

# POWER TAKE-OFF INSTALLATIONS

**2003**  
MODEL YEAR

## THE VEHICLE AS AN AUXILIARY OR STATIONARY POWER SOURCE

Ford trucks are designed principally to provide vehicle motivation and short term auxiliary power needs. Power activation of hydraulic or mechanically driven devices such as wrecker lift, snowplow blade lift and movement, power tailgate lift, or dump body lift, are a few examples. The variety of factors such as air circulation available, temperature environment, vehicle maintenance level, and other existing conditions, combined with the range of auxiliary horsepower and torque demands that may be placed upon a vehicle in power take-off usage, make it difficult to assess the ultimate performance of a vehicle subjected to extended duration usage as an auxiliary power source. The guidelines in this book are intended to assist the PTO equipment installer in avoiding inadvertent vehicle performance and safety concerns. These guidelines should not be considered all inclusive, and it is the responsibility of the PTO equipment installer to choose and install a PTO system that the vehicle operators will be able to use in a safe manner with the necessary precautions to ensure safe operation and customer satisfaction.

## TRANSMISSION POWER TAKE-OFF PROVISION

This is a regular production option, code 62R, and must be ordered separately to obtain an automatic transmission with PTO capability. It is available for Super Duty F-Series automatic transmission only, 6.8L gas engine, or 7.3L or 6.0L diesel engines. The 6.0L diesel engine with TorqShift 5-speed automatic transmission replaces the 7.3L diesel engine with 4R100 automatic transmission in November 2002. The M6 6-speed manual transmission has a LH-side PTO port and does not require a PTO-Provision option. The following chart shows what is included with the PTO-Provision versus an automatic transmission vehicle without the option.

PTO versus NON-PTO Transmission	Non-PTO	4R100	Torqshift
Option Code	None	62R	
PTO Drive Gear	None	Included	
PTO Opening	None	LH side, non-standard 60bolt pattern	
Controlled Compression Gasket	None	Included	
Transmission Shift Cable & Bracket	Standard	Unique	Standard
Diesel Engine PCM	All diesel engine PCM's are PTO-capable		
Under-dash PTO wiring	Two circuits, 12-volt power and PTO signal to PCM, included.		

PCM: Powertrain Control Module (previously called ECC or Engine Control Module)

The following chart characterizes the differences between PTO-capable automatic transmissions.

4R100 versus TorqShift Transmission	4R100	TorqShift
Transmission Fluid <sup>(1)</sup>	Type H	Type D
Fluid Line Pressure (psi)		
Normal Engine Idle	50-60	50-60
1200 RPM Engine Idle	130 <sup>(2)</sup>	130
PTO Drive Gear Function		
All Forward Drive Gears <sup>(3)</sup>	Yes	Yes
Reverse <sup>(3)</sup>	Yes	Yes
Overdrive <sup>(3)</sup>	No	Yes
PARK (Stationary)	Requires 1200 minimum engine rpm	
PTO Drive Gear Torque Ratings (lb-ft)		
Peak Intermittent	170	180
Continuous	120	180
Non-Volatile PTO Memory	No <sup>(4)</sup>	Yes
Internal Transmission Fluid Temperature Monitor	Yes <sup>(5)</sup>	No

(1) Affects PTO clutch capacity.

(2) Torque converter clutch applied and PTO circuit activated. May be as high as 180 psi.

(3) Vehicle road speed must be greater than zero.

(4) 4R100-PTO logic in the PCM is "forgotten" with loss of vehicle battery electrical power. To remedy, a sensor in the transmission needs to count the teeth on the PTO drive gear. Once the vehicle ignition goes through the ON-CRANK-START cycle, a strategy cycle begins in the PCM to look for "PTO". Then, driving the vehicle in 3<sup>rd</sup> and 4<sup>th</sup> (Overdrive) gears at steady throttle for 10 seconds should re-activate PTO function. PTO function in the TorqueShift automatic transmission is not similarly affected with loss of battery electrical power.

(5) The 4R100-PTO gear is automatically disconnected when transmission fluid over-temperature condition occurs. Disengage PTO operation and rest the vehicle in PARK or NEUTRAL at normal engine idle. PTO function is automatically returned once the fluid returns to normal operating temperature.

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## APPENDIX

### GENERAL RECOMMENDATIONS AND WARNINGS

1. Additional transmission fluid may be required with the addition of the PTO.
2. Follow the severe-duty vehicle maintenance schedules, including transmission fluid changes.
3. Route PTO hydraulic lines and hoses away from the vehicle exhaust system.
4. Diesel engines are recommended over gas engines for stationary PTO operation of extended duration.
5. Do not block air flow circulation to the engine coolant radiator, engine, and transmission fluid cooler.
6. The following are maximum temperatures for powertrain fluids. The PTO system designer or installer should consider adding a sensor to monitor these depending on the demands of the PTO operation's duty cycle. Request a PTO temperature monitor from the PTO supplier where available.
  - a. Maximum Engine Top Water: 230° F
  - b. Maximum Engine Oil Sump: 284° F
  - c. Maximum Transmission Oil Sump: 250° F

NOTE: If any of the above temperatures are exceeded disengage PTO operation and return vehicle engine speed to normal engine idle. Allow the temperature to stabilize at a lower level before re-engaging the PTO.

### Ford Automatic Transmission Fluid Temperature Gauge

Beginning with 2002 model year a Transmission Fluid Temperature Gauge is included with the instrument cluster of Super Duty F-Series, automatic transmission only. A complete description can be found in the vehicle's Owner Guide. The following briefly describes the meanings of the needle readings to help the operator monitor PTO operation.

Cold Range: 50° F or colder.

White Area: "Normal" operating range, 51° F to 248° F.

Yellow Area: "Warning": Stop driving the vehicle or remove auxiliary loads at the earliest convenience. Typically, leave the engine running at normal idle and allow to cool into the normal range before starting to drive or operate the PTO. The transmission fluid is not over-heating, but operating in the Yellow Range for extended periods of time may cause internal transmission damage.

Red Area: "Over-Temperature": The transmission fluid is over-heating. Stop the vehicle, do not drive, and allow to cool into the normal operating range. If the gauge continues to show high temperatures then see your Ford dealer.

For readings in the Red and Yellow areas, make sure that snow or debris is not blocking airflow to the radiator and transmission fluid cooler, that cooler lines are not kinked or restricted, and that vehicle load capacities or duty cycles are not excessive.

### GUIDELINES FOR FRONT END ACCESSORY DRIVE (FEAD) MOUNTED PTO or "CLUTCH-PUMPS"

1. An auxiliary crankshaft bearing support is required on all modular gas engine applications where the clutch-pump is drawing greater than 5-hp from the engine crankshaft pulley. This further applies to all tangentially-mounted auxiliary aftermarket equipment in general.
  - a. A "spider" bracket kit can be obtained for this purpose by contacting DewEze Manufacturing, 151 E Hwy. 160, Harper, Kansas, 67058. Toll-free phone: (800) 835-1042, or fax: (316) 896-7129. It provides up to 70 lb-ft of torque at the clutch-pump. Part Numbers: (6.8L) XC2E-7275-BB, (5.4L) XC2E-7275-AB. QVM Bulletin No. Q-62 has a complete description of the kit and its usage.
  - b. QVM Bulletin No. Q-74 amends Bulletin Q-62, describing how the "Spider" bracket is not required for auxiliary equipment requiring less than 5-hp. Both bulletins are available at [www.fleet.ford.com/truckbbas](http://www.fleet.ford.com/truckbbas), and select "Bulletins".
2. Always maintain the clearance relationship between the Ford OEM fan, radiator, and shroud to help maintain optimum engine cooling performance.
3. Always consider engine roll and body/frame torsion when packaging clearances.
4. Restrict FEAD-PTO application to 5.4L and 6.8L gas, and 7.3L and 6.0L diesel engines.
5. Temperature monitoring of powertrain fluids as discussed earlier in this section is recommended.

### STATIONARY ELEVATED IDLE CONTROL

Ford offers the following two methods for obtaining stationary elevated idle control for 7.3L and 6.0L diesel engines. For gas engines the PTO installer will need to obtain elevated idle control from an aftermarket source:

- a. "Auxiliary Idle Control": option code 96P for F-Series (option code 961 for E-Series) contains a "full function" Auxiliary Powertrain Control Module or APCM, mounting bracket and operating manual. It must be ordered separately and is not included with the Transmission Power Take-Off Provision option. A "limited function" APCM is included in the kit that is part of the Ambulance Prep Option, has no LED read-out, and is not a separate orderable option. Both of these kits are more fully described later in this section under PTO Auxiliary Idle Control. The operating manuals can be found at [www.fleet.ford.com/truckbbas](http://www.fleet.ford.com/truckbbas), then "Publications" drop-down box. It will function for both manual or automatic transmissions.
- b. "Elevated Idle Feature": this feature is inherent in the powertrain control modules of diesel engine vehicles ordered with "Transmission Power Take-Off Provision". Activating the Ford "PTO Circuit" will automatically elevate the engine idle to 1200 rpm in "PARK" or "NEUTRAL" regardless of the parking brake being set. This feature does not require use of the Auxiliary Idle Control option or APCM module. This feature is not available for manual transmission.

### SPLIT-SHAFT PTO

Light truck automatic transmissions from Ford are not prepared for split-shaft PTO operation. The electronic control strategy is affected, and the powertrain has not been fully qualified for the higher horsepower and extended duration usage typical of this application. Restricting split-shaft application to manual transmission only is recommended. Also, temperature monitoring and control of the manual transmission fluid is highly recommended.

# POWER TAKE-OFF INSTALLATION

## M60D MANUAL TRANSMISSIONS

### 4R100 AND TORQSHIFT

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POWERTRAIN COMPATIBILITY				
FORD POWERTRAIN			PTO MODEL SERIES <sup>(1)</sup>	
Engine	Manual Transmission	PTO Port Location (vehicle side)	Multi-Gear Single Speed	
			Chelsea	Muncie
All	M60D	LH	440	TG

<sup>(1)</sup> Consult PTO manufacturer for complete detail on gear set, usage and exceptions.  
SG / TG = Single Gear / Two Gear

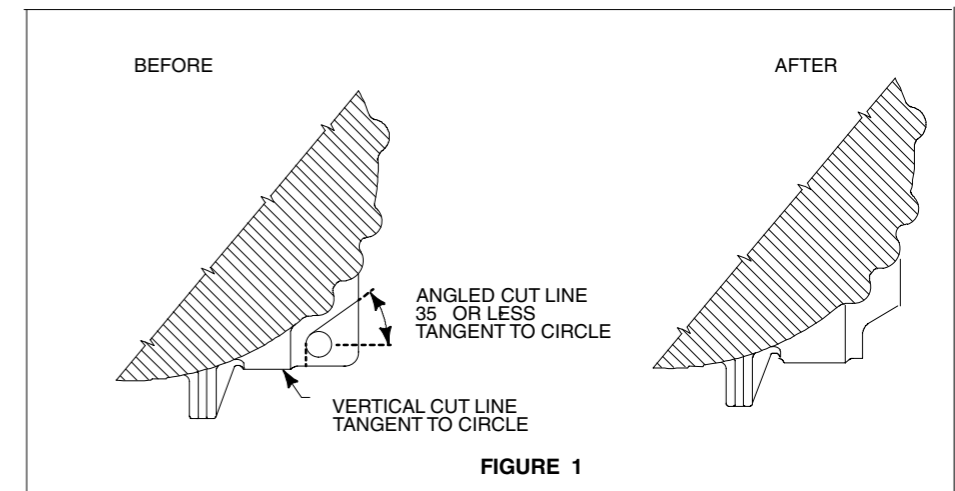
M60D MANUAL TRANSMISSION PTO DRIVE GEAR DATA	
GEAR RATIO	5.79 (LOW)
NUMBER OF TEETH	39
DIAMETRAL PITCH	9.2364
PITCH DIAMETER	132.568 mm
NORMAL PRESSURE ANGLE	20°
ANGLE AND HAND OF HELIX	36° RH
RPM @ 1000 RPM OF ENGINE	590
PITCH LINE VELOCITY @ 1000 RPM OF ENGINE	806

POWERTRAIN COMPATIBILITY					
FORD POWERTRAIN			AFTERMARKET PTO MODEL SERIES <sup>(1)</sup>		
Engine	Automatic Transmission	PTO Port Location (vehicle side)	Multi-Gear Single Speed		
			Chelsea	Muncie	Bazares (PTO, Inc.)
6.8L 4x2	4R100	LH	242	FA62	TBD
6.8L 4x4			244	FA64	TBD
7.3L Diesel 4x2	4R100	LH	242	FA62	TBD
7.3L Diesel 4x4			244	FA64	TBD
6.0L Diesel 4x2	TorqShift	LH	245	FR62	TBD
6.0L Diesel 4x4			245	FR64	TBD

<sup>(1)</sup> Consult PTO manufacturer for complete detail on gear set, usage and exceptions.

AUTOMATIC TRANSMISSION PTO DRIVE GEAR DATA		
	TRANSMISSION 4R100	TorqShift 5-Speed
GEAR RATIO	2.71 (1 <sup>ST</sup> )	3.09
NUMBER OF TEETH	115	121
DIAMETRAL PITCH		
PITCH DIAMETER	216.33 mm	215.985 mm
NORMAL PRESSURE ANGLE	15.907°	17.989°
ANGLE AND HAND OF HELIX	18° Left	Spur
RPM @ 1000 RPM OF ENGINE	1000 RPM	1000 RPM
PITCH LINE DIAMETER VELOCITY @ 1000 RPM OF ENGINE	2230 ft/min	2226 ft/min

The M60D manual transmission case will require a slight modification to package PTO pumps that are mounted directly to the PTO and facing rearward. Refer to Figure 1 for instructions on removing a small tab on the case to obtain clearance for the pump.



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**Instructions for removing M60D case tab (for PTO clearance)**

A section of the aluminum tab may be removed as indicated above. Use a mechanical tool only, such as a die grinder. DO NOT use a flame torch of any kind to remove aluminum transmission case material.

- NOTES** — [ ] DIMENSIONS ARE INCHES.
- M60D USES ALL METRIC FASTENERS EXCEPT FOR COOLER LINES.
  - DO NOT SCALE DRAWINGS.
  - PTO OPENING IS A STANDARD 6 BOLT SAE #J704B.