Chapter Three

Engine and Engine Rebuilding

Engine Electrical

DISTRIBUTOR

Removal

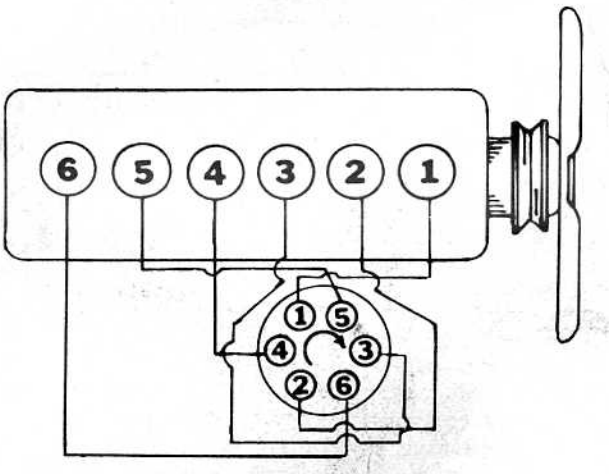
1. Remove the cables from the spark plugs, after marking the wiring order.
2. Remove the primary wire and the vacuum line from the distributor. Remove the distributor cap.
3. Match-mark the distributor housing and the engine block; mark the rotor position in the distributor as well. This will aid in correct positioning of the distributor during installation.
4. Remove the clamp from the distributor. Remove the distributor from the block.

NOTE: *It is easier to install the distributor if the engine timing is not disturbed while it is removed. If the timing has been lost, see "Installation—Timing Lost," below.*

Installation—Timing Not Disturbed

1. Insert the distributor in the block and align the matchmarks made during removal.
2. Engage the distributor drive with the oil pump driveshaft.
3. Install the distributor clamp, cap, primary wire, and vacuum line.

Firing Order



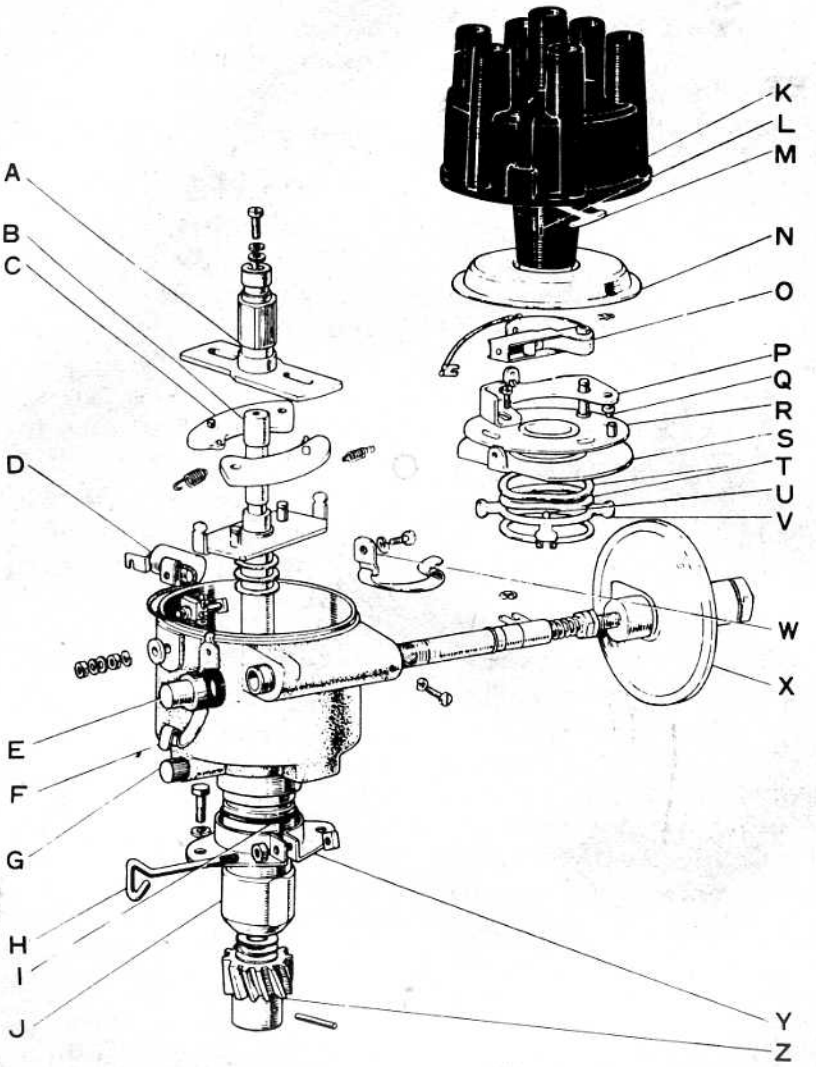
Firing order and wiring sequence for the F Series engine

4. Install the wires on the spark plugs. Remember to check the marks made during removal to be sure that the right wire goes to the right plug.
5. Start the engine. Check and adjust the timing, as outlined in Chapter 2.

Installation—Timing Lost

If the engine has been cranked, dismantled, or the timing otherwise lost, proceed as follows:

1. Determine top dead center (TDC) of the number one (no. 1) cylinder's compression stroke by removing the spark plug from the no. 1 cylinder and



Exploded view of the distributor

A. Distributor cam
B. Distributor shaft
C. Governor weight
D. Condenser
E. Adjuster cap
F. Spring clip
G. Oil cap
H. Holder screw
I. O-ring
J. Distributor housing
K. Distributor cap
L. Carbon piece
M. Distributor rotor
N. Dustproof cover
O. Breaker arm
P. Contact point plate
Q. Eccentric bolt
R. Breaker plate
S. Stationary plate
T. Washer
U. Ball
V. Breaker plate set spring
W. Spring clip
X. Vacuum advancer
Y. Distributor clamp
Z. Distributor drive gear

placing a finger or a compression gauge over the spark plug hole.

Crank the engine until compresssion pressure starts to build up. Continue cranking the engine until the timing marks indicate TDC.

2. Next, align the timing marks to the specifications given in the "Ignition Timing" column of the tune-up chart at the beginning of Chapter 2.

3. Temporarily install the rotor in the distributor without the dust cover. Turn the distributor shaft so that the rotor is pointing toward the No. 1 terminal in the distributor cap. The points should just be about to open.

4. Use a small screwdriver to align the slot on the distributor drive (oil pump driveshaft) with the key on the bottom of the distributor shaft.

5. Lightly oil the distributor spiral gear and the oil pump driveshaft end.

6. Install the distributor in the block by rotating it slightly (no more than one gear tooth in either direction) until the driven gear meshes with the drive.

7. Rotate the distributor, once it is installed, so that the points are just about

to open. Temporarily tighten the pinch bolt.

8. Remove the rotor and install the dust cover. Replace the rotor and the distributor cap.

9. Install the primary wire and the vacuum line.

10. Install the no. 1 cylinder spark plug. Connect the cables to the spark plugs in the proper order by using the marks made during removal.

11. Start the engine and adjust the breaker point dwell and ignition timing.

ALTERNATOR

Alternator Precautions

To prevent damage to the alternator and regulator, the following precautionary measures must be taken when working with the electrical system.

1. Never reverse the battery connections. Always check the battery polarity visually. This is to be done before any connections are made to be sure that all of the connections correspond to the negative ground polarity of the Land Cruiser.

2. Booster batteries for starting must be connected properly. Make sure that the positive cable of the booster battery is connected to the positive terminal of the battery which is getting the boost.

3. Disconnect the battery cables before charging. The charger has a tendency to force current through the alternator diodes in the opposite direction for which they were designed. This burns out the diodes.

4. Never use a fast battery charger as a booster for starting the vehicle.

5. Never operate the alternator with the battery cables disconnected, the leads disconnected from the regulator, or with any open circuit in the charging system.

6. Never ground the alternator output terminal or the regulator terminals while operating the alternator.

7. Always disconnect the battery ground cable when replacing electrical components.

8. Never subject the alternator to excessive heat or dampness if the engine is being steam cleaned.

9. Never use arc welding equipment on the vehicle with the alternator and battery connected.

10. Never attempt to polarize an alternator.

Removal and Installation

1. Disconnect the battery-to-starter cable from the battery.

2. Disconnect the electrical leads from the rear of the alternator.

3. Remove the air cleaner assembly.

4. Remove the fan belt adjusting bar bolt, and then remove the drive belt.

5. Remove the alternator retaining bolt, and remove the alternator from the bracket, lifting upward.

6. Install the alternator in the reverse order of removal.

Belt Tension Adjustment

Inspection and adjustment to the alternator drive belt should be performed every 3,000 miles or if the alternator has been removed.

1. Inspect the drive belt to see that it is not cracked or worn. Be sure that its surfaces are free of grease or oil.

2. Push down on the belt halfway between the fan and the alternator pulleys, with a force of about 22 lbs. The belt should deflect ⅜–½ in.

3. If the belt tension requires adjustment, loosen the adjusting link bolt and move the alternator until the proper belt tension is obtained.

CAUTION: *Do not overtighten the belt; damage to the alternator bearings could result.*

4. Tighten the adjusting link bolt.

REGULATOR

Removal and Installation

1. Disconnect the battery-to-starter cable from the battery.

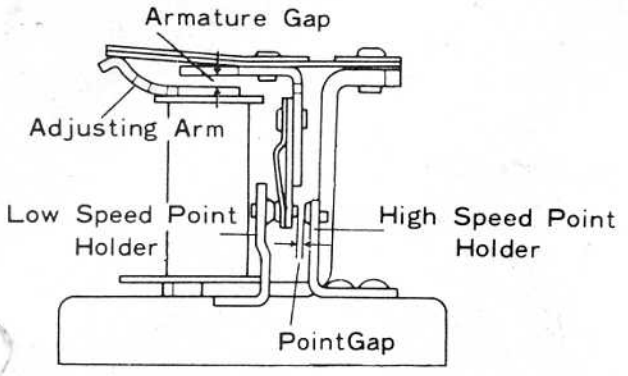
2. Disconnect the electrical leads from the regulator, taking note of their positions for reinstallation.

3. Remove the regulator retaining screws and remove the regulator.

4. Install the regulator in the reverse order of removal.

Adjustment

1. Remove the regulator from the vehicle and remove the cover.



Regulator adjustments

2. Dress dirty or slightly pitted point contacts with fine sandpaper. Wash and rinse the points with a suitable solvent.

3. Inspect the point contacts and replace the regulator assembly if the points are excessively burned or pitted.

4. Check the point gap with a feeler gauge. The gap should be 0.010–0.018 in.

5. Adjust the point gap to specifications by bending the high-speed point holder.

6. Install the regulator on the vehicle, leaving the cover off.

7. Connect a voltmeter to the IG terminal on the regulator.

8. Start the engine and rev it until maximum voltage is reached on the voltmeter. The maximum voltage should be 13.6–14.6 volts.

9. To adjust the voltage, bend the regulator adjusting arm.

10. Remove the voltmeter and install the cover.

STARTER

Removal and Installation

1. Disconnect the battery ground cable.

2. Disconnect the starter cable and the wire from the starter solenoid terminal.

3. Remove the two retaining bolts and remove the starter from the vehicle.

4. Install the starter in the reverse order of removal.

Starter Solenoid and Brush Replacement

1. Remove the starter from the vehicle and remove the field coil lead from the solenoid terminal.

2. Unscrew the solenoid retaining screws. Remove the solenoid by tilting it upward and withdrawing it.

3. Unscrew the end frame bearing cover screws and remove the cover.

4. Unscrew and withdraw the thrubolts. Remove the commutator endframe.

5. Remove the brushes from their holder if they are to be replaced.

6. Check the brush length against the specification in the "Battery and Starter Specifications" chart. Replace the brushes with new ones if required.

7. Dress the new brushes with emery cloth so that they will make proper contact.

8. Use a spring scale to check the brush spring tension against the specification in the chart. Replace the springs if they do not meet specification.

9. Assembly is the reverse order of disassembly. Remember to pack the end bearing cover with multipurpose grease before installing it.

BATTERY

Removal and Installation

1. Remove the battery ground cable at the negative (−) battery terminal, *first*.

Alternator and Regulator Specifications

Alternator			*Regulator*						
				Field Relay			*Regulator*		
Engine	*Manufacturer*	*Output (amps)*	*Manufacturer*	*Contact Spring Deflection (in.)*	*Point Gap (in.)*	*Volts to Close (in.)*	*Air Gap (in.)*	*Point Gap (in.)*	*Volts*
F Series	Nippondenso	38	Nippondenso	—	—	4.5–5.8	—	0.012–0.018	13.6–14.8