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SECTION 10-I
POLICE CAR GENERATING SYSTEM

CONTENTS OF SECTION 10-I

10-52 POLICE CAR GENERATING SYSTEM SPECIFICATIONS

a. Alternating Current Generator

Make and Type	Delco-Remy, Alternating Current
Number	1117070
Location, Side of Engine	Right
Drive and Rotation (Viewing Drive End)	Fan Belt, Clockwise
Speed Ratio, Generator to Engine	2 to 1
Brush Spring Tension, ounces	13
Field Current Draw (Amps.) @ 80°F and 12 Volts	5.6 to 6.3
Bench Test at 14 Volts (Amps.) Cold @ Generator RPM	58 @ 2500
Belt Tension	80 lbs.
Current Output at Idle (525 Engine RPM)	Approx. 25 Amps.

b. Transistorized Generator Regulator

Make and Type	Delco-Remy, Transistorized
Number	9000554
Cutout Relay	None
Current Regulator	None
Voltage Regulator Air Gap, Points Just Touching	.075"
Voltage Regulator Setting @ 1500 Engine RPM (After 15 Min. Warm-Up)	See Fig. 10-77
Indicator Light Relay Air Gap, Points Just Touching	.075"
Indicator Light Relay Closing Voltage	2 Volts Below VR Setting

c. Field Relay

Field Relay Number	1116895
Field Relay Closing Voltage	7 to 9
Field Relay Air Gap, Points Just Touching	.010"
Field Relay Contact Point Opening	.015" to .025"

10-53 DESCRIPTION OF POLICE CAR GENERATING SYSTEM

The police car generating system is a factory option designed to handle a high electrical accessory load without allowing the battery to run down. The high maximum output of this system plus its ability to charge at curb idle makes it especially good for a police car with its two-way radio, blinker light, and siren in addition to the normal accessory load. Maximum output of the generator is 60 amperes; output at curb idle (525 engine RPM) is approximately 25 amperes.

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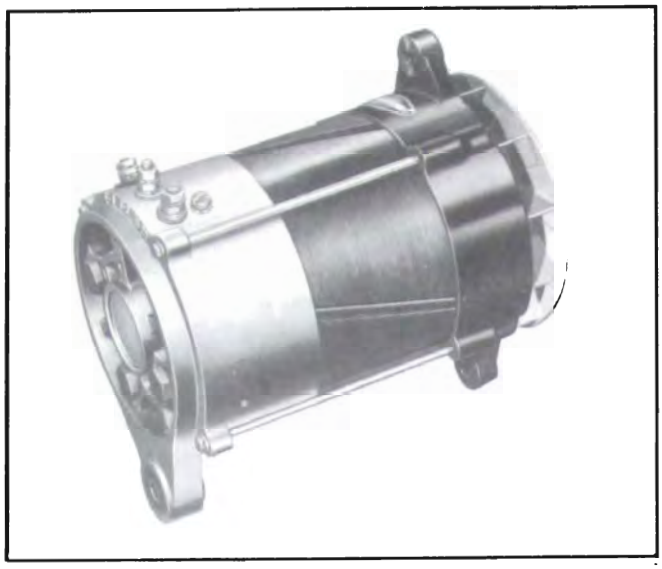

Figure 10-71—Diode Rectified Alternating Current Generator

The self-rectifying alternating current generator is designed and constructed to give long periods of trouble-free service with a minimum amount of maintenance. The rotor is mounted in ball bearings. Each bearing has a grease reservoir which eliminates the need for periodic lubrication. Two brushes are required to carry current through the two slip rings into and out of the field coils which are wound on the four-pole rotor. The brushes are extra long and brush spring tension requirements are fairly light. Under normal operating conditions, the brushes will provide long periods of service.

The stator windings are assembled on the inside of a laminated core that forms the generator frame. Six rectifier diodes are mounted in the slip ring end and are connected to the stator windings through connectors mounted internally in two nylon holders. The six diodes act to change the generator alternating current voltages to a direct current voltage which appears at the "BAT" terminal on the generator.

The transistorized regulator used with the diode-rectified alternating current generator contains a vibrating voltage regulator unit and an indicator light relay unit.

The voltage regulator uses a single transistor and two diodes. The transistor works in conjunction with a conventional voltage unit having vibrating contact points to limit the voltage to a pre-set value. The diodes reduce arcing at the voltage regulator contacts by dissipating the energy created in the generator field windings when the contacts separate.

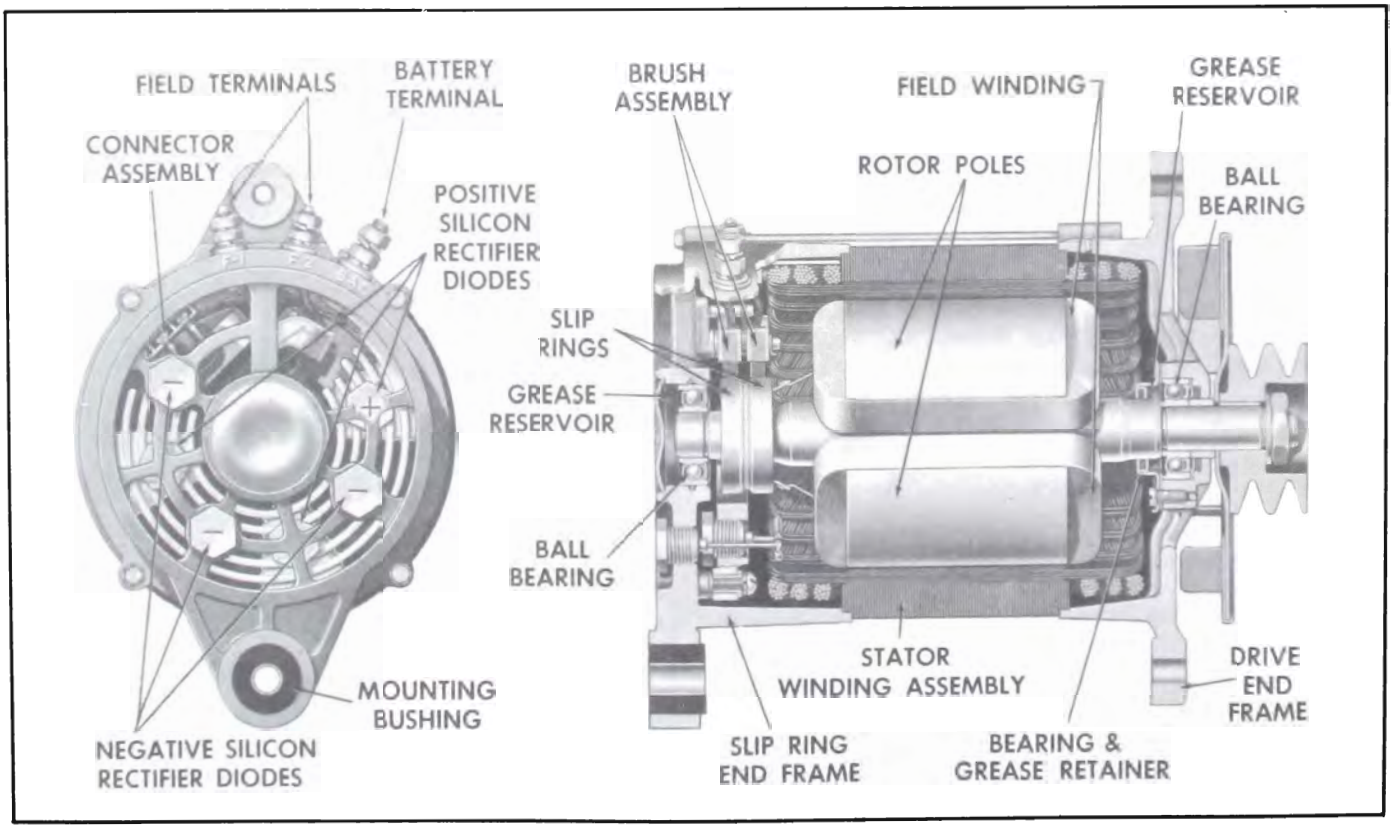

Figure 10-72—Cross-Section View of Alternating Current Generator

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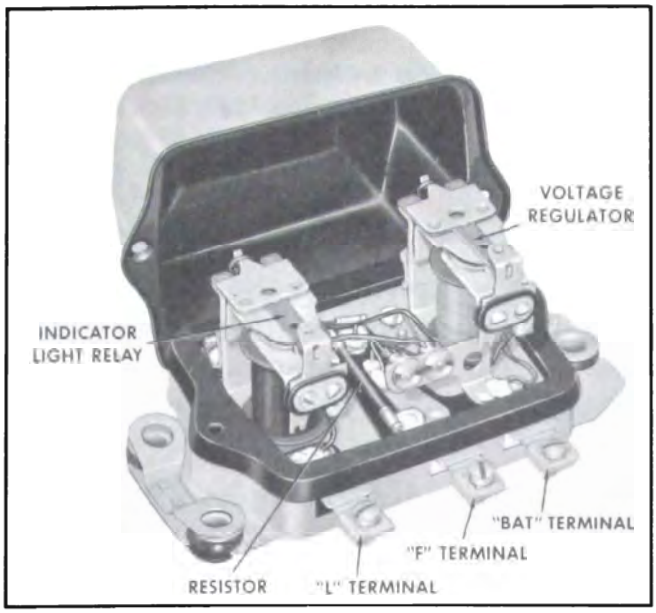

Figure 10-73—Transistorized Regulator

Greater generator field current and smaller voltage unit contact point current both result from the use of a transistor. This improves generator performance and lengthens regulator contact point life.

The police car generator is larger than the standard generator. It requires special front and rear mounting brackets and a different fan belt. To provide clearance between the larger generator and the oil filter, the position of the oil pump cover and filter assembly is lowered by installation of a spacer between the pump cover and the oil pump. Because the oil filter is more vulnerable to damage in this lowered position, a shield is bolted to the front suspension crossmember for added oil filter protection. See Figure 10-85.

The transistorized regulator is mounted in the same location as the standard regulator. The field relay requires new mounting holes. A new two-wire harness is required for the generator and several new connecting wires are needed. See Figure 10-86.

10-54 OPERATION OF POLICE CAR GENERATING SYSTEM

a. Generator

In any generating system, the basic principle used is that voltage will be induced in a conductor if there is relative movement between a magnetic field and that conductor. This same principle, as used in direct current generators, is now being used in the heavy-duty alternating current generator used in the police car charging circuit. The means of applying this principle are somewhat different, however.

In a direct current generator, the magnetic field is produced by passing current through stationary windings near the outside of the generator frame. The conductors are wound on the rotating part near the center of the generator. Each conductor forms a loop with the ends fastened to two opposite bars of the commutator. As each successive loop passes through the magnetic field, a strong voltage is induced, always in the same direction. At this point, two brushes contact the two commutator bars at the opposite ends of this loop. A circuit is completed and direct current is taken from the generator.

In an alternating current generator, the magnetic field is produced by passing direct current through windings on the rotating part (called the rotor) near the center of the generator. The conductors are wound in three separate stationary windings near the outside of the generator frame with one end of each connected like a "Y" (called a three-phase "Y" connected stator).

The rotor is wound in such a way that it has four poles - two North and two South. Since field current is supplied to the rotor by two brushes contacting slip rings, the polarity of the windings never changes. As the magnetic field of a North pole rotates past each successive stator winding, a voltage is induced in one direction; as the following South pole rotates past these same stator windings, a voltage is induced in the opposite direction. As a result, the output directly from each of the three stator windings is an alternating voltage. If a circuit were completed directly, alternating current would flow. The actual circuit, however, is completed through diodes which rectify the alternating current so that only direct current comes out of the "BAT" terminal of the generator. See Figure 10-74.

Simply put, diodes function like a one-way check valve. They allow current to flow very freely in one direction, but don't allow it to flow in the other direction. As shown in Figure 10-74, whenever the voltage in a stator winding is in the proper direction, current will flow through the diode in the direction indicated by the arrow and out the "BAT" terminal. As the voltage alternates in the opposite direction, however, current is prevented from reversing

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by the same diode. Current in this winding will then flow in reverse and on out of one of the other stator windings to the "BAT" terminal. The combined action of the three stator windings results in a more even output than could be obtained from a single phase alternating current generator.

b. Regulator

The generator regulator's main function is regulating the voltage output of the generator to a safe maximum according to the under hood temperature. It also contains an indicator light relay. This relay closes to provide a ground for the red "GEN" indicator light when the voltage in the charging circuit is below a certain figure. Whenever the engine is running, the voltage in the charging circuit should be high enough to create enough magnetism to overcome the spring tension and open the indicator light relay contacts to cause the "GEN" light to go out. A fully charged battery should cause the relay contacts to separate when the ignition switch is turned on even before the engine is started. See Figure 10-74.

Notice that the regulator does not contain a cutout relay unit. The diodes act as one-way check valves to prevent the battery from discharging back through the generator, thereby making a cutout relay unnecessary.

The transistorized voltage regulator unit consists of a single transistor which works in conjunction with a conventional vibrating contact voltage unit to limit the generator voltage to a pre-set value. This is accomplished the same way as with a direct current generator - by controlling the field current flow by inserting a resistance in the ground circuit. In the transistorized regulator, there are two paths to ground; one through the points and one through the transistor. The nature of a

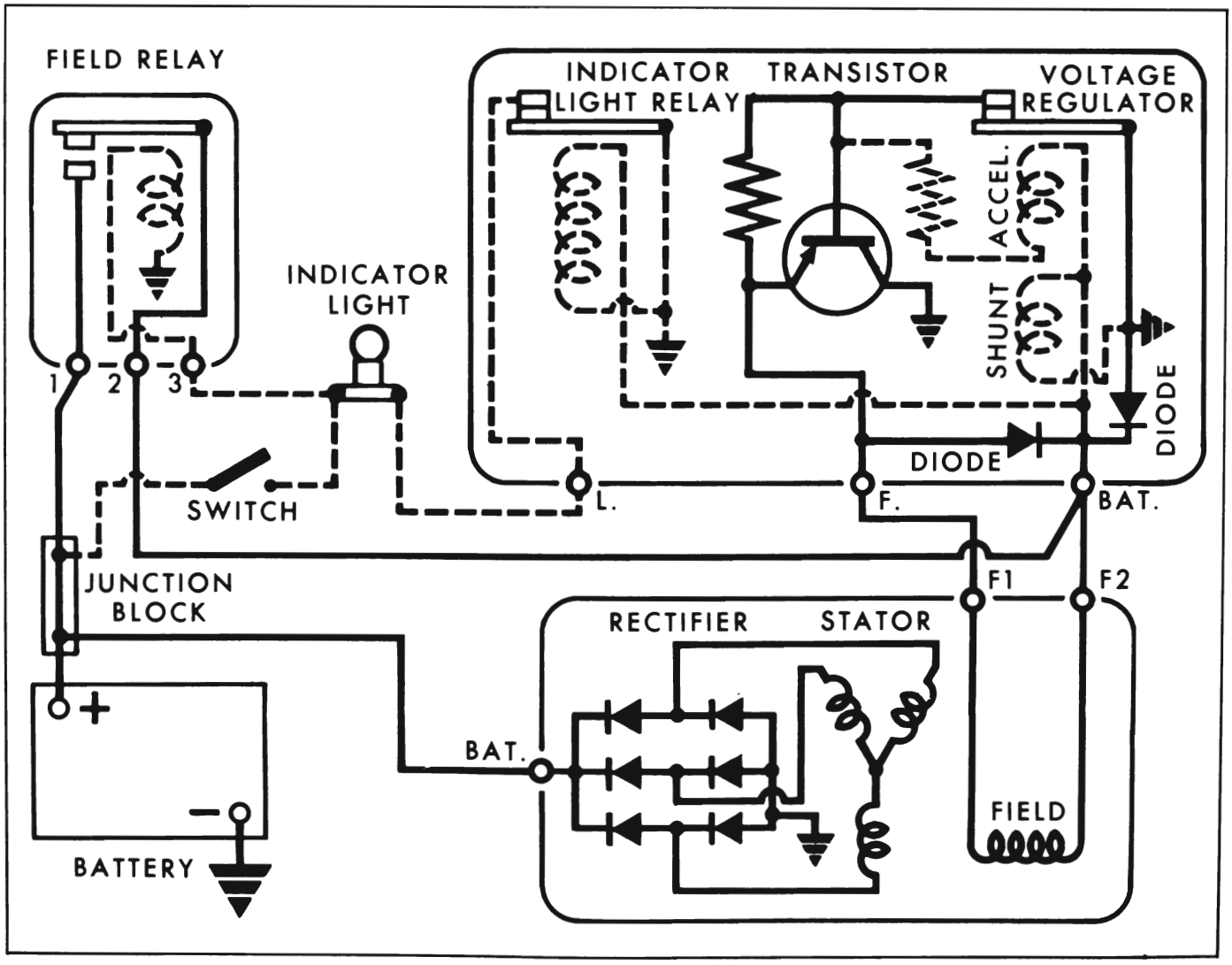

Figure 10-74—Police Car Generator System Wiring Circuit Diagram

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transistor is such that whatever the resistance in the point circuit, a proportional resistance is transferred to the transistor. (The transistor gets its name from the words "transfer resistance".) In other words, if the points are vibrating at a very high frequency so that very little current flows through them to ground, very little will flow through the transistor to ground; if the points are closed so that full field current flows through them to ground, full current will also flow through the transistor to ground.

The transistor used in this particular application has a built-in proportion of approximately 12 to 1; for instance, with a total field current flow of 1-1/12 amperes, one ampere would flow through the transistor while only 1/12 ampere would flow through the points. Since vibrating contact points can handle safely only about 1-1/2 to 2 amperes, a single contact regulator without a transistor limits the generator field current to this value. A transistorized regulator, however, allows the use of much greater field current with resulting increased generator output. Also, the low contact point current in a transistorized regulator reduces arcing at the contacts and lengthens contact point life.

The two diodes in the voltage regulator are placed to dissipate a momentary voltage surge which is created in the field windings when the voltage contacts separate. If the voltage contacts opened without diodes in the circuit, the sudden interruption of the field current would cause a high voltage to be induced in the field coils; this high voltage would cause failure of the transistor and also excessive arcing at the voltage regulator contacts. The diodes provide alternate circuits where the current can flow, which prevents a high voltage build-up in the field windings.

c. Field Relay

The purpose of the field relay is to supply battery current to energize the generator field when the engine is running and to cut off the field current when the engine is shut off. As shown in Figure 10-74, the instant the ignition switch is closed, current will flow through the field relay winding to ground and close the relay contacts. Current will also flow through the indicator light to ground at the indicator light relay contacts (if closed).

When the field relay contacts are closed, current flows through the generator field. The field current then goes to ground through both the transistor and the voltage regulator contacts.

The field relay should require very little service or adjustment since it does not function as a control but rather as an automatic switch. If the field relay does not operate properly, specifications are listed for point opening, air gap and closing voltage. However, it may be more economical to replace the relay than to repair it.

d. Charging Circuit

The charging circuit flow starts from a voltage induced in the stator windings of the generator. See Figure 10-74. Current then flows through the diodes in the heat sink to the generator "BAT" terminal. Flow is from the "BAT" terminal to the junction block terminal to the positive terminal of the battery. Charging current flows through the battery and into ground at the ground cable. To complete the circuit, current enters the stator windings through the diodes in the generator end frame. Notice that the battery is connected directly to generator at all times so that only the diodes keep the battery from discharging to ground in the generator.

Before the generator will put out any current, the rotor field must be energized. The rotor poles have no residual magnetism, so unless current is supplied to the field from the battery, there is no generator output.

The field circuit is completed the instant the ignition switch is turned on. As shown in Figure 10-74, a wire from the ignition switch energizes the winding in the separately mounted field relay, causing the relay contacts to close. This allows current to flow from the battery, through the relay, to the "BAT" terminal of the regulator, into the generator at the "F2" terminal, through the rear brush and slip ring, through the field, out the forward slip ring and brush, out the "F1" terminal to the regulator "F" terminal. The field current then goes to ground through two paths - the transistor and the voltage regulator contacts. When the engine is started and the field circuit voltage rises to the voltage regulator setting, the voltage contacts vibrate to control field current in conjunction with the transistor.

A lead in the generator regulator connects the "BAT" terminal to the indicator light relay winding. If the voltage in the field circuit is above the indicator light relay setting, the relay winding will open the relay contacts, causing the "GEN" indicator light to go out.

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10-55 TROUBLE-SHOOTING POLICE CAR GENERATING SYSTEM

SPECIAL PRECAUTIONS: Alternating current charging system wiring circuits are completely different from direct current charging system circuits. Therefore, none of the troubleshooting checks used for direct current systems can be used. The transistor or diodes may be burned out instantly if you do not observe the following precautions:

1. Never arc terminals. Never short between terminals on the generator or regulator; never arc any terminal to ground. The field has no residual magnetism and therefore cannot be polarized; any attempt to do so may cause damage.

2. Always observe polarity. Use extreme caution before installing a battery, connecting a fast charger, or connecting a booster battery to insure that the ground polarity is matched to the ground polarity of the generator and regulator. For example, if a battery is accidentally installed in reverse, the diodes in the generator will be burned out instantly. The alternating current system is a negative ground system, just as Buick's charging systems have always been.

3. Always disconnect battery before doing any work on the generator or regulator.

Complaints on operation of the generating system generally fall into one of the following classifications. Go through steps listing possible troubles in order until the trouble is found.

a. Battery Runs Down

1. Check generator belt tension. Belt tension as measured with Gauge J-7316 should be 80 pounds. Because of the heavy electrical loads which are possible at lower generator speeds, correct belt tension is even more important than with a standard generator.

2. Check battery condition. Light load test battery to see if battery is actually low (par. 10-9). If low, quick-charge battery and retest to see if battery is defective.

3. If battery tests okay, check battery terminal voltage (headlights still on low beam from light load battery test). Start engine and again check charging voltage at battery terminals, which should be approximately one volt higher than first reading. If this brief check shows charging voltage is low, test generator output as described in paragraph 10-56, a. If output is low, make sure field circuit is okay by checking for resistance in regulator control circuit as described in paragraph 10-56, c; excess resistance may be caused by a loose or corroded connection, or by a defective field relay. If field circuit is okay, but generator output tests low, remove generator for repair.

4. If generator output tests okay, test voltage regulator setting as described in paragraph 10-56, b. If voltage setting is low, adjust to specifications shown in Figure 10-77. If voltage cannot be correctly adjusted, trouble may be oxidized voltage regulator contacts, an open transistor, or a shorted regulator diode.

5. If voltage regulator setting was okay, but battery is low, check for a continuous short or ground in car electrical system.

6. If there is no short or ground, normal electrical load may be more than the generator can supply at engine idle; if this is the case, engine idle may be speeded up slightly, as required.

b. Battery Needs Water too Often

1. Check battery condition. Light load test battery to see if there is a shorted cell (par. 10-9).

2. Test voltage regulator setting (par. 10-56, b). If voltage setting is 16 volts or higher, check for a grounded generator field or a shorted transistor. Disconnect field wire from "F" terminal of regulator. If charging circuit voltage does not drop to battery voltage level, generator field is grounded; if voltage does drop to battery voltage level, regulator transistor is probably shorted.

3. Adjust voltage regulator, using a regulator temperature gauge to make sure voltage setting is correct according to temperature.

c. Generator Indicator Light Comes On—Engine Running

If the generator indicator light comes on with the engine running, the charging circuit is not operating. Test generator output and voltage regulator setting as described above.

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d. Generator Indicator Light Never Comes On

The generator indicator light should come on the first time the ignition switch is turned on in the morning. However, when the ignition is turned on shortly after running the engine, the terminal voltage of the warm battery may be high enough to hold the indicator light off. To check operation of the "GEN" light bulb and circuit under these conditions, turn on headlights and light should come on.

10-56 TEST AND ADJUSTMENT OF POLICE CAR GENERATING SYSTEM—ON CAR

a. Test Generator Output

1. Check generator belt tension. Adjust to 80 lbs. if required.

2. Disconnect battery ground strap.

3. Disconnect generator lead (largest red wire) from terminal of junction block and retighten terminal nut with other leads in place. Connect ammeter between generator lead and junction block terminal. See Figure 10-75.

4. Connect a tachometer between distributor terminal of coil and ground.

5. Reconnect battery ground strap.

6. Turn on all possible accessory load.

7. Start engine. With engine idling, connect a jumper between regulator "F" terminal and ground.

8. Slowly increase engine speed until ammeter reads 58 amperes. At this generator output, engine speed should not be over 1250 RPM. Shut off engine immediately after taking readings. Remove jumper from car.

9. If 58 amperes output cannot be obtained before 1250 RPM of engine, generator is faulty. Remove generator for testing and make necessary repairs.

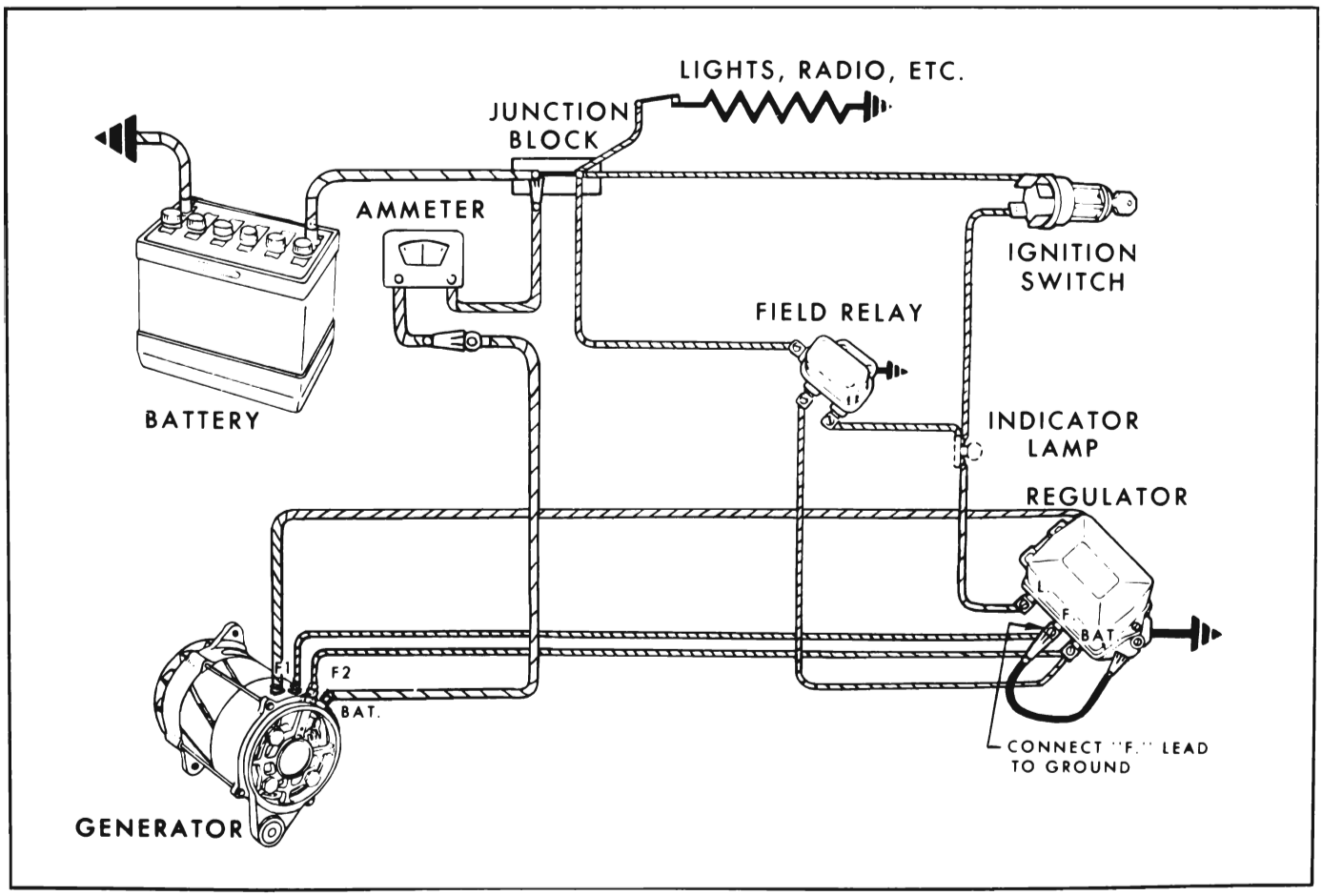

Figure 10-75—Checking Generator Output

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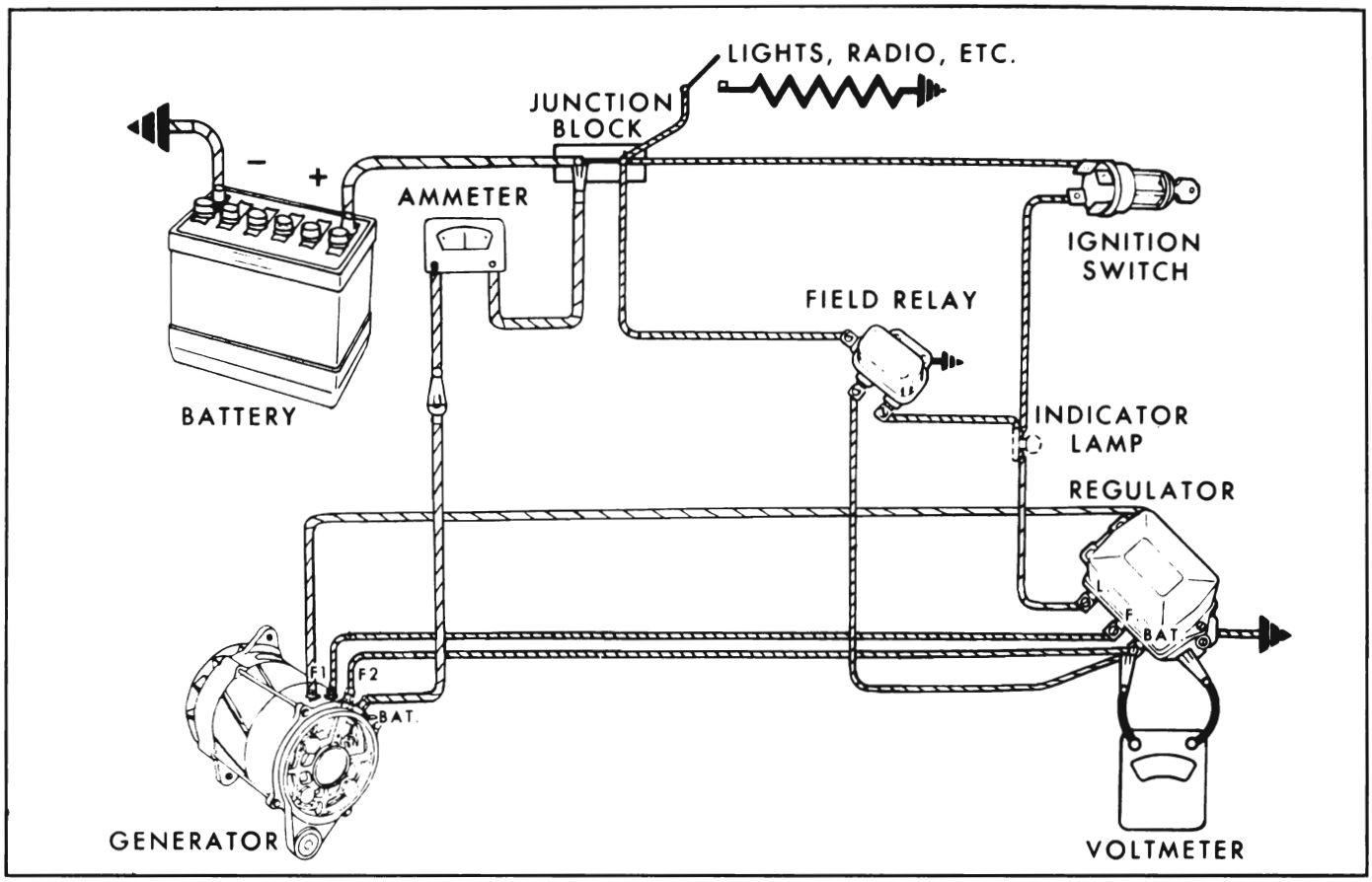

Figure 10-76—Checking Voltage Regulator Setting

b. Test and Adjust Voltage Regulator

1. Disconnect generator lead (largest red wire) from terminal of junction block and retighten terminal nut with other leads in place. Connect an ammeter between generator lead and junction block terminal. See Figure 10-76.

2. Connect a voltmeter from "BAT" terminal to ground on base plate of regulator.

3. Install a thermometer such as Gauge J-8529 on regulator cover.

4. Run engine at approximately 1500 RPM for 15 minutes. Make sure all electrical load is turned off except ignition.

5. Cycle generator by stopping engine and then re-running at approximately 1500 RPM.

6. Check ammeter reading; for an accurate voltage setting check, ammeter must read between 3 and 10 amperes.

7. Read voltmeter and thermometer. See Figure 10-77 to determine if voltage regulator setting is within limits for the existing temperature. If setting is within limits and battery condition has been satisfactory, voltage regulator should not be disturbed.

8. If necessary to adjust voltage regulator setting, increase spring tension to increase voltage setting, or decrease spring tension to decrease voltage setting. See Figure 10-78.

Air Temperature at Regulator	Voltage Limits
45°	14.2 - 14.8
65°	13.9 - 14.5
85°	13.6 - 14.2
105°	13.3 - 13.9
125°	13.0 - 13.6
145°	12.7 - 13.3

Figure 10-77—Voltage Setting Limits for Various Regulator Temperatures

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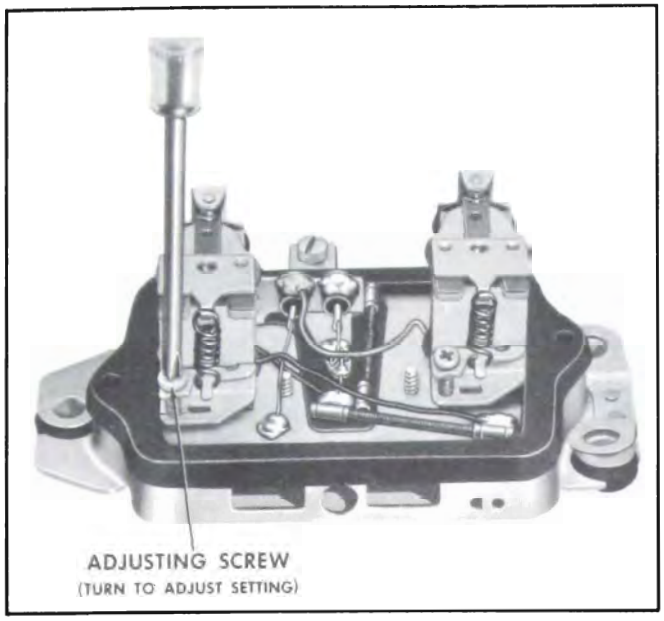

Figure 10-78—Adjusting Voltage Regulator Setting

CAUTION: Final adjustment should always be made by increasing spring tension to assure contact between screw head and spring support.

9. After making an adjustment, replace cover, cycle generator and recheck voltage setting as described above.

c. Test Resistance of Regulator Control Circuit

Current to energize the generator field is supplied from the battery to the junction block, through the field relay, to the "BAT" terminal, through the generator field, and into the "F" terminal to go to ground in the regulator. If there is any resistance in the field circuit between the junction block terminal and the "BAT" terminal, then the voltage at the junction block terminal will be higher than at the "BAT" terminal. As shown in Figure 10-74, the only place the voltage regulator can sense the charging circuit voltage is at the "BAT" terminal of the regulator. Therefore, even though the voltage setting of the regulator is correct, the actual charging circuit voltage will be too high by the amount of voltage loss between the junction block and the regulator. For example, if there is a voltage loss of one volt through the field relay, even though the voltage regulator is operating at 14 volts, the charging circuit voltage to the battery would be 15 volts. This voltage would be excessive and would cause overcharging of the battery.

Test resistance of regulator control circuit as follows:

1. Turn on ignition switch. Do not start engine. Make sure all electrical accessories are turned off.

2. Connect a voltmeter from positive post of battery to "BAT" terminal of regulator. See Figure 10-79.

3. If voltage drop exceeds .3 volt, circuit resistance is excessive. Move voltmeter leads toward each other to find the point or points of resistance.

4. To correct, clean and tighten connections, replace damaged wiring, and clean or replace field relay.

d. Test and Adjust Indicator Light Relay

The closing voltage check must be made immediately after the voltage regulator setting check, before the regulator has time to cool off and while the battery terminal voltage is as high as possible. The battery must be sufficiently charged to hold the relay contacts open and the indicator light off when the ignition switch is turned on.

1. Disconnect both leads from "BAT" terminal of regulator.

2. Connect a variable resistor such as J-7099 between field relay lead and "BAT" terminal. Turn control knob to position for least resistance (direct connection).

3. Connect a voltmeter from "BAT" terminal to ground on regulator base.

4. Connect a 12 volt test light from "BAT" terminal to "L" terminal to show same action as the "GEN" indicator light on instrument panel.

5. Turn ignition switch on. (Do not start engine.) If "GEN" indicator light comes on, battery must be charged further by running engine before test can be made.

6. Turn resistor control knob slowly to increase resistance until test light comes on. Note voltage at which relay contacts close. Closing voltage of indicator light relay should be 2 volts below voltage regulator setting. See Figure 10-77 for correct voltage regulator setting.

7. If necessary to adjust light relay setting, increase spring tension to increase closing voltage, or decrease spring tension to decrease closing voltage.

8. After making an adjustment, replace cover and recheck light relay closing voltage.

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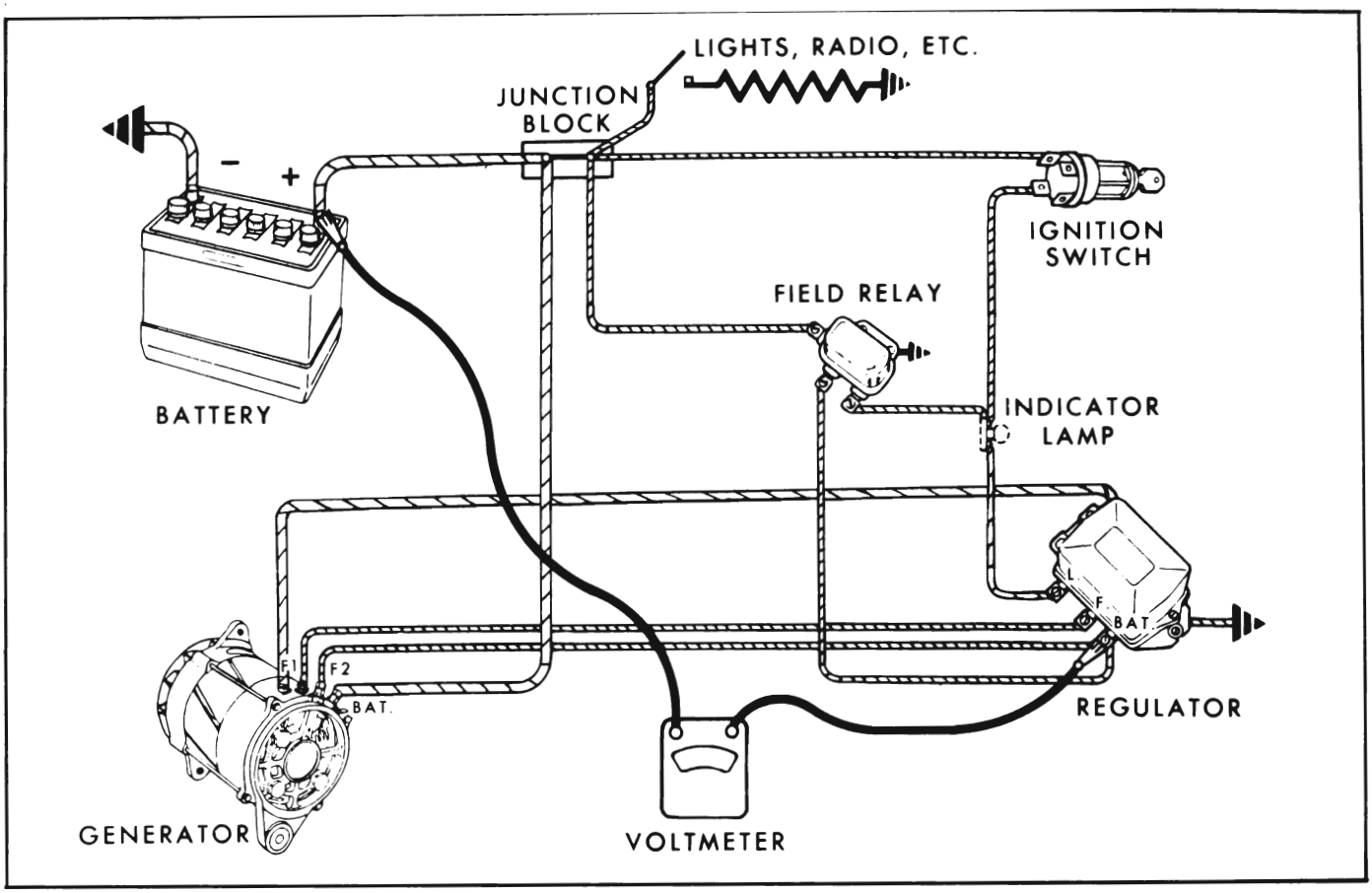

Figure 10-79—Checking for Resistance in Regulator Control Circuit

10-57 POLICE CAR GENERATING SYSTEM REPAIR—ON BENCH

a. Disassembly of Generator

When it is necessary to disassemble a generator for any reason, always make a complete clean-up and inspection to make sure all parts are in satisfactory condition. The generator consists of four main components; the drive end frame, the stator, the rotor, and the slip ring end frame.

1. Take out four through-bolts.

2. Remove drive end frame and rotor assembly. CAUTION: To prevent damage to brushes when removing drive end frame and rotor assembly, insert a through-bolt into slip ring end frame and lift brushes off slip rings.

3. Separate drive end frame from rotor by removing shaft nut, lock washer, pulley, fan and woodruff key. See Figure 10-80.

4. The slip ring end frame bearing should not be removed from the shaft unless the bearing is to be replaced. The old bearing will be ruined during removal and must be replaced with a new bearing. When installing new bearing, press against inner race only.

5. Separate slip ring end frame from stator slowly, using a screwdriver to pry apart two halves of nylon connector before completing separation. See Figure 10-80.

b. Checking Generator Diodes

There are six diodes mounted in the slip ring end frame assembly. Three of these diodes are mounted in the slip ring end frame and three are mounted in the heat sink which is attached to but insulated from the slip ring end frame. The "BAT" terminal on the generator is attached to the insulated heat sink.

All diodes are marked either with a "+" or "-" on the hexagon head to identify the polarity. See Figure 10-81. On a generator used with a negative grounded system such as Buick's, the negative diodes are mounted in the slip ring end frame and the positive diodes are mounted in the insulated heat sink.

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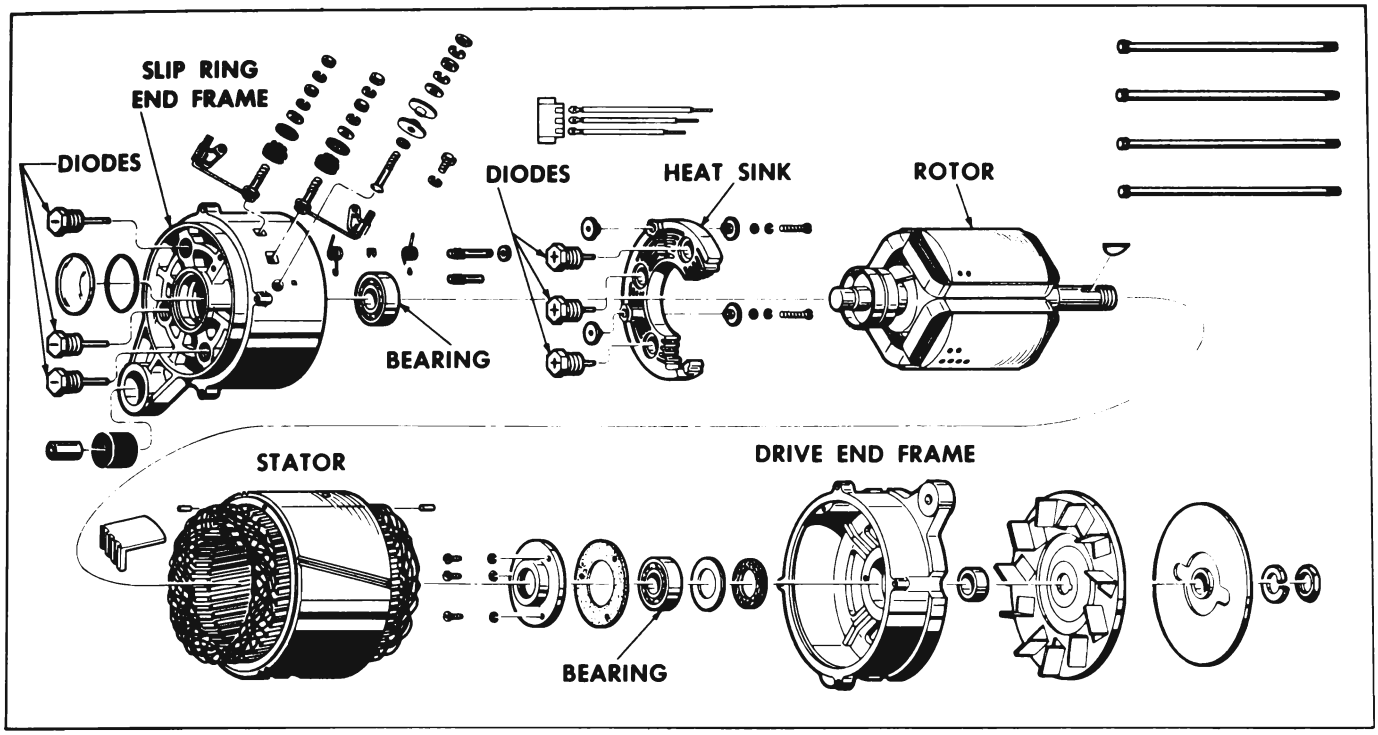

Figure 10-80—Exploded View of Alternating Current Generator

Diodes function like a one-way check valve. That is, they allow current to flow through in one direction very easily and allow practically no flow in the other direction. A positive diode allows current flow in one direction; a negative diode allows flow in the other direction. When shown on a schematic wiring diagram such as Figure 10-74, diodes have an arrow to point the direction of flow.

Diodes can be checked accurately using an ohmmeter having a 1-1/2 volt cell and a scale on which 300 ohms and 4-1/2 ohms can be read accurately. See Figure 10-82. Diode resistance can vary considerably and still have no effect on the efficient operation of the diode. When

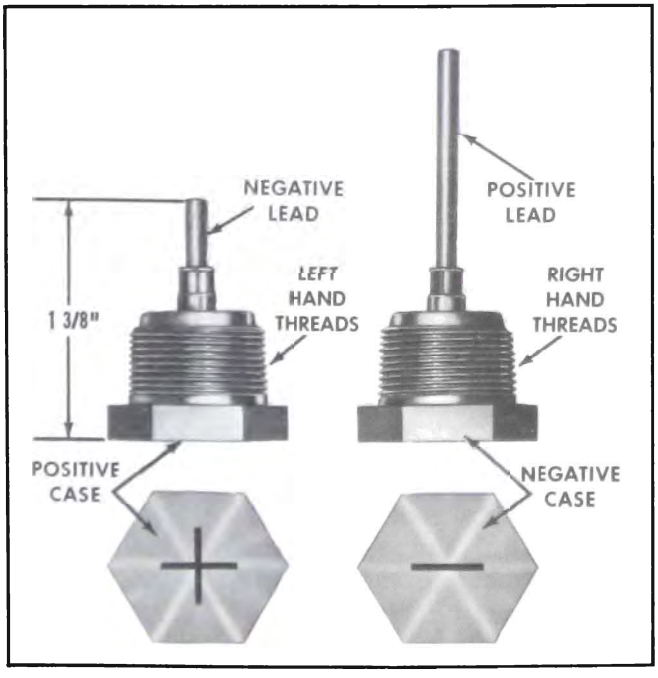

Figure 10-81—Comparison of Diodes

Figure 10-82—Checking Diodes

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diodes do fail, they invariably fail completely. For these reasons, use of a 12-volt test light is very satisfactory for checking diodes. Using a 12-volt battery for a power source, connect the test light across each diode in first one direction, then the other. In one direction, the bulb should light at full brightness; in the other direction, there should not be any glimmer of light. A diode which lights the bulb in both directions is shorted and must be replaced; a diode which will not light the bulb in either direction is open and must be replaced. CAUTION: Never use a 110-volt test light for checking diodes, as high voltage will ruin diodes.

c. Replacing Generator Diodes

Since pipe threads are used, the depth of penetration of diodes may vary when installed. To replace a diode which is mounted in the outside frame, use diagonal cutters to clip the leads on each side of the diode lead. Leave about one-half inch of lead length on each side of the diode lead to match the replacement diode. See Figure 10-83. Remove the defective diode.

Before installing the new diodes, lightly coat the threads with silicone grease. Install the diode and torque to 200 inch-pounds. Strip about one-half inch insulation from the long lead which is connected to the nylon terminal holder, and place over the long lead the insulating sleeve which is provided with the new diode.

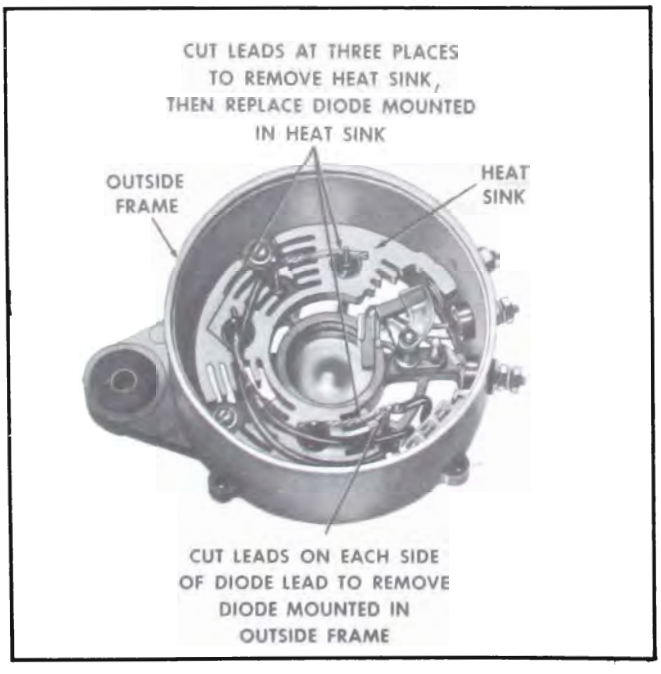

Figure 10-83—Replacing Defective Diodes

Join the ends of the leads of the new diode to the respective leads in the end frame, using the special connectors provided with the new diode. Crimp the connectors tightly over the ends of the wires and solder securely. Then push the sleeve over the soldered connector. CAUTION: Use only 60% tin, 40% lead solder, or other solder with melting point of 360°F or above. Do not bend the diode lead.

To replace a diode mounted in the heat sink, it is necessary to remove the heat sink from the end frame. This is accomplished by clipping with diagonal cutters the lead midway between each pair of negative and positive diodes, removing the nylon terminal holder from the frame and the leads from the holder, and then removing the "BAT" terminal and the heat sink attaching screws. It is not necessary to clip the long insulated leads attached to the diodes mounted in the outside end frame. See Figure 10-83. CAUTION: Negative diodes have right hand threads, and positive diodes have left hand threads.

After removing the defective diode, lightly coat the threads of the new diode with silicone grease. Install the diode and torque to 200 inch-pounds. Attach the heat sink to the frame, insert the lead ends into the connectors, crimp securely, and solder, using 360°F melting point, or higher, solder. Clip off the unused lead attached to the diode lead. Do not bend the diode lead.

d. Checking Rotor

The rotor may be checked electrically for grounded, open, or short circuited field coils. To check for grounds, connect a 110-volt test light from either slip ring to the rotor shaft or to the laminations. If the lamp lights, the field windings are grounded.

To check for opens, connect the leads of the 110-volt test light to each slip ring. If the lamp fails to light, the windings are open.

The windings are checked for short circuits by connecting a battery and ammeter in series with the two slip rings. Note the ammeter reading. Field current draw at 12 volts should be between 5.6 and 6.3 amperes. An ammeter reading above 6.3 amperes indicates shorted windings.

Since the field windings are not serviced separately, the rotor assembly must be replaced if the windings are defective.

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e. Checking Stator Windings

The stator windings may be checked for grounded, open, or shorted windings. If a 110-volt test lamp lights when connected from any terminal in the nylon holder to the stator frame, the windings are grounded. If the lamp fails to light when successively connected between each pair of stator terminals, the windings are open.

A short circuit in the stator windings is difficult to locate without laboratory test equipment, due to the low resistance of the windings. However, if all other electrical checks are normal and the generator fails to supply rated output, shorted stator windings are indicated.

f. Checking and Replacing Slip Rings

Slip rings which are rough or out of round should be trued in a lathe to .001 inch maximum indicator reading. Remove only enough material to make the rings smooth and round. Finish with 400 grain or finer polishing cloth and blow away all dust.

Slip rings which must be replaced can be removed from the shaft with a gear puller after the leads have been unsoldered. The new assembly should be pressed on with a sleeve which just fits over the shaft; this will apply all the pressure to the inner slip ring collar and prevent damage to the outer slip rings. Only pure tin solder should be used when reconnecting the field leads. Make sure the soldered connections are secure. New slip rings must be turned in a lathe to a smooth finish with .001 inch maximum indicator reading. Finish with 400 grain or finer polishing cloth.

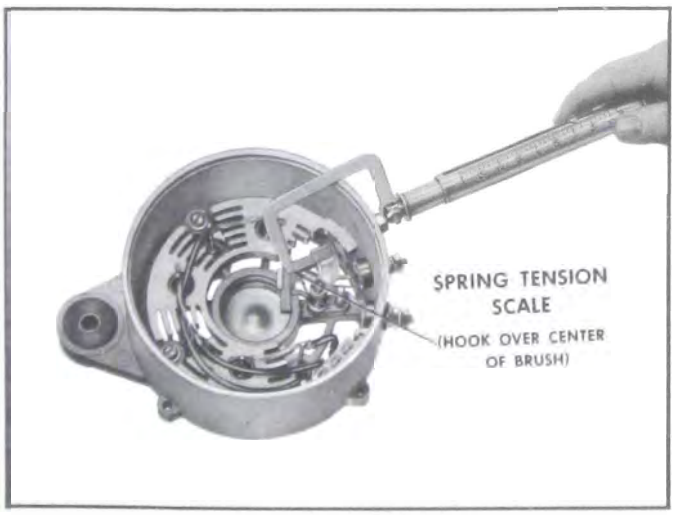

Figure 10-84—Checking Brush Spring Tension

g. Replacing Brushes

The extent of brush wear can be determined by comparison with a new brush. If brushes are worn over half way, they should be replaced. Replacement is accomplished by installing a new holder, brush, lead, and terminal assembly. Note that there are both right and left hand holders and springs. Both brush holders should be to the right of their pivot pin as viewed from the outside of the slip ring end frame.

Brush spring tension should be checked as shown in Figure 10-84. The spring tension scale should be hooked under the brush, and the reading taken with the brush in the same position encountered when riding on the slip ring. Excessive tension will cause rapid wear, whereas low tension results in erratic generator output and burning of the slip rings. Defective springs cannot be adjusted, and therefore must be replaced.

h. Lubricating Bearings

Under normal operating conditions, the generator will not require lubrication between engine overhaul periods. The grease reservoir in each end frame provides an adequate supply of lubricant for long periods of operation.

Before reassembly after generator overhaul, each reservoir should be half filled with Delco-Remy Lubricant No. 3 or its equivalent. CAUTION: Make sure that after assembly the reservoirs will be only half filled. Overfilling will cause the bearings to overheat.

If the bearings are found to be in satisfactory condition, they should be repacked with Delco-Remy Lubricant No. 3 or its equivalent before reassembly.

Satisfactory bearing life will be obtained only if recommended lubrication procedures are followed.

i. Reassembly of Generator

Reassembly is the reverse of disassembly. The exploded view in Figure 10-80 can be used as a guide during reassembly. Remember to lift up the brushes to prevent damage from side

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contact with the slip rings. Also be sure the two halves of the nylon connector are aligned so the connector tongues enter properly.

j. Servicing Regulator

If the generator operates properly, and all other circuit checks are satisfactory, trouble within the regulator is indicated. This most likely will appear as oxidized voltage regulator contacts, an open transistor, or a shorted regulator diode.

The only movable parts within the transistorized regulator are the contact points on the voltage regulator and relay units. For this reason, maintenance is limited mostly to keeping the contacts clean, as they eventually oxidize and develop resistance after extended periods of operation.

The contacts may be cleaned with crocus cloth or other fine abrasive material. After contacts have been cleaned, they should be washed with trichlorethylene or some other non-toxic cleaning solution to remove any foreign material. Never use emery cloth or sandpaper to clean contacts. All oxides should be removed, but it is not necessary to remove any cavity that may have developed.

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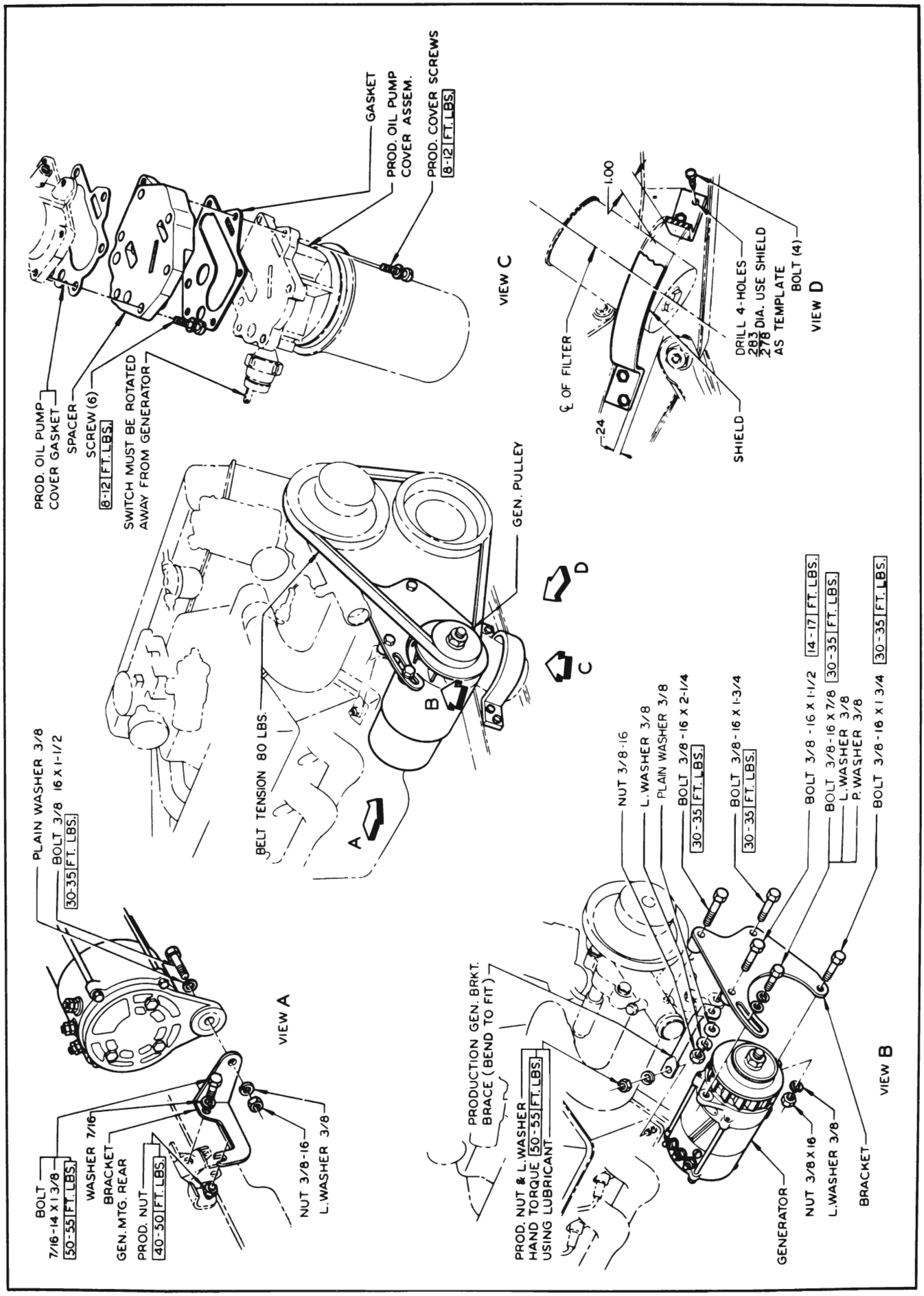

Figure 10-85—Police Car Generator Installation

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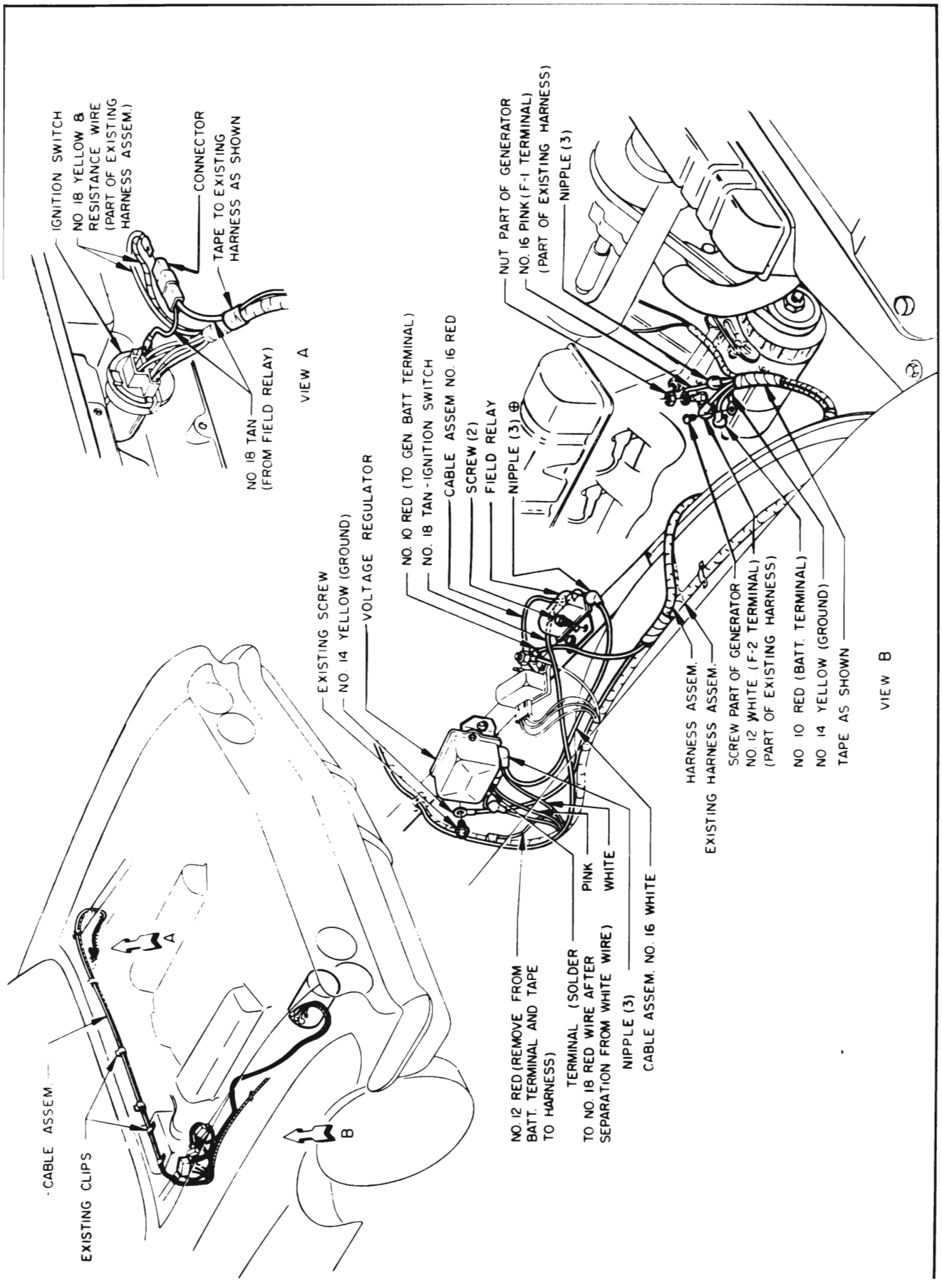

Figure 10-86—Police Car Generator System Wiring