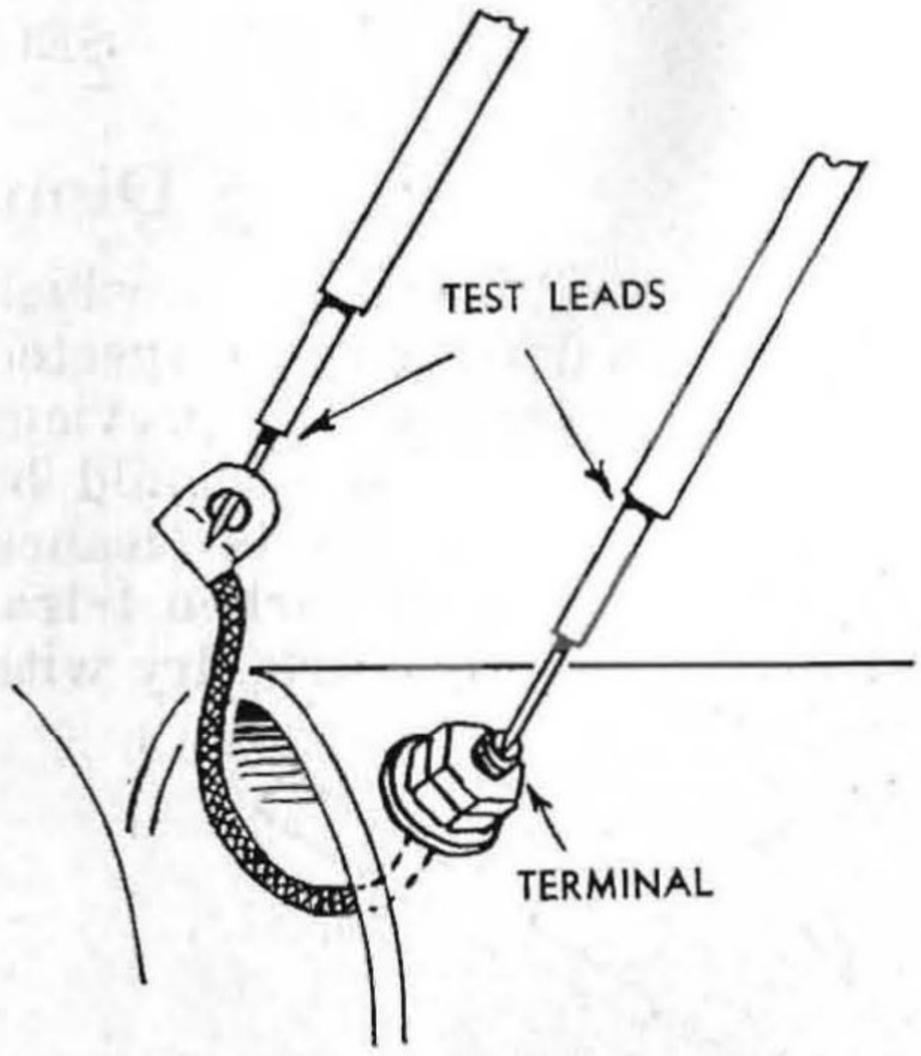


Fig. 69—Brush lead to generator positive terminal test.

Ground Test For Positive Terminal—Place one test point on the terminal and the other on the generator housing, Fig. 70. If the lamp lights it indicates that the terminal insulation is broken down. If it does not light the insulation is in good condition.

Ground Test Of Main Brush — First, thoroughly clean brush holder of dust. Place one test point on the positive brush and the other on the end frame of the generator, Fig. 71. If the test lamp lights the brush holder is grounded. If it does not light the brush holder is in good condition. (Grounded circuits or short circuits usually can be repaired by cleaning the parts thoroughly or reinsulating the brush holder.)

Armature Test For Ground — Place one test point on the armature core and the other to the commutator bars, Fig. 72. If the test lamp lights the commutator is grounded. If it does not light the commutator is not grounded.

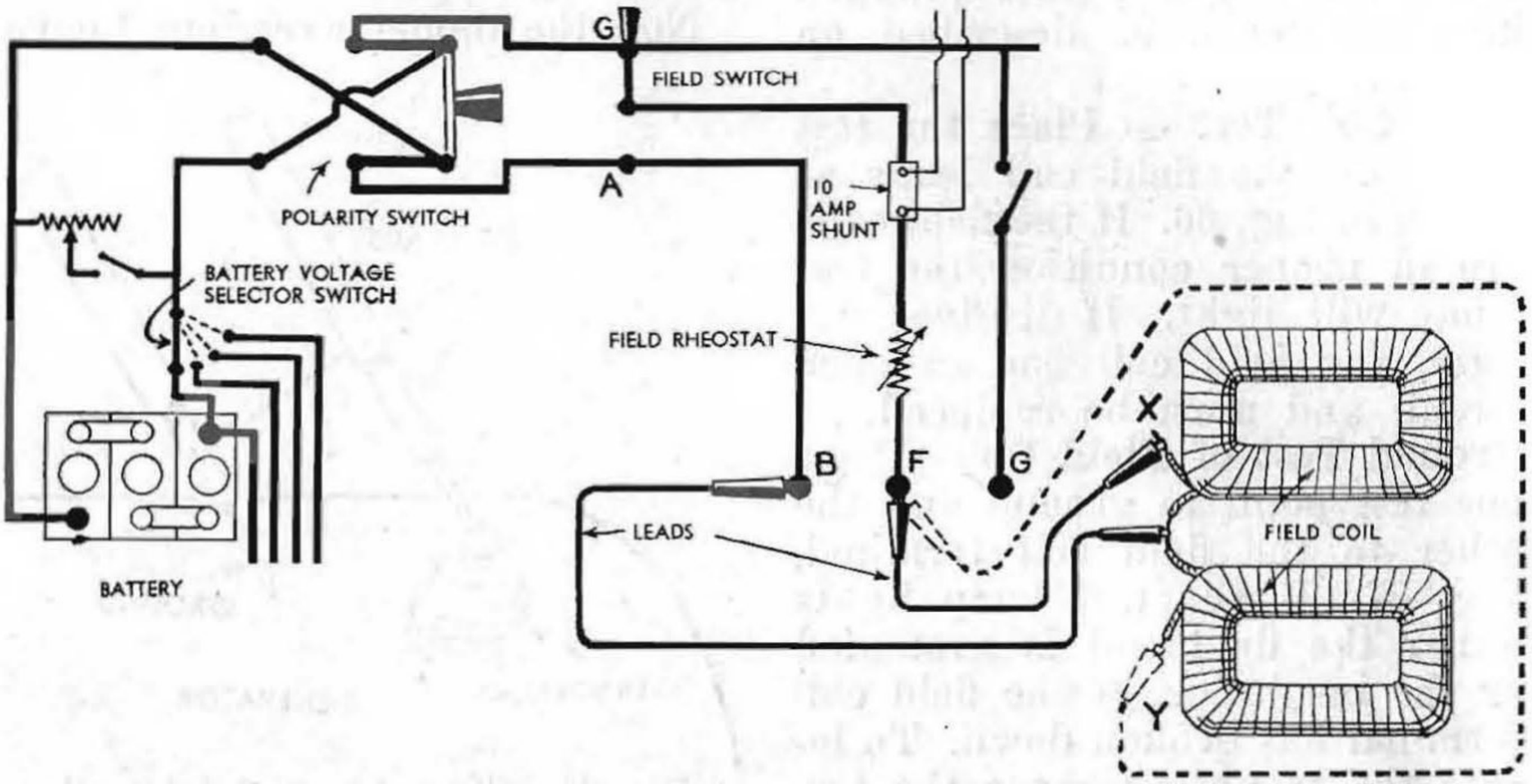


Fig. 68—Field coil balancing test, using 10-amp. shunt.

Brush Holder Spring Tension — Test each brush holder spring to see that there is sufficient tension to hold the brushes firmly against the commutator. This is done with a tension scale and the proper tension should conform to manufacturer's specifications. Check the brushes for wear and condition.

Drive End Bearing—Remove the ball bearing from the housing and clean it in clean gasoline. Re-oil and blow it out with compressed air. Rotate the bearing to locate any rough spots. If rough spots are found the bearing should be

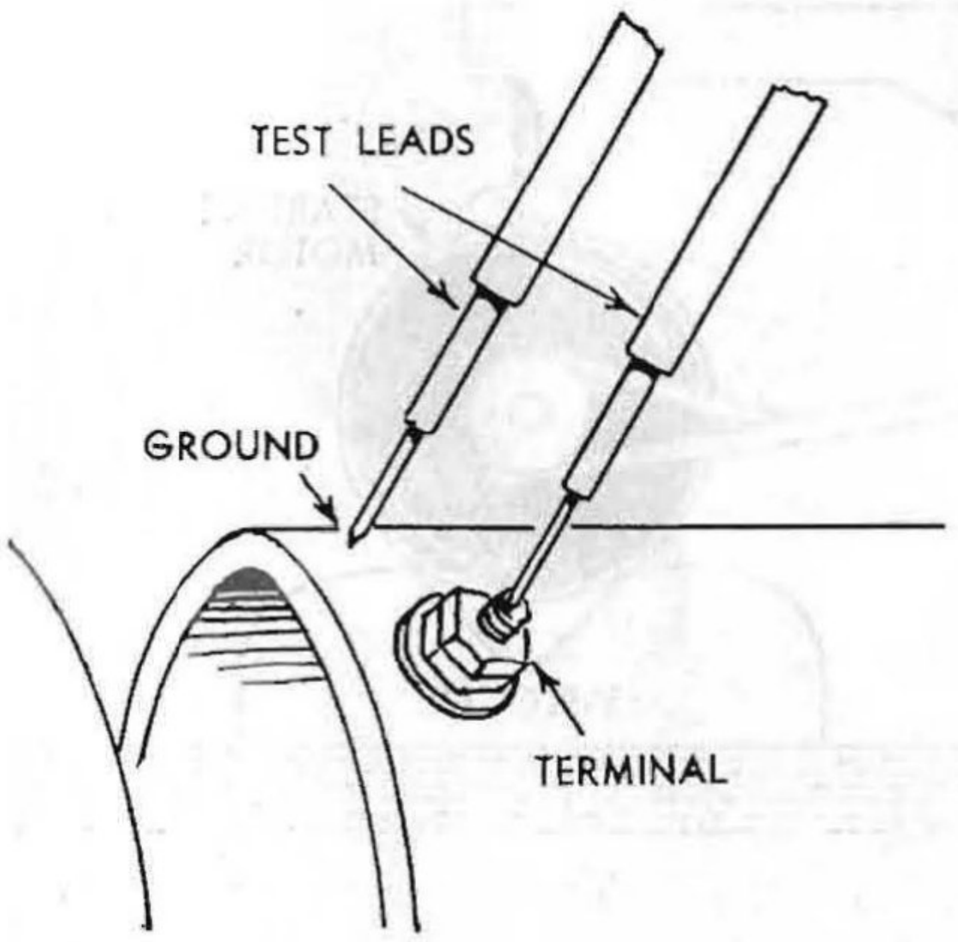


Fig. 70—Positive terminal ground test.

replaced. Some generators also have a ball bearing on the commutator end. This should be serviced the same as the others.

Commutator End Bushing — If there is a bushing in the commutator end plate check the fit of the armature shaft on this bushing. If the bushing is worn replace it with a new one.

Commutator — If the commutator is rough it should be turned down in a lathe until all roughness disappears. Tool marks can be removed by sanding the commutator with "OO" sand paper. Undercut the mica in an undercutter fixture after which the armature should be checked on a growler.

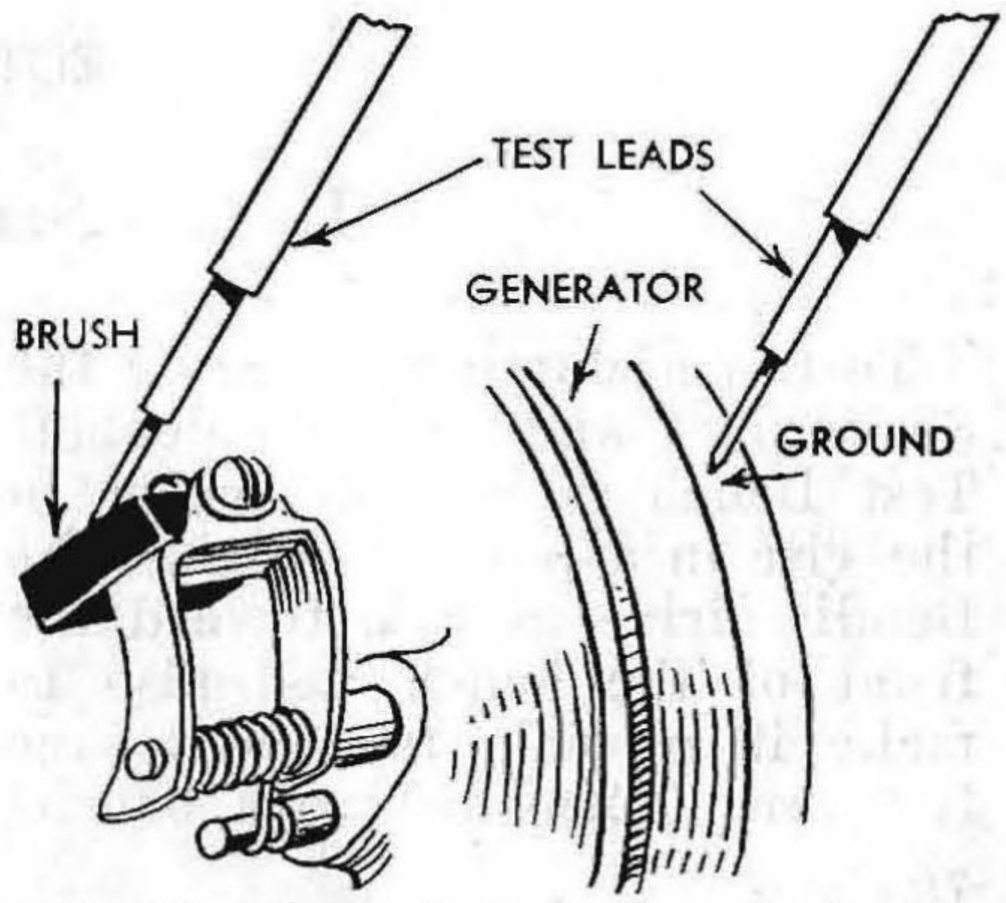


Fig. 71—Ground test of main brush.

Growler Test of Armature — A complete test of the armature for short circuited condition can be made in the customary manner on a growler and if the tests show the armature to be short-circuited it should be replaced.

Armature to Commutator Leads—See that the armature to commutator leads are properly soldered to the commutator bars. Any loose leads should be resoldered using a resin flux. In no case should an acid flux be used for this.

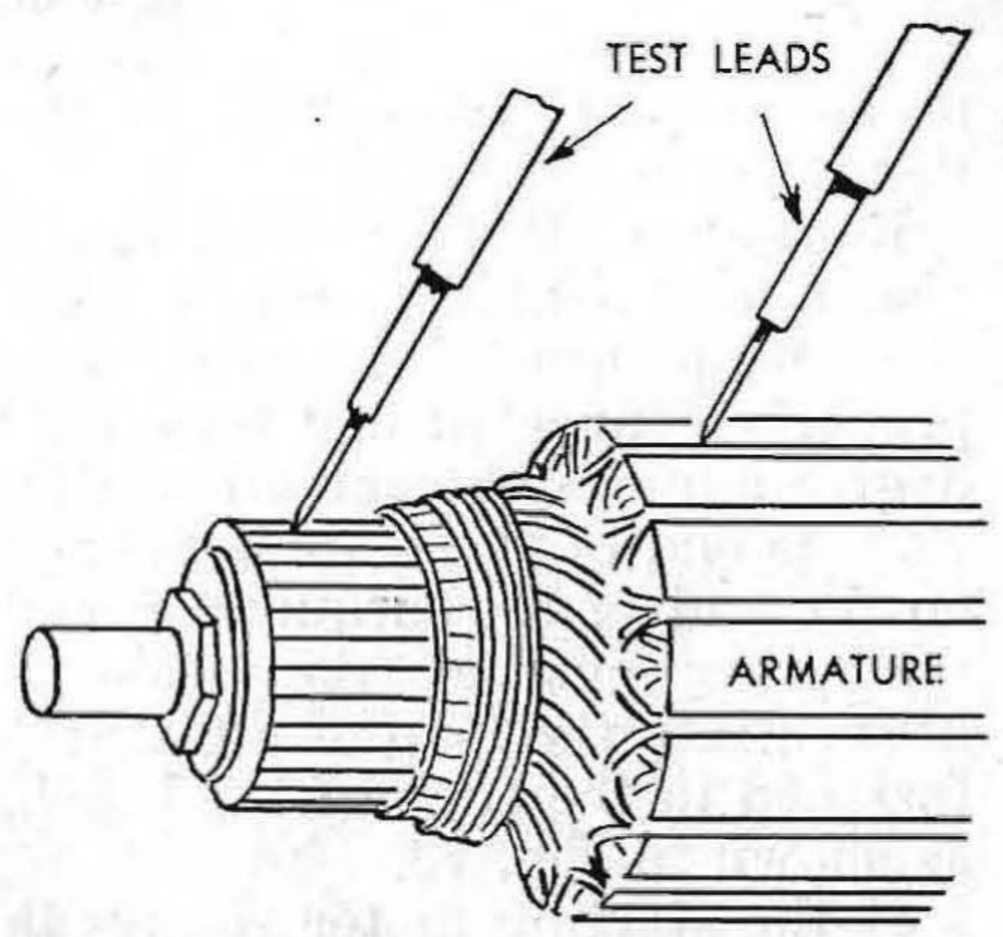


Fig. 72—Armature test for ground.

SECTION 7

Testing Starting Motor

To test a starting motor on the Series 500 and 501 Weidenhoff Test Bench mount the motor in the vise in a position so that the Bendix drive gear is toward the front of the bench and also to make it possible for the torque test arm (furnished with bench) should be mounted on the right side of the bench and the C-clamp fastened to the left side of the bench, at the front, Fig. 73. The reverse is true if the starting motor rotates in a counter-clockwise direction. In any event the apparatus must be so placed that the

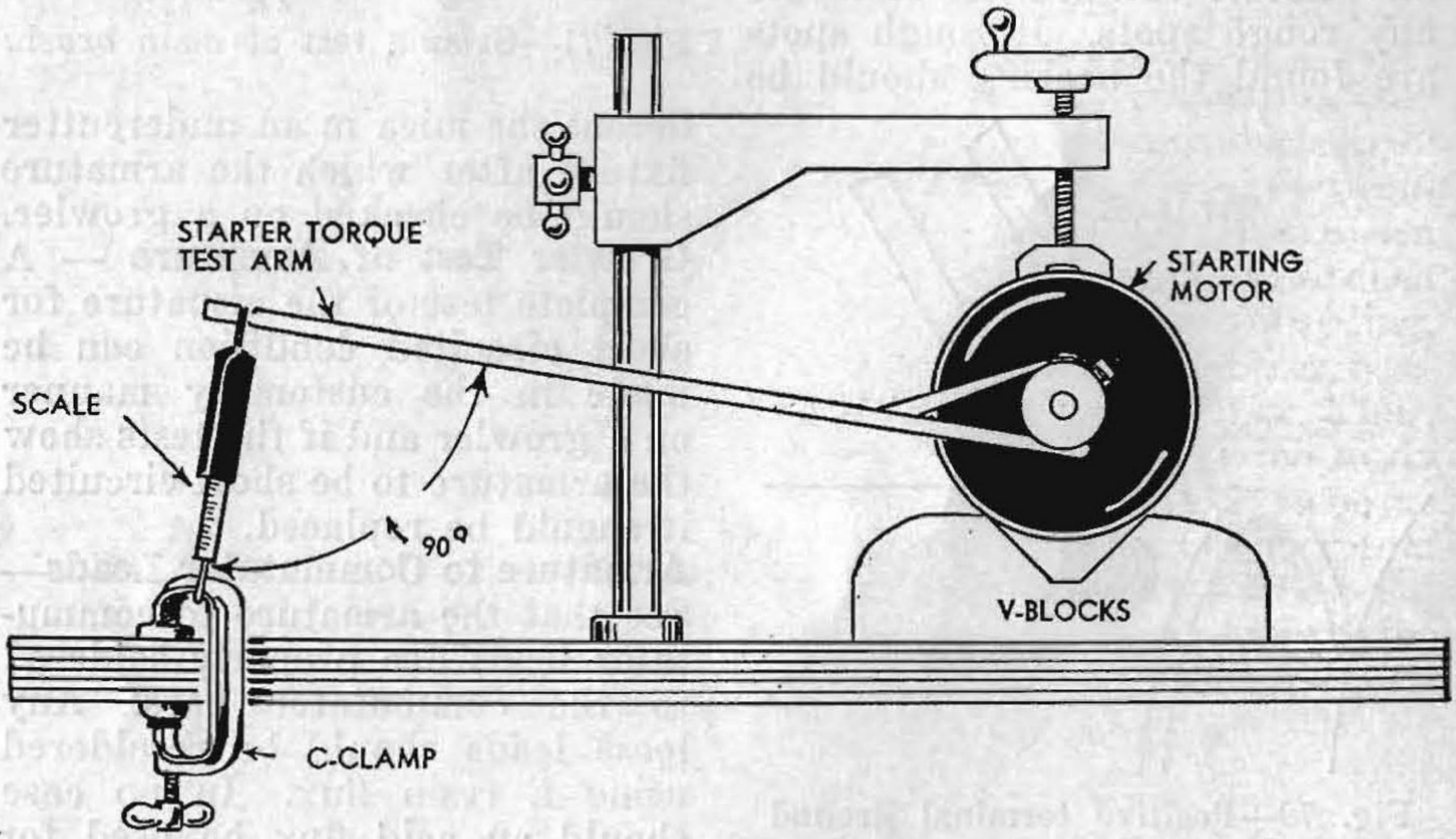


Fig. 73—When properly installed the starter torque test arm and scale form a right angle (90°).

to be properly connected to the Bendix gear.

Rotate the starting motor in the vise a sufficient amount so that the torque arm and scale when properly connected will form a 90 degree angle with each other, Fig. 73. One end of the scale is hooked on the end of the torque arm and the other end of the scale is hooked into the loop of a C-clamp fastened to the edge of the bench, as shown in Fig. 73.

If the starting motor rotates in a clockwise direction the vise scale and torque arm are substantially at an angle of 90 degrees to each other.

CONNECTING STARTING MOTOR FOR TEST—Connect a heavy lead from the starting motor terminal to the battery terminal of the test bench. Connect a second lead from the starter terminal of the test bench to a ground on the starting motor. Also connect the two voltmeter terminals of the panel to the starting motor by attaching one voltmeter lead to the terminal of the

starting motor and the other voltmeter lead to a ground on the starting motor.

The operator can then use the voltage selector switch to close the circuit for obtaining readings.

In order to avoid a sudden jerk or surge as is commonplace on most starting motor tests, the operator can open the series carbon pile switch K (Figs. 6 and 8) and by gradually compressing the carbons on this carbon pile increase the voltage from a low value to a high enough value to give a complete test. To be sure that this value is as high as it should be a higher switch selection can be made. For example, in testing a six volt starting motor, the operator can make a connection with the battery selector switch for 12 volts and in using the series carbon pile adjust the voltage to the starting motor to any desired value.

If the operator wishes to measure these voltages across the starting motor, he can do so by using the two binding posts (voltmeter terminals O and Q, Fig. 64 on the front of the panel and connecting them across the starting motor. The correct voltmeter scale is obtained by means of the voltmeter scale push button switches as in preceding tests.

What the Readings Indicate

EXAMPLE—Assume that the specifications call for 300 amperes at 3.2 volts and 10 foot lbs. torque. Adjusting the voltage with the rheostat to 3.2 volts, ammeter should show 300 amperes. This indicates perfect electrical conditions. Less than 300 amperes at 3.2 volts indicates abnormal resistance due to poor brush contact, loose leads in commutator riser, etc.

More than 300 amperes indicates short circuits in the field windings, brush holders, etc. Correct torque with correct electrical conditions indicates perfect mechanical conditions. Correct electrical conditions but insufficient torque would indicate mechanical troubles such as worn bearings, bent shaft, etc.

SECTION 8.

General Information

(GENERATORS)

How a Generator Works—While there are many different types of generators, each being designed for a particular kind of service, in general, it might be said that all generators are substantially the same in basic design.

Generally speaking a generator is a machine which changes mechanical energy to electrical energy. There is nothing electrical about such a machine when it is at rest. But when everything is in order, electric current is produced at the terminals of a generator when its armature is driven by some outside means, as, for example, the fan belt on a motor vehicle.

The generators used on motor vehicles are of the direct current type and available for 6, 12, 24 and 32 volt circuits. Six-volt generators are generally used for passenger car service, while the higher voltages, 12, 24 and 32 volt units are used on trucks, busses and for industrial installations.

The principal function of the generator on a motor vehicle is to keep the storage battery in a properly charged condition. In addition to this, the generator has to furnish current for ignition, lighting, heater, radio, fan and other electrically-operated accessories. Thus, the generator has a real job to do and much of its work is done at high speed. Modern generators

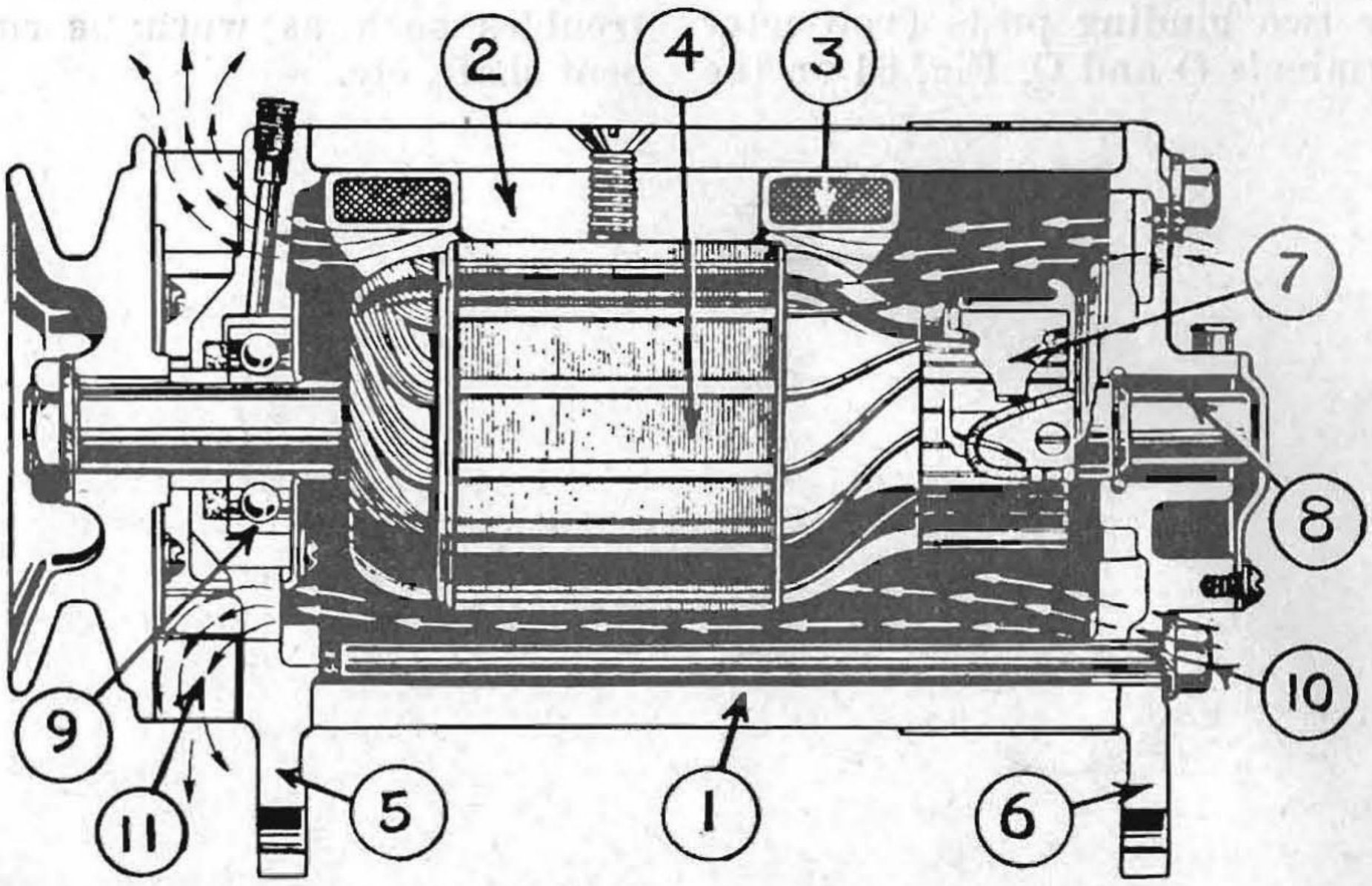


Fig. 74—Longitudinal cross section of generator showing relation of the various parts.

revolve over 7,000 r.p.m. in many cases, consequently the need for proper testing and servicing becomes at once apparent.

The generator must be of sufficient size to provide capacity for all electrical loads, with enough surplus to keep the battery charged.

When the connected electrical load is taken care of, any surplus current from the generator goes to the storage battery creating chemical energy. The chemical energy in the battery is used for operating the starting motor and together with the generator furnishes current for ignition, lighting and operating other electrically operated units.

Generator Types

The different types of automotive generators are designed for a particular kind of service. The kind of service to which a motor vehicle is subjected and the demands regarding the total current output determine largely the kind of current regulation needed. This is done to insure enough current at all times without danger to any part of the car's electrical system. A generator is designed and built to deliver a maximum output. It cannot exceed this maximum output with any degree of safety. Consequently when more output is required, the thing to do is to install a larger generator.

Although differing in details, an automotive type generator consists essentially of the following parts (Fig. 74):

1—Frame or Housing
2—Pole Shoes
3—Field Coils

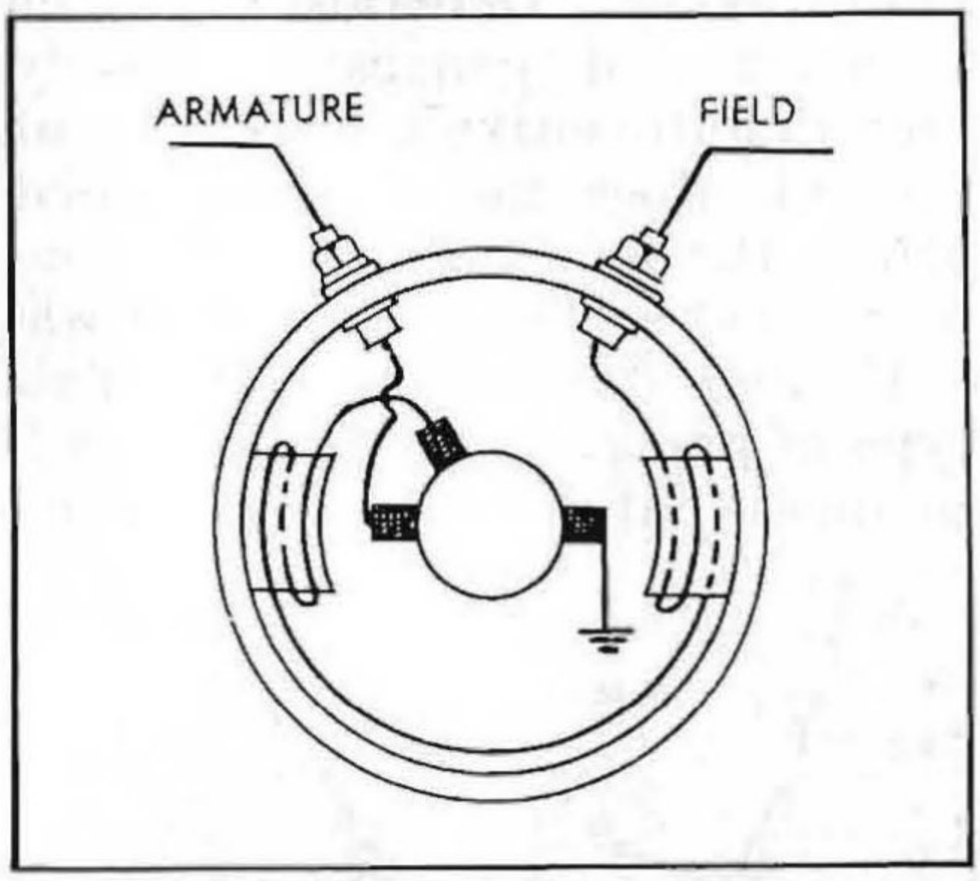


Fig. 75—Third brush type generator. In some generators the field lead is grounded on the inside of the housing.

4—Armature
5—Drive End Plate
6—Commutator End Plate
7—Brushes and Holders
8—Bushing
9—Ball Bearing
10—Bolts
11—Fan Type Pulley

In order to operate properly the armature shaft bearings of the generator must be in good condition. Wear in the bearings allows the armature to become misaligned, destroying the correct air gap which must exist between the armature and pole shoes.

In general there are two types of generators:

1—Third Brush (Fig. 75)

In some third brush types of generators the field lead is not brought outside the housing as in Fig. 75, but grounded on the inside of the housing or frame.

2—Shunt Wound (Fig. 76).

These generators are further classified by the kind of voltage or current regulation used to control the output. Regardless of the type of current regulation, a cut-out always is used.

Shunt Wound Generators — The shunt wound generator, widely used in automotive installations at present, does not have a third brush, the field circuit being connected across the two main brushes through the regulator unit. This type of generator reaches its maximum output at a lower speed and

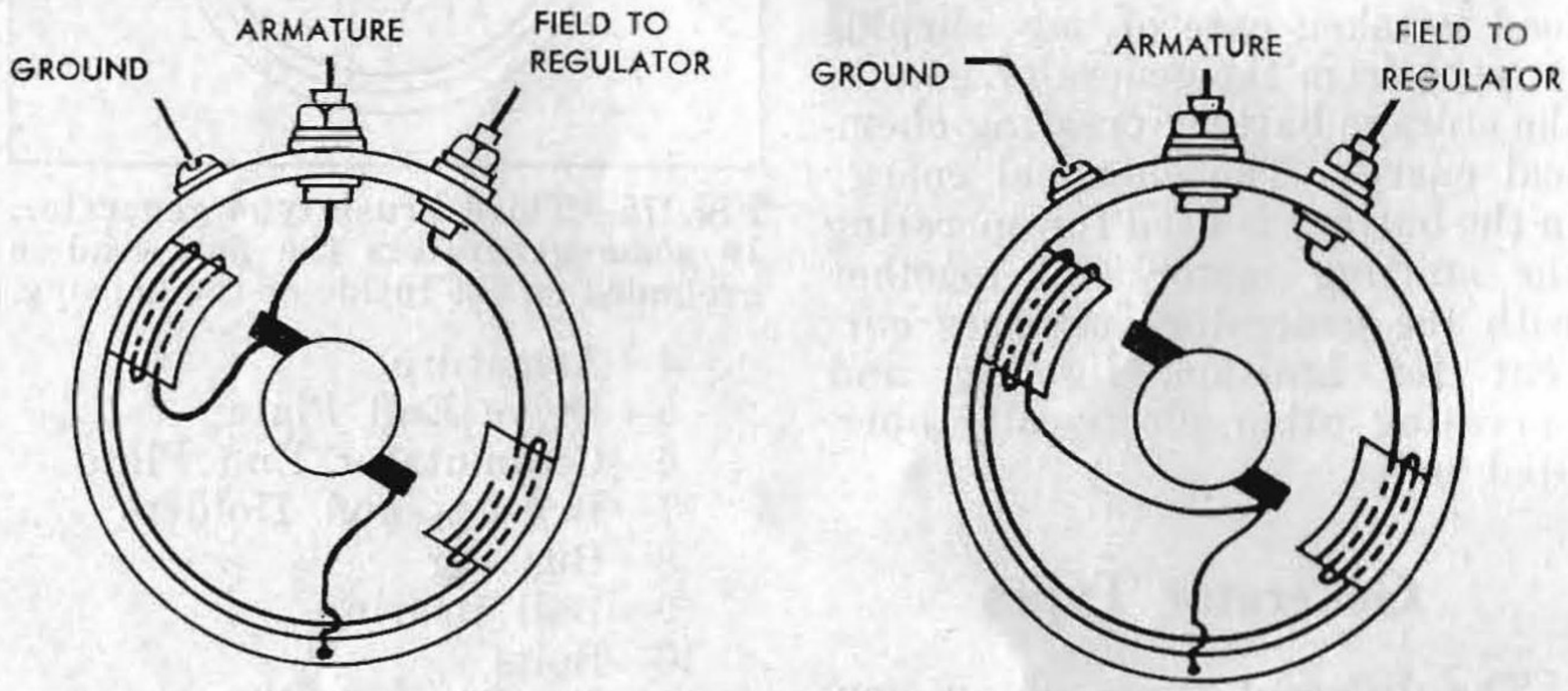


Fig. 76—Left, shunt wound generator with field completed to ground through regulator. Right, field is completed to armature through regulator.

due to the regulator maintains a constant output throughout the higher speed ranges without the "taper-off" characteristics of third brush generators. External current regulation is required with this type generator.

How Generator Output Is Controlled—The selection of a generator for a particular application is based on the amount and usage of the electrical load, the type of service, the type of mounting and drive. A heavy electrical load during a large percentage of the total running time would require a larger capacity generator than if the same electrical load were connected into the circuit only a small percentage of the running time.

In normal operating conditions, the ventilated type of generator, air-cooled by a centrifugal fan, is usually preferred, since this permits a greater output from a given generator size. Enclosed generators are preferred on farm tractors, street sweepers, and other applications where excessive dust is encountered.

The type of generator drive (belt and pulley, gear, or coupling) depends on the application. The drive ratio (generator r.p.m. per engine r.p.m.) is a factor in generator life. The greater the generator speed, the shorter the life of brushes, bearings and commutator.

Generators may be classified according to the type of regulation used. Some form of generator output control or regulation must be used to prevent the generator from being overloaded, and to prevent excessive battery charge and high voltages in the electrical circuit. Regulation is based on controlling the generator field current by one of the following methods:

1. THIRD BRUSH TYPES

(a) Adjustable third brush.
(b) Adjustable third brush with thermostat controlled field resistance.
(c) Adjustable third brush with manually controlled field resistance.
(d) Adjustable third brush with light switch controlled field resistance.
(e) Adjustable third brush with divided field circuit.
(f) Adjustable third brush with Step-Voltage Control.
(g) Adjustable or fixed third brush with Vibrating Voltage Regulator.

2. SPLIT FIELD TYPE

(a) Fixed third brush with Vibrating Voltage Regulator.

3. SHUNT WOUND TYPES

(a) With Current Regulator.
(b) With Current and Voltage Regulator.

The different designs of generators differ in detail. For example, some generators use a plain bushing on one end of the armature shaft and a ball bearing on the drive end. Others may use two ball bearings, one at each end.

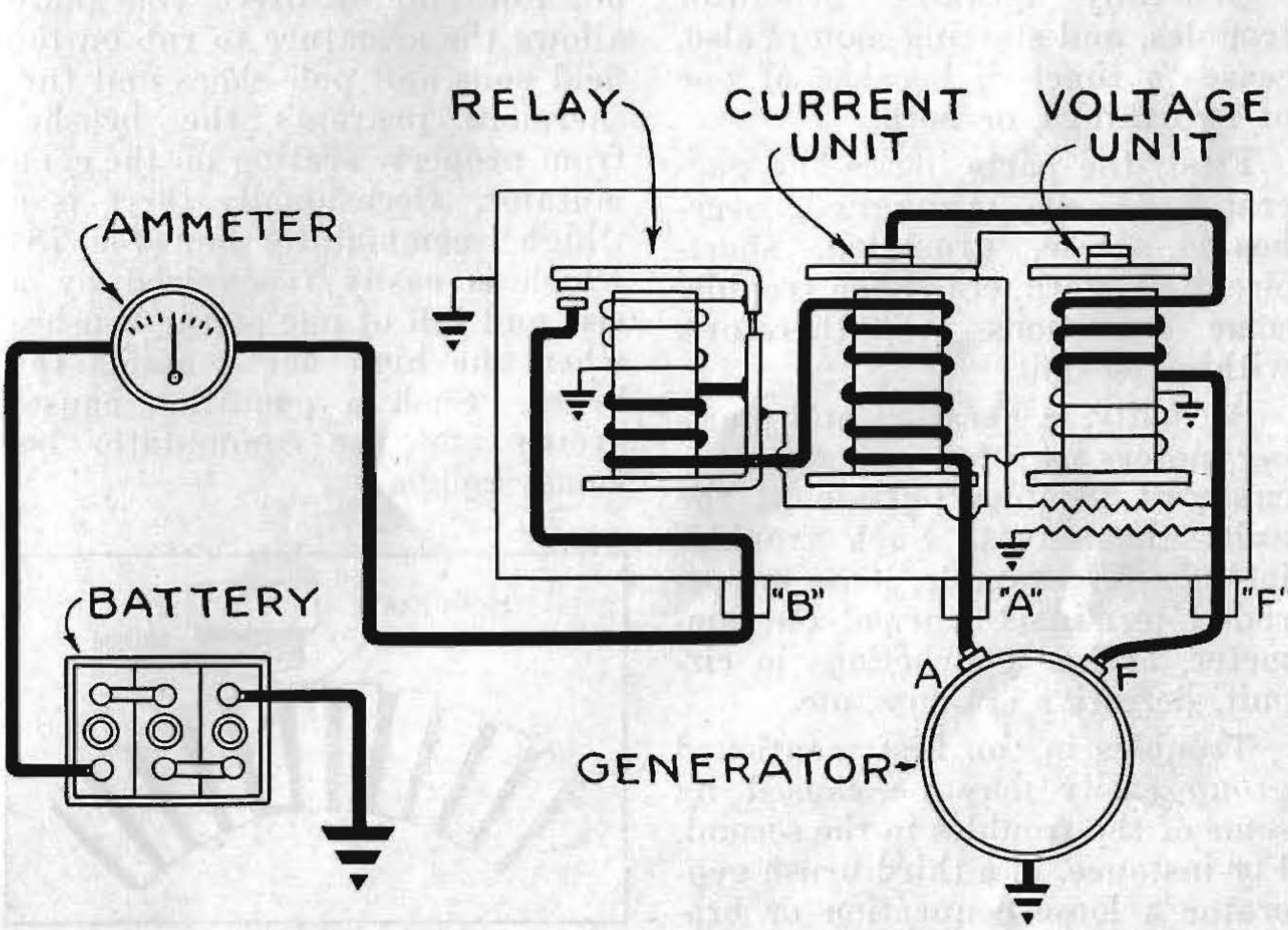


Fig. 77—Schematic diagram of a typical system of voltage and current regulation.

SECTION 9

Generator Troubles

Some of the Reasons Why Generators Fail In Service. Troubles May Be Due to Unit Itself or to Outside Factors Like Leads, Connections, Etc.

Automotive generators and starting motors like other units of the motor car or truck sooner or later require service work. There are many reasons why these units might fail in service. Some generators will operate over exceedingly long periods of time while others may require servicing relatively much sooner. Much depends on the conditions under which the units operate and the care given them.

Generally speaking generator troubles, and starting motors also, cease to function because of one of two things, or both.

First, the parts inside the generator become misaligned, overheated, loose, grounded, short-circuited, worn, etc. Such troublesome conditions are, therefore, within the unit.

Secondly, generators and starting motors may fail in service because of troubles outside of the units themselves. Such troubles include, for example, loose or corroded terminals, burned out ammeter, broken connections in circuit, defective cut-outs, etc.

Troubles in the first mentioned group easily may be caused by some of the troubles in the second. For instance, in a third brush generator a loose connection or broken cable may build up very high voltage within a generator due to the high resistance. A loose brush lead causes high resistance causing the generator to build up voltage to a dangerously high point resulting in over-heating and eventual failure of the generator.

Frayed or broken field coil leads set up a high resistance and this sort of hidden trouble eventually spells the failure of the generator.

Bearing Wear

Wear in the bearing of the commutator end or drive end plate allows the armature to rub on the field coils and pole-shoes and furthermore prevents the brushes from properly seating on the commutator. Occasionally there is a "high" commutator bar (Fig. 78) which is easily recognized by a rise and fall of one of the brushes when the high bar contacts the brush. Such a condition causes arcing and the commutator becomes rough.

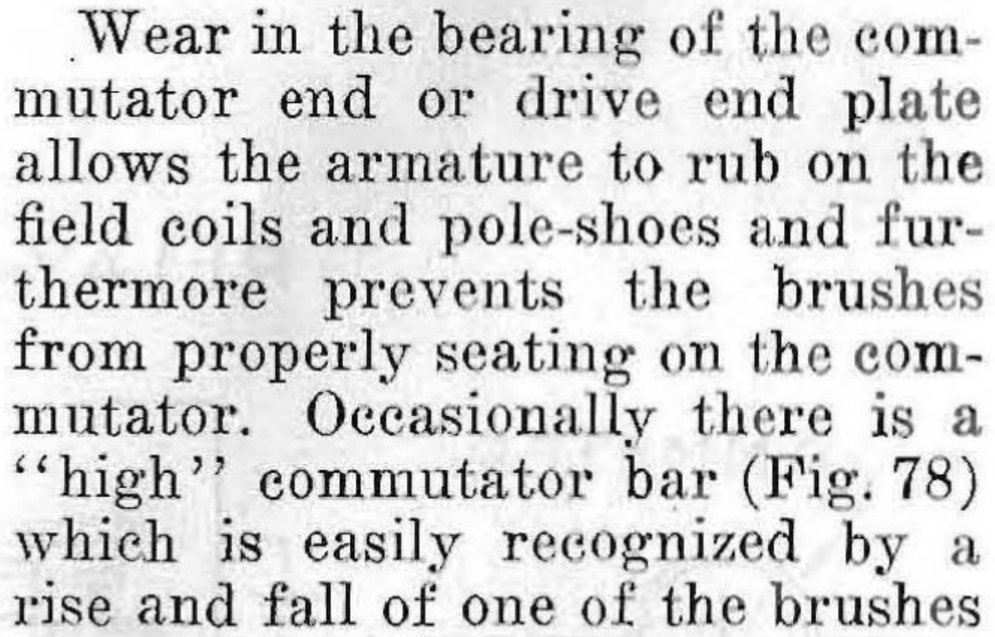


Fig. 78 — "High" commutator bar which causes arcing and roughens the commutator.

Excessive sparking at the brushes indicates any one or more of several conditions. The commutator may be out of round, Fig. 79, armature out of balance, armature shaft may be bent, etc. Other conditions include the following: High mica, weak brush springs, worn brushes, opened coil, loose bearings.

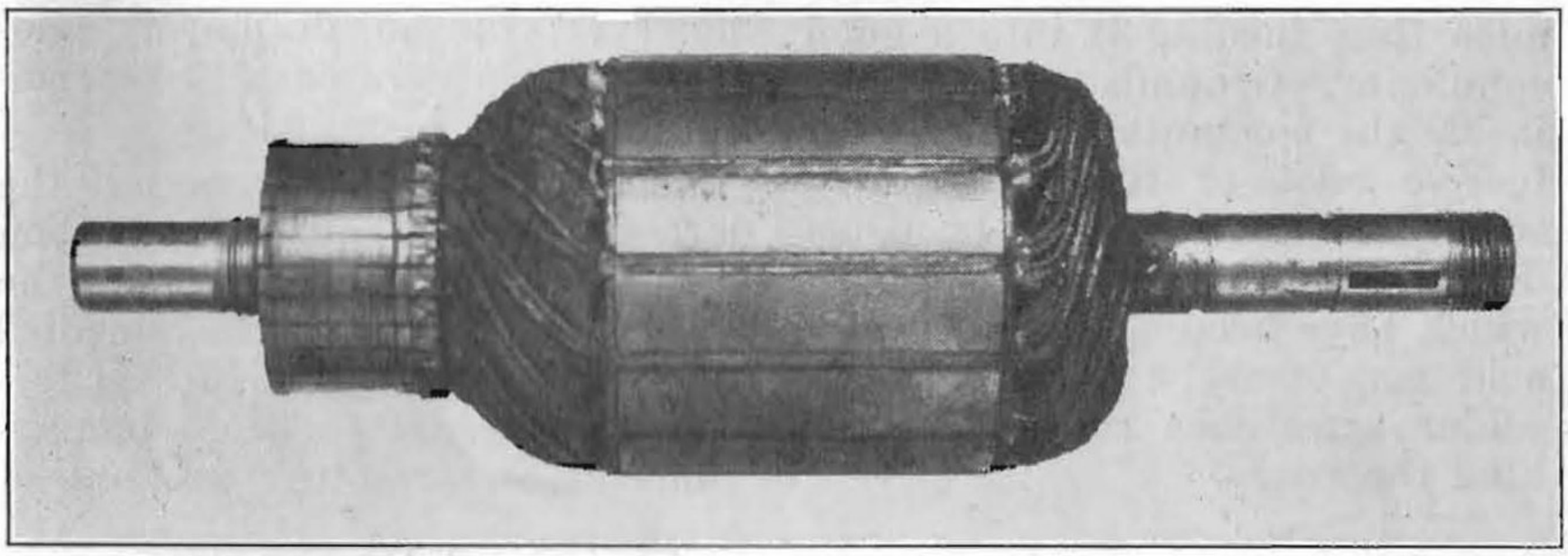


Fig. 79—Generator armature, showing wear of the commutator.

The carbon brushes used in a generator are of a relatively soft material and naturally there is wear. If the brushes become excessively worn or oil soaked they must be replaced. In older types the brush holders actually rubbed on the commutator when the brushes became unduly worn. Box-type brush holders, with stops, on modern generators, prevent this.

Short Circuits and Grounds in Commutator — Very often the terms "short," "ground," and "open" are incorrectly used in connection with electrical service work, especially on armatures. Therefore, it is well to remember that a short circuit (Fig. 80) in an armature occurs when copper touches copper. A ground (Fig. 81) occurs when contact is made between copper and steel in the armature. A loose or broken wire, poor soldering, etc., causes an "open," (Fig. 82).

Short circuits in a commutator are caused by carbon dust getting into the commutator undercutting and thereby bridging the segments. The segments also can be bridged by solder or soldering acid. Naturally when a partial or slight short occurs local current flows through it causing heat. The mica under this condition becomes black and readily conducts current. A heavier current causes more heat up to the point where the short is sufficiently pronounced to carry enough current to burn out a coil.

"Grounds"

Grounds in the commutator may be caused by carbon and copper dust which packs into the front end of the generator causing current leakage. This sort of leakage produces heat also blackening the

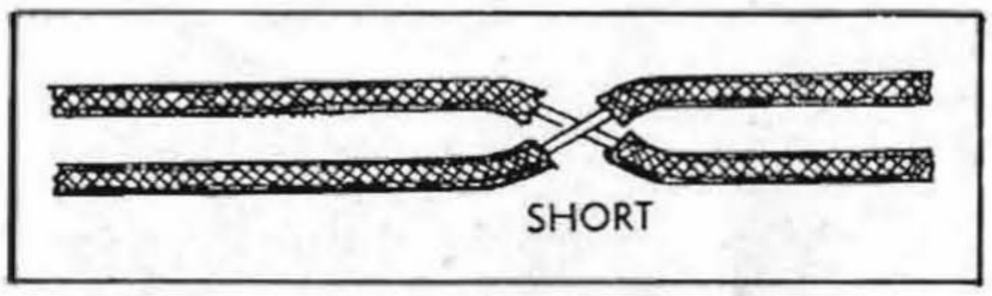


Fig. 80—Illustrating the term "short."

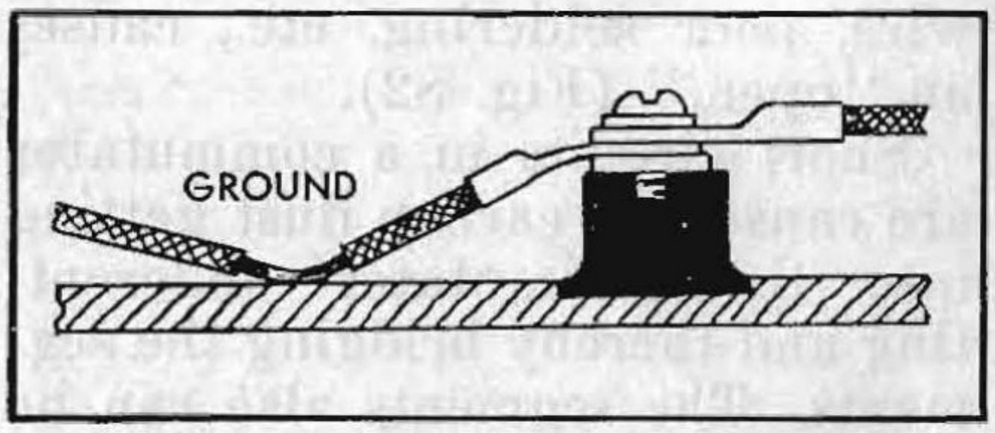


Fig. 81—Illustrating the term "ground."

mica thus turning it into a good conductor. Grounds also develop inside the commutator due to defective mica or to incorrect assembly of the commutator. Dust deposit behind risers or wires which have been soldered in with acid may cause a ground. Even solder sometimes runs down behind the risers.

"Shorts"

Short circuits in the winding may be caused by damaged insulation on the wires while winding the coils thus leaving a weak spot easily broken down under vibration and heat. Insulation is weakened and charged by overheating, resulting in a break down.

"Open"

The cause of an open in an armature may be due to a ground or a short circuit burning through a wire breaking it in two. An open also can be caused mechanically by the armature rubbing on some protruding part inside the generator frame or against some part which may work loose and cut a wire.

The cure for a short circuit providing the insulation is not burned often can be affected by simply cleaning the parts thoroughly. If however, the insulation is completely disintegrated a new armature must be installed.

In the case of a ground if the latter has been caused by carbon dust or solder behind the riser the trouble sometimes can be remedied by cleaning the parts of this foreign matter. If the core laminations of an armature are out of

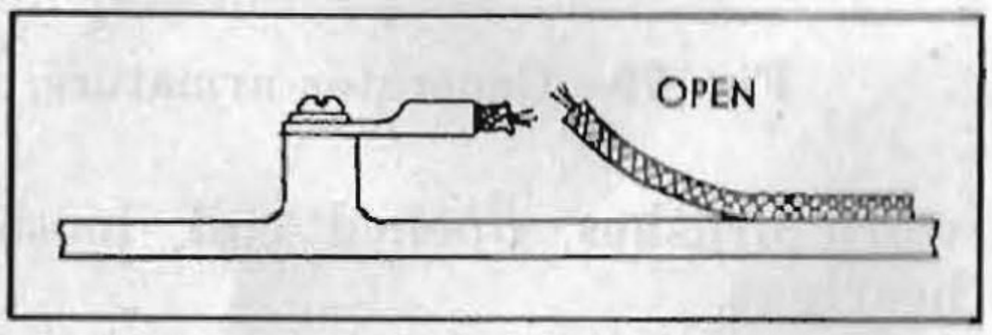


Fig. 82—Illustrating the term "open."

line or loose, and are rubbing on the pole shoes, the only safe cure is to replace with a new armature.

Obviously the remedy for an open is to simply clean the broken wire and resolder it, providing that no short circuit or ground is present. The most likely place for an open to occur of course, is at the commutator.

SUPPLEMENTARY INSTRUCTIONS APPLYING TO

WEIDENHOFF

MODEL 325

MAGNETO TEST FIXTURE

(NOTE: The Model 325 Magneto Test Fixture is not furnished with Models 500 and 501 Test Bench but can be purchased separately.)

SECTION 10

HOW TO USE THE WEIDENHOFF MODEL 325 MAGNETO TEST FIXTURE

(with Models 500 and 501 Test Bench)

The Weidenhoff Model 325 Magneto Test Fixture provides both a direct and reduction drive for testing magnetos in the Weidenhoff 500 and 501 generator test bench.

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Both base and flange mounted magnetos are tested in the fixture. The reduction drive (5 to 1 ratio) provides a powerful low speed drive for impulse coupling tests. High speed tests are made with the magneto directly coupled to the drive.

•

The magneto test fixture is bolted into place on the test bench in the place normally occupied by a generator on test. The drive to the flange and base-mounted magnetos is shown in Figs. 84 and 85.

•

When testing a base mounted type of magneto the adjustable base shown in Fig. 83, is used. It will readily be seen that if the magneto has been first mounted on the slotted plate correct alignment is easily secured by adjusting the six thumb screws.

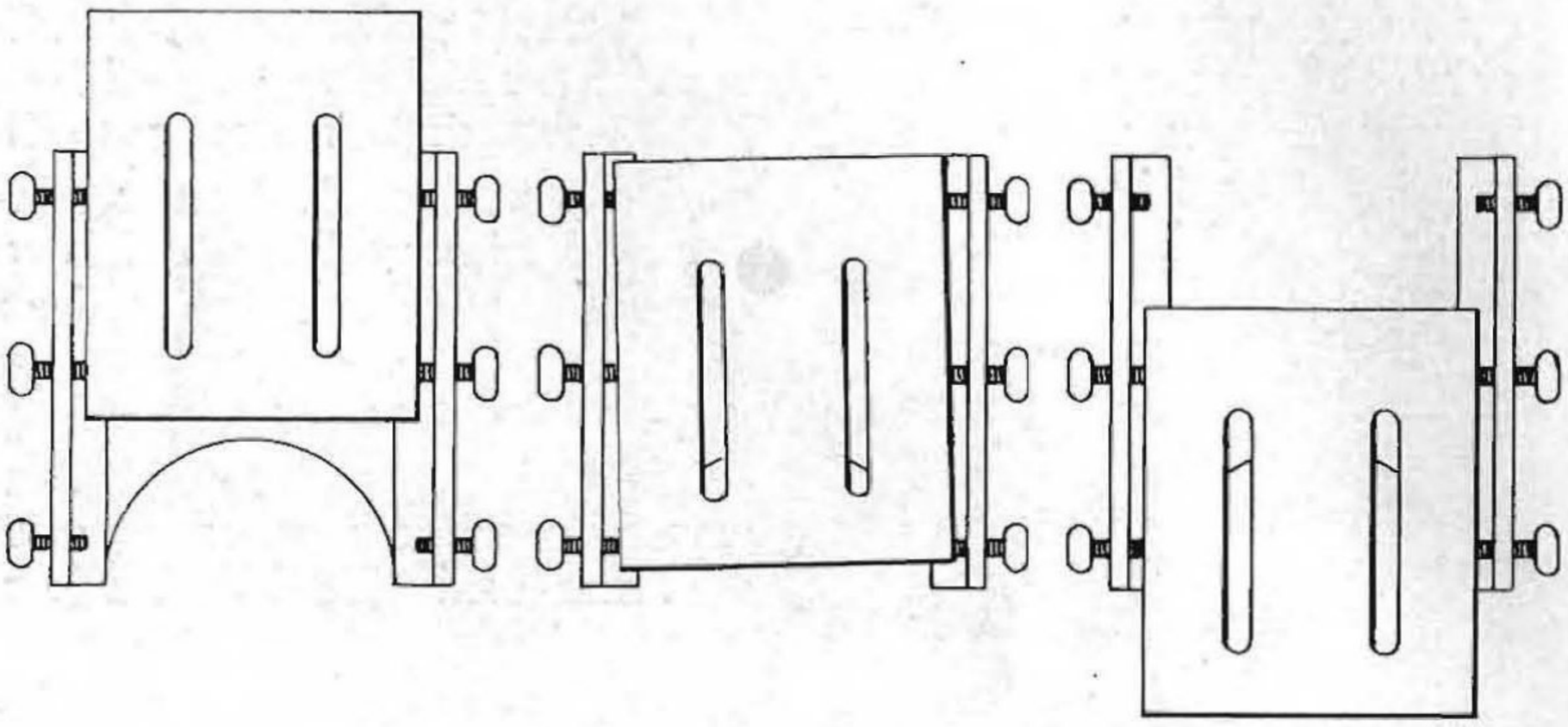


Fig. 83—Illustration showing how base plate of fixture carriage can be adjusted by the thumbscrews to correctly line-up magneto.

WEIDENHOFF GENERATOR TEST BENCH

Driving Flange-Mounted Type Magneto

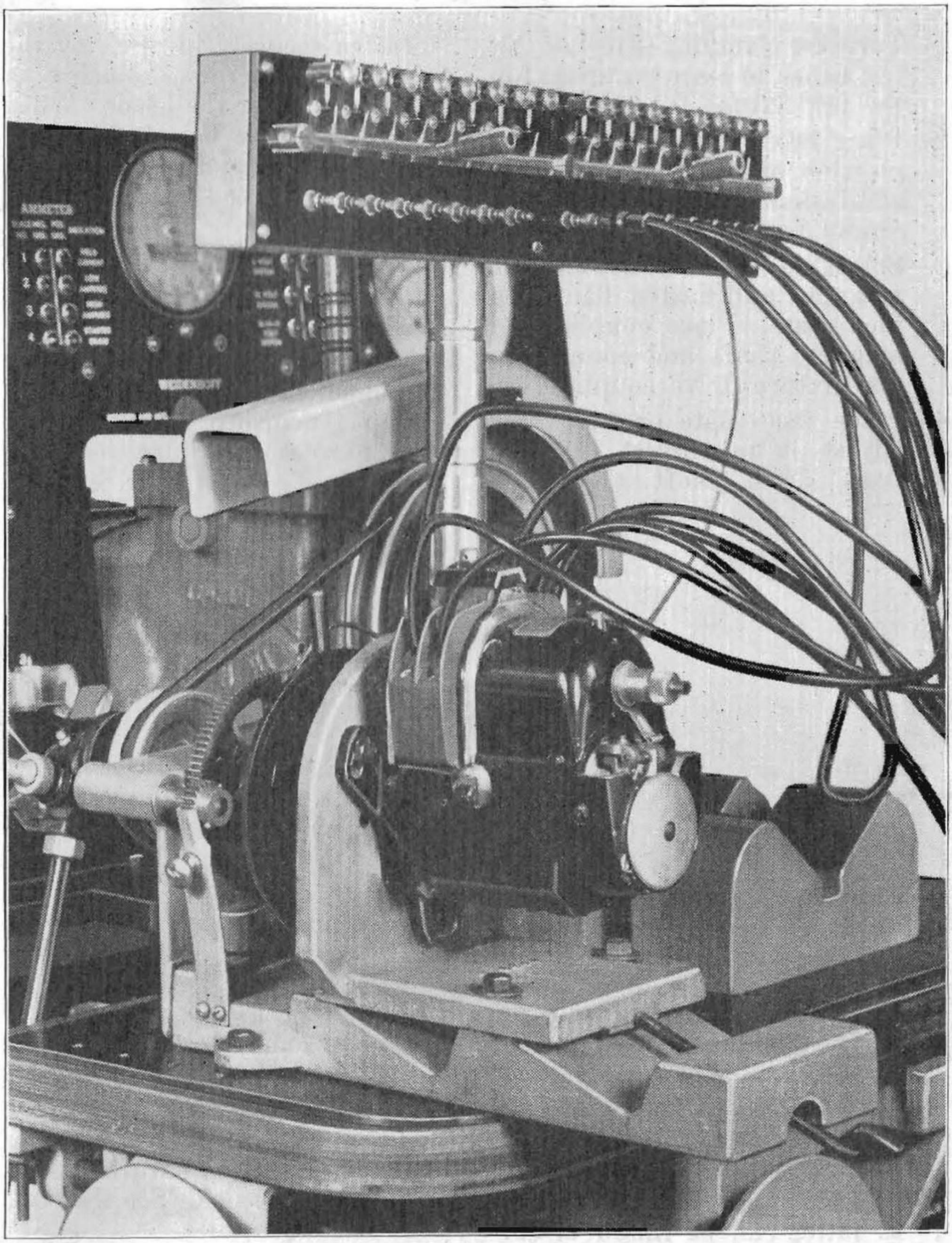


Fig. 84—A flange-mounted type of magneto in test fixture. Correct centering is obtained by adapter rings. These adapters are accurately machined for the opening in the vertically mounted plate as well as for the boss on the magneto. Since the magneto may be driven at high-speed it is necessary that the cap screws on the adjusting flange be securely fastened.

Driving Magneto
(Flange-Mounted Type)

1—Turn the clamping screw of the test bench to clear the space for the test fixture.

2—Place base of test fixture into position as shown in Fig. 84, and fasten in place with the cap screws provided.

3—Select necessary adapter for magneto and fasten flange to face plate. Place coupling on magneto shaft and connect to test fixture drive coupling.

4—Place face plate on base and adjust it to correct distance from drive shaft and then fasten securely in place by the two cap screws, placing a washer under the heads. When tightened the hole in the face plate is automatically centered with the drive shaft of the test fixture.

5—Place belt of test bench motor on pulley of test fixture and adjust belt tension.

6—Connect high tension cables to magneto and to variable spark gap (furnished at extra cost) or to rotary gap furnished with fixture.

Driving Magneto
(Base-Mounted Type)

1—Turn the clamping screw of the test bench to clear the space for the magneto test fixture.

2—Place base of test fixture into position as shown in Fig. 85, and fasten in place with the cap screws provided.

3—Place carriage on base with rollers on bottom resting on inclined surfaces of base. Screw adjusting crank into carriage so latter can be raised to correct height for centering magneto drive shaft.

4—Attach magneto to slotted base plate, tightening the screws securely.

5—Put drive coupling on magneto shaft and connect to drive shaft of test fixture. Alignment can be secured by the set screws as shown in Fig. 83, as well as by the hand crank on the end of the fixture which provides vertical alignment.

6—Place belt of test bench motor on pulley of test fixture and adjust belt tension. See that belt is not too tight.

7—Connect high tension cables to magneto and variable spark gap (furnished at extra cost) or to rotary gap furnished with fixture.

Driving Base-Mounted Type Magneto

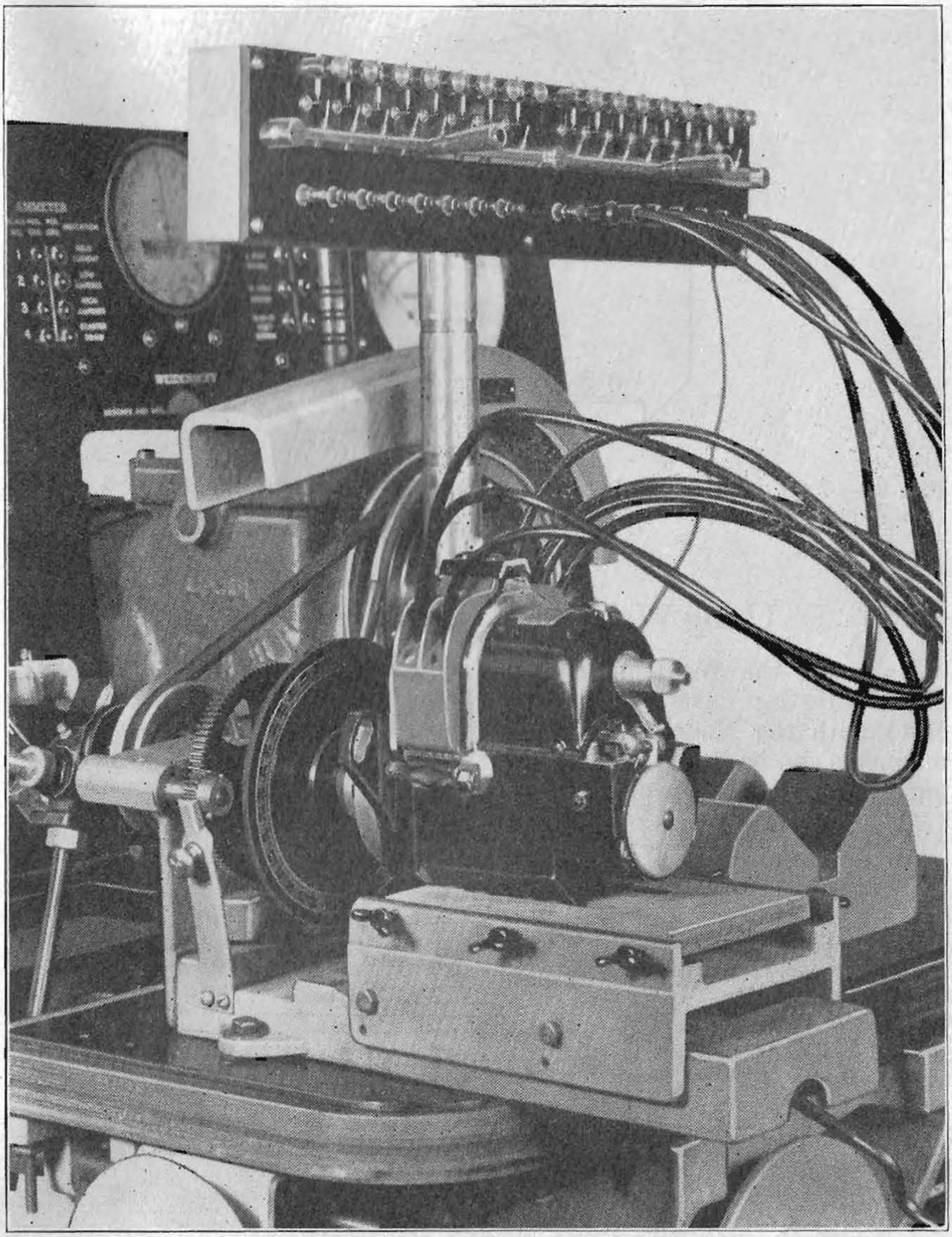


Fig. 85—A base-mounted type of magneto on Model 325 test fixture. Alignment is secured by the set screws shown in Fig. 83, as well as by the hand clamp on the end of the fixture which provides vertical alignment.

WEIDENHOFF GENERATOR TEST BENCH

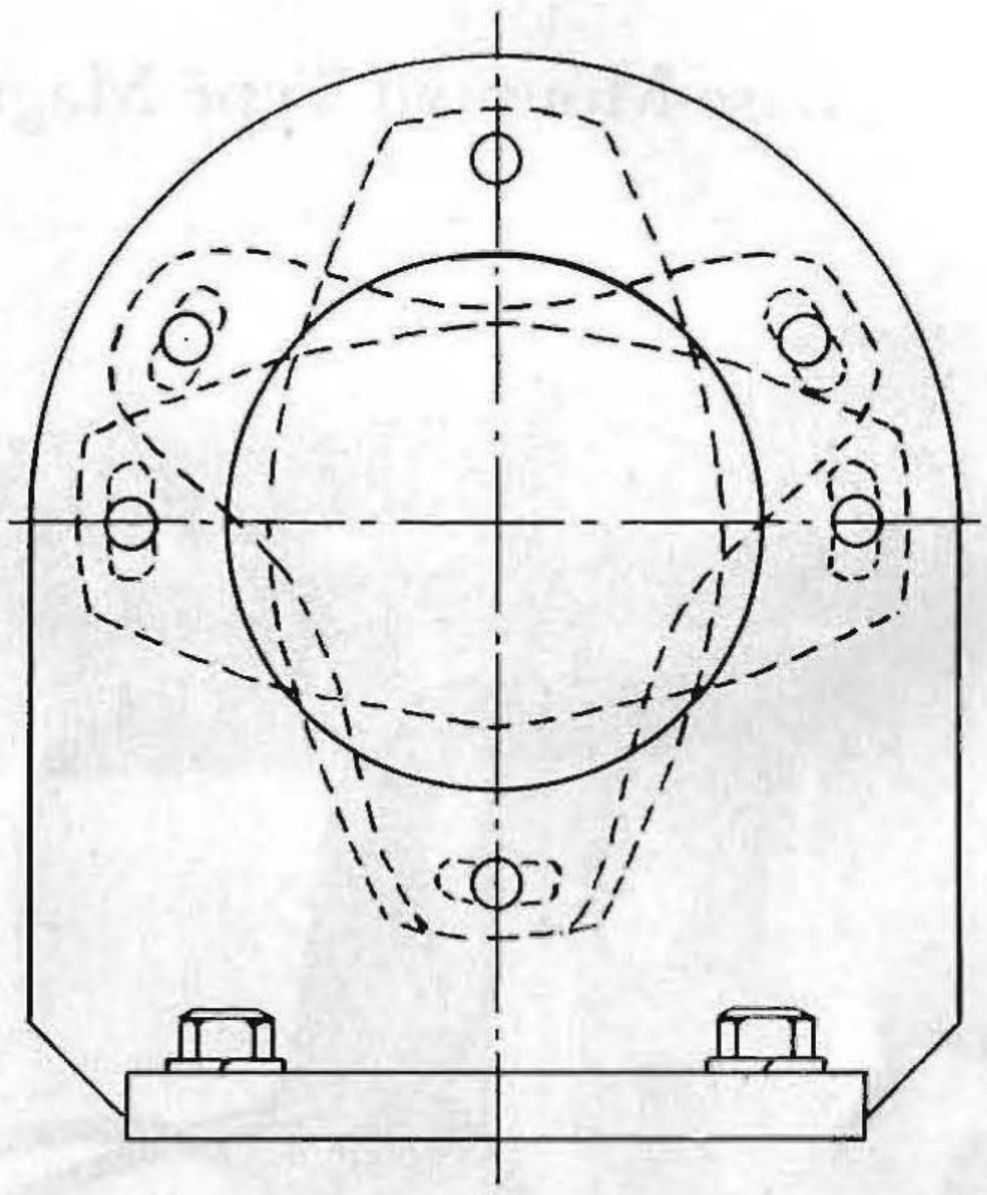


Fig. 86—Face plate is made with six holes for mounting magnetos with two-bolt horizontal and vertical S.A.E. flange as well as the three-bolt type.

Using Weidenhoff Variable Spark Gap

By using the Weidenhoff Variable Spark Gap (available at extra cost) with the Model 325 fixture, magnetos can be tested under varying conditions of gap length and for length of gap and speed at which the spark should occur—according to manufacturers' specifications. Also, the tachometer of the test bench on which the magneto fixture is used

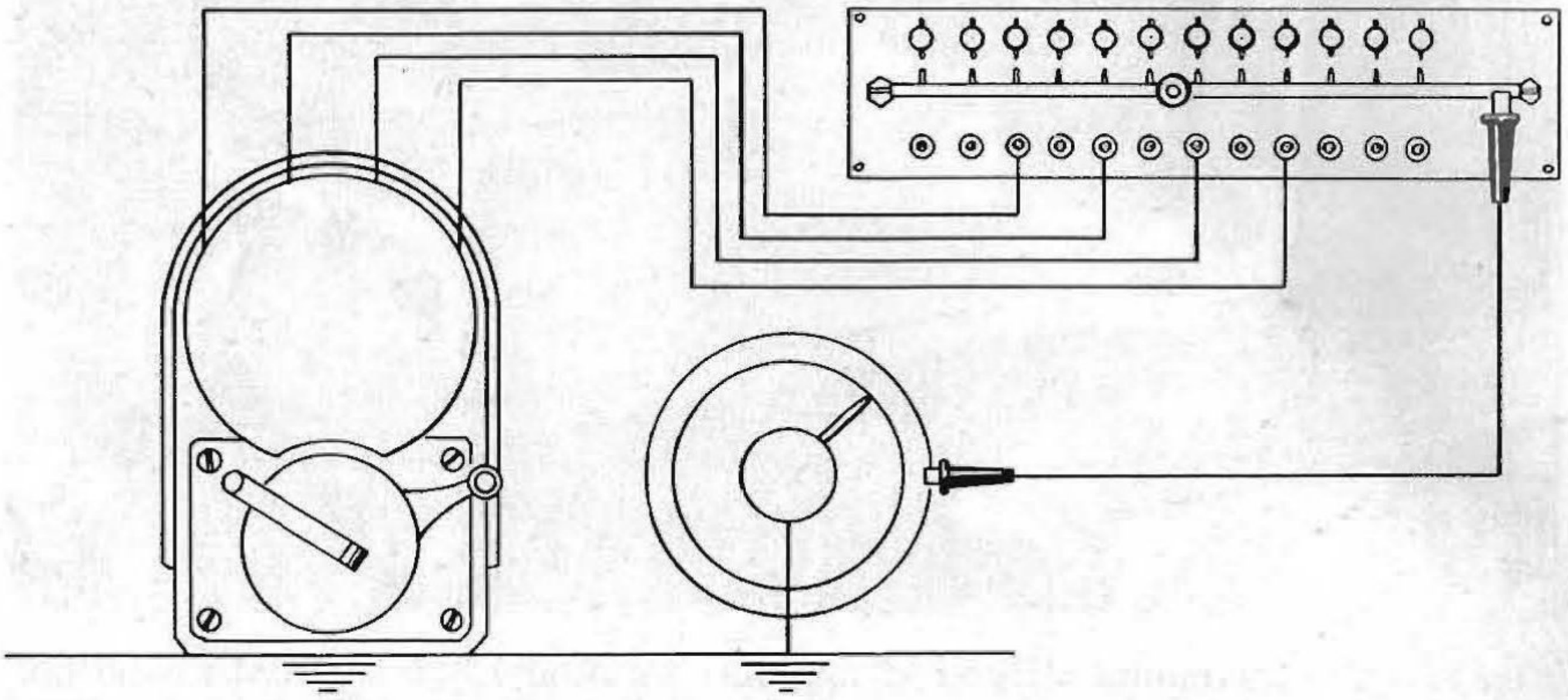


Fig. 87—Diagram showing how high-tension cables should be connected to magneto on test, to variable spark gap and to rotary gap.

makes possible performance tests at specified speeds.

The Weidenhoff Variable Spark Gap is connected into the magneto testing circuit as shown in Fig. 87 The insulated pivoted part of the gap is connected to the rotary spark gap of the test fixture. In this way the spark output of the magneto can be observed in the variable gap for consistency of performance and in rotary gap for proper timing and distribution over the 360 degrees scale.

By using the reduction drive (5 to 1 ratio) of the test fixture magnetos with impulse couplings can be easily tested. When reduction gear is being used, read one fifth of tachometer reading (thus when tachometer reads 500 R.P.M. magneto is turning 100 R.P.M. This enables a very close reading of the tripping speeds of the impulse starters.)

Carbon tracks or leakage paths which occur between the electrodes within the magneto distributor, as for example, "A," can be readily located by shorting out the spark gaps as at "E," Fig. 88.

If, with the leakage path as at "A," the rotor "B" engages the electrode "F," the spark instead of passing through the gap "C" of the variable spark gap will pass through "D" if the latter gap between the carbon track or leakage path and "G" is less than gap "C." Naturally the spark takes the line of least resistance. If the leakage path is to the clip H, the spark fails completely in the test gap because the spark is then grounded.

By shorting out each gap, failure of the spark due to leakage paths is readily located.

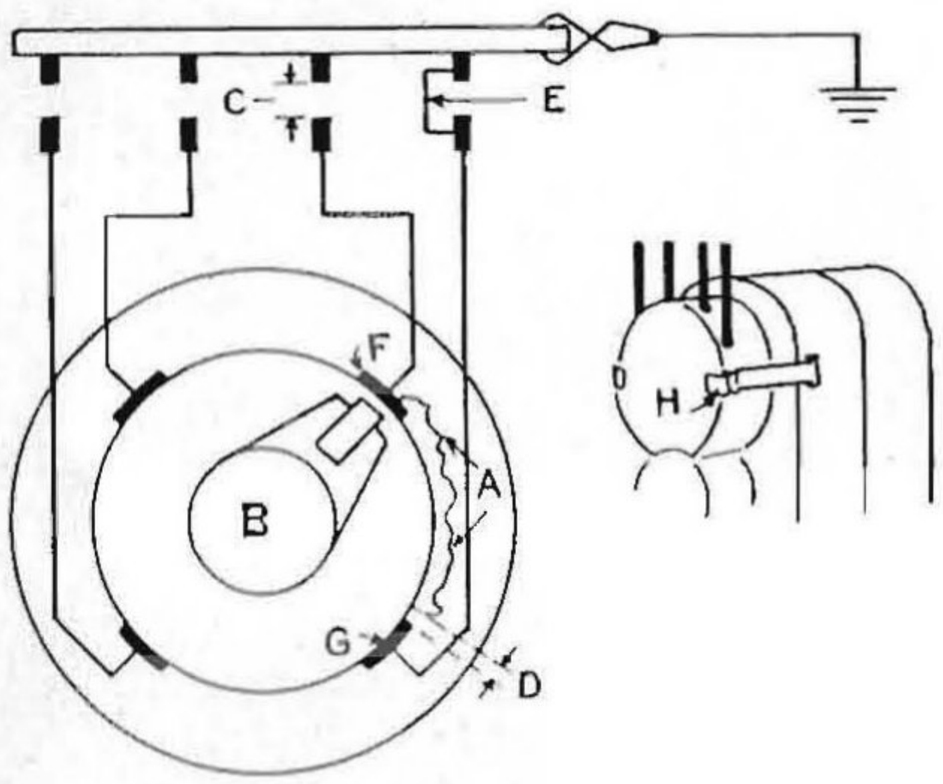


Fig. 88—Shorting out gaps to locate leakage paths.

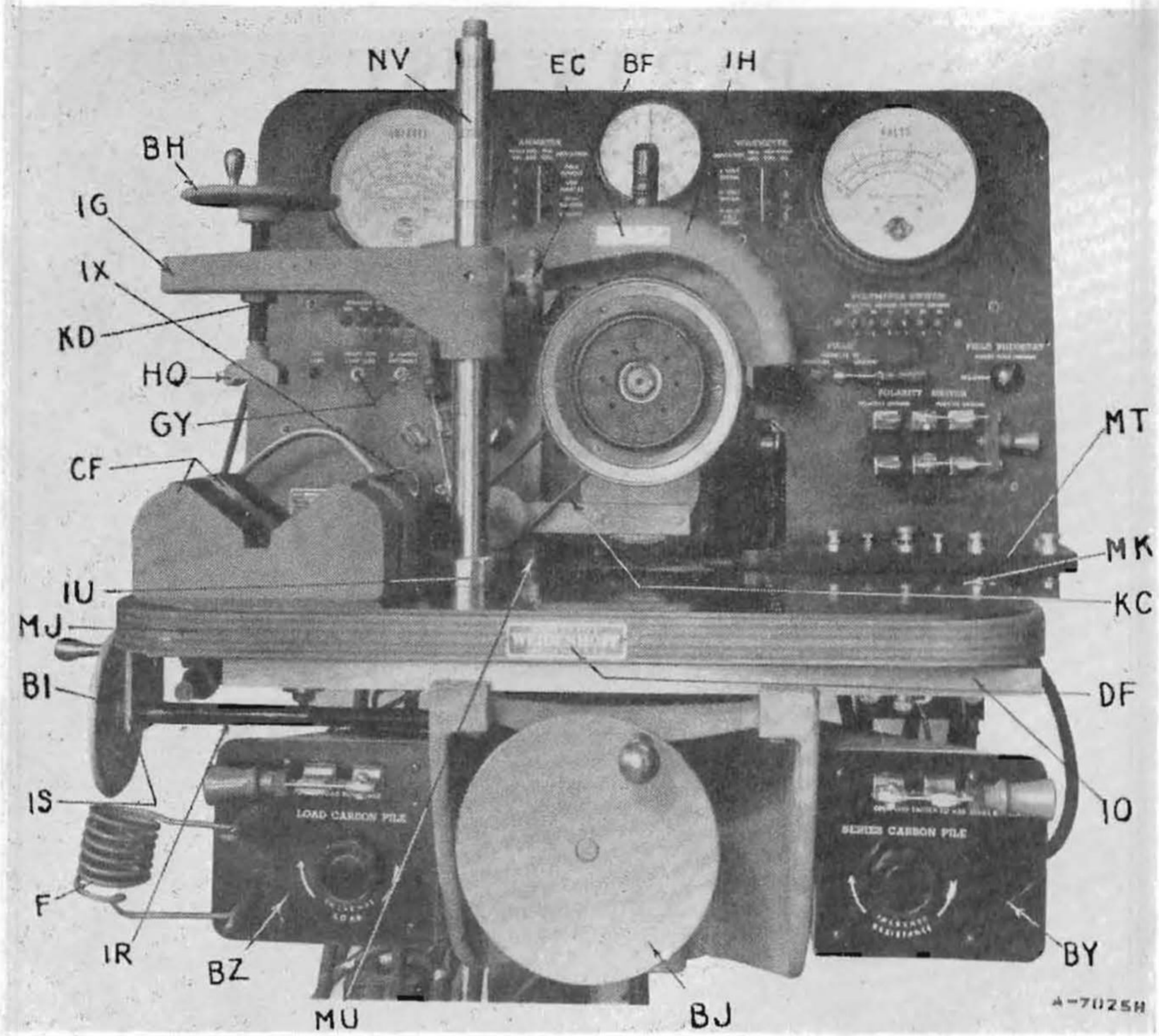
WEIDENHOFF GENERATOR TEST BENCH

PARTS LIST

WEIDENHOFF
MODELS 500 and 501
GENERATOR
TEST BENCHES

JOSEPH WEIDENHOFF, INC., CHICAGO 24, ILL.

Front Assembly Model 501 Test Bench



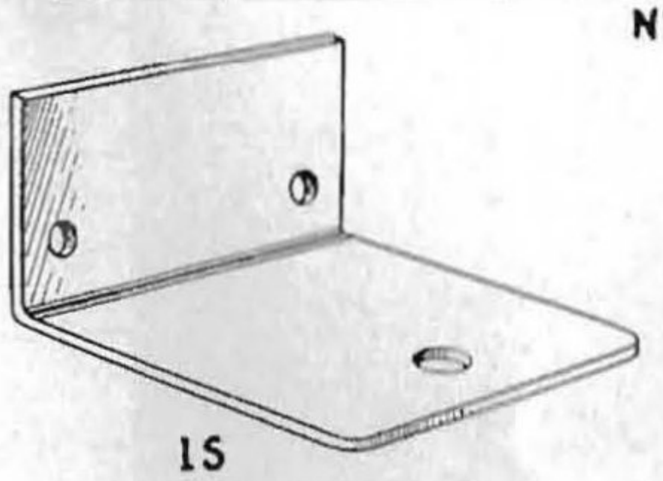
CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
F	X-146	Carbon Pile Resistor	1
BF	SA-1175	Vise Clamp Hand Set Screw	1
BH	SA-1315	Generator Vise Clamp Hand Wheel Assembly	1
BI	SA-1316	Table Adjusting Hand Wheel (Side)	1
BJ	SA-1317	Table Adjusting Hand Wheel (Front)	1
BY	SA-1412	Series Carbon Pile Complete (See Page 91)	1
BZ	SA-1415	Load Carbon Pile Assy. with Bracket (See P. 94)	1
CF	SA-1422	Vise Blocks	2
DF	P-2225	Weidenhoff Name Plate	1
EC	P-3360	Caution Name Plate	1
GY	P-8494	External Shunt and Lamp Plug Jack	1
HQ	X-8573	Generator Vise Clamp Chuck	1
IG	X-8679	Generator Vise Arm	1
IH	X-8680	Drive Belt Guard	1
IO	X-8688	Front Table Runner	1
IR	X-8691	Table Adjusting Screw	1
IS	X-8692	Table Adjusting Screw Bracket	1
IU	X-8695	Vise Post Support Ring	1
IX	X-8702	Tachometer Drive Pulley (See Page 99)	1
JD	P-8707	Vise Post Nut	1
KC	P-8828	Tachometer Drive Belt (See Page 99)	1
KD	X-8833	Generator Clamp Special Nut	1

WEIDENHOFF GENERATOR TEST BENCH

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
MJ	X-9625	Plywood Table Top (Not Shown)	1
MK	X-9626	Top Steel Plate (Not Shown)	1
MT	X-9644	Sub Panel (Right)	1
MU	X-9645	Sub Panel (Left)	1
NV	X-9677	Generator Vise Clamp Post	1



NV



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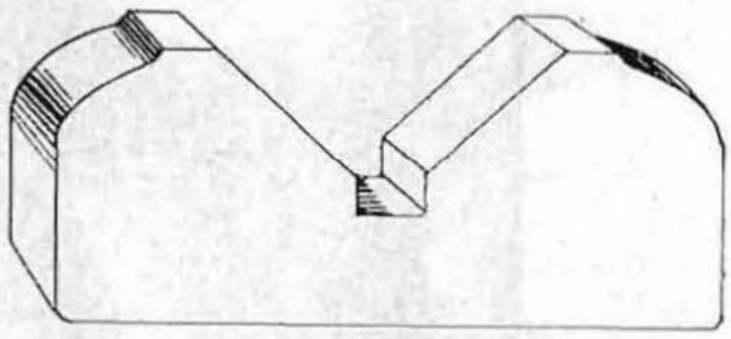

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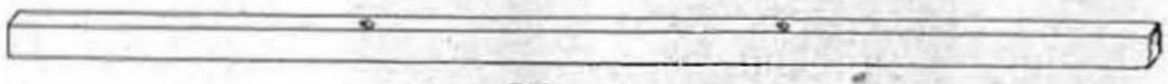

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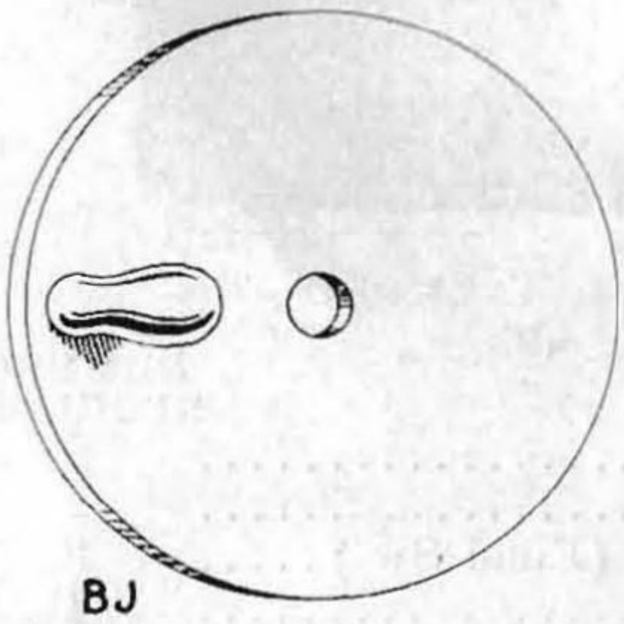

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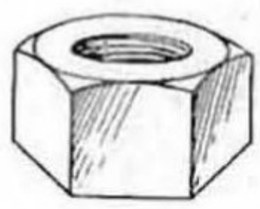

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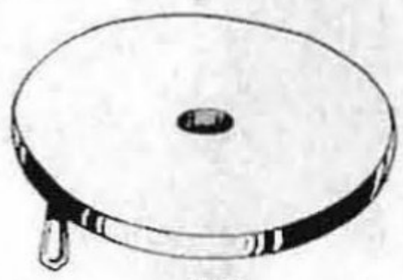

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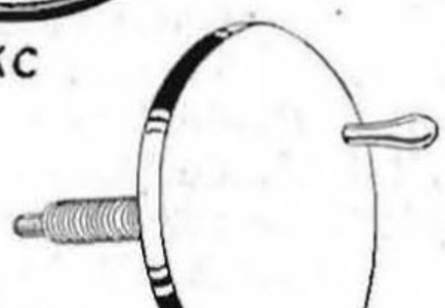

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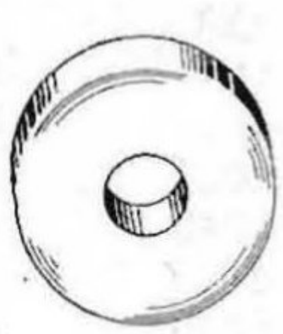

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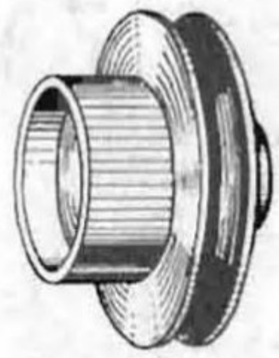

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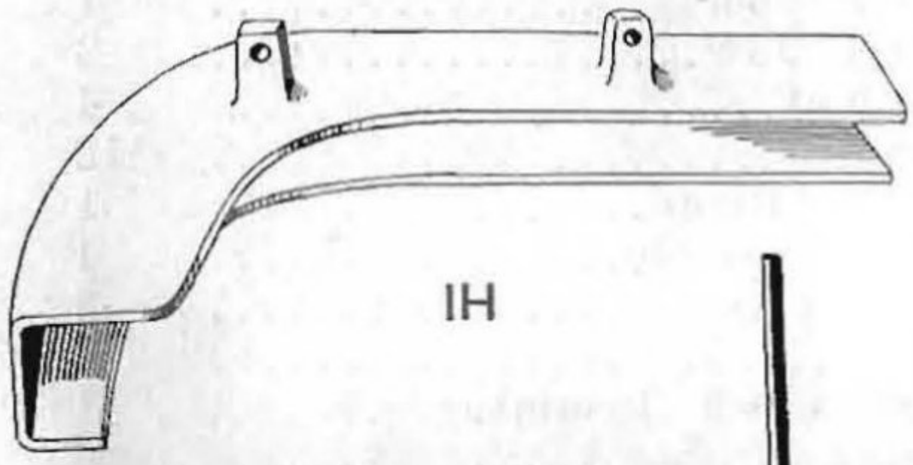

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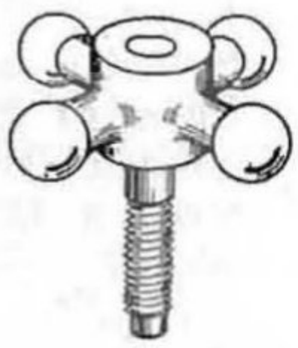

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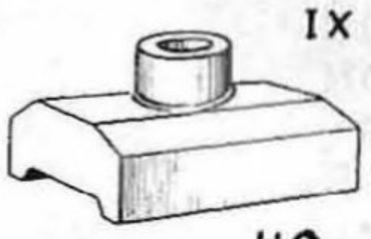


HQ



EC



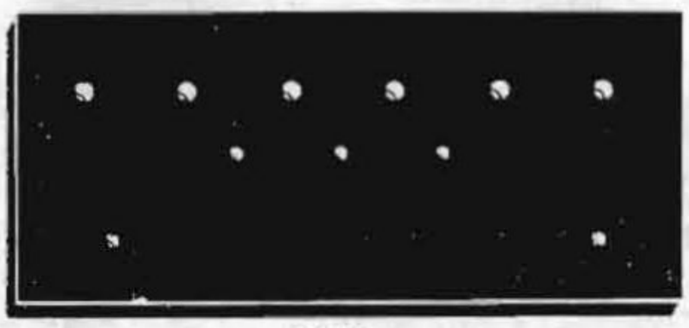
DF



MU



GY



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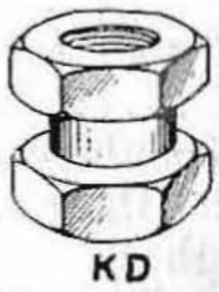

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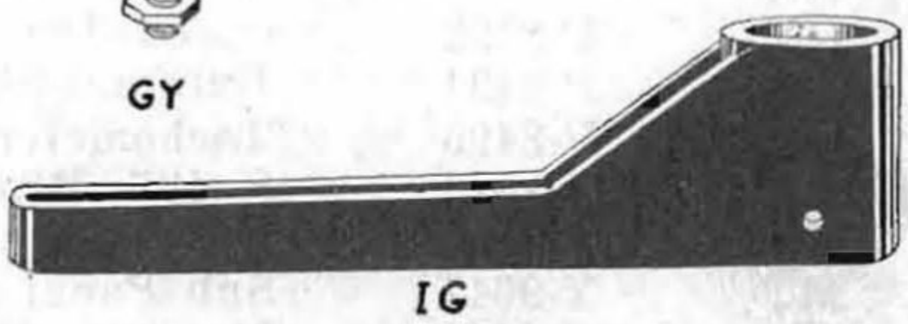
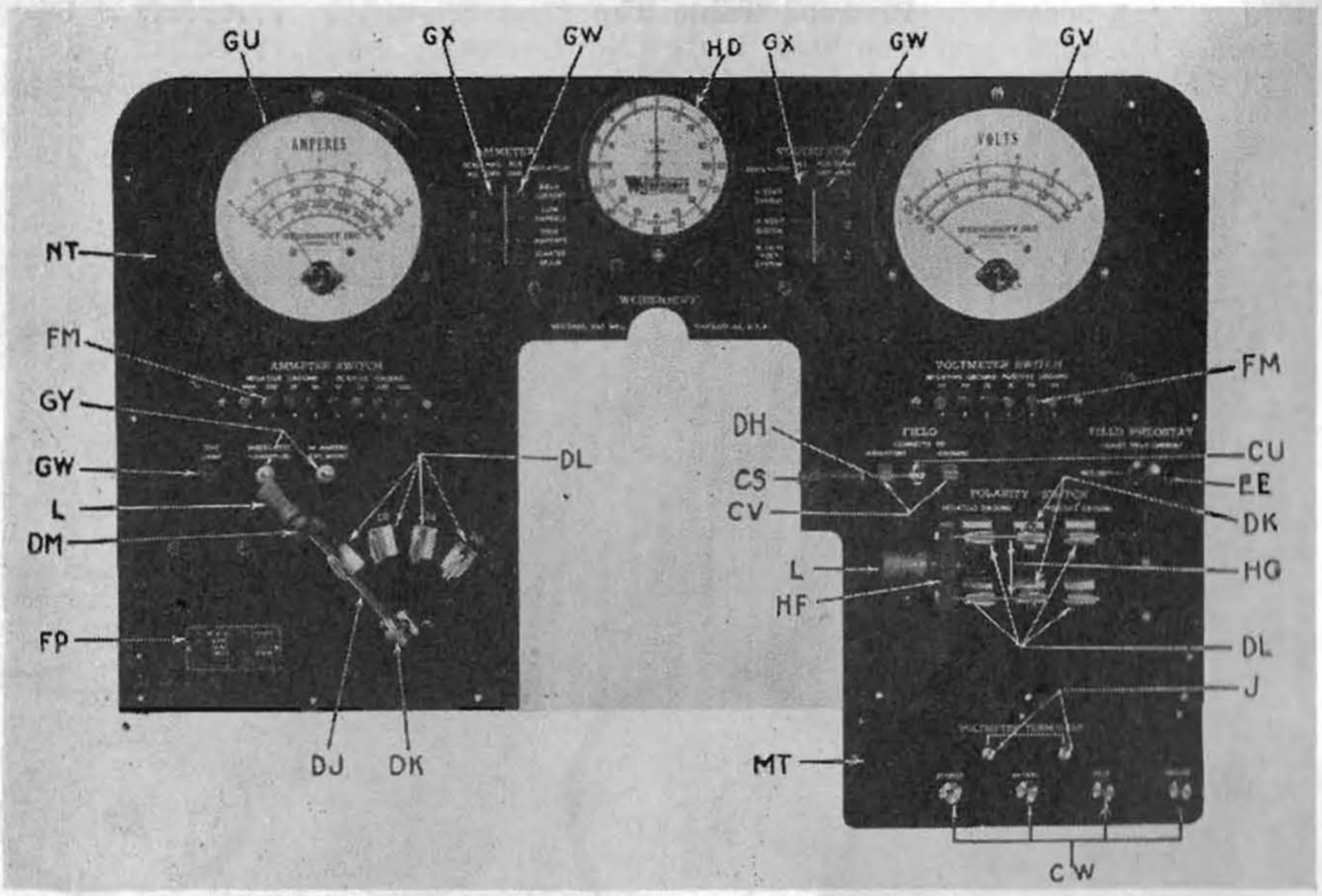


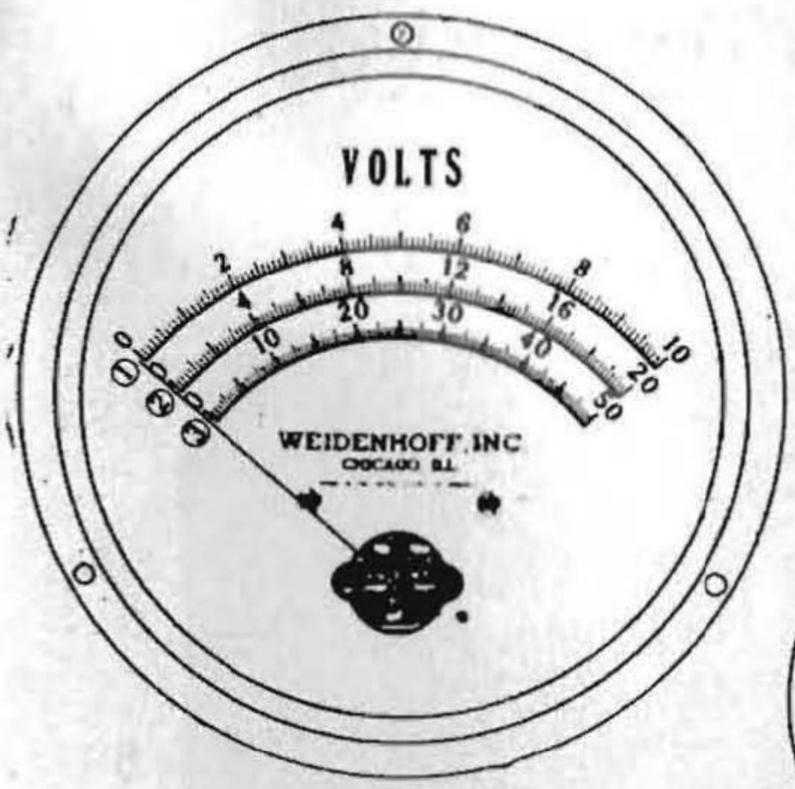
IG

Panel View Model 501 Test Bench



CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
J	P-183	Voltmeter Terminal Nut	2
L	SA-209	Switch Blade Handle	2
CK	P-1533	Switch Blade Tension Washer (Field Sw.)	2
CS	X-2031	Field Selector Switch Handle	1
CU	X-2043	Field Switch Blade Support	1
CV	X-2044	Field Selector Switch Jaw	2
CW	P-2085	Generator Terminal Nut	4
DE	P-2139	Meter Rubber Grommet	12
DH	X-2297	Field Selector Switch Blade	1
DJ	X-2554	Battery Selector Switch Blade	1
DK	X-2557	Selector Switch Support Jaw	3
DL	X-2558	Selector Switch Jaw	8
DM	X-2560	Switch Blade Fibre Block Insulator	1
DN	X-2561	Switch Blade Tension Washer	6
DQ	P-2650	Selector Switch Spring	1
DV	P-3008	Tachometer Tension Spring	1
EE	P-3593	Field Control Rheostat Knob	1
EH	P-3763	Tachometer Adjusting Pin	1
FM	P-8323-A	Red Push Button	14
FP	P-8417-A	Model and Serial Number Plate	1
GU	P-8488	Ammeter	1
GV	P-8489	Voltmeter	1
GW	P-8491	Red Jewel	8
GX	P-8492	Green Jewel	7
GY	P-8494	External Shunt and Lamp Plug Jack	2
HD	P-8496	Tachometer	1
HF	X-8498	Switch Blade Insulating Crossbar	1
HG	X-8499	Polarity Switch Blade	2
MT	X-9644	Sub Panel (Right)	1
NT	X-9674	Masonite Panel (Not Shown)	1

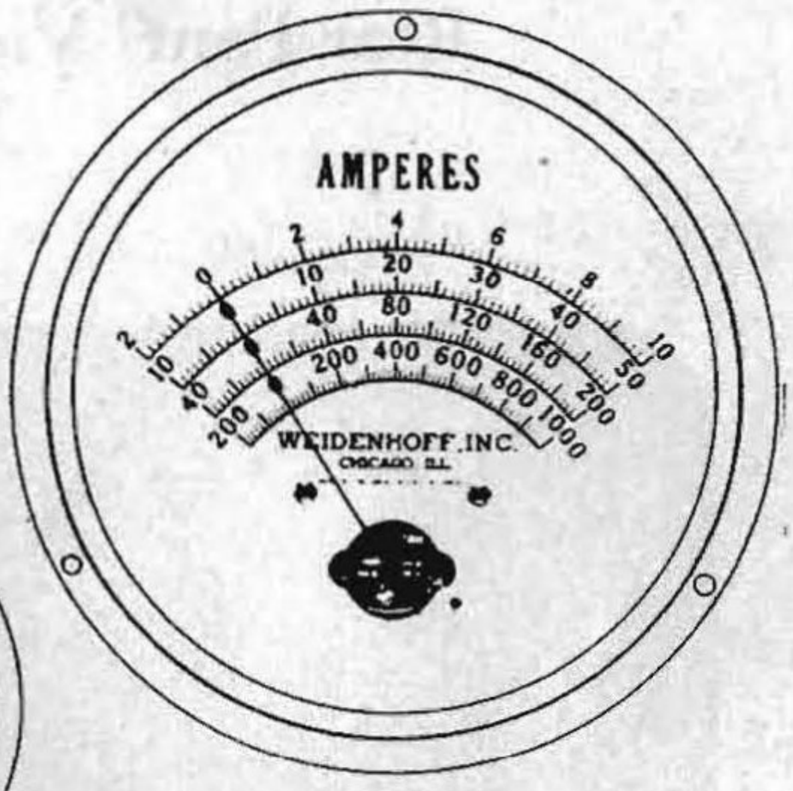
WEIDENHOFF GENERATOR TEST BENCH



GV



EE



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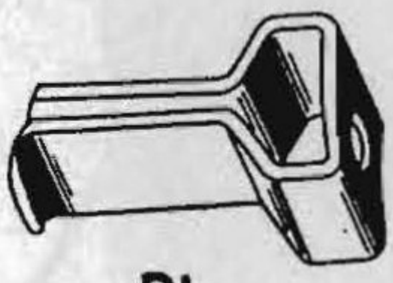

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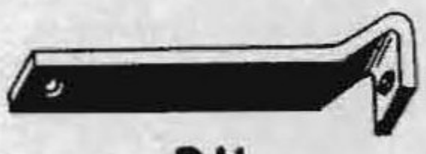

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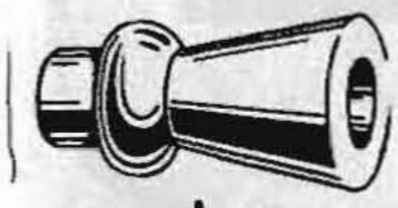


L



CS



CV



GY



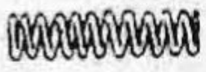
J



CK



DN



DV



GW- GX



DE



FM



CU



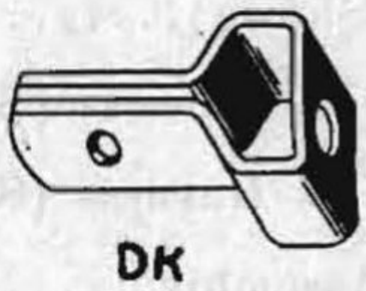
EH



HG



FP



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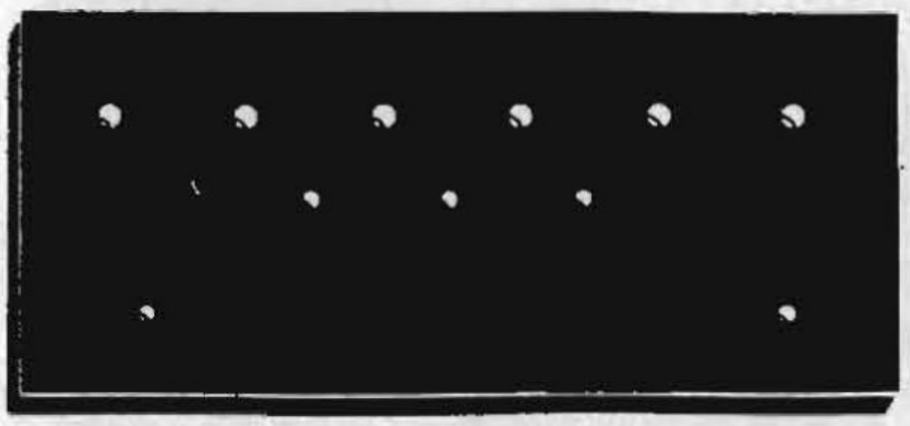

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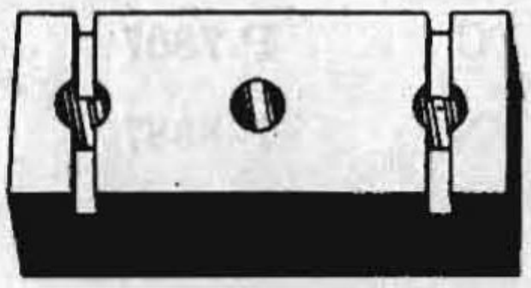
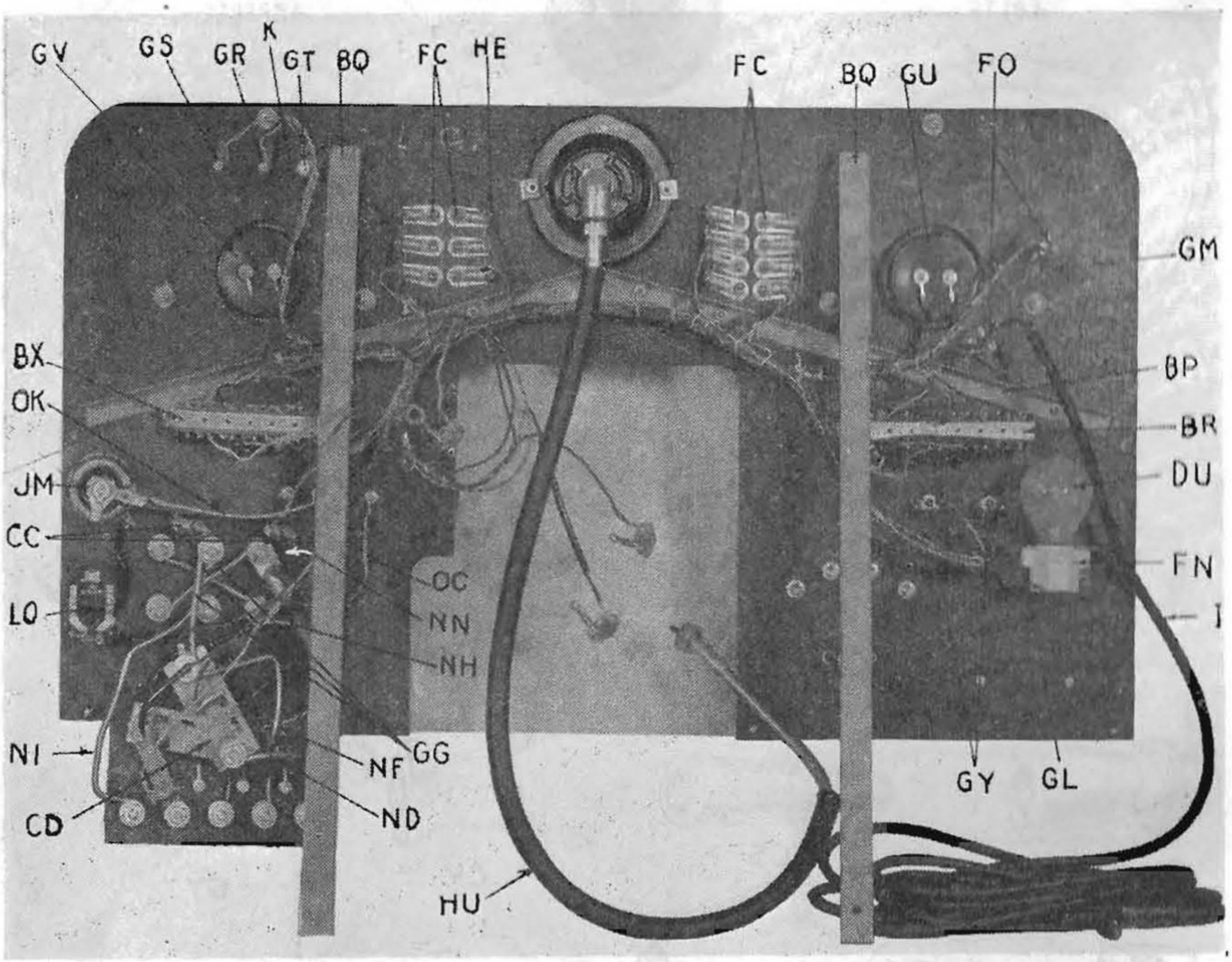
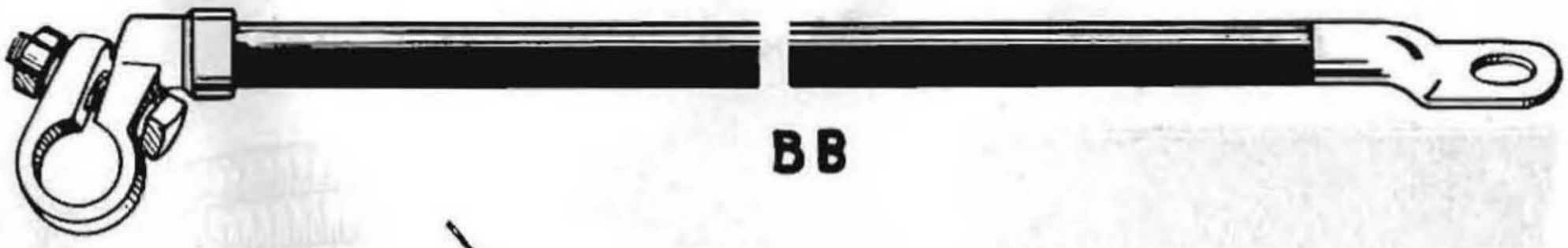


HF

Rear Panel View Model 501 Test Bench



CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
I	SA-181	110 Volt Lead & Plug.....	1
K	SA-195	Multiplier Insulator	3
BB	SA-905	Selector Switch to Positive 32 Volt Batty. Lead	1
BP	SA-1385	Panel Brace Assembly (Not Shown)	1
BQ	SA-1386	Panel Support (Not Shown).....	2
BR	SA-1388	8 Button Switch Assy. & Harness (See Page 90)	1
BX	SA-1408	6 Button Switch Assy. & Harness (See Page 90)	1
CC	SA-1418	Field Circuit Shunt Assembly.....	1
CD	SA-1419	Shunt Assembly	1
DU	P-2898	Test Lamp	1
FC	P-7807	Miniature Light	14
FN	P-8387	Test Lamp Socket.....	1
FO	P-8394	Line Lead Wire Wound Resistor.....	2
GG	X-8454	Polarity Switch Bus Lead.....	3



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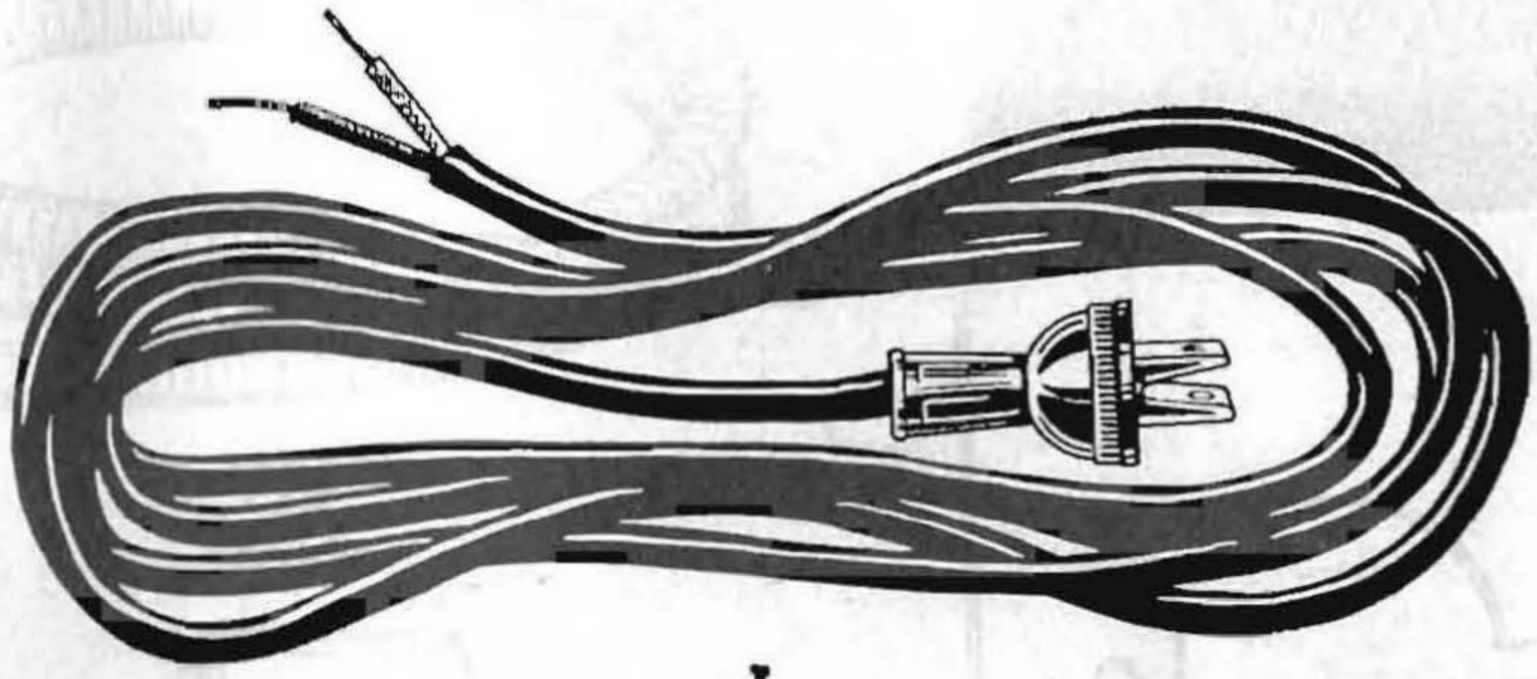

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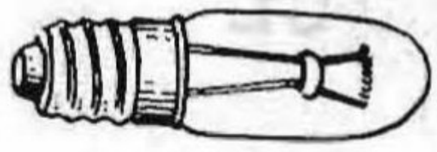

FC



GG



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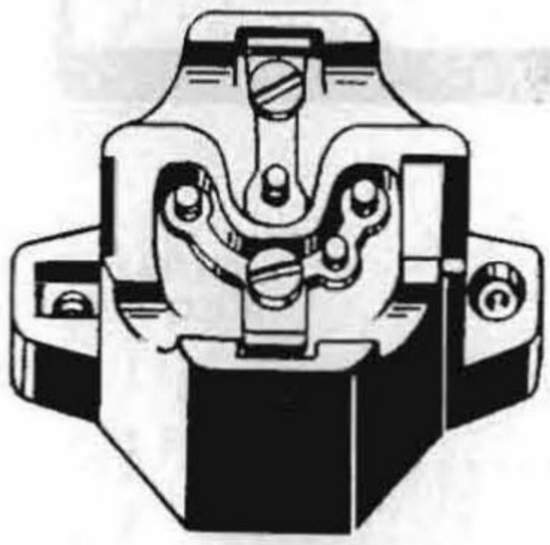

FN



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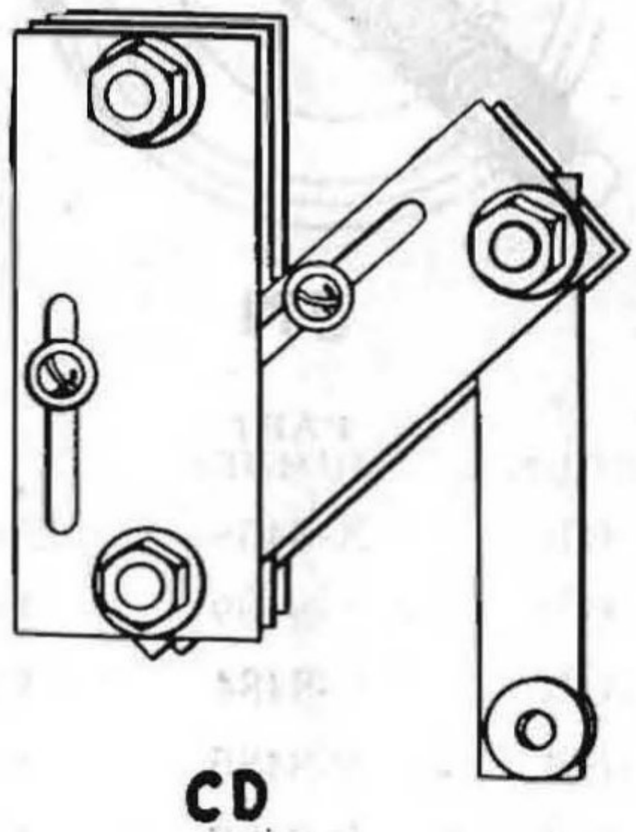

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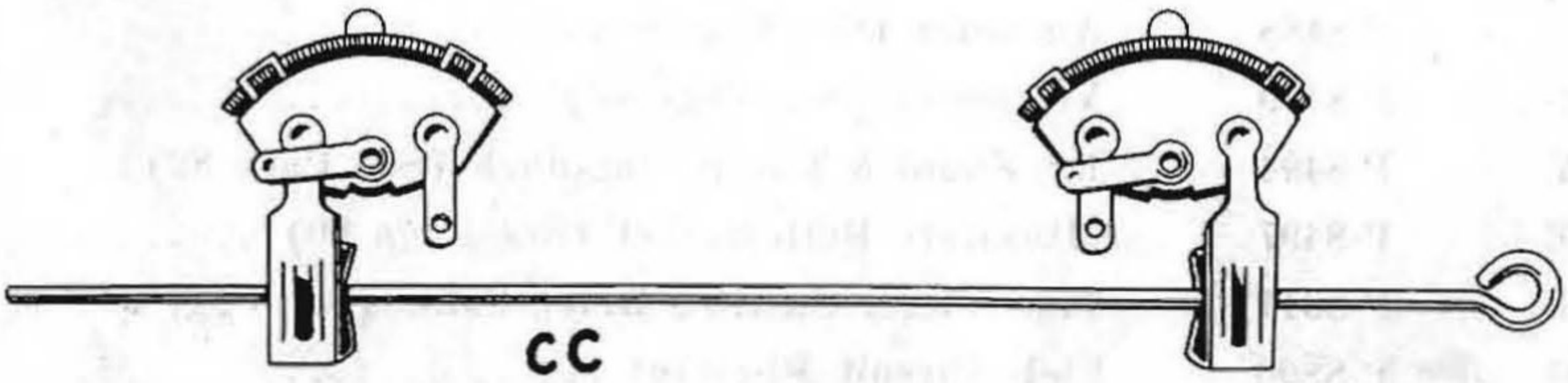
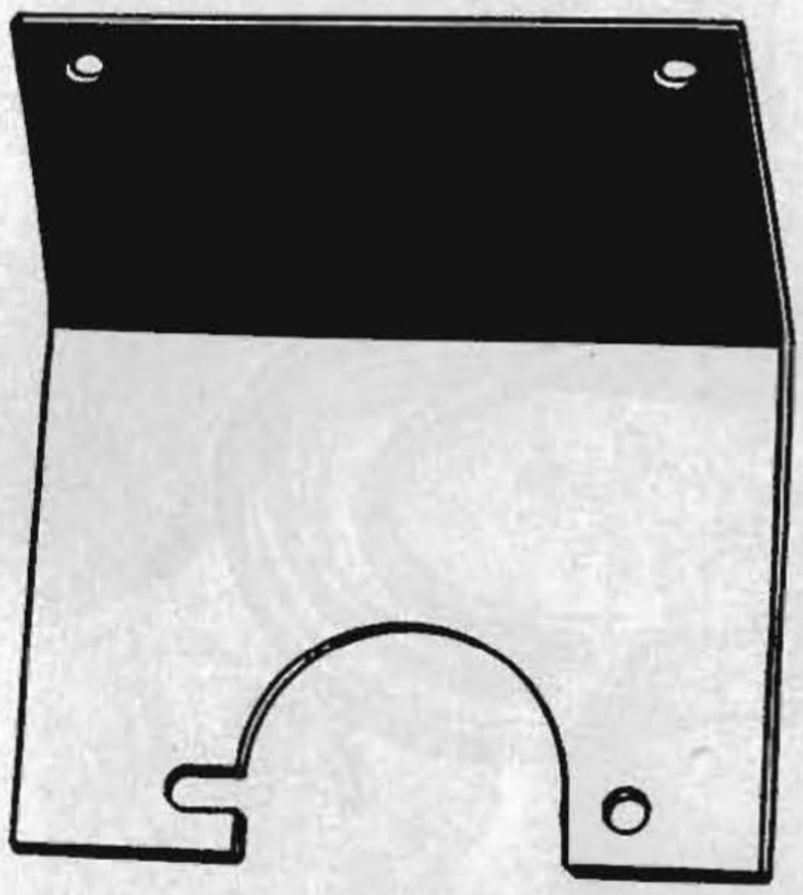
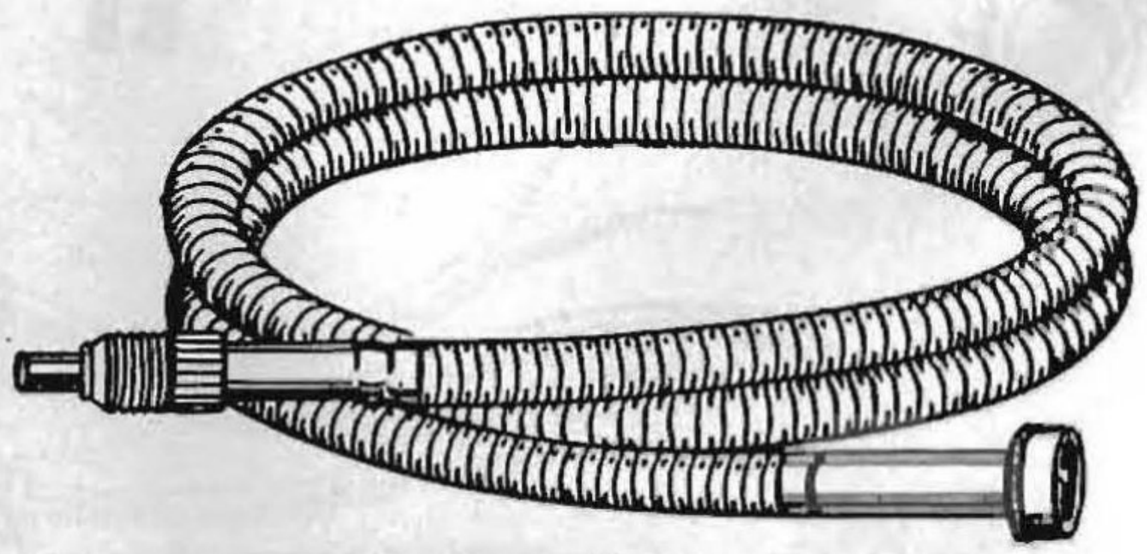


CC

Rear Panel Parts Model 501 Test Bench



GL



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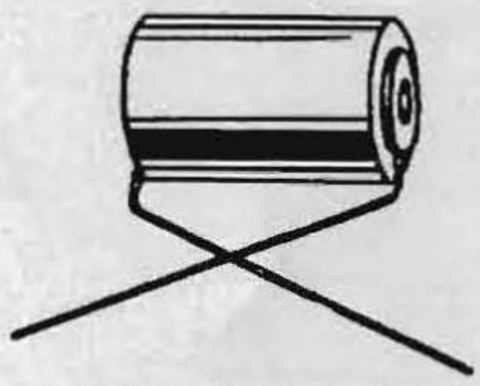

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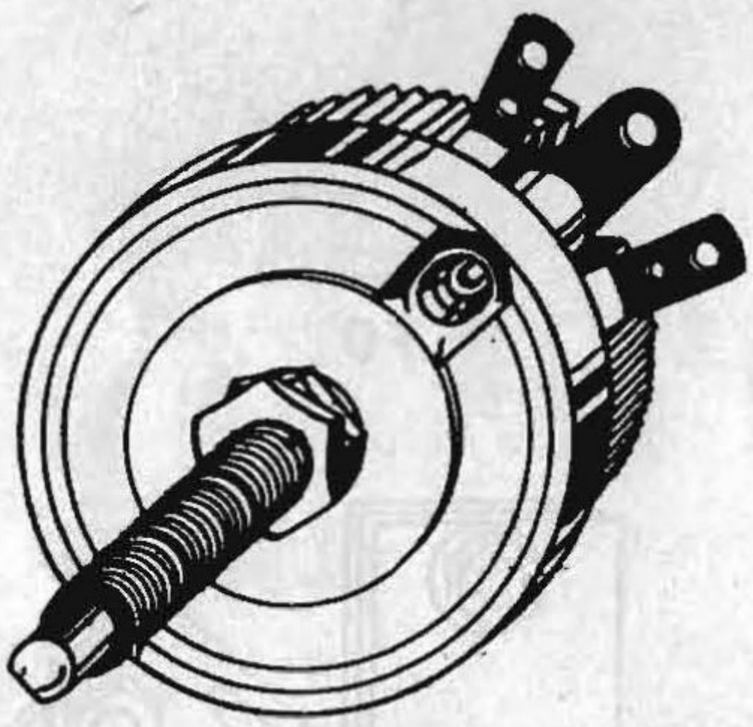

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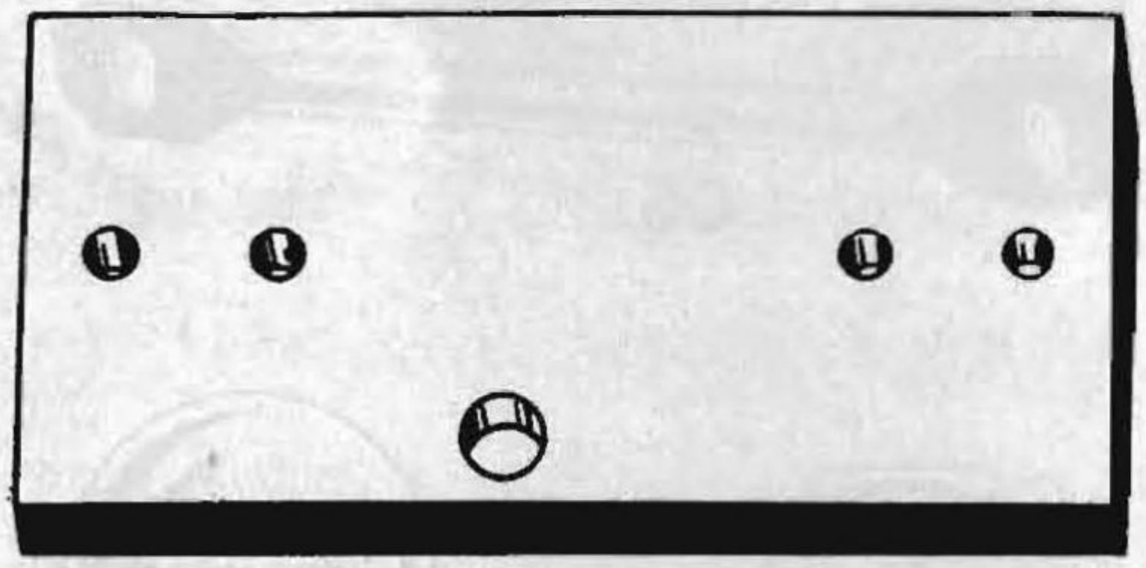
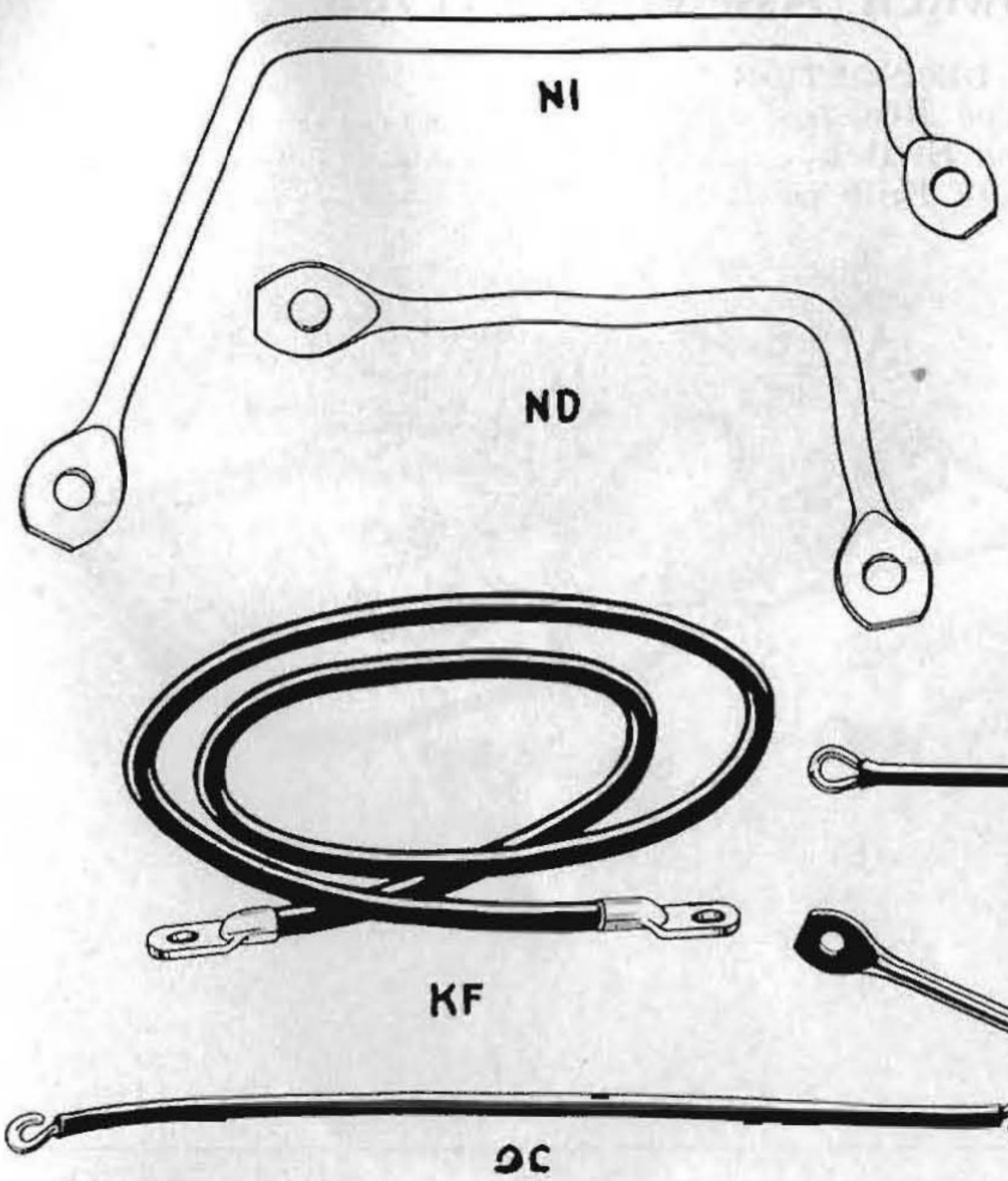
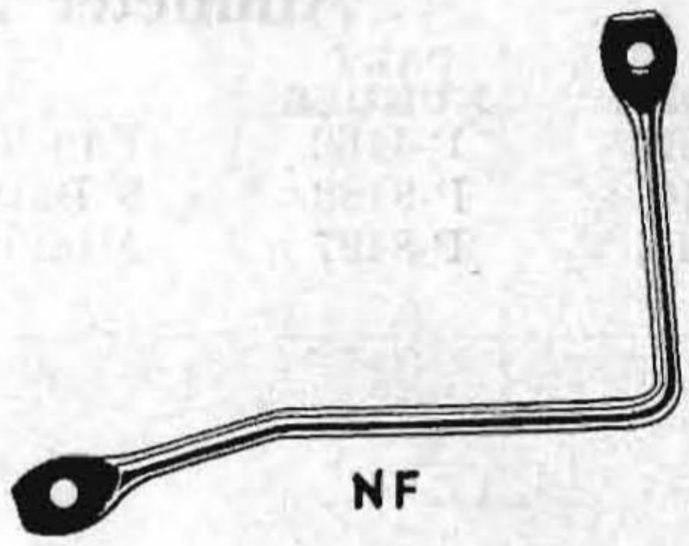


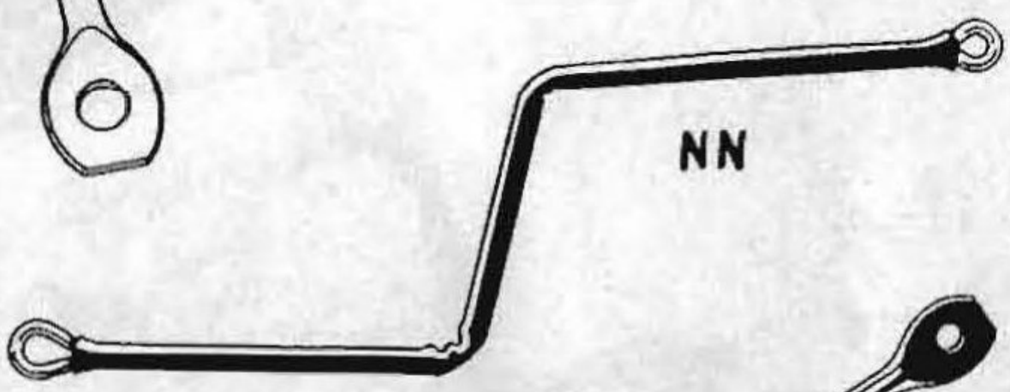
GM

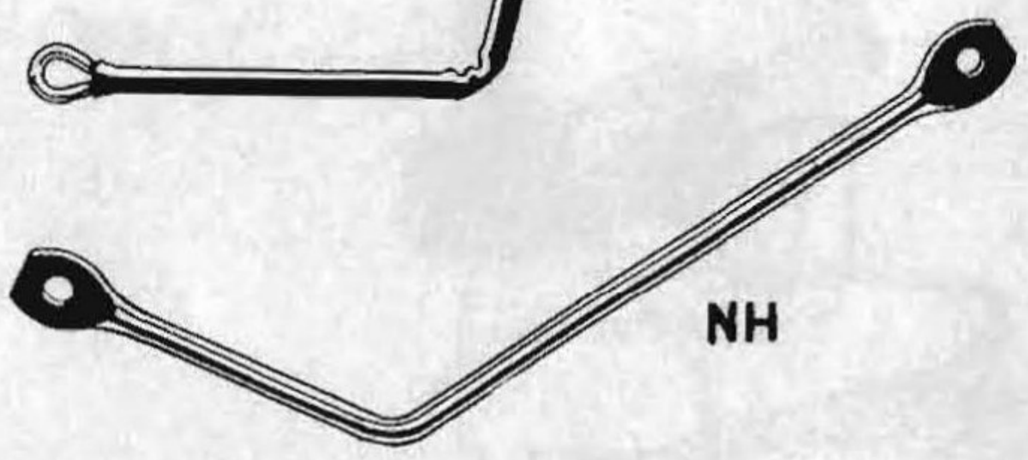
CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
GL	X-8468	Test Lamp Bracket.....	1
GM	X-8469	Terminal Board	1
GR	P-8484	Voltmeter Multiplier	1
GS	P-8485	Voltmeter Multiplier	1
GT	P-8486	Voltmeter Multiplier	1
GU	P-8488	Ammeter (See Page 85).....	1
GV	P-8489	Voltmeter (See Page 85).....	1
GY	P-8494	Ex. Shunt & Lamp Plug Jack (See Page 82)...	2
HE	P-8497	Miniature Bulb Socket (See Page 90).....	14
HU	P-8611	Tachometer Flexible Drive Cable (See Page 99)	1
JM	P-8800	Field Circuit Rheostat	1

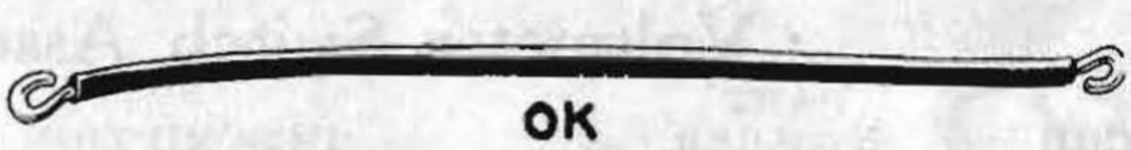
WEIDENHOFF GENERATOR TEST BENCH











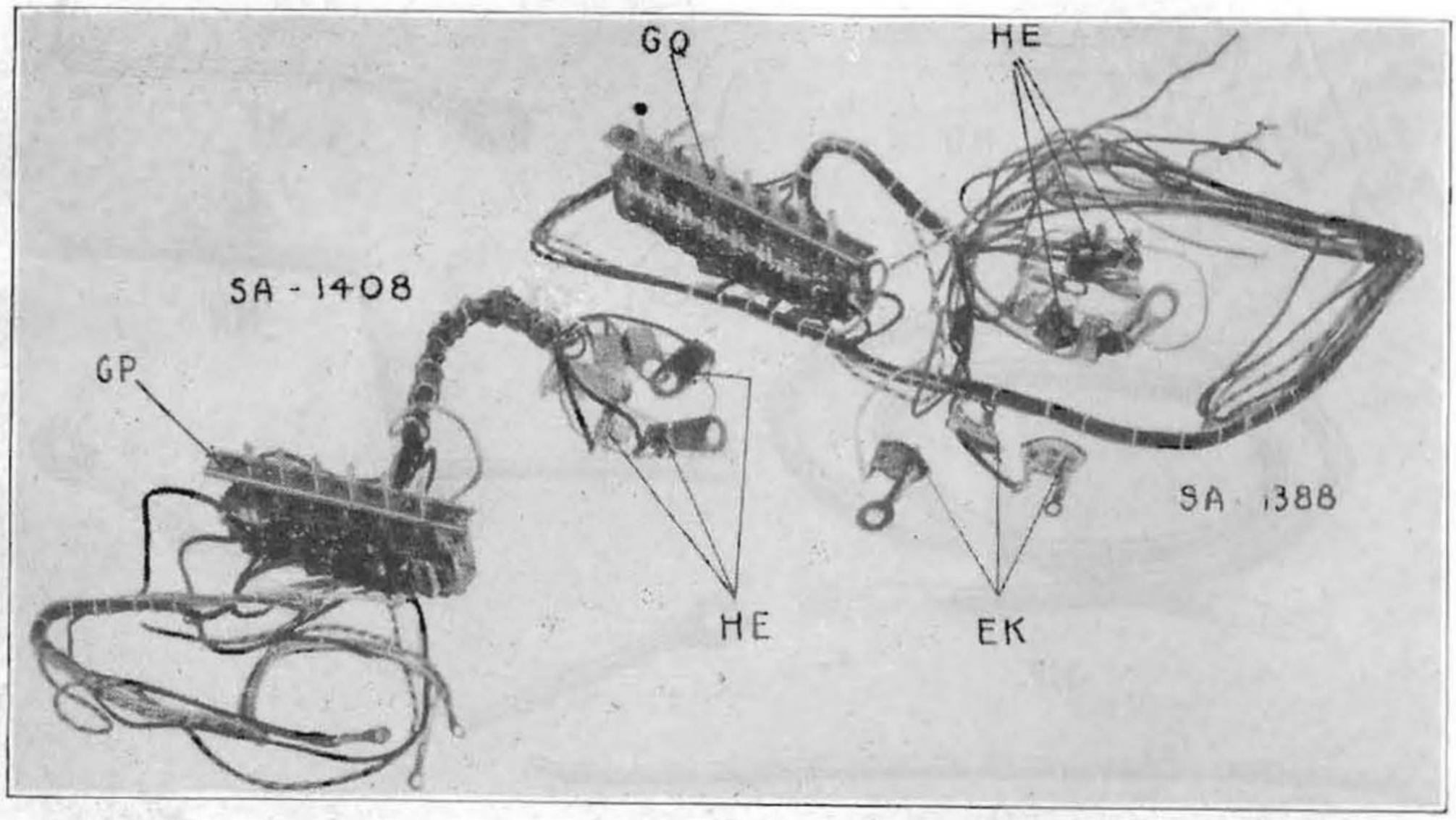




CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
KE	SA-8844	Selector Switch to Positive 6-12-24 Volt Battery Post Lead.....	3
KF	SA-8845	Polarity Selector Switch to Neg. Battery Post Lead	1
LO	P-9450	Field Limiting Relay	1
MX	SA-9654	Battery Selector Switch Terminal to Terminal Board Connection	1
ND	X-9656	Shunt to Starter Test Bus Lead.....	1
NF	X-9658	Shunt to Neg. Ground Bus Lead.....	1
NH	X-9660	Bus Lead	1
NI	X-9661	Polarity Switch to Series Carbon Pile Bus Lead	1
NN	SA-9666	Field Ground to Shunt Bus Lead.....	1
OC	SA-9690	Armature Field to Battery Bus Lead Connection	1
OK	SA-9750	Field to Rheostat Lead.....	1

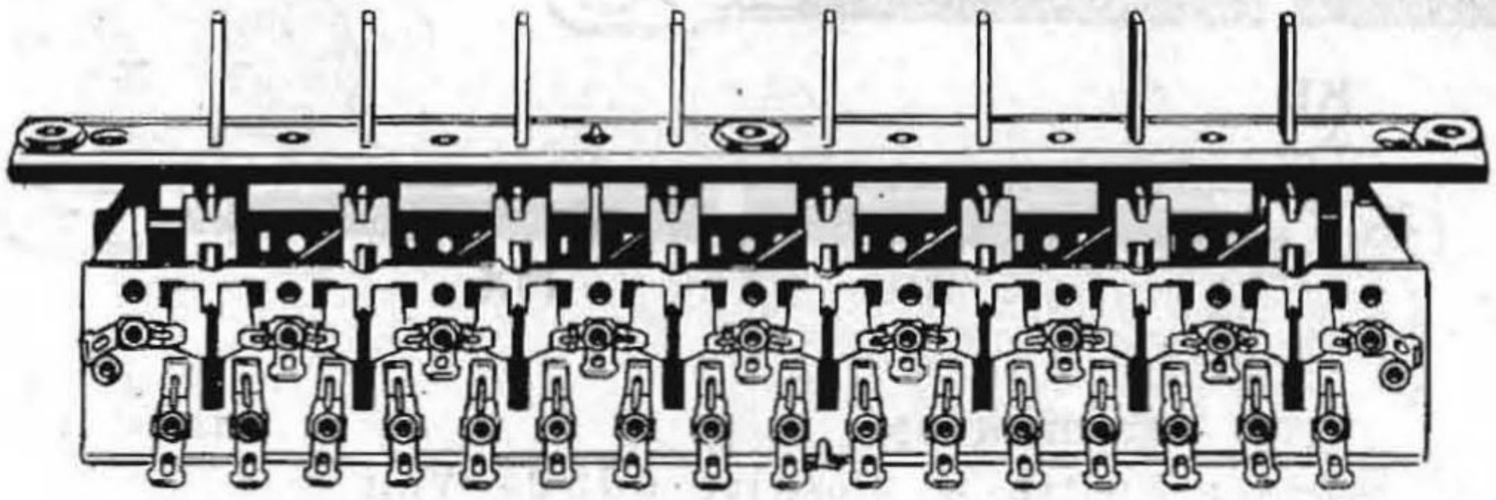
Ammeter Switch Assembly SA1388

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
EK	P-4162	Fan Type Resistor	3
GQ	P-8483	8 Button Switch	1
HE	P-8497	Miniature Bulb Socket	8

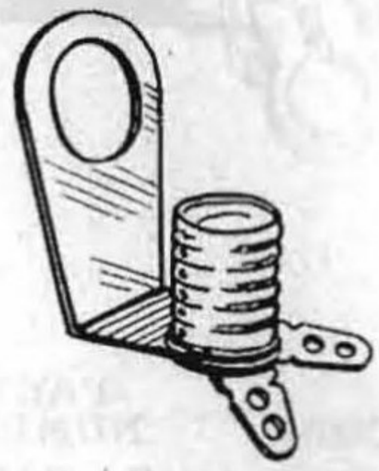


Voltmeter Switch Assembly SA1408

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
GP	P-8482	6 Button Switch	1
HE	P-8497	Miniature Bulb Socket	6



GQ



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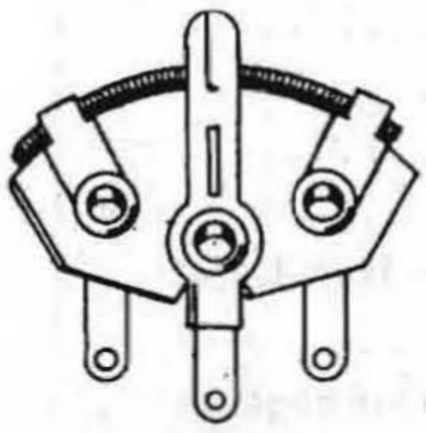
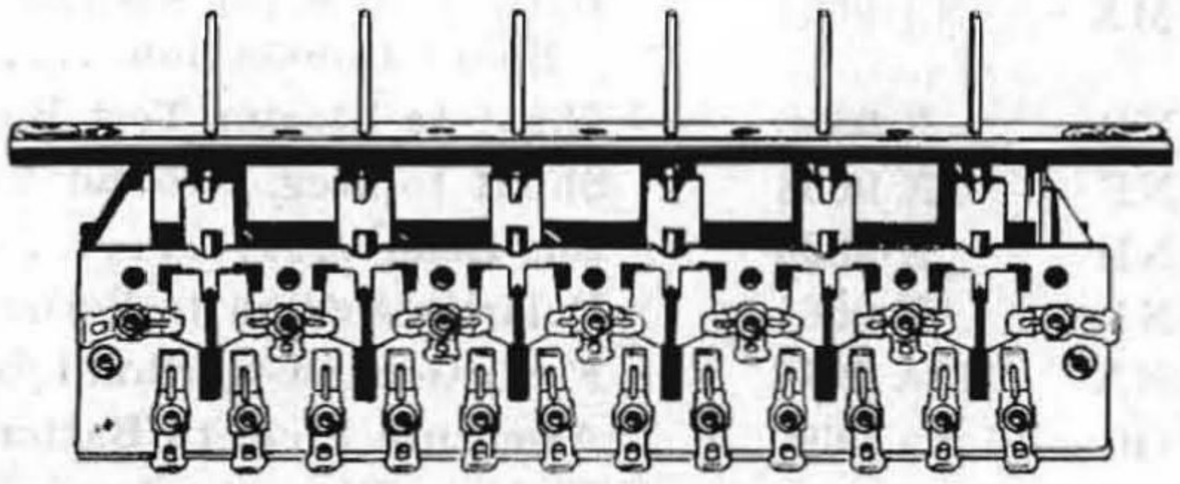
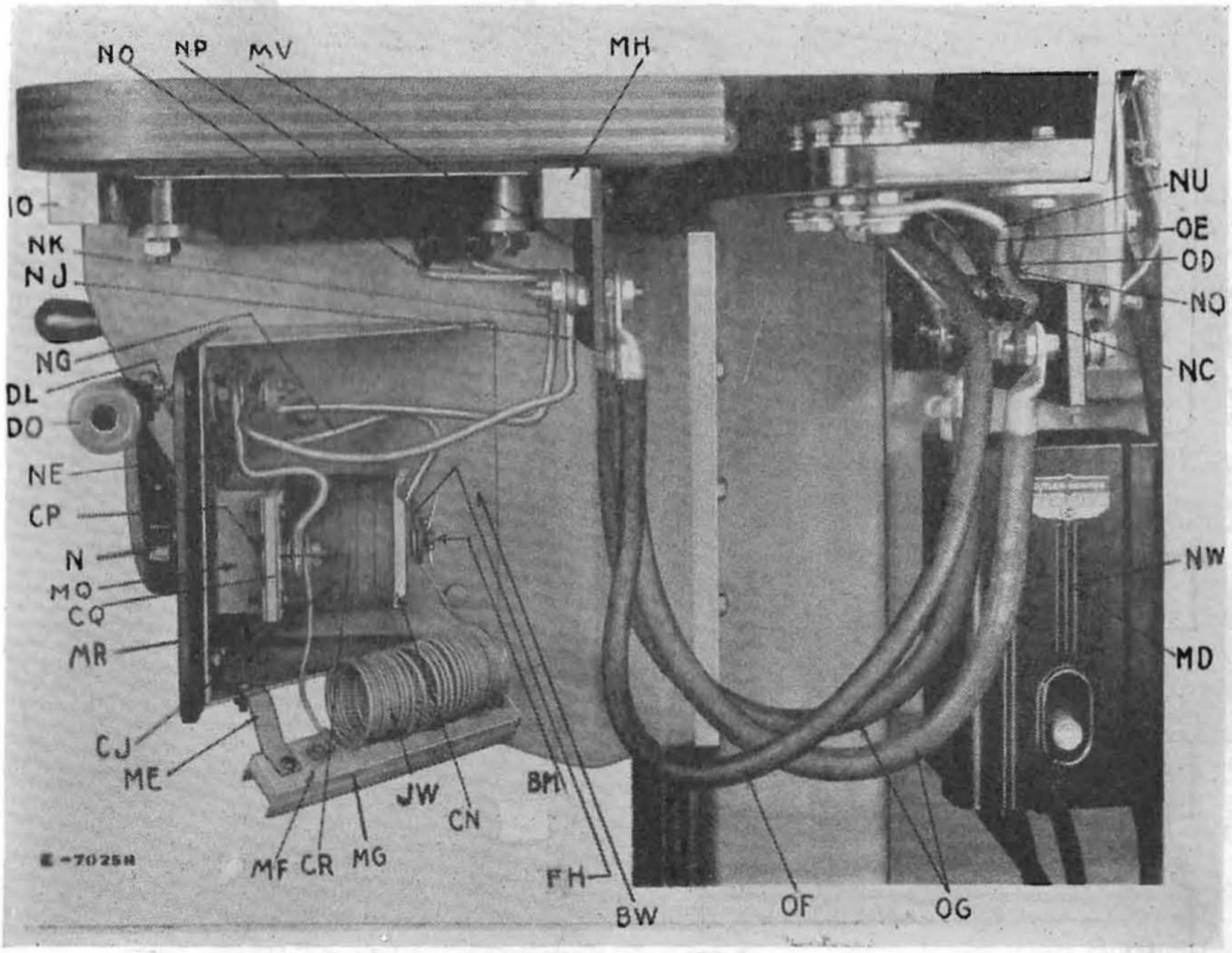


EK



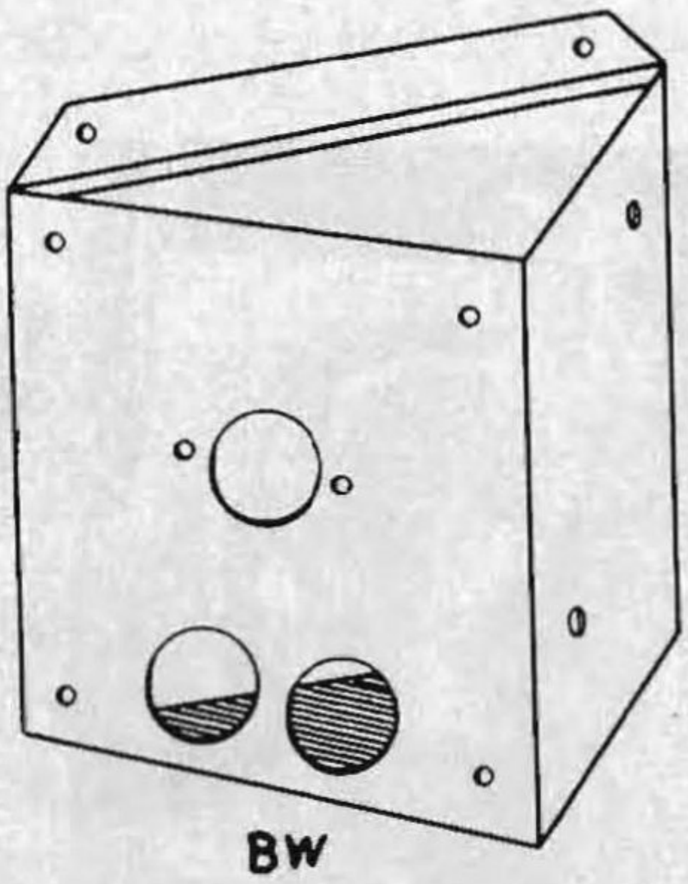
GP

Parts for SA1412 Series Carbon Pile, Model 501 Test Bench



CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
N	P-288	Carbon Pile Adjusting Knob	1
AT	P-634	Internal Mechanism for P-9679 (See Page 115)	1
AU	P-636	Internal Mechanism for P-9567 (See Page 115)	1
BM	SA-1365	Carbon Pile Adjusting Shaft	1
BV	SA-1403	Carbon Pile Assembly	1
BW	SA-1404	Carbon Pile Bracket	1
CJ	P-1522	Carbon Disc	6
CN	X-1849	Connecting Plate	1
CP	X-1866	Top Plate	
CQ	X-1870	Carbon Pile Transite Panel	1
CR	X-1871	Carbon Pile Connecting Plate	1
DK	X-2557	Switch Blade Support Jaw	1
DL	X-2558	Switch Jaw	1
DM	X-2560	Switch Blade Fibre Block	1
DN	X-2561	Switch Blade Tension Washers	2
DO	P-2589	Switch Handle	1
FH	X-8014-A	Special Nut	1
FJ	P-8057	Porcelain Washer	1
GN	X-8471	Guide Rod	1
HG	X-8499	Switch Blade	1
IO	X-8688	Front Bar Table Runner	1
JW	X-8825	Resistor	1
MD	P-9567	Overload Switch 110 Volt, 60 cy. 1ph	1
ME	X-9568	Resistor Mounting Clip	3

Parts for SA1412 Series Carbon Pile, Model 501 Test Bench



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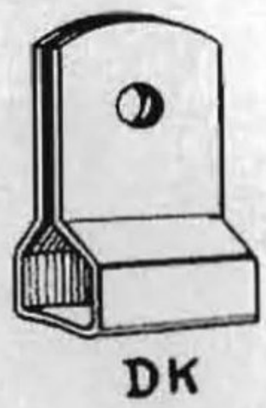

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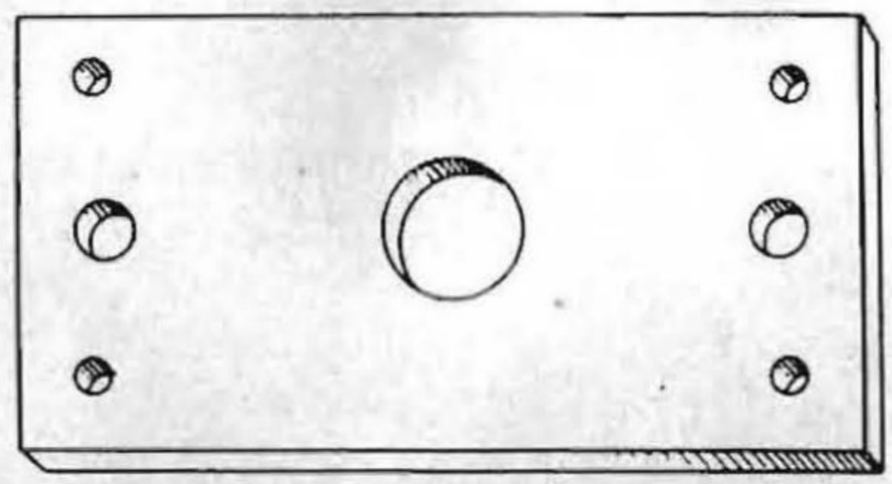
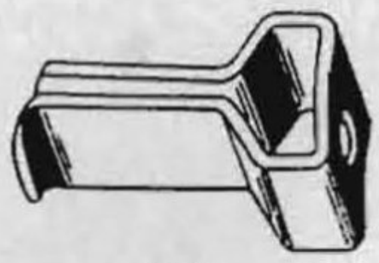


CQ



CJ



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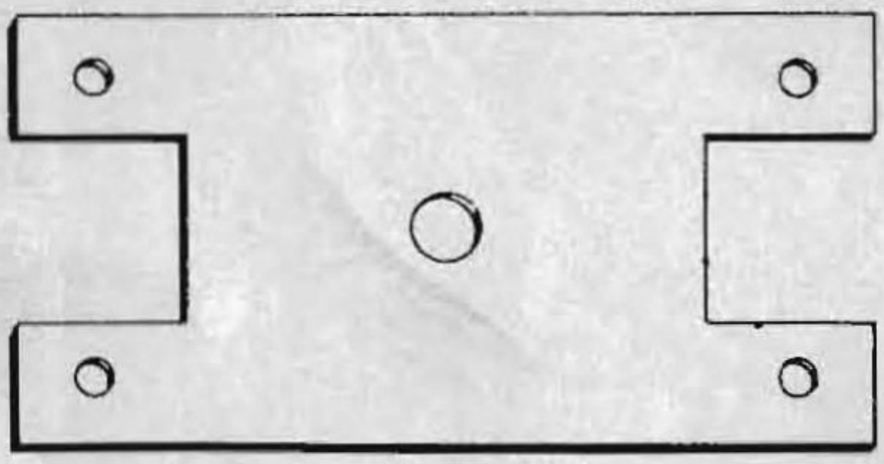

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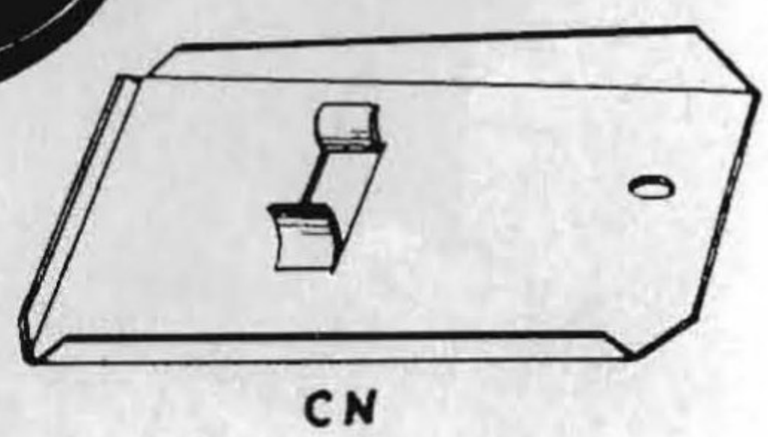


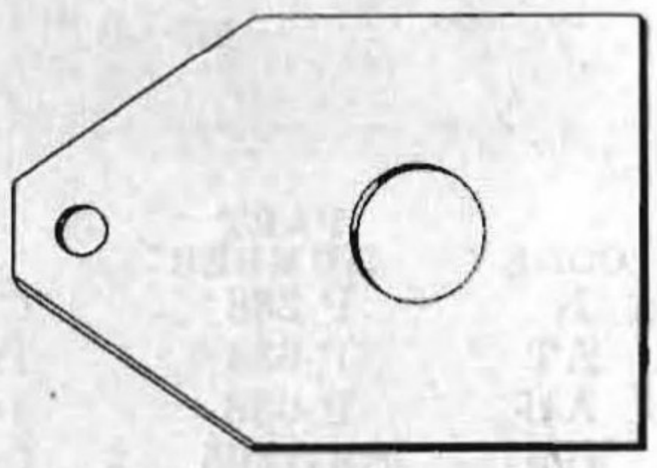
CN



HG



ME



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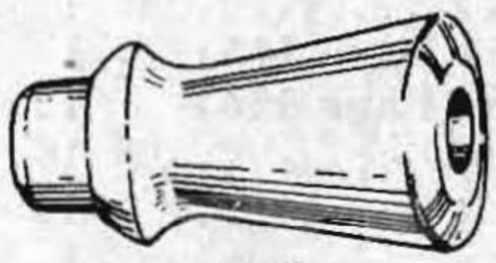

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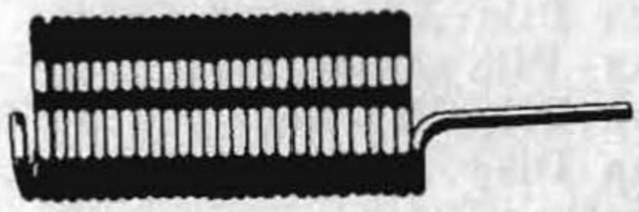

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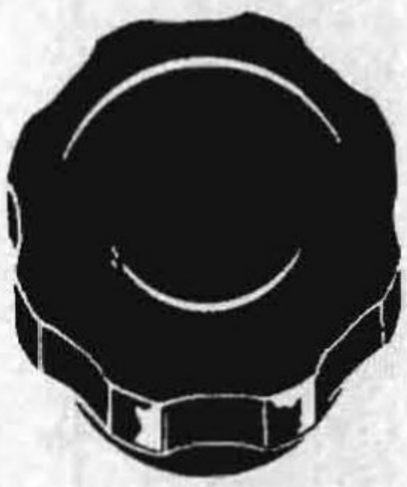

N



FH



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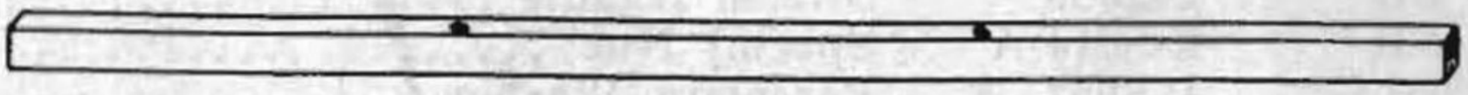

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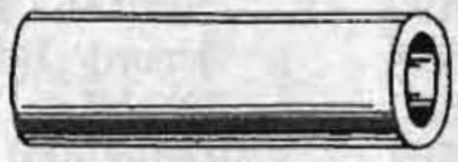


FJ

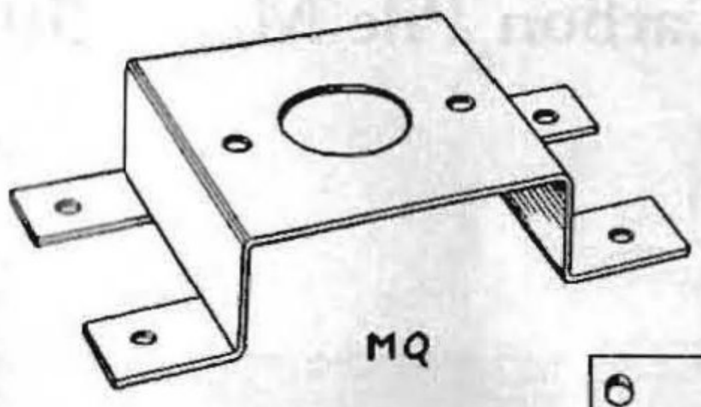


DM

WEIDENHOFF GENERATOR TEST BENCH



MR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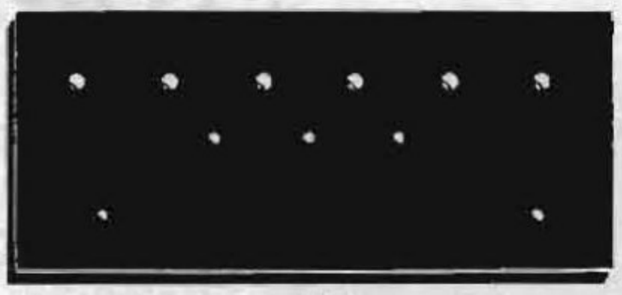
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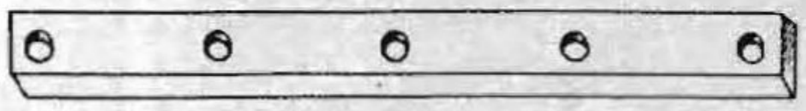
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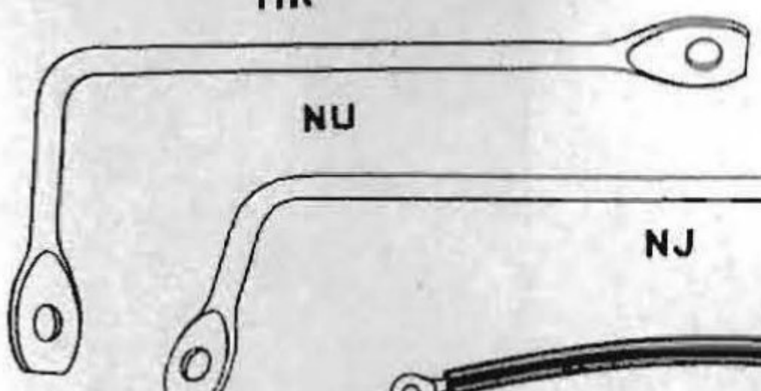
OE

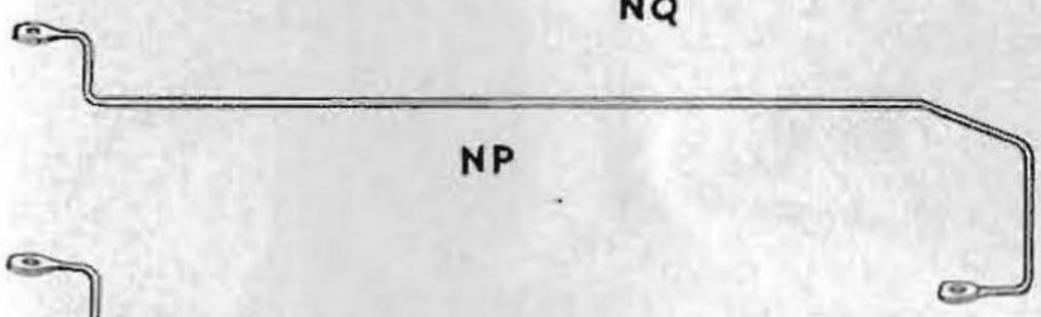

MF


NU

NJ

NQ


NK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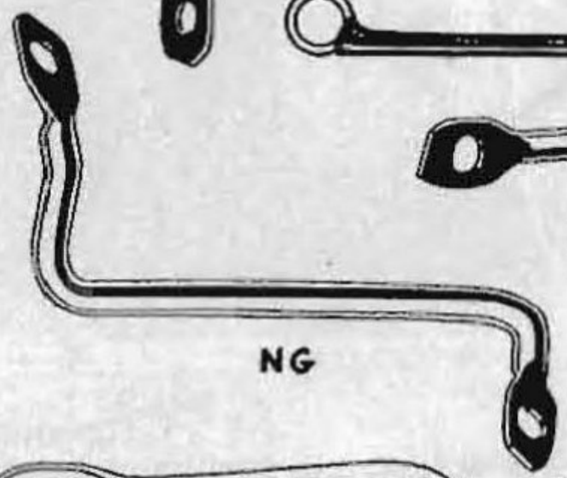
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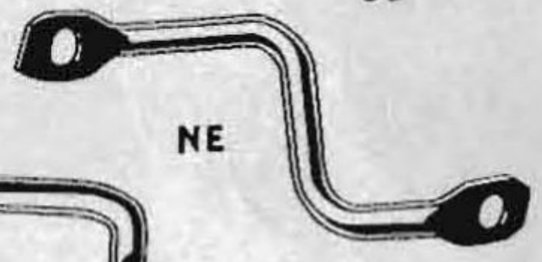
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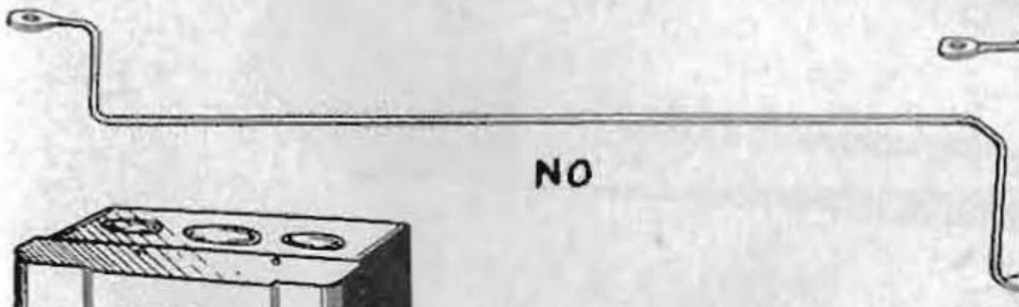
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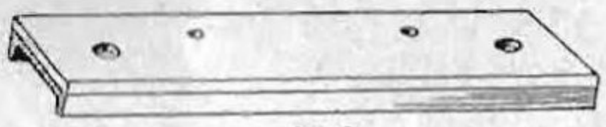

MG


OG


OF

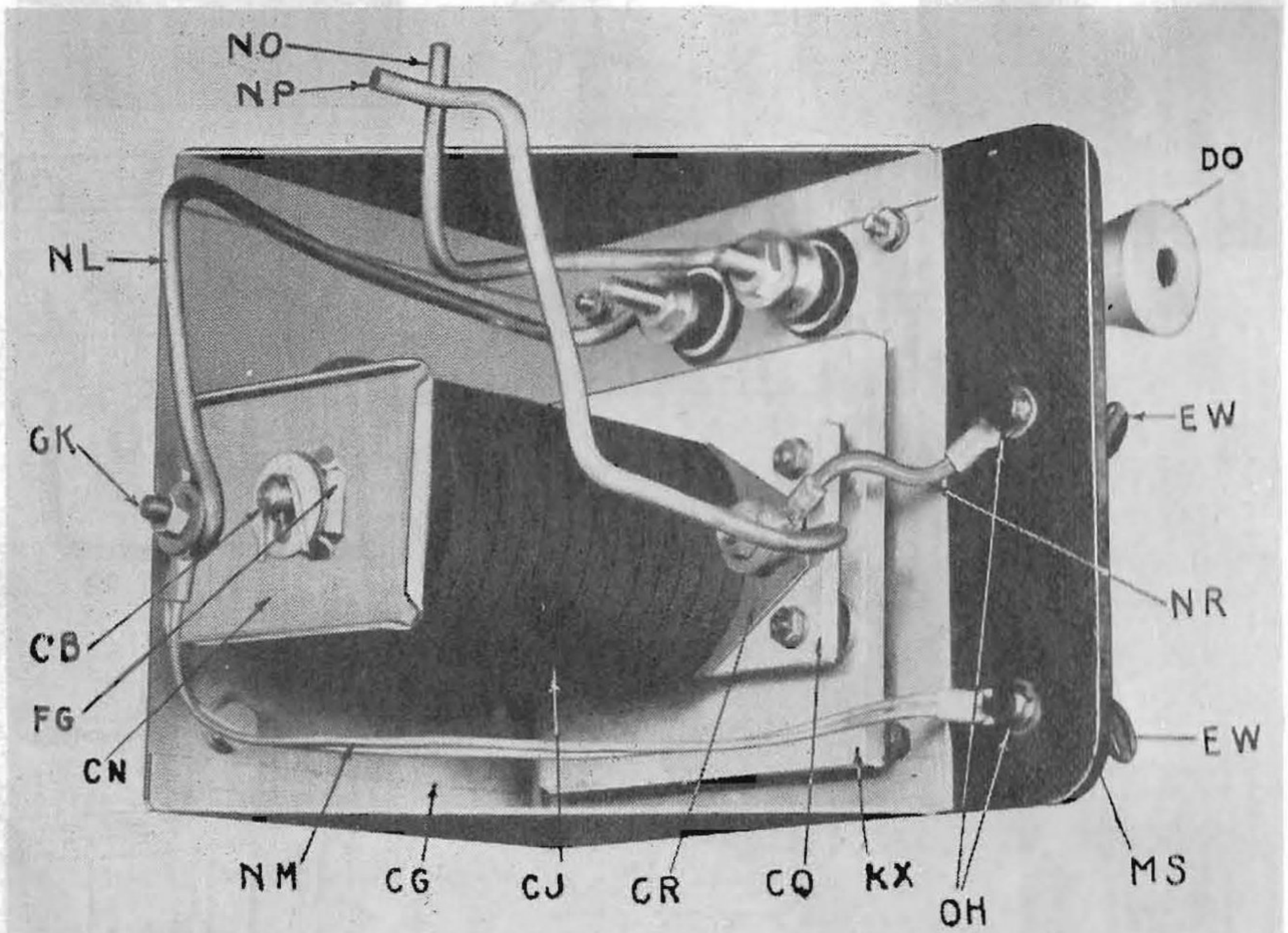

MD

NC

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
MF	X-9569	Resistor Transite Block	1
MG	X-9570	Resistor Mounting Bracket	1
MH	X-9572	Rear Bar Table Runner	1
MQ	X-9633	Carbon Pile Bracket	1
MR	X-9642	Masonite Panel	1
MV	X-9646	Terminal Board (Right)	1
NC	X-9655	Starter Test Connection Bus Lead	1
NE	X-9657	Bus Bar	1
NG	X-9659	Bus Bar	1
NJ	X-9662	Bus Bar	1
NK	X-9663	Bus Bar	1
NO	X-9667	Carbon Pile Connector Bus Bar	1
NP	X-9668	Carbon Pile Connector Bus Bar	1
NQ	SA-9669	Bus Lead Connector	2
NU	X-9675	Ground Connection Bus Lead	1
NW	P-9679	Overload Switch 220 Volt, 60 cy. 1ph	1
OD	SA-9691	Field Connection Bus Lead	1
OE	SA-9692	Battery Connection Bus Lead	1
OF	SA-9693	Battery Connection Lead	1
OG	SA-9694	Lead	2

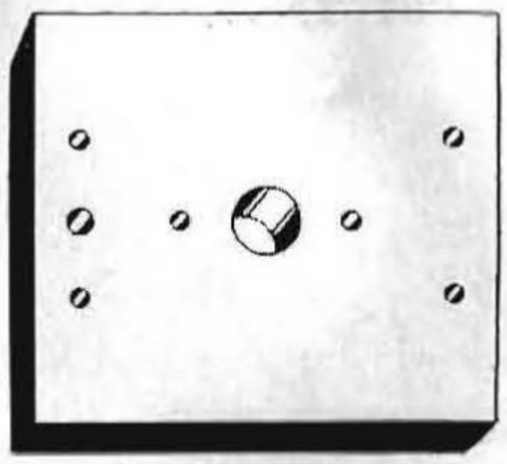
WEIDENHOFF GENERATOR TEST BENCH

SA1415 Carbon Pile Model 501 Bench



CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
N	P-288	Carbon Pile Knob	1
CA	SA-1416	Load Carbon Pile (Not Shown)	1
CB	SA-1417	Carbon Pile Shaft	1
CG	SA-1442	Carbon Pile Bracket	1
CJ	P-1522	Carbon Discs	13
CN	X-1849	Carbon Pile Connecting Plate	1
CP	X-1866	Carbon Pile Top Plate	1
CQ	X-1870	Carbon Pile Transite Panel	1
CR	X-1871	Connecting Plate	1
DK	X-2557	Switch Blade Support Jaw	1
DL	X-2558	Switch Jaw	1
DM	X-2560	Switch Fibre Block	1
DN	X-2561	Switch Blade Tension Washer	2
DO	P-2589	Switch Blade Handle	1
EW	P-4464	Thumb Screws	2
FG	P-8014	Shaft Nut	1
FJ	P-8057	Porcelain Insulator	2
GK	X-8460	Carbon Pile Guide Rod	1
HG	X-8499	Switch Blade	1
IR	X-8691	Bench Top Adjusting Screw	1
KX	X-8869	Carbon Pile Transite Heat Shield	1
MS	X-9643	Masonite Panel	1
NL	X-9664	Binding Post to Carbon Pile Bus Bar	1
NM	X-9665	Binding Post to Rear of Carbon Pile Bus Bar	1
NO	X-9667	Bus Bar	1
NP	X-9668	Bus Bar	1
NR	X-9670	Carbon Pile to Resistor Post Bus Bar	1
OH	X-9702	Resistor Mounting Post	2

WEIDENHOFF GENERATOR TEST BENCH



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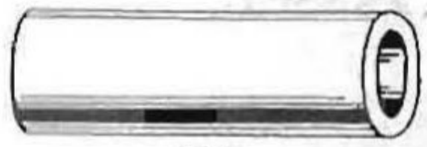


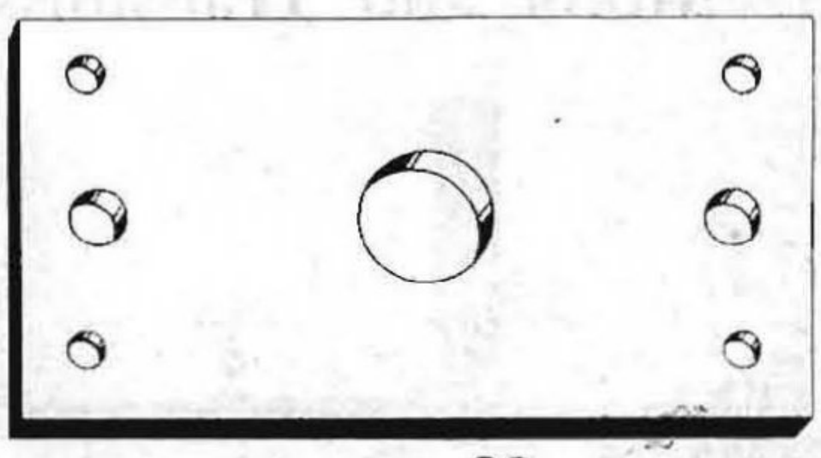
FJ



OH



DM



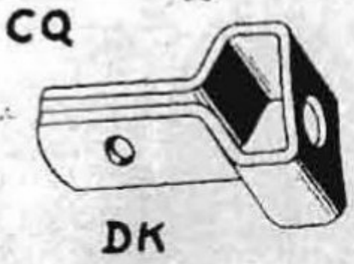
CQ



NM



EW



DK



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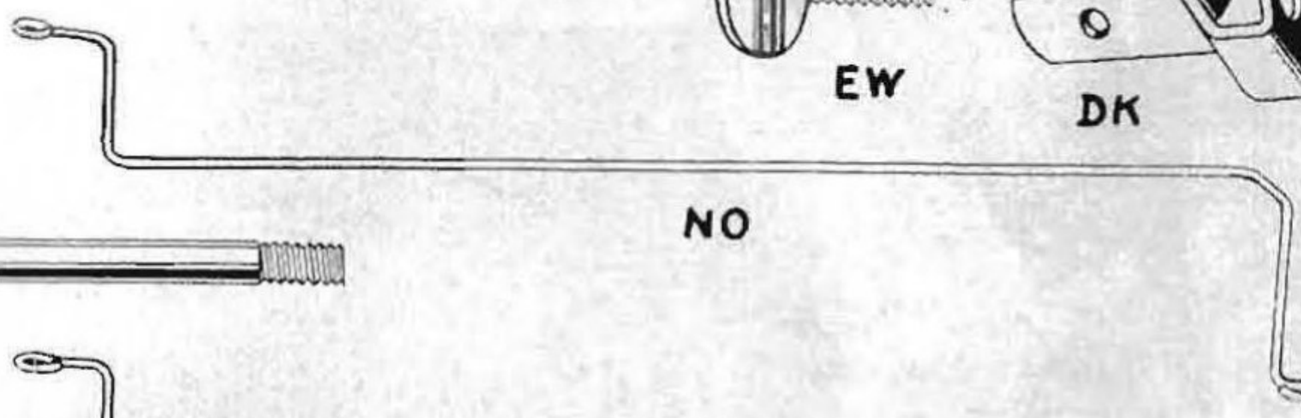

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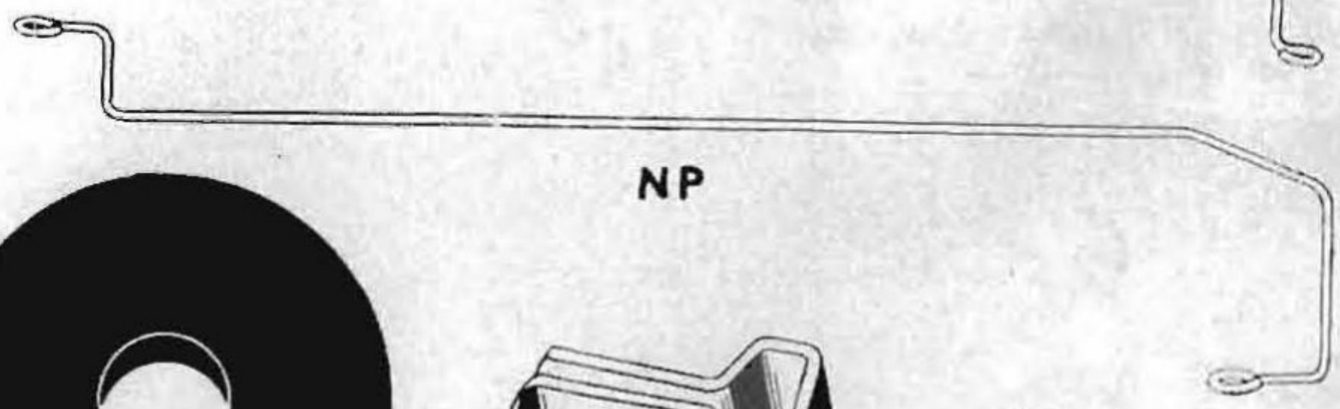
GK



HG



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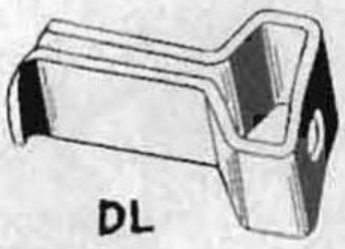
DO



CJ



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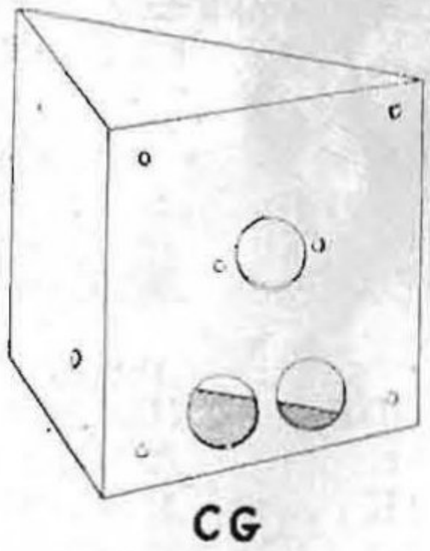

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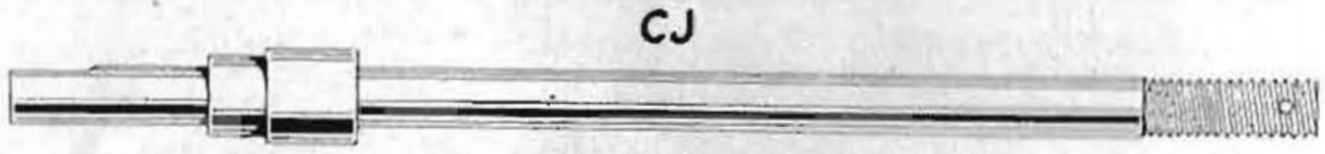

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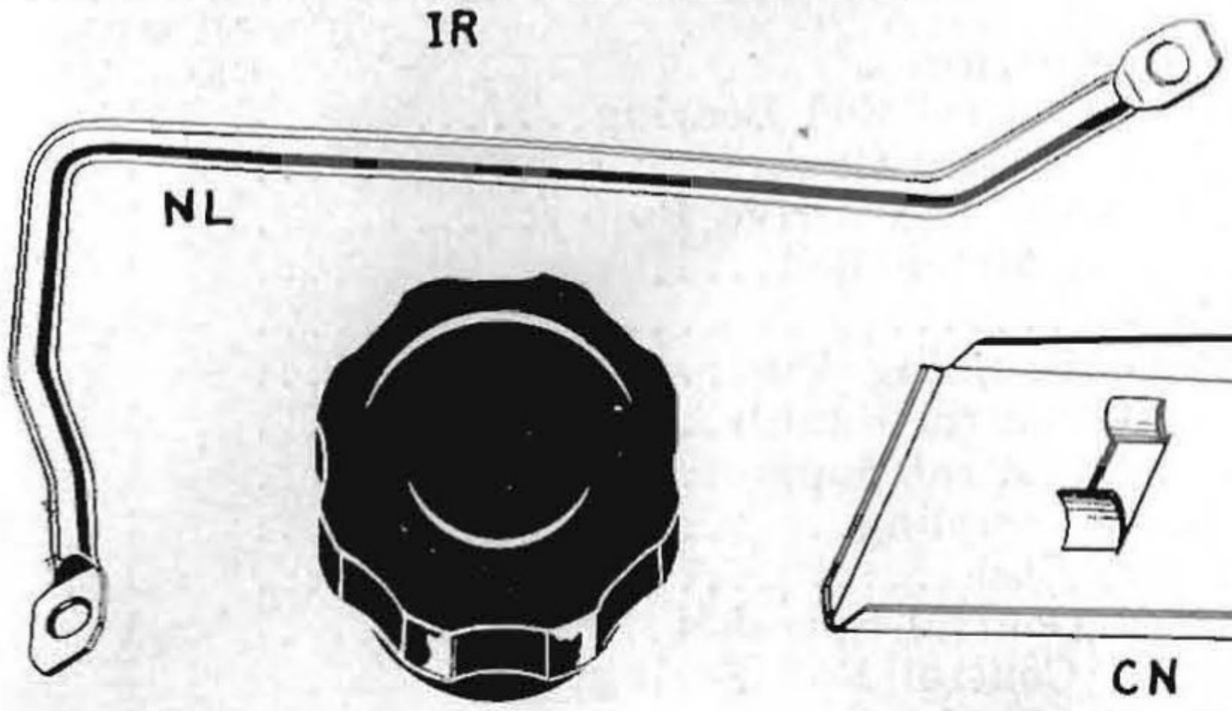

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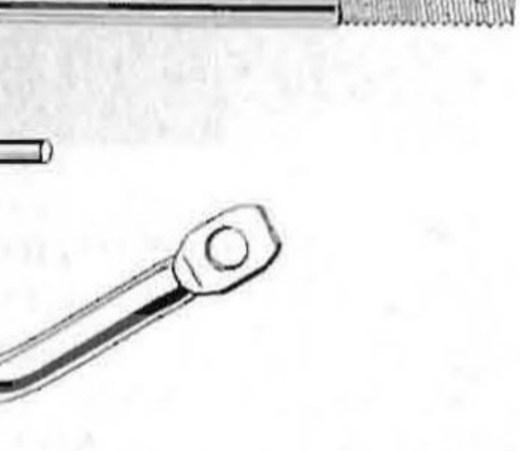

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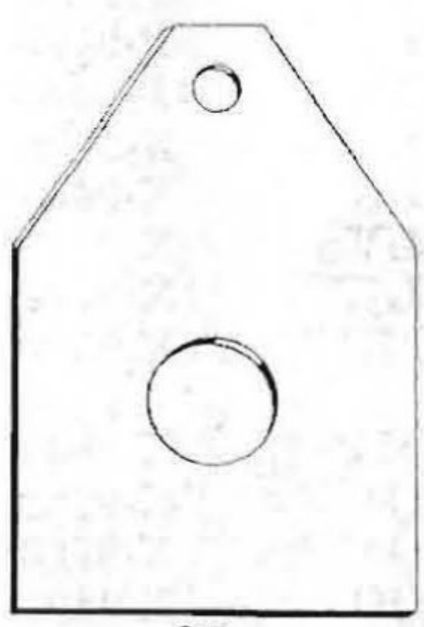
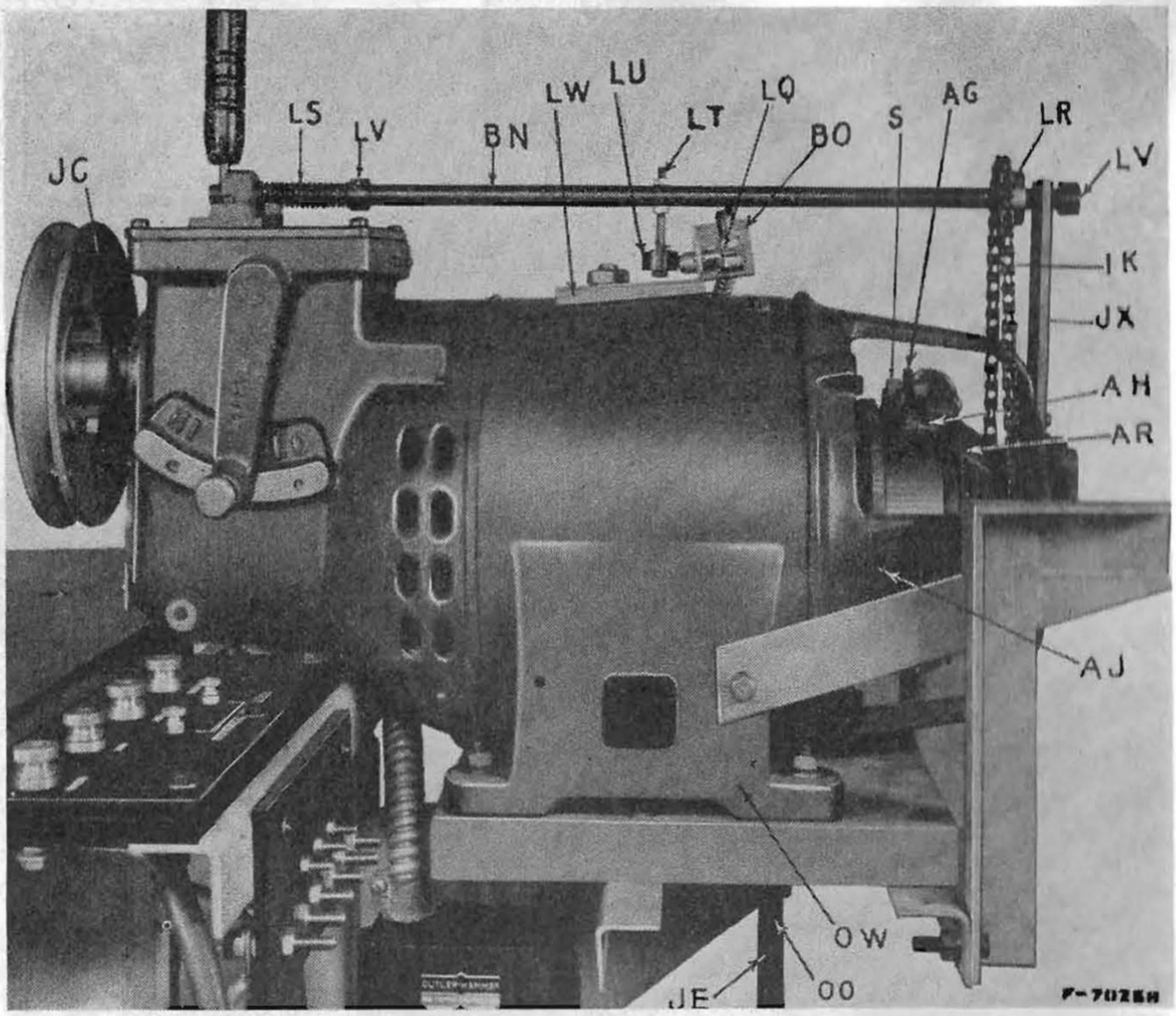


CR

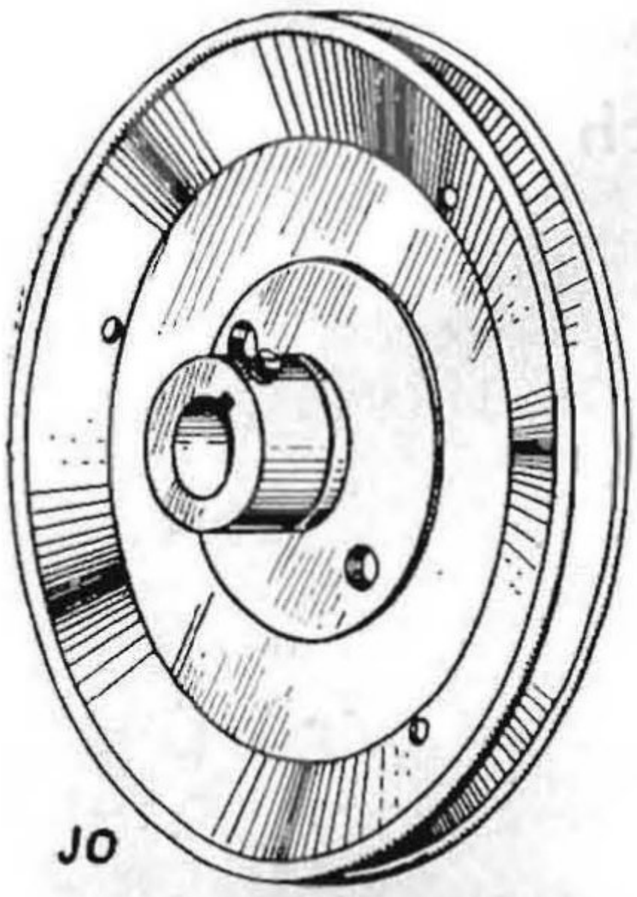
WEIDENHOFF GENERATOR TEST BENCH

Motor and Transmission Assembly 501 Test Bench



CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
IE	X-8675	Motor Speed Control Rod Bearing	1
IK	P-8683	Motor Speed Control Chain	1
JC	X-8703	Tachometer Gear Box Drive Pulley	1
JE	X-8708	Motor Support Brace Rod	1
JO	X-8814	Drive Pulley	1
JP	X-8815	Motor Drive Coupling Pin	2
JQ	P-8816	Motor Speed Control Handle	1
JX	X-8826	Motor Speed Control Support	1
JY	P-8827	Rubber Drive Coupling	1
LQ	P-9482	Start Stop Switch	1
LR	P-9483	Motor Speed Control Sprocket	1
LS	P-9486	Motor Speed Control Rod Spring	1
LT	X-9488	Contact Roller Stud	1
LU	X-9489	Start Stop Switch Contact Roller	1
LV	X-9490	Speed Control Adjustment Collar	2
LW	X-9491	Start Stop Switch Bracket Support	1
MB	X-9526	Tachometer Idler Drive Pulley Support Bar (See Page 91)	1
MT	X-9644	Sub-Panel (Right) (See Page 84)	1
OI	X-9722	Tachometer Drive Idler Pulley (See Page 99)	1
OJ	X-9723	Tachometer Idler Pulley Shaft See Page 99)	1
OO	X-9831	Motor Support Brace Rod used with X-9835	1
OW	P-9888	5HP T.L.K.—220-Volt, 60-cy., 1-ph. Motor	1

WEIDENHOFF GENERATOR TEST BENCH



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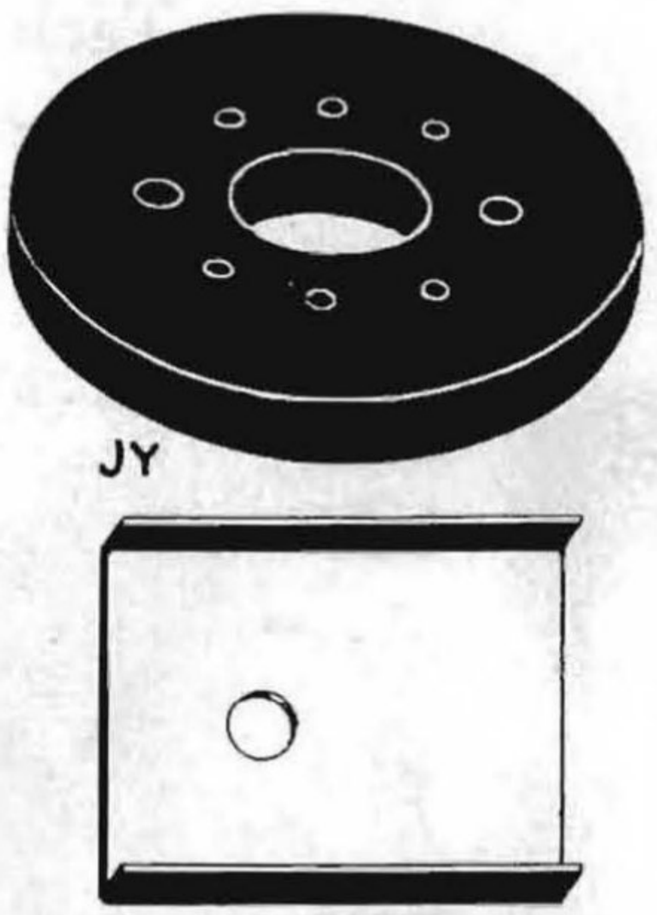

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LW



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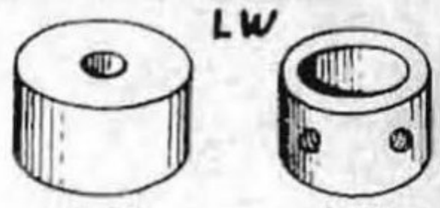

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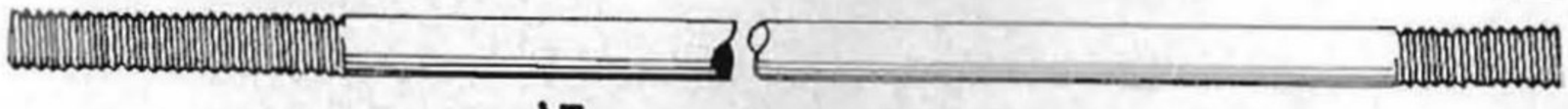

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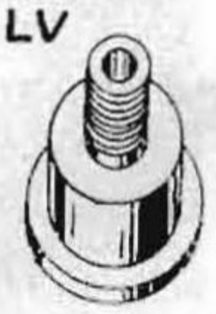

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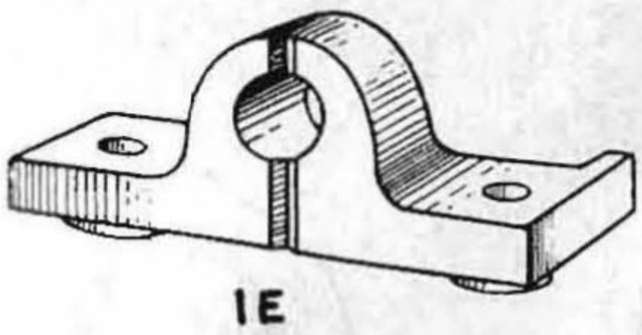
LT

OJ



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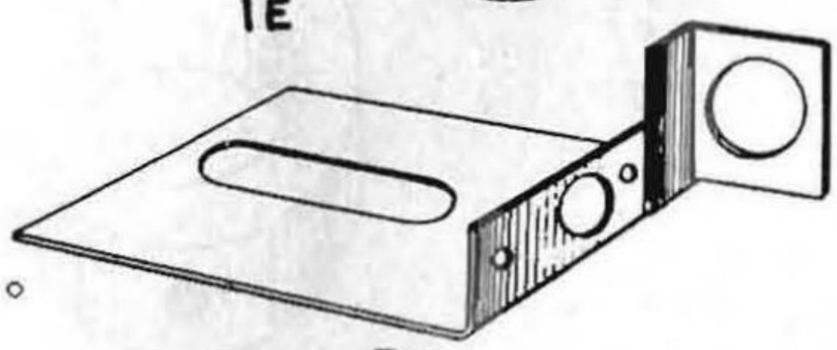

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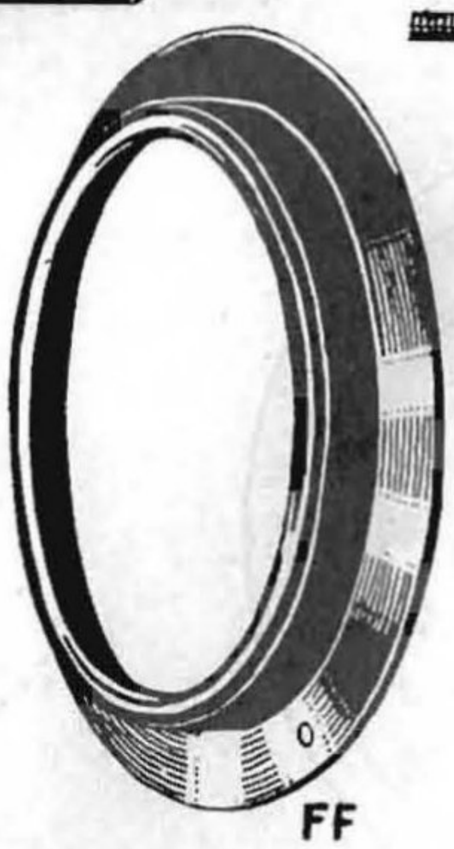

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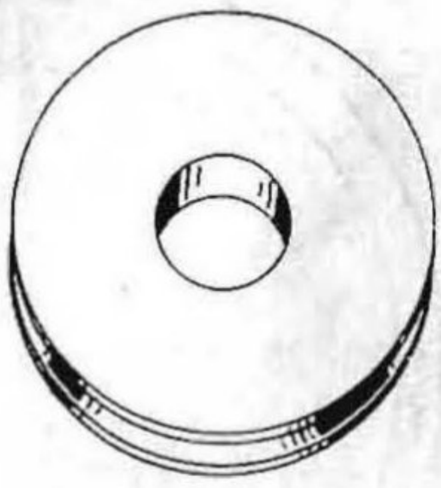

01



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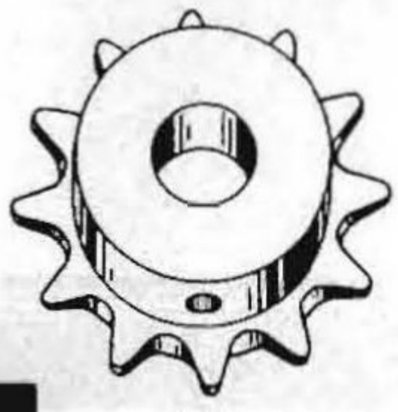

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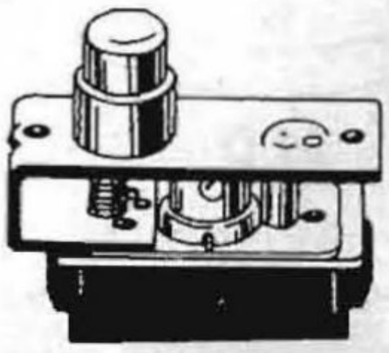

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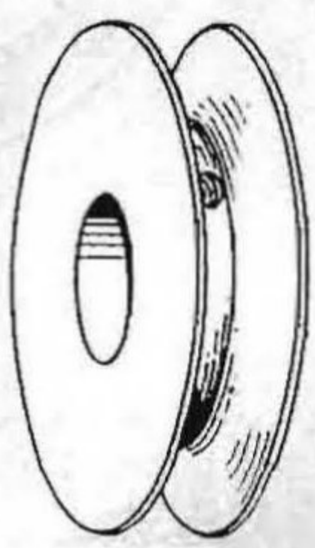

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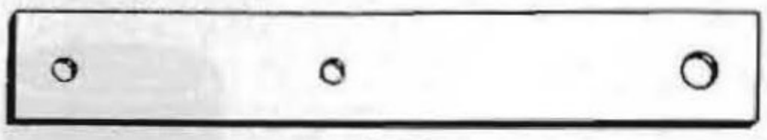

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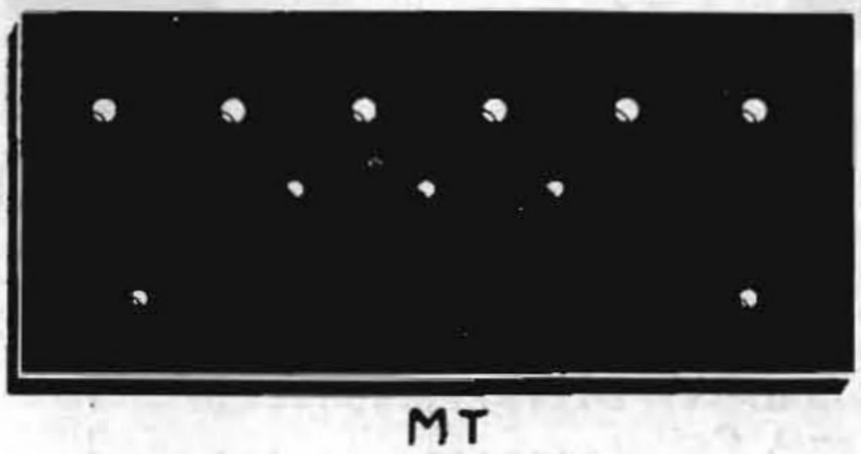
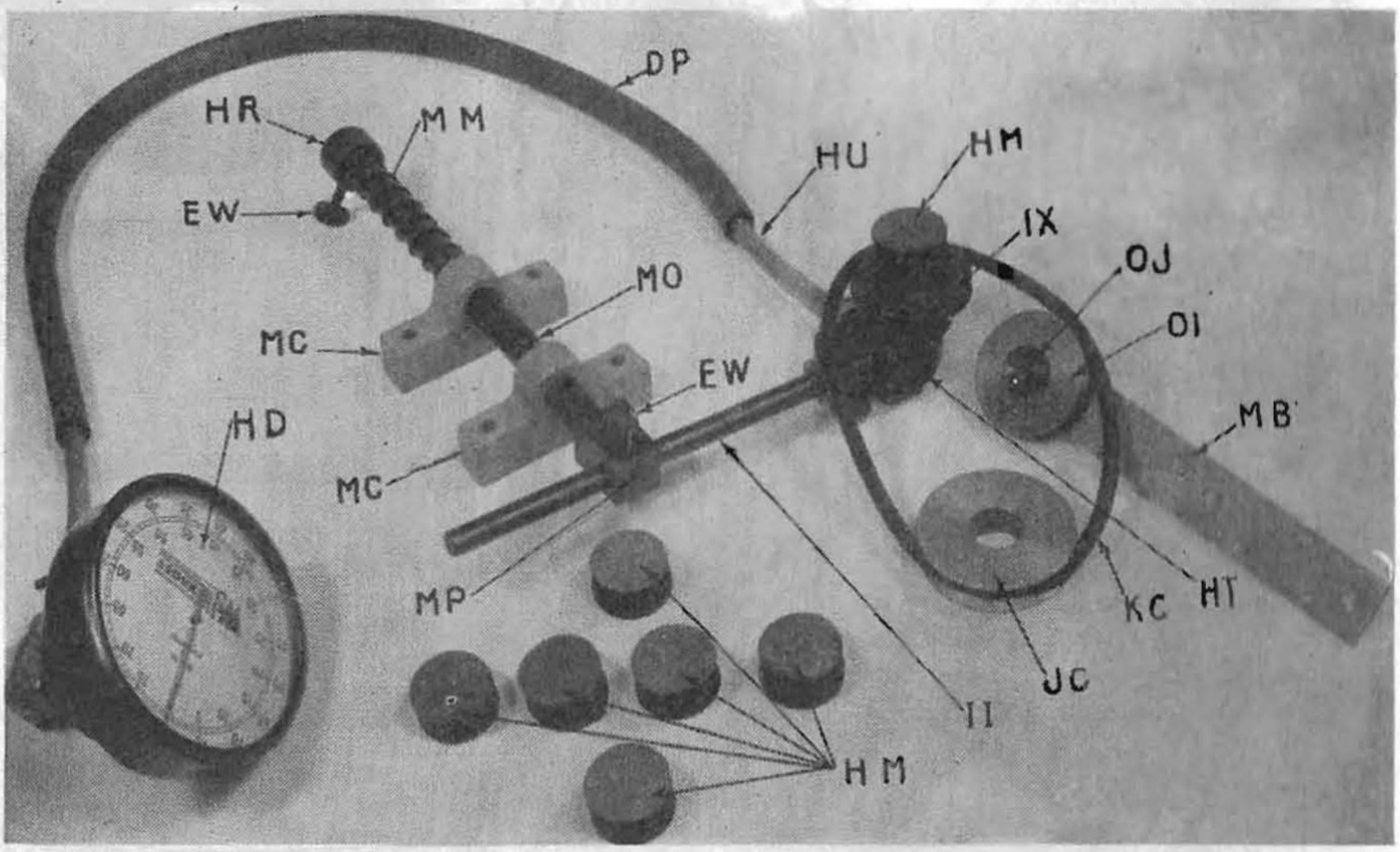


MT



JX

Tachometer and Drive Assembly
Model 501 Test Bench





HD



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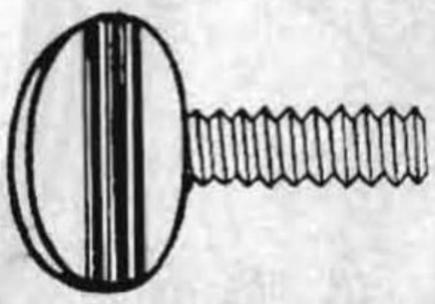


EW



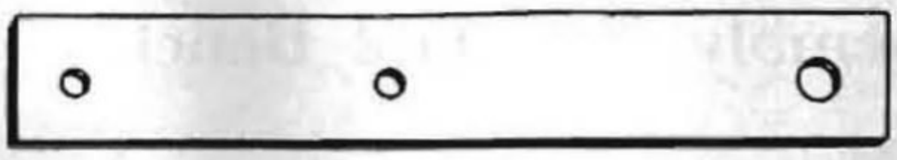
HR



HM

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
DP	P-2620	Tachometer Shaft Rubber Tubing.....	1
EW	P-4464	Thumb Screw.....	2
HD	P-8496	Tachometer	1
HM	X-8524	Rubber Discs for Tachometer Drive.....	7
HR	X-8592	Tachometer Drive Thrust Collar.....	1

WEIDENHOFF GENERATOR TEST BENCH



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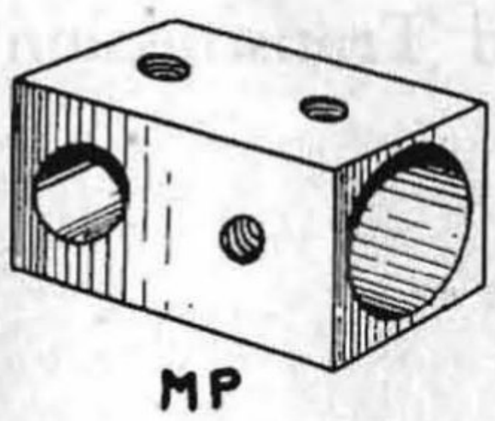

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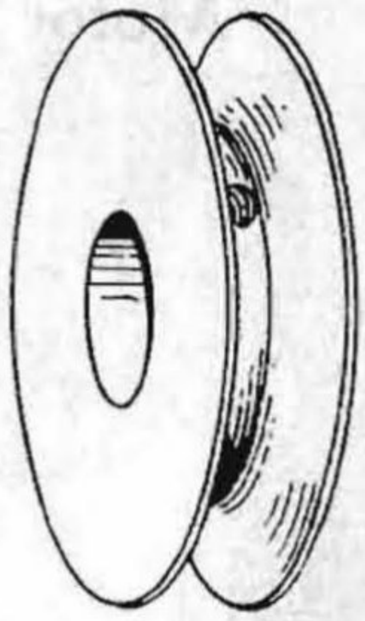

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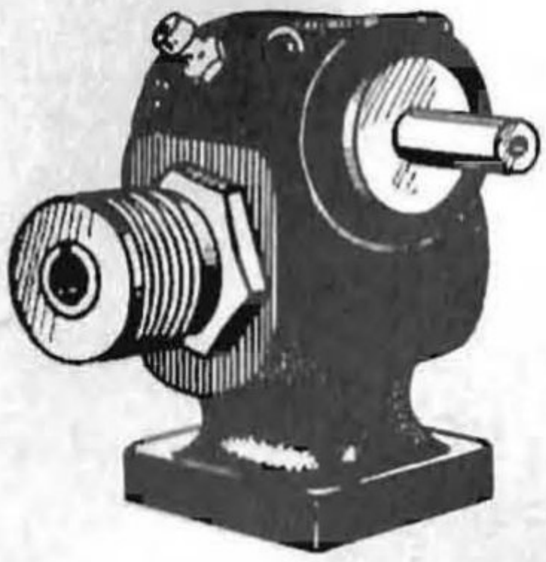

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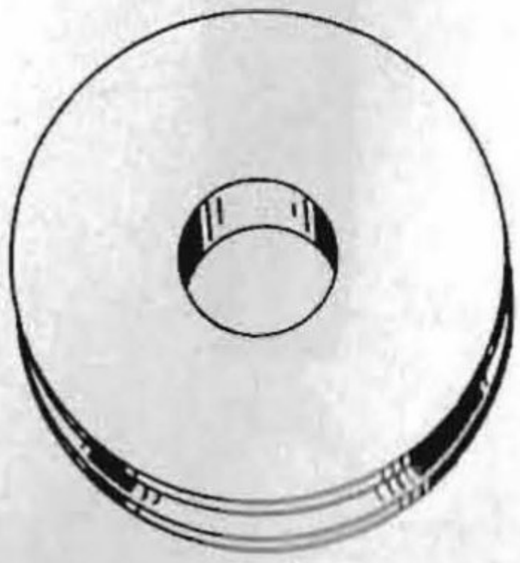

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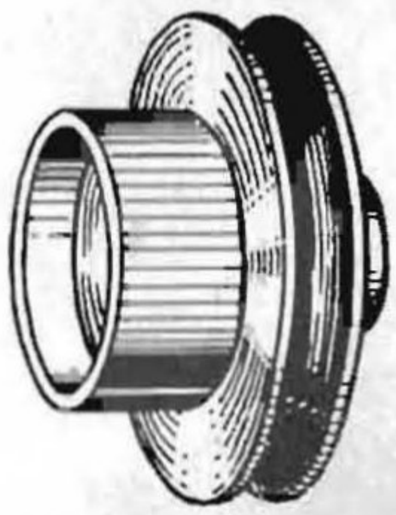

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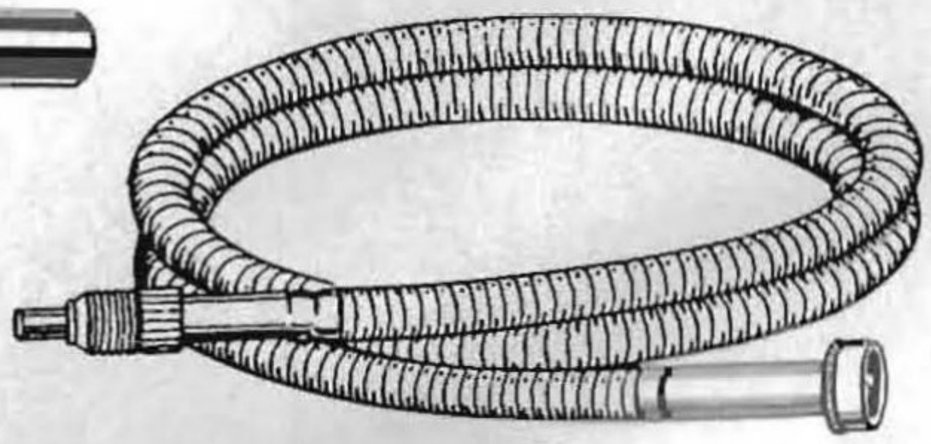

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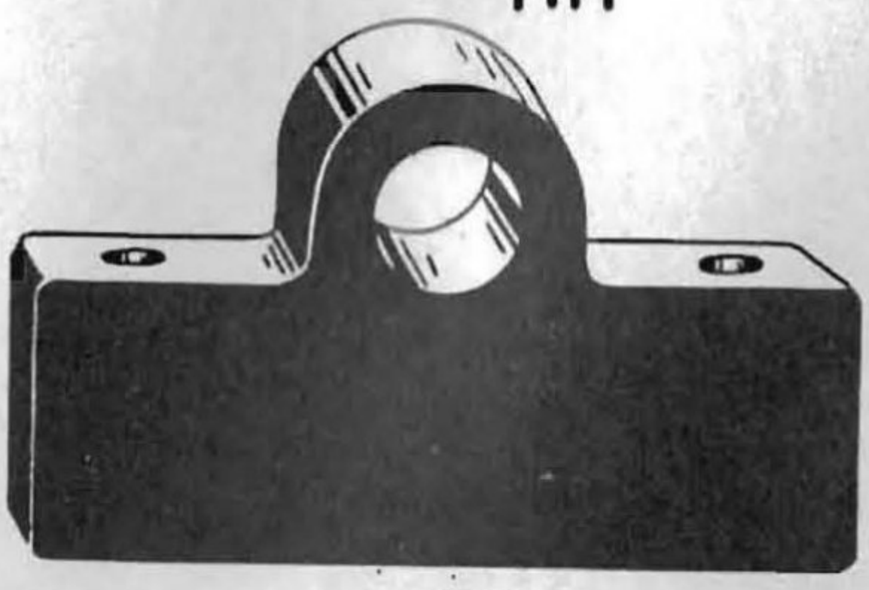


MC



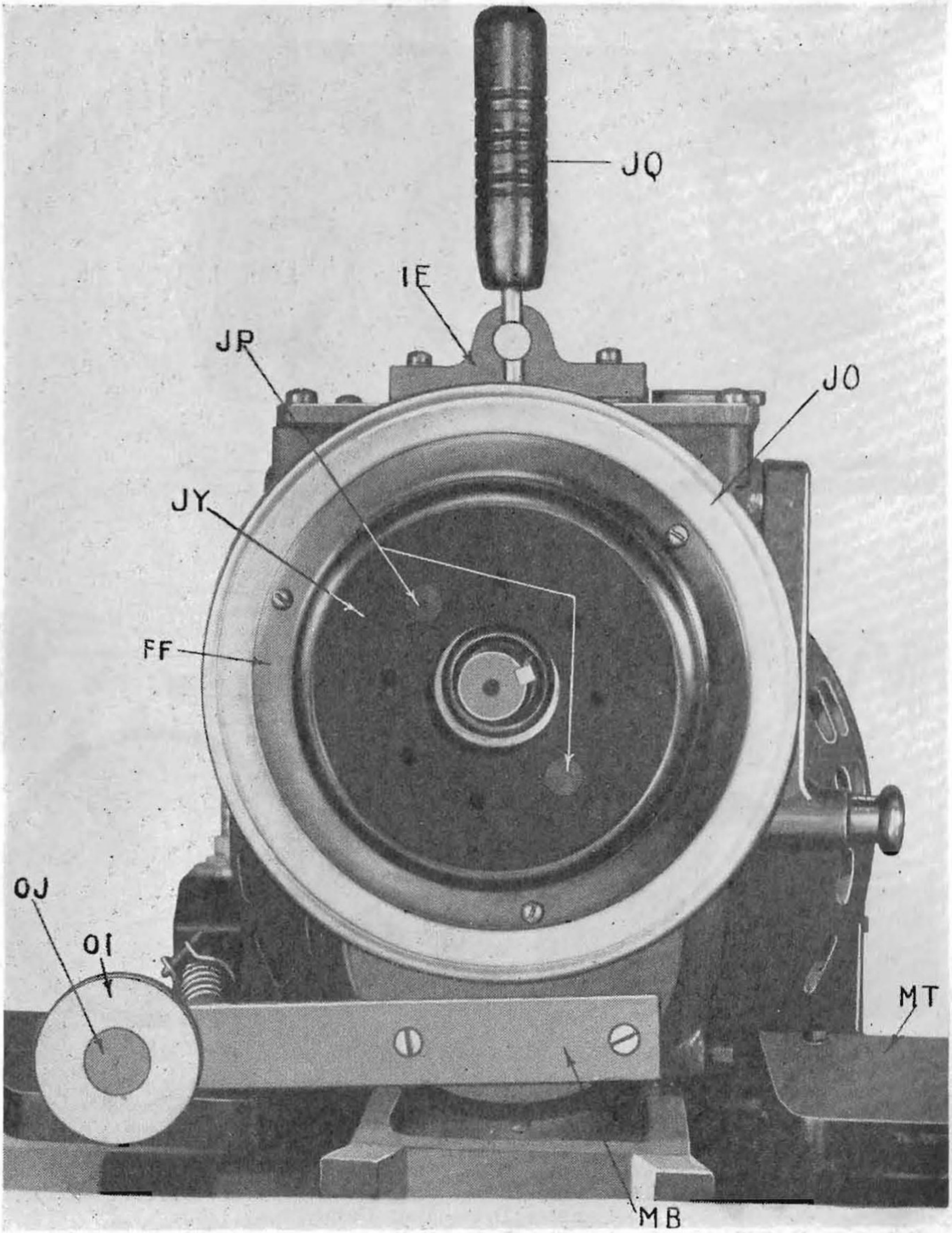
OJ



KC

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
HT	X-8609	Tachometer Drive Head	1
HU	P-8611	Tachometer Flexible Drive Cable	1
II	X-8681	Tachometer Head Support Bar	1
IX	X-8702	Tachometer Drive Pulley	1
JC	X-8703	Tachometer Drive Belt Pulley	1
KC	P-8828	Tachometer Drive Belt	1
MB	X-9526	Tachometer Idler Drive Pulley Support Bar	1
MC	X-9529	Tachometer Shaft Pillow Block	2
MM	P-9628	Tachometer Support Shaft Spring	1
MO	X-9630	Tachometer Support Shaft	1
MP	X-9631	Tachometer Support Shaft Adjusting Block	1
OI	X-9722	Tachometer Drive Idler Pulley	1
OJ	X-9723	Tachometer Idler Pulley Shaft	1

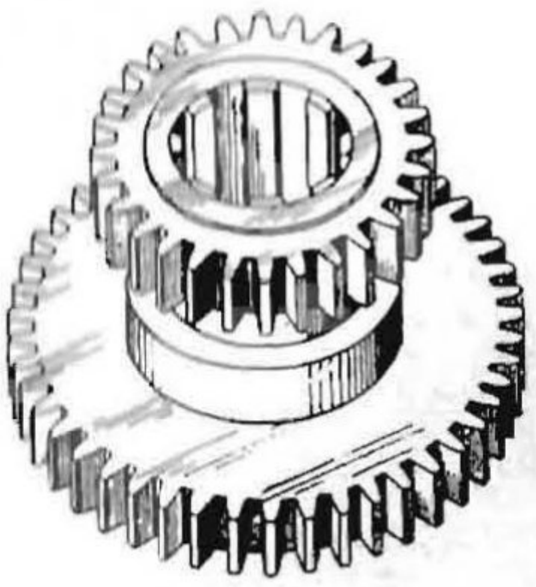
Motor and Transmission Assembly 501 Test Bench



CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
S	P-312	Motor Brush	4
AG	P-615	Motor Brush Spring	4
AH	P-616	Motor Brush Holder	4
AI	P-617	Motor Armature Assembly	1
AJ	P-618	Commutator End Housing	1
AK	P-619	Armature Shaft Bearing—Rear	1

WEIDENHOFF GENERATOR TEST BENCH

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
AL	P-620	Armature Shaft Bearing—Front	1
AM	P-621	Transmission Shaft Bearing Outer	1
AN	P-622	Transmission Shaft Bearing Inner	1
AO	P-623	Transmission Gear Shaft 28 and 43 Teeth	1
AP	P-624	Armature Shaft Gear Assy. 37 and 52 Teeth	1
AQ	P-625	Transmission Shaft	1
AR	P-626	Motor Brush Yoke Assembly	1
AS	P-631	Commutator	1
BN	SA-1382	Motor Speed Control Rod	1
BO	SA-1384	Start Stop Switch Bracket	1
FF	X-7986	Spinning for Rubber Drive Coupling	1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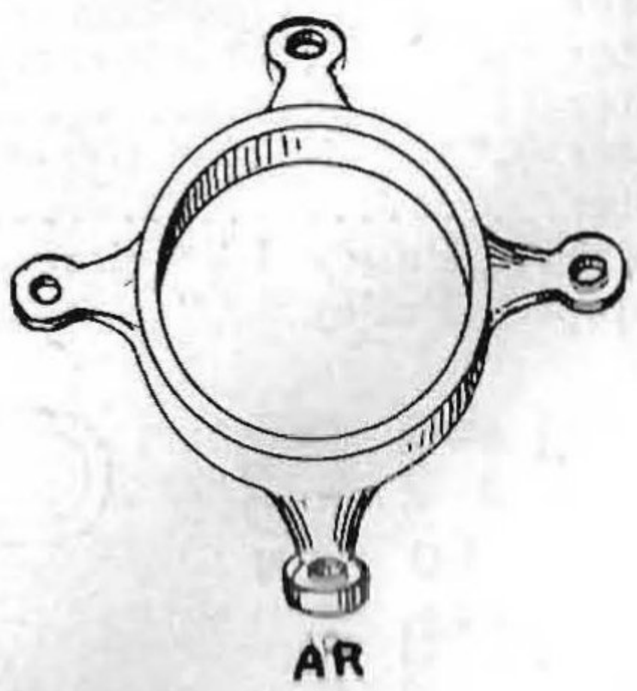
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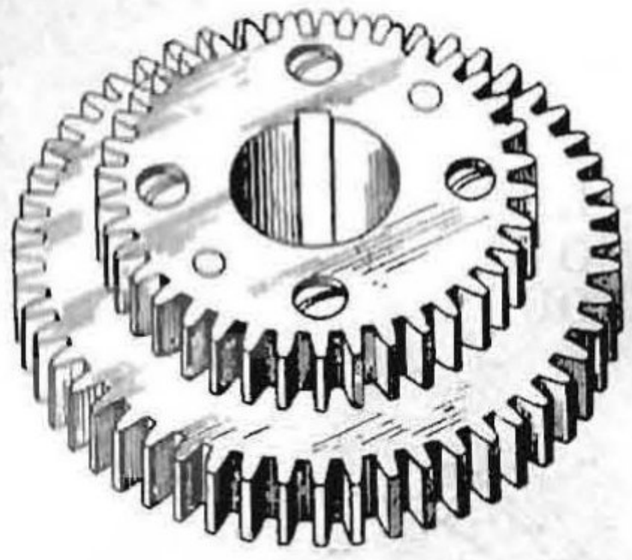
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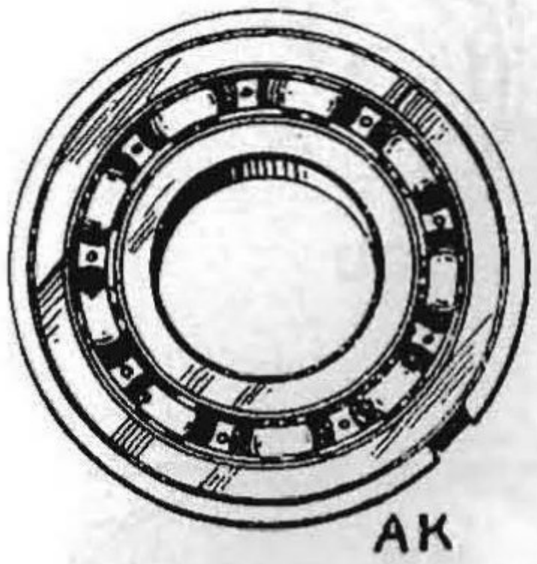
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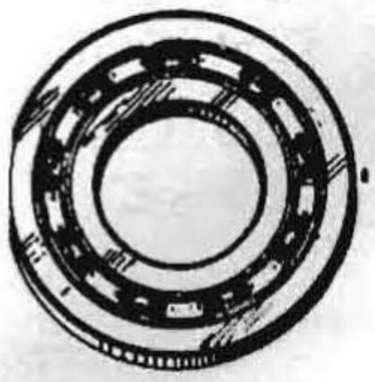
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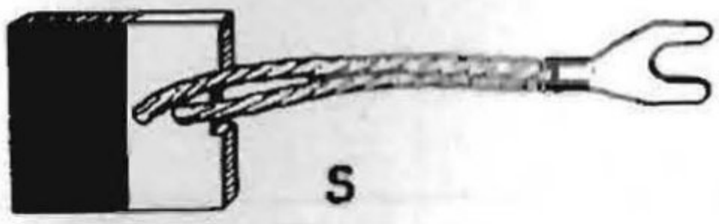
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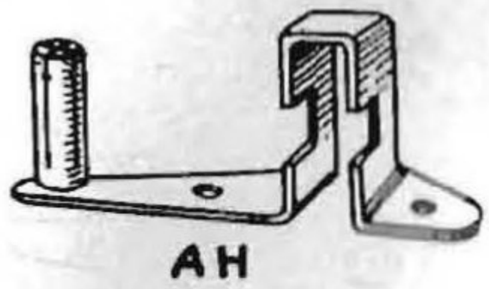
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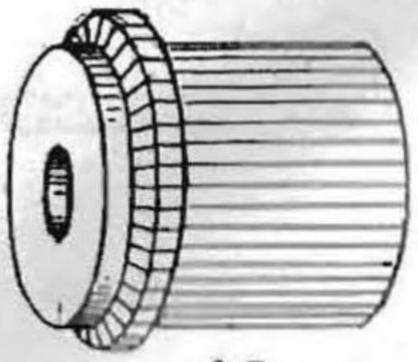
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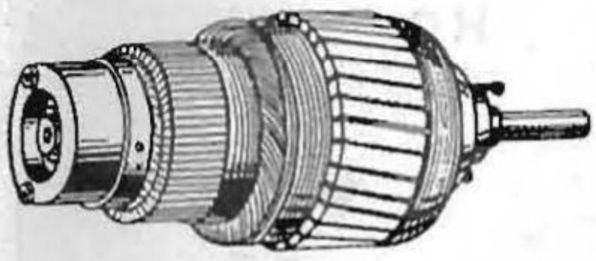
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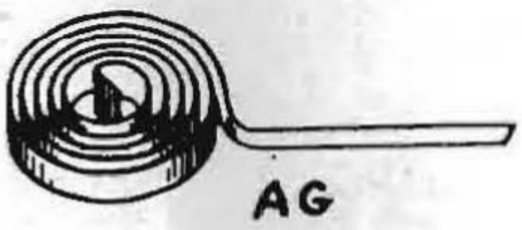
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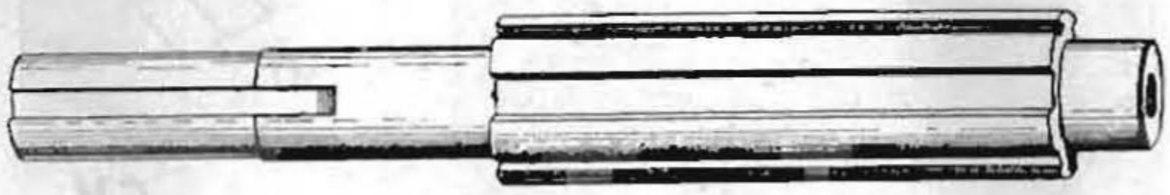
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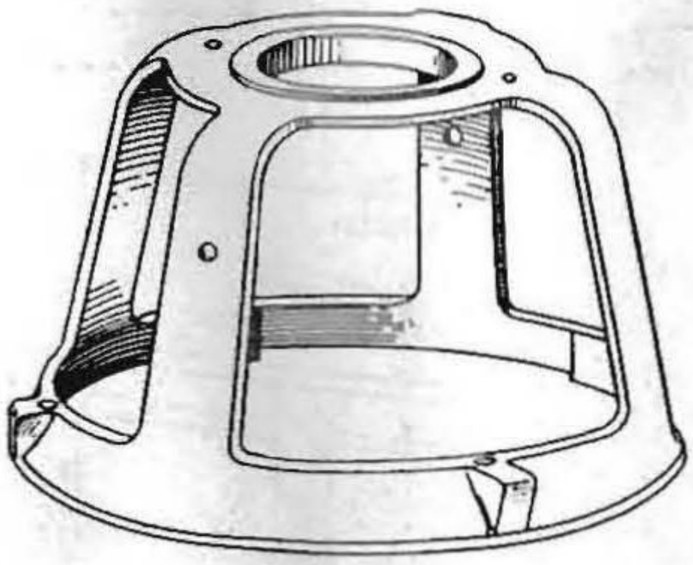
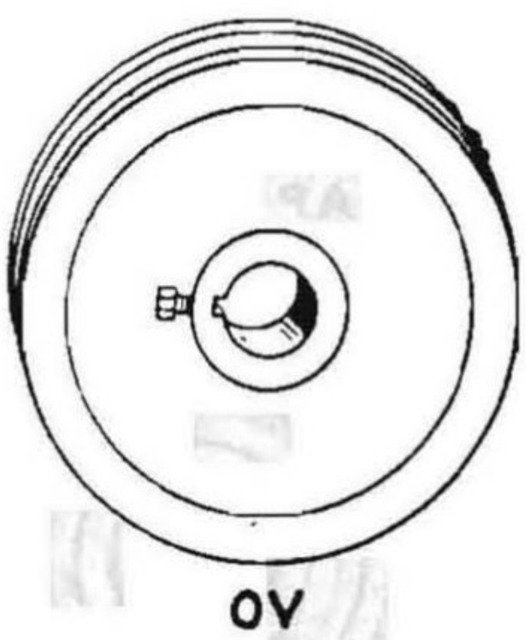

AJ

Accessory Equipment Model 501 Test Bench

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
B	SA-142	Starter Test Lead	1
H	SA-152	10 Amp. External Scale Test Lead	1
T	CA-355	Pulleys and Hubs as follows:	1
EM	X-4210	Adapter 31/32"	1
EN	X-4211	Adapter 5/8"	1
EO	X-4212	Adapter 43/64"	1
EP	X-4213	Adapter 7/8"	1
EQ	X-4214	Adapter 39/64"	1
ER	X-4215	Adapter 51/64"	1
ES	X-4218	Adapter 13/16"	1
ET	X-4219	Adapter 3/4"	1
EU	X-4220	Adapter 13/32"	1
LN	X-9054	Adapter 5/8" for Eclipse Generator	1
LP	X-9456	Adapter	1
OV	X-9887	8" Adapter Pulley 1 1/16" Bore	1
OU	X-9886	4" Adapter Pulley 1 1/16" Bore	1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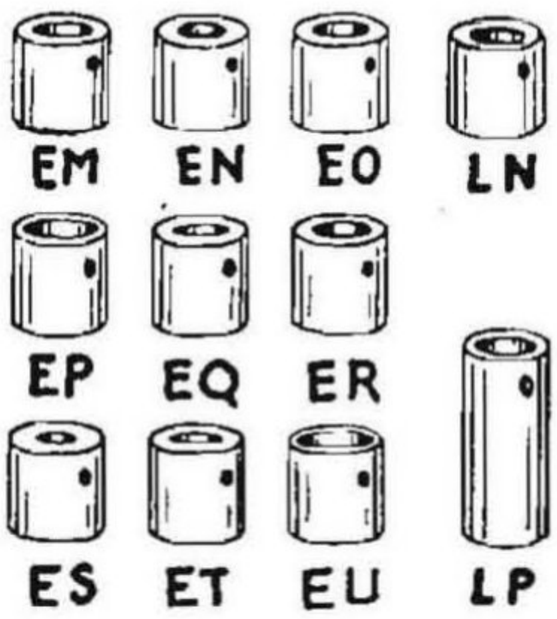

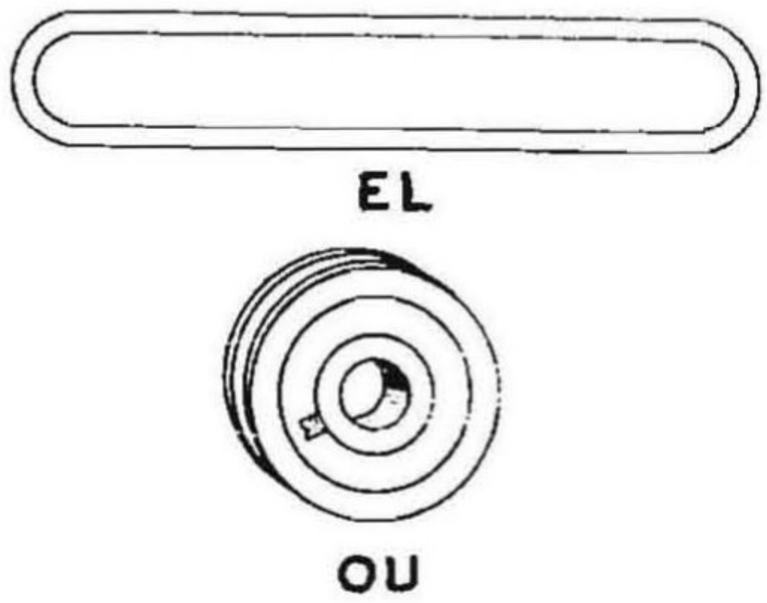

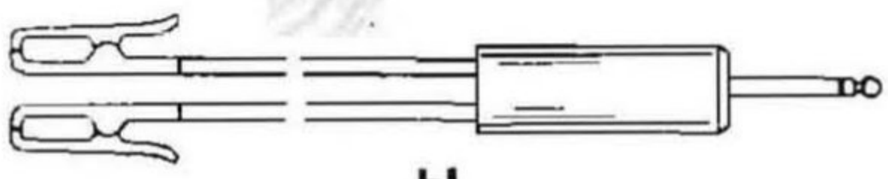
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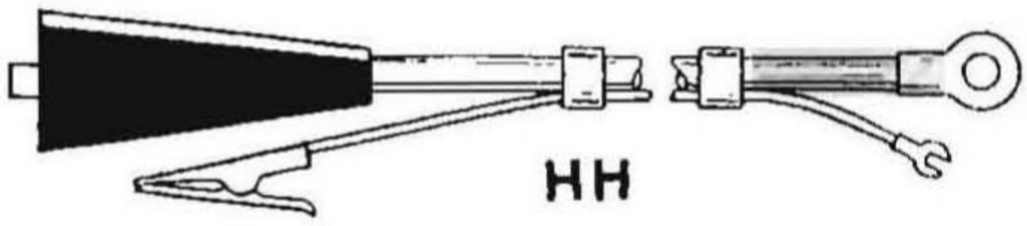
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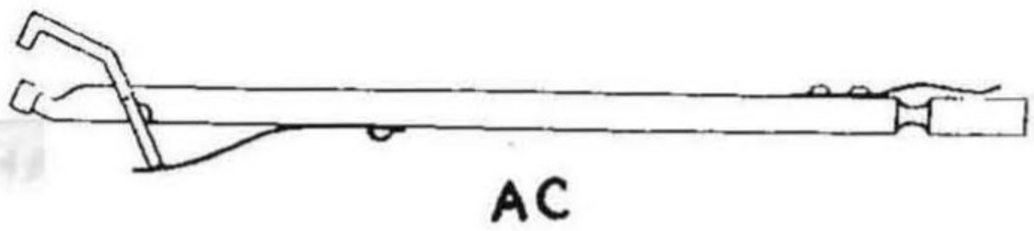
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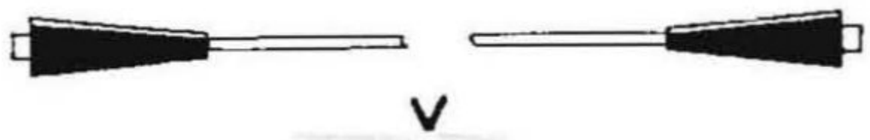
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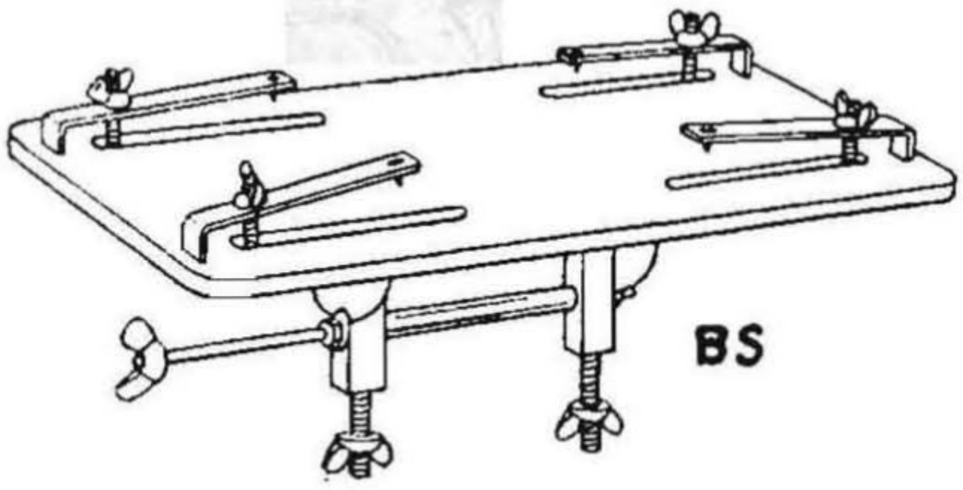
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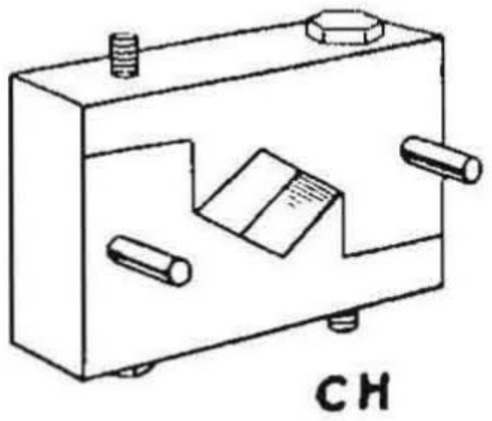
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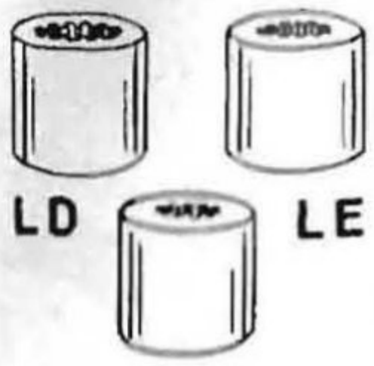
WEIDENHOFF GENERATOR TEST BENCH



HN



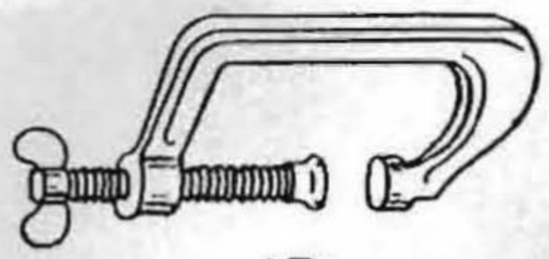
KC



LD LE LF



JT



JR



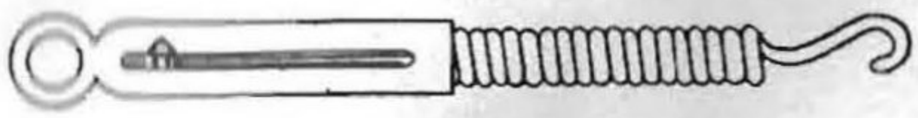
LI-LJ-LK



HM



OX



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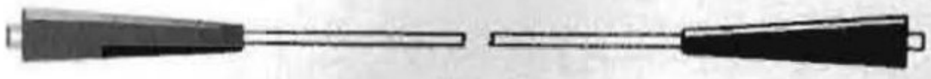

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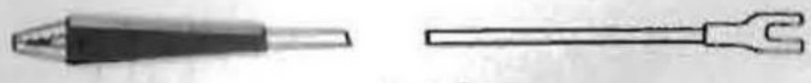

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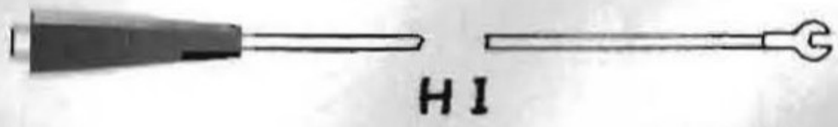
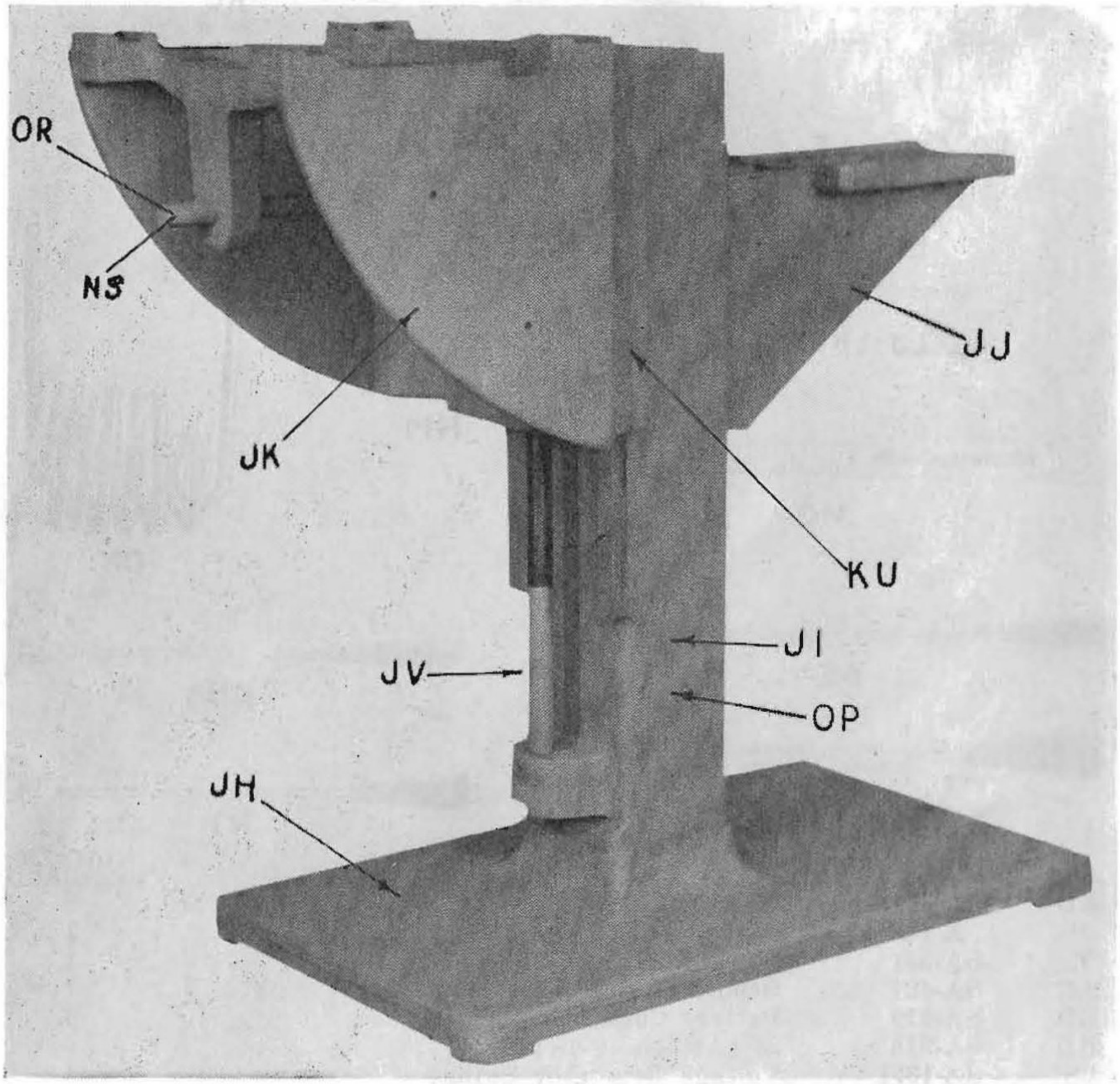
HJ



HI

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
ED	3510	Allen Hd. Set Screw	2
F	X-146	Load Carbon Pile Resistor	1
V	SA-391	9″ Lead	1
AC	SA-421	Bendix Torque Rod Assy.	1
BD	SA-910	Battery Connecting Lead	4
BE	SA-915	28″ Attaching Lead	5
BS	SA-1391	Voltage Regulator Stand	1
CH	SA-1443	Drive Dog	1
EL	P-4185	Drive Belt (Short)	1
HC	P-8495	Test Lead with Plug	1
HH	SA-8511	5¼″ Main Lead	2
HI	SA-8512	5 Ft. Field Lead	1
HJ	SA-8513	5 Ft. Main Lead	2
HM	X-8524	Sponge Rubber Disc for Tachometer	7
HN	P-8526	Drive Belt (Long)	1
HO	P-8527	Bendix Starter Torque Scale	1
JR	P-740	Bendix Starter Torque Clamp	1
JT	P-8821	Can of Rubber-to-Metal Cement	1
KC	P-8828	Tachometer Drive Belt	1
LD	X-8878	Spline Adapter Fitting	1
LE	X-8879	Spline Adapter Fitting	1
LF	X-8880	Spline Adapter Fitting	1
LH	SA-8906	Voltmeter Test Lead	2
LI	P-8918	Allen Head Wrench	1
LJ	P-8919	$\frac{5}{16}$″ Allen Set Screw Wrench	2
LK	P-8920	$\frac{3}{8}$″ Allen Set Screw Wrench	2

Pedestal Assembly Model 501 Test Bench
Model 501 Test Bench



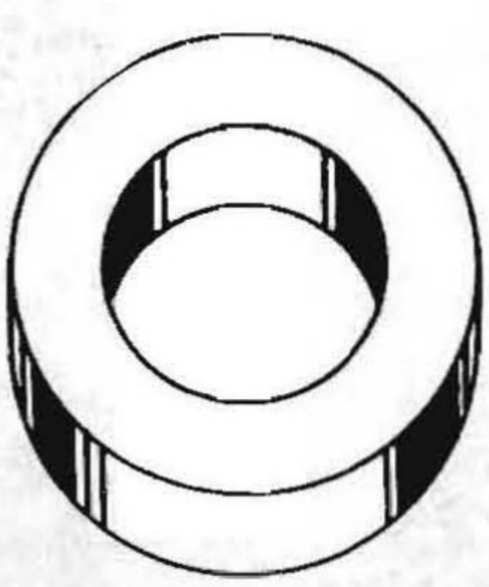
CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
JH	X-8788	Floor Casting (Not Shown).....	1
JI	X-8789	Post Casting (Length 28 11/16") (Not Shown)....	1
JJ	X-8790	Motor Support Casting (Not Shown).....	1
JK	X-8791	Table Support Casting (Not Shown).....	1
JV	X-8824	Table Height Adjusting Screw.....	1
KJ	X-8850	Thrust Washer (Used with X-8853 Gear Only)..	1
KK	X-8851	Clevis Pin (Length 1") (Used with X-8853 Gear Only).....	1
KL	P-8853	Table Elevating Shaft Gear (Using X-8854 Thrust Washer)	1
KM	X-8854	Thrust Washer (Used with X-8853 Gear Only)..	1
KO	P-8856	Table Height Adjusting Screw Worm Gear.....	1
KP	X-8857	Thrust Washer (Used above X-8856 Gear)....	1
KQ	X-8858	Thrust Washer (Used below X-8856 Gear)....	1
KU	X-8866	Slide Gib Adjust Bar.....	1
NS	X-9673	Table Elevating Crank Shaft (Length 14½")..	1
OP	X-9835	Post Casting (Length 26 7/16") (Not Shown)....	1

WEIDENHOFF GENERATOR TEST BENCH

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
OR	X-9883	Table Elevating Crank Shaft (Length 14")	1
OS	P-9884	Table Elevating Shaft Gear (Does not use X-8854 Washer)	1
OT	X-9885	Clevis Pin (Length 1⅛") (Used with X-9884 Gear Only)	1



JV



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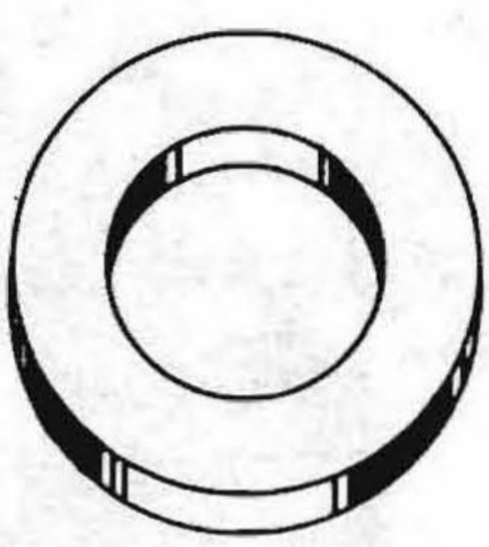

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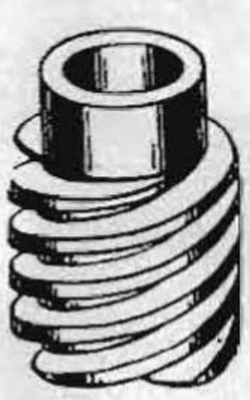


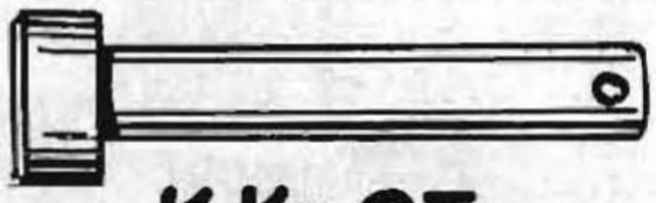
OS



KL



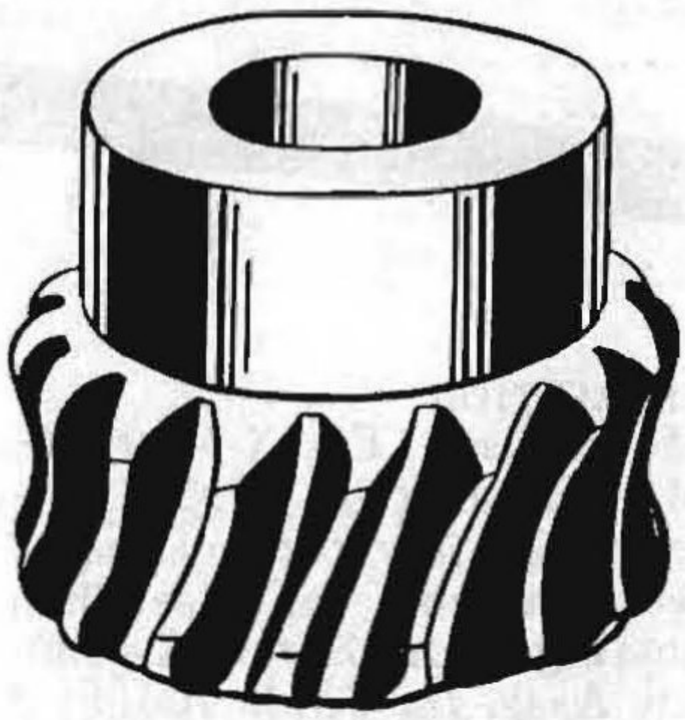
KM



KK-OT



KU



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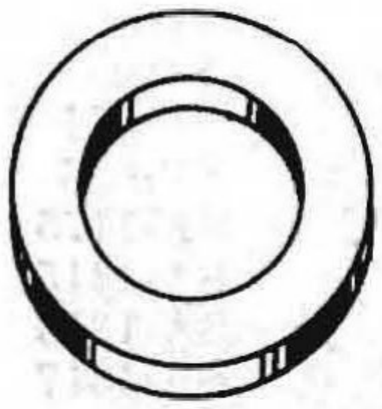
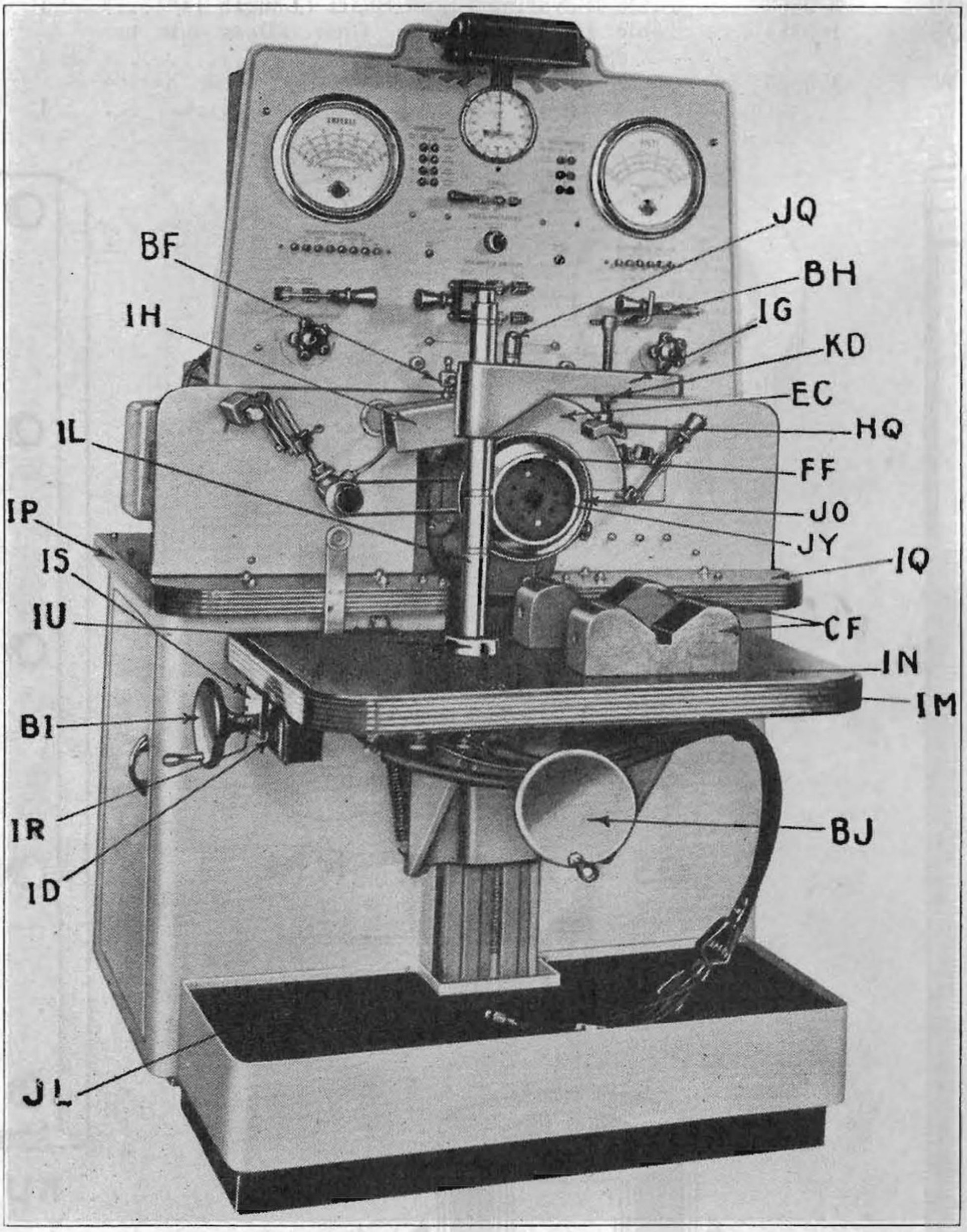


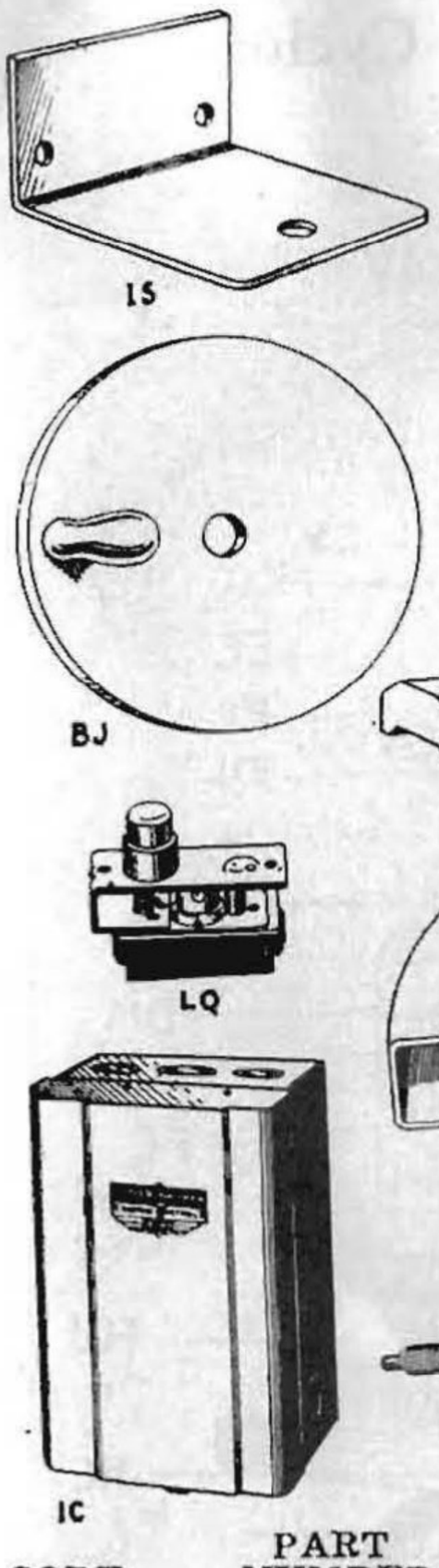
KJ

Front View of Model 500 Cyclone Test Bench



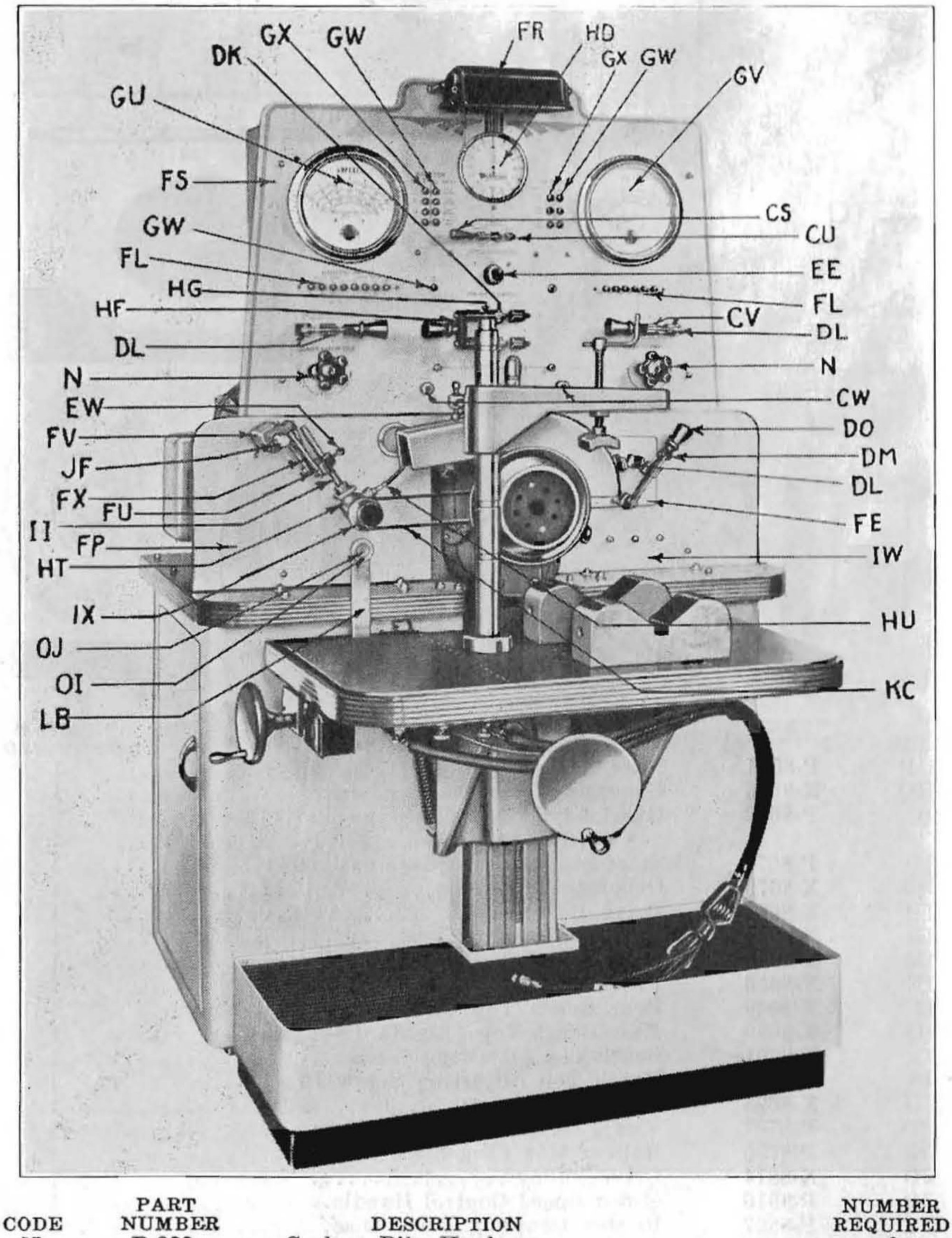
CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
AT	P-634	Internal Mechanism (For X-9679) (See P. 119)	1
AU	P-636	Internal Mechanism (For X-9567) (See P. 119)	1
BF	SA-1175	Hand Wheel Assembly for Locking Vise Arm..	1
BH	SA-1315	Hand Wheel Assembly for Vise Clamp Chuck..	1
BI	SA-1316	Table Adjusting Hand Screw Assembly.....	1
BJ	SA-1317	Hand Screw Assy. for Table Height Adjustment	1
CF	SA-1422	Generator Vise Blocks.....	2
EC	P-3360	Caution Name Plate.....	1
FF	X-7986	Front Metal Spinning.....	1

WEIDENHOFF GENERATOR TEST BENCH



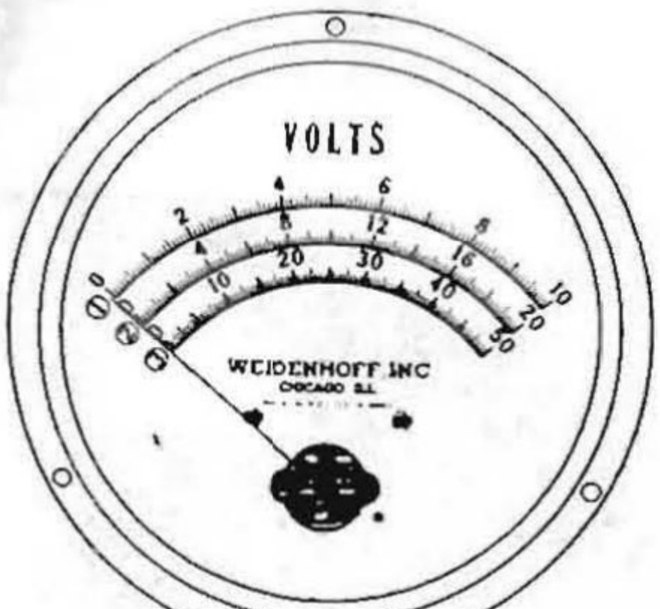
CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
HP	**P-8531**	Idler Pulley Spring	1
HQ	**X-8573**	Generator Vise Clamp Chuck	1
IC	P-8672	Overload Switch (Used on Early Models with X-8673)	1
ID	P-8673	Start Stop Switch (Used on Earlier Models)	1
IG	**X-8679**	Generator Vise Arm	1
IH	X-8680	Drive Belt Guard	1
IL	X-8684	Vise Arm Support Post	1
IM	X-8685	Front Bench Top (Not Shown)	1
IN	X-8686	Front Bench Top Steel Plate (Not Shown)	1
IP	X-8689	Rear Bench Top (Left) (Not Shown)	1
IQ	X-8690	Rear Bench Top (Right) (Not Shown)	1
IR	**X-8691**	Bench Top Adjusting Screw	1
IS	X-8692	Bench Top Adjusting Screw Bracket	1
IU	X-8695	Vise Post Support Ring	1
JD	P-8707	Vise Post Nut	1
JL	P-8795	Rubber Mat (Not Shown)	1
JO	X-8814	Drive Pulley	1
JQ	P-8816	Motor Speed Control Handle	1
JY	P-8827	Rubber Coupling Drive Disc	1
KD	X-8833	Generator Vise Clamp Screw Nut	1
LQ	P-9482	Start Stop Switch Used on Later Models with X-9567 and X-9679 Overload Switches (See Page 118)	1
MD	P-9567	Overload Switch Complete 110 Volt 60 cy. 1 phase (Used on Later Models)	1
NW	P-9679	Overload Switch Complete 220 Volt 60 cy. (Used on Later Models)	1

Front Panel Assembly of Model 500 Cyclone



CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
N	P-288	Carbon Pile Knob	2
CK	X-1533	Field Switch Tension Washers (Same as DN)	2
CS	P-2031	Field Switch Handle	1
CU	X-2043	Field Switch Blade Support Jaw	1
CV	X-2044	Field Switch Jaw	2
CW	P-2085	Terminal Nut	4
DE	P-2139	Meter Rubber Grommet	12
DH	X-2297	Field Switch Blade	1

WEIDENHOFF GENERATOR TEST BENCH



GV



DM



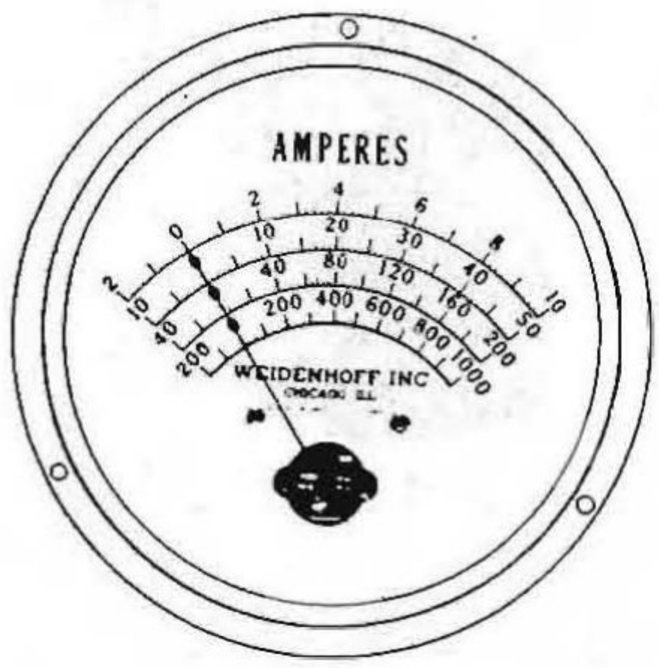
EE



DN



FL



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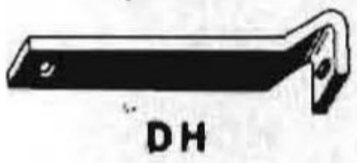
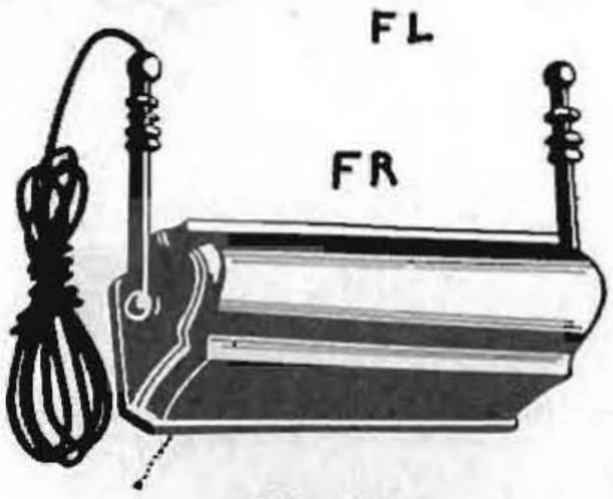


DH



DE



FR



CV



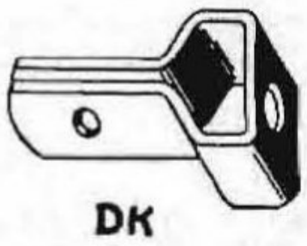
CU



FP



N



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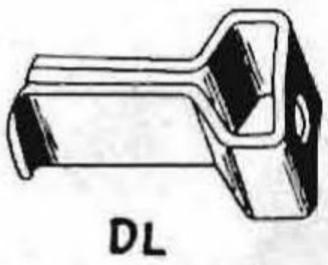

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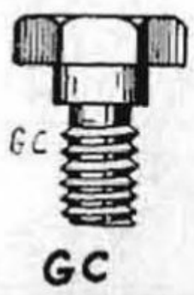

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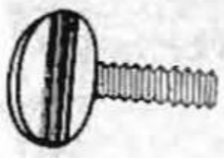

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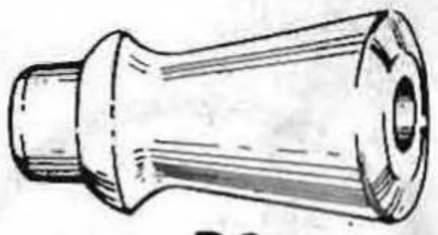
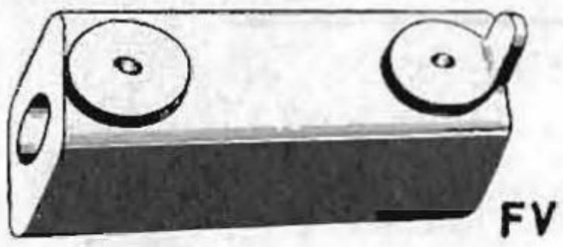


DO



FE



FV



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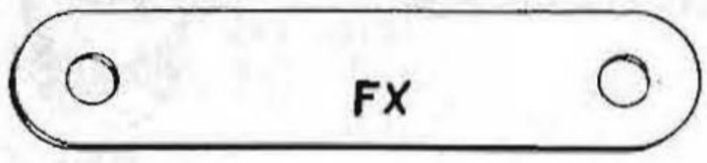
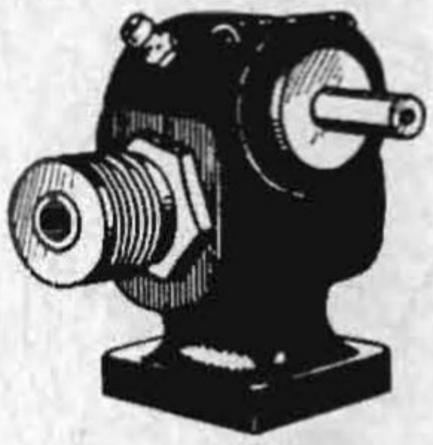


FX



CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
DK	X-2557	Selector Switch Support Jaw	4
DL	X-2558	Selector Switch Jaw	10
DM	X-2560	Switch Blade Fibre Block Insulator	3
DN	X-2561	Switch Blade Tension Washer	8
DO	P-2589	Switch Blade Handle	4
EE	P-3593	Field Control Rheostat Knob	1
EW	P-4464	Thumb Screw	1
FE	X-7878-A	Selector Switch Masonite Panel	1
FL	P-8323	Black Push Button Caps	14
FP	P-8417	Model and Serial Number Plate	1
FR	P-8425	Overhead Panel Lamp and Shade	1
FS	X-8441	Masonite Panel (Not Shown)	1
FU	X-8444	Tachometer Support Drive Pillow Casting	1
FV	X-8445	Tachometer Shift Block Casting	1
FX	X-8446-A	Tachometer Drive Support Arm	2
GC	X-8447	Tachometer Support Arm Bearing Screw	4
GU	P-8488	Ammeter	1
GV	P-8489	Voltmeter	1

WEIDENHOFF GENERATOR TEST BENCH



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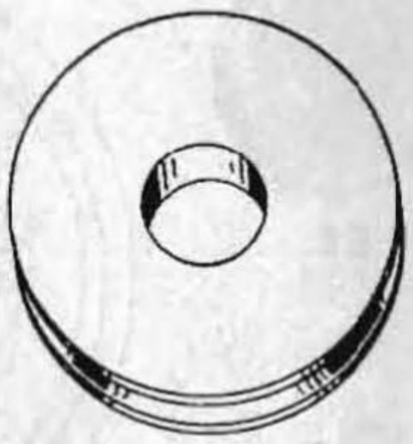

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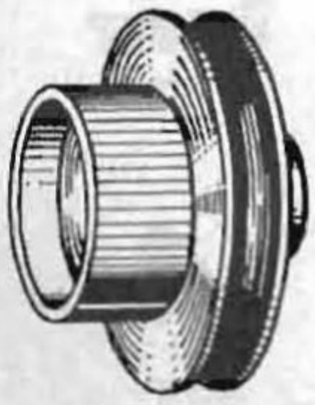


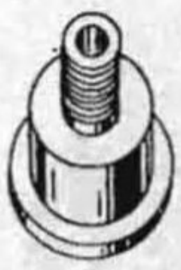
IX



HG



HD



OJ



HR



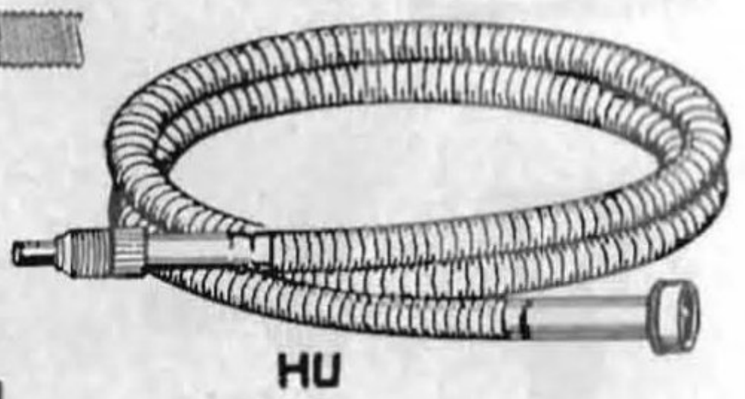
HV



GW- GX



II



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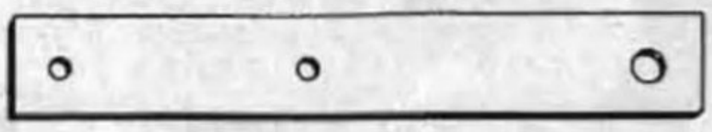


JF



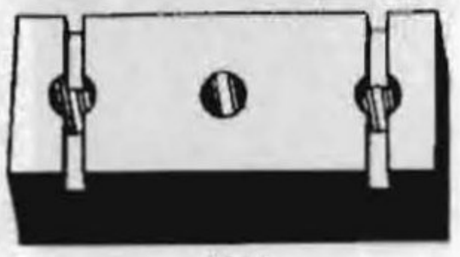
KC



HP



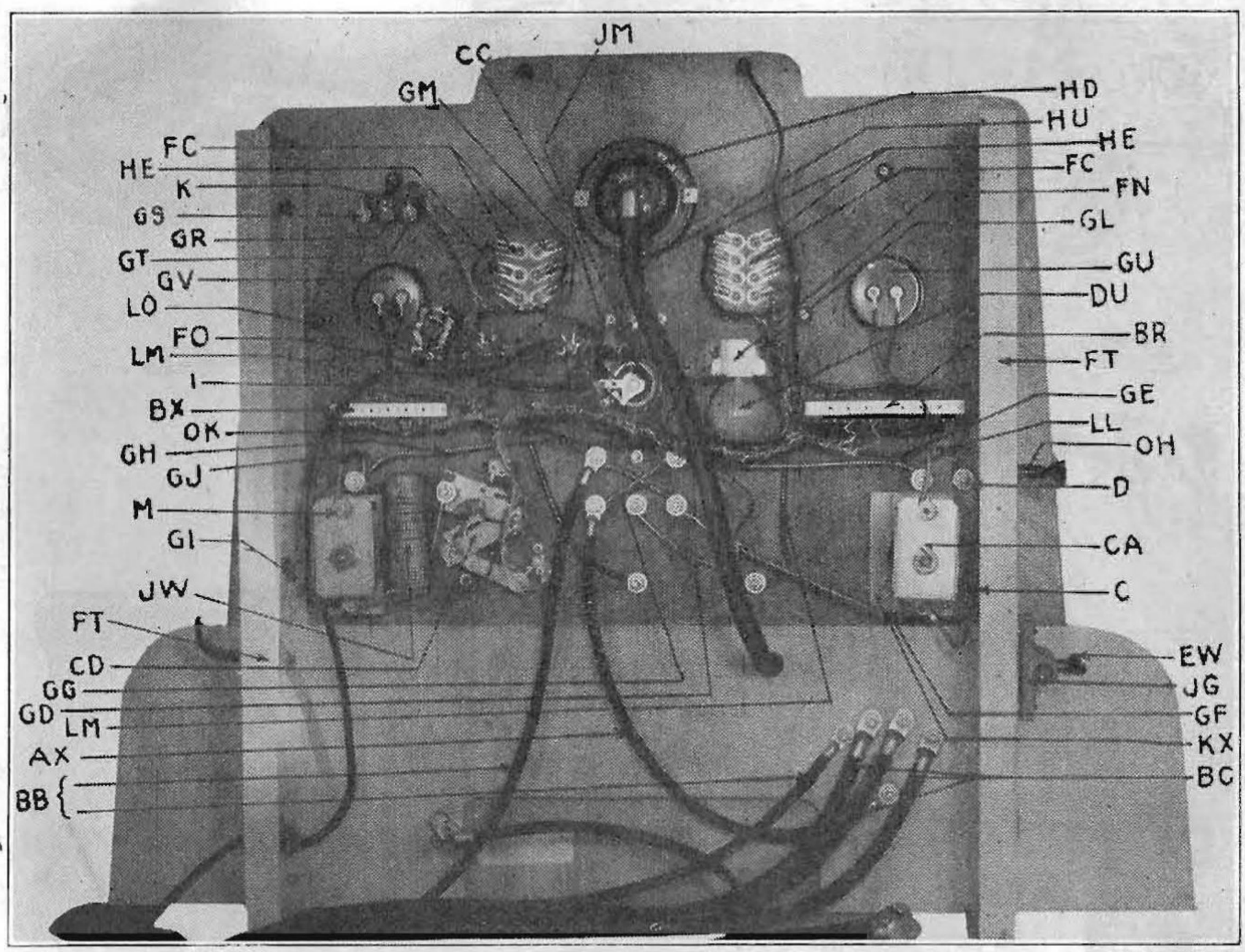
CW



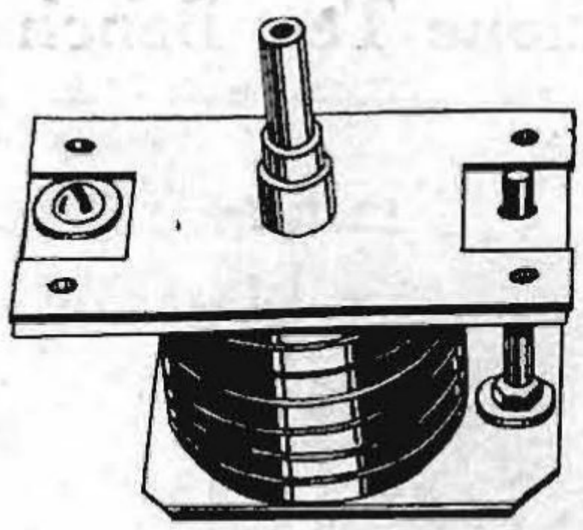
HF

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
GW	P-8491	Red Jewel	8
GX	P-8492	Green Jewel	7
HD	P-8496	Tachometer	1
HF	X-8498	Switch Blade Insulating Cross Bar	1
HG	X-8499	Polarity Switch Blade	4
HP	P-8531	Tachometer Support Spring	1
HR	X-8592	Tachometer Support Bar Locking Collar	1
HT	X-8609	Tachometer Drive Head	1
HU	P-8611	Tachometer Flexible Drive Shaft	1
HV	X-8624	Tachometer Drive Retainer	1
II	X-8681	Tachometer Drive Support Bar	1
IW	X-8699	Sub Panel (Not Shown)	1
IX	X-8702	Tachometer Drive Pulley	1
JF	X-8716	Tachometer Drive Assembly Support Bar	1
KC	P-8828	Tachometer Drive Belt	1
LB	X-8871	Tachometer Idler Pulley Lever	1
OI	X-9722	Tachometer Idler Pulley	1
OJ	X-9723	Tachometer Idler Pulley Bearing Shaft	1

Rear Panel Assembly of Model 500 Cyclone Test Bench



CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
C	SA-144	Load Carbon Pile to Binding Post Bus Bar....	1
D	SA-145	Load Carbon Pile Sw. Blade to Binding Post Bus Bar	1
G	X-148	Starter Terminal to SA-1419 Shunt Assy Bus Bar	1
I	SA-181	110 Volt Lead and Plug.....	1
K	SA-195	Multiplier Insulator	3
M	SA-287-A	Series Carbon Pile Assy. (See Page 116).....	1
AX	SA-903	Selector Switch Post to Polarity Switch Lead..	1
BB	SA-905	Selector Switch 32 Volt to Pos. Batty. Term. Lead	1
BB	SA-905	Polarity Switch to Neg. Batty. Term. Lead....	1
BC	SA-907	Selector Switch 6-12-24 to Pos. Batty. Term. Lead	3
BR	SA-1388	8 Butt. Sw. Assy. and Harness (See Page 114).	1
BX	SA-1408	6 Butt. Sw. Assy. and Harness (See Page 114).	1
CA	SA-1416	Load Carbon Pile Assy. (See Page 115).....	1
CC	SA-1418	10 Amp. Shunt Assembly.....	1
CD	SA-1419	Shunt Assembly	1
CO	X-1865	Series Carbon Pile Bracket.....	1
DM	X-2560	Battery Selector Switch Fiber Insulating Block	1
DP	P-2620	Tachometer Flexible Cable Rubber Tubing....	1
DU	P-2898	Test Lamp	1
DV	P-3008	Tachometer Adjustment Tension Spring.....	1
EH	P-3763	Tachometer Adjustment Pin.....	1
EW	P-4464	Thumb Screw	2
FC	P-7807	Miniature Light	14
FN	P-8387	Test Lamp Socket.....	1
FO	P-8394	Wire Wound Resistor.....	2
FT	X-8442	Panel Support (1 Right—1 Left) (Not Shown)	2
GD	X-8450	Polarity Switch to Battery Terminal Bus Bar..	1



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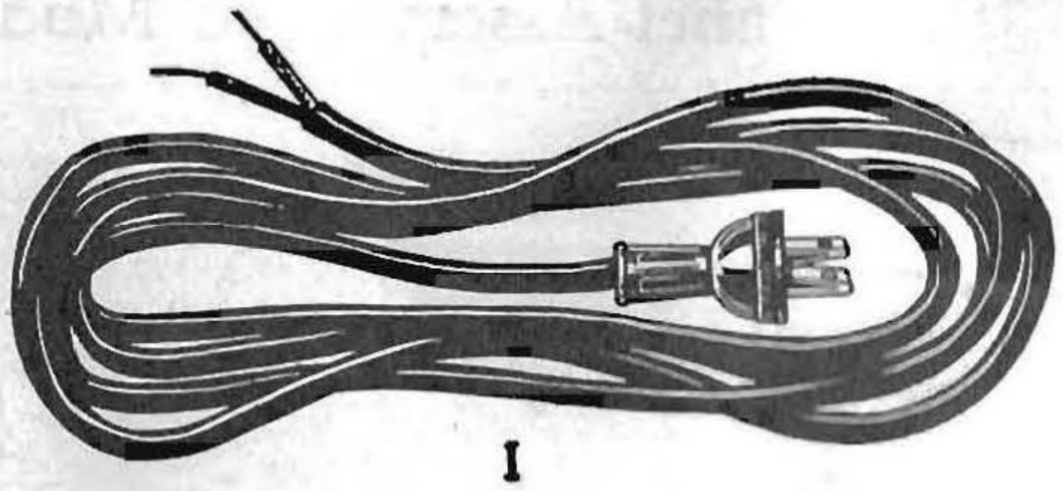

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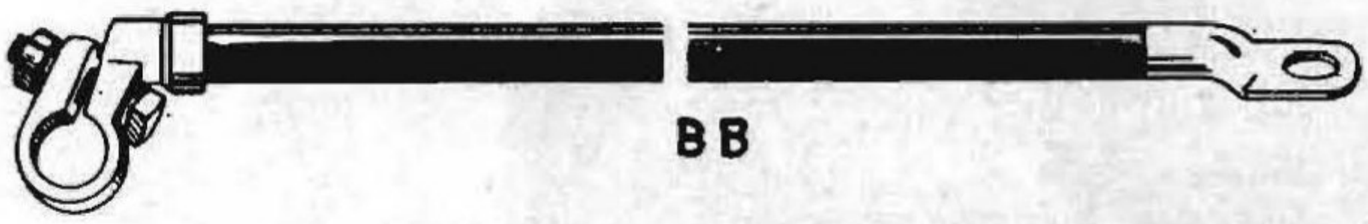

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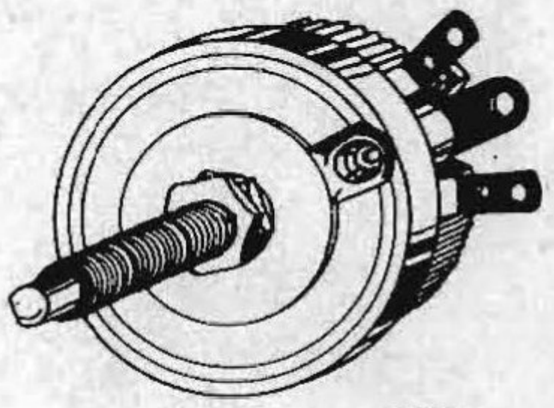

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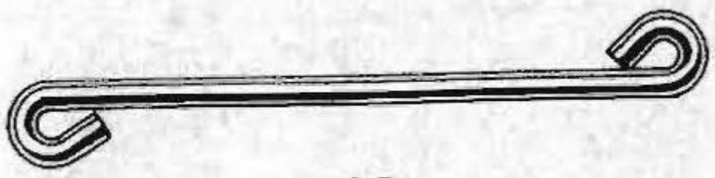

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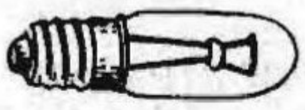

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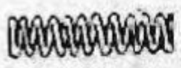

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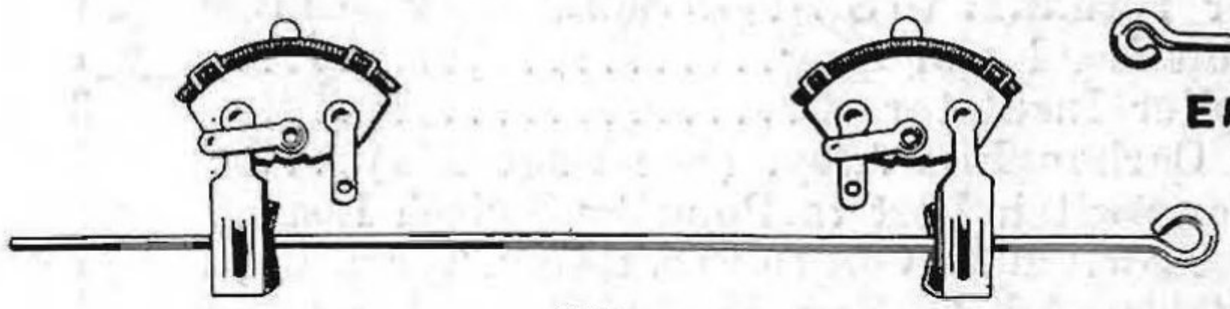

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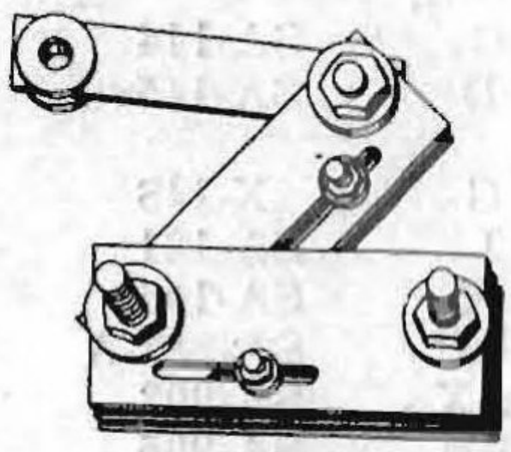

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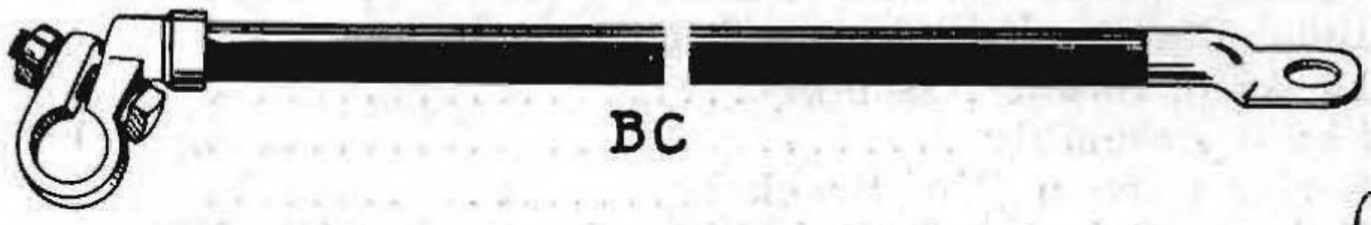

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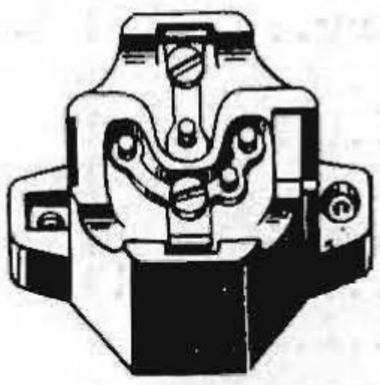

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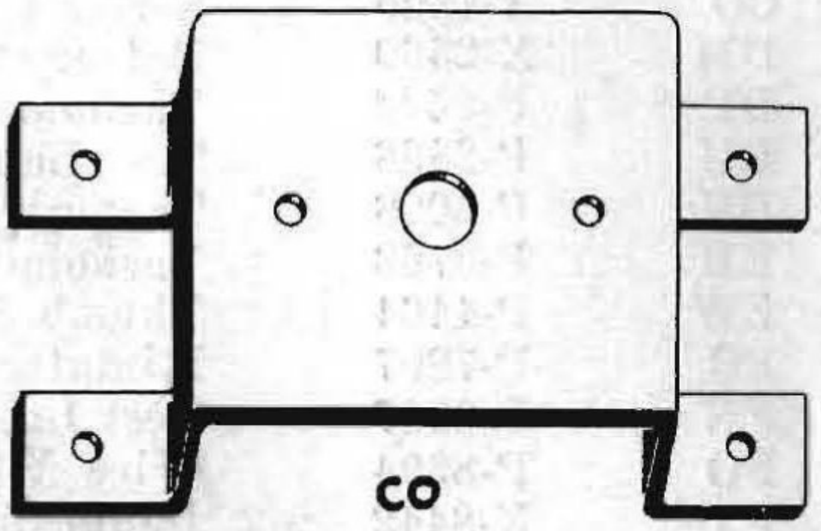

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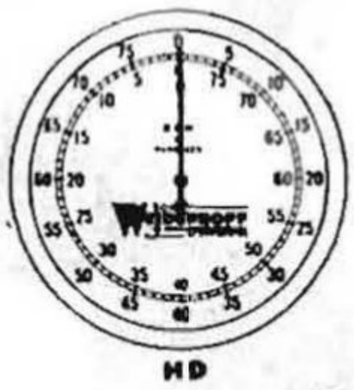
WEIDENHOFF GENERATOR TEST BENCH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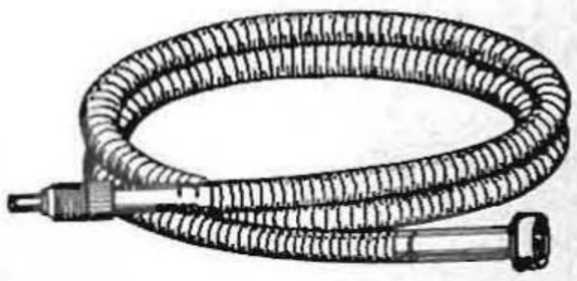
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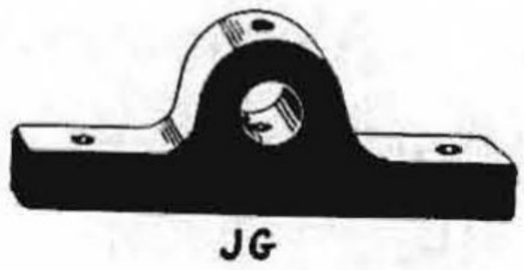
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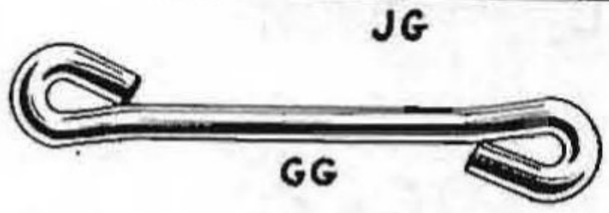
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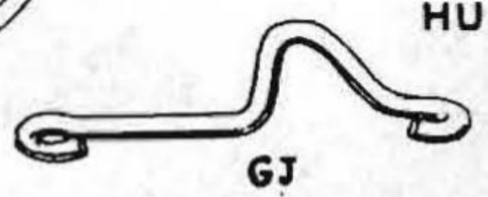
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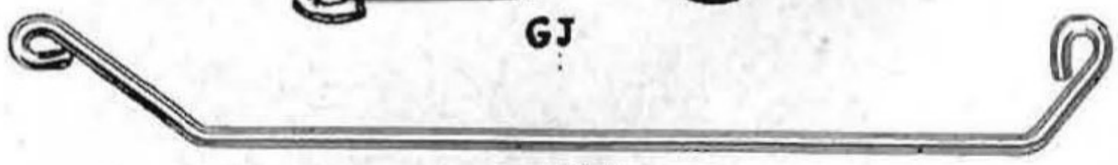
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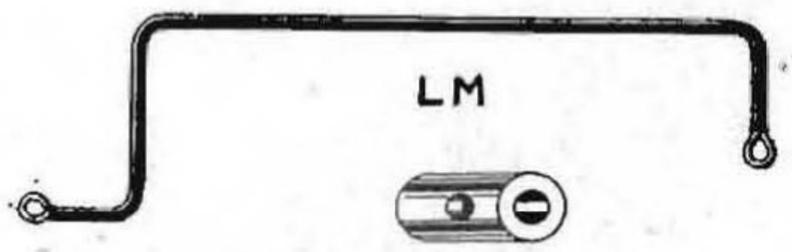
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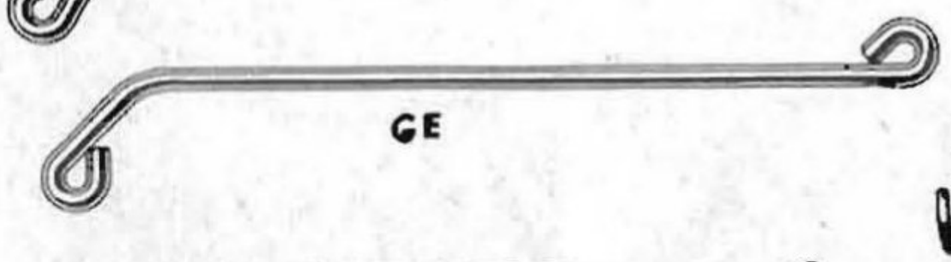
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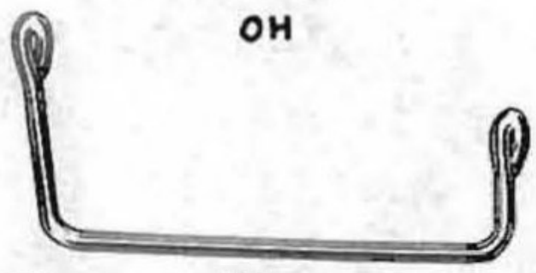
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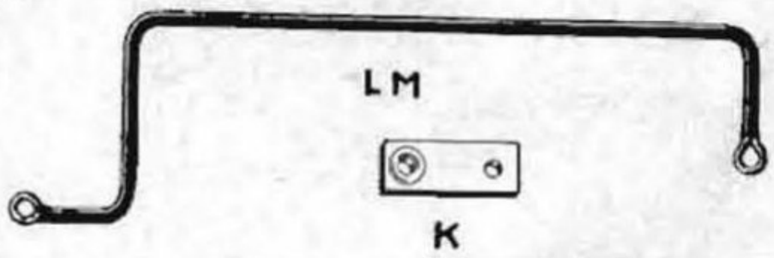
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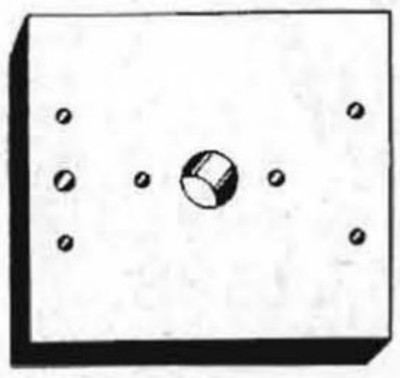
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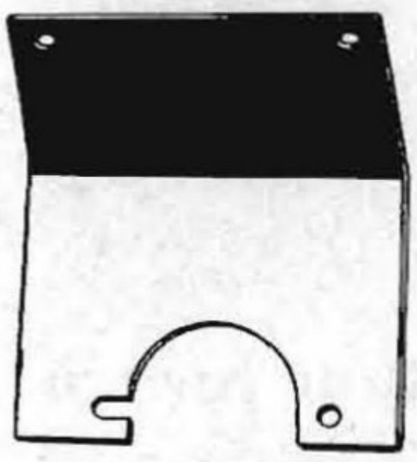
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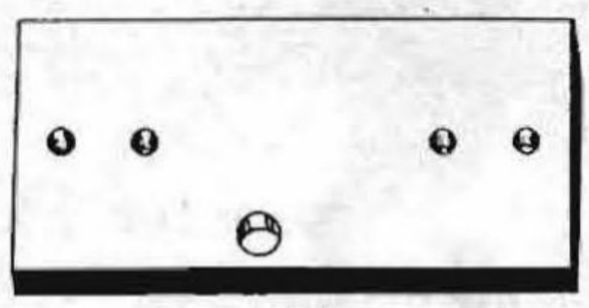
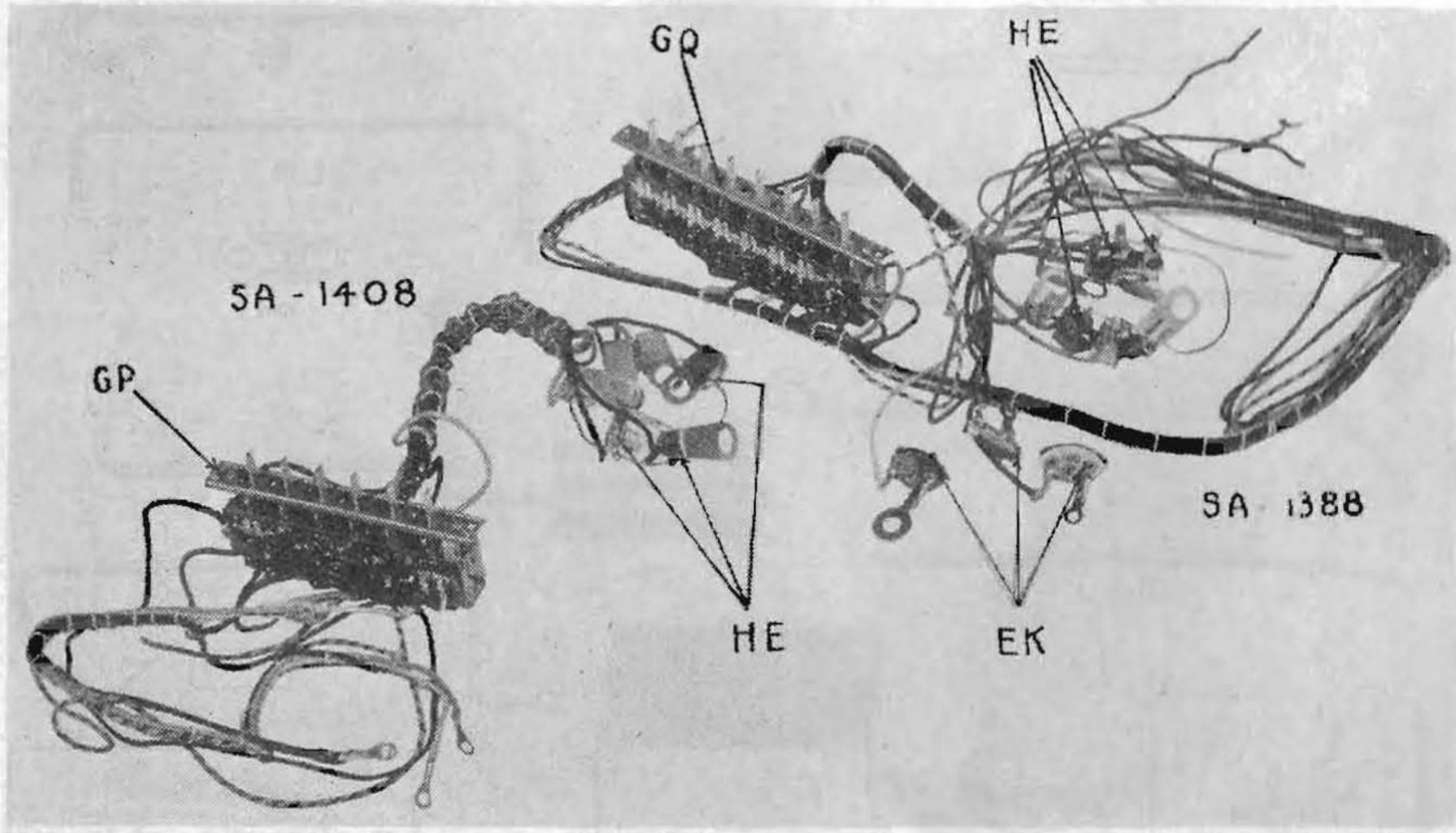

GM

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
GE	X-8452	Pol. Switch to Load Carbon Pile Switch Bus Bar	1
GF	X-8453	Polarity Switch to Load Carbon Pile Bus Bar..	1
GG	X-8454	Polarity Switch Bus Bar.....	2
GH	X-8455	Ser. Carbon Pile Sw. Blade to Pol. Sw. Bus Bar	1
GI	X-8456	Ser. Carbon Pile Sw. Blade to Car. Pile Bus Bar	1
GJ	X-8457	Ser. Ca. Pile Sw. Jaw to Bot. Car. Pile Bus Bar	1
GL	X-8468	Test Lamp Bracket.....	1
GM	X-8469	110 Volt Terminal Board.....	1
GR	P-8484	Voltmeter Multiplier	1
GS	P-8485	Voltmeter Multiplier	1
GT	P-8486	Voltmeter Multiplier	1
GU	P-8488	Ammeter (See Page 109).....	1
GV	P-8489	Voltmeter (See Page 109).....	1
HD	P-8496	Tachometer	1
HE	P-8497	Miniature Bulb Socket (See Pape 114).....	14
HU	P-8611	Tachometer Drive Cable.....	1
JG	X-8717	Tachometer Support Bar Shoulder.....	2
JM	P-8800	Variable Field Rheostat.....	1
JW	X-8825	Fixed Resistor	1
KX	X-8869	Transite Heat Shield.....	1
LL	X-9033	Load Carbon Pile Sw. Blade to Top of Car. Pile	1
LM	SA-9035	Field Switch Jaw to Batty Term. Bus Bar.....	1
LM	X-9035	Field Switch Jaw to SA-1419 Shunt Assy.....	1
LO	P-9450	Field Limiting Relay.....	1
OH	X-9702	Load Carbon Pile Resistor Binding Post.....	2
OK	SA-9750	Relay to Field Terminal Bus Bar.....	1

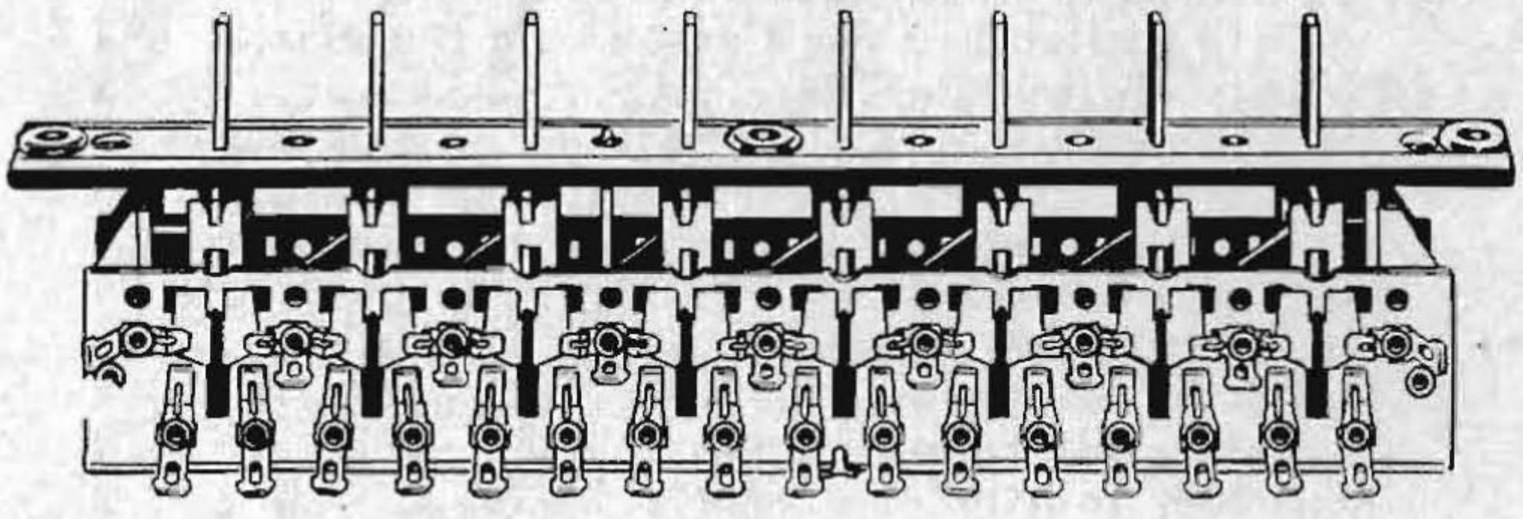
Voltmeter Push Button Switch Assembly SA1408

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
GP	P-8482	6 Button Switch	1
HE	P-8497	Miniature Bulb Socket	6



Ammeter Push Button Switch Assembly SA1388

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
EK	P-4162	Fan Type Resistor	3
GQ	P-8483	8 Button Switch	1
HE	P-8497	Miniature Bulb Socket	8



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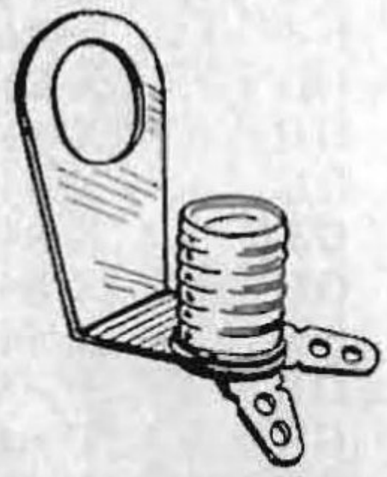

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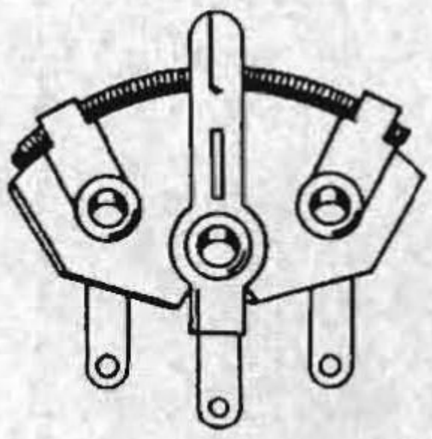

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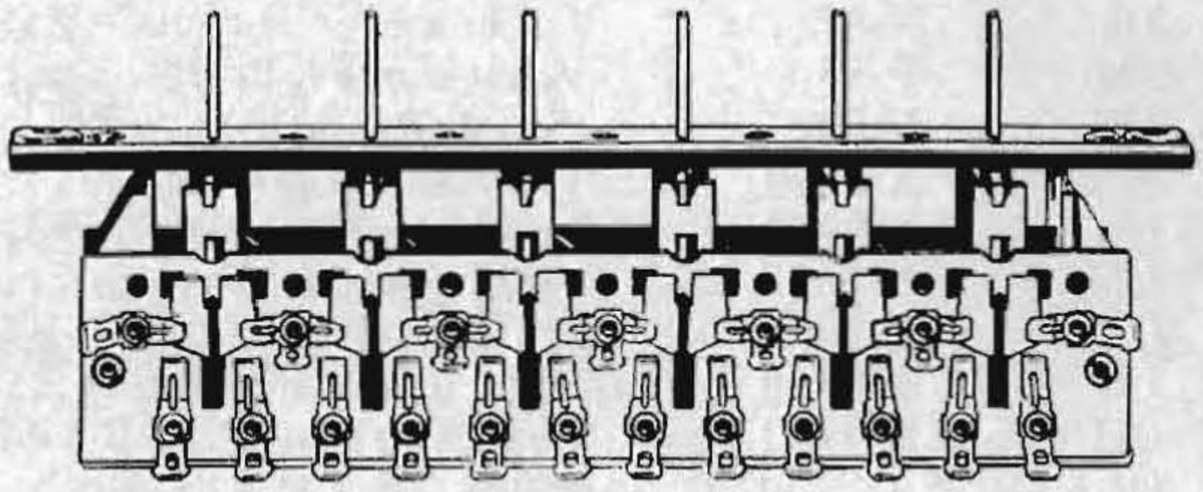
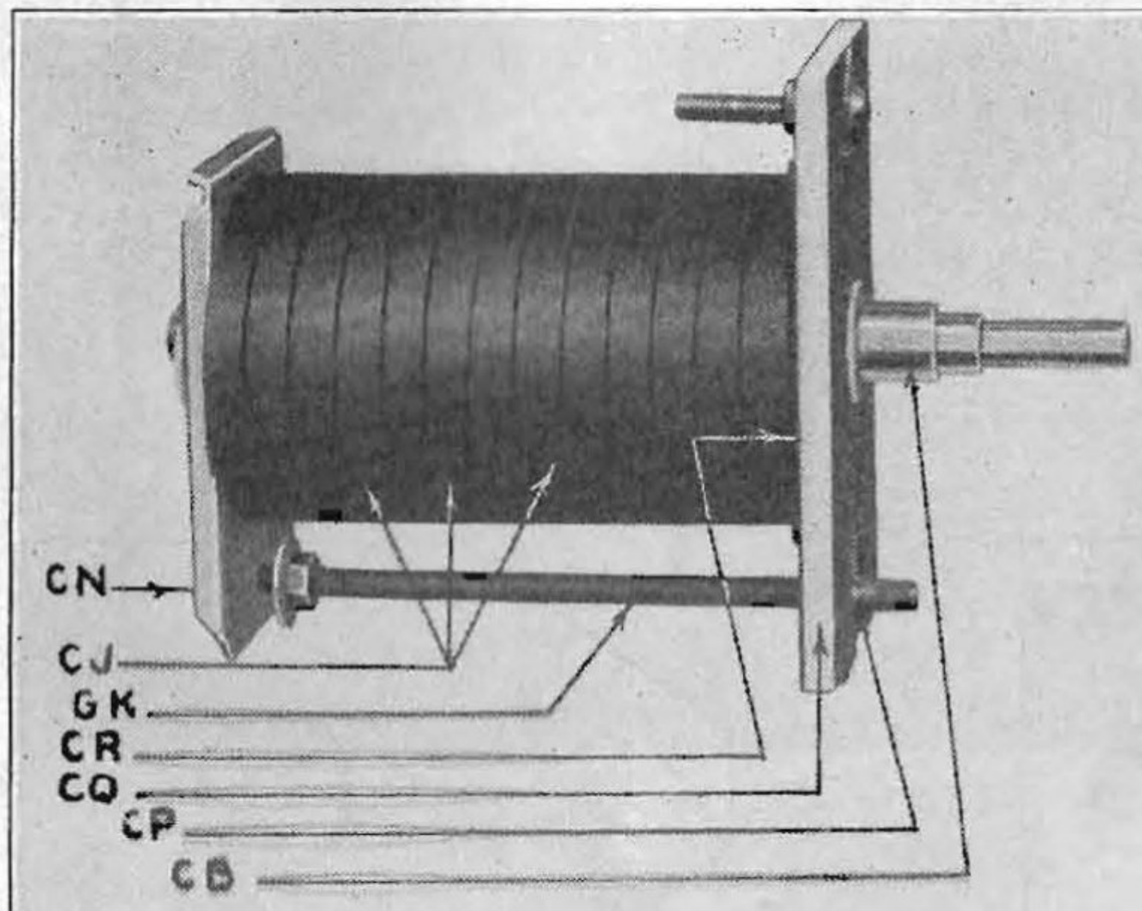
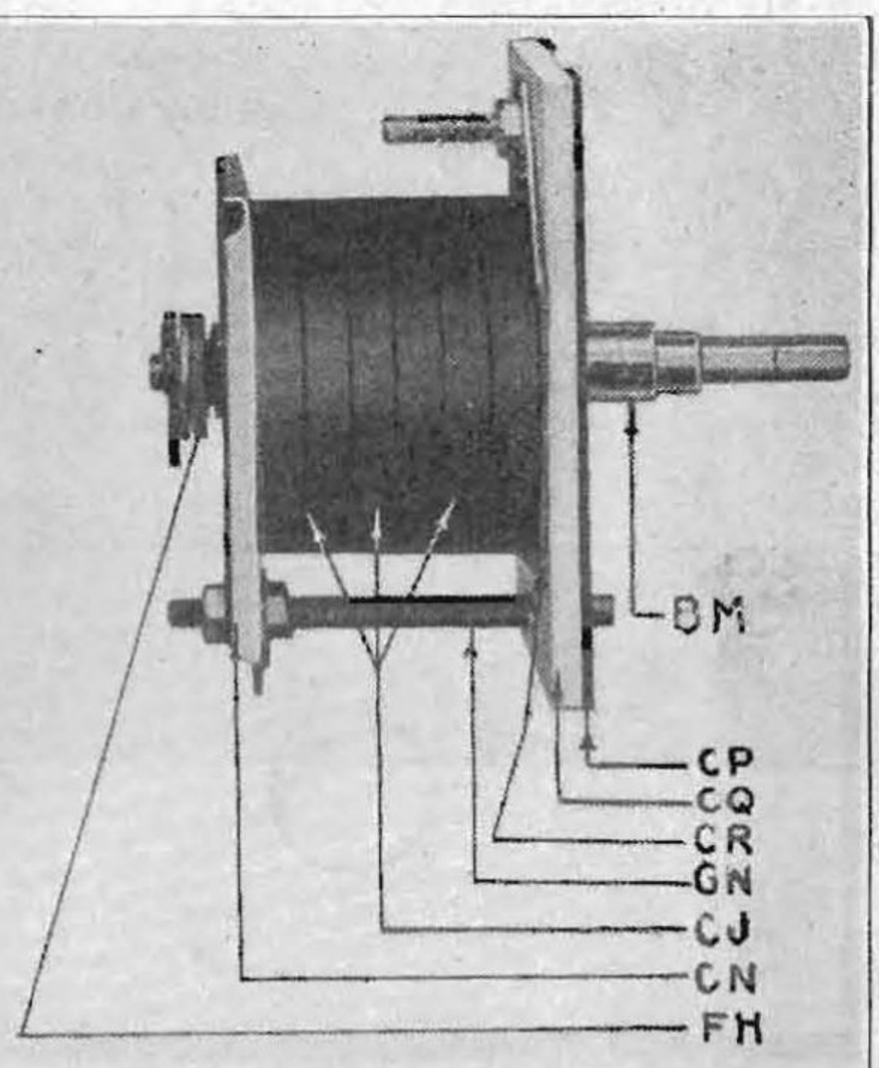


GP

Load Carbon Pile Assembly SA-1416
For Model 500 Cyclone Test Bench



SA-1416



SA-287-A

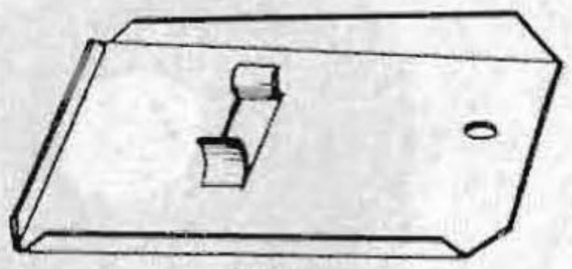
CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
CB	SA-1417	Shaft	1
CJ	P-1522	Carbon Disc	13
CN	X-1849	Connecting Plate	1
CP	X-1866	Top Plate	1
CQ	X-1870	Transite Panel	1
CR	X-1871	Front Connecting Plate	1
FG	P-8014	Shaft Nut	1
FJ	P-8057	Porcelain Insulator Tube	2
GK	X-8460	Guide Rod	1


CJ


GK


FJ


FG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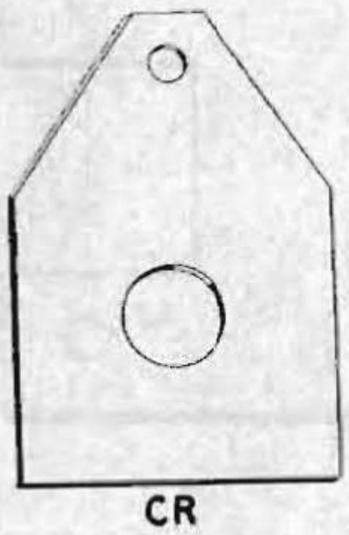
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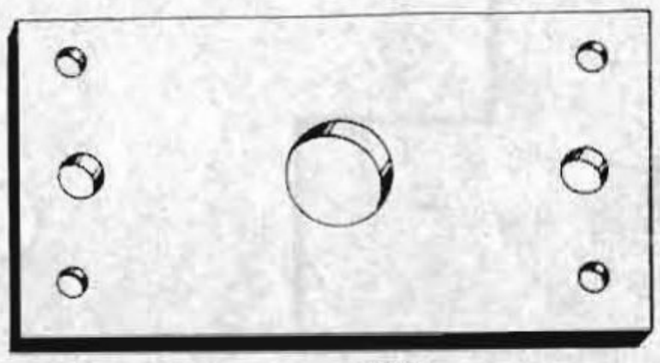
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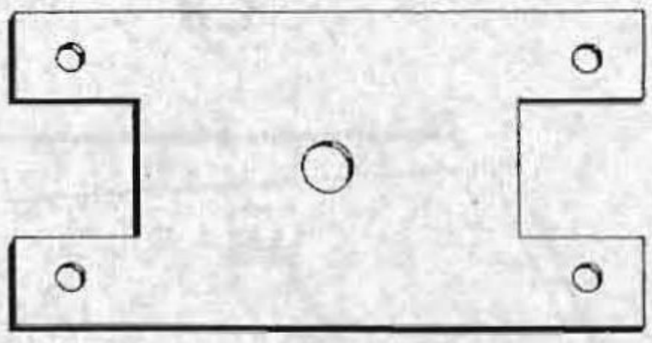
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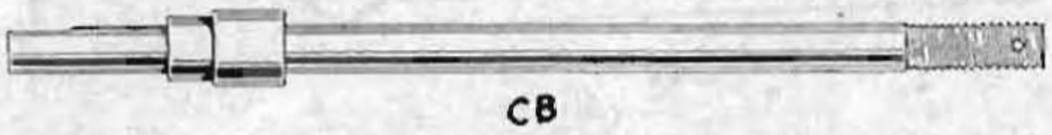
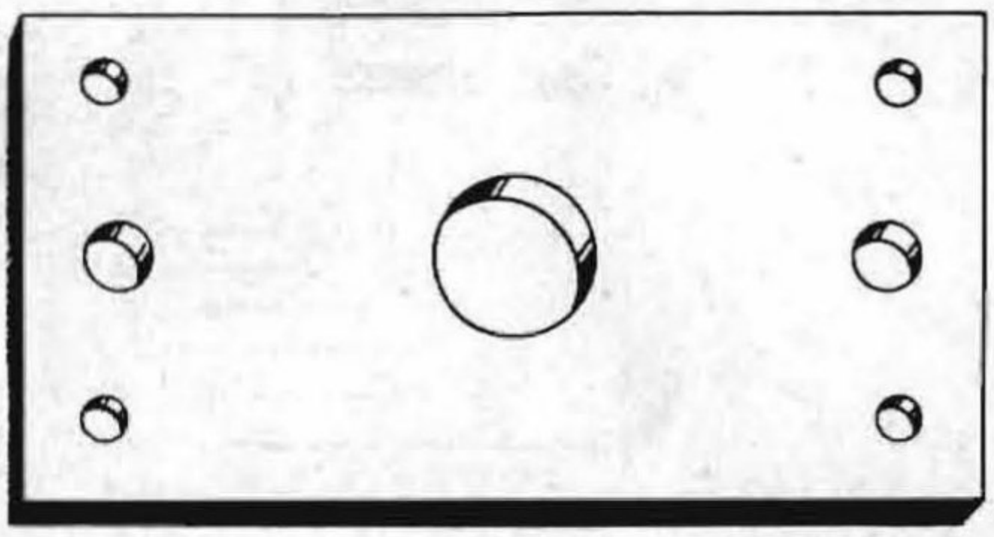

CB

SA-287-A Series Carbon Pile Assembly

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
BM	SA-1365	Shaft	1
CJ	P-1522	Carbon	6
CN	X-1849	Rear Connecting Plate	1
CP	X-1866	Top Plate	1
CQ	X-1870	Transite Panel	1
CR	X-1871	Front Connecting Plate	1
FH	X-8014-A	Shaft Nut	1
FJ	P-8057	Porcelain Insulator Tube	1
GN	X-8471	Guide Rod	1



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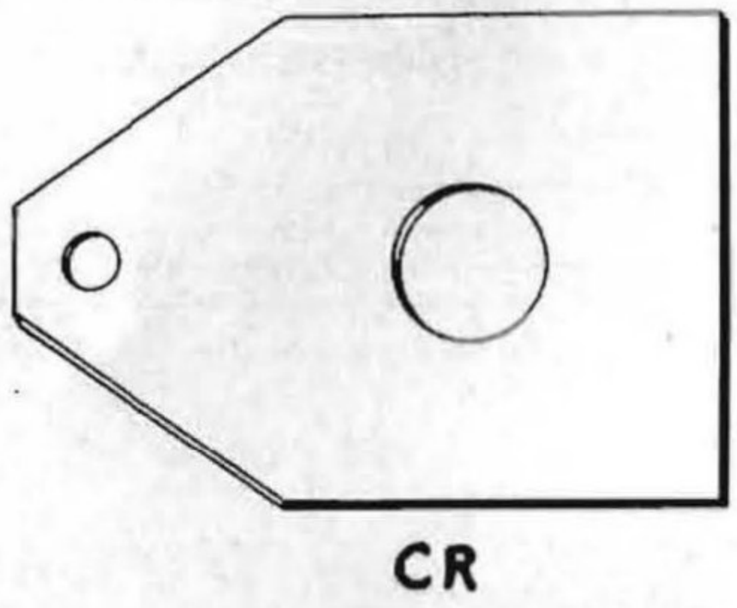

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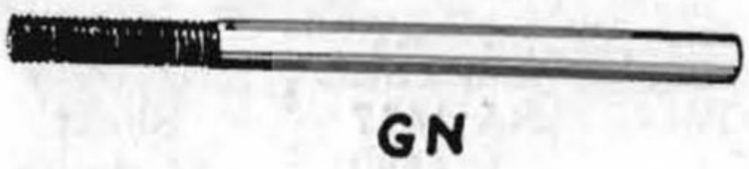

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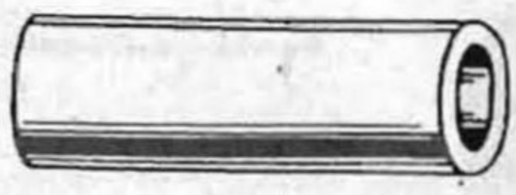
BM



CJ



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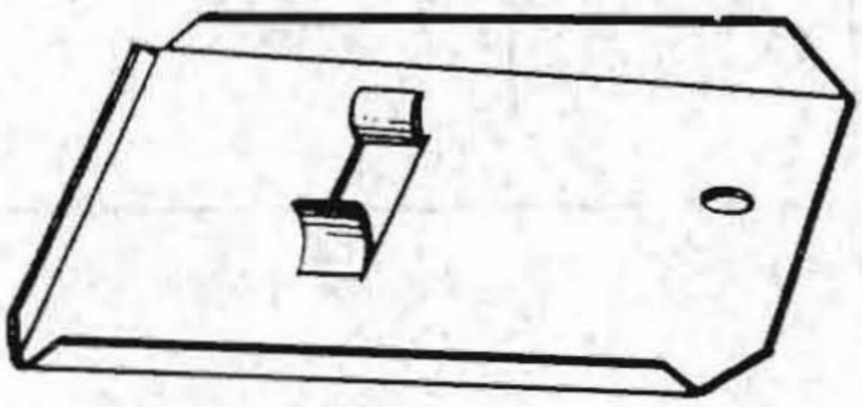

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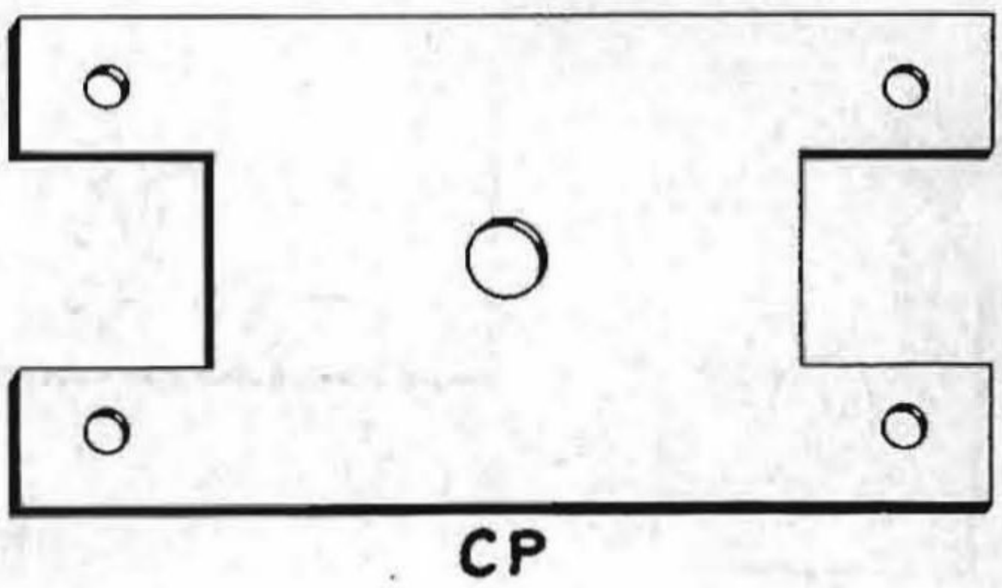
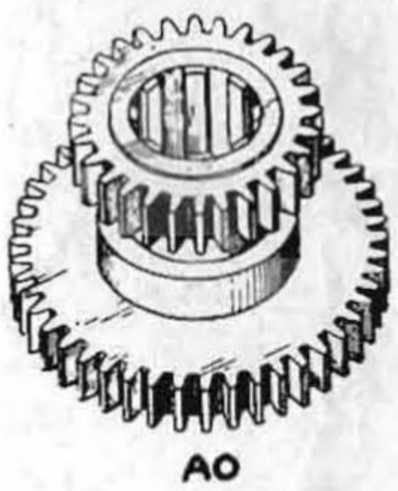


CP

Motor and Transmission Assembly for Model 500 Test Bench

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
S	P-312	Motor Brush	4
AG	P-615	Motor Brush Spring	4
AH	P-616	Motor Brush Holder	4
AI	P-617	Motor Armature Assembly	1
AJ	P-618	Commutator End Housing	1
AK	P-619	Armature Shaft Bearing—Rear	1
AL	P-620	Armature Shaft Bearing—Front	1
AM	P-621	Outer Transmission Shaft Bearing	1
AN	P-622	Transmission Gear Shaft 28 and 43 Teeth	1
AO	P-623	Transmission Shaft Gear 28 and 43 Teeth	1
AP	P-624	Armature Shaft Gear Assy. 37 and 52 Teeth	1
AQ	P-625	Transmission Shaft	1
AR	P-626	Motor Brush Yoke Assembly	1
AS	P-631	Commutator	1
BL	SA-1354	Motor Speed Control Rod	1
BO	SA-1384	Start Stop Switch Bracket	1
FF	X-7986	Spinning for Rubber Drive Coupling	1
HX	P-8663	5 H.P. TLK 220 Volt 60 cy. 1 ph. Motor	1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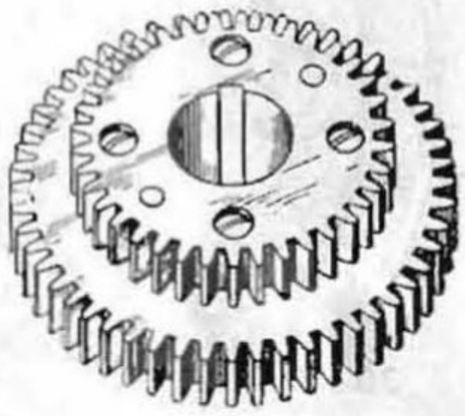
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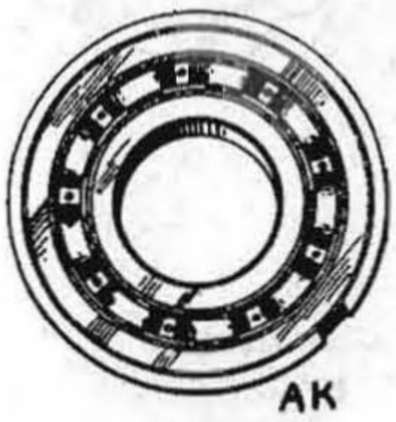
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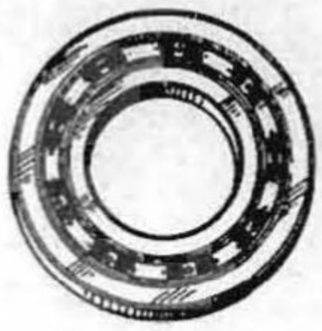
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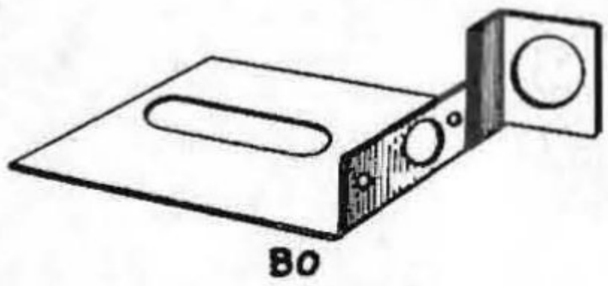
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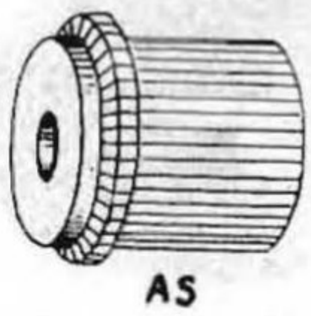
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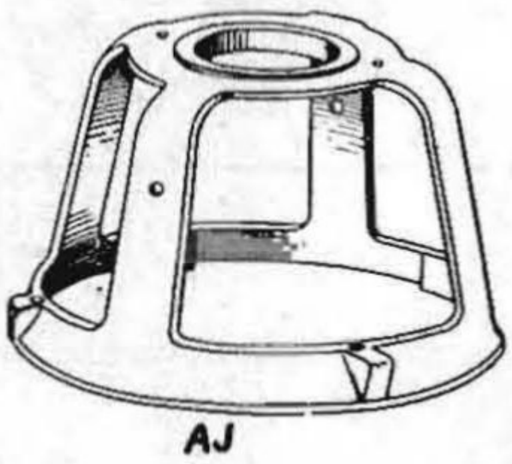
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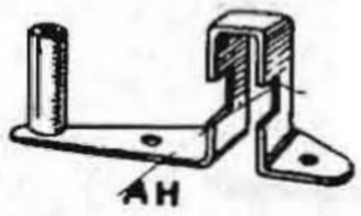
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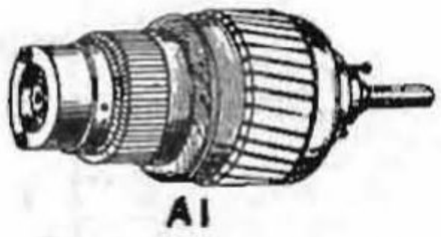
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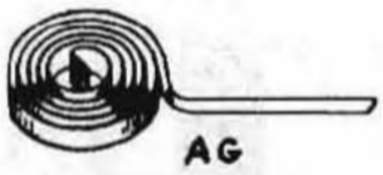
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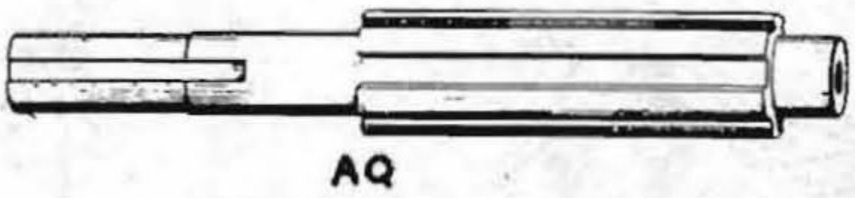
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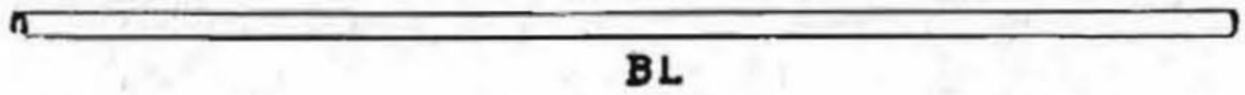
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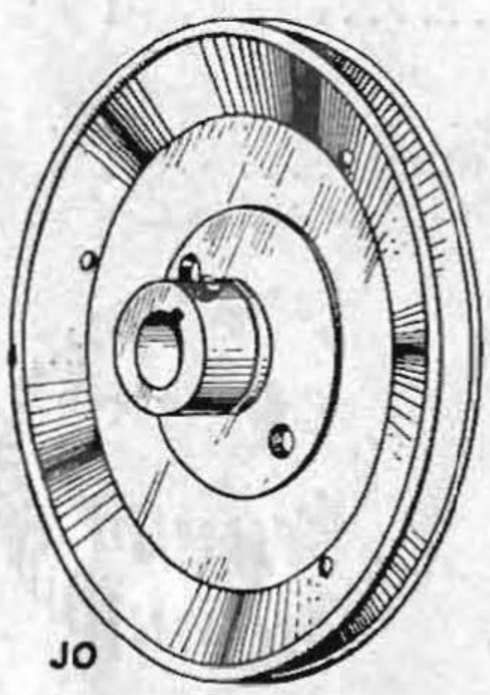
WEIDENHOFF GENERATOR TEST BENCH

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
IE	X-8675	Motor Speed Control Rod Bearing	1
IF	P-8677	Motor Sprocket Wheel (Rear of Motor)	1
IJ	P-8682	Motor Speed Control Sprocket	1
IK	P-8683	Motor Speed Control Chain	1
JC	X-8703	Tachometer Gear Box Drive Pulley	1
JE	X-8708	Motor Support Brace Rod	1
JO	X-8814	Drive Pulley	1
JP	X-8815	Motor Drive Coupling Pin	2
JQ	P-8816	Motor Speed Control Handle	1
JX	X-8826	Motor Speed Control Support (Rear)	1
JY	P-8827	Rubber Drive Coupling	1
KT	X-8865	Auxiliary Generator Drive Pulley	1
LQ	P-9482	Start-Stop Switch (Used on Later Models)	1
LS	P-9486	Motor Speed Control Rod Spring	1
LT	X-9488	Contact Roller Stud	1
LU	X-9489	Start-Stop Switch Contact Roller	1
LV	X-9490	Speed Control Adjustment Collar	1
LW	X-9491	Start-Stop Switch Bracket Support	1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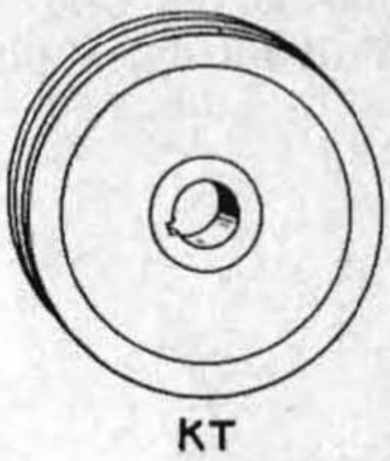
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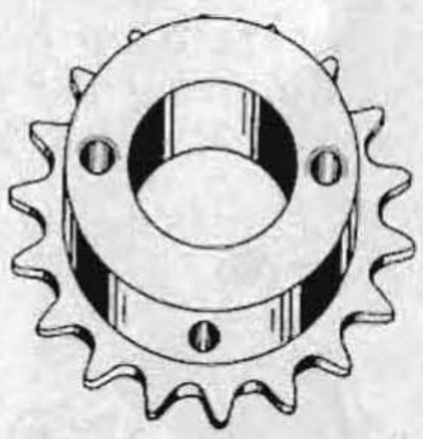
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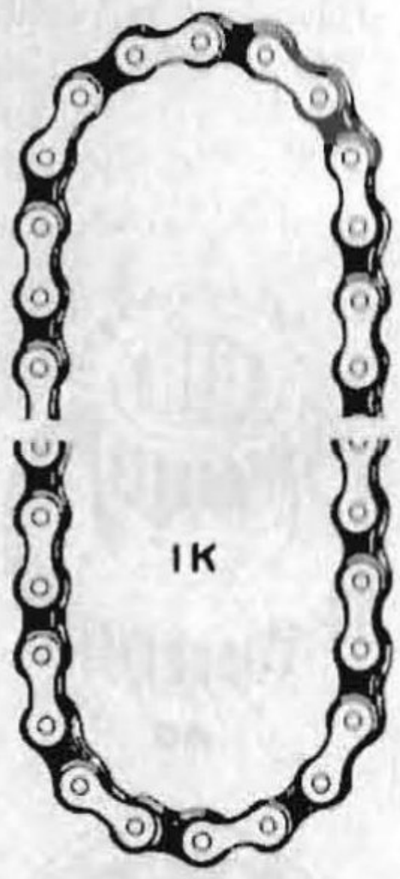
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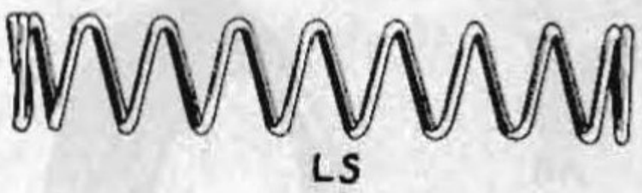
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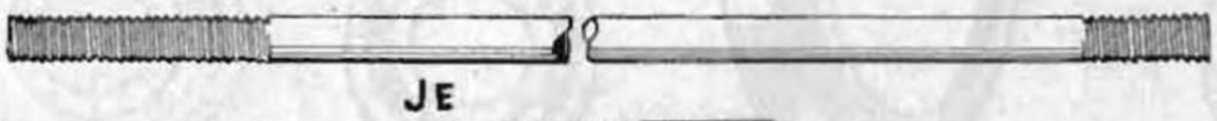
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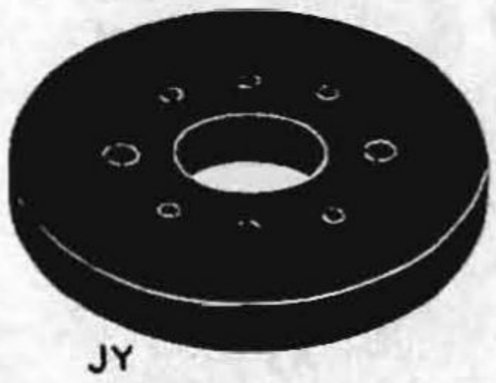
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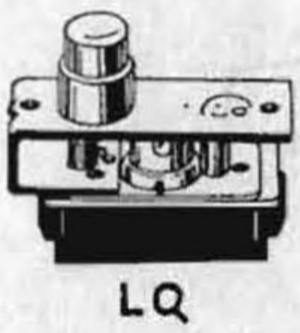
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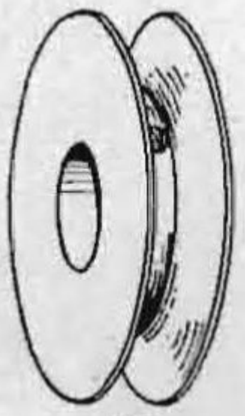
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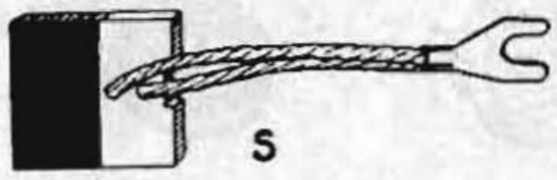
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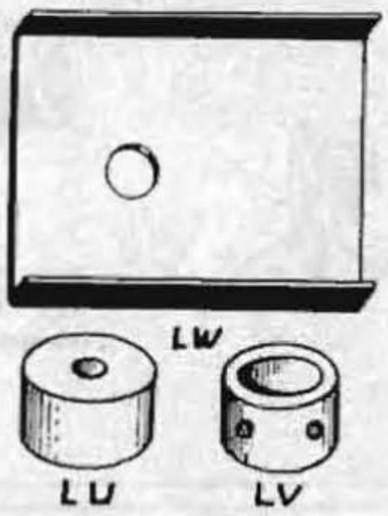
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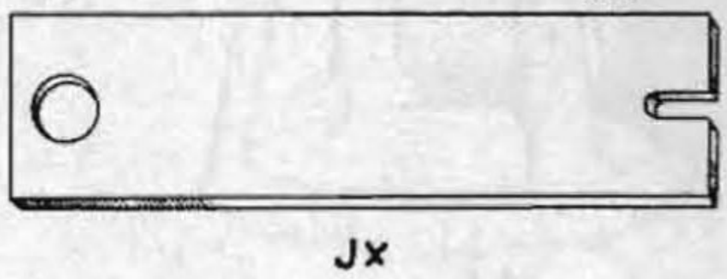
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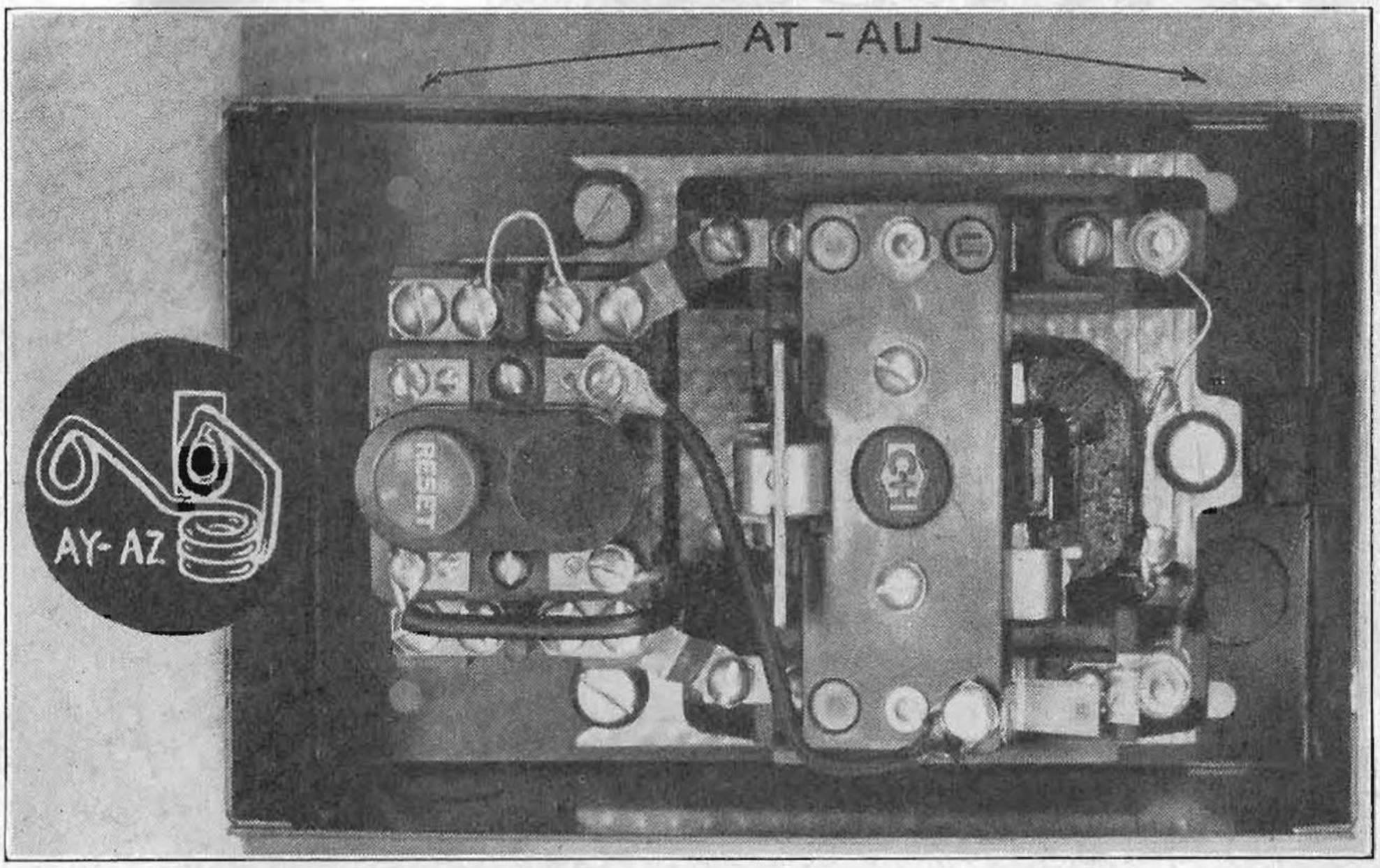
Overload Switch for Model 500 Cyclone Test Bench

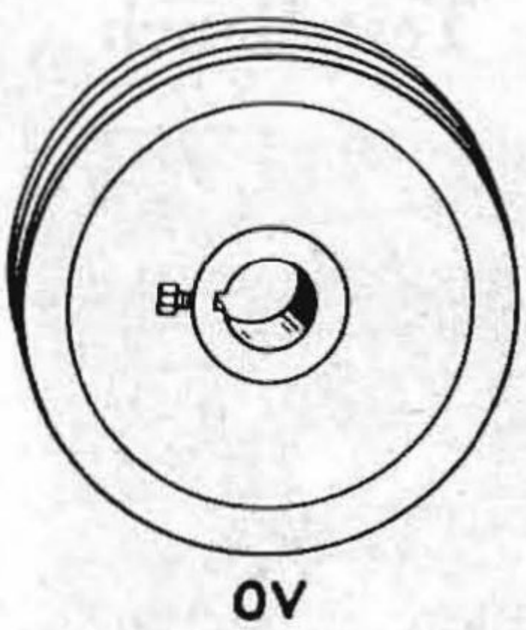


CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
AT	P-634	Internal Mechanism of X-9679.....	1
AU	P-636	Internal Mechanism of X-9567.....	1
MD	P-9567	Overload Switch 110-Volt 60 cycle—1 ph.....	1
NW	P-9679	Overload Switch 220-Volt 60 cycle—1 ph.....	1
AY	P-675	Heater Coil for X-9679—Overload Switch.....	1
AZ	P-676	Heater Coil for X-9567—Overload Switch.....	1

SA-1448—Equipment for the 500 Test Bench

CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
A	P-116	5/16" I. D. Plain Iron Washers (Not Shown)..	2
B	SA-142	Starter Test Lead.....	1
F	X-146	Resistor (Furnished Late Models only).....	1
H	SA-152	10 Amp. Ext. Scale Test Lead.....	1
T	CA-355	Pulleys and Hubs as follows:	
		CODE NUMBER / PART NUMBER / DESCRIPTION	
		EM / X-4210 / Adapter 31/32"	1
		EN / X-4211 / Adapter 5/8"	1
		EO / X-4212 / Adapter 43/64"	1
		EP / X-4213 / Adapter 7/8"	1
		EQ / X-4214 / Adapter 39/64"	1
		ER / X-4215 / Adapter 51/64"	1
		ES / X-4218 / Adapter 13/16"	1
		ET / X-4219 / Adapter 3/4"	1
		EU / X-4220 / Adapter 13/32"	1
		LN / X-9054 / Adapter 5/8" for Eclipse Generator.	1
		LP / X-9456 / Adapter	
		OV / X-9887 / 8" Adapter Pulley... 1 1/16" Bore	1
		OU / X-9886 / 4" Adapter Pulley... 1 1/16" Bore	1

WEIDENHOFF GENERATOR TEST BENCH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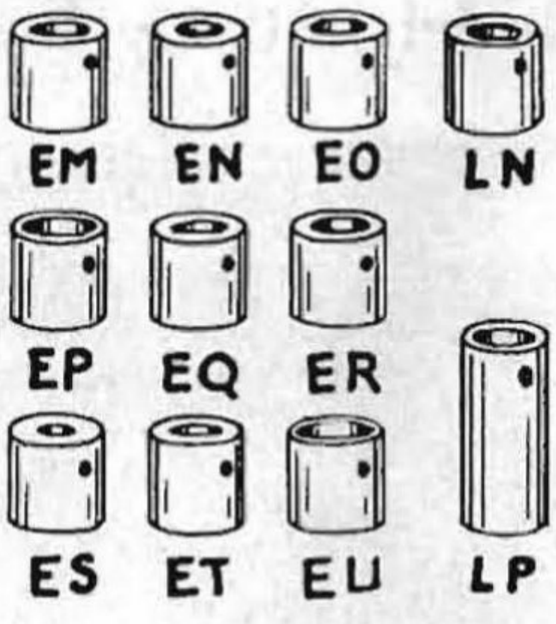

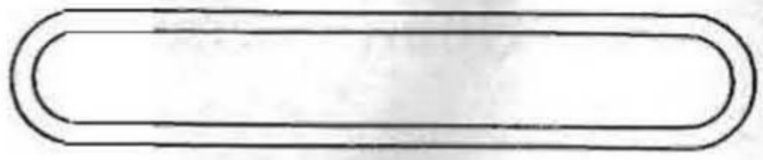
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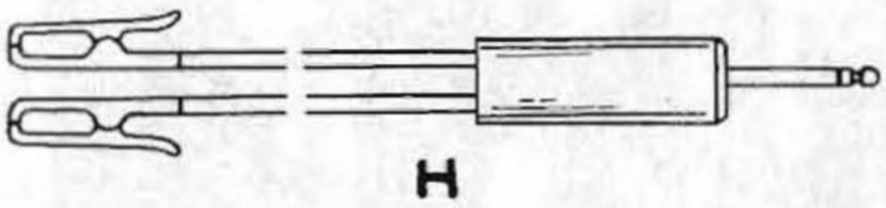
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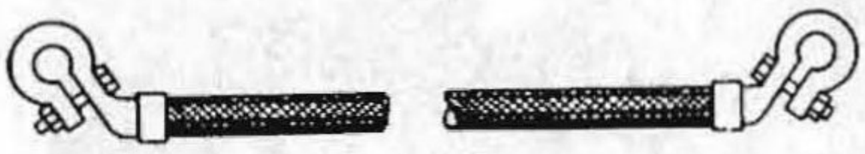
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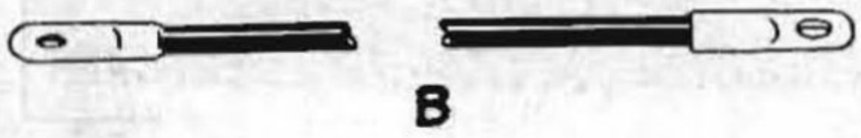
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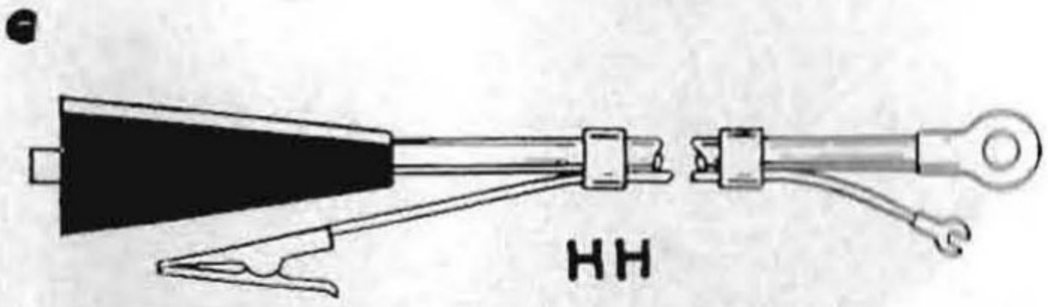
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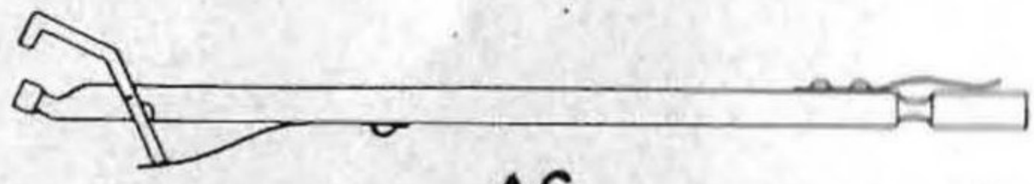
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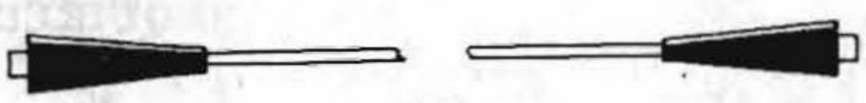
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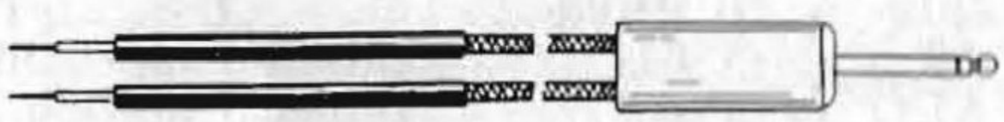
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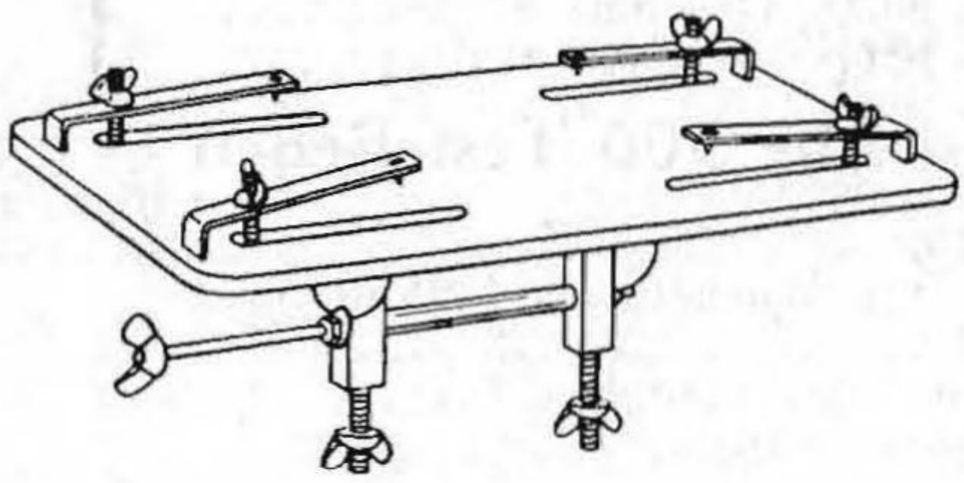
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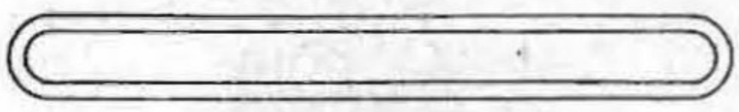
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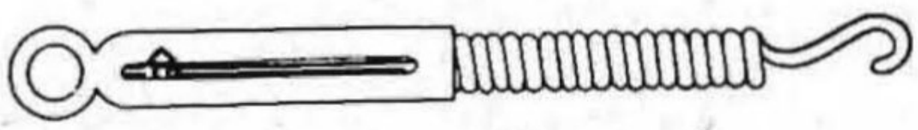
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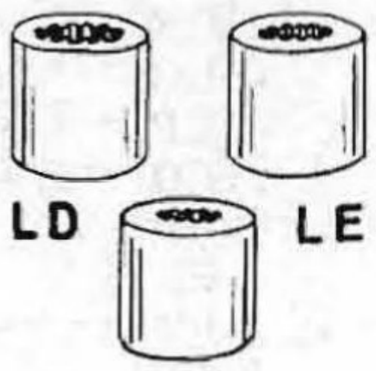


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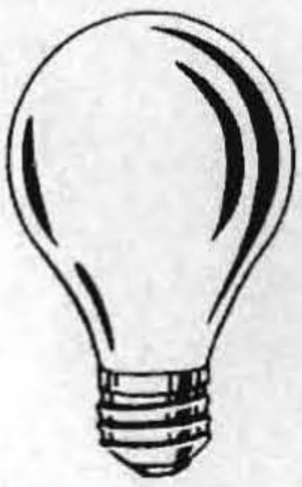
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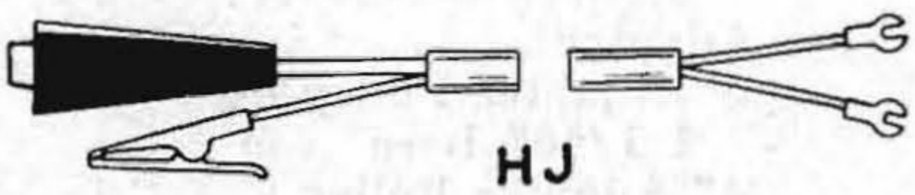
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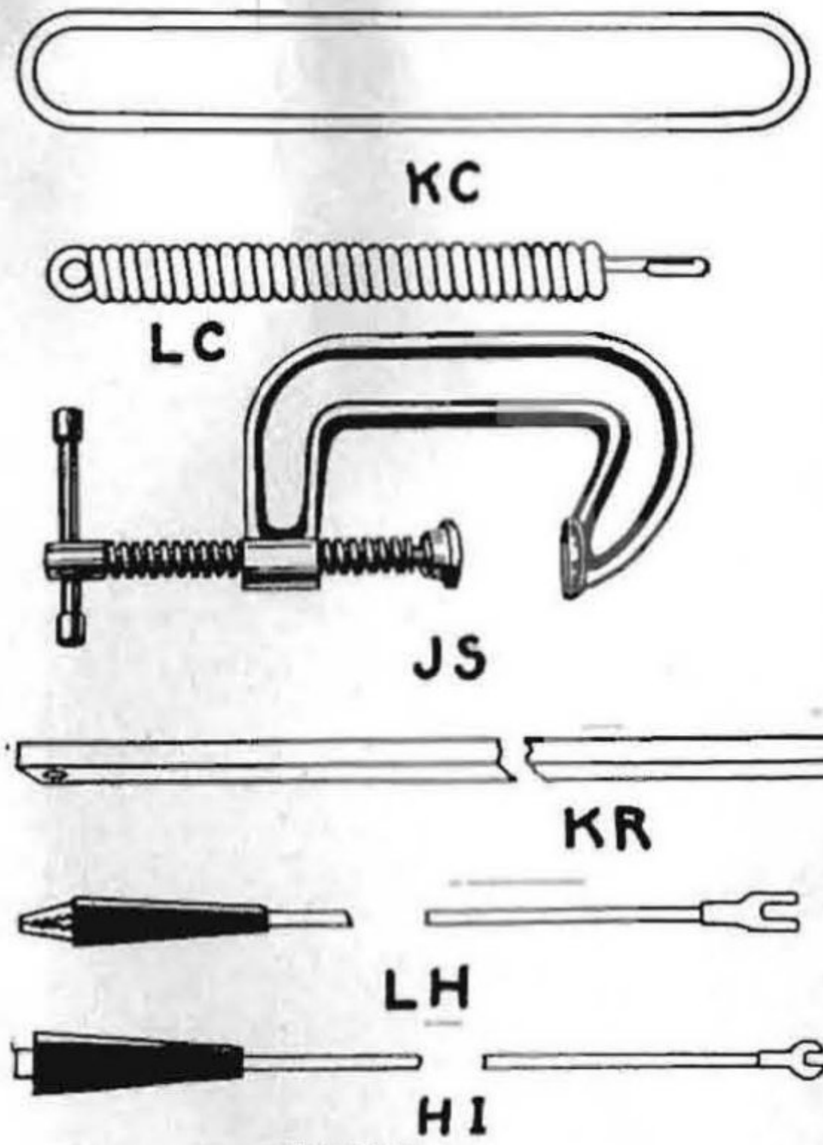
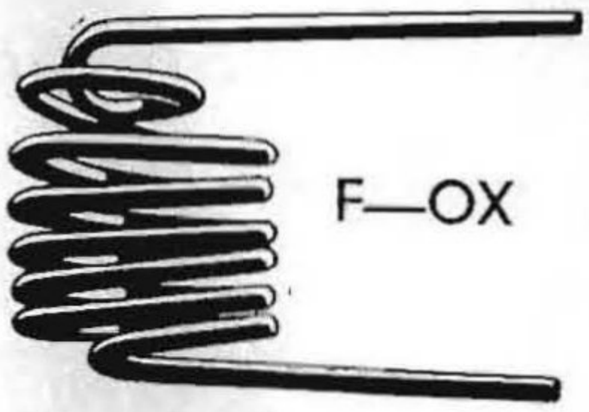
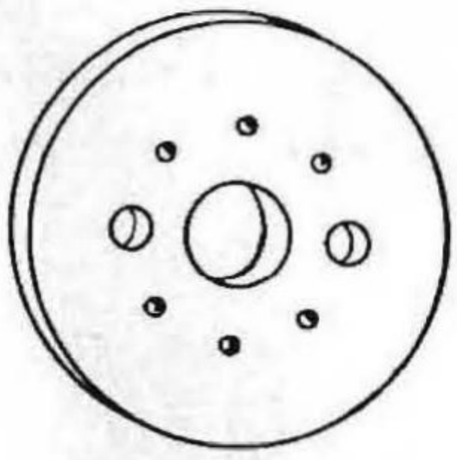
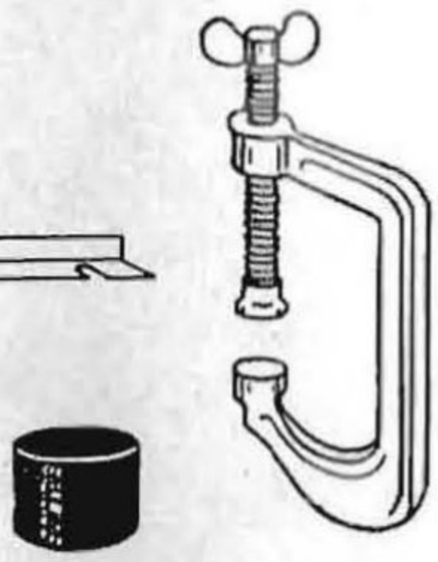
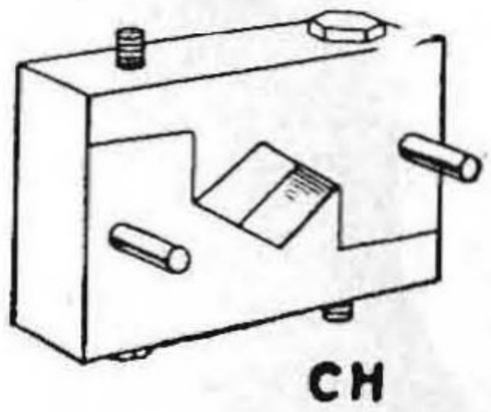
WEIDENHOFF GENERATOR TEST BENCH





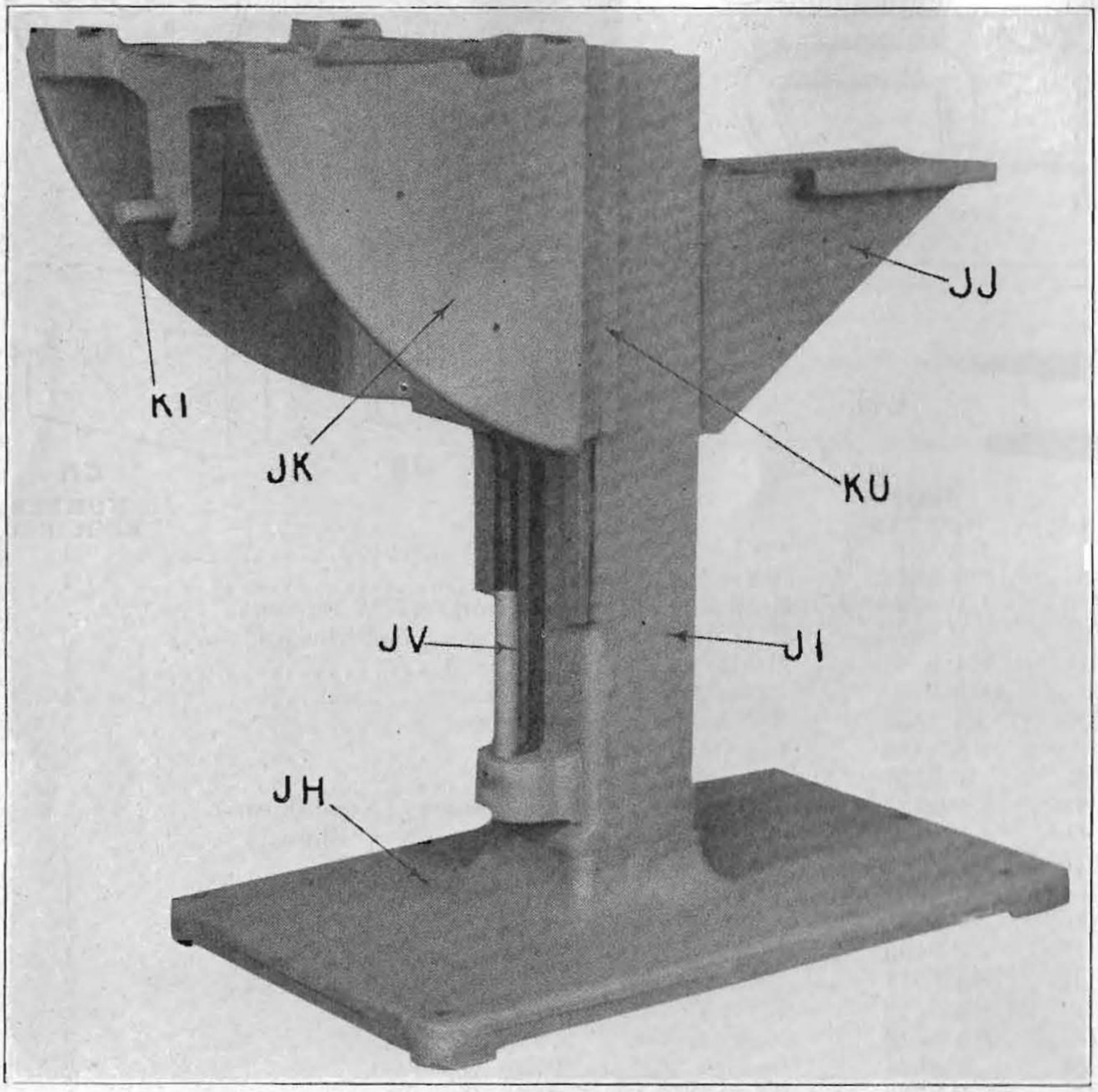






CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
V	SA-391	9" Lead	1
AC	SA-421	Starter Torque Arm	1
AW	P-865	5/16-18 x 1½ Steel Bolts (Not Shown)	2
BC	P-907	5/16-18 Steel Hex Nuts (Not Shown)	6
BD	SA-910	Battery Connecting Lead	4
BE	SA-915	Attaching Leads 28" Long	4
BK	SA-1351	Voltage Regulator Stand	1
CH	SA-1443	Generator Drive Dog	1
CL	P-1557	60 Watt Bulb	1
DD	P-2128	5/16" I. D. Lock Washers (Not Shown)	2
DG	P-2243	5/16-18 x 1" Steel Bolts (Not Shown)	2
DR	P-2754	#10 Washer (Not Shown)	4
F	X-146	Resistor	1
EL	P-4185	Generator Drive Belt (Short)	1
HC	P-8495	Test Lead With Plug	1
HH	SA-8511	Main Leads, 5¼'	2
HI	SA-8512	Field Leads, 5'	1
HJ	SA-8513	Main Leads, 5'	2
HM	X-8524	Sponge Rubber Discs for Tach.	7
HN	P-8526	Generator Drive Belt (Long)	1
HO	P-8527	Starter Torque Scale	1
JR	P-740	Starter Torque Clamp	1
JS	X-8819	"C" Clamp	2
JT	P-8821	Can of Rubber to Metal Cement	1
JY	P-8827	Rubber Coupling Disc	1
KC	P-8828	Endless Belt for Tachometer Drive	2
KR	X-8862	Angle Anchor	2
KS	X-8864	Lever	1
KV	SA-8867	Red Lead, 15" Long (For Aux. Gen. Mtg.)	2
KW	SA-8868	Black Lead, 15" Long	2
LC	P-8876	Spring	1
LD	X-8878	Spline Fitting ¾"	1
LE	X-8879	Spline Fitting ⅞"	1
LF	X-8880	Spline Fitting 1⅛"	1
LH	SA-8906	Volt Meter Test Lead	2
LJ	P-8919	5/16" Allen Set Screw Wrench	2
LK	P-8920	3/8-16 Allen Set Screw Wrench	2
OX	X-9889	Resistor with terminals used on earlier mod. only	1

Pedestal Assembly SA-1366 for Model 500 Cyclone Test Bench

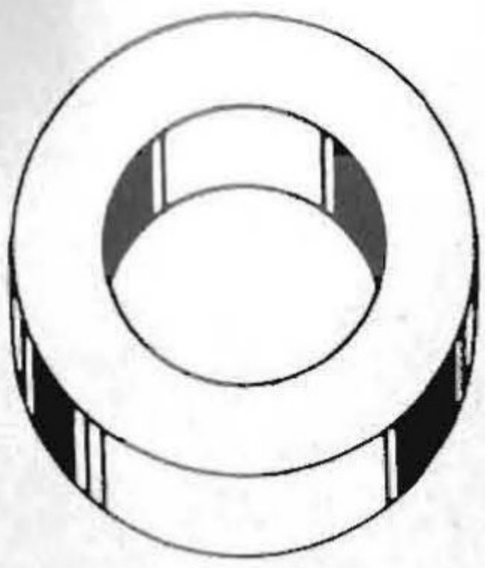


CODE	PART NUMBER	DESCRIPTION	NUMBER REQUIRED
JH	X-8788	Floor Casting (Not Shown)	1
JI	X-8789	Post Casting (28 11/16" Length) (Not Shown)	1
JJ	X-8790	Motor Support Casting (Not Shown)	1
JK	X-8791	Table Support Casting (Not Shown)	1
JV	X-8824	Table Height Adjustment Screw	1
KI	X-8849	Table Elevating Crank Shaft (Length 22") ..	1
KJ	X-8850	Shaft Thrust Washer (Between Gear and X-8851 Pin)	1
KK	X-8851	Table Elevating Crank Shaft Pin (Length 1").	1
KL	P-8853	Table Elevating Crank Shaft Gear	1
KM	X-8854	Shaft Thrust Washer (between Gear and Casting)	1
KO	P-8856	Table Height Adjusting Screw Worm Gear....	1
KP	X-8857	Thrust Washer above X-8856 Gear and Casting	1
KQ	X-8858	Thrust Washer below X-8856 Gear and Casting	1
KU	X-8866	Slide Gib Adjust Bar	1

WEIDENHOFF GENERATOR TEST BENCH .



JV



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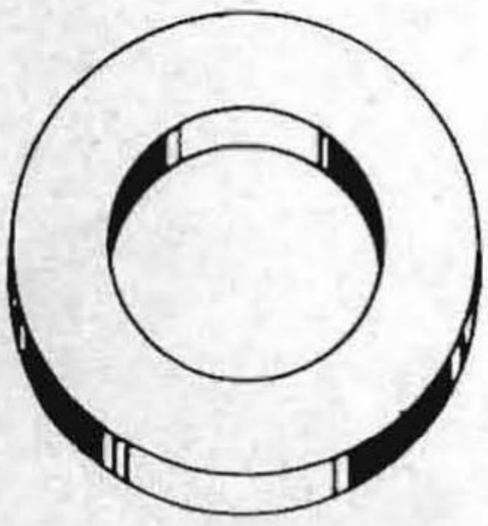

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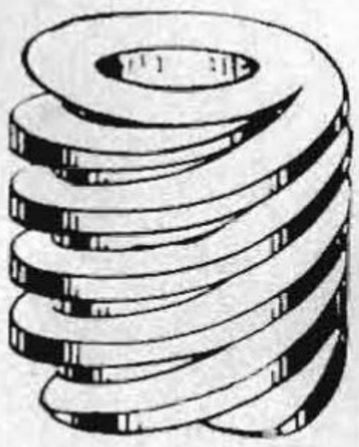

KL



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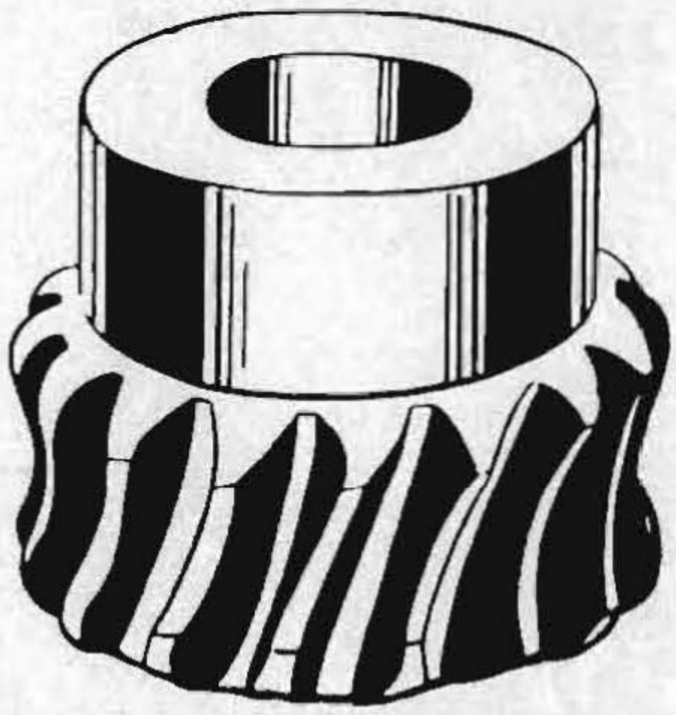

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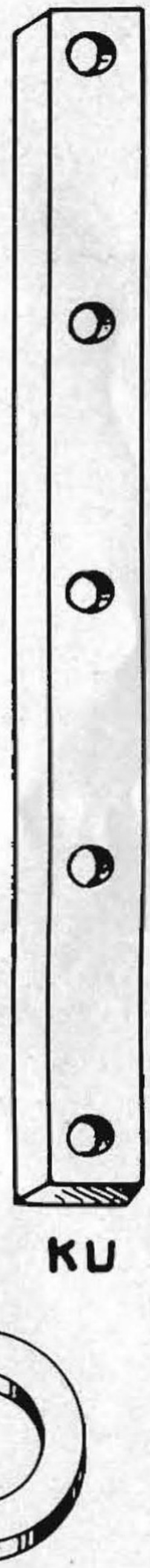

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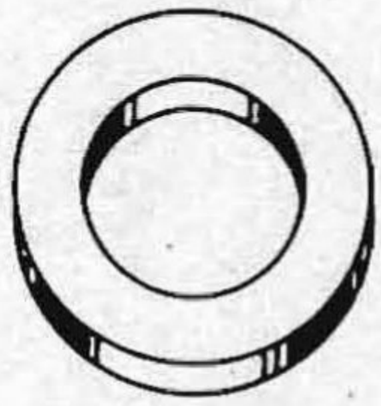

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