 <p><b>Power Stroke</b></p>	CUSTOMER NAME	DEALER NAME	P & A CODE					<p align="center">-NOTE- IF CONCERN IS FOUND, SERVICE AS REQUIRED. IF THIS CORRECTS THE CONDITION, IT IS NOT NECESSARY TO COMPLETE THE REMAINDER OF THE DIAGNOSTIC PROCEDURE.</p>
	MODEL AND YEAR	VEHICLE GVW	TRANSMISSION					
	VEHICLE SERIAL NO. (VIN)	AMBIENT TEMPERATURE	ODOMETER					
	DATE:	ENGINE SERIAL NO.	1983 CLAIM NO.	TYPE OF SERVICE PERSONAL <input type="checkbox"/> COMMERCIAL <input type="checkbox"/>				

**Customer Concerns**

**Hard Start / No Start Diagnostics**

**1. Visual Engine/Chassis Inspection**

Fuel Oil Coolant Electrical Hoses Leaks	
Method	Check
Visual	

**2. Check Engine Oil Level** See Fig. E

- Check for contaminants (fuel, coolant)
- Correct Grade/Viscosity
- Miles/Hours on oil, correct level
- Check level in reservoir

Method	Check
Visual	

**3. Intake/Exhaust Restriction** See Fig. H

- Inspect air filter and ducts - exhaust system
- Inspect exhaust back pressure device

Method	Check
Visual	

**4. Sufficient Clean Fuel** See Fig. A

- Check fuel tank(s), drain sample from fuel filter while cranking engine
- Note if operator has indicated that the Water in Fuel or Fuel Filter Restriction Lamp has been illuminated

Method	Checks	
Visual	Front Tank	Rear Tank

**5. Tandem Fuel Pump Pressure** See Fig. D

- Measure at regulator block
- Minimum 100 RPM crank speed for 20 sec.

Front Tank		
Instrument	Spec.	Measurement
0-160 PSI Gauge	20 PSI min.	
Rear Tank		
Instrument	Spec.	Measurement
0-160 PSI Gauge	20 PSI min.	

*If failed test 5 change fuel filter, re-test*

**6. Perform KOEO On Demand Test** See Fig. L

- Use NGS Tester
- Diagnostic Trouble Codes set during this test are current faults.

Pass Code = P1111

Diagnostic Trouble Codes
--------------------------

**7. Retrieve Continuous Trouble Codes** See Fig. L

- Diagnostic Trouble Codes retrieved during this test are historical faults.

Pass Code = P1111

Diagnostic Trouble Codes
--------------------------

**8. KOEO Injector Electrical Self-Test** See Fig. L

- Use NGS Tester
- All injectors will momentarily buzz, then individual injectors will buzz in sequence 1 through 8
- Diagnostic Trouble Codes will be transmitted after test is completed.

Pass Code = P1111

Injector Trouble Codes
------------------------

*Refer to PC/ED manual Pinpoint tests if Diagnostic Trouble Codes are set.*

**9. NGS Tool - Data List Monitoring** See Fig. L

- NGS Tester may reset below 9.5 volts.
- Select the parameters indicated from the NGS parameter list and monitor while cranking engine

Parameter	Spec.	Measurement
V PWR	7 volt minimum	
RPM	100 RPM minimum	
ICP	500 PSI or 3.4 mPa min.	
FUEL PW	1 mS to 6 mS	

- A - V PWR** - If indicating a low voltage condition, check battery voltage, charging system or power and ground circuits to the PCM.  
**GO TO PINPOINT TEST A**
- B - RPM** - Low RPM could be an indication of starting/charging system problems. No RPM indicated with the engine cranking - could be CAMP circuit fault, check for Diagnostic Trouble Codes.  
**GO TO PINPOINT TEST G**
- C - ICP** - A minimum of 500 PSI (3.4 mPa) is required before the injectors are enabled. No or low oil in the reservoir, system leakage, faulty IPR or high pressure pump could cause pressure loss.  
*Note: CAMP signal is required before IPR is commanded above 14 %* See Fig. G
- D - FUEL PW** - Even though a 1 to 6 mS FUEL PW is shown on the NGS to be sent to the IDM, it's possible that the IDM did not get the signal, due to a fault on either CID or FDCS circuits or even the IDM.

**10. Glow Plug System Operation Relay Operation** See Fig. F

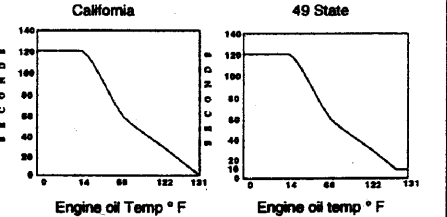
- Glow Plug ON time is dependent on oil temperature and altitude. The Glow Plug relay comes on between 1 to 120 sec. and does not come on at all if oil Temp is above 131 ° F for (California) and the relay comes on between 10 to 120 sec. for (49 State)
  - Verify that B+ is being supplied on the large BK/W wire going to the Glow Plug relay.
  - Install a voltmeter to the glow plug feed terminal (terminal with two brown wires) or (center terminal on the sturt for California).
  - Turn key to run position, measure "ON" time
  - Using the NGS GPCTM and EOT pids, verify sufficient glow plug "ON" time and voltage.
- (Dependent on oil temperature and altitude)

9 - 12 volts Relay On time	Spec. Seconds	Measurement
	1 to 120 (Calif.) 10 to 120 (49 State)	

*Note: Wait to Start Lamp "On" time (1 - 10 sec.) is independent from Glow Plug Relay "On" time*

- Measure Glow Plug Resistance to Bat. Ground.
- Remove all glow plug/injector connectors
- Measure GP Harness Resistance to Relay

Glow Plug Number	Glow Plug to Ground .1 to 2 ohms	Connector to Relay 0 to 1 ohms
#1		
#3		
#5		
#7		
#2		
#4		
#6		
#8		



- Add 5 seconds to glow plug on time when above 7000 feet in altitude, but not to exceed 120 seconds.

**See PC/ED manual, Section 18A for more detail on all of the above test steps.**


**95/96**

When troubleshooting a Hard Start / No Start or Performance problem, this form must be completed and returned to receive warranty credit for diagnostic time for the parts listed below.

**95/96**

Fuel injectors (9E527), regulator-injection control pressure (9C968), pump assembly-high pressure oil (9A543), turbo charger assembly/pedestal (9K694), fuel pump (9350), IDM (12B599) and PCM (EEC) (12A650)

What problems were found and what repairs were performed?	List Part Name, Number and Serial Number of parts replaced.

 <p><b>Power Stroke</b></p>	CUSTOMER NAME	DEALER NAME	P & A CODE					<p align="center">-NOTE- IF CONCERN IS FOUND, SERVICE AS REQUIRED. IF THIS CORRECTS THE CONDITION, IT IS NOT NECESSARY TO COMPLETE THE REMAINDER OF THE DIAGNOSTIC PROCEDURE.</p>
	MODEL AND YEAR	VEHICLE GVW	TRANSMISSION					
	VEHICLE SERIAL NO. (VIN)	MODEL AND YEAR	ODOMETER					
	DATE:	ENGINE SERIAL NO.	1983 CLAIM NO.	TYPE OF SERVICE PERSONAL <input type="checkbox"/> COMMERCIAL <input type="checkbox"/>				

**Customer Concerns**

**Performance Diagnostics**

**1. Sufficient Clean Fuel** See Fig. A

- Check fuel tank(s), drain sample from fuel filter while cranking engine
- Note if operator has indicated that the Water in Fuel or Fuel Filter Restriction Lamp has been illuminated

Method	Check
Visual	

**2. Check Engine Oil Level** See Fig. E

- Check for contaminants (fuel, coolant)
- Correct Grade/Viscosity
- Miles/hours on oil, correct level
- Check level in reservoir

Method	Check
Visual	

**3. Intake Restriction** See Fig. H

- Check filter minder
- or Measure at WOT w/magnehelic gauge

Instrument	Check
Magnehelic/Filter Minder	

**4. Perform KOEO On Demand Test** See Fig. L

- Use NGS Tester
- Diagnostic Trouble Codes set during this test are current faults.

Pass Code = P1111

Diagnostic Trouble Codes

**5. Retrieve Continuous Trouble Codes** See Fig. L

- Use NGS Tester
- Diagnostic Trouble Codes retrieved during this test are historical faults.

Pass Code = P1111

Diagnostic Trouble Codes

**6. KOEO Injector Electrical Self-Test** See Fig. L

- Use NGS Tester
- All injectors will momentarily buzz, then individual injectors will buzz in sequence 1 through 8.
- Diagnostic Trouble Codes will be transmitted after test is completed.

Pass Code = P1111

Injector Trouble Codes

*Refer to PC/ED manual Pinpoint tests if Diagnostic Trouble Codes are set.*

**7a. Tandem Fuel Pump Pressure** See Fig. D

- Measure at regulator block.
- Road Test- select appropriate gear to obtain a full load on the engine.

**WOT - Front Tank**

Instrument	Spec.	Measurement
0-160 PSI Gauge	30-70 PSI	

**WOT - Rear Tank**

Instrument	Spec.	Measurement
0-160 PSI Gauge	30-70 PSI	

*If fuel pressure falls low, inspect Fuel filter condition and regulator valve for debris*

**7b. Tandem Pump Inlet Restriction** See Fig. D

- Measure at fuel inlet line
- Measure at WOT

Instrument	Spec.	Measurement
0-30" Hg vacuum g.	6" Hg	

- If fuel feed line is restricted above 6" Hg, check for blockage between pump and fuel tank.
- If fuel feed is not restricted below 6" Hg, check regulator valve for sticking or internal debris.

**8. Air in Fuel System Test** See Fig. I

- Remove fuel return line from fuel filter
- Install clear line from filter to return line
- View clear line during low idle for air

Method	Checks	
	Front Tank	Rear Tank
Visual		

**9. Perform KOER On Demand Test** See Fig. L

- Select KOER test from NGS test menu.

Pass Code = P1111

KOER Diagnostic Trouble Codes

**10a. Injection Control Pressure Tests (Oil Aeration - Poor idle quality)** See Fig. L

- Monitor ICP and RPM with the NGS Tester
- Turn A/C and all accessories off
- Hold engine speed at 3400 RPM for 3 minutes.

**High Idle**

Parameter	Spec.	Measurement
ICP	750 to 1250 PSI @ 3400 RPM	

- If ICP signal increases above 1250 PSI after 3 minutes anti-foam oil additives may have become depleted from oil, change oil re-test.

**10b. Low Idle Stability (ICP Pressure)** See Fig. L

- Check at low idle
- Monitor ICP and RPM with the NGS Tester

**Low Idle**

Parameter	Spec. @ 650 RPM	Measurement
ICP	400 to 600 PSI California	
ICP	550 to 700 PSI 49 State	

- If engine RPM is unstable disconnect the ICP sensor
- If idle speed still unstable, change IPR re-test
- If low idle smoothes out ICP signal faulty (see ICP circuit diagnostics)

**11. Crankcase Pressure Test** See Fig. D

- Assure engine is at normal operating temp.
- Measure at oil fill with adapter and orifice tool P.N. 5631 & 014-00743 installed.
- Measure at WOT under no load.

Instrument	Spec.	Measurement
Magnehelic	less than 0 to 60" H <sub>2</sub> O	6" H <sub>2</sub> O

*If more than 6" H<sub>2</sub>O, Refer base engine in Shop Manual*

**12. Cylinder Contribution Test** See Fig. L

- Assure that the engine is at operating temp. 170° F (77°C) minimum before performing test
- Turn A/C and all accessories off
- Select Cylinder Contribution from the test menu

*Note: Engine will run rough during test*

CCT Trouble Codes

**13. Exhaust Restriction** See Fig. J, K & L

- Visually inspect exhaust system for damage
- Verify EBP device is open at WOT
- Monitor EBP with the NGS Tester with the engine temperature at 170° F minimum at 3400 RPM.

Parameter	Spec.	Measurement
EBP	28 PSI MAX @ 3400 RPM	

**14. Boost Pressure Test** See Fig. D & L

- Verify that MAP hose is not open or pinched
- Monitor MGP (manifold gauge pressure) and RPM with the NGS Tester.
- Road Test - select appropriate gear to obtain desired engine speed at full load throttle position.

Parameter	Spec. PSIG	Measurement
MGP	(95 & 96) 15.5 PSIG MIN (96 Calif.) 15 PSIG MIN	

*Measure between 2500 to 3000 RPM*

**See PC/ED manual, Section 18A for more detail on all of the above test steps.**

**95/96** When troubleshooting a Hard Start / No Start or Performance problem, this form must be completed and returned to receive warranty credit for diagnostic time for the parts listed below. **95/96**

Fuel injectors (9E527), regulator-injection control pressure (9C988), pump assembly-high pressure oil (9A543), turbo charger assembly/pedestal (8K684), fuel pump (8350), IDM (12B589) and PCM (EEC) (12A850)

What problems were found and what repairs were performed?	List Part Name, Number and Serial Number of parts replaced.

SETUP ILLUSTRATION OF ROTUNDA™ 014-00761

FIGURE D

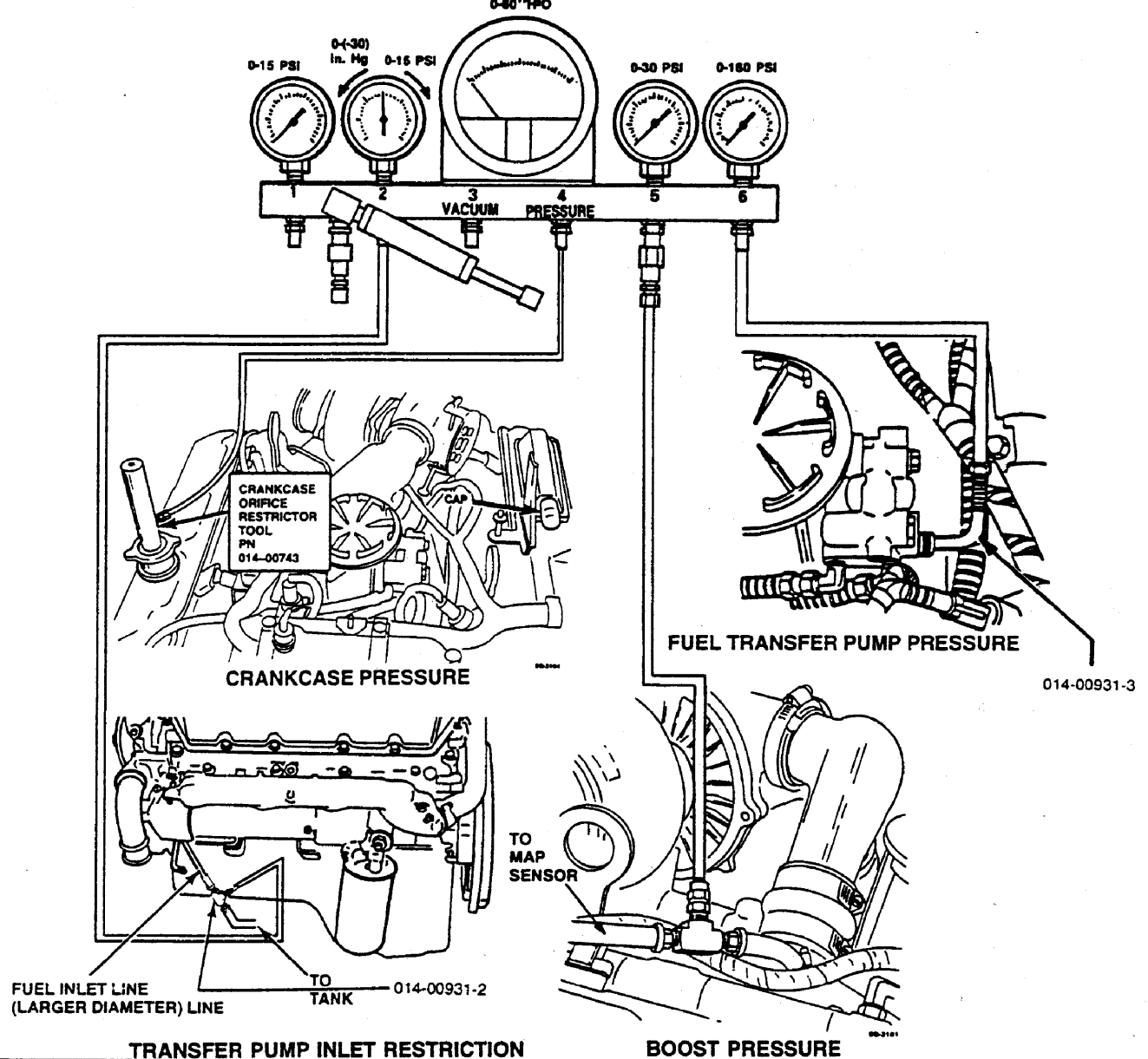
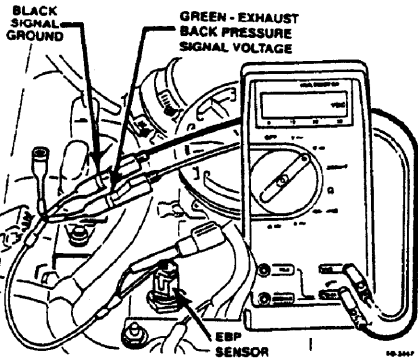


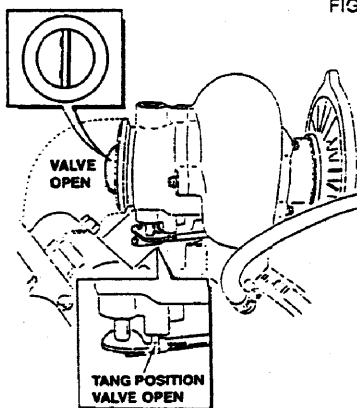
FIGURE J



D94T-50-A

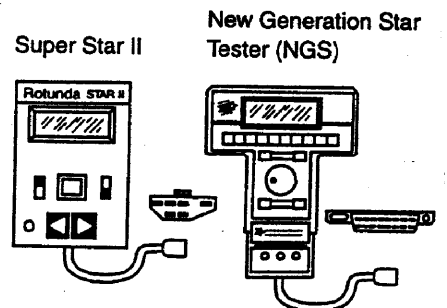
EXHAUST BACK PRESSURE

FIGURE K



EXHAUST RESTRICTION

FIGURE L



Diagnostic Tests with Star II Tester for 94 1/2 (NGS) for 94 1/2 to 97

