

SECTION 1F

CRANKING SYSTEM

GENERAL DESCRIPTION	1F — 122
Cranking Circuit	1F — 122
Starting Motor	1F — 122
TROUBLESHOOTING	1F — 124
INSPECTION	1F — 126
Starting Motor	1F — 126

GENERAL DESCRIPTION

CRANKING CIRCUIT

Cranking circuit is consisted of battery, starting motor, ignition switch and related electrical wiring. Only the starting motor will be covered in this section.

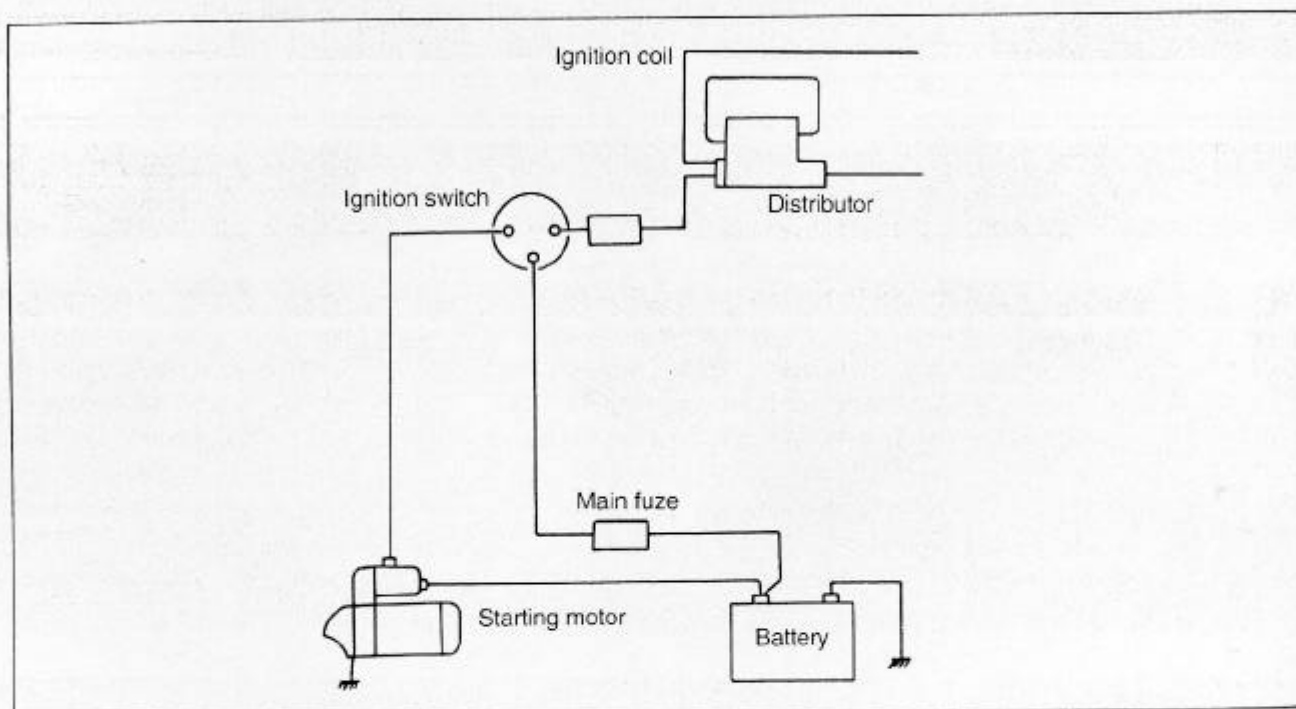


FIG. 1F — 1 CRANKING CIRCUIT

STARTING MOTOR

Item	DAEWOO
Output(Kw)	0.8

Starting motor is consisted of the parts shown in Fig. 1F — 2, and has a permanent magnet mounted in starting motor yoke(frame).

The magnetic switch assembly and parts in the starting motor are enclosed in the housings so that they will be protected against possible dirt and water splash. In the circuit shown in Fig. 1F — 1, magnetic switch coils are magnetized when ignition switch is in "ON" position, and the pinion is to be engaged in the ring gear of flywheel by the moving pinion drive lever. This makes magnetic switch turned to "ON" and cranking takes place. After starting engine, pinion one-way clutch protects armature from excessive speed until ignition switch turns to "OFF", and when the switch turns to "OFF", the return spring causes the pinion to disengage.

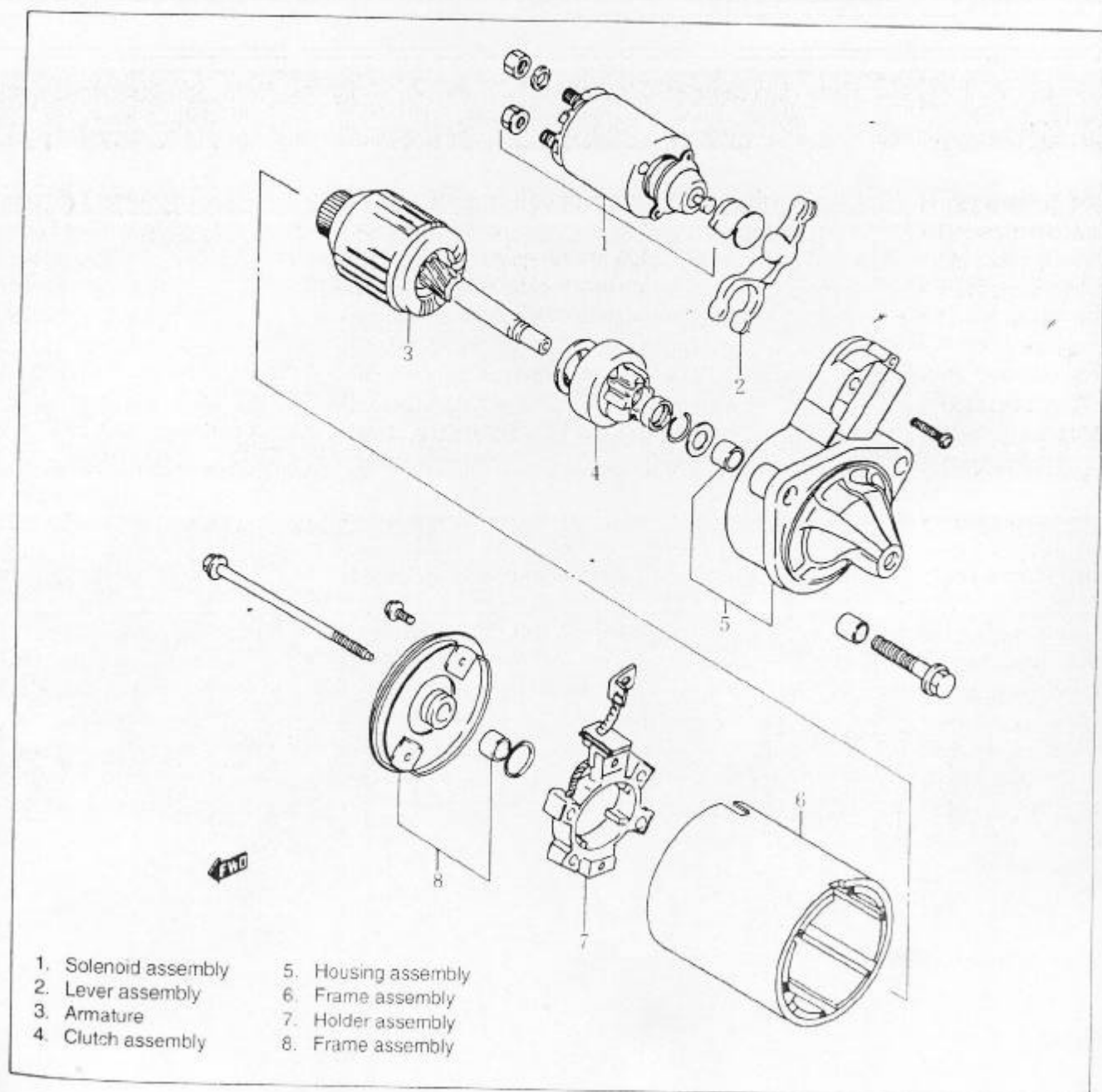


FIG. 1F — 2 STARTING MOTOR CONFIGURATION DIAGRAM

TROUBLE SHOOTING

Following conditions are found due to the malfunction in the cranking system.

- Starting motor does not work (or retarded starting speed).
- Engine does not turn with working start motor.
- Abnormal noise comes
- Confirm the probable causes in battery, harness (including starting motor switch), starting motor or in any parts of engine.

Check the probable causes with the motor installed because the motor can not be started with the starting motor removed.

1. Malfunction details
2. Connecting condition of battery terminal (grounding cable connections in the engine side) and starting motor terminals
3. Battery charging
4. Installation of starting motor

Condition	Probable Cause	Correction
Starting motor does not work	No operating sound of magnetic switch <ul style="list-style-type: none"> • Battery run down • Low battery voltage due to deterioration • Poor contact in battery terminal • Loose grounding cable connection • Fuse loosening or cutting • Poor contact upon ignition switch • Loosened leads • Cutting cable between ignition switch and magnetic switch • Cutting of pull in coil • Poor lubrication of plunger 	<ul style="list-style-type: none"> • Charge battery • Replace battery • Retighten or replace • Retighten • Tighten or replace • Replace • Retighten • Repair • Replace magnetic switch • Replace
	Operational sound of magnetic switch is heard <ul style="list-style-type: none"> • Battery run down • Low battery voltage due to deterioration • Poor contact in battery cable • Burnt main contact point, or poor contacting action of magnetic switch • Brushes are seating poorly or worn • Low elasticity of brush spring • Burnt commutator • Malfunction of armature 	<ul style="list-style-type: none"> • Charge battery • Replace battery • Retighten • Replace magnetic switch • Repair or replace • Replace • Replace • Replace

Condition	Probable Cause	Correction
Starting motor running, but too slow (insufficient torque)	Inspect starting motor when no defect is found on battery or wiring sides. <ul style="list-style-type: none"> • Poor contact of main joints of magnetic switch • Malfunction of armature • Disconnected, burnt or worn commutator • Abrasion or burn of brush • Low elasticity of brush spring 	<ul style="list-style-type: none"> • Replace • Replace • Repair or replace • Replace • Replace
Starting motor running, but not cranking engine	<ul style="list-style-type: none"> • Worn pinion chip • Poor lubrication of one-way clutch • Clutch idling due to defect of roller spring • Worn ring gear 	<ul style="list-style-type: none"> • Replace one-way clutch • Replace one-way clutch • Replace one-way clutch • Replace flywheel
Noise	<ul style="list-style-type: none"> • Abnormal abrasion of brush • Worn pinion ring gear • Poor lubrication of pinion • Worn inner teeth of idle gear 	<ul style="list-style-type: none"> • Replace • Replace pinion, flywheel • Replace • Replace
Starting motor won't stop	<ul style="list-style-type: none"> • Fused contacts of magnetic switch • Malfunction of magnetic switch • Failure returning action in ignition switch 	<ul style="list-style-type: none"> • Repair or replace • Replace • Replace

INSPECTION

STARTING MOTOR

1. Armature Inspection

Inspect commutator for dirt or burn. Remove with sandpaper or lathe, if necessary.

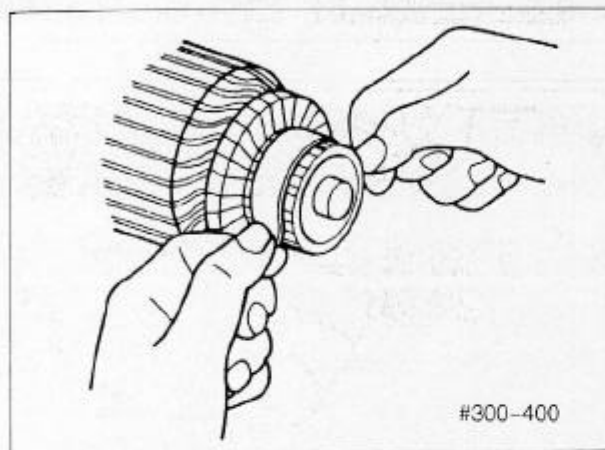


FIG. 1F-3

Check commutator for uneven wear. If deflection of dial gauge pointer exceeds limit, repair or replace.

CAUTION

If the bent exceeds below specification, replace the armature.

Commutator out of round(mm)	Standard	Limit
	0.05	

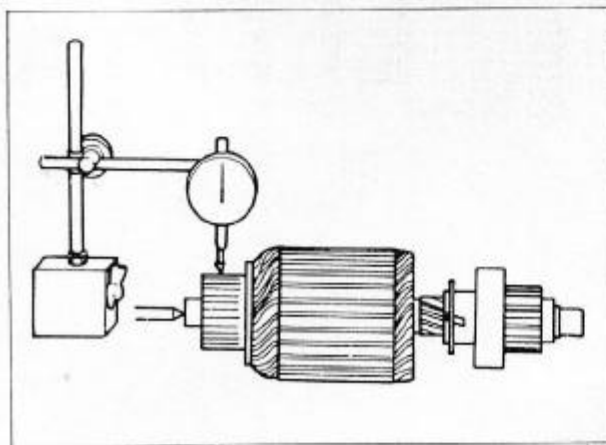


FIG. 1F-4

Replace armature if the outer diameter of worn commutator is below the following standard.

Outer diameter of commutator(mm)	Standard	Limit
	31.90 — 32.60	

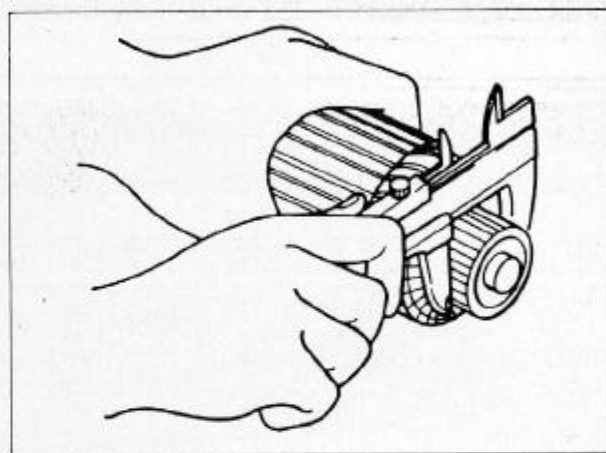


FIG. 1F-5

Check commutator for mica thickness. Repair or replace if below the limit.

Commutator Mica thickness(mm)	Standard	Limit
	above 1.0	

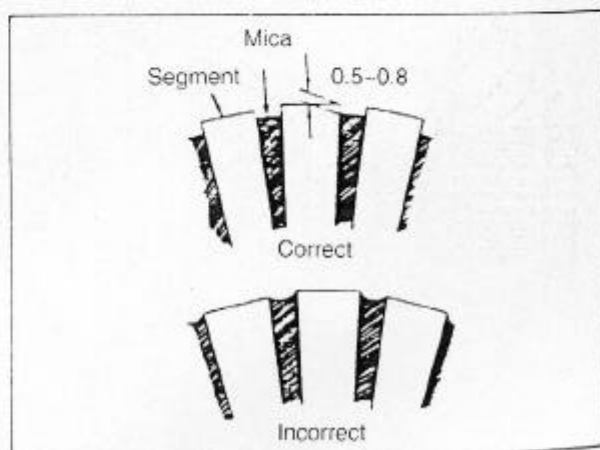


FIG. 1F-6

Ground Test

Check commutator and armature. If there is continuity, armature is grounded and must be replaced.

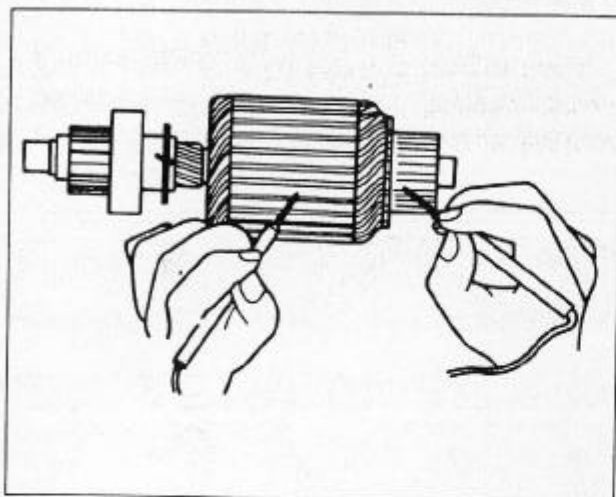


FIG. 1F-7

Open Circuit Test

Check for continuity between segments. If there is no continuity at any test point, there is an open circuit and armature must be replaced.

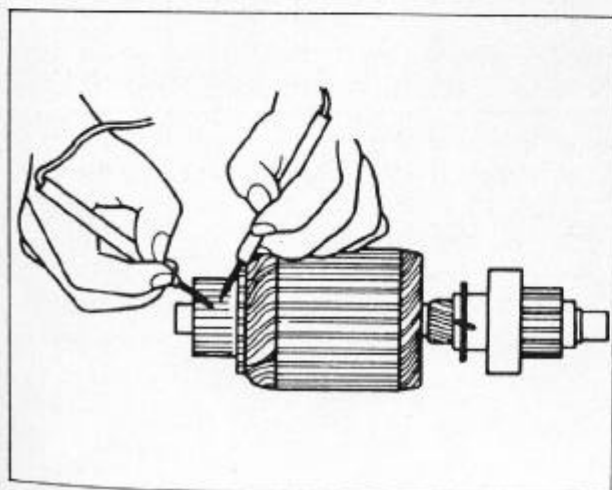


FIG. 1F-8

2. Brush Inspection

If the length of worn brush is below the following value, replace the brush.

Brush Length(mm)	Standard	Limit
	7.00 — 7.25	

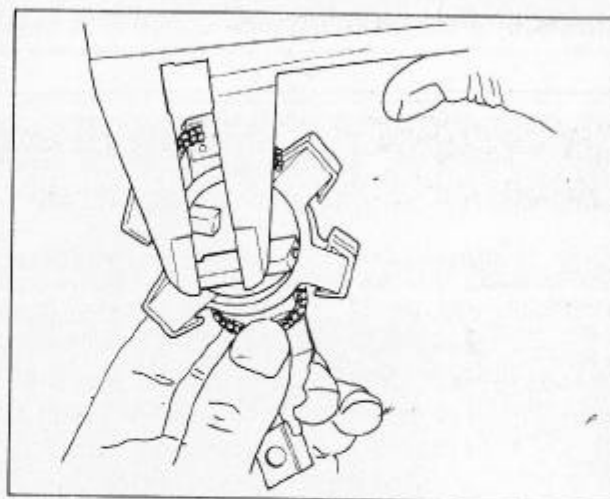


FIG. 1F-9

3. Performance Test

CAUTION

Finish test in 3~5 seconds not to make coil burnt.

Pull-in test

Connect battery to magnetic switch as shown below, and check that plunger moves outward. If the plunger does not move, replace magnetic switch.

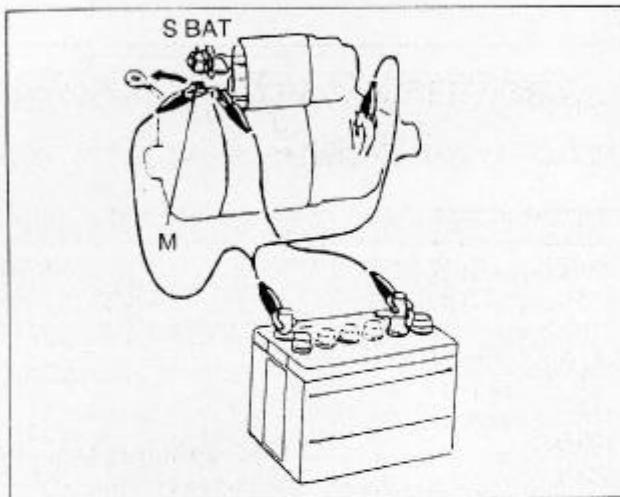


FIG. 1F - 10

Hold-in test

While connected as above with plunger out, disconnect \ominus lead from terminal M, and check the plunger returning inward. If the plunger returns inward, replace the magnetic switch.

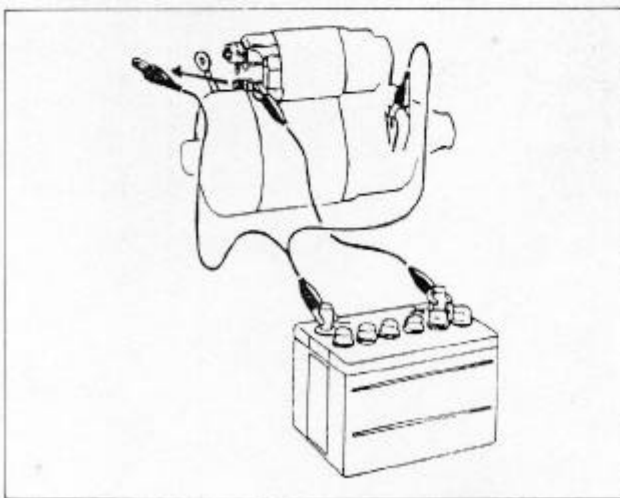


FIG. 1F - 11

Check plunger return

Disconnect \ominus lead from switch body and check plunger returning inward. If plunger does not return, replace magnetic switch.

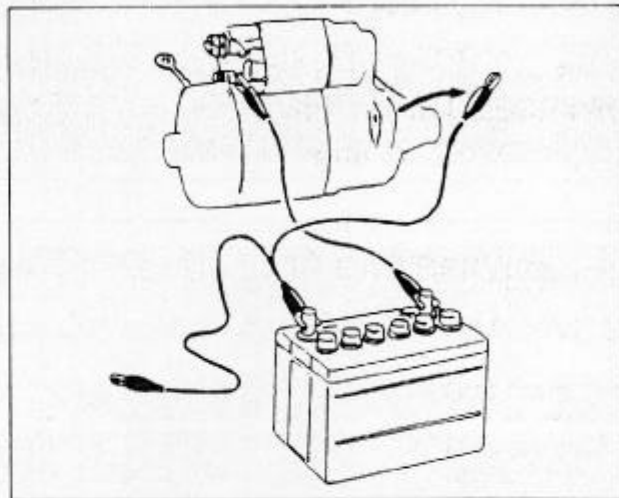


FIG. 1F - 12

No-load performance test

- Connect the battery and ammeter to starting motor as shown below.
- Check that starting motor rotates smoothly and steadily with pinion moving out. Check that ammeter reads the specified current.

Specified current(A)

Less than 53A at 11.5V

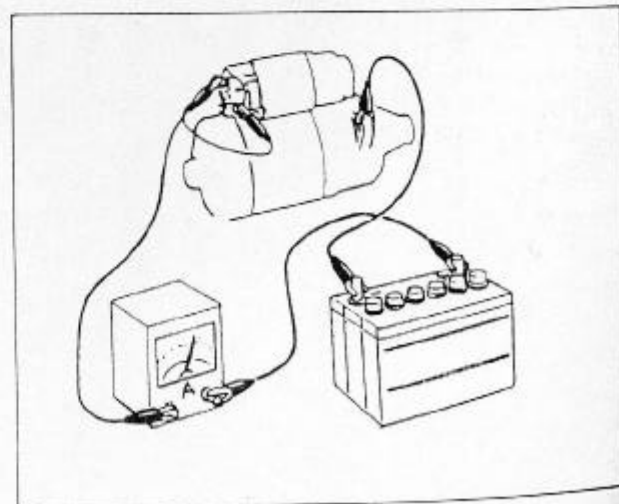


FIG. 1F - 13