NIPPONDENSO DIRECT DRIVE

Courier
Pickup
Honda
Civic (Calif. Only)
Subaru
Hatchback
Hardtop
Sedan
Wagon
Toyota
Land Cruiser
Starlet
Tercel

DESCRIPTION

Nippondenso direct drive starter is conventional 12 volt, 4-pole, brush type starter. Integral solenoid is attached to drive housing and causes starter pinion to engage flywheel ring gear when starter is energized. Overrunning clutch pinion drive is mounted directly on drive end of armature shaft.

APPLICATION

Model	①Part No.
Courier	
2000 cc	D97Z 11002A, E17Z 11002A
2300 cc	
Man. Trans.	D77Z 11002A, E17Z 11002A
Auto. Trans.	D77Z 11002B, E17Z 11002B
Honda	
Civic (Calif. Only)	31200 PC1 004
Subaru	
Man. Trans.	8299 18600
Auto. Trans. (Calif.)	4299 17200
Toyota	
Land Cruiser	28100 60042
Starlet	28100-13020
Tercel	28100-15011

① – Vehicle manufacturer part number.

TESTING

PERFORMANCE TESTS

No Load Test – With starter on bench, and using a fully charged 12 volt battery, make connections as shown in *Fig. 1*. Starter should rotate smoothly at more than 5000 RPM, drawing less than 50 amps at 11 volts.

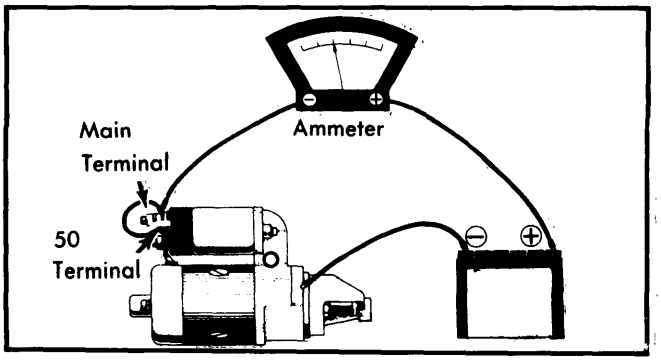

Fig. 1 Circuit for No Load Test

Lock Test – To perform lock test, follow procedures outlined in tester instruction manual. With starter locked in test stand and voltage adjusted as specified, ammeter and torque should be within limits.

SOLENOID TESTS

NOTE – *Tests must be performed with starter assembled and "M" (field) lead from starter disconnected at the solenoid. Plunger and sleeve must be clean and dry.*

Pull-In Test – Connect test equipment as shown in *Fig. 2*. Battery negative is connected to starter body and "C" terminal. Battery positive is connected to terminal "50". If plunger has definitely jumped out, pull-in coil is satisfactory.

Hold-In Test – Connect leads as shown in *Fig. 2*. Disconnect "C" terminal. The pinion should remain projected. If the pinion does not remain projected, hold-in coil is defective and must be replaced.

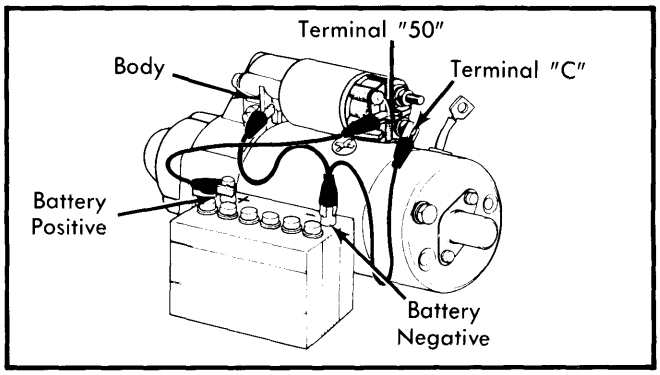

Fig. 2 Solenoid Test Hookup

Plunger Return Test – Connect leads as shown in *Fig. 2*. Disconnect terminal "C" as in Hold-In Test. Disconnect switch body lead. When disconnecting switch body, the pinion should return quickly.

OVERHAUL

DISASSEMBLY

1) Disconnect field coil wire from starter solenoid main terminal and remove solenoid attaching bolts. Remove solenoid by moving it up and down to unhook unit from drive lever.

2) Remove bearing cover and pull out armature shaft lock plate, washer, seal and spring. Remove through bolts, commutator end frame, brush holder and yoke.

3) Remove drive lever set bolt, rubber piece, plate, armature and drive lever from housing. Remove pinion stop collar from armature shaft end and remove starter clutch.

PARTS REPLACEMENT & TESTING

Armature – Check armature for open, shorted or grounded circuits. Check armature shaft for bend. Inspect bushings for condition and maximum clearance of .008"(.20 mm). Replace if required.

NIPPONDENSO DIRECT DRIVE (Cont.)

NOTE – *Do NOT attempt to straighten a bent armature shaft. Replace if bent.*

Commutator – Clean contact surface and polish with fine sandpaper if required. If surface is scored, burned, out of round or pitted, dress in a lathe only enough to restore smooth concentric surface. Out of round should not exceed .016" (.4 mm) on Subaru and .012" (.3 mm) on all other models. Mica depth should be .016-.031" (.40-.80 mm) standard with a limit of .008" (.20 mm). If beyond limit, undercut with a hacksaw blade to standard depth.

Brushes & Springs – 1) Check brush holder insulation. Connect one lead of ammeter to brush holder positive side and other lead to negative side. If test needle moves, brush holder is shorted and must be replaced.

2) Check brush length. If less than .39" (10 mm) replace brushes. Check spring tension. Minimum tension for Courier is 38 ounces (1077 g), for Land Cruiser and Tercel is 35 ounces (1020 g), and for Subaru is 37 ounces (1050 g). Brushes must move freely in holders.

Field Coils – Connect one prod of circuit tester lead to field coil and other to soldered portion of brush lead. If meter does not register, field coil is open and must be repaired or replaced. Check field coil for ground by connecting one test prod to field coil lead and other to starter housing. If meter registers, coil is grounded and must be repaired or replaced.

REASSEMBLY

Clean all parts and coat sliding surface of armature shaft splines, starter clutch bushing, drive lever and moving stud with multipurpose grease. Reassemble in reverse order of disassembly and note the following: After completing reassembly, between pinion gear and stop collar. If clearance is not .080-.160" (.20-.40 mm) for Courier or .004-.160" (.10-4.0 mm) for all other models, adjust by lengthening or shortening plunger shaft.

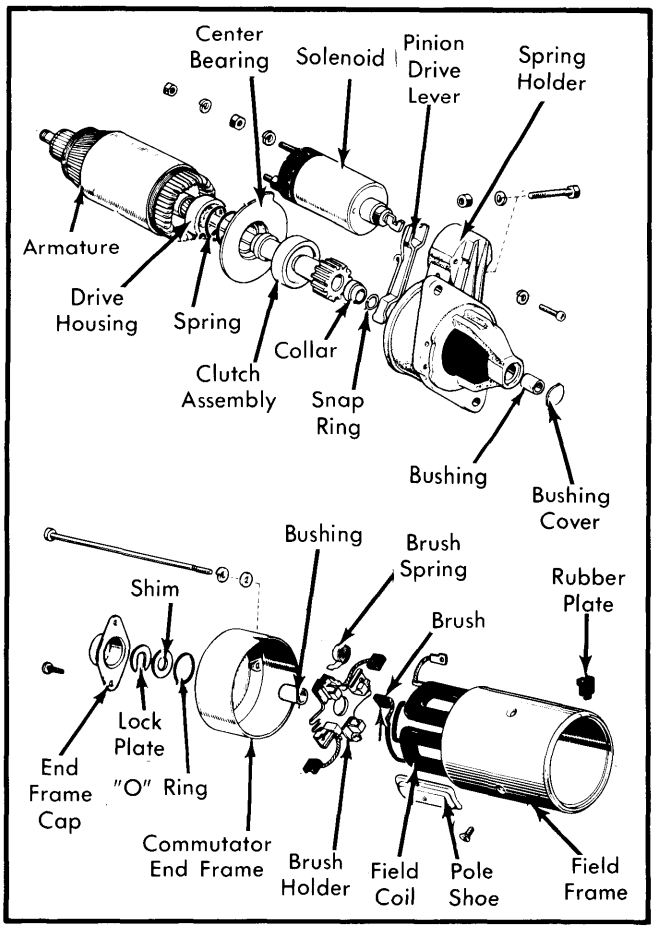

Fig. 3 Disassembled View of Typical Nippondenso Direct Drive Starter Motor