Contents

Page

DF 150/250 Transmission (Digital)
Group 05—Safety messages

Group 10—General Information

Group 15—Transmission Mounting

Group 20—Torque Converter

Group 25—Charge Pump

Group 30—Front Cover

Group 35—Control Valve

Group 40—Main Case Front Housing

Group 45—Gear Ratio Group

Group 50—Main Case Rear Housing

Group 55—Brake Group

Group 99—Special Tools

Group 100—Test and Troubleshooting

Group 105—Transmission Control Unit

Index

All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

CTM84-19-16JUL98

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A John Deere ILLUSTRUCTION® Manual

WARNING VEHICLE RUNAWAY HAZARD Avoid serious or fatal injury. This transmission is not a braking system. Install it only if there is a braking system capable of stopping vehicle with dead engine, disengaged transmission, or loss of hydrostatic retardation. Otherwise, vehicle may roll freely, resulting in loss of control.

YZ,WARN -19-10MAR98

HANDLE FLUIDS SAFELY—AVOID FIRES

When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.



TS227 -UN-23AUG88

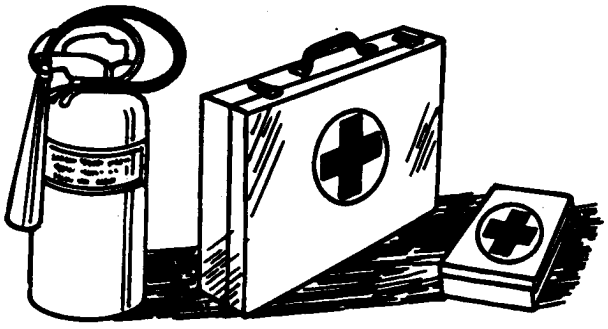
DX,FLAME -19-04JUN90

PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



TS291 -UN-23AUG88

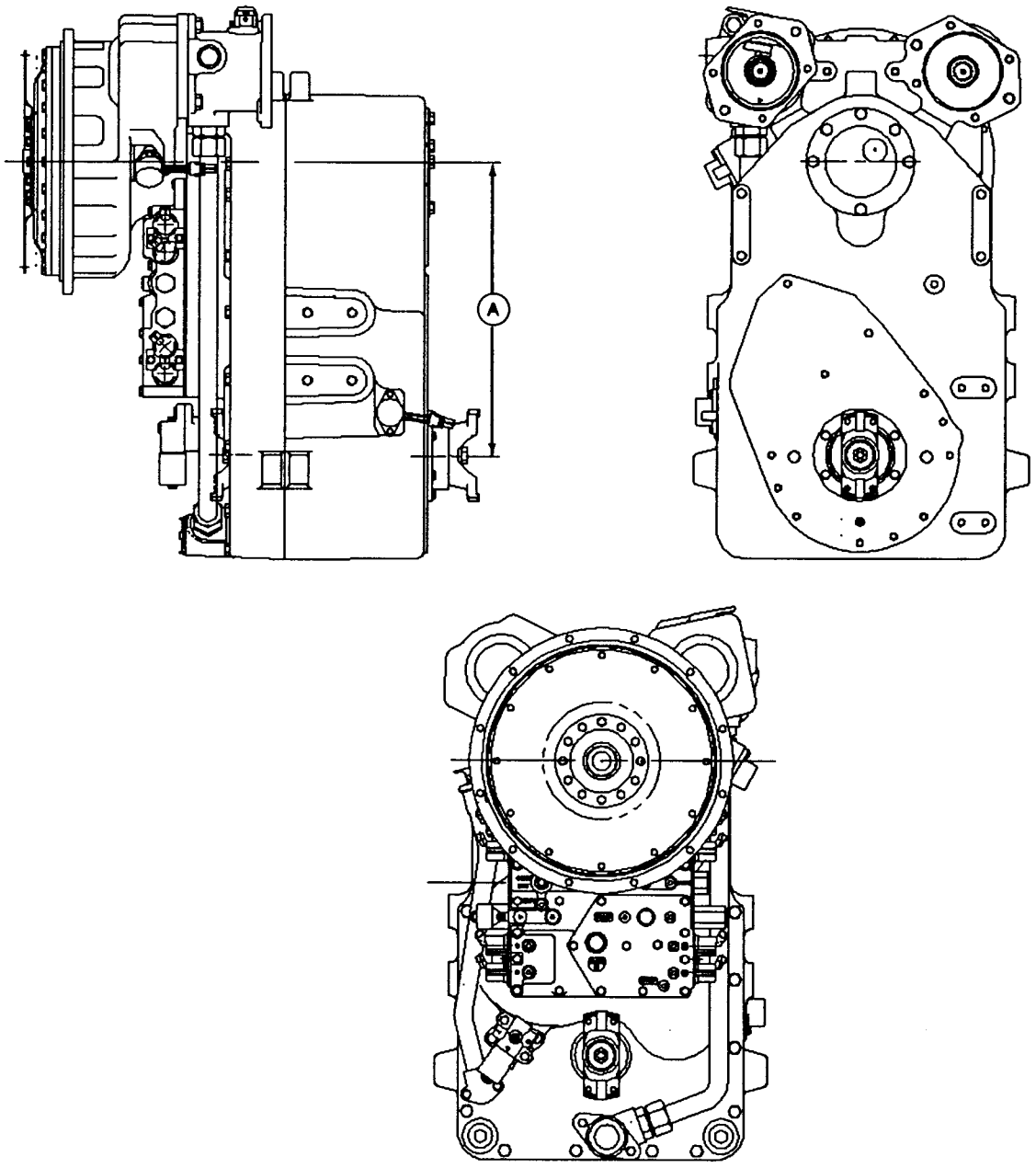
DX,FIRE2 -19-03MAR93

SPECIFICATIONS

Item	Measurement	Specification
• DF-150	Weight	567 Kg (1250 lbs)
• DF-150	Input-to-Output	500 mm (19.69 in)
• DF-150	Rating	Input power(maximum) - 142 kW (190 SAE hp)
		Input no load speed (maximum) - 3000 rpm
		Turbine torque (maximum) - 1288 N·m (950 lb-ft)
• DF-250	Weight	703 Kg (1550 lbs)
• DF-250	Input-to-Output	550 mm (21.65 in)
• DF-250	Rating	Input power(maximum) - 224 kW (300 SAE hp)
		Input no load speed (maximum) - 3000 rpm
		Turbine torque (maximum) - 1898 N·m (1400 lb-ft)
• DF-150/250	Mounting	Engine
		Midship
		Remote
• DF-150/250	Torque Converter	298.5 mm (11.75 in)
		323.8 mm (12.75 in)
		355.6 mm (14.00 in)
• DF-150/250	Clutches	Fully modulated, oil cooled, multidisc, hydraulic actuated and self-adjusting.
• DF-150/250	Gearing	Constant mesh, in line, high contact ratio ground gears. Up to eight speeds forward and four speeds Reverse full powershift.
• DF-150/250	Oil	Hydraulic transmission fluid.

Continued on next page

DF SERIES 150 TRANSMISSION



Dimension “A” - 500mm (19.69 in)
Approximate weight 567Kg (1250 lbs)

YZ,CTM84,10,15 -19-25MAY98

SUGGESTED WRENCHING TORQUE FOR TAPERED PIPE THREAD

00
10
18

TAPERED PIPE THREAD WITH SEALANT CHART

Thread Size	N·m	lb-ft
1/16-27 UNF	15	10
1/8-27 UNF	20	15
1/4-18 UNF	25	20
3/8-18 UNF	35	25
1/2-14 UNF	45	35
3/4-14 UNF	60	45
1-11 1/2 UN	75	55
1-1/4-11 1/2 UN	95	70
1-1/2-11 1/2 UN	110	80
2-11 1/2 UN	130	95

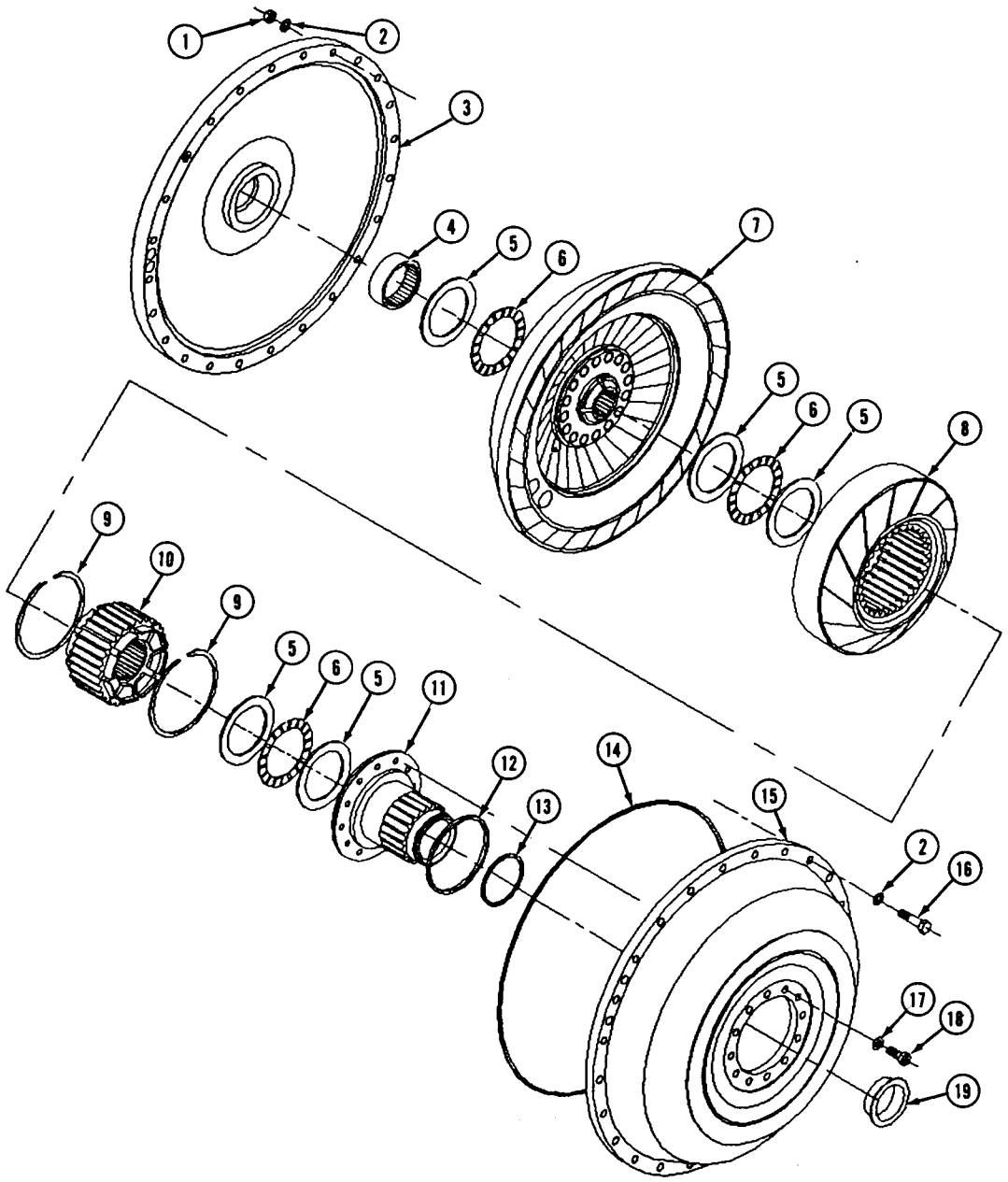
TAPERED PIPE THREAD WITHOUT SEALANT CHART

Thread Size	N·m	lb-ft
1/16-27 UNF	20	15
1/8-27 UNF	25	20
1/4-18 UNF	35	25
3/8-18 UNF	45	35
1/2-14 UNF	60	45
3/4-14 UNF	75	55
1-11 1/2 UN	90	65
1-1/4-11 1/2 UN	110	80
1-1/2-11 1/2 UN	130	95
2-11 1/2 UN	160	120

SUGGESTED WRENCHING TORQUE FOR TAPERED PIPE THREAD charts meet Funk Engineering Procedures Manual Torque Specifications FEP 14.4.

CTM147,10,41 -19-25MAY98

DISASSEMBLE AND ASSEMBLE 12.75 INCH TORQUE CONVERTER WITH FIXED STATOR



YZ541 -UN-25OCT93

1—Hex nut (24 used)
2—Flat washer (24 used)
3—Front cover
4—Bearing
5—Thrust washer (5 used)
6—Needle thrust washer (3 used)
7—Turbine assembly
8—Converter stator
9—Retainer ring (2 used)
10—Fixed stator hub
11—Impeller hub
12—O-ring
13—Seal ring
14—Gasket O-ring
15—Converter impeller
16—Cap screw (24 used)
17—Washer (12 used)
18—Cap screw (12 used)
19—Shipping plug

YZ,CTM84,20,28 -19-01APR98

REMOVE TORQUE CONVERTER AND DRIVE PLATE ASSEMBLY.

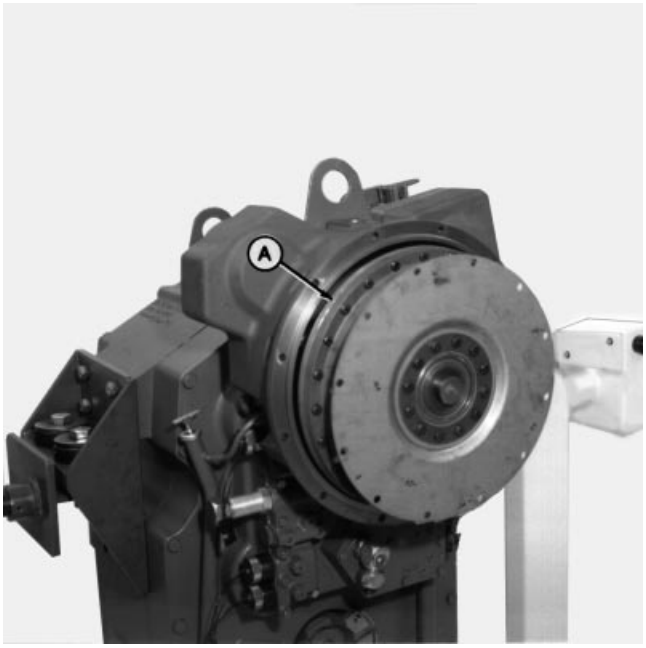
CAUTION: Torque converter assembly weighs approximately 32 Kg (70 lbs). Torque converter is not attached to transmission. Do not allow torque converter to fall out of transmission input housing. Personal injury could result.

1. Remove torque converter assembly (A) straight away from transmission input housing.

2. Drain oil through impeller hub, check for contaminates, dispose of oil properly.

3. Place torque converter assembly on work surface with drive plate assembly up.

4. Place support blocks under torque converter impeller to prevent tipping.

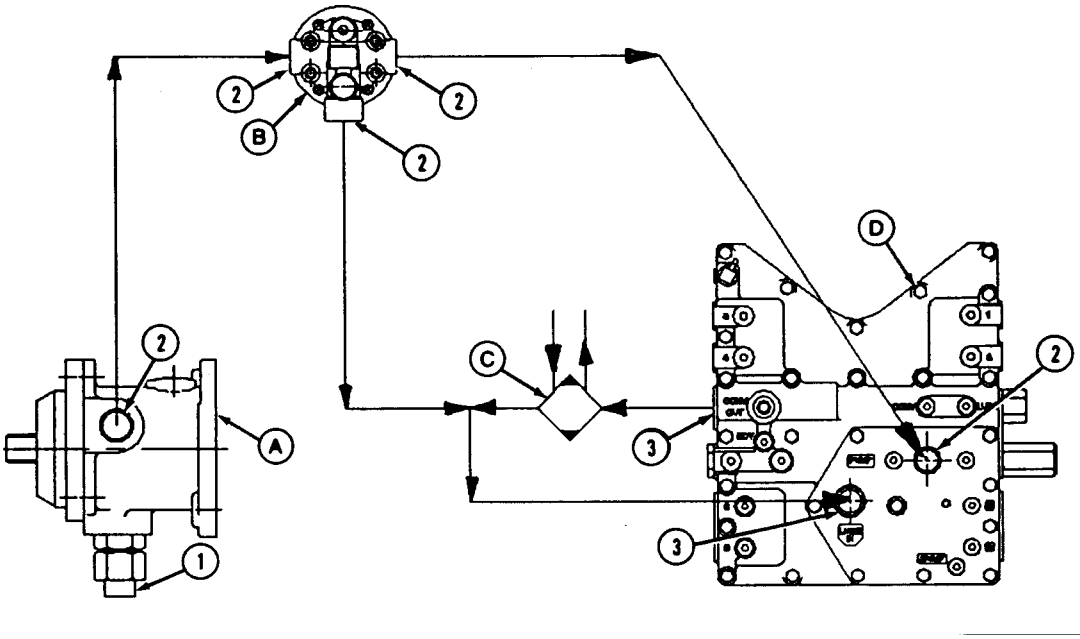


YZ,CTM84,20,3 -19-25MAY98

PIPING DIAGRAM, CONVERTER DRIVEN TRANSMISSION, (WITHOUT WET BRAKE)

00 35 6

NOTE: Piping diagram for converter driven or direct drive DF series transmission without wet brake option (Digital Valve Shown).



A—Charge pump 91 lpm (24gpm) at 2100 engine rpm.

B—Remote mount filter with bypass warning switch.

C—Heat exchanger Maximum allowable pressure drop with converter 69 kPa (10psi) with direct drive 345 kPa (50 psi).

D—Main control valve for transmission

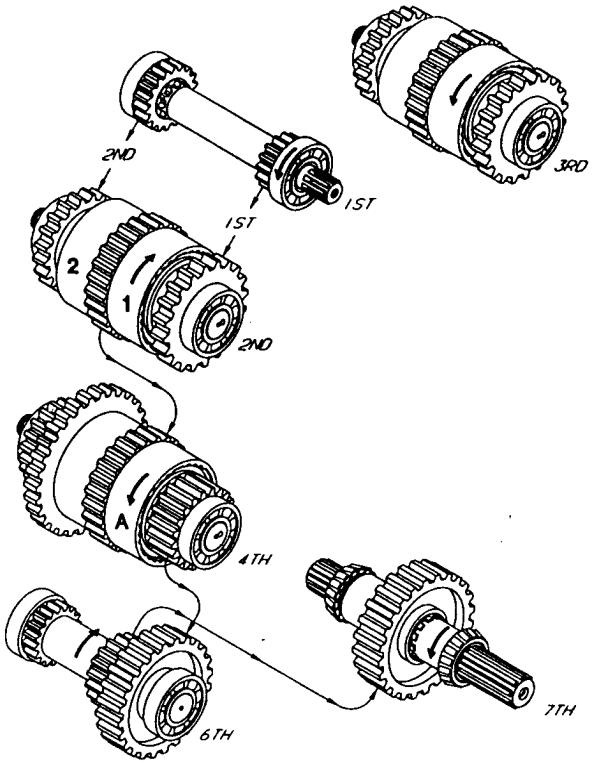
1—Transmission sump suction

2— 1 1/16-12UNC-2B JIC thd port.

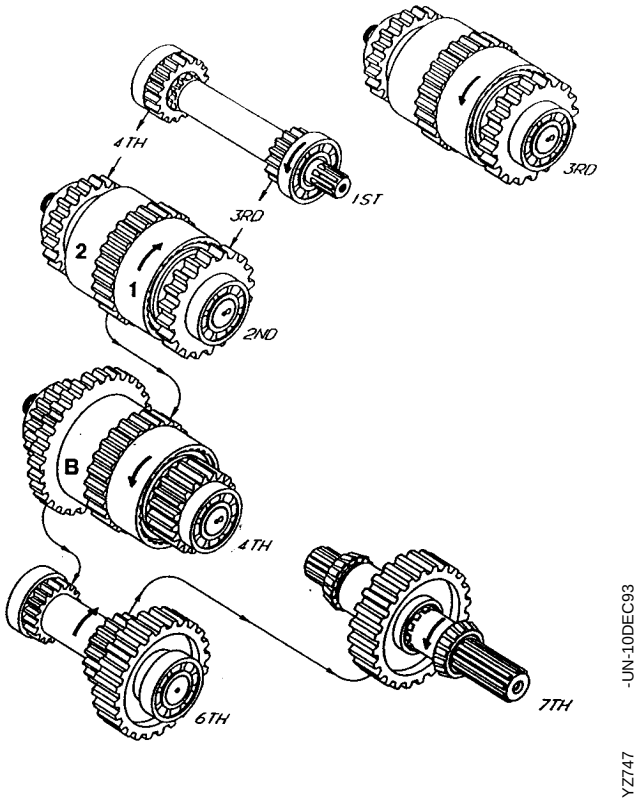
3— 1 5/16-12UNC-2B JIC thd port.

YZ,CTM84,35,4 -19-25MAY98

4-4 DF POWER FLOW FORWARD SPEEDS



1st Gear - 1A, 2nd Gear - 2A



3rd Gear - 1B, 4th Gear - 2B

YZ,CTM84,100,10-19-13JAN94

TROUBLESHOOT TRANSMISSION SYSTEM MALFUNCTIONS

Symptom	Problem	Solution
Erratic oil pressure.	Low oil level.	Add oil to proper level.
	Suction tube fitting	Replace O-ring fitting.
	Suction manifold O-ring not sealing.	Replace O-ring.
	Foreign object in suction port.	Remove object and check for other contamination.
Excessive oil pressure.	Sticking main regulator valve.	Replace main regulator valve.
	Faulty spring.	Replace main regulator valve.
Low oil pressure in all gears.	Sticking main regulator valve.	Replace main regulator valve.
	Control valve body gasket leaking.	Replace gaskets.
	Charge pump defective.	Replace pump.
	Internal disconnect seal damage or installed incorrectly.	Replace seal and install correctly.
	Faulty main regulator valve.	Replace regulator assembly.
	Control valve body cracked.	Replace control valve body.
Low pressure in one gear but all right in other gears.	Contaminated proportional solenoid.	Replace proportional solenoid. *Check suction screen for contamination.
	Broken wire to one solenoid, or dirty connection.	Repair wire.
	Broken seal ring on input end of clutch assembly.	Replace seal ring.
	Bore sleeve worn.	Replace bore sleeves.
	Outer or inner piston seal leaking.	Replace seals.
Transmission System Pressure is Low (One or Two Gears)	Failed transmission control valve	Inspect transmission control valve for external leakage, Remove control valve. Inspect or replace gasket (See group 35)
	Leakage in clutch piston or seal ring.	Air check to confirm leak.

Continued on next page

CLUTCH CALIBRATION FOUR FORWARD SPEEDS AND FOUR REVERSE

For Funk Digital Valve DF150 or DF250 Series Transmissions Four Forward Speeds and Four Reverse.

1.Bring the transmission oil temperature up to normal operating range for optimum calibration.

2. With the vehicle ignition off, apply the park brake.

3. Plug a jumper plug (which connects pin A to pin B) in the calibration plug (S16) on the vehicle harness.

4. Power up the TCU by turning on the vehicle ignition. The display should show “CAL”.

5. Start the engine. The display should show Error Code “96”. With the engine speed at idle, slowly increase RPM until the code is no longer displayed. This engine speed must be maintained at ± 10 RPM. The calibration will start. If error code “92” is displayed, slow the engine RPM until neither code “96” nor “92” is displayed. Error “96” = RPM too low and error “92” = RPM too high.

6. Move the shift handle to the Forward position. This will calibrate all the directional clutches.

7. The display will alternate showing NEU and C1F, while calibrating the fast fill of clutch 1. It will then go to C1H, while calibrating the hold level for clutch 1. This will be followed by C2F, C2H, C3F, C4F and C4H for calibrating the fast fill and hold for clutches 2, 3, and 4.

8. The display will show END when the routine is finished. At that time move the shift back to the neutral position.

9. Move the shift handle to the Reverse position. This will calibrate all the speed clutches.

10. The display will alternate showing NEU and CAF, while calibrating the fast fill of A clutch. It will then go to CAH, while calibrating the hold level for A clutch. This will be followed by CBF and CBH for calibrating the fast fill and hold for clutch B.

11. The display will show END when the routine is finished. At that time move the shift handle back to the neutral position.

12. Shut the vehicle’s ignition OFF, which will power down the TCU.

13. Remove the jumper plug from the calibration plug (S16).

The calibration procedure is now complete.

When the TCU is powered up, the display will show “N1”.

CTM84,105,34A -19-25MAY98

CLUTCH SOLENOID VOLTAGE REQUIREMENTS

NOMINAL VOLTAGE	12V	24V
ALLOWABLE VOLTAGE	10—14V	20—28V
CURRENT DRAW	1 AMPS	.6 AMP
CURRENT DRAW MAX.	1.2 AMPS	.7 AMPS
RESISTANCE	14 OHMS ± 3%	53 OHMS ± 3%

** This coil must be used with a Funk approved electronic control module.*

All checks must be made at the valve.

YZ,CTM84,100,6 -19-25MAY98

TEST SOLENOIDS

IMPORTANT: If a solenoid is removed from the valve, it must be installed in the same location.

NOTE: To determine the defective clutch is simply a matter of elimination. For example, if the gear selected uses solenoids 1 and A, and low pressure is indicated, select another clutch that uses one of those solenoids. If pressure is good, then the solenoid or clutch not selected is the one that is bad.

To confirm that this is the faulty circuit, select another clutch that uses this solenoid, to assure that the discrepancy is actually in this solenoid or clutch.

1. Select solenoids 1 and A.

If low pressure exists, then solenoid or clutch 1 or A is defective.

2. Select solenoids 2 and A.

If pressure is OK, then solenoid or clutch 1 is defective.

3. Select solenoids 1 and B.

If low pressure exists, then this confirms solenoid or clutch 1 is defective.

YZ,CTM84,100,3 -19-25MAY98

105
4

J1 CONNECTOR



J1 and Mating Connector

Mating connector for J1 is:

- Metri-Pack 150 series 30-way sealed P2S connector
- Delphi/Packard part number: 12034398
- Mating terminals for J1 are Delphi/Packard terminals: 12103881
- Tighten connector to TCU 0.8—1.5 N•m (7.1—13.3 lb-in)

Continued on next page

AG,YZ07927,21 –19–13OCT98–1/2

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

SYSTEM DIAGNOSTICS CODES

The TCU provides troubleshooting assistance in the form of diagnostic codes.

Diagnostic codes may appear due to a number of causes, including:

- Pinched or broken wiring
- Shorted or open solenoids
- Bad connections
- Shorted wiring (to either ground or vehicle voltage)
- Invalid signal combinations from the gear selector.
- Magnetic pickup sensor failures

IMPORTANT: All diagnostics codes are neutral recoverable, unless the condition causing the diagnostics code prevents the TCU from detecting a legal neutral condition. After a neutral recovery, the shift lever may be placed back into a legal forward or reverse position. If the condition causing the diagnostics code still exists, the diagnostics code will again be detected and displayed.

The TCU retains the last eight non-repeating diagnostics codes in nonvolatile memory in the order in which they have occurred. These codes are available for future retrieval, except in the earliest-model TCU's.

AG,YZ07927,30 –19–14OCT98–1/1

OVERVIEW OF DIAGNOSTIC CODES

The following are those diagnostic codes that can be logically grouped by similarities. (Not all codes are included in this list.)

- **Codes 20-29, 175-177:** Low or no current in a solenoid.
- **Codes 30-39, 178-180:** Solenoid current too high.
- **Codes 50-57, 59:** Gear selector related.
- **Codes 91-99:** Application specific codes.
- **Codes 100-127:** Calibration related.
- **Codes 145, 148:** Inching voltage related.
- **Codes 154, 155:** Speed sensor related.

The following table describes all diagnostic codes in summary form.

Continued on next page

DPSG,YZ07927,189 –19–30MAR99–1/4

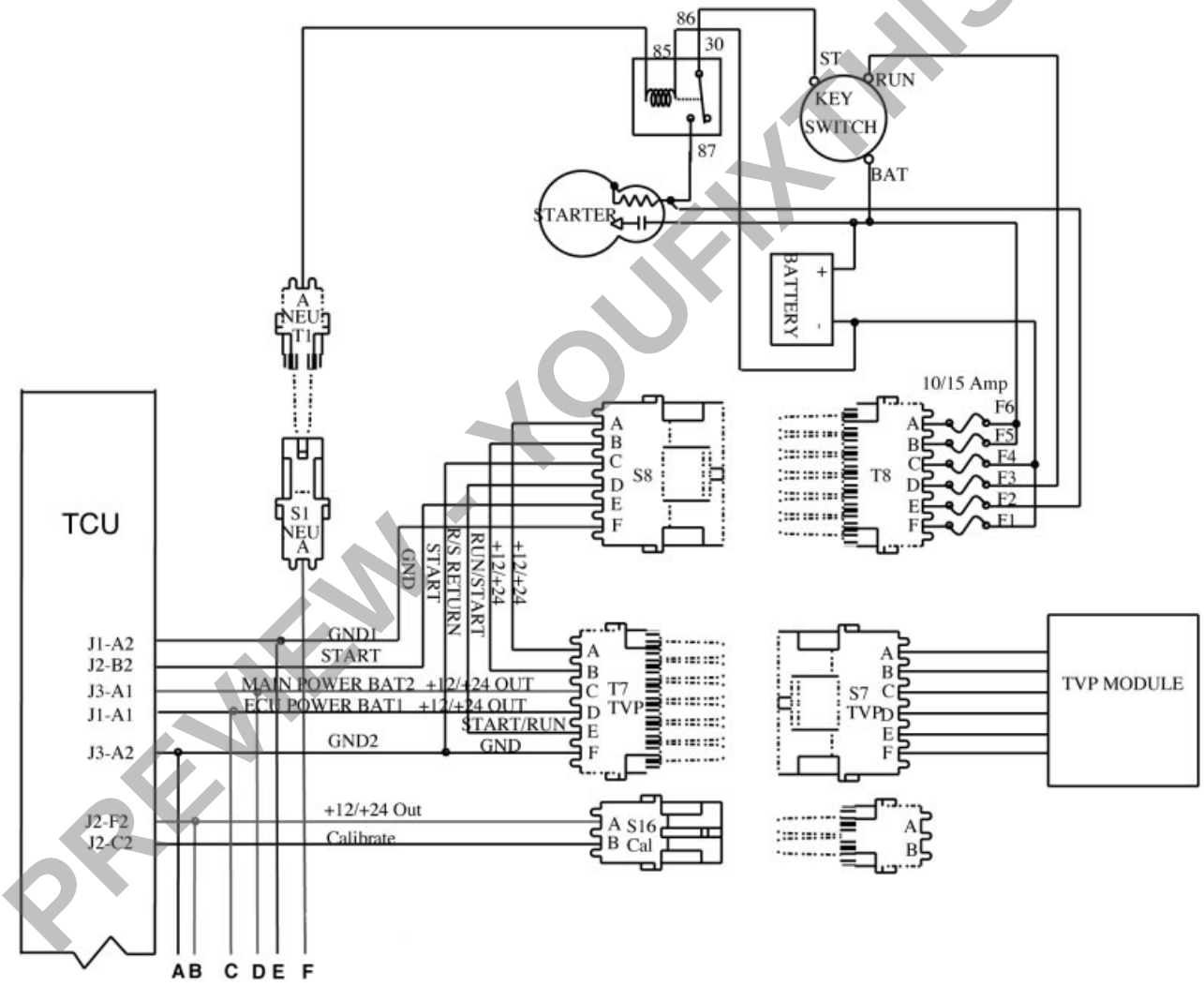
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105
26

TRANSMISSION WIRING HARNESS 1 OF 4

This drawing represents a generic harness only. Specific applications may vary; reference the vehicle manufacturer's harness diagram.

AG,YZ07927,25 –19–14OCT98–1/2



YZ1596 –UN–19SEP98

Part 1 of 4

NOTE: Letters A,B,C,D,E,F are labels linking to the following three pages.

AG,YZ07927,25 –19–14OCT98–2/2

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Introduction

FOREWORD

Component Technical Manuals (CTM) are concise service guides for specific components. Component technical manuals are written as stand-alone manuals covering multiple machine applications.

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual and are recommended for use.

Live with safety: Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.

This is the safety-alert symbol. When you see this symbol in the manual or on the machine, be alert to the potential for personal injury.

WARNING VEHICLE RUNAWAY HAZARD
Avoid serious or fatal injury. This transmission is not a braking system. Install it only if there is a braking system capable of stopping vehicle with dead engine, disengaged transmission, or loss of hydrostatic retardation. Otherwise, vehicle may roll freely, resulting in loss of control.

IMPORTANT: Important warns of possible damage to transmission.

NOTE: To make special mention of or to record in writing useful information about the transmission.

Use this component technical manual in conjunction with the machine technical manual. See the machine technical manual for information on component removal and installation, and gaining access to the components.

This manual is divided in three parts; general information, repair, and troubleshooting and tests:

• General information group offers component identification with specification information about the transmission.

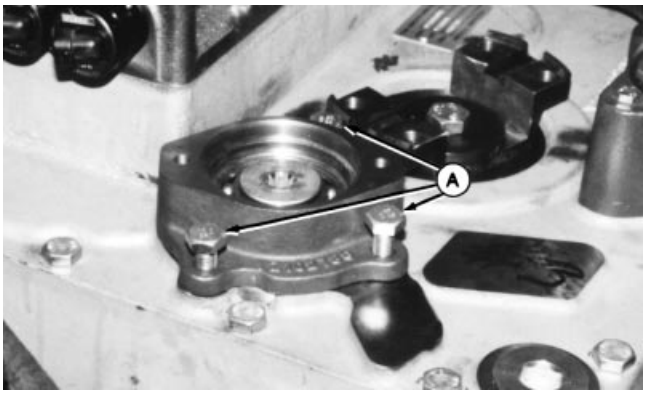
• Repair groups contain necessary instructions to repair the component.

• Troubleshooting and test groups help you identify the majority of routine failures quickly and then allows you to perform certain tests.

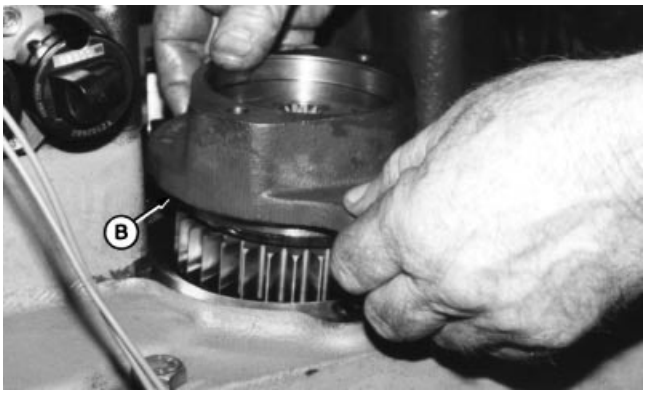
Information is organized in groups for the various components requiring service instruction. At the beginning of each group are summary listings of all applicable service equipment and tools, other materials needed to do the job, specifications, and torque values.

YZ,CTM84,IFC -19-16APR98

1. Remove three cap screws (A).



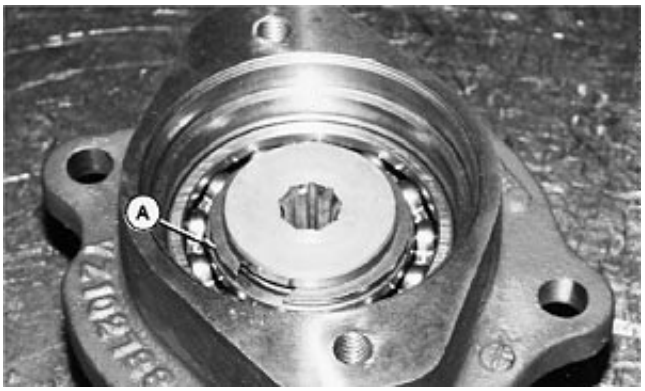
2. Remove ground driven pump assembly (B).



YZ,CTM84,40,35 -19-25MAY98

DISASSEMBLE GROUND DRIVEN PUMP

1. Remove external retaining ring (A).



YZ,CTM84,40,36 -19-25MAY98

Page

Front housing group
Install input housing assembly 00-30-22

G

Gear ratio group
Assemble clutch stage assembly 00-45-27
Disassemble clutch stage assembly . . . 00-45-18
First stage shaft assembly 00-45-13
First stage shaft disassembly 00-45-13
Remove 00-45-11
Remove seventh stage output 00-45-2
Second stage shaft assembly 00-45-14
Ground Driven Pump
Assemble 00-40-14
Disassemble 00-40-13
Disassemble and assemble drawing . . . 00-40-12
Install 00-40-15
Remove 00-40-13

I

Identification plate
ID plate location 00-10-5
Input assembly
Assemble 00-30-11
Assemble driven gear and bearings . . . 00-30-9
Assemble idler gears 00-30-10
Assemble input shaft & stator tube 00-30-20
Disassemble 00-30-6
Disassemble front cover 00-30-7
Drawing, front cover group 00-30-19
Front cover group drawing 00-30-2
Install driven gear assembly 00-30-16
Install idler gears assemblies 00-30-13
Install idler shafts 00-30-14
Install magnetic pickup 00-30-18
Install oil seal and bearing 00-30-12
Install on transmission 00-30-22
Remove and disassemble 00-30-3
Remove bearings from driven gears . . . 00-30-8
Remove driven gears 00-30-8
Remove idler gears and disassemble . . 00-30-9
Remove magnetic pickup 00-30-10

L

Lubricant, transmission 00-10-7

Page

M

Magnetic pickup
Input assembly 00-30-10
Output assembly 00-45-1
Metric torque values 00-10-22

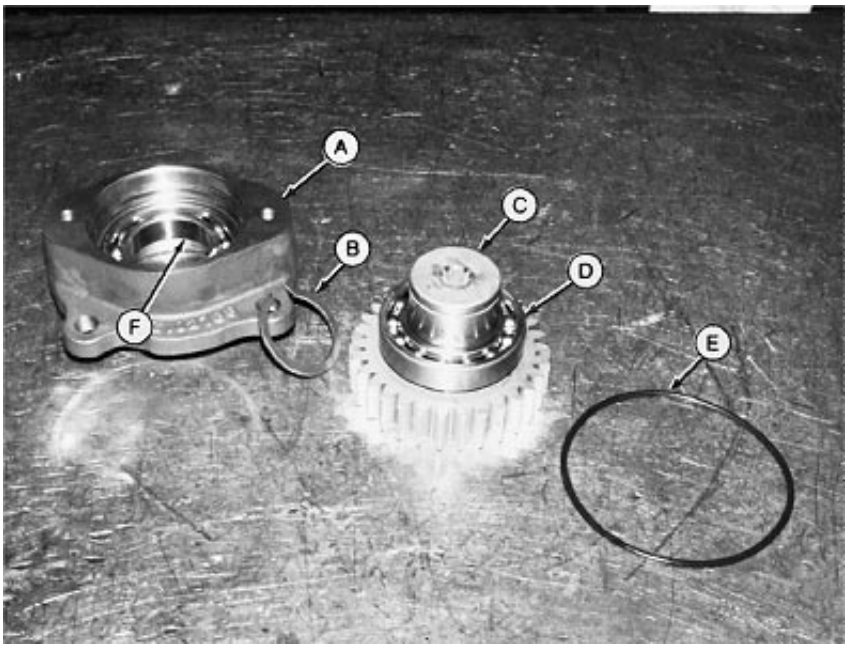
O

O-ring boss fittings 00-10-19
Oil
Air Temperature Range 00-10-7
Check and service 00-10-10
Cold weather startup 00-10-8
Fill with oil 00-10-9
Lines and fittings 00-10-21
Oil analysis 00-10-12
Oil and filter change intervals 00-10-11
Oil drain location 00-10-12
Oil fill location 00-10-12
Oil level check location 00-10-12
Oil specifications 00-10-7
Oil temp warning signal 00-10-13
Oil filter bypass
Cold weather startup 00-10-8
Filter bypass indication 00-10-11
Oil lines and fittings 00-10-21
Output Group
Assemble 00-45-40
Oil Trough 00-45-40

R

Rear housing
Assemble bearing retainer 00-50-9
Component identification 00-50-2
Disassemble bearing retainer 00-50-8
Install first stage cover group 00-50-5
Install output yokes 00-50-11
Remove / install magnetic pickup 00-45-1
Remove and install bearing cup 00-50-9
Remove bearing retainer 00-50-6
Remove first stage cover group 00-50-4
Setting end play 00-50-11

S



Disassemble Ground Driven Pump

1. Press Gear (C) from Adapter (A).

2. Remove bearings from gear (C) and from adapter (A).

3. Discard bearings (D) and (F).

Assemble Ground Driven Pump

1. Install new bearing (D) onto gear (C).

2. Press gear (C) and bearing (D) into adapter (A).

3. Start bearing (F) onto gear (C) and press bearing into adapter (A).

4. Install external retaining ring (B) into groove in gear (C).

YZ,CTM147,40,37-19-06MAY98

Page

Rear housing—Continued
Install output yokes 00-50-11
Remove / install magnetic pickup 00-45-1
Remove and install bearing cup 00-50-9
Remove bearing retainer 00-50-6
Remove first stage cover group 00-50-4
Setting end play 00-50-11

S

Seventh stage
Assemble 00-45-40
Oil Trough 00-45-40
Output Group 00-45-40
Solenoid
Test 00-100-3
Valve operation 00-100-2
Voltage requirements 00-100-3
Special tools
Clutch stage lift tool 00-45-11
Suction leak test 00-100-1
Suction tube
Disassemble 00-25-2
Drawing 00-25-4
Install suction tube 00-25-5
Remove suction tube 00-25-3

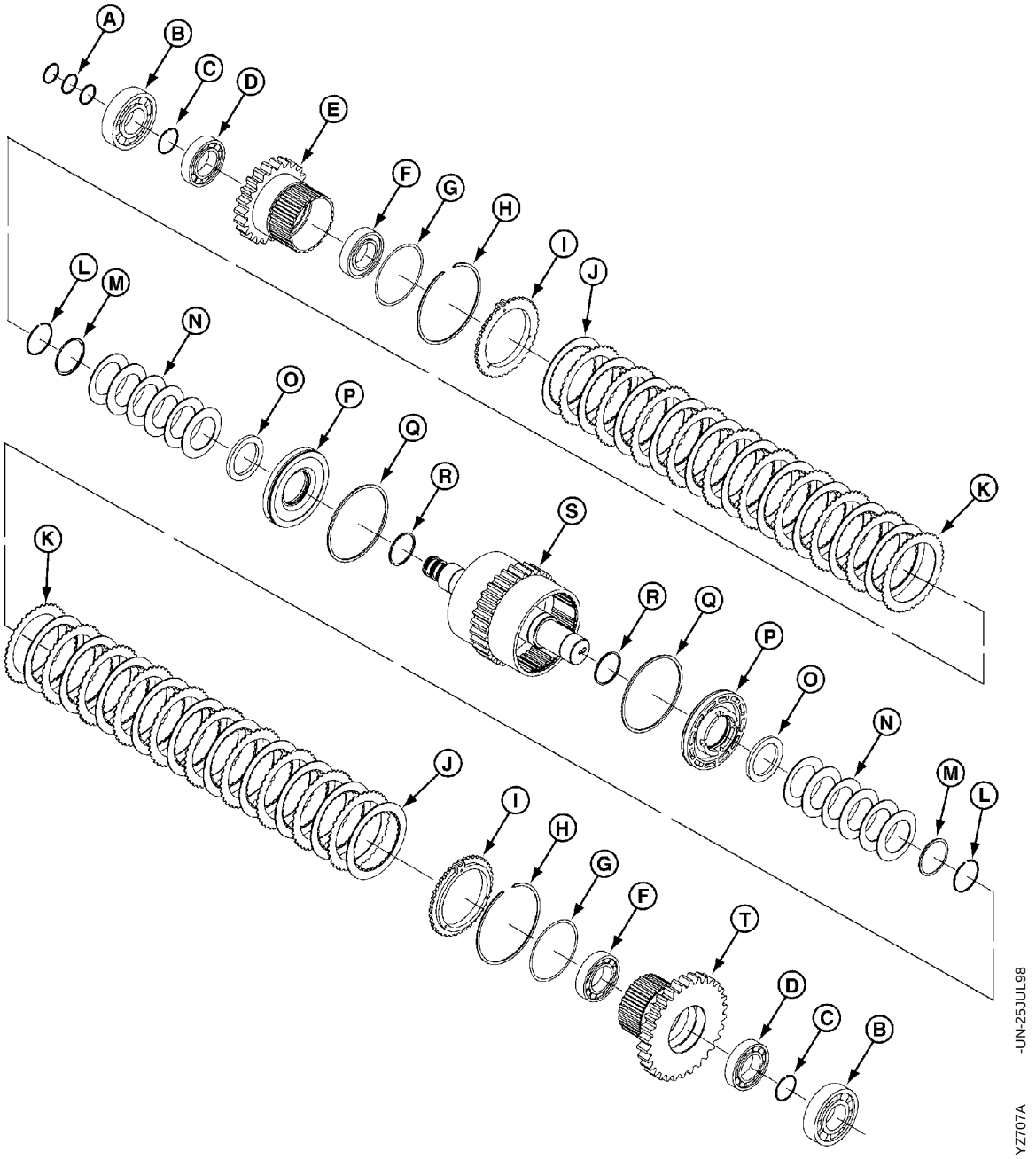
T

Temperature
Maximum Operating 00-10-1
Minimum Operating 00-10-1
Normal Operating 00-10-1
Test
Solenoids 00-100-3
Suction leak 00-100-1
Torque converter 12.75
Assemble cover/turbine/impeller 00-20-21
Assemble fixed stator 00-20-10
Assemble free stator 00-20-13
Assemble free stator clutch 00-20-14
Assemble impeller 00-20-17
Assemble stator/impeller 00-20-19
Assemble turbine/stator 00-20-20
Disassemble fixed stator assembly 00-20-8
Disassemble free stator 00-20-12
Disassemble impeller 00-20-16
Drive plate assembly drawing 00-20-2
Fixed stator assembly drawing 00-20-7

Page

Torque converter 12.75—Continued
Fixed stator converter drawing 00-20-4
Free stator assembly drawing 00-20-11
Free stator converter drawing 00-20-5
Front cover 00-20-6
Install drive plate 00-20-3
Remove and install bearing 00-20-6
Remove drive plate group 00-20-2
Remove from transmission 00-20-1
Remove stator 00-20-7
Remove turbine 00-20-6
Stator identification 00-20-9
Torque value
Flat face O-ring seal fitting 00-10-18
O-Ring boss fitting 00-10-17
Torque values
Inch 00-10-21
Metric 00-10-20
Towing
Towing the vehicle 00-10-11
Transmission
Check and service 00-10-8
Cold weather startup 00-10-5
Drawing, rear housing 00-50-2
Fill with oil 00-10-7
Front housing drawing 00-40-16
Ground Driven Pump 00-40-12
ID plate location 00-10-3
Install output yokes 00-50-11
Install transmission to engine 00-10-13
Installation Warning notice 00-10-13
Oil analysis 00-10-10
Oil and filter change intervals 00-10-9
Oil specifications 00-10-4
Oil temp warning signal 00-10-10
Remove and install dipstick tube 00-40-2
Remove output yokes 00-40-3
Repair stand 00-15-2
Safety precautions 00-15-3
Stalling torque converter 00-10-5
Storing the transmission 00-10-11
Towing the vehicle 00-10-11
Troubleshooting 00-100-10
Transmission Control Unit
Calibration 00-105-7
Clutch Calibration 00-105-8, 00-105-9
Component Functions 00-105-3
Connector Pinouts, J1 J2 J3 00-105-12
Cylinder Speed MPU 00-105-4
Glossary 00-105-26

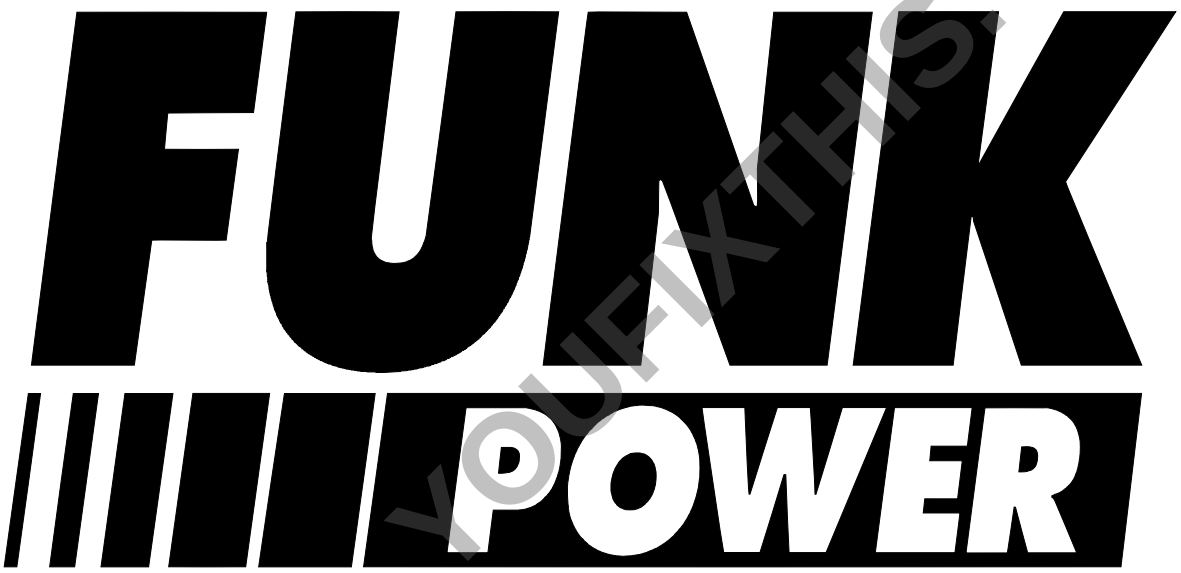
SECOND STAGE CLUTCH ASSEMBLY



A—Seal Ring (3 used)
B—Ball Bearing (2 used)
C—Retaining Ring (2 used)
D—Bearing (2 used)
E—2nd Clutch 54T Gear
F—Bearing (2 used)
G—O-ring (2 used)
H—Snap ring (internal),(2 used)
I—Clutch Plate Retainer (2 used)
J—Clutch Plate (20 used)
K—Clutch Separator Plate (20 used)
L—Retainer Ring (2 used)
M—Snap Ring Retainer (2 used)
N—Clutch Return Spring (12 used)
O—Lube Shutoff Washer (2 used)
P—Clutch Piston (2 used)
Q—Piston Outer Seal (2 used)
R—O-ring (2 used)
S—2nd Stage Shaft Assembly
T—61T Clutch Gear (2nd and 3rd stage)

YZ,CTM148,45,16-19-01AUG98

DF250 Series Transmission
Analog Valve System



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8. Compress clutch return springs.

9. Install retaining ring (E).

10. Release pressure on clutch return springs slowly, be sure snap ring retainer is properly positioned.



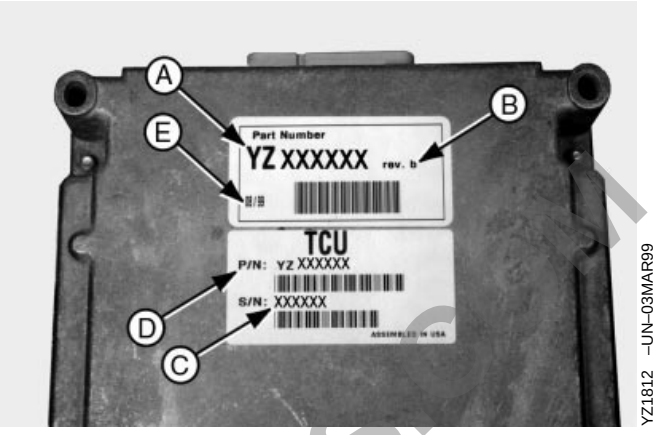
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2

UNDERSTANDING THE TCU LABEL

NOTE: On older model TCUs, the hardware P/N is on a sticker beneath the software P/N.

A — TCU software part number
B — Software revision letter
C — TCU serial number
D — TCU hardware part number
E — Original programming date (week/year)



TCU Label Information

DPSG,YZ07927,185 –19–03MAR99–1/1

ABBREVIATIONS AND ACRONYMS

- **BOC:** Bottom of Clutch
- **CAN:** Controller Area Network
- **CCD:** Chrysler Collision Detection
- **CYL:** Cylinder
- **DC:** Direct Current
- **ENG:** Engine
- **GND:** Ground or negative battery terminal
- **ms:** Milliseconds
- **MPU:** Magnetic Pick-Up sensor. This device monitors the rotational speed (the engine for example) and sends a proportional frequency signal to the TCU.
- **PWM:** Pulse Width Modulation
- **P:** Park
- **POT:** Potentiometer
- **RPM:** Revolutions Per Minute
- **SOL:** Solenoid
- **TCLU:** Torque Converter Lock-Up
- **TCU:** Transmission Control Unit
- **TEMP:** Temperature
- **TOC:** Top of Clutch
- **TVP:** Transient Voltage Protection module. This device conditions vehicle battery power for the TCU and protects the TCU from reverse battery connections and potentially harmful voltage spikes.
- **V:** Volt

AG,YZ07927,31 –19–14OCT98–1/1

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Symptom	Problem	Solution
	Faulty gear selector.	Attach connector J4 to the gear selector, and disconnect J2 from the TCU. The ignition should be in the "ON" position. Replace the gear selector if and only if **all** of the following are true: 1. NEUTRAL signal line is OK. (see above) 2. System battery voltage line between TVP module and gear selector is OK. (see above) 3. The voltage on harness pin J2-A1 does **not** alternate between 0 volts and system battery voltage as the gear selector is moved in and out of neutral. If all these tests are true, it indicates that the gear selector is getting power, but is incapable of providing an active NEUTRAL output signal. **IMPORTANT: For more information refer to TROUBLESHOOTING THE GEAR SELECTOR in Group 100 (Test and Troubleshooting).**
	Faulty TCU.	After all other possible causes have been eliminated, replace TCU.

AG,YZ07927,72 –19–23OCT98–6/6

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