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GENERAL INFORMATION

Introduction

This section covers various engine tests, adjustments, service procedures and cleaning/inspection procedures. Engine assembly and service specifications appear at the end of the Section 02.

For engine disassembly, assembly, installation, adjustment procedures and specifications, refer to Section 02.

This engine incorporates a closed-type crankcase ventilation system.

To maintain the required performance level, the fuel system, ignition system and engine must be kept in good operating condition and meet recommended adjustment specifications.

Before replacing damaged or worn engine components such as the crankshaft, cylinder head, valve guide, valves, camshaft or cylinder block, make sure part(s) is not serviceable.



WARNING: TO AVOID THE POSSIBILITY OF PERSONAL INJURY OR DAMAGE, DO NOT OPERATE THE ENGINE UNTIL THE FAN BLADE HAS FIRST BEEN EXAMINED FOR POSSIBLE CRACKS OR SEPARATION.

CAUTION: Use of abrasive grinding discs to remove gasket material from the engine sealing surfaces during repair procedures can contribute to engine damage and wear. Airborne debris and abrasive grit from the grinding disc may enter the engine through exposed cavities causing premature wear and eventual engine damage.

Ford Power Products does not recommend using abrasive grinding discs to remove engine gasket material. Use manual gasket scrapers for removing gasket material from the engine sealing surfaces.

Take added care to prevent scratching or gouging aluminum sealing surfaces.

Safety Notice

There are numerous variations in procedures, techniques, tools and parts for servicing equipment, as well as in the skill of the individual doing the work. This manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this Manual must first establish that neither personal safety nor equipment integrity are compromised by the choice of methods, tools or parts.

Notes, Cautions, and Warnings

As you read through the procedures, you will come across NOTES, CAUTIONS, and WARNINGS. Each one is there for a specific purpose. NOTES gives you added information that will help you to complete a particular procedure. CAUTIONS are given to prevent you from making an error that could damage the equipment. WARNINGS remind you to be especially careful in those areas where carelessness can cause personal injury. The following list contains some general WARNINGS that you should follow when you work on the equipment.



GENERAL WARNINGS:

TO HELP AVOID INJURY:

- **ALWAYS WEAR SAFETY GLASSES FOR EYE PROTECTION.**
- **USE SAFETY STANDS WHENEVER A PROCEDURE REQUIRES YOU TO BE UNDER THE EQUIPMENT.**
- **BE SURE THAT THE IGNITION SWITCH IS ALWAYS IN THE OFF POSITION, UNLESS OTHERWISE REQUIRED BY THE PROCEDURE.**
- **SET THE PARKING BRAKE (IF EQUIPPED) WHEN WORKING ON THE EQUIPMENT. IF YOU HAVE AN AUTOMATIC TRANSMISSION, SET IT IN PARK (ENGINE OFF) OR NEUTRAL (ENGINE ON) UNLESS INSTRUCTED OTHERWISE FOR A SPECIFIC OPERATION. PLACE WOOD BLOCKS (4" X 4" OR LARGER) TO THE FRONT AND REAR SURFACES OF THE TIRES TO PROVIDE FURTHER RESTRAINT FROM INADVERTENT EQUIPMENT MOVEMENT.**
- **OPERATE THE ENGINE ONLY IN A WELL VENTILATED AREA TO AVOID THE DANGER OF CARBON MONOXIDE.**
- **KEEP YOURSELF AND YOUR CLOTHING AWAY FROM MOVING PARTS WHEN THE ENGINE IS RUNNING, ESPECIALLY THE FAN BELTS.**
- **TO PREVENT SERIOUS BURNS, AVOID CONTACT WITH HOT METAL PARTS SUCH AS THE RADIATOR, EXHAUST MANIFOLD, TAIL PIPE, CATALYTIC CONVERTER AND MUFFLER.**
- **DO NOT SMOKE WHILE WORKING ON THE EQUIPMENT.**
- **ALWAYS REMOVE RINGS, WATCHES, LOOSE HANGING JEWELRY, AND LOOSE CLOTHING BEFORE BEGINNING TO WORK ON THE EQUIPMENT. TIE LONG HAIR SECURELY BEHIND THE HEAD.**
- **KEEP HANDS AND OTHER OBJECTS CLEAR OF THE RADIATOR FAN BLADES. ELECTRIC COOLING FANS CAN START TO OPERATE AT ANY TIME BY AN INCREASE IN UNDERHOOD TEMPERATURES, EVEN THOUGH THE IGNITION IS IN THE OFF POSITION. THEREFORE, CARE SHOULD BE TAKEN TO ENSURE THAT THE ELECTRIC COOLING FAN IS COMPLETELY DISCONNECTED WHEN WORKING UNDER THE HOOD.**

Battery Handling and Charging

The handling and correct use of lead acid batteries is not as hazardous provided that sensible precautions are observed and that operatives have been trained in their use and are adequately supervised.

It is important that all labelling on the battery is carefully read, understood and complied with. The format of the following symbols and labels is common to most brands of lead acid battery.



	Explosive gases		Read relevant instructions
	Eye protection must be WORN.		Keep away from children
	No smoking or naked flames.		Do not dispose of as household waste.
	Corrosive acid		Recycle (via recognized disposal system).
	Flush eyes immediately when contacted with acid		Electrical current may cause injury to personnel
	Caution/important notice.		

NOTE: Observe all manufacturers' instructions when using charging equipment.

CAUTION: Batteries should not be charged in the vehicle or equipment. May damage electrical components.

Forward

This book contains operating and maintenance instructions for the engine(s) listed on the title page.

The life of your engine unit and the delivery of the high performance built into it will depend on the care it receives throughout its life. It is the operator's responsibility to ensure that the engine is correctly operated and that the maintenance operations outlined in this book are carried out regularly after the specified hours of operation have been reached. We consider it to be in your interests to enlist the aid of an authorized Ford Power Products Distributor not only when repairs are required but also for regular maintenance. Distributors are listed at the back of this manual.

Regular maintenance will result in minimal operating costs.

Engines manufactured by Ford Motor Company are available through Ford Power Products Distributors. When in need of parts or service, contact your local Authorized Distributor. In overseas territories, in the event of difficulties, communicate directly with the supervising Ford affiliated Company in your area whose address appears at the end of this book.

Where the terms "Right" or "Left" occur in this publication, they refer to the respective sides of the engine when viewed from the rear or flywheel end.

Pistons and valves are numbered from the front or timing cover end of the engine commencing at No. 1.

You may find that your engine assembly includes optional equipment not specifically covered in the following text. Nevertheless, the maintenance procedures outlined in this book still apply to your engine.

Engine Identification


Because Ford Power Products Operations markets such a wide range of industrial gasoline and diesel engines - manufactured both in the U.S. and overseas - it is important that you have as complete identification of the engine as possible in order to provide the correct replacement parts. Review the list of Ford Power

Product distributors for a distributor in your area. You can obtain a standard parts listing describing the parts. It remains a distributor function to identify the part number.

The key to identifying the engine is the identification decal mounted on the engine rocker cover. That decal provides not only the engine serial number, but also the exact model or type, configuration code and customer name. The combination of that data permits you to isolate the precise engine, build level and customer so you can determine the correct replacement parts.

U.S.A. Engine Identification Decal


An identification Decal is affixed to the valve cover of the engine. The decal contains the engine serial number which identifies this unit from all others. Use all numbers when seeking information or ordering replacement parts for this engine.

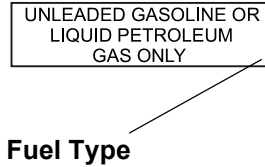
	Serial Number:	
	Model Number:	
Base Engine Code:	Build Date:	
Customer Name:		
Configuration Code:		

For a handy reference, this information is recorded on your Ford Power Products Operations Engine Registration copy (Form #194-103-D).

The emission decal is affixed to the valve cover on all certified engines over 25 horsepower distributed in the State of California with an engine build date after January 1st, 2001. The decal identifies that the engine is compliant with California's Air Resources Board's (ARB) Large Spark Ignited (LSI) Engine Regulations. Use all numbers when seeking information or ordering replacement parts for this engine.

Unique Engine Serial Number

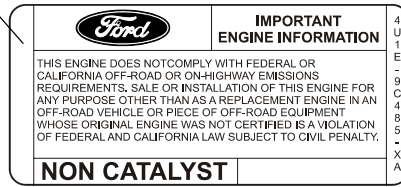
	IMPORTANT ENGINE INFORMATION	4
THIS ENGINE CONFORMS TO 2004 CALIFORNIA REGULATIONS FOR OFF-ROAD LARGE SPARK-IGNITION ENGINES. THIS ENGINE IS CERTIFIED TO OPERATE ON UNLEADED GASOLINE ONLY.		U
ADJUSTMENTS: SPARK PLUG GAP 0.042" TO 0.046" NO OTHER ADJUSTMENTS NEEDED.		1
CATALYST	4FMXB04.2GAA TWC H02S SFI	E
		-
		9
		C
		4
		8
		5
		-
		A
		A



Non-Certified Engine Decal

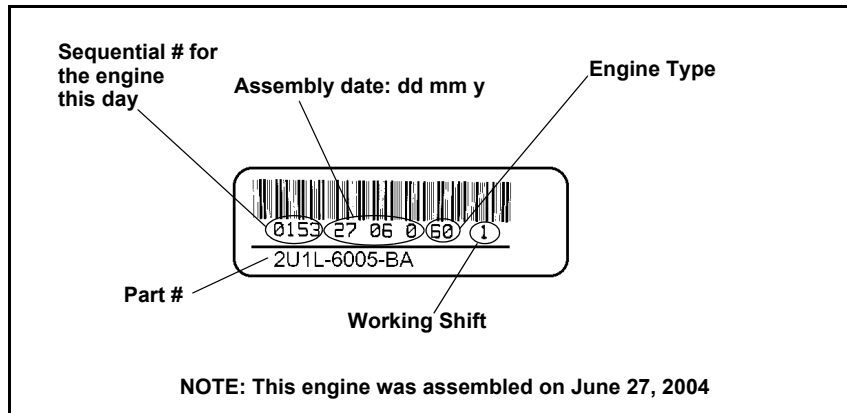
The identification decal shown below is an example (Non-certified engine build shown) OF THE DECAL THAT MUST BE AFFIXED to the valve cover of the engine for a Non-certified engine build or export of an engine outside of the United States.

Unique Engine Serial Number



Engine Build Identification Label

The TSG-416 Engine Build Identification Label is located on the front side of the valve cover near the oil level indicator. This label contains assembly information as shown below.




European Service Identification Plate

This plate is fixed to the engine in a prominent position. Panels 1 to 6 on the plate shown to the right, refer to various engine details as listed below:

1. **Serial No:** This identifies the engine as supplied by Ford Power Products.

Date: The two letters following the serial No. indicate the year and month in which the specified build components were assembled - refer to the chart below:

	SER No. / DATE		
	1		
	C.o.O	CAPACITY	MODEL
	2	3	4
	BUILD No.		
	5		
SPECIAL EQUIPMENT			
6			

YEAR		JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
1997	U	B	R	A	G	C	K	D	E	L	Y	S	T
1998	V	J	U	M	P	B	R	A	G	C	K	D	E
1999	W	L	Y	S	T	J	U	M	P	B	R	A	G
2000	X	C	K	D	E	L	Y	S	T	J	U	M	P
2001	Y	B	R	A	G	C	K	D	E	L	Y	S	T
2002	Z	J	U	M	P	B	R	A	G	C	K	D	E
2003	A	L	Y	S	T	J	U	M	P	B	R	A	G
2004	B	C	K	D	E	L	Y	S	T	J	U	M	P
2005	C	B	R	A	G	C	K	D	E	L	Y	S	T
2006	D	J	U	M	P	B	R	A	G	C	K	D	E

NOTE: The letters I, O and Q are not used in the year column. The letter representing the month repeats every five years.

2. This identifies the country of origin of the engine.
3. Engine capacity in liters.
4. Engine model identification.
5. The Build Number indicates the complete specification. The digit to the extreme right hand side is the build scheme chart issue number.
6. This space is provided for Equipment Manufacturers' use when extra equipment is fitted outside of the Ford Motor Company. Reference should be made to the Equipment Manufacturer for any information or parts required.

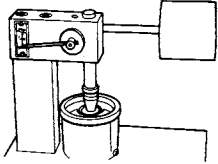
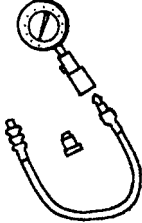
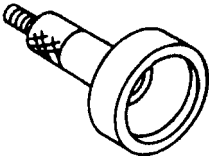
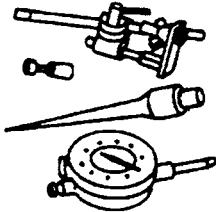
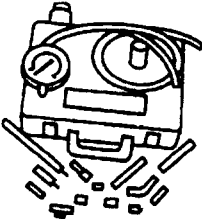



Parts and Service

Replacement parts can be obtained through your local Ford Power Products Distributors listed in the back portion of this manual. They also may be found in the yellow pages under "Engines" or contact Ford Power Products.

Ford Power Products Distributors are equipped to perform major and minor repairs. They are anxious to see that all of your maintenance and service needs are quickly and courteously completed.

DIAGNOSIS AND TESTING

Special Tools

 <p>FPP10023</p>	<p>Commercially Available Leakdown Tester</p>	 <p>FPP10024</p>	<p>Compression Tester 014-00707 or Equivalent</p>
 <p>FPP10025</p>	<p>Cup Shaped Adapter TOOL-6565-AB or Equivalent</p>	 <p>FPP10026</p>	<p>Dial Indicator with Bracketry TOOL-4201-C or Equivalent</p>
 <p>FPP10027</p>	<p>Engine Cylinder Leak Detection/Air Pressurization Kit 014-00705 or Equivalent</p>	 <p>FPP10028</p>	<p>Engine Oil Pressure Gauge T73L-6600-A</p>
 <p>FPP10029</p>	<p>12 Volt Master UV Diagnostic Inspection Kit 164-R0756 or Equivalent</p>	 <p>FPP10030</p>	<p>Vacuum/Pressure Tester 164- R0253 or Equivalent</p>

Special Service Tools called for by the procedures can be obtained by calling:
1-800-ROTUNDA (1-800-768-8632).

Inspection and Verification

1. Verify the customer concern by operating the engine to duplicate the condition.
2. Visually inspect for obvious signs of mechanical and electrical damage:
 - Engine coolant leaks.
 - Engine oil leaks.
 - Fuel leaks.
 - Damaged or severely worn pads.
 - Loose mounting bolts, studs, and nuts.
3. If the inspection reveals obvious concerns that can be readily identified, repair as required.
4. If the concerns remain after the inspection, determine the symptoms and go to the symptom chart.