ALTERNATOR OUTPUT CONTROL MODEL 4TR

1. DESCRIPTION

Model 4TR is an electronic control unit. In effect its action is similar to that of the vibrating contact type of voltage control unit, but switching of the field circuit is achieved by transistors instead of vibrating contacts, while a Zener diode provides the voltage reference in place of the voltage coil and tension spring system. No cut-out is required since the diodes incorporated in the alternator prevent reverse currents from flowing. No current regulator is required as the inherent self-regulating properties of the alternator limit the output current to a safe value.

The control unit and the alternator field windings are isolated from the battery when the engine is stationary, usually either by a special double-pole ignition switch or by means of an isolating relay.

When a temperature compensation device is fitted this takes the form of a thermistor connected in parallel with one of the Zener-biasing resistors. The thermistor is a device whose resistance increases as the temperature falls and vice-versa. Any alteration in its ohmic value will cause the Zener diode to begin to conduct at a modified value of alternator output voltage, so matching the changes which take place in "on charge" battery terminal voltage due to temperature change.

WARNING: The battery must never be disconnected while the alternator is running. Failure to observe this ruling will cause the control unit to be irreparably damaged.

Care must be taken at all times to ensure that the battery, alternator and control unit are correctly connected. Reversed connexions will damage the semi-conductor devices employed in the alternator and control unit.

2. ROUTINE MAINTENANCE

The output control unit does not require any regular maintenance but the moulded cover, can be occasionally be wiped clean and a check made that the terminal connector is secure.

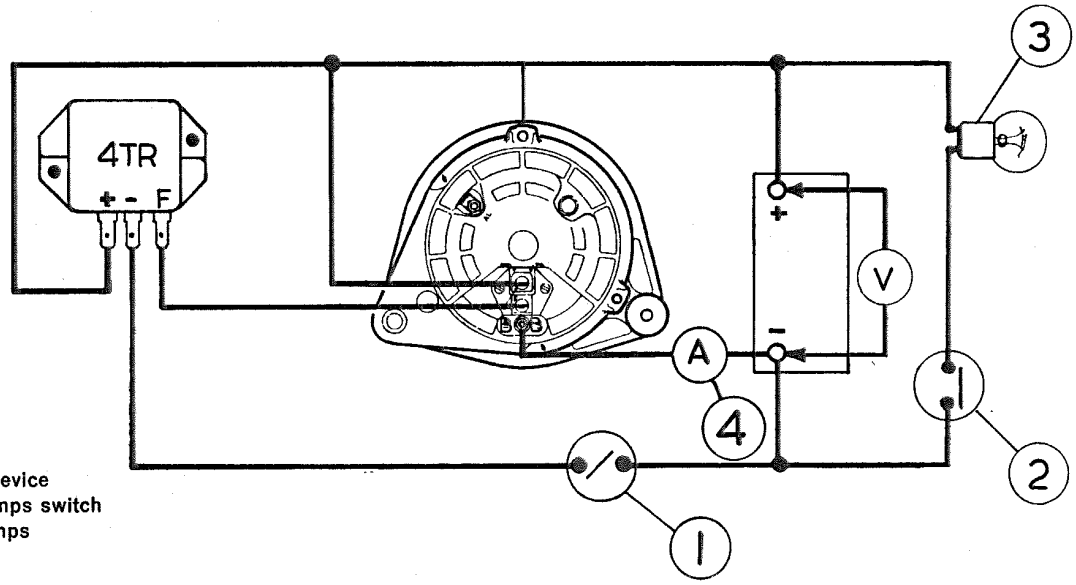
3. CHECKING AND ADJUSTING

Before checking and adjusting the control unit it must be established that the alternator and the charging circuit wiring are in good order (see PART A). Check also the battery-to-control unit wiring which incorporates the field isolating device. To ensure proper working of the control unit, the resistance of this complete circuit — including the isolating device — must not exceed 0.1 ohm. Any unduly high resistance must be traced and remedied.

Checking

Leave the existing connexions to the alternator and control unit undisturbed. Connect a voltmeter of 1% or better accuracy and appropriate range between the battery terminals and note the reading with all electrical equipment switched off. If available, use a voltmeter of the suppressed-zero type, reading 12–15 volts (12-volt installations) or 24–30 volts (24-volt installations).

Unless an ammeter is fitted to the vehicle, insert one, of suitable range, in series with the alternator main output cable.



1. Field isolating device
2. Side and tail lamps switch
3. Side and tail lamps
4. Ammeter

Fig. 1 4TR Control test circuit

Alternator Output Control Model 4TR

Switch on an electrical load of approximately 2 amperes, e.g. side and tail lighting. The test circuit is shown in Fig. 1.

Ascertain the Part Number of the control unit — this is marked on the upper edge of the moulded cover.

Start the engine and run the alternator at approximately 3,000 rev/min for at least eight minutes. (This will ensure that the system voltage has stabilised.) If the charging current is still greater than 10 amperes, continue to run the engine until this figure is reached. Now compare the voltmeter reading with the appropriate setting limits given in the following table.

Part No.	*Voltage Setting Limits*
*37423, *37449	13.9 – 14.3
37429	13.7 – 14.1
*37444, *37502	27.9 – 28.3

*Fitted with thermistor.

If the reading obtained is stable but outside the appropriate limits the unit can be adjusted to control at the correct voltage (see **'Adjusting'**).

If, however, the voltmeter reading remains unchanged (at open-circuit battery terminal voltage) or, conversely, increases in an uncontrolled manner, then the control unit is faulty and a replacement must be fitted. Component parts are not serviced individually.

Adjusting

Stop the engine and withdraw the control unit mounting screws. Invert the unit and carefully scrape away the sealing compound which conceals the potentiometer adjuster (see Fig. 2). Check that the voltmeter is still firmly connected between the battery terminals. Start the engine and, while running the alternator at 3,000 rev/min, turn the potentiometer adjuster slot — clockwise to increase the setting or anti-clockwise to decrease it — until the required setting is obtained. Use care in making this adjustment — a small amount of adjuster movement causes an appreciable difference in the voltage reading.

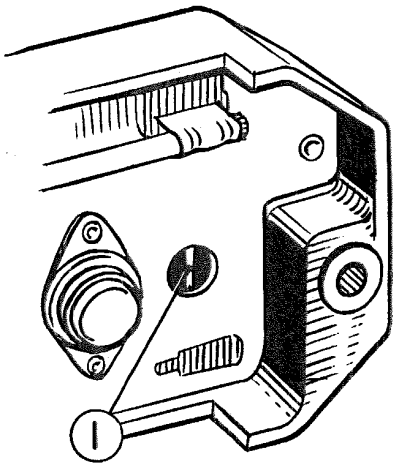


Fig. 2 4TR Control rear view
1 Potentiometer adjuster

Re-check the setting by first stopping the engine, then again starting and running the alternator at 3,000 rev/min.

Refit the control unit and disconnect the voltmeter.

IMPORTANT

Precaution to be observed when using a fast-charger

Before using a fast-charger, either to boost the battery or to start the engine, first withdraw the three-way connector from the control unit terminals. Do not re-connect the terminals until the charger has been disconnected and, in the case of assisted starting, the engine speed reduced to tick-over.

Failure to observe this precaution may result in irreparable damage of the semiconductors in the control unit.

Note: Originally, three separate connectors were used at the control unit. When disconnecting these, make sure that

(i) the disconnected ends do not contact either each other or any other part, and

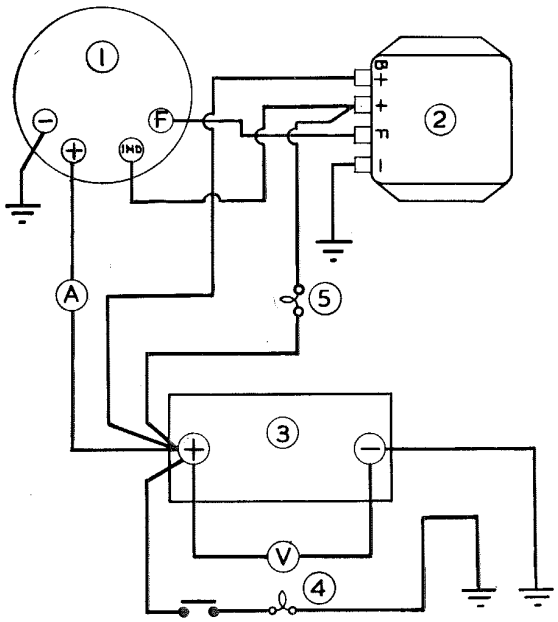
(ii) are correctly re-connected subsequently.

ALTERNATOR OUTPUT CONTROL MODEL 4TR

PART NO. 37527

1. DESCRIPTION

This addition to the range of 4TR output control units is designed for use with '9-diode' alternators, e.g. models 15AC and 16AC. The unit is similar to previous 4TR units, described earlier in this section, except that the thermistor is omitted and the unit is not adjustable. In addition, it carries a fourth terminal by means of which battery voltage is sensed directly from the battery connection at the starter solenoid. This avoids the necessity for an external relay or separate contacts on the ignition switch, and ensures more accurate sensing of battery voltage. The drain on the battery created by the permanent connection is negligible.



1 Alternator
2 Output control unit
3 12 V 9-plate battery
4 Side and tail lighting (if required)
5 Warning light

Fig. 1 4-terminal 4TR Control test circuit

2. CHECKING THE VOLTAGE SETTING

Before checking the voltage setting of the control unit it must be established that the alternator and the charging circuit wiring are in good order (see Part A). In particular the circuit resistance must not exceed 0.04 ohm between regulator '—' terminal and battery '—' terminal or 0.003 ohm between alternator '—' terminal and battery '—' terminal.

For the following test the vehicle battery must be in a well-charged condition, or temporarily replaced by a 9-plate battery that is well charged.

Leave the existing connections to the alternator and control unit undisturbed. Connect a voltmeter of 1% or better accuracy and appropriate range between the battery terminals. If available, use a voltmeter of the suppressed-zero type, reading 12–15 volts. Unless an ammeter is fitted to the vehicle, insert an ammeter of 0–40 range in series with the alternator main output (+) cable at its connection with the starter solenoid. Make the ammeter connections firmly so that, when at charging speed, there is no risk of disconnection taking place due to vibration. See 'PRECAUTIONS' in Section A-4.

Start the engine and run the alternator at approximately 5,000 rev/min until the ammeter shows an output current of 5 amperes. If, on starting the engine, the charging rate is already below this value, switch on a light external load, e.g. side and tail lamps. The test circuit is shown in Fig. 1.

The voltmeter should now give a reading of 14.3–14.7 volts. If the reading obtained is unstable or is outside these limits, the control unit is faulty and a replacement unit must be fitted.

The control unit is not adjustable and its component parts are not serviced individually.