Service Bulletin 1R-119A

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Dated 6-1-57

References: 1R-180, 1R-185, 1R-186

Delco Remy

STANDARD WATERPROOF

REGULATORS

(DOUBLE CONTACT TYPE — 1119600 SERIES)

This bulletin covers Delco-Remy three-unit, waterproof, Double Contact Type generator regulators beginning with the Model 1119600 series.

These generator regulators (Figure 1) contain three basic units—a cutout relay, a current regulator and a voltage regulator. The cutout relay and current regulator are of the conventional type and are checked and adjusted similarly to the other three-unit generator regulators.

The voltage regulator has a *double set of contact points* to control the generator voltage. The *lower set of contacts* is in series with the generator field circuit and the *upper set of contacts* shorts out the generator field circuit. This unit is checked and adjusted differently than the standard three-unit type voltage regulator.

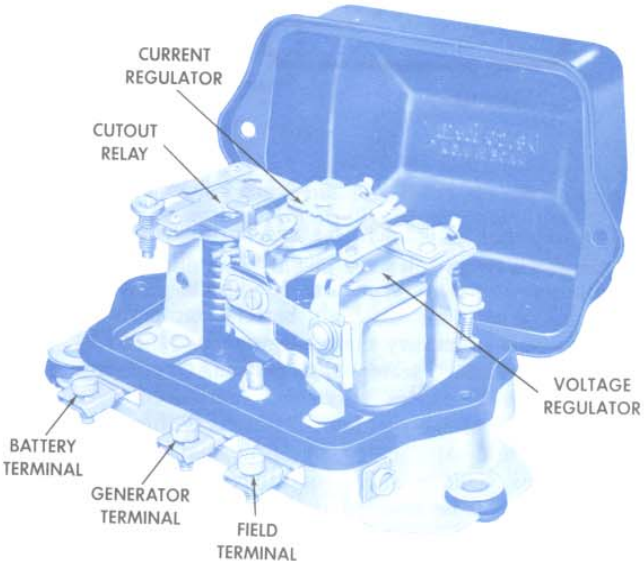

Figure 1—Delco-Remy "1119600 Series—Double Contact Voltage Regulator" with cover removed.

Voltage Control is accomplished in the Double Contact Regulator by the use of the two sets of contacts. A wiring diagram of this type regulator is shown in Figure 2. When the generator field current requirement is high, such as would occur at low generator speeds and high electrical loads, the Double Contact Regulator controls the generator voltage in the same manner as regulator models containing a single contact point set. That is, the lower contacts vibrate open and closed, alternately inserting and removing resistance which is in series with the generator field coils for generator voltage control. When the generator field current requirements are low, such as would occur at high generator speeds and low electrical loads, voltage control shifts to the upper set of contacts which also vibrate open and closed. This alternately inserts a resistance in series with the generator field coils and shorts out the generator field coils entirely for generator voltage control.

Some models of this type regulator incorporate an external adjustment feature which enables the user to make changes in the voltage regulator setting without removing the regulator cover, using electrical meters, or warm-up periods to bring the regulator up to operating temperature.

External adjustment is made possible by a plate and resistors located on the side of the regulator. This plate has five positions for an adjustment screw as shown in Figure 3. Any one of these positions can be used to satisfy the voltage requirements of the vehicle. A wiring diagram for this type double contact regulator is illustrated in Figure 4. Under normal operating conditions, the external adjustment screw should be in the middle or "O" position. The adjusting screw can be moved to the other positions to raise or lower the voltage setting + or — 0.3 volt or + or — 0.6 volt from the normal or "O" setting.

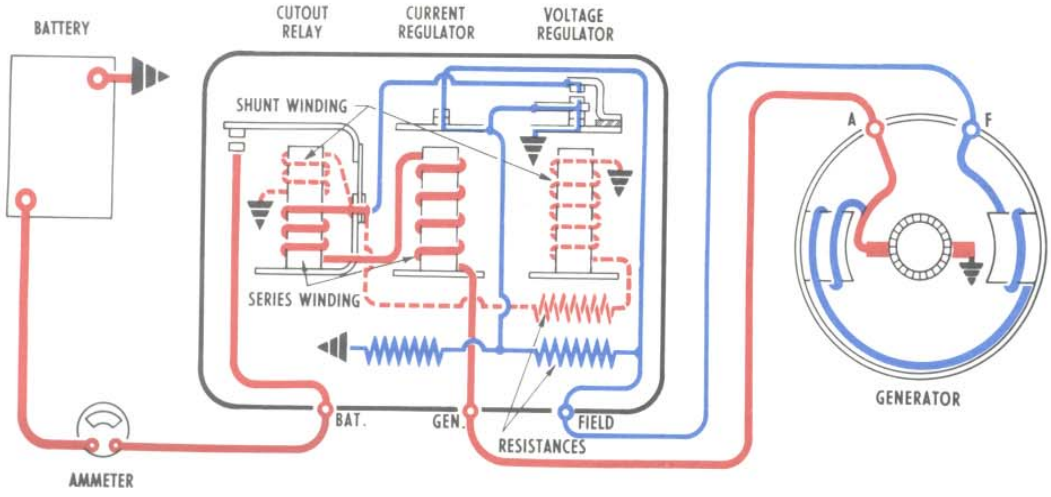

Figure 2—Circuit Wiring Diagram.

The external adjustment feature permits the user to quickly adjust the voltage setting to conform with variations in operating conditions. Unusual driving conditions or high battery temperature may result in battery overcharge as evidenced by excessive battery water consumption. Overcharge due to these causes may be experienced even though the voltage regulator setting is within specifications and satisfactory for all normal operating conditions. Under such conditions, overcharged batteries may be avoided if the voltage setting is reduced by moving the external adjustment screw to a lowered setting position. Conversely, unusual driving conditions or low battery temperature may be responsible for discharged batteries. In such cases, the voltage regulator setting may be quickly raised by moving the external adjustment screw to a higher setting position.

The ideal voltage setting is the one which will maintain the battery in a fully charged condition with a minimum use of water. This setting can be determined by observing the battery water consumption over a reasonable service period.

CHECKING PROCEDURE

CUTOUT RELAY—

Closing Voltage Check

1. With regulator on vehicle or on a test stand connect as shown in Fig. 5.
2. Connect voltmeter between the regulator "GEN" terminal and ground.
3. Connect a 25 ohm (25 watt) variable resistance (which has an "open" position) between regulator "F" (field) terminal and field lead from generator. (Connections to the variable resistance should be made so all the resistance can be inserted into the circuit before opening the circuit.)
4. Operate generator at medium speed with variable resistance turned completely in (maximum resistance).
5. Turn on lights or equivalent load.

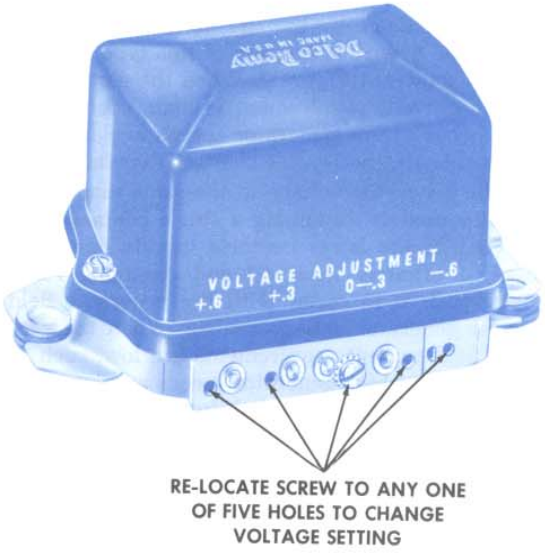

Figure 3—External Adjustment Plate.

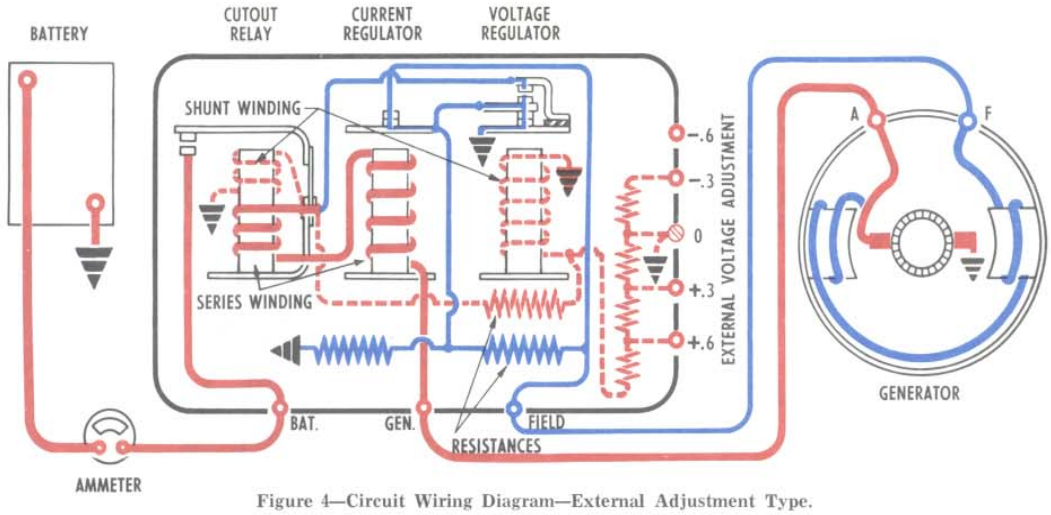

Figure 4—Circuit Wiring Diagram—External Adjustment Type.

6. Slowly decrease (turn out) resistance until cutout relay points close. Note closing voltage by a "kick" on the meter.

CAUTION—*Never ground the generator or regulator field terminal* when these units are connected and operating together. This will burn up the upper set of contacts of the voltage regulator.

VOLTAGE REGULATOR SETTING

Note: On regulators containing the external voltage setting adjustment, the adjusting screw and washer should be placed in the tapped hole marked "O" before making the internal voltage regulator setting (Figure 3). This assures that the voltage can be increased or decreased at some future time from the new setting by the external adjusting feature.

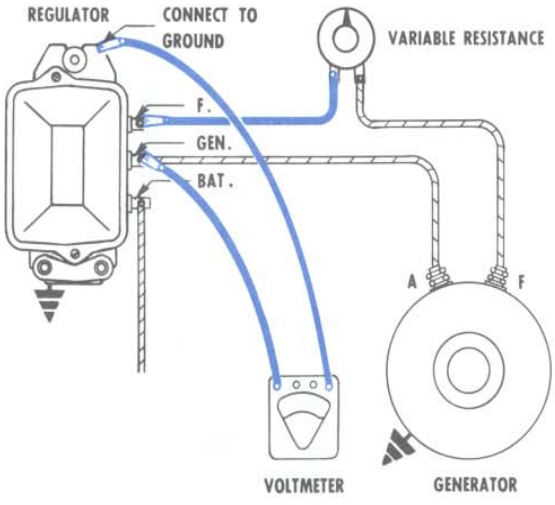

Figure 5—Voltmeter connections to check cutout relay closing voltage. Variable resistance used to control output of generator.

1. To properly check voltage regulator, the battery must be fully charged. Otherwise, insert a ¼ ohm fixed resistor (not less than 25 watts) into the charging circuit at "BAT" terminal of regulator (in series with battery) as shown in Figure 6. This limits the current flow to the battery to less than 10 amperes.
2. Connect a voltmeter from regulator "BAT" terminal to ground.
3. Connect a 25 ohm—25 watt variable resistance (as used above for checking closing voltage of cutout relay) in the field circuit.
4. With variable resistance turned out (minimum resistance), operate generator at medium speed, or a higher speed so that the voltage regulator is operating on the upper set of contacts. *Continue to operate for 15 minutes to establish operating temperature.* Regulator cover *must be* in place.
5. Cycle the generator by turning the variable resistance to the "open" position momentarily, then slowly decrease (turn out all) resistance. Regulator should again be operating on the upper set of contacts. See Bulletins 1R-180, 1R-185, and 1R-186 for the "normal range" voltage regulator setting specifications.
6. Increase (turn in) resistance slowly until the voltage regulator begins to operate on the lower contacts. The lower set of contacts should oper-

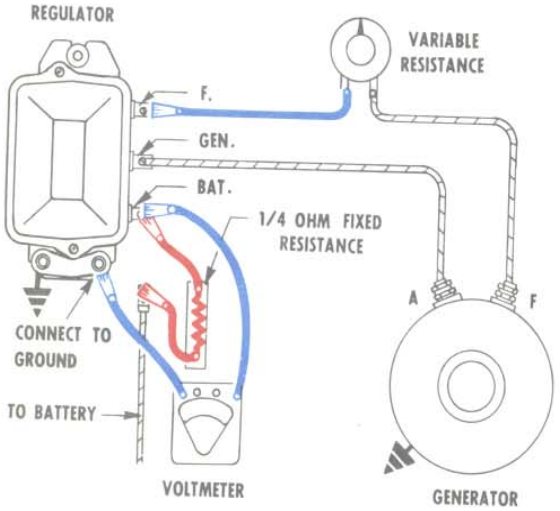

Figure 6—Fixed resistance and volt meter connections to check voltage regulator settings. Variable resistance used to control and cycle the generator.

ate at .1 - .3 volt lower voltage than the upper set.

CAUTION—*Never ground the generator or regulator field terminal* when these units are connected and operating together. This will *burn up* the upper set of contacts of the voltage regulator.

CURRENT REGULATOR SETTING

1. Connect ammeter into charging circuit as shown in Figure 7.
2. Turn on all accessory load (lights, radio, etc.) and connect an additional load across the battery (such as a carbon pile or bank of lights) so as to drop the system voltage approximately one volt *below* the voltage regulator setting.
3. Operate generator at a speed sufficient to produce current in excess to specified setting.
4. (a) *Temperature—Compensated Current Regulators* are identified by a small hole in the hinge which can be seen through the hole in the center of the armature assembly.

   Operate regulator at the current regulator setting (maximum output of generator) for at least 15 minutes to establish operating temperature. The regulator cover must be in place. See Bulletins 1R-180, 1R-185, and 1R-186 for the "normal range" current regulator setting specifications.

   (b) *Non-Temperature—Compensated Current Regulators* have the hole omitted in the armature hinge. Disregard 15-minute warm-up period. See Bulletins 1R-180, 1R-185, and 1R-186 for the "normal range" current regulator setting specifications.

5. Cycle generator as outlined in step 5 under "Voltage Regulator Setting" and *note* current regulator setting.

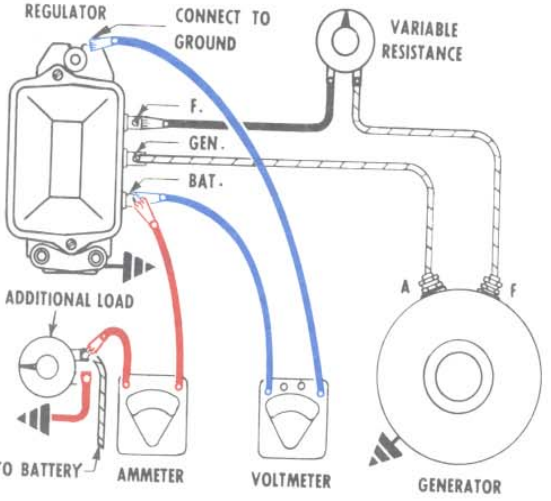

Figure 7—Connections for checking current regulator. Variable resistance used to cycle the generator.

ADJUSTING PROCEDURE—ELECTRICAL

CUTOUT RELAY

Adjusting Closing Voltage

1. Adjust closing voltage by turning adjusting screw as shown in Figure 8. Turn screw *clockwise to increase* setting and *counter-clockwise to decrease* the setting.

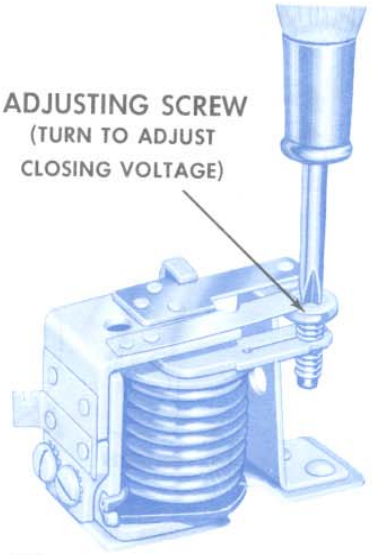

Figure 8—Adjustment of cutout relay closing voltage.

VOLTAGE REGULATOR

Adjusting the Voltage Setting

1. Upper set of contacts—To adjust the voltage setting while operating on the upper set of contacts, turn the adjusting screw as shown in Figure 9. Turn *clockwise to increase* voltage setting and *counter-clockwise to decrease* voltage setting.

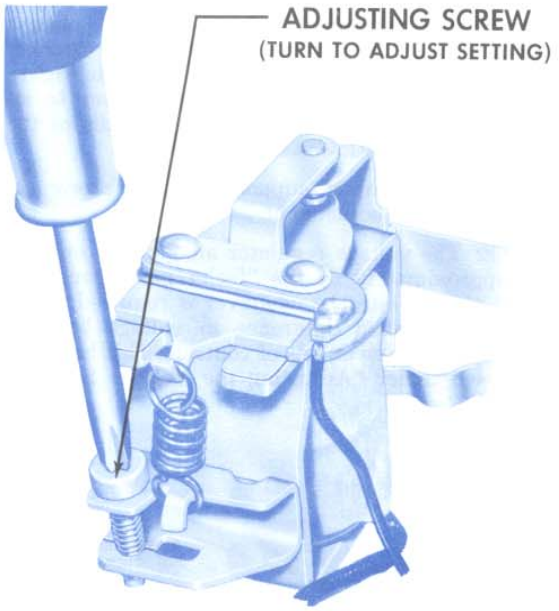

Figure 9—Adjusting the voltage regulator setting of the upper (shorting) set of contacts.

CAUTION: If adjusting screw is turned down (clockwise) beyond range, spring support may not return when screw is backed off. In such case, turn screw counter-clockwise until there is ample clearance between screw head and spring support. Then bend spring support up carefully until it touches the screw head. Final setting of the unit should always be made by increasing spring tension, never by reducing it. If setting is too high, adjust unit below required value and then raise to exact setting by increasing spring tension. After each adjustment and before taking reading, replace the regulator cover and cycle the generator.

2. Lower set of Contacts—The difference in voltage between the operation of the upper set of contacts and the lower set is increased by *slightly* increasing the air gap between the armature and center of core and decreased by *slightly* decreasing the air gap. See Figure 13 for changing the voltage regulator air gap. This adjustment can be made while the regulator is operating. If it is found necessary to make this air gap adjustment, it will be necessary to recheck the voltage setting of both sets of contacts.

CURRENT REGULATOR

Adjusting the Current Setting—

1. To adjust the current setting, turn the adjusting screw in the same manner as described for the voltage regulator. (See Figure 9.) Turn clockwise to increase current setting and counter-clockwise to decrease setting.

REPAIR & MECHANICAL ADJUSTMENT

(AIR GAPS & POINT OPENING)

CUTOUT RELAY—Air Gap

1. Place finger on armature directly behind the blade, move armature down until points just close.

2. Measure air gap between armature and center of core as shown in Figure 8. See specifications in Bulletins 1R-180, 1R-185, and 1R-186.

3. To adjust air gap loosen two screws in back of relay and raise or lower armature as required (Figure 10). Tighten screws after adjustment.

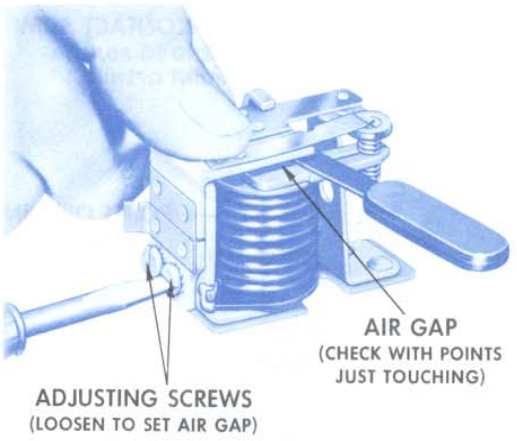

Figure 10—Cutout relay air gap check and adjustment. Battery must be disconnected when making this check.

CUTOUT RELAY—Point Opening

Check point opening and adjust by bending the upper armature stop as shown in Figure 11.

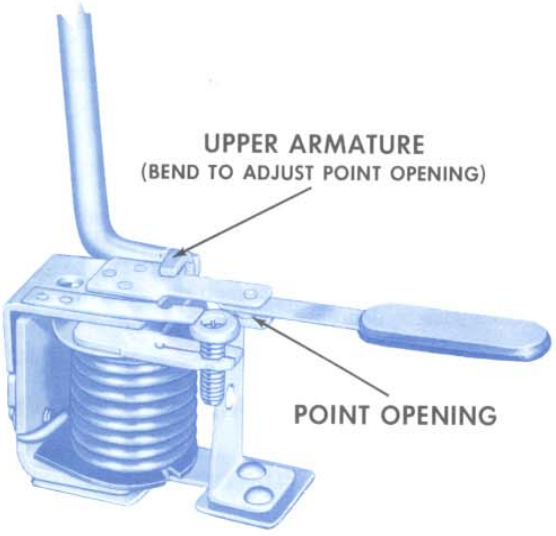

Figure 11—Cutout relay point opening check and adjustment. Battery must be disconnected when making this check.

VOLTAGE REGULATOR—Point Opening

1. With the lower contacts touching, measure the point opening between the upper set of contacts.
2. Adjust by bending the upper contact arm on the armature assembly as shown in Figure 12, being careful not to damage the armature hinge.

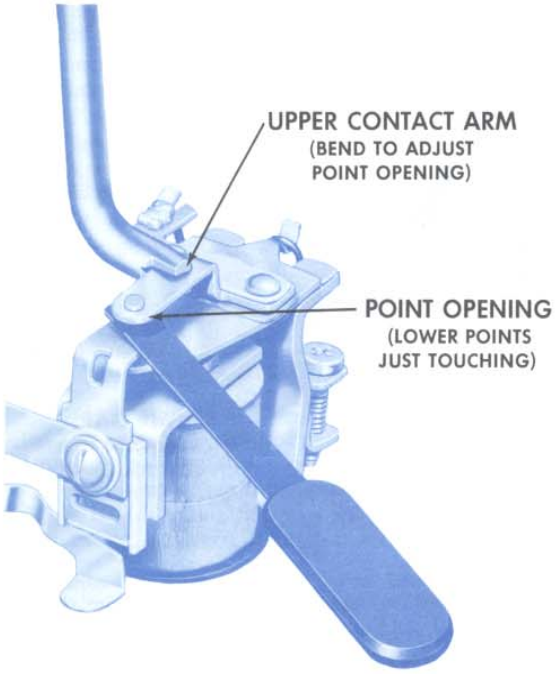

Figure 12—Voltage regulator point opening check and adjustment.

VOLTAGE REGULATOR—Air Gap

1. With lower contacts touching, measure air gap between armature and winding core as shown in Figure 13.
2. Adjust by loosening contact support bracket screw approximately ⅛ to ¼ of a turn, place a screwdriver in slot in contact support bracket and into the molded insulator as shown in Figure 13. Raise on the handle of screwdriver to increase the air gap and lower the handle of the screwdriver to lower the air gap.
3. Retighten contact support bracket screw securely after adjustment.

NOTE: The voltage regulator air gap can only be set approximately by the "feeler gauge" method. Final air gap must be whatever is required to obtain the specified difference in voltage between the upper and lower sets of contacts. This has been discussed under "Adjusting the Voltage Setting."

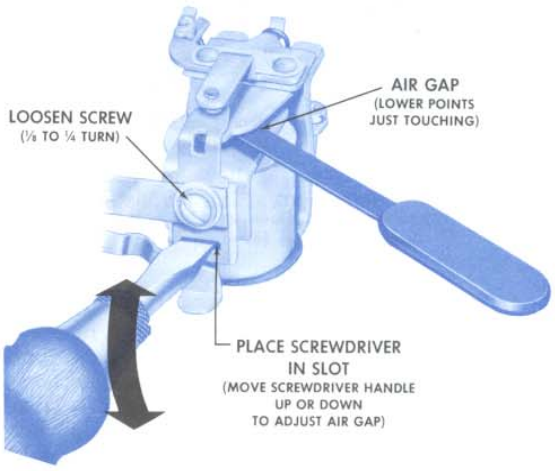

Figure 13—Voltage regulator air gap check and adjustment.

CURRENT REGULATOR—Air Gap

1. With contact points just touching, measure air gap between armature and winding core as shown in Figure 14.
2. Adjust by loosening contact mounting screws and raising or lowering contact mounting bracket as required.

CAUTION: Be sure the contact points are aligned and screws securely tightened after adjustment.

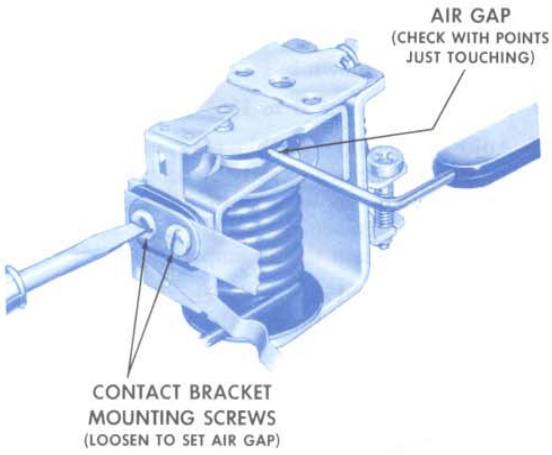

Figure 14—Current regulator air gap check and adjustment.

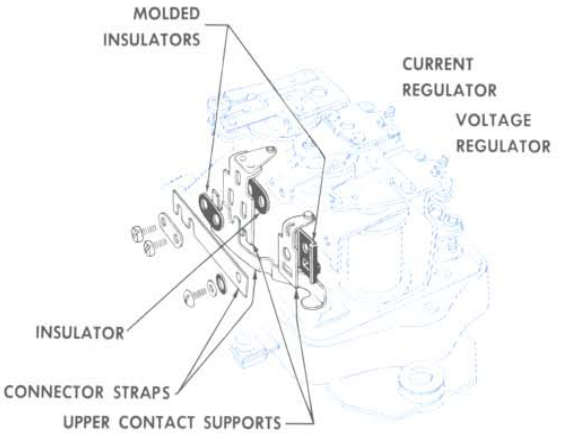

Figure 15—Relationship of insulators, contact support brackets and connector straps of both the voltage and current regulator.

CLEANING CONTACT POINTS

Contact points of a regulator will not operate indefinitely without some attention. The majority of regulator troubles can be eliminated by simply cleaning the voltage and current regulator contact points.

CURRENT REGULATOR CONTACTS

1. The large flat point should be cleaned with a spoon or riffler file so that pure metal is exposed. After filing the contacts they should be thoroughly washed with trichloroethylene or alcohol to remove any foreign materials.
2. The small soft-alloy contact point should be cleaned in accordance with the following section covering the cleaning of voltage regulator contact points.

VOLTAGE REGULATOR AND CUTOUT RELAY CONTACTS

The contact points on these units are of a soft material and SHOULD NOT BE CLEANED WITH A FILE.

1. Clean these contact points with crocus cloth or fine abrasive material.
2. Thoroughly wash contact points with trichloroethylene or alcohol to remove any foreign materials.

CAUTION—NEVER USE EMERY CLOTH OR SANDPAPER TO CLEAN THE CONTACT POINTS.

INSTALLING OR REPLACING CONTACT SUPPORT BRACKETS

After cleaning or replacing the voltage or current regulator contact supports, reassemble as shown in Figure 15.

POINTS TO REMEMBER ABOUT REGULATORS

POLARIZING GENERATOR

After reconnecting the leads, momentarily connect a jumper lead *between the "GEN" and "BAT" terminals of the regulator.* This allows a momentary surge of current to flow through the generator which correctly polarizes it. Failure to do this may result in severe damage to the equipment since reversed polarity causes vibration, arcing and burning of the relay contact points.

REGULATOR POLARITY

Some regulators are designed for use with negative grounded systems, while other regulators are designed for use with positive grounded systems. Using the wrong polarity regulator on an installation will cause the regulator contact points to pit badly and give short life. As a safeguard against installation of the wrong polarity regulator, *all regulators of this type have the model number and the polarity clearly stamped on the end of the regulator base.*

RADIO BY-PASS CONDENSERS

The installation of radio by-pass condensers on the field terminal of the regulator or generator *will cause the regulator contact points to burn and oxidize so* that generator output will be reduced and a rundown battery will result. If a condenser is found connected to either of these terminals, disconnect the condenser and clean the regulator contact points as previously explained.

COVER & RUBBER GASKET

Make sure the rubber gasket is in place between the cover and base. Tighten the cover screws securely. The gasket prevents the entrance of moisture, dust and oil vapors which are detrimental to regulator life.

CHECKING GENERATOR OUTPUT AND THE CHARGING CIRCUIT

In charging circuits where a double contact voltage regulator is used, it is quite important NEVER TO GROUND THE GENERATOR OR REGULATOR FIELD TERMINAL when these units are connected and operating together. Grounding of the field terminals when the units are operating together will result in *burning up* the upper set of voltage regulator contacts. A different method of checking the charging circuit voltage drops and generator output must be applied:

GENERATOR OUTPUT CHECK—
(Connect as shown in Figure 16).

1. Disconnect the field lead from the regulator "F" terminal—connect a 25 ohm-25 watt variable resistance (with an open position) between this lead and ground of the regulator—turn variable resistance to the "open" position.

2. Connect a voltmeter and an ammeter into the charging circuit as shown in Figure 16.

3. Turn on all accessory load (lights, radio, etc.) and connect an additional load across the battery (such as a carbon pile or bank of lights) if additional load is required to obtain the output (amperes) rating of the generator.

4. Operate engine at 1500 R.P.M. (or generator speed at 3000 R.P.M.) and then turn field variable resistance toward the direct position until the voltage reaches not more than 16 volts or until all field variable resistance is cut out. Ammeter will indicate the generator output.

   CAUTION—*Never allow the voltmeter reading to exceed 16 volts.* Exceeding this voltage may result in damage to radio, regulator, lights, etc.

5. Turn variable resistance to the "open" position.

Circuit Voltage Drop

6. Turn off all accessory load and disconnect any added load as shown in Figure 16.

7. Adjust engine speed to 1000 R.P.M.

8. Adjust the field variable resistance until the ammeter indicates exactly 20 amperes. *Do not allow voltage to exceed 16 volts.* It may be necessary to place a load directly across the battery to obtain the 20 ampere load.

9. To test insulated side of the circuit, connect the voltmeter leads between the ungrounded battery post and the armature terminal of the generator. Voltmeter reading should not exceed 0.6 volts. Note—the voltage drop across the test ammeter should be measured and subtracted from the voltmeter reading to give the actual drop of the wiring in this part of the charging circuit.

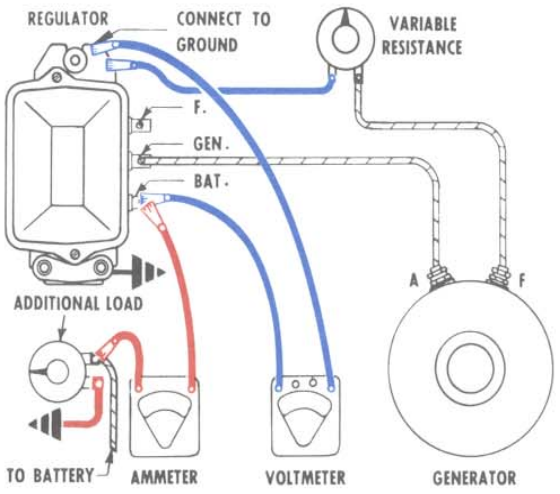

Figure 16—Connections for checking generator output and voltage drop check.

10. To test the ground side of the circuit, connect the voltmeter leads between the grounded battery post and the generator ground. Voltmeter reading should not exceed 0.2 volts.

11. Return the field variable resistance to the open position and stop engine.

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