

1990 Chevrolet Caprice

1983-90 AUTOMATIC TRANSMISSIONS General Motors Corp. - Turbo Hydra-Matic 200-4R Overhaul

1983-90 AUTOMATIC TRANSMISSIONS**General Motors Corp. - Turbo Hydra-Matic 200-4R Overhaul****APPLICATION****TRANSMISSION APPLICATION (BUICK)**

Vehicle Application	Transmission
1983-84 Electra 4.1L	200-4R, MW9
1983-89 Electra 5.0L	200-4R, MW9
1983-85 Electra 5.7L	200-4R, MW9
1990 Estate Wagon 5.0L	200-4R, MW9
1983-89 LeSabre 5.0L	200-4R, MW9
1983-85 LeSabre 4.1L & 5.7L	200-4R, MW9
1983-87 Regal 3.8L	200-4R, MW9
1983-84 Regal 4.1L & 4.3L	200-4R, MW9
1983 Regal 5.7L	200-4R, MW9
1984-87 Regal 5.0L	200-4R, MW9

TRANSMISSION APPLICATION (CADILLAC)

Vehicle Application	Transmission
1987-90 Brougham 5.0L	200-4R, MW9
1983-84 DeVille 4.1L & 5.7L	200-4R, MW9
1983-85 Fleetwood 4.1L & 5.7L	200-4R, MW9
1984 Fleetwood 6.0L	200-4R, MW9
1986 Fleetwood 5.0L	200-4R, MW9

TRANSMISSION APPLICATION (CHEVROLET)

Vehicle Application	Transmission
1983-90 Caprice 5.0L	200-4R, MW9
1983-85 Caprice 5.7L	200-4R, MW9
1984 El Camino 3.8L & 5.7L	200-4R, MW9
1984-87 El Camino 5.0L	200-4R, MW9
1985-87 El Camino 4.3L	200-4R, MW9
1983-84 Impala 5.0L	200-4R, MW9
1983-85 Impala 5.7L	200-4R, MW9
1984 Monte Carlo 3.8L & 5.7L	200-4R, MW9
1984-88 Monte Carlo 5.0L	200-4R, MW9
1988 Monte Carlo 4.3	200-4R, MW9

TRANSMISSION APPLICATION (GMC)

Vehicle Application	Transmission

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1984 Caballero 3.8L & 5.7L	200-4R, MW9
1984-87 Caballero 5.0L	200-4R, MW9
1985-87 Caballero 4.3L	200-4R, MW9
1986-87 Caballero 4.3L	200-4R, MW9

TRANSMISSION APPLICATION (OLDSMOBILE)

Vehicle Application	Transmission
1983-90 Custom Cruiser 5.0L	200-4R, MW9
1983-85 Custom Cruiser 5.7L	200-4R, MW9
1983 Cutlass 4.3	200-4R, MW9
1983-88 Cutlass 5.0L	200-4R, MW9
1983-85 Cutlass 5.7L	200-4R, MW9
1984 Cutlass 4.3	200-4R, MW9
1985 Cutlass 3.8	200-4R, MW9
1983-85 Delta 88 5.0L & 5.7L	200-4R, MW9
1983 Ninety-Eight 4.1L	200-4R, MW9
1983-84 Ninety-Eight 5.0L & 5.7L	200-4R, MW9

TRANSMISSION APPLICATION (PONTIAC)

Vehicle Application	Transmission
1984-86 Bonneville 5.0L	200-4R, MW9
1984 Bonneville 5.7L	200-4R, MW9
1986 Bonneville 4.3L	200-4R, MW9
1989 Firebird 3.8L	200-4R, MW9
1984 Grand Prix 5.7L	200-4R, MW9
1984-87 Grand Prix 5.0L	200-4R, MW9
1986-87 Grand Prix 4.3L	200-4R, MW9
1983-86 Parisienne 5.0L	200-4R, MW9
1983-85 Parisienne 5.7L	200-4R, MW9
1986 Parisienne 4.3L	200-4R, MW9
1987-89 Safari 5.0L	200-4R, MW9

IDENTIFICATION

Transmission is identified by the production number, located on an I.D. plate attached to right side (rear) of case, near modulator. Production number consists of a year code, a 2 character model code and a build date code.

DESCRIPTION

The Turbo Hydra-Matic 200-4R transmission is a fully automatic unit consisting of 3 major components: 3-element torque converter (with a torque converter clutch), compound planetary gear set and an overdrive unit.

Friction elements used in this transmission include 5 multiple-disc clutches, 2 roller clutches and a band.

A hydraulic system, pressurized by a variable capacity vane-type pump, provides working pressure required to operate friction elements and automatic controls.

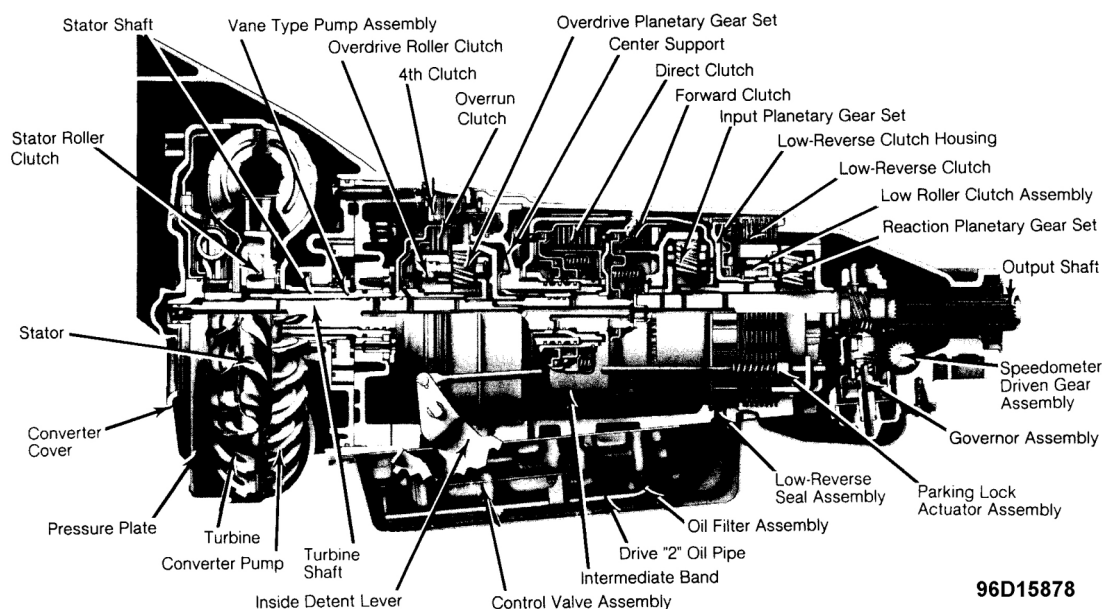


Fig. 1: Cutaway View of Turbo Hydra-Matic 200-4R Transmission
Courtesy of GENERAL MOTORS CORP.

NOTE: For information on converter clutch system used in the THM 200-4R, see **GENERAL MOTORS TORQUE CONVERTER CLUTCH** article.

LUBRICATION

See appropriate TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICE section.

ADJUSTMENTS

See appropriate TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICE section.

SERVICE (IN VEHICLE)

The following components can be removed from transmission without removing transmission from vehicle. For removal and installation procedures for these components, see **TRANSMISSION DISASSEMBLY**.

- Extension Housing Seal.
- Governor Assembly.
- Intermediate Servo Piston Assembly.

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- Oil Pan and Screen.
- Control Valve Assembly.
- Check Balls and Valve Body Spacer Plate and Gaskets.
- Pressure Regulator Parts.
- Inside Detent/Selector Lever.
- Manual Detent Roller and Spring Assembly.
- Throttle Lever and Bracket Assembly.
- T.V. Cable and "O" Ring.
- T.V. Boost Valve and Bushing.
- Parking Pawl Actuator Rod, Bracket and Pawl.
- Manual Shaft and Seal.
- Manual Valve and Link.
- Rear Seal.
- 1-2 Accumulator Assembly.
- 3-4 Accumulator Assembly.
- Low-Reverse Cup Plug.
- Reverse Boost Valve and Bushing.
- Stop Valve.
- Intermediate Band Anchor Pin.
- 4-3 Pressure Switch.
- 4th Clutch Pressure Switch.
- Speedometer Driven Gear Assembly.
- Converter Clutch Valve and Spring.
- Converter Clutch Solenoid.
- Solenoid Wire Clips.
- Electrical Connectors.
- Cooler Fittings.
- Oil Filter Pipe and "O" Ring.

TROUBLE SHOOTING

See **TROUBLE SHOOTING - BASIC PROCEDURES** article in the GENERAL TROUBLE SHOOTING section.

CLUTCH & BAND APPLICATIONS

Lever Position	Elements In Use
"D" Drive	
First	Overdrive Clutch, Low Roller Clutch & Forward Clutch

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Second	Intermediate Band, Overdrive Clutch & Forward Clutch
Third	Overdrive Clutch, Direct Clutch & Forward Clutch
Overdrive	Direct Clutch, Low Roller Clutch & 4th Clutch
"3" Manual 3rd	Overrun Clutch, Direct Clutch & Forward Clutch
"2" Manual 2nd	Overrun Clutch, Intermediate Band & Forward Clutch
"1" Low	Overrun Clutch, Forward Clutch & Low/Reverse Clutch
Reverse	Overdrive Clutch, Direct Clutch & Low/Reverse Clutch
Neutral/Park	Overdrive Clutch

TESTING

LEAKAGE

See [AUTO TRANS OVERHAUL - TURBO HYDRA-MATIC 400](#) article.

ROAD TEST

In Drive

Position selector lever in Drive and accelerate vehicle. A 1-2 and 2-3 shift should occur at all throttle positions (shift points will vary with throttle position). Check part throttle 3-2 downshift at 30 MPH by quickly opening throttle approximately three-fourths. Transmission should downshift 3-2. Check for 3-2 downshifts at 50 MPH, by depressing accelerator fully.

In "L2"

Position selector lever in "L2" and accelerate vehicle. A 1-2 shift should occur at all throttle openings (shift point will vary with throttle opening). Check detent 2-1 downshift at 20 MPH. Transmission should downshift 2-1.

Downshift From Drive To "L2"

Place selector lever in Drive. Moving at approximately 50 MPH with closed throttle, move selector lever to "L2". Transmission should downshift to 2nd gear. An increase in engine RPM and an engine braking effect should be noticed.

In ("L1")

Place selector lever in Low ("1") and accelerate vehicle. No upshift should occur.

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Downshift From "L2" To "L1"

At 40 MPH with throttle closed, move selector lever to "1st". A 2-1 downshift should occur at about 40-25 MPH, depending on axle ratio and control valve assembly calibration. The 2-1 downshift at closed throttle will be accompanied by increasing engine RPM and an engine braking effect should be noticed.

In Reverse

Place selector lever in Reverse and check for proper reverse operation.

HYDRAULIC PRESSURE TESTS

Preliminary Checking Procedure

Prior to making control pressure test: check transmission fluid level, check and adjust T.V. cable, check and adjust outside manual linkage. Check engine tune. Install oil pressure gauge to transmission and connect tachometer to engine.

CAUTION: When performing T.V. pressure checks, DO NOT sustain engine test speed more than 2 minutes.

Minimum T.V. Pressure Check

With T.V. cable adjusted to specifications and brakes applied, check line pressure in selector lever positions and at 1000 RPM. See CONTROL PRESSURE SPECIFICATIONS.

Maximum T.V. Pressure Check

With T.V. cable held at in fully extended position and brakes applied, check for correct line pressure in selector lever positions and at 1000 RPM. See CONTROL PRESSURE SPECIFICATIONS.

CONTROL PRESSURE SPECIFICATIONS

CONTROL PRESSURE SPECIFICATIONS (PARK & NEUTRAL @ 1000 RPM)

Series Code Letter	MINIMUM T.V. psi	MINIMUM T.V. kg/cm ²	MAXIMUM T.V. psi	MAXIMUM T.V. kg/cm ²
BR	56-64	3.9-4.5	173-198	12.0-13.8
CC, HF, HT	56-64	3.9 4.5	119 134	8.32-9.4
CH, CY	56-64	3.9-4.5	114-129	8.0-9.0
CR	56-64	3.9-4.5	112-126	7.8-8.8
CZ	56-64	3.9-4.5	144-162	10.8-11.3
KC, KJ, KT	56-64	3.9-4.5	116-130	8.1-9.1
KZ	56-64	3.9-4.5	160-183	11.2-12.8

CONTROL PRESSURE SPECIFICATIONS (REVERSE @ 1000 RPM)

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Series Code Letter	MINIMUM T.V. psi	MINIMUM T.V. kg/cm ²	MAXIMUM T.V. psi	MAXIMUM T.V. kg/cm ²
BR	105-118	7.4-8.3	322-369	22.5-25.8
CC, HH, HT	105-118	7.4-8.3	222-250	15.5-17.5
CH, CY	105-118	7.4-8.3	213-240	14.8-16.8
CR	105-118	7.4-8.3	208-235	14.5-16.4
CZ	105-118	7.4-8.3	268-301	18.7-21.0
KC, KJ, KT	105-118	7.4-8.3	215-242	15.1-17.0
KZ	80-90	5.6-6.3	226-257	15.8-18.0

CONTROL PRESSURE SPECIFICATIONS ("D4" & "D3" @ 1000 RPM)

Series Code Letter	MINIMUM T.V. psi	MINIMUM T.V. kg/cm ²	MAXIMUM T.V. psi	MAXIMUM T.V. kg/cm ²
BR	56-64	3.9-4.5	173-198	12.0-13.8
CC, HH, HT	56-64	3.9-4.5	119-134	8.3-9.4
CR	56-64	3.9-4.5	112-126	7.8-8.8
CZ	56-64	3.9-4.5	144-162	10.1-11.3
KC, KJ, KT	56-64	3.9-4.5	116-130	8.1-9.1
KZ	56-64	3.9-4.5	160-183	11.2-12.8

CONTROL PRESSURE SPECIFICATIONS ("D2" & "D1" @ 1000 RPM)

Series Code Letter	MINIMUM T.V. psi	MINIMUM T.V. kg/cm ²	MAXIMUM T.V. psi	MAXIMUM T.V. kg/cm ²
BR, CC, CH CR, CY, CZ HH, HT, KC, KJ, KT	123-138	7.9-8.9	123-138	7.9-8.9
KZ	114-129	7.9-9.0	114-129	7.9-9.0

PRESSURE TEST RESULTS**High or Low Pressures**

- T.V. cable out of adjustment, binding, unhooked, broken or wrong link.
- Throttle lever and bracket assembly binding, unhooked or mispositioned.
- Throttle valve or plunger valve binding.
- Pressure regulator valve binding.
- T.V. boost valve binding or wrong valve installed (causing low oil pressure only).
- Reverse boost valve binding.
- Manual valve unhooked or mispositioned.
- Pressure relief valve ball missing or spring damaged.
- Oil pump slide stuck or slide seal missing or damaged.

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- Pump decrease air bleed orifice missing or damaged (causing low oil pressure only).
- Pump decrease air bleed orifice plugged (causing low oil pressure only).
- T.V. limit valve binding.
- Line bias valve binding in open position (causing high oil pressure).
- Line bias valve binding in closed position (causing low oil pressure).

NOTE: Control valve assembly spacer plate and case should be closely inspected for corroded orifices and passages.

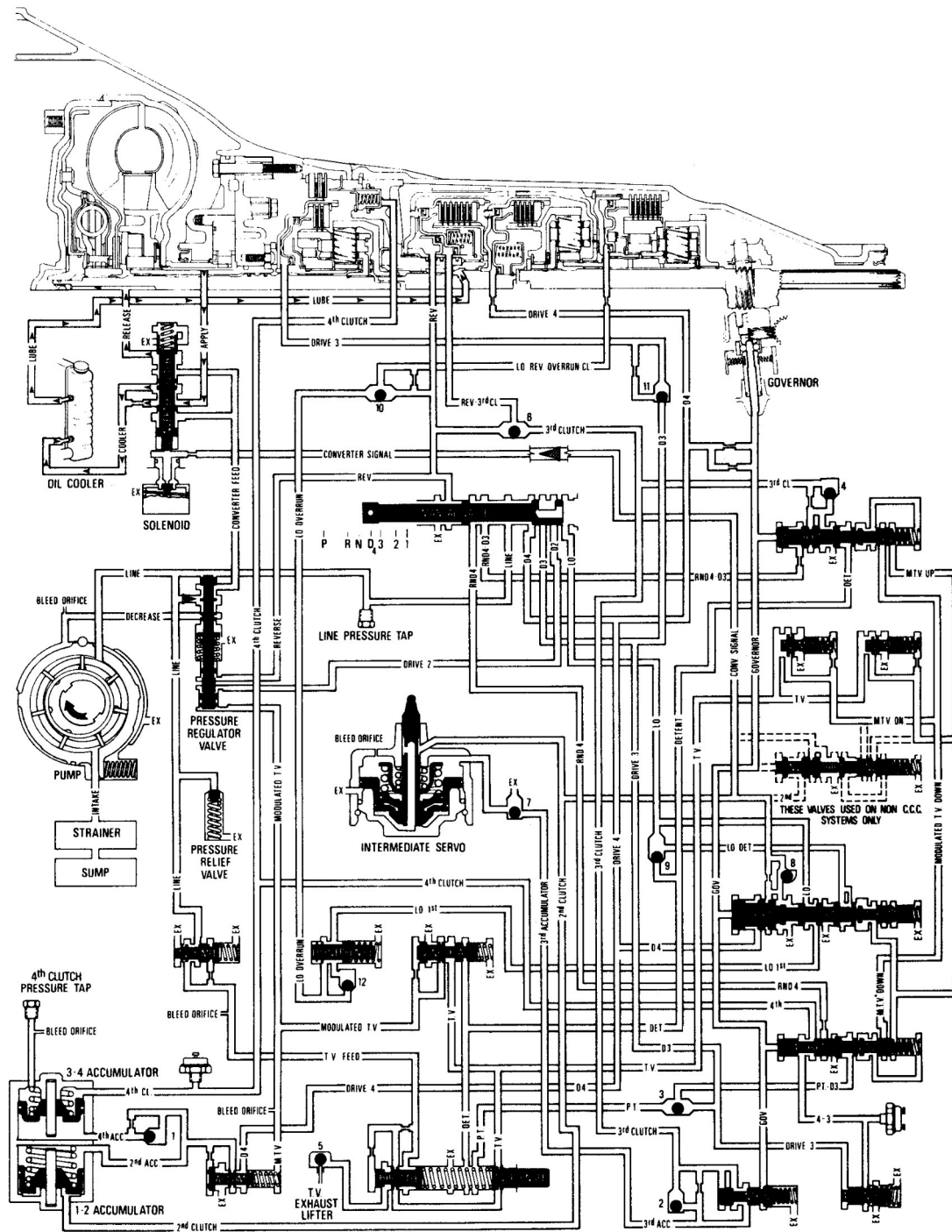
REMOVAL & INSTALLATION

See appropriate TRANSMISSION REMOVAL & INSTALLATION - A/T article.

NOTE: For information on converter clutch system used in the THM 200-4R, see GENERAL MOTORS TORQUE CONVERTER CLUTCH article.

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Fig. 2: Turbo Hydra-Matic 200-4R Hydraulic Circuits Diagram
Courtesy of GENERAL MOTORS CORP.

TRANSMISSION DISASSEMBLY

INPUT SHAFT END PLAY

See [AUTO TRANS OVERHAUL - TURBO HYDRA-MATIC 400](#) article.

EXTERNAL PARTS

1. Mount transmission in a holding fixture and remove torque converter. Rotate transmission so that oil pan is facing up. Remove oil pan and gasket. Remove oil filter intake pipe and "O" rings. "O" rings may be located in pump bore.
2. Disconnect wire leads at electrical connector and pressure switches. See **Fig. 3**. Using a 3/4" box wrench to compress connector tangs, withdraw electrical connector and "O" ring from case. Remove converter clutch solenoid assembly bolts, clips and solenoid.

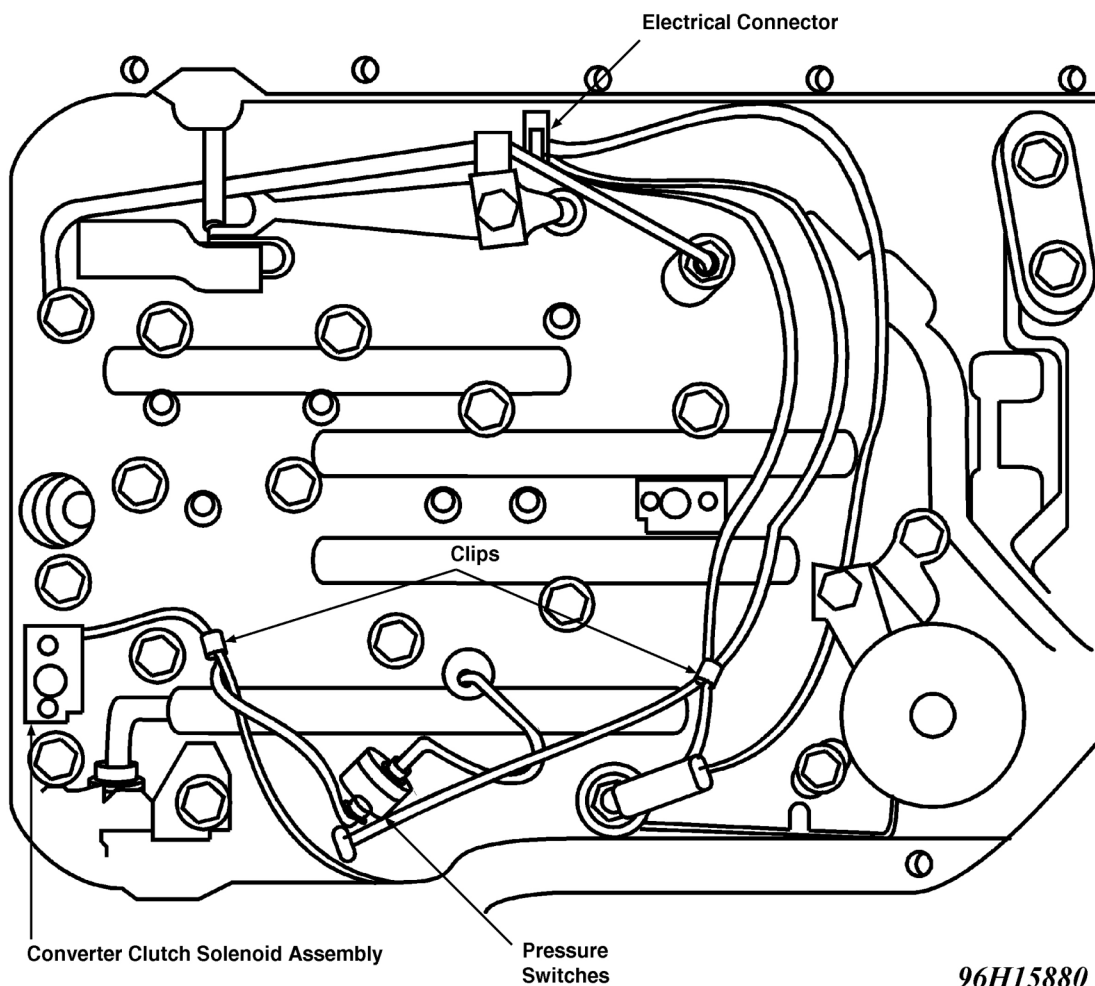


Fig. 3: Bottom View of Transmission Case
Courtesy of GENERAL MOTORS CORP.

3. Using care not to bend throttle lever link, remove throttle lever and bracket assembly. T.V. exhaust valve lifter and spring may separate from lever and bracket assembly. Remove manual detent roller and spring

assembly, signal (Drive "2") oil pipe retaining clip and oil pipe.

4. Remove 4-3 pressure switch and retaining bolt. Remove remaining bolts attaching valve body to case. Identify bolts for replacement in correct location during reassembly. Hold manual valve in bore and carefully lift control valve assembly from case. Care must be taken as 3 check balls are located on top of spacer plate-to-valve body gasket. Remove check balls.
5. Remove 1-2 accumulator housing. Withdraw spring, gasket, plate and piston from housing. It may be necessary to apply low air pressure (approximately 3 psi) to orifice in accumulator housing passage to remove piston.
6. Remove control valve assembly gaskets and spacer plate from transmission case. Withdraw 3-4 accumulator spring, piston and pin from bore in case. It may be necessary to apply low air pressure (approximately 3 psi) to orifice in case core passage to remove piston. See **Fig. 4**.

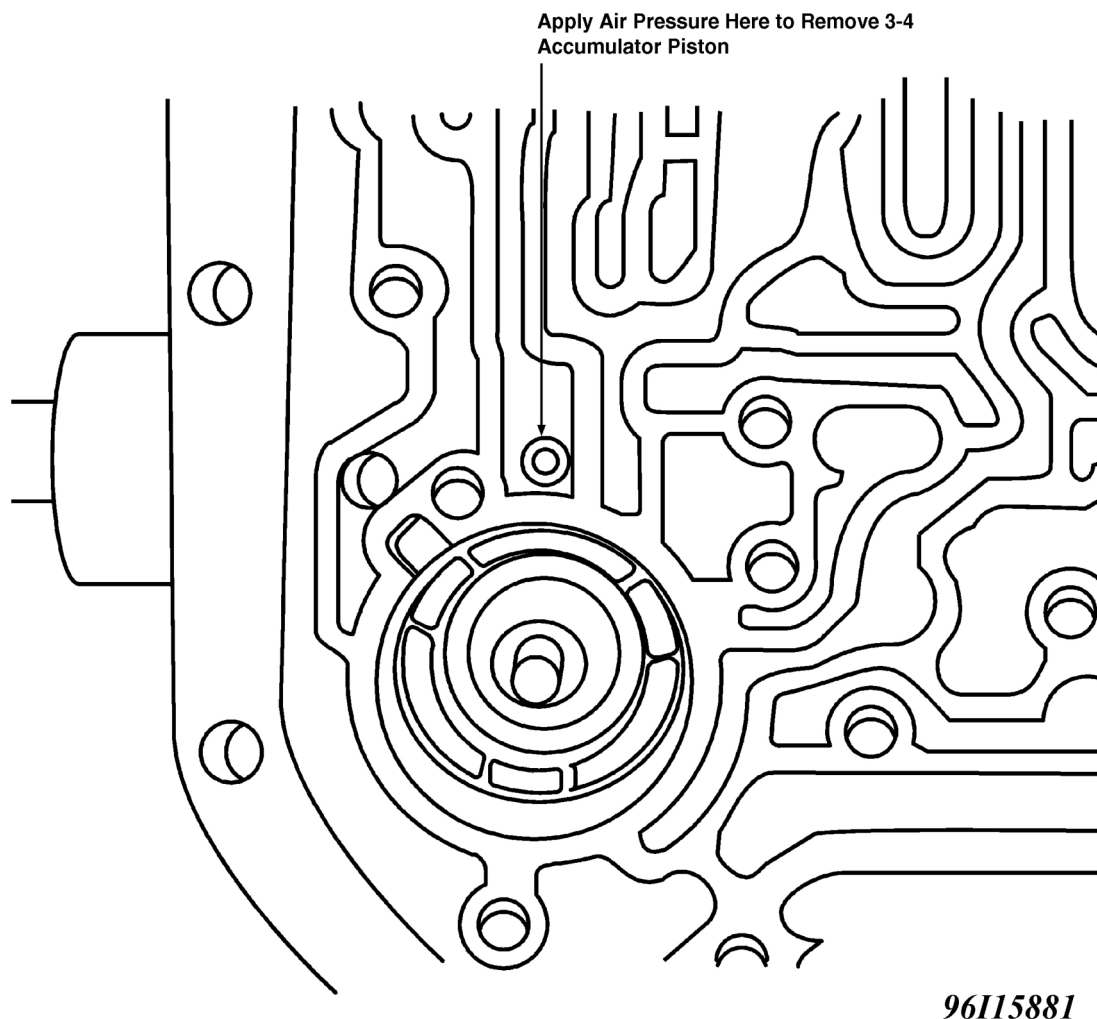


Fig. 4: View of Case Core Passage
Courtesy of GENERAL MOTORS CORP.

7. Remove 9 check balls from the core passages in the case. See **Fig. 5** and **Fig. 41**. Remove governor cover and gasket from case. Remove governor assembly while rotating output shaft counterclockwise to ease

removal.

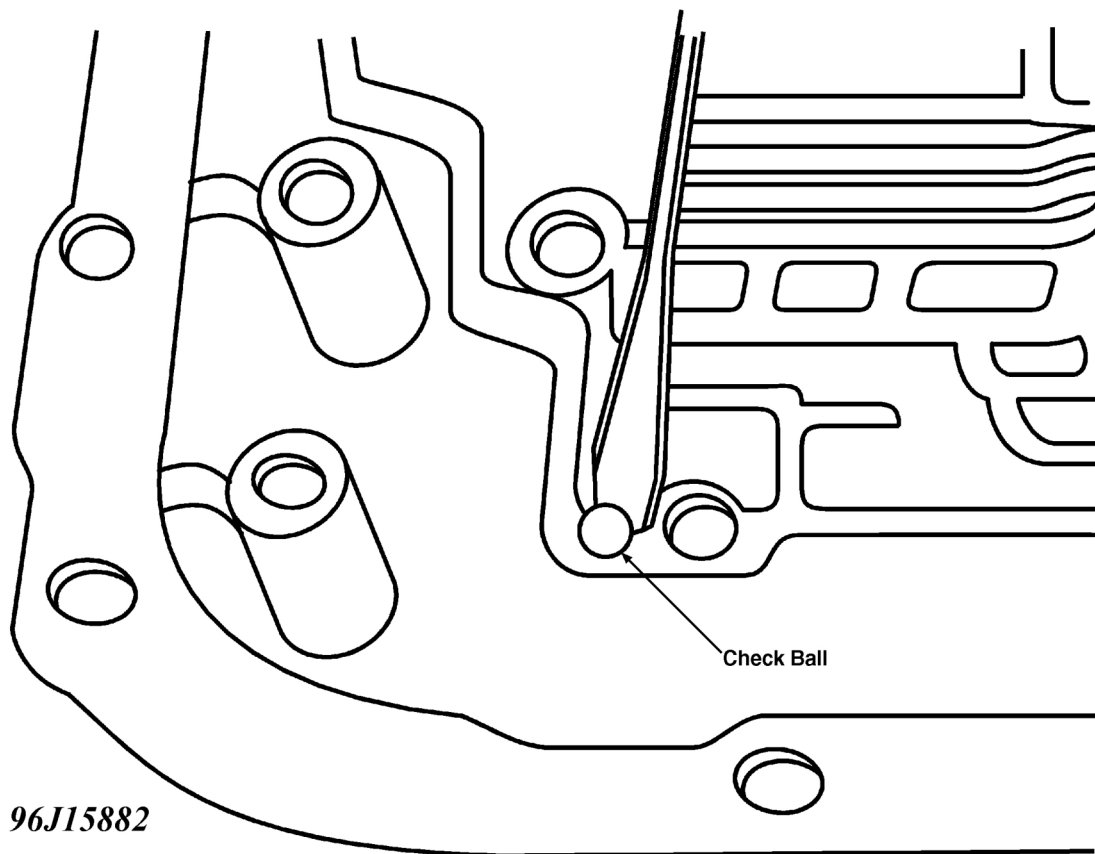


Fig. 5: Removing Check Balls From Case
Courtesy of GENERAL MOTORS CORP.

NOTE: DO NOT use pliers to remove governor assembly.

8. Pry intermediate servo cover retaining ring from groove in case. Remove servo cover and discard seal ring. Remove servo piston and band apply pin from bore in case.

NOTE: Before continuing with transmission disassembly, check for proper intermediate band apply pin as follows.

Intermediate Band Apply Pin Selection

1. Install Band Apply Pin Selection Gauge (J-25014-2) in intermediate servo bore and retain with servo cover retaining ring, aligning ring with gap at case slot. Install Selection Gauge Tapered Pin (J-25014-1) into gauge. See [Fig. 6](#).

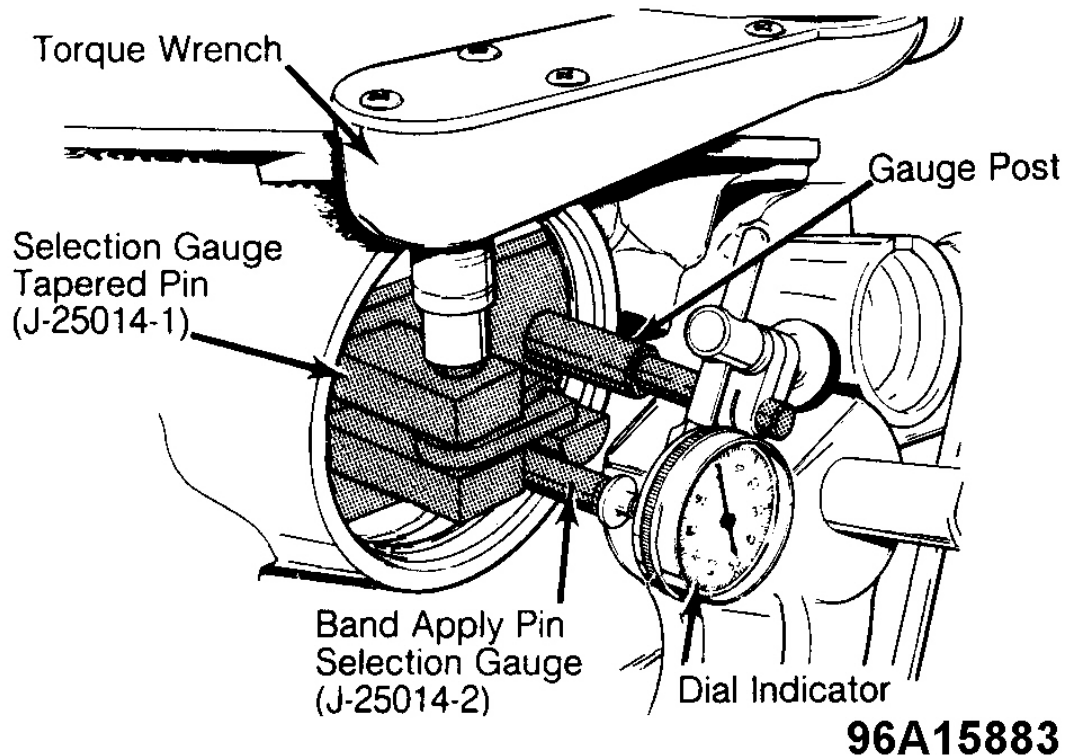


Fig. 6: Intermediate Band Apply Pin Selection
 Courtesy of GENERAL MOTORS CORP.

2. Ensure tapered pin end is properly located against band apply lug and band anchor pin is properly located in case and band anchor lug. If band selection tapered pin does not register between high and low limits, look for possible problem with intermediate band, direct clutch housing or transmission case.
3. Install dial indicator and position indicator point on top of selection gauge post. Set indicator to zero. Ensure selection gauge is squarely seated against servo retaining ring and stepped side of tapered pin is aligned with torquing arm of gauge.
4. Using torque wrench, apply 100 INCH Lbs (12 N.m.) to selection gauge torque arm. Slide dial indicator over tapered pin. Read dial indicator and see **INTERMEDIATE BAND APPLY PIN SELECTION** for proper pin.

NOTE: Dial indicator travel is reversed, making indicator readings backwards. On an indicator that ranges from 0-100, a .020" (.51 mm) travel will read .080" (2.03 mm), a .060" (1.52 mm) travel will read .040" (1.02 mm).

INTERMEDIATE BAND APPLY PIN SELECTION

Indicator Reading: In. (mm)	Apply Pin I.D.
0-.029 (0-.72)	One Groove
.029-.057 (.72-1.44)	2 Grooves

.057-.086 (1.44-2.16)	3 Grooves
.086-.114 (2.16-2.88)	None

3rd Accumulator Check Valve Replacement

1. Inspect 3rd accumulator check valve for the following conditions: Missing check ball, check ball binding or stuck in tube, oil feed slot in tube missing or restricted, improperly assembled, loose fitting or not fully seated in case. If check valve requires replacement, go to step 2).

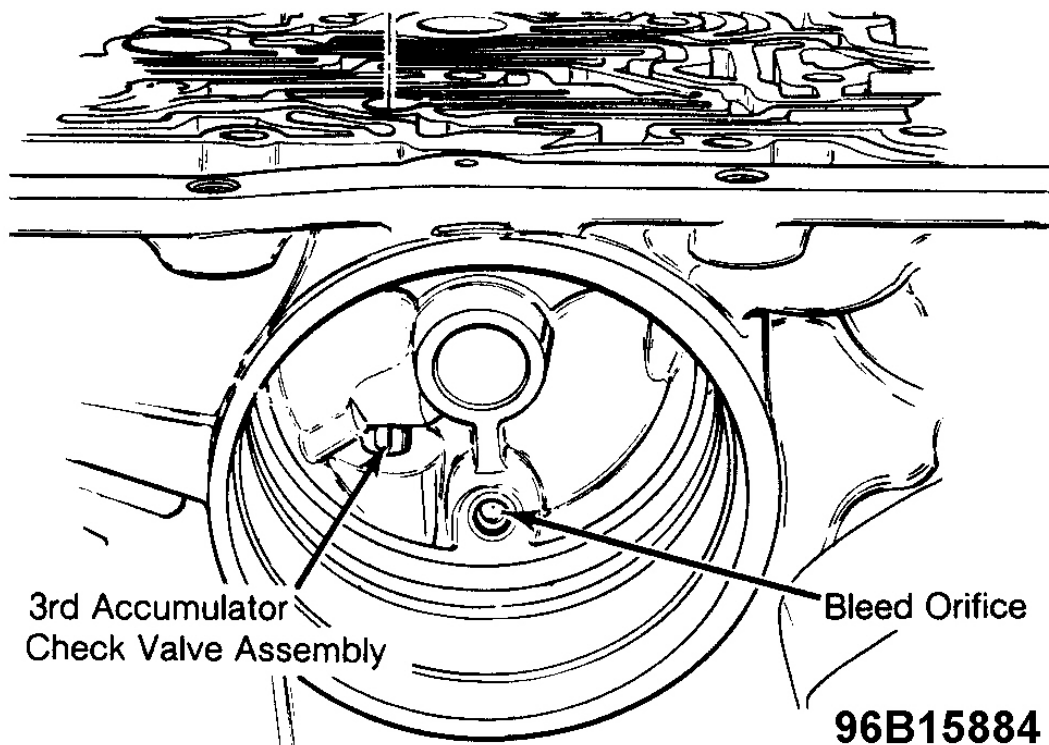


Fig. 7: 3rd Accumulator Check Valve Assembly
Courtesy of GENERAL MOTORS CORP.

2. Using a No. 4 screw extractor, remove check valve assembly from case by turning and pulling straight out. See **Fig. 8**.
3. Install new check valve assembly, small end first, into case. Position oil feed slot in tube so it faces servo. Using a 3/8" diameter metal rod and hammer, drive assembly until it is seated in case hole.

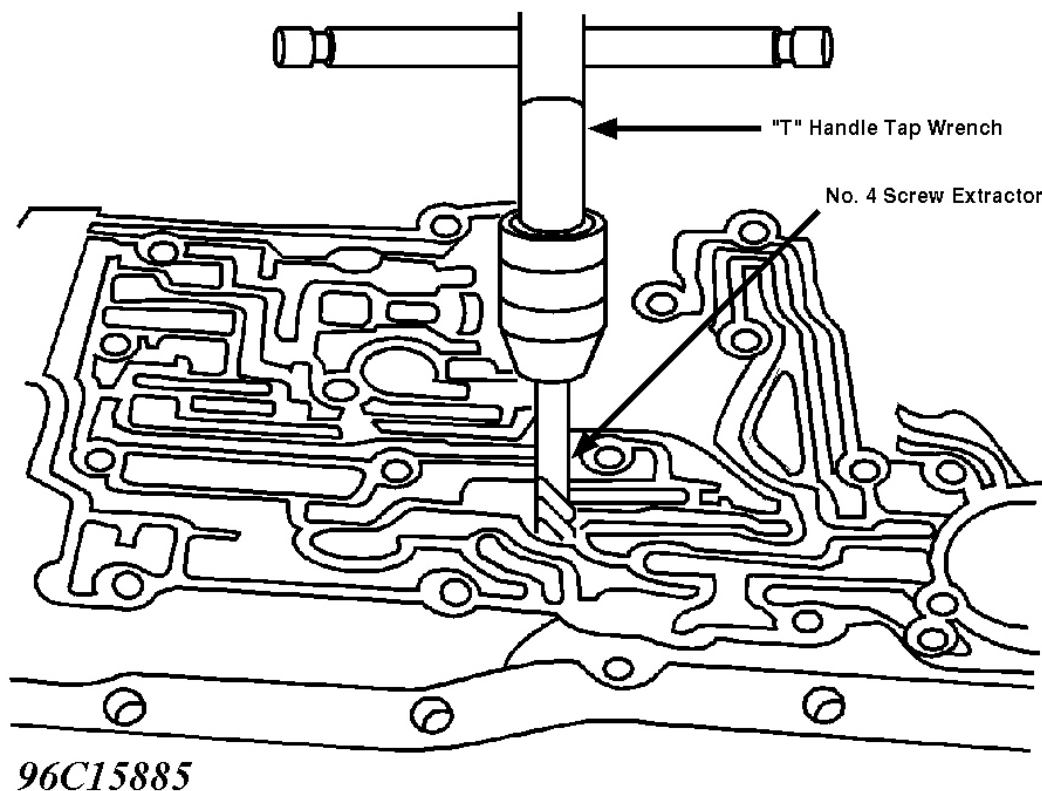


Fig. 8: Removing 3rd Accumulator Check Valve Assembly
 Courtesy of GENERAL MOTORS CORP.

OVERDRIVE UNIT PARTS

NOTE: Prior to removing overdrive unit parts, check overdrive unit end play to determine correct end play thrust washer for use during reassembly.

Overdrive End Play

1. Install Output Shaft Loading Fixture (J-29332) and Support Sleeve (J-25013-1) on output shaft. See **Fig. 9**. Turn transmission to vertical position, pump side up.

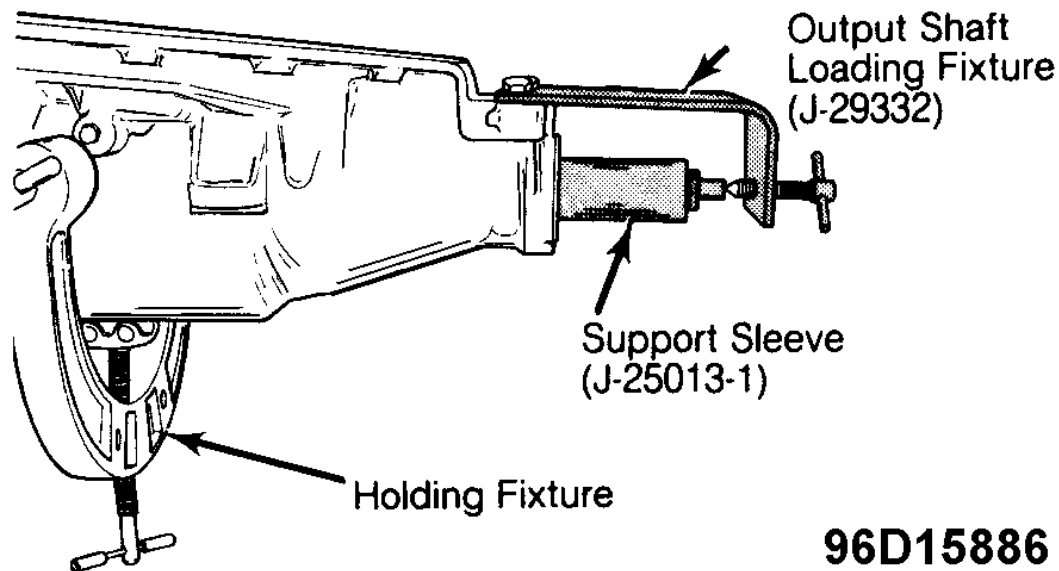


Fig. 9: Installing Output Shaft Loader
Courtesy of GENERAL MOTORS CORP.

2. Remove one pump-to-case bolt and washer and install an 11" long bolt into pump bolt hole. Attach Overdrive End Play Checker (J-25022) and Oil Pump Remover (J-24773-5) to turbine shaft. See **Fig. 10** .

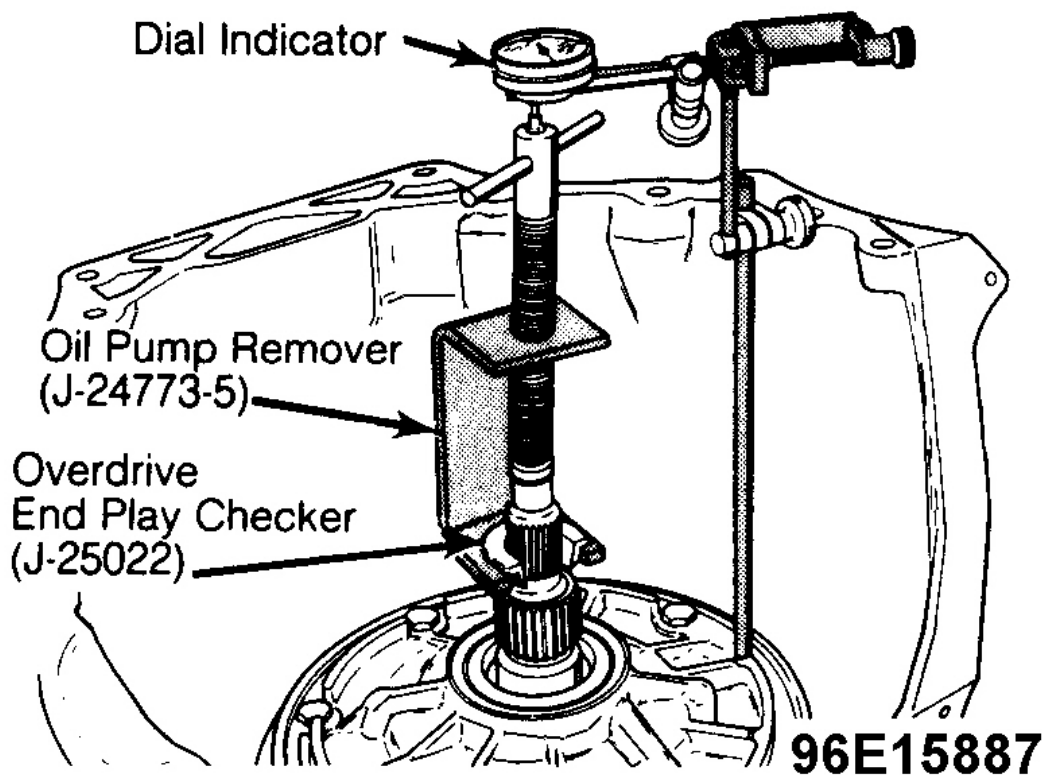


Fig. 10: Checking Overdrive Unit End Play
Courtesy of GENERAL MOTORS CORP.

NOTE: The following step must be performed to eliminate tolerance difference between turbine shaft snap ring and overdrive carrier.

3. Mount a dial indicator and clamp assembly on long bolt, positioning indicator point cap on top of pump remover. Lift upward on remover with approximately 3 lbs. force and zero indicator while maintaining upward force.
4. With dial indicator zeroed, increase upward force to approximately 20 lbs. (9.1 kg) and read end play on indicator. Overdrive unit end play should be .004-.027" (.10-.69 mm). The selective thrust washer controlling this end play is located between pump cover and overdrive clutch housing. If more or less washer thickness is required to bring end play within specification, select correct washer. See **OVERDRIVE UNIT END PLAY WASHER SELECTION**.

OVERDRIVE UNIT END PLAY WASHER SELECTION

Washer Thickness	I.D. Number	I.D. Color
.167-.171" (4.25-4.36 mm)	0	Scarlet
.172-.176" (4.37-4.48 mm)	1	White

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.177-.180" (4.49-4.60 mm)	2	Brown
.181-.185" (4.61-4.72 mm)	3	Grey
.186-.190" (4.73-4.84 mm)	4	Yellow
.191-.195" (4.85-4.96 mm)	5	Lt. Blue
.196-.200" (4.97-5.08 mm)	6	Purple
.201-.204" (5.09-5.20 mm)	7	Orange
.205-.209" (5.21-5.32 mm)	8	Green

Component Removal

1. If necessary, pry oil pump seal from pump. Remove pump-to-case bolts and washers. Install Oil Pump Remover (J-24773-5) on turbine shaft. See **Fig. 10** . Remove oil pump assembly from case. Remove pump-to-case gasket and tanged oil deflector plate located under pump.
2. Remove 4th clutch plate-to-case snap ring. Grasp turbine shaft and lift overdrive assembly and 4th clutch plates from case. Remove clutch plates from overdrive assembly and remaining steel plate from case.
3. Remove overdrive internal gear-to-carrier thrust washer from inside internal gear. Remove internal gear and internal gear-to-support thrust washer from case.
4. Using a spring compressor, compress 4th clutch spring and retainer assembly. Remove support-to-clutch snap ring, spring and retainer. Remove compressor from retainer assembly. Lift 4th clutch piston from case.

FRONT UNIT PARTS

NOTE: Prior to removing front unit parts, check front unit end play to determine correct thrust washer to install at reassembly.

Front Unit End Play

1. Push forward clutch shaft downward. Install Forward And Direct Clutch Remover (J-29337) in end of shaft. Mount dial indicator and clamp assembly. See **Fig. 11** . Position indicator point on top of clutch remover.

NOTE: Perform this check with output shaft loading fixture and support sleeve in place.

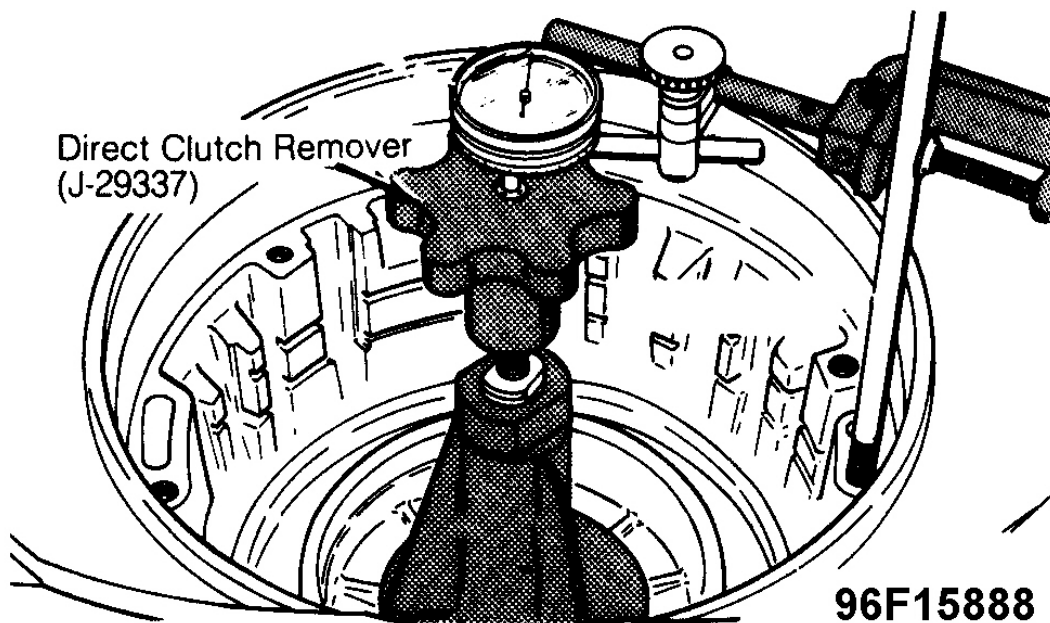


Fig. 11: Checking Front Unit End Play
Courtesy of GENERAL MOTORS CORP.

2. Move output shaft upward by turning adjusting screw on output shaft loading fixture. Move shaft upward until White or scribed line on support sleeve begins to disappear. Zero dial indicator.
3. Pull clutch remover upward and read resulting end play on dial indicator. Front unit end play should be .022-.051" (.56-1.30 mm). Selective thrust washer controlling this end play is located between output shaft and forward clutch shaft. If more or less washer thickness is required to bring end play within specification, select proper washer. See **FRONT UNIT END PLAY WASHER SELECTION**.

FRONT UNIT END PLAY WASHER SELECTION

Washer Thickness	I.D. Number	I.D. Color
.065-.070" (1.66-1.78 mm)	1	N/A
.070-.075" (1.78-1.90 mm)	2	N/A
.076-.080" (1.92-2.03 mm)	3	Black
.081-.085" (2.05-2.16 mm)	4	Lt. Green
.086-.090" (2.18-2.29 mm)	5	Scarlet
.091-.095" (2.31-2.42 mm)	6	Purple
.096-.100" (2.44-2.55 mm)	7	Brown
.101-.106" (2.57-2.69 mm)	8	Orange
.106-.111" (2.69-2.82 mm)	9	Yellow
.111-.116" (2.82-2.94 mm)	10	Lt. Blue
.117-.121" (2.96-3.07 mm)	11	N/A

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.122-.126" (3.09-3.20 mm)	12	N/A
.127-.131" (3.22-3.33 mm)	13	Pink
.132-.136" (3.35-3.46 mm)	14	Green
.137-.141" (3.48-3.59 mm)	15	Grey

Component Removal

1. Remove 2 center support bolts. See **Fig. 12** . From inside case, remove center support beveled snap ring. Lift center support from case using Slide Hammer (J-7004) and Remover (J-29334). Remove center support/direct clutch thrust washer.

NOTE: Center support/direct clutch thrust washer may be stuck to back of direct clutch.

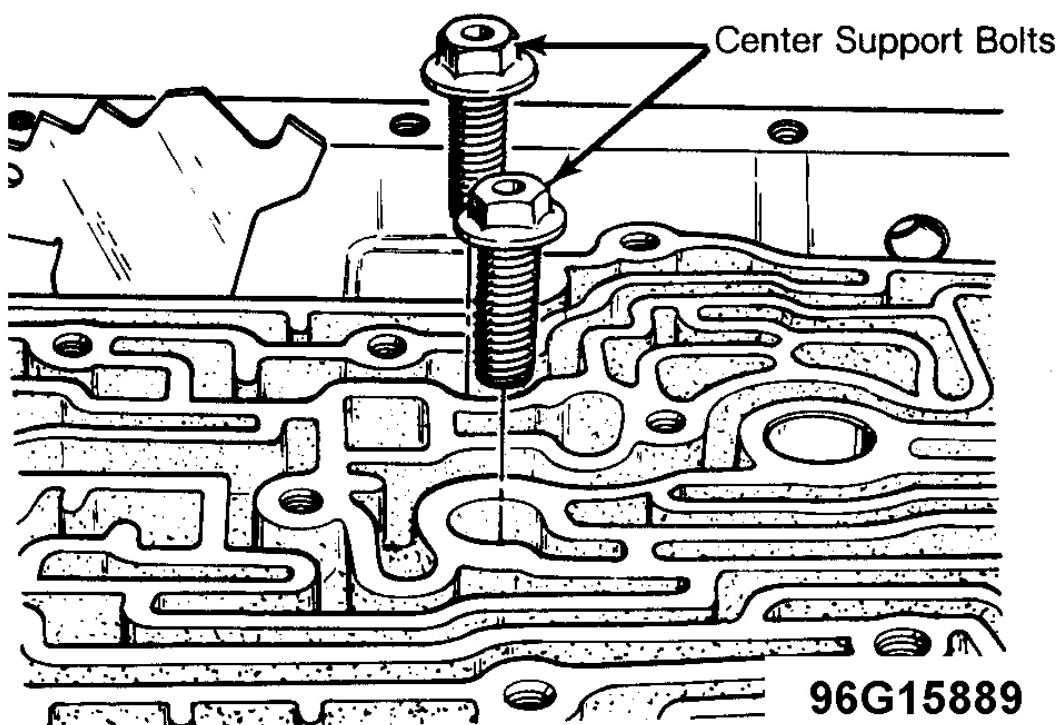


Fig. 12: Removing Center Support Bolts
Courtesy of GENERAL MOTORS CORP.

2. Install Direct And Forward Clutch Remover (J-29337) in end of forward clutch shaft. See **Fig. 11** . Pull direct and forward clutch assemblies from case. Separate direct clutch from forward clutch. Remove intermediate band assembly and band anchor pin from case. Remove output shaft-to-forward clutch shaft selective thrust washer.

NOTE: The direct-to-forward clutch thrust washer may stick to end of direct clutch housing when separating clutch assemblies.

FRONT GEAR PARTS

NOTE: Prior to removing front gear parts, check rear unit end play to determine correct thrust washer to install at transmission reassembly.

Rear Unit End Play

1. Loosen adjusting screw on output shaft loading fixture (installed at overdrive end play check) and push output shaft downward. Install a "C" clamp on case. See **Fig. 13** . Mount a dial indicator and extension on "C" clamp.

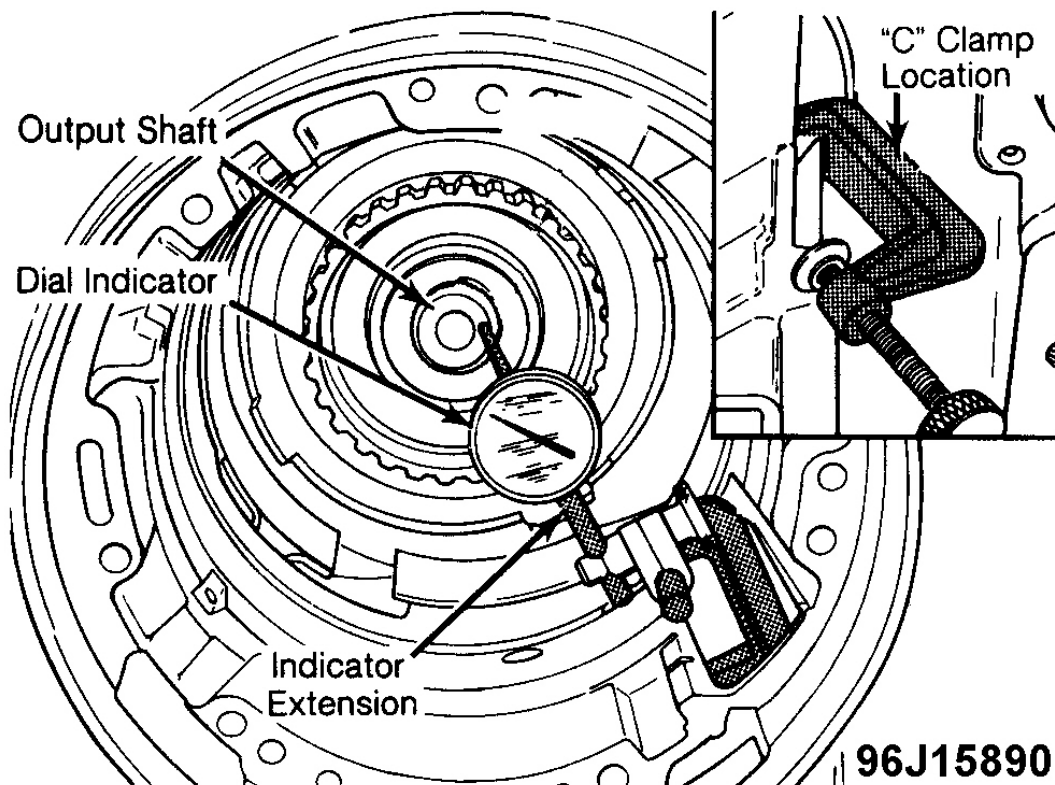


Fig. 13: Checking Rear Unit End Play
Courtesy of GENERAL MOTORS CORP.

2. Position dial indicator extension against end of output shaft and set indicator to zero. Move output shaft upward by turning screw on loading fixture until White or scribed line on support sleeve begins to disappear. Read indicator end play.

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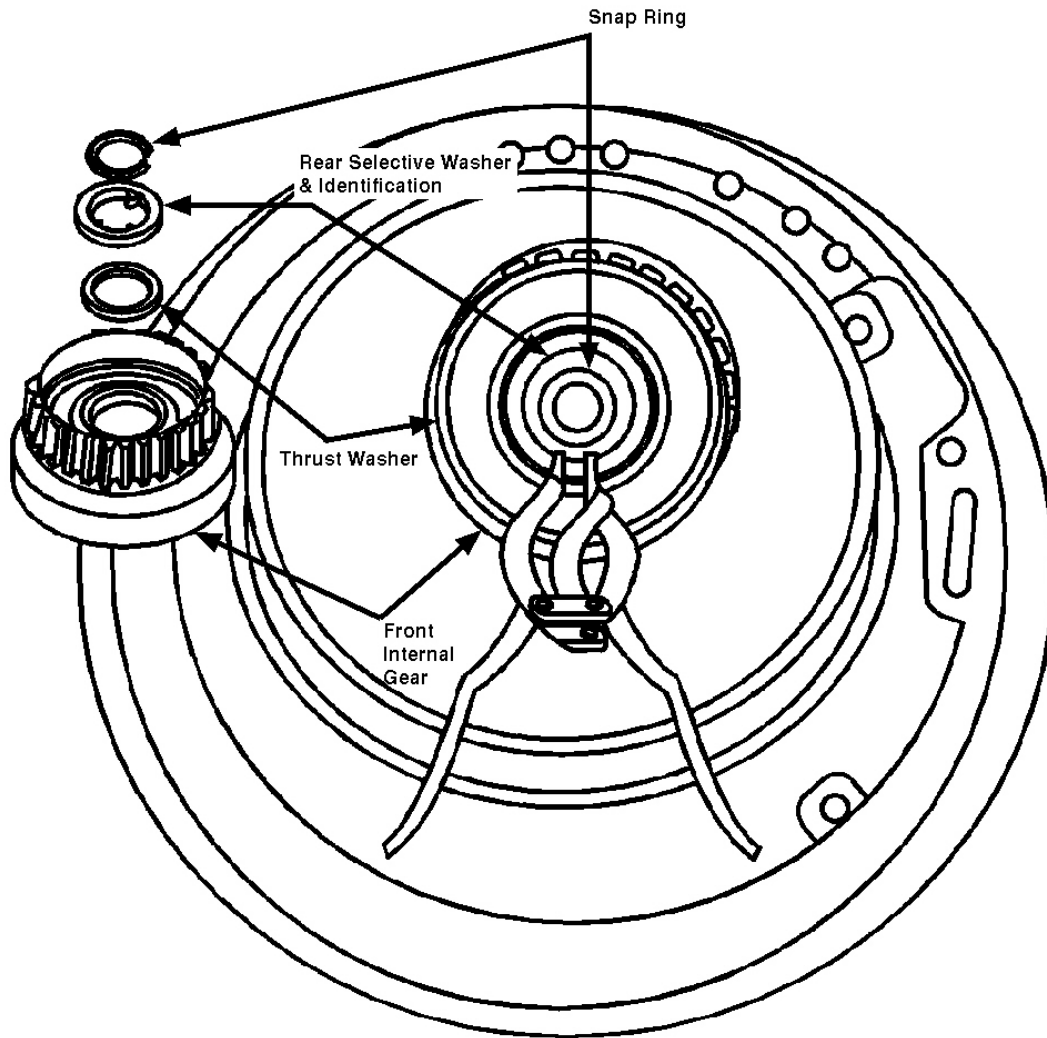
3. Rear unit end play should be .004-.025" (.10-.64 mm). Selective thrust washer controlling this end play is located between front internal gear thrust washer and output shaft snap ring. If more or less thrust washer thickness is required to bring end play within specification, select proper washer. See **REAR UNIT END PLAY WASHER SELECTION** . Remove dial indicator and "C" clamp.

REAR UNIT END PLAY WASHER SELECTION

Washer Thickness	I.D. Number	I.D. Color
.097-.102" (2.46-2.59 mm)	0	N/A
.114-.119" (2.90-3.01 mm)	1	Orange
.121-.126" (3.08-3.19 mm)	2	White
.128-.133" (3.26-3.37 mm)	3	Yellow
.135-.140" (3.44-3.55 mm)	4	Blue
.143-.147" (3.62-3.73 mm)	5	Red
.150-.154" (3.80-3.91 mm)	6	Brown
.157-.161" (3.98-4.09 mm)	7	Green
.164-.168" (4.16-4.27 mm)	8	Black
.171-.175" (4.34-4.45 mm)	9	Purple

Component Removal

1. Remove output shaft-to-selective washer snap ring. Lift front internal gear, rear selective washer and thrust washer from case and remove washers from front internal gear.



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Fig. 14: Removing Output Shaft Snap Ring
Courtesy of GENERAL MOTORS CORP.

2. Remove front carrier assembly and front internal gear-to-front carrier thrust bearing assembly. If it did not come out with front carrier, remove front sun gear and sun gear-to-front carrier thrust bearing assembly.

NOTE: The front sun gear-to-front carrier thrust bearing requires only one race.

3. Remove input drum and rear sun gear. Remove 4-tanged input drum-to-reverse clutch housing thrust washer from rear of drum or front clutch housing.

4. Grind approximately 3/4" from end of a No. 4 screw extractor. Insert screw extractor into low-reverse clutch housing-to-case cup plug. Turn screw extractor 2 or 3 turns and pull out cup plug. Remove low-reverse clutch-to-case beveled snap ring. Lift clutch assembly from case. Remove low-reverse clutch housing-to-case spacer ring.

NOTE: **DO NOT reuse low-reverse clutch housing cup plug and seal assembly.**

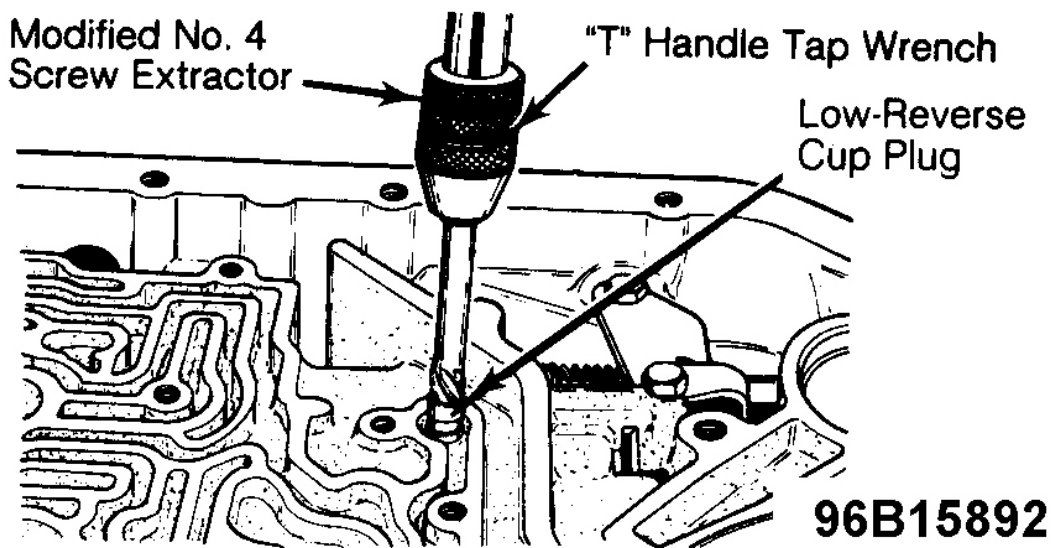


Fig. 15: Removing Low-Reverse Clutch Housing Cup Plug
Courtesy of GENERAL MOTORS CORP.

REAR GEAR PARTS

NOTE: **Governor assembly must be removed before removing rear gear parts.**

1. Grasp output shaft and lift out remaining rear unit parts and lay in a horizontal position. Remove roller clutch and rear carrier from output shaft. Remove 4-tanged rear carrier-to-rear internal gear thrust washer from end of carrier or from inside rear internal gear.
2. Pull low-reverse clutch plates from output shaft. Remove rear internal gear-to-rear sun gear thrust bearing assembly from internal gear. Remove internal gear from output shaft. If necessary, remove rear oil seal from transmission case.

MANUAL SHAFT & PARKING PAWL PARTS

1. Turn transmission to a horizontal position, oil pan side up. If necessary, remove manual shaft and parking pawl linkage.
2. Remove hex nut securing inside detent lever to manual shaft. Remove parking lock actuator rod and

inside detent lever. Remove manual shaft retaining pin from case and slide shaft out. If damaged, pry manual shaft oil seal from case.

3. Remove parking lock bracket. Remove parking pawl shaft retaining pin. Remove parking pawl cup plug using a No. 4 screw extractor with 3/4" ground from end. Using No. 4 screw extractor, remove parking pawl shaft from case. Remove parking pawl and spring.

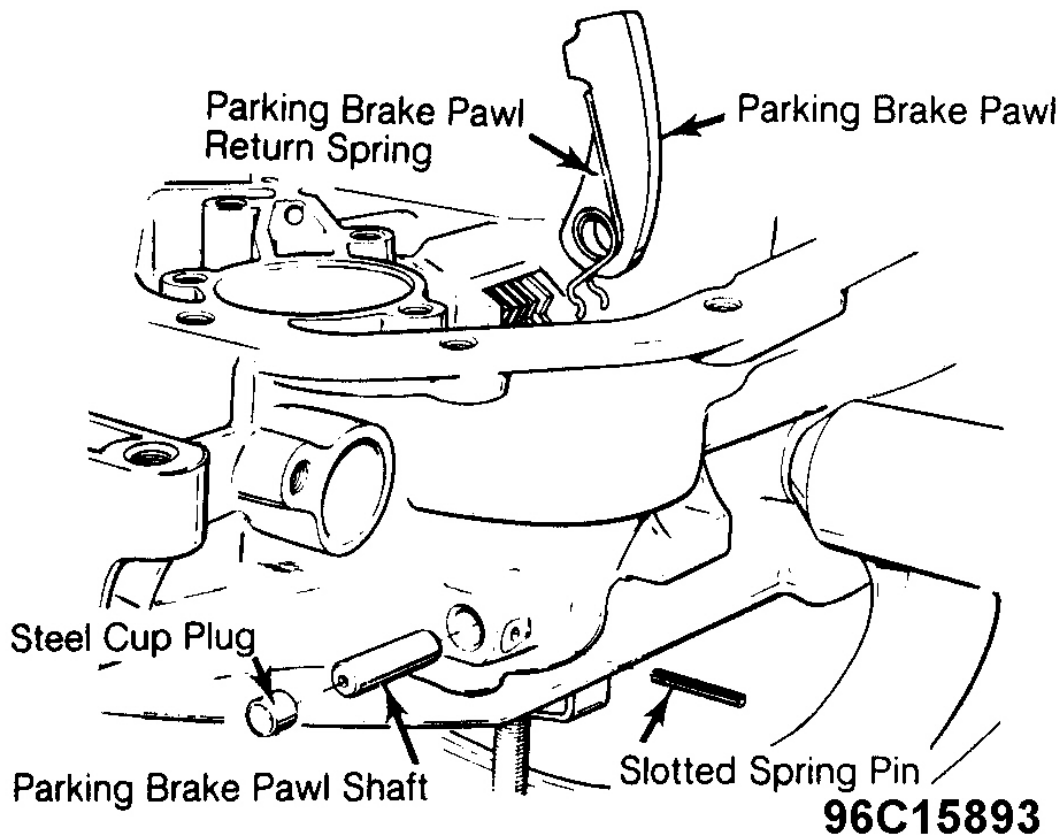


Fig. 16: Removing Parking Pawl Cup Plug
Courtesy of GENERAL MOTORS CORP.

TORQUE CONVERTER

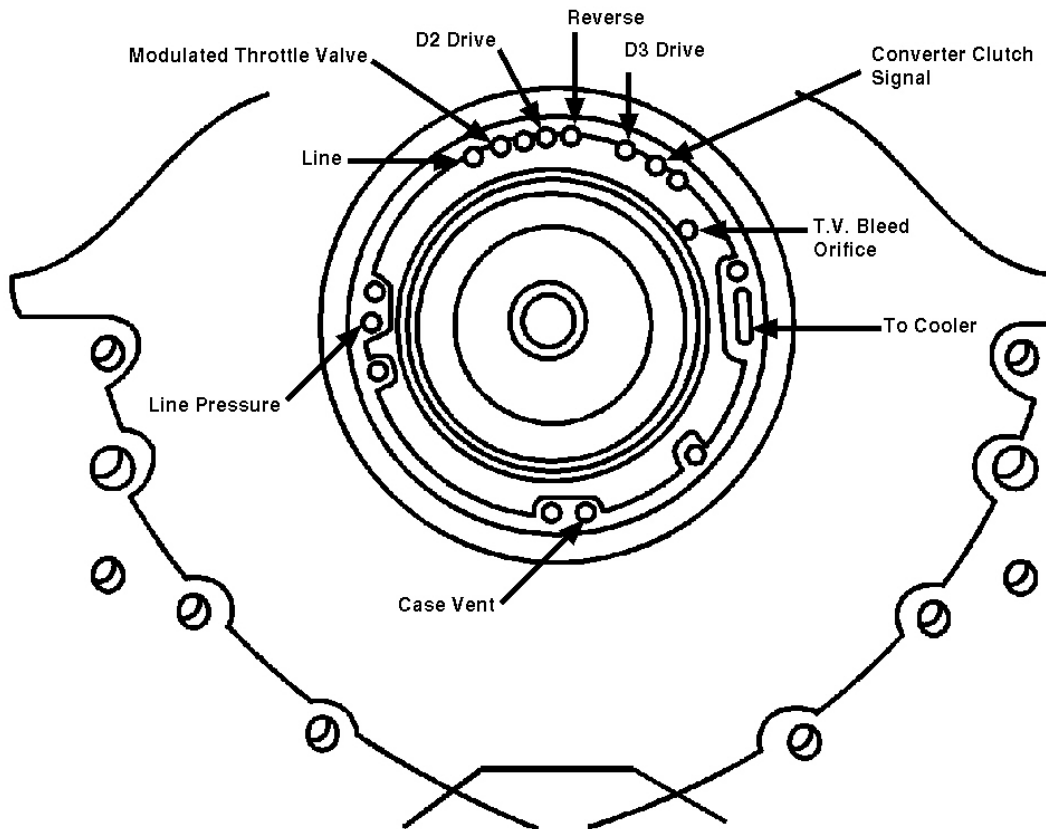
NOTE: The torque converter is a sealed unit and cannot be disassembled for service.

COMPONENT DISASSEMBLY & REASSEMBLY

TRANSMISSION CASE

Cleaning & Inspection

1. Inspect case assembly for damage, cracks, porosity or interconnected oil passages. Inspect orifice plug in intermediate servo bore. If plug requires replacement, install new plug, orifice end first, flush to slightly below top of plug hole.
2. Inspect case exhaust passages for restrictions. Inspect reverse clutch lugs, governor, intermediate servo bore, speedometer bore and snap ring grooves for damage. Inspect all bolt holes for damage or stripped holes. Inspect case bushing for damage and scoring.



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Fig. 17: Front View of Transmission Case Showing Oil Passages
Courtesy of GENERAL MOTORS CORP.

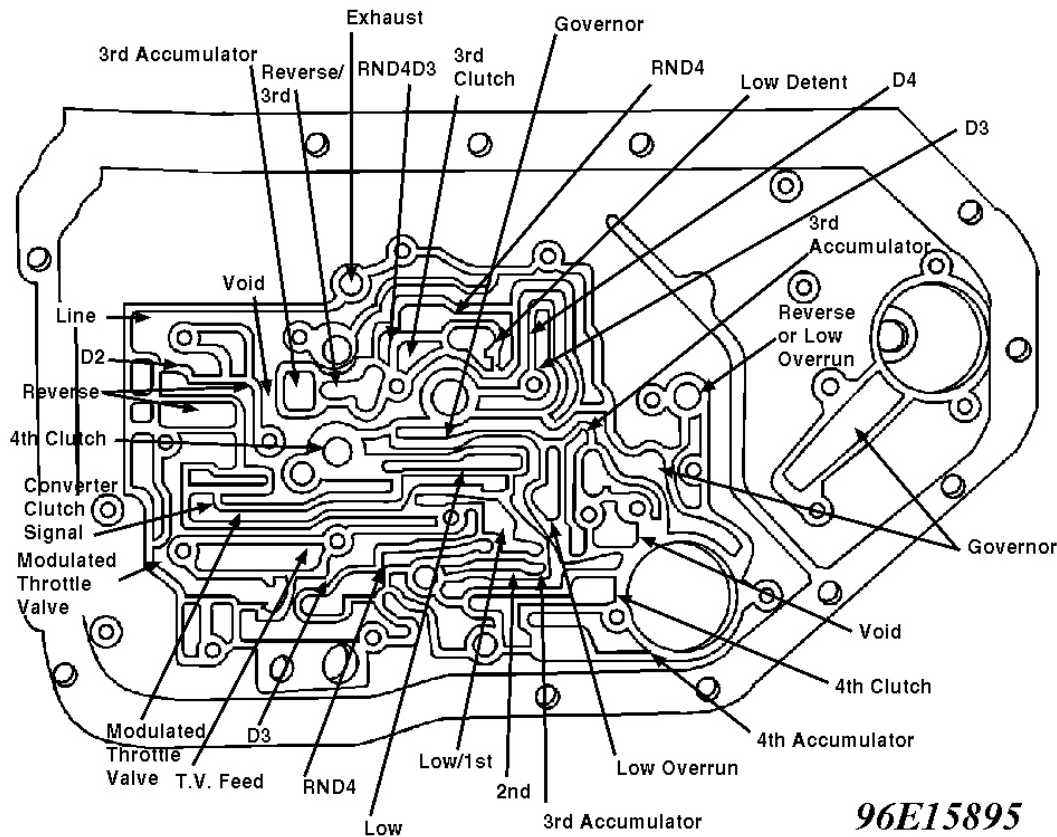


Fig. 18: Bottom View of Transmission Case Showing Oil Passages
Courtesy of GENERAL MOTORS CORP.

REAR GEAR PARTS

Cleaning & Inspection

1. Inspect output shaft journals, snap ring groove and splines for wear or damage. Check lubrication passages for damage or obstructions. Check governor drive gear for rough or damaged teeth.
2. Inspect rear internal gear splines, teeth and bearing surface for wear, cracks or damage. Inspect parking pawl lugs for cracks or damage. Thoroughly clean, air dry and inspect rear internal gear-to-rear sun gear thrust bearing assembly for pitted or rough conditions.

ROLLER CLUTCH & REAR CARRIER ASSEMBLY

Disassembly

Remove roller clutch inner race and lift roller clutch assembly from rear carrier. Remove rear carrier-to-clutch thrust washer (4 tangs) from rear of carrier and roller clutch-to-rear carrier thrust washer from inside carrier.

Cleaning & Inspection

1. Inspect roller clutch race and spline for scoring or wear. Inspect roller clutch bearings, cage and springs for damage or wear. Inspect thrust washers for signs of scoring or excessive wear and check tanged thrust washer for bent tangs.

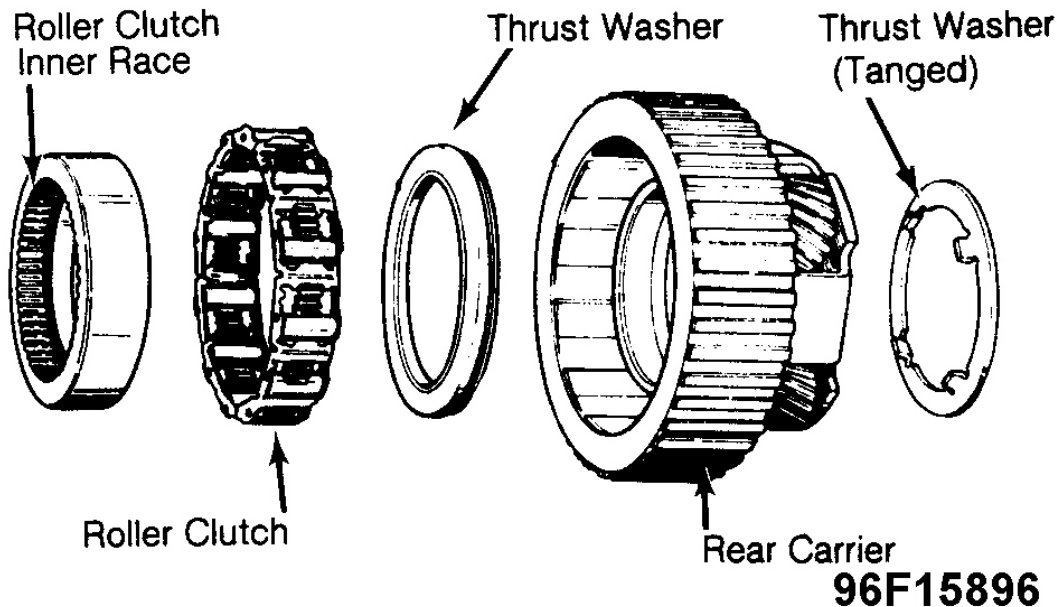


Fig. 19: Exploded View of Roller Clutch & Rear Carrier Assembly
Courtesy of GENERAL MOTORS CORP.

2. Inspect rear carrier for damage to roller clutch cam ramps. Inspect bushing for damage and scoring. Inspect planet pinions for damage, rough bearings or tilt. Check pinion end play using a feeler gauge inserted between carrier and pinion gears. End play should be .009-.024" (.23-.61 mm).

Reassembly

1. Position roller clutch-to-carrier thrust washer in rear carrier. Install rollers that may have come out of roller cage by compressing energizing spring with forefinger and inserting roller from outer edge. Install roller clutch into rear carrier.

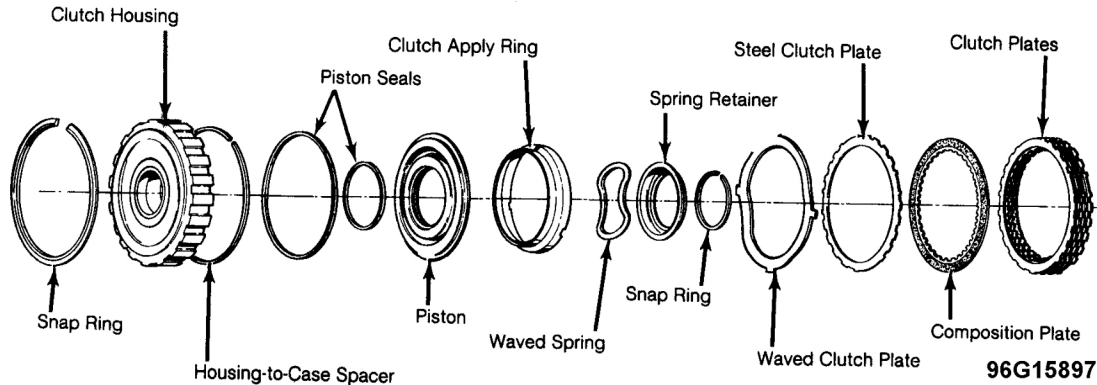


Fig. 20: Exploded View of Low-Reverse Clutch Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install roller clutch race, spline side out, into roller clutch and rotate it into position. Install 4-tanged rear carrier-to-rear internal gear thrust washer. Align tangs into slots of rear carrier and retain with petroleum jelly.

LOW-REVERSE CLUTCH

Disassembly

Compress low-reverse clutch spring retainer and remove snap ring. Remove waved spring from top of piston. Remove piston from housing. Remove inner and outer seals from piston. Remove clutch apply ring. Low-reverse clutch assembly clutch plates and disc were removed during **TRANSMISSION DISASSEMBLY**.

Cleaning & Inspection

1. Inspect composition, steel and waved clutch plates for signs of wear or burning. Check spring retainer and waved spring for damage or distortion. Inspect clutch housing for damage or plugged feed hole. Inspect clutch housing bushing for damage or scoring.
2. Inspect clutch housing splines and snap ring groove for damage or burrs. Remove burrs with crocus cloth. Inspect clutch piston and apply ring assembly for distortion, cracks or damage. Inspect clutch housing-to-case spacer ring for damage.

Reassembly

1. Position clutch apply ring on piston. Install new inner and outer seals on piston with seal lips facing away from apply ring side. Lubricate seals with automatic transmission fluid. Install piston into housing using care not to damage seals.
2. Install waved release spring on clutch piston. Install spring retainer, cupped face up, on top of piston. Compress retainer and install snap ring.

REAR SUN GEAR & INPUT DRUM

NOTE: Rear sun gear and input drum need not be disassembled unless it is worn or defective.

Disassembly

Remove input drum-to-rear sun gear snap ring. Separate sun gear from input drum. Remove tanged thrust washer from drum.

Cleaning & Inspection

Inspect rear sun gear for cracks, splits, damaged splines, worn gear or journals and plugged lubrication holes. Inspect sun gear bushing for damage or scoring. Inspect input drum for damage. Inspect 4-tanged input drum-to-low and reverse clutch housing thrust washer for scoring or distorted tangs. If damaged, replace sun gear-to-input drum snap ring.

Reassembly

Install sun gear into input drum, spline side first and retain with snap ring. Install 4-tanged thrust washer on drum over sun gear end. Align tangs into drum and retain with petroleum jelly.

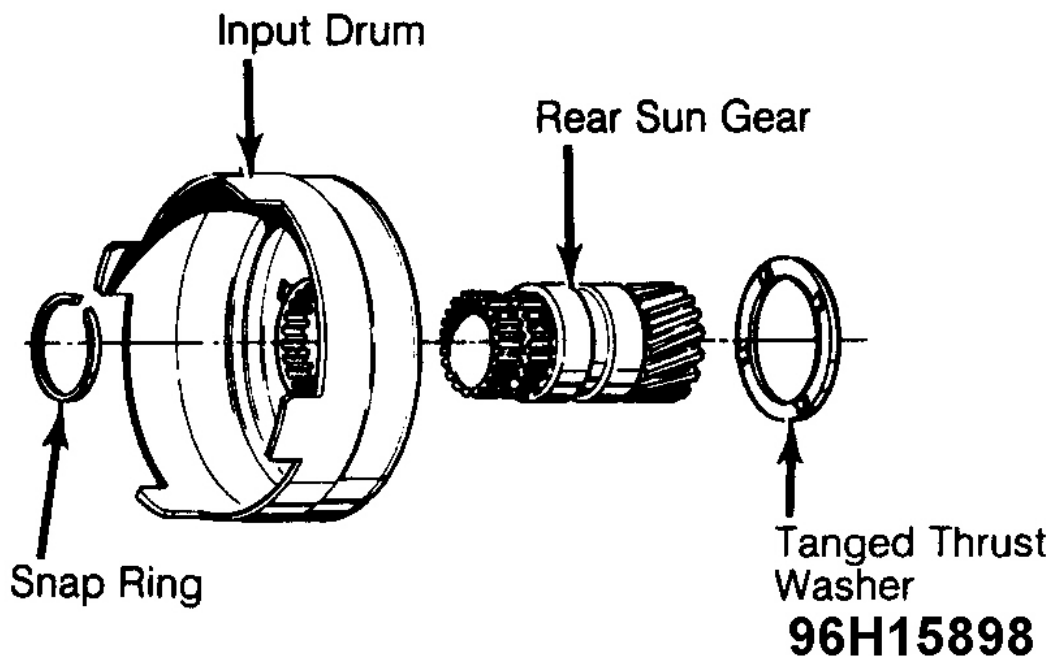


Fig. 21: Disassembled View of Rear Sun Gear & Input Drum Assembly
Courtesy of GENERAL MOTORS CORP.

FRONT SUN GEAR

Cleaning & Inspection

Inspect front sun gear splines and teeth for damage or wear. Inspect machined face for pitting, scoring or damage.

FRONT CARRIER ASSEMBLY**Cleaning & Inspection**

1. Inspect front carrier for damage. Check pinions for damage, rough bearings or tilt. Check pinion end play by placing a feeler gauge between pinion gear and carrier housing. End play should be .009-.024" (.23-.61 mm).
2. Inspect front carrier-to-front internal gear thrust bearing assembly for pitted or rough conditions.

FRONT INTERNAL GEAR**Cleaning & Inspection**

Inspect forward clutch hub for worn splines and restricted lubrication holes. Inspect internal gear for cracks, damage and worn gear teeth. Check bushing for damage or scoring. Inspect front internal gear-to-selective thrust washer for scoring or damage. See **Fig. 14**.

DIRECT CLUTCH ASSEMBLY**Disassembly**

1. Remove snap ring and lift out clutch backing plate, composition clutch plates and steel clutch plates. Keep clutch plates separated from forward clutch plates.
2. Compress retainer and spring assembly and remove snap ring. Withdraw retainer and spring assembly from clutch housing. Remove release spring guide. Remove piston from housing and remove seals from piston. Remove center seal from housing.

NOTE: **DO NOT remove apply ring from clutch piston unless piston or apply ring require replacement.**

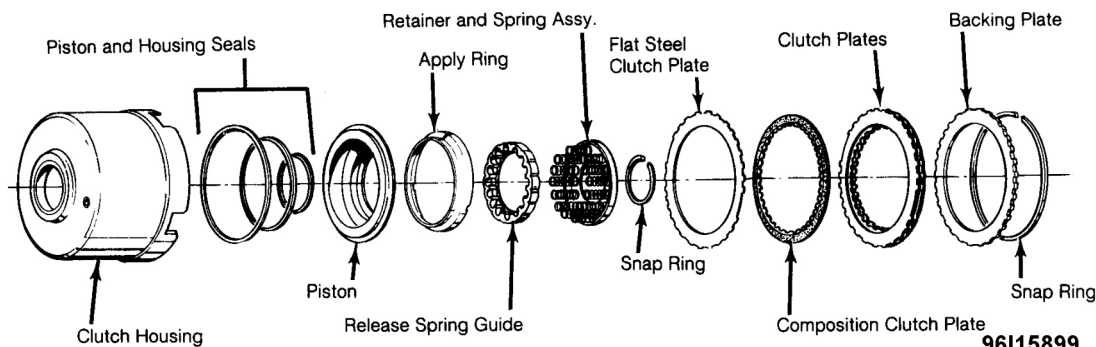


Fig. 22: Exploded View of Direct Clutch Assembly
Courtesy of GENERAL MOTORS CORP.

Cleaning & Inspection

1. Inspect clutch plates for wear or signs of burning. Inspect backing plate for scoring or damage. Inspect retainer and release springs for being collapsed. Inspect release spring guide for damage.
2. Inspect clutch piston for distortion, cracks or other damage. Check for free operation of check ball in clutch housing or piston. If damaged, replace check ball.
3. Remove check ball assembly using a 3/8" diameter rod as a punch. Place new check ball in check ball hole. Using same rod, drive check ball down into hole until it bottoms.
4. Inspect direct clutch housing for cracks, wear and open oil passages. Inspect housing snap ring grooves for damage. Inspect direct clutch bushings for damage or scoring.

Reassembly

1. If removed, install clutch apply ring on piston. Install new inner and outer seals on piston with lips facing away from clutch apply ring side. Install new center seal on direct clutch housing with lip facing up. Lubricate seals and install piston into housing using care not to damage seals.

CAUTION: Use care when installing piston into clutch housing. Large snap ring groove in housing could cut outer piston seal.

2. Install release spring guide with omitted rib over check ball in piston. See **Fig. 23** . Install retainer and spring assembly, compress springs and install snap ring.

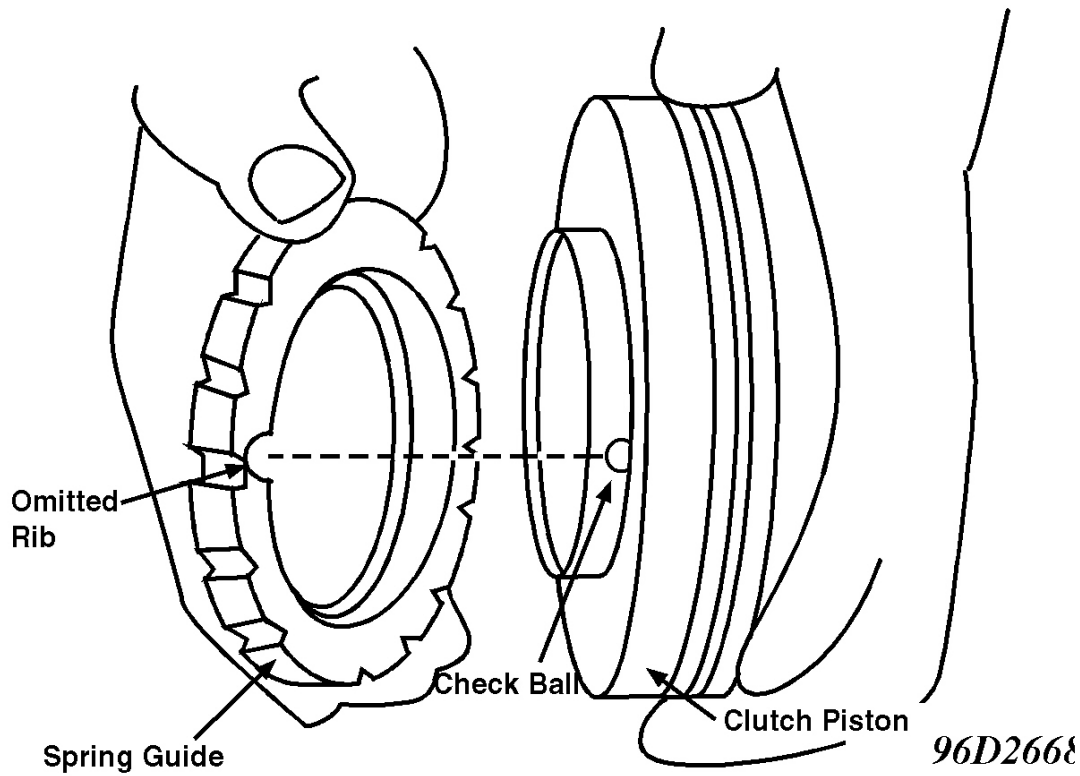


Fig. 23: Installing Direct Clutch Release Spring Guide
Courtesy of GENERAL MOTORS CORP.

3. Oil and install clutch plates into clutch housing. Start with a flat steel and alternate composition and flat steel clutch plates. See **DIRECT CLUTCH PLATE USAGE** . Install backing plate, micro-finish down. Install clutch pack retaining snap ring. Ensure composition clutch plates turn freely.

DIRECT CLUTCH PLATE USAGE

Application	Steel	Composition
All Models	6	6

FORWARD CLUTCH ASSEMBLY

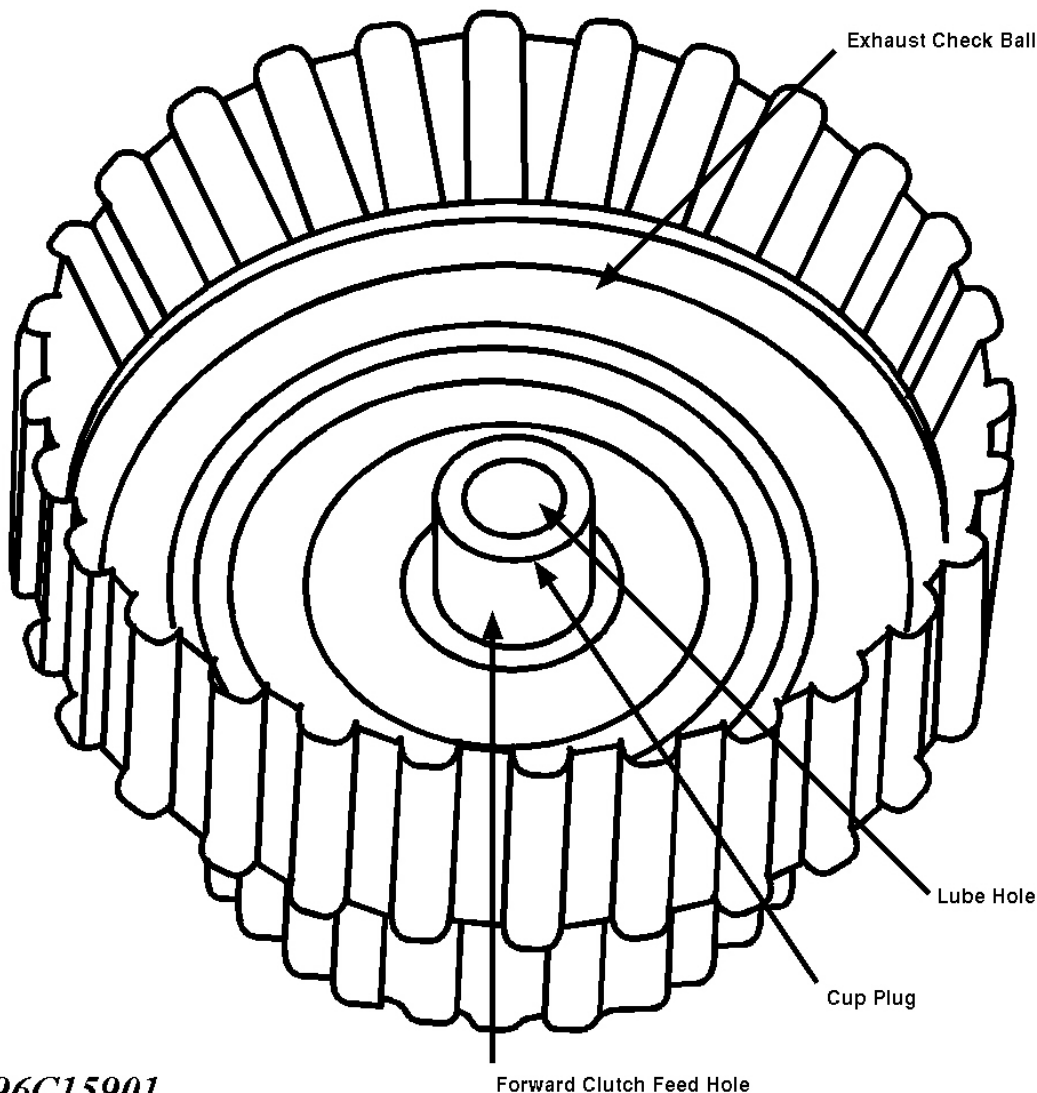
Disassembly

1. If damaged, remove Teflon oil seal rings from forward clutch shaft. Remove forward clutch-to-direct clutch thrust washer. Remove retaining snap ring and withdraw backing plate, composition plates and steel plates from clutch housing and keep them separated from direct clutch plates.
2. Compress retainer and release spring assembly and remove snap ring. Remove retainer and spring assembly from housing. Remove forward clutch piston from housing. Remove inner and outer oil seals from piston. If necessary, remove clutch apply ring from piston.

NOTE: **DO NOT** remove clutch apply ring from piston unless apply ring or piston requires replacement.

Cleaning & Inspection

Forward clutch assembly inspection is identical to direct clutch assembly inspection except for the following differences; Replace forward clutch housing cup plug if damaged or missing. Remove plug using a No. 3 screw extractor (grind to fit). Install new cup plug .039" (1 mm) below surface.



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Fig. 24: Forward Clutch Housing
Courtesy of GENERAL MOTORS CORP.

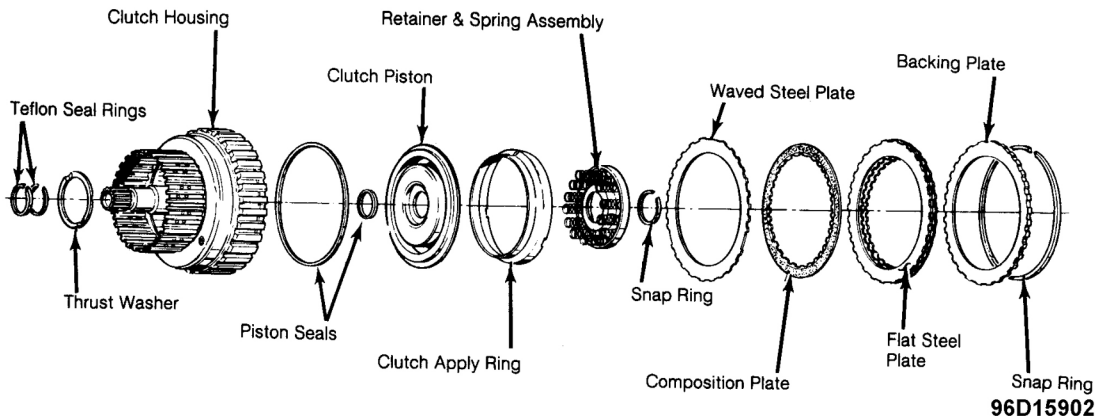


Fig. 25: Exploded View of Forward Clutch Assembly
Courtesy of GENERAL MOTORS CORP.

Reassembly

1. If removed, install clutch apply ring on clutch piston. Install new inner and outer seals on clutch piston. Lubricate piston seals and install piston into clutch housing using care to prevent seals from being damaged when installing piston past large snap ring groove in housing.
2. Install release springs and retainer assembly on piston. Compress retainer and install snap ring. Lubricate (ATF) and install clutch plates into housing, starting with waved steel plate and alternating composition plates and flat steel plates. See **FORWARD CLUTCH PLATE USAGE**.
3. Install backing plate into housing with micro-finish side down. Install clutch pack retaining snap ring and ensure composition clutch plates rotate freely in housing. Install forward-to-direct clutch thrust washer and retain with petroleum jelly.
4. If removed, install new forward clutch shaft oil seal rings. Ensure cut ends are assembled in same relationship as cut and that rings are seated in their groove. Retain with petroleum jelly.

FORWARD CLUTCH PLATE USAGE

Application	Steel	Composition
All Models	(1) 4	4
(1) Installed first is one waved steel plate .062" (1.57 mm) thick. Flat steel plates are .077" (1.96 mm) thick.		

CENTER SUPPORT

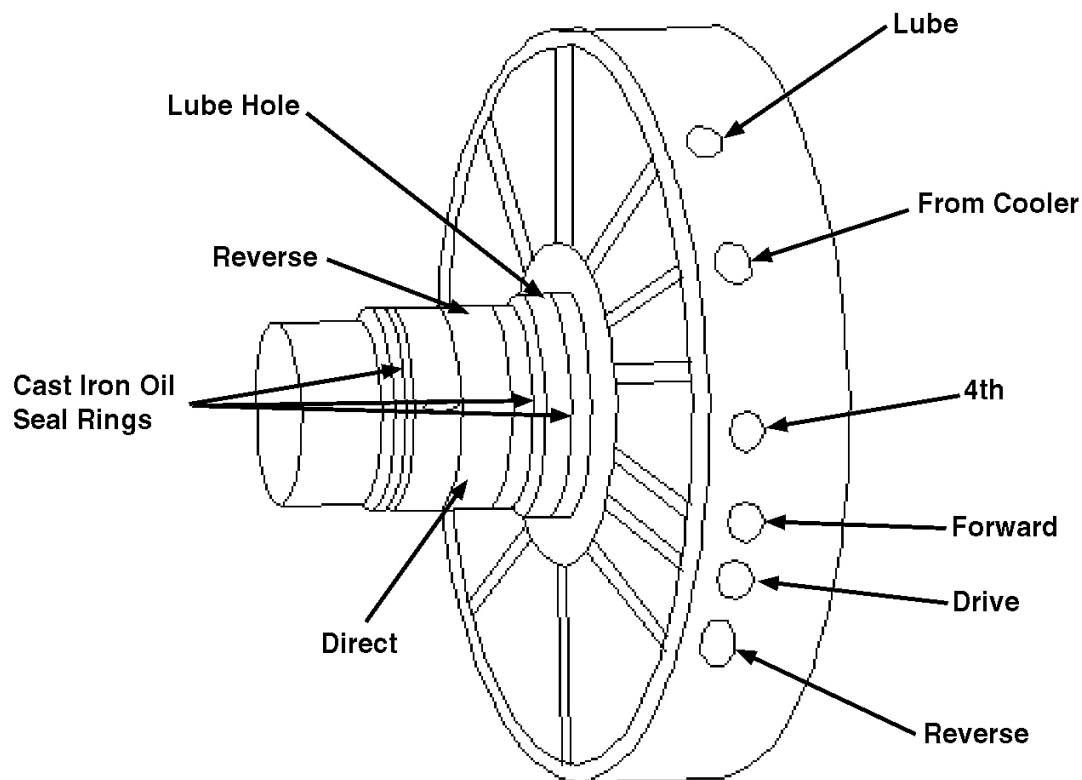
Cleaning & Inspection

1. Remove 4th clutch inner and outer seal rings from center support. Check condition of cast iron oil rings. If necessary, remove from center support.
2. Inspect bushings for scoring, wear or galling. Check oil ring grooves and oil rings for nicks or other damage. Apply air to oil passages to ensure passages are open and are not interconnected.
3. Inspect piston sealing surfaces for scratches. Inspect support for cracks or porosity. Inspect support for

burrs or raised edges. If present, remove with fine stone or fine abrasive paper.

4. If removed, install cast iron oil seal rings on center support. Install new inner and outer seal rings on center support with seal lips down. See **Fig. 26**.

NOTE: When installing cast iron oil seal rings, ensure ends overlap and interlock. Verify that ends are flush with each other when interlocked and oil seal rings are seated in grooves to prevent damage to ring during assembly of mating parts.



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Fig. 26: Location of Cast Iron Seals on Center Support
Courtesy of GENERAL MOTORS CORP.

4TH CLUTCH ASSEMBLY

NOTE: The 4th clutch assembly was disassembled during TRANSMISSION DISASSEMBLY.

Cleaning & Inspection

Inspect snap rings for damage. Inspect 4th clutch piston for cracks or damage. Inspect release springs and retainer assembly for distortion or damage. Inspect clutch plates for signs of wear or burring. Inspect plate for scratches or damage.

OVERDRIVE INTERNAL GEAR

Cleaning & Inspection

Clean and inspect internal gear-to-support thrust washer and overdrive carrier-to-sun gear thrust bearing assembly. Inspect gear, splines, teeth and bearing surface of overdrive gear for wear, cracks or damage.

OVERRUN CLUTCH & OVERDRIVE CARRIER ASSEMBLY

Disassembly

Remove snap ring and slide turbine shaft from overdrive carrier assembly. Remove carrier from overrun clutch assembly. Remove sun gear from clutch assembly.

NOTE: **Reassembly of this unit follows disassembly and reassembly of individual components.**

OVERRUN CLUTCH ASSEMBLY

Disassembly

1. Remove retaining snap ring and lift backing plate, steel clutch plates and composition clutch plates from overrun clutch housing. Keep clutch plates separated from other plate assemblies.
2. Using snap ring pliers, remove overrun clutch hub snap ring. Lift overdrive roller clutch cam assembly from housing. Separate roller clutch from cam assembly.
3. Remove retainer and wave spring assembly from clutch housing. Remove overrun clutch piston from housing. Remove inner and outer seals from piston.

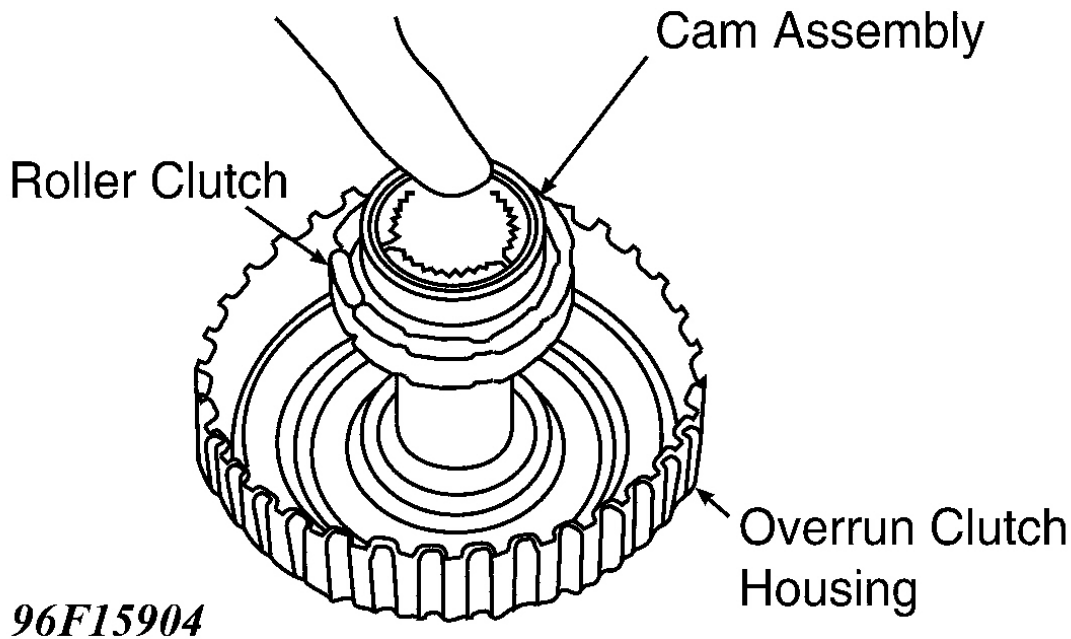


Fig. 27: Removing Overdrive Roller Clutch Cam Assembly
 Courtesy of GENERAL MOTORS CORP.

Cleaning & Inspection

1. Inspect clutch plates for signs of wear or burning. Inspect roller clutch cam ramps for damage. Check roller bearings, cage and springs of roller clutch for wear or damage.
2. Inspect retainer and wave spring for damage. Inspect clutch piston for distortion, cracks and damage. Inspect housing for cracks, wear and open oil passages. Check clutch housing snap ring groove and bushing for damage or scoring.

Reassembly

1. Install new inner and outer seals on piston with seal lips facing away from clutch apply ring side. Lubricate seals and install piston into clutch housing using care not to damage seals. Install overrun clutch waved release spring and spring retainer (cupped face down) on clutch piston.
2. Install roller clutch cam on roller clutch assembly. Locating tangs on roller clutch must set on roller clutch cam. Install roller clutch assembly on overrun clutch hub. Compress spring and retainer assembly by pushing down on roller clutch assembly and install narrow snap ring.
3. Oil and install overrun clutch plate into housing. Start with a flat steel and alternate composition and flat steel plates. See **OVERRUN CLUTCH PLATE USAGE** . Install backing plate, chamfered side up. Install retaining snap ring. Ensure composition clutch plates rotate freely.

OVERRUN CLUTCH PLATE USAGE

Application	Flat Steel	Composition
-------------	------------	-------------

All Models	(1) 2	2
(1) Plate thickness is .077" (1.96 mm).		

OVERDRIVE CARRIER

Inspection

1. Inspect locating splines for damage and roller clutch race for scratches and wear. Inspect carrier housing for cracks and wear.
2. Inspect pinions for damage, rough bearings or tilt. Using a feeler gauge, measure pinion end play between pinion and carrier. End play should be .009-.024" (.23-.61 mm). If necessary to disassemble carrier, go to disassembly procedure.

Disassembly

1. Remove overdrive carrier snap ring. Using pliers, remove pinion pins. Remove pinions, thrust washers and roller bearings. Inspect pinion pocket thrust faces for burrs. Remove if present.
2. Remove overdrive sun gear-to-overdrive carrier thrust bearing assembly. Thoroughly clean, air dry and closely inspect thrust bearing assembly for pitting or rough condition.

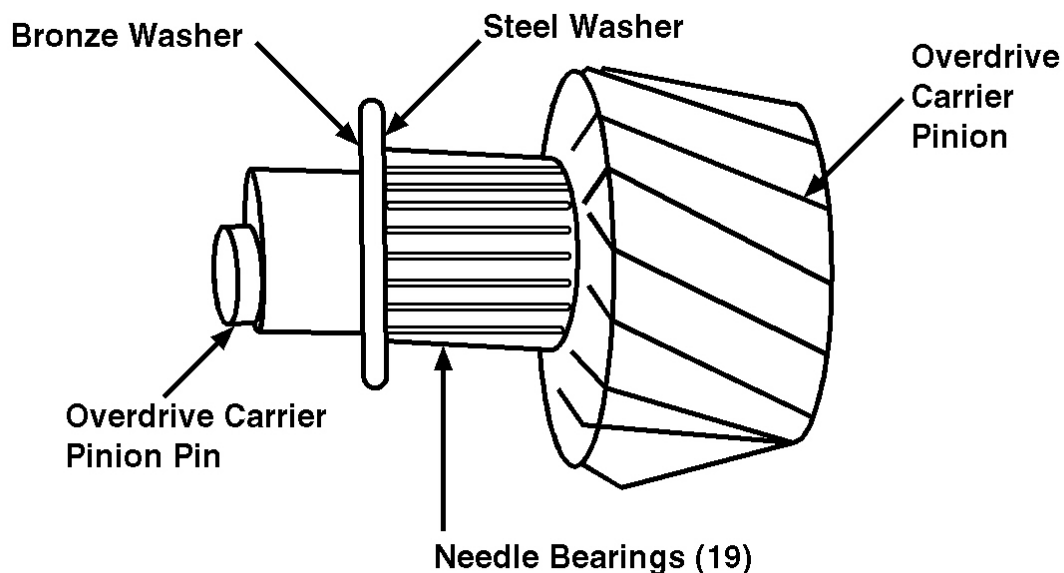
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Fig. 28: Assembling Overdrive Carrier Pinions
Courtesy of GENERAL MOTORS CORP.

Reassembly

1. Install thrust bearing into carrier housing with small diameter race down. Retain bearing in place with petroleum jelly. Install 19 needle bearings into each pinion and hold them in place. Place a bronze and steel thrust washer on each side of pinion so that steel washer is against pinion. Hold washers in place with petroleum jelly.
2. Install a pinion assembly in place in housing and use a pilot shaft to align parts. Push pinion pin into place while rotating pinions from side. Repeat procedure for remaining pinions. Install overdrive carrier snap ring to retain pinion pins.

TURBINE SHAFT

Cleaning & Inspection

1. Inspect Teflon oil seals on turbine shaft for damage and free fit in grooves. **DO NOT** remove seal unless replacement is necessary. Inspect snap ring for damage. Check journals and snap ring grooves for wear or damage.
2. Inspect both ends of turbine shaft for open oil passages. Inspect journals for damage. Check for free operation of check ball in end of shaft. If check ball is damaged, go to step 3).
3. Straighten tangs of retainer and check valve assembly capsule in end of shaft. Remove check ball. Using a No. 4 screw extractor, remove check valve retainer from turbine shaft by turning and pulling straight out.
4. Install new check valve assembly, check valve seat first, into turbine shaft. Using a 3/8" diameter rod, drive retainer and check valve assembly until it is 1/8" below top surface of turbine shaft.

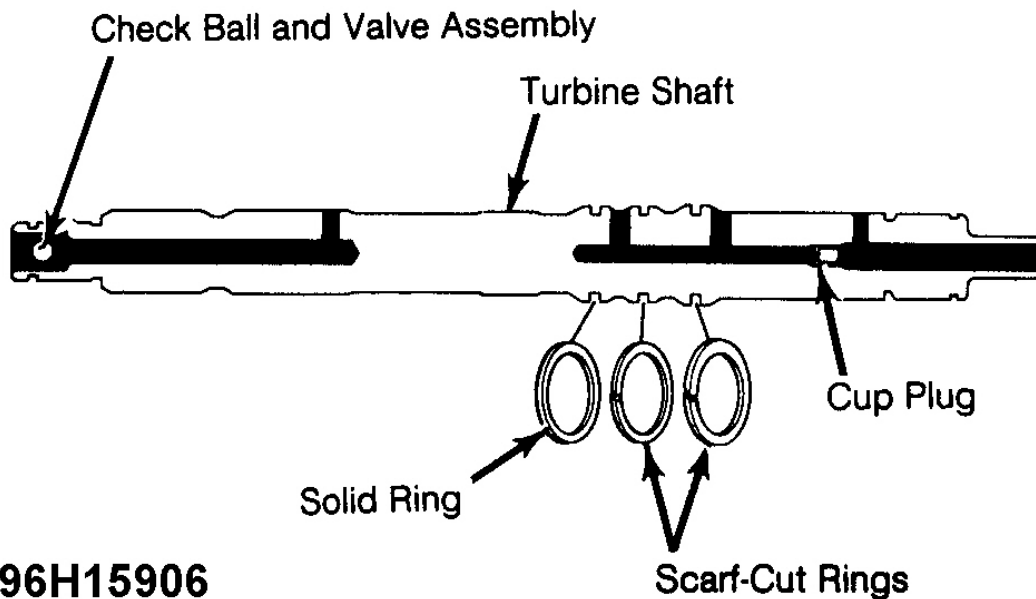


Fig. 29: Turbine Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

OVERRUN CLUTCH & OVERDRIVE CARRIER ASSEMBLY

Reassembly

1. Install overdrive sun gear on overrun clutch hub with groove up. Center clutches in overrun clutch housing. Position overdrive carrier in overrun clutch with pinion side of carrier facing up. It may be necessary to rotate carrier counterclockwise to seat it.
2. Position clutch and carrier assembly (clutch up) over hole in work bench. Install turbine shaft, ring grooved spline first, into carrier assembly. Turn assembly sideways and install NEW turbine shaft snap ring.

CAUTION: A new turbine shaft snap ring must be installed as damage to unit may occur if old snap ring is used.

PUMP ASSEMBLY

Disassembly

1. Remove pump-to-case seal ring. See **Fig. 30** . Remove pump cover-to-pump body attaching bolts and separate cover from body. Remove stator shaft-to-overrun selective thrust washer.
2. Push in on T.V. boost valve bushing, compressing pressure regulator spring. Remove retaining snap ring. Release spring tension slowly and remove valve train.
3. Push in on converter clutch stop valve, compressing converter clutch valve spring. Remove snap ring. Release spring tension slowly and remove stop valve and converter clutch valve. Using a punch, remove pressure relief spring retaining pin. Remove relief spring and ball.
4. If replacement of stator shaft and flange assembly is required, remove attaching screws and press stator shaft until it is removed from pump cover bore.
5. Place shop towel over pump slide spring (spring is under high pressure) and using a screwdriver, remove spring from pump body. Remove pump slide, slide-to-wear plate oil seal and back-up "O" ring seal, rotor, rotor guide, 7 vanes and 2 vane rings, pump slide seal support and seal. Remove pivot slide pin and spring.

Cleaning & Inspection

1. Inspect pump-to-case seal ring groove in pump body for damage. Inspect stator shaft-to-overrun selective washer for wear and damage. Wash pump body, springs, pump slide, rotor, vanes, vane rings and rotor guide. **DO NOT** put pump seals in solvent.
2. Inspect pump pocket and pump body for damage or scoring. Check pump body bushing for wear or scoring. Inspect springs for damage or distortion and pump slide for damage, cracks or wear. Check rotor for damage, cracks or wear. Inspect vanes and vane rings for damage, cracks or wear. Inspect pump body face for nicks and overall flatness and open oil passages.
3. Inspect T.V. boost valve, reverse boost valve, stop valve and converter clutch valve for nicks or damage. Check valves for free operation in bushing or cover bore. Inspect all springs for damage or distortion. Inspect stator shaft and flange assembly for damaged splines or bushing. Check stator shaft for damaged or missing orifice cup plug in dowel pin. **DO NOT** remove cup plug unless damaged.

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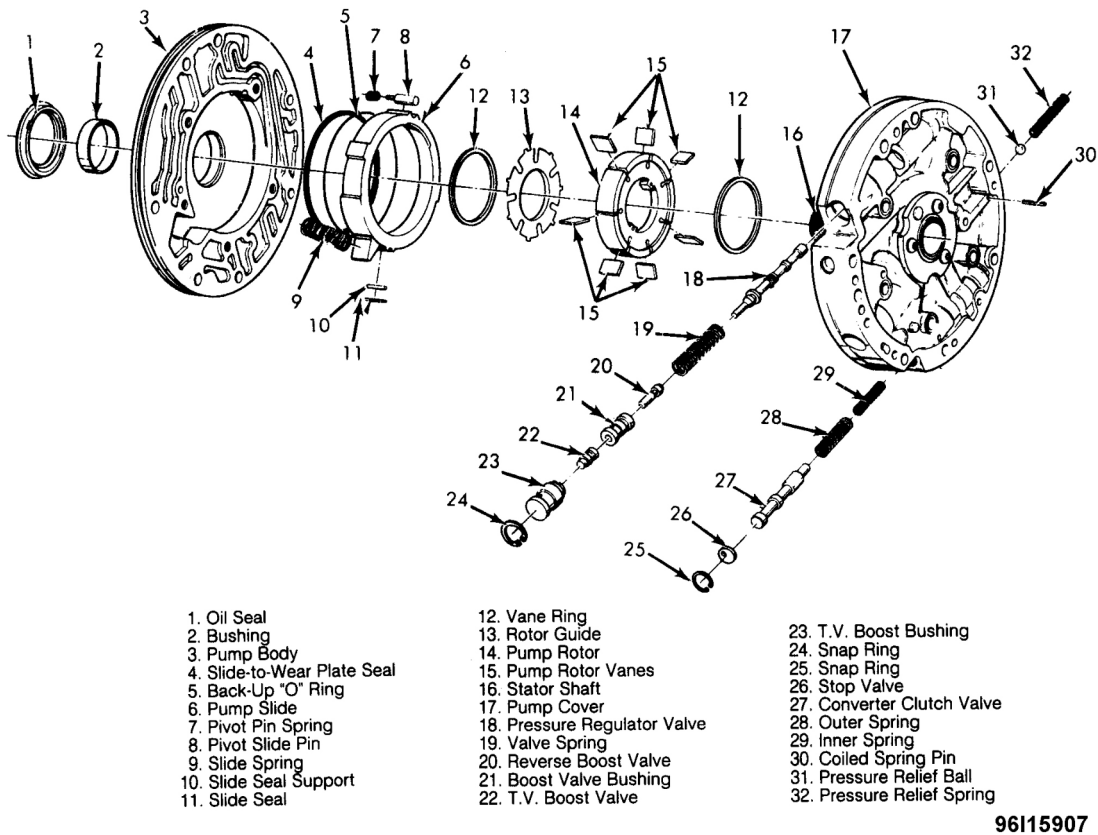


Fig. 30: Exploded View of Pump Assembly
Courtesy of GENERAL MOTORS CORP.

4. Inspect pump cover for open oil passages. Check pump cover face for nicks and overall flatness. Inspect for chips in pressure regulator, pressure relief and converter clutch bores. Inspect cup plugs and orifice plugs in cover and if damaged, replace plugs.

Pump Cover Cup Plug Replacement

If cup plug is missing, drive a new plug to 1/32" below top of hole, using a 9/32" diameter rod on 2 smaller plugs, a 5/16" rod on line-to-case cup plug and a 7/16" rod on large plug. Stake top of hole in 2 places, directly opposite each other, to retain plug.

Pump Cover Orifice Plug Replacement

If plugs require replacement, place new plug, orifice end first, into plug hole from rough casting side of cover. Drive new plug flush to .100" (2.8 mm) below top of hole, on rough casting side. Stake top of hole in 2 places to retain plug.

1990 Chevrolet Caprice

1983-90 AUTOMATIC TRANSMISSIONS General Motors Corp. - Turbo Hydra-Matic 200-4R Overhaul

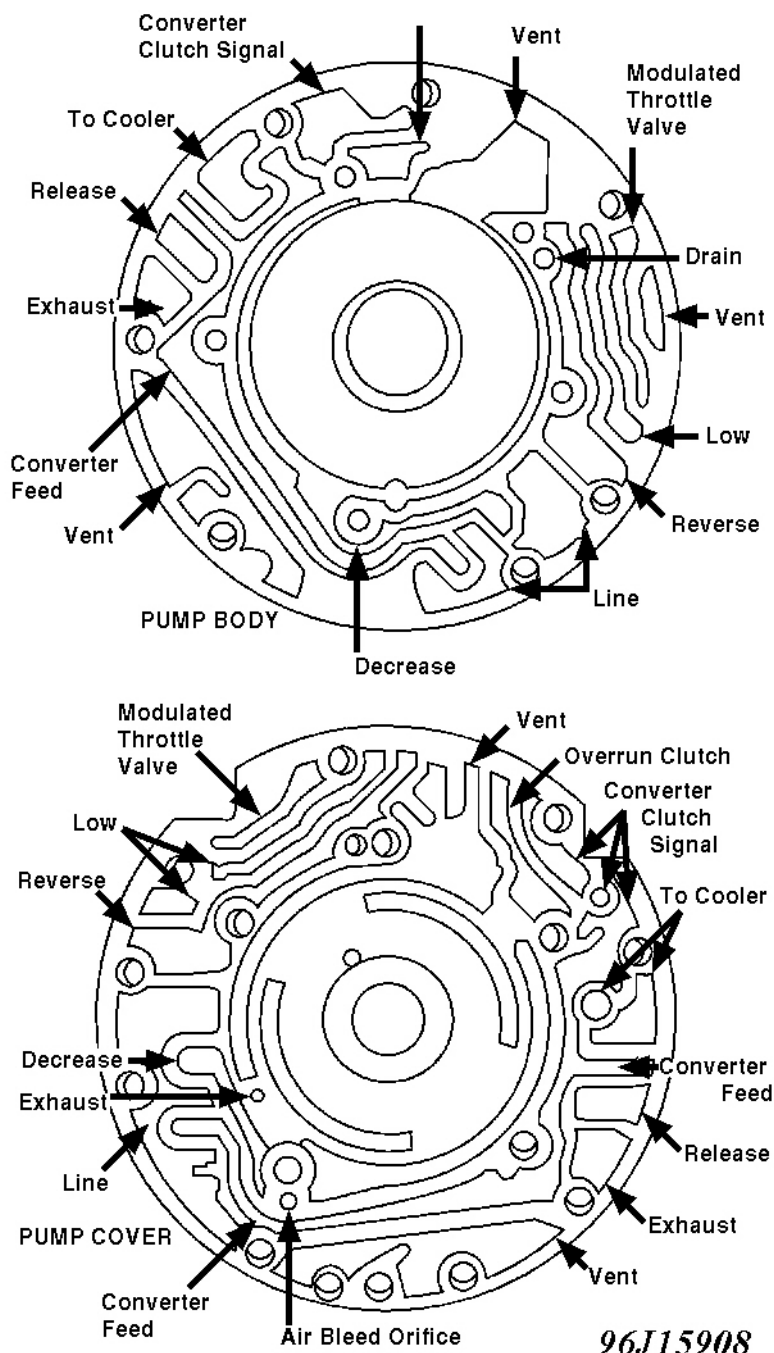


Fig. 31: View of Pump Cover & Body Showing Hydraulic Passages
Courtesy of GENERAL MOTORS CORP.

Reassembly

1. Turn pump body so that pump pocket side is up. Install slide "O" ring and slide-to-wear plate oil seal in slide and retain with petroleum jelly. Install slide into pump pocket with seal side down. Install slide seal support and pump slide seal. Retain with petroleum jelly. Install pivot pin and spring into bore in pump body (opposite pivot pin and spring).
2. Install a vane ring in pump pocket. Install rotor guide in pump rotor. Install rotor into pump pocket. Center and seat rotor on guide so rotor is flush with pump slide. Install 7 vanes into pump. Ensure vane pattern is installed against vane ring. Install top vane ring. Install pump slide spring.
3. If stator shaft and flange assembly was removed from pump cover, install as follows: Align dowel pin of stator shaft with hole in pump cover. Using a press, press stator shaft into cover until fully seated on cover. Install stator shaft and flange assembly attaching bolts.
4. Install all valve trains in reverse order of removal. See **Fig. 31** . Assemble pump cover to pump body and install attaching bolts finger tight. Align cover to body using Alignment Strap (J-25015). Tighten attaching bolts. Install pump-to-case seal ring, chamfered side out, making sure seal is not twisted. Install stator shaft-to-overnrun clutch selective thrust washer and retain with petroleum jelly.

GOVERNOR ASSEMBLY

Cleaning & Inspection

1. Inspect governor cover for damage, plugged oil passage, scored or worn bore. Inspect governor driven gear for nicks or damage. If replacement is necessary, remove retaining ring. Slide gear and thrust washer from shaft.

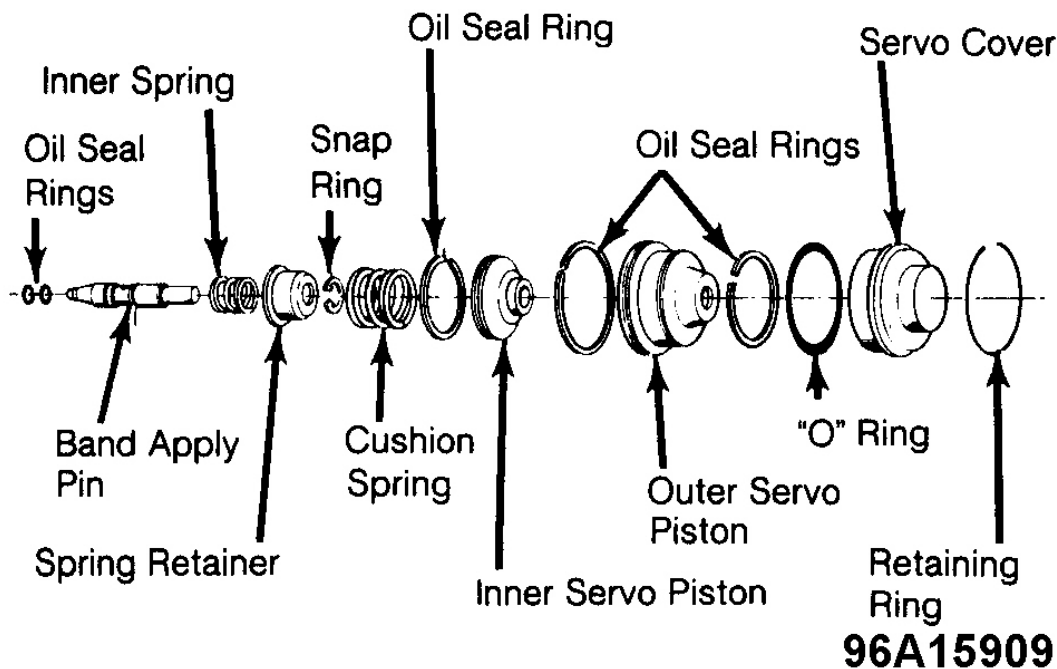
NOTE: Care must be taken after removing driven gear to keep governor in a vertical position to retain governor weight pin in its holding position.

2. Inspect governor shaft seal ring for cuts, damage and free fit in groove. Inspect for free operation of weights. Weights must operate freely and independently of each other. Check spring for damage and correct installation. Check for presence of 2 check balls. Inspect shaft for damage.

INTERMEDIATE SERVO ASSEMBLY

Disassembly

Using a small screwdriver, remove intermediate pin-to-retainer snap ring. Separate band apply pin, spring and washer from servo pistons.



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Fig. 32: Exploded View of Intermediate Servo
Courtesy of GENERAL MOTORS CORP.

Cleaning & Inspection

Inspect pin oil seal rings for damage and replace if necessary. Inspect pin for damage and fit in case. Inspect inner and outer piston seal rings for damage and free fit in grooves; **DO NOT** replace unless damaged. Inspect spring for damage and distortion.

Reassembly

1. Install retainer on band apply pin. Install snap ring. Install apply pin, retainer end first, through servo pistons. If removed, install new inner and outer piston seal rings, making sure cut ends are assembled in same relationship as cut. Retain with petroleum jelly.
2. Lubricate with petroleum jelly and install new seal ring on intermediate servo cover. Install servo piston into servo cover.

CAUTION: Intermediate servo cover seal rings must be well lubricated to prevent damage or cutting of ring.

CONTROL VALVE ASSEMBLY

NOTE: As valve trains are removed from each valve body bore, place individual parts

in correct order in relative position to valve body to ease reassembly. Valves, bushings and springs are not interchangeable. Parts must be installed in correct order in proper valve body bore.

Disassembly

1. Lay control valve assembly with machined face up and manual valve at upper left corner. If not removed at TRANSMISSION DISASSEMBLY, remove 3 check balls from cored passages of valve body. Remove manual valve from upper left corner bore.

CAUTION: Some roll pins in valve body have pressure against them. Hold shop towel over bore while removing pin to prevent possibly losing bore plug or spring.

2. From bore beneath manual valve, remove roll pin and slide out 2-3 throttle valve and 2-3 shift valve train. The 2-3 throttle valve spring and valve may be inside bushing.
3. From next bore down, remove roll pin and withdraw converter clutch valve train. Converter clutch valve spring and converter clutch throttle valve may be inside bushing. On Computer Command Control models, clutch throttle valve and spring have been eliminated.
4. From next bore down, remove outer roll pin and remove 1-2 throttle valve train and low 1st/detent valve. Remove inner roll pin and slide out low 1st/detent valve bushing and 1-2 shift valve.
5. Cover next bore down to prevent loss of spring. Remove outer spring retaining sleeve. Remove bore plug and 4-3 control valve and spring. Remove inner spring retaining sleeve and withdraw low-overrun clutch valve spring and valve.
6. From next bore down, remove roll pin and slide out 3-4 throttle valve train. From last bore down, remove roll pin and bore plug and withdraw accumulator valve train.
7. From upper right corner, remove roll pin and remove line bias valve train. From next bore down, remove roll pin and 3-2 control valve train.
8. From next bore down, remove roll pin. Remove T.V. modulator upshift valve train. From next bore down, remove roll pin and T.V. modulator downshift valve train.
9. Cover next bore down to prevent loss of spring. Remove spring retaining sleeve and withdraw T.V. limit valve train.
10. From last bore, remove outer roll pin. Remove throttle valve bushing, plunger and spring. Remove inner pin as follows: Grind a taper to end of a No. 49 drill. Lightly tap tapered end of drill into roll pin. Pull drill and roll pin out. Remove throttle valve.

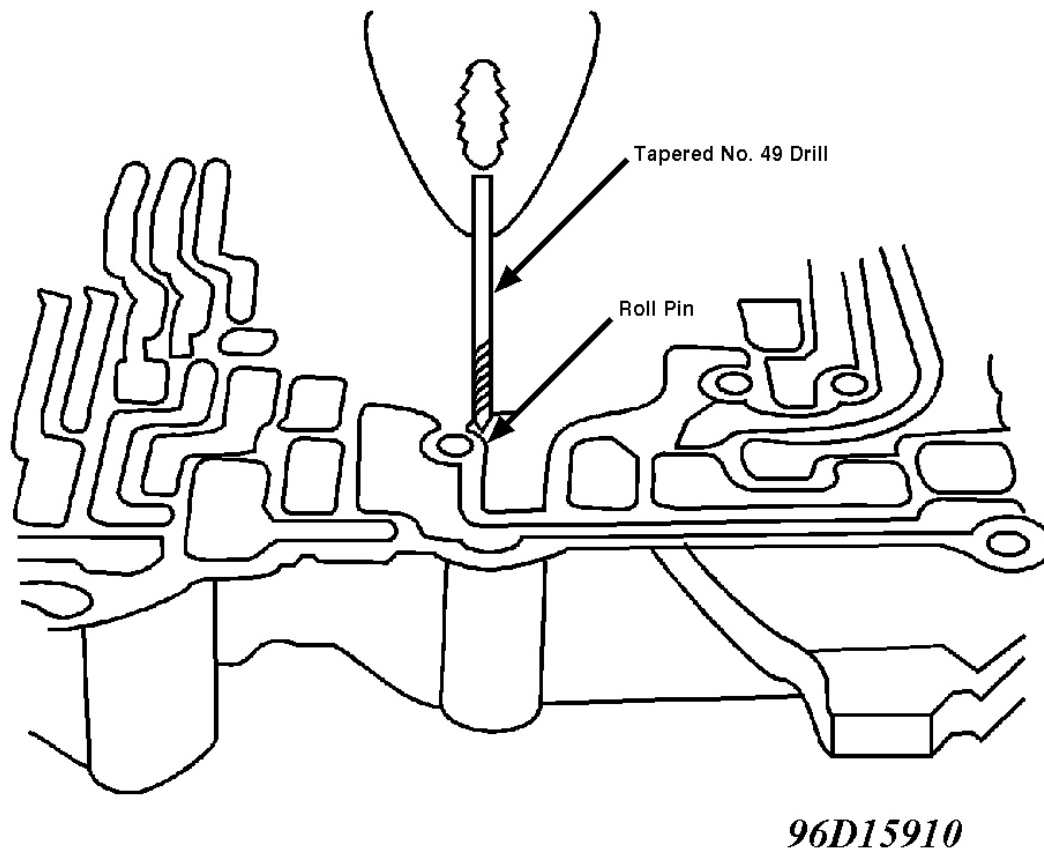


Fig. 33: Removing Throttle Valve Inner Roll Pin
Courtesy of GENERAL MOTORS CORP.

Cleaning & Inspection

1. Wash control valve body, springs, valves and other parts in clean solvent and air dry. Inspect valves for scoring, cracks and free movement in their bores.
2. Inspect bushings for cracks and scored bores. Inspect valve body for cracks, damage or scored bores. Inspect springs for distortion or collapsed coils. Inspect bore plugs for damage.

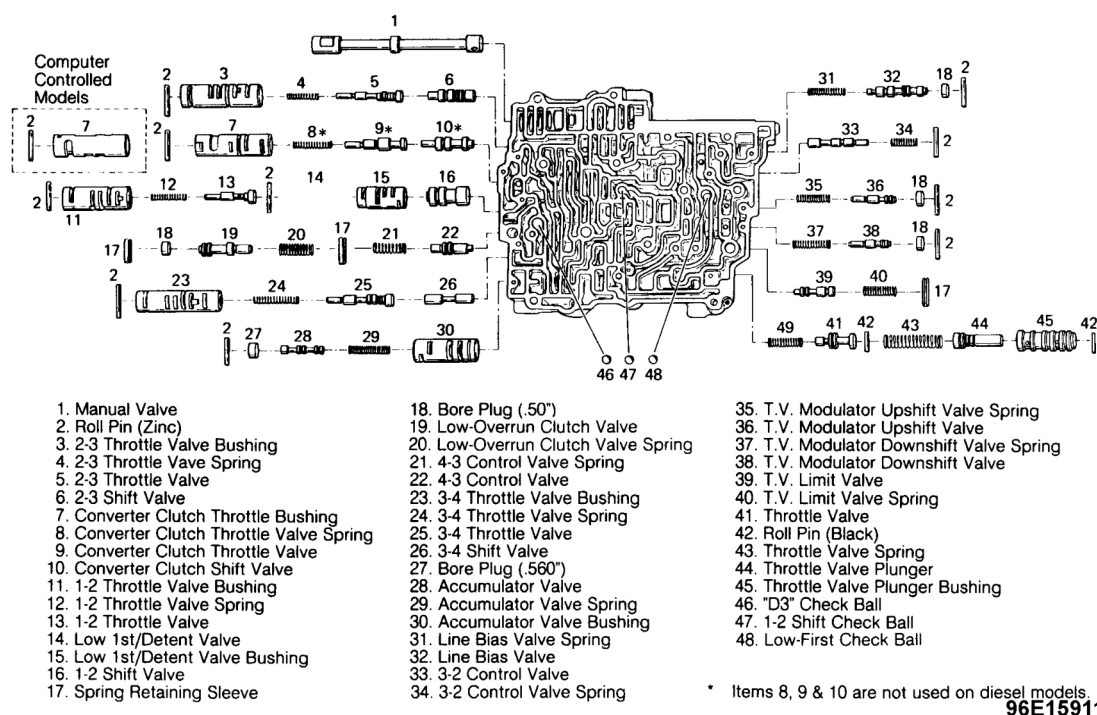


Fig. 34: Exploded View of Control Valve Assembly
Courtesy of GENERAL MOTORS CORP.

Reassembly

Reassembly is reverse of disassembly procedure. Reassemble control valve assembly using exploded view as a guide. See **Fig. 34**.

- Install all flared roll pins (zinc coated) flared end out and from machined face of valve body.
- Install 2 tapered roll pins (Black finish) that retain throttle valve and throttle valve bushing, tapered end first.
- Roll pins do not fit flush on rough casting face. Ensure all roll pins are flush at machined face or damage to transmission will occur.
- Ensure all spring retaining sleeves are installed from machined face and that they are level with or below machined surface.
- Install all bore plugs with hole out.
- Install all valve sleeves so that slot in sleeve aligns with roll pin hole in valve body.

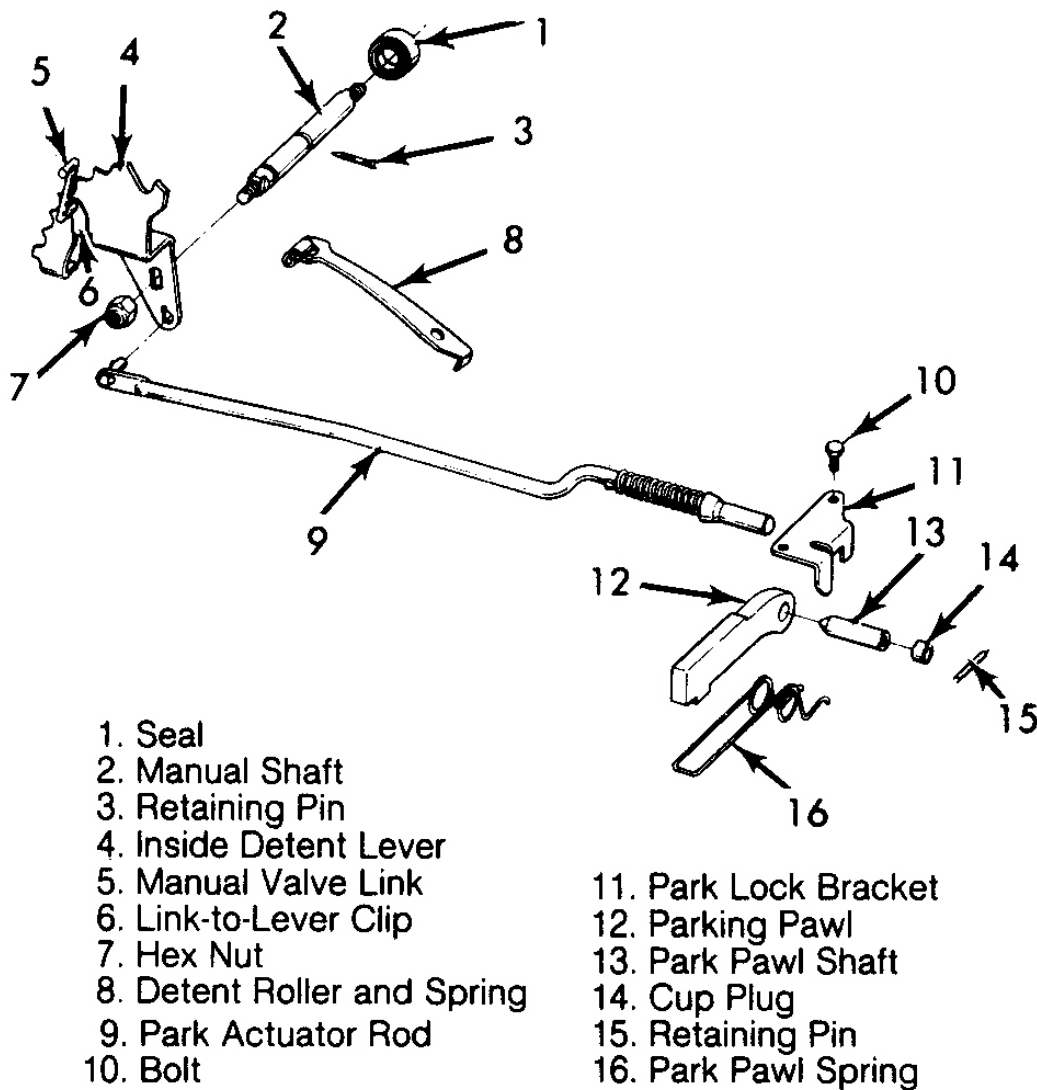
TRANSMISSION REASSEMBLY

MANUAL SHAFT & PARKING PAWL PARTS

1. Turn transmission to horizontal position with oil pan side up. If removed, install new manual shaft seal with lip facing into case using a 9/16" socket to seat seal. Install parking pawl and spring into case with

tooth toward inside of case and spring under pawl tooth with spring ends toward inside of case. Ensure spring ends locate against case pad.

2. Align parking pawl and spring with case shaft hole. Install parking pawl shaft, tapered end first. Using a 3/8" diameter rod, install new parking pawl cup plug, open end out, past retaining pin hole. Install retaining pin.



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Fig. 35: Manual Shaft & Parking Parts
Courtesy of GENERAL MOTORS CORP.

3. While holding parking pawl toward center of transmission, install parking lock bracket and tighten attaching bolts. Assemble parking actuator rod on pin side of inside detent lever, locating lever between

actuator rod tangs. Install rod and detent lever into case with detent lever pin toward center of transmission and actuator plunger between parking pawl and parking lock bracket.

NOTE: File any burrs or raised edges off manual shaft that could damage manual shaft seal during installation of shaft.

4. Install manual shaft, small identification ring groove first, through case. Align inside detent lever with flats on shaft. Install detent lever on manual shaft. Install hex nut on manual shaft and tighten. Install manual shaft retaining pin, indexing with large groove on shaft.

REAR GEAR PARTS

1. Install rear internal gear, hub end first, onto output shaft. Install rear internal gear-to-rear thrust bearing assembly, inside diameter race against gear, over output shaft and into internal gear.
2. Install roller clutch and rear carrier assembly into rear internal gear. Install output shaft loading fixture and support sleeve into rear of case. See **Fig. 9** . Turn case to vertical position, pump end up. Install rear unit parts into case, indexing internal gear parking pawl lugs to pass by parking pawl tooth.
3. Using adjusting screw on output shaft loading fixture, adjust height of rear internal gear parking pawl lugs to align flush with parking pawl tooth.

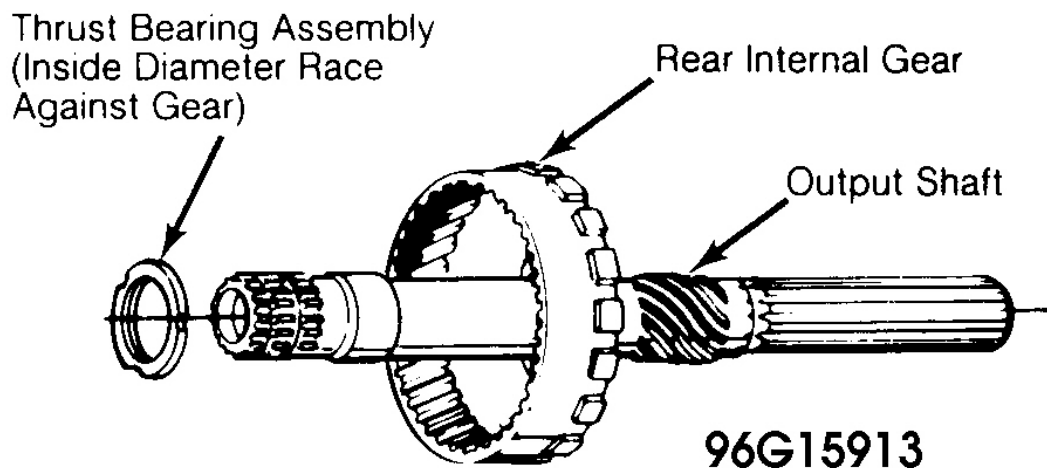


Fig. 36: Installing Rear Internal Gear & Thrust Bearing
Courtesy of GENERAL MOTORS CORP.

4. Oil and install low-reverse clutch plates into case starting with a flat steel plate and alternating composition and flat steel clutch plates. See **LOW-REVERSE CLUTCH USAGE** . Install waved steel plate on top of last flat steel plate. Install low-reverse clutch housing-to-case spacer ring in case.
5. Install low-reverse clutch housing into case, aligning feed hole in housing with reverse clutch feed passage in case. If clutch housing does not seat past case snap ring groove, install input drum and rear sun gear into case.

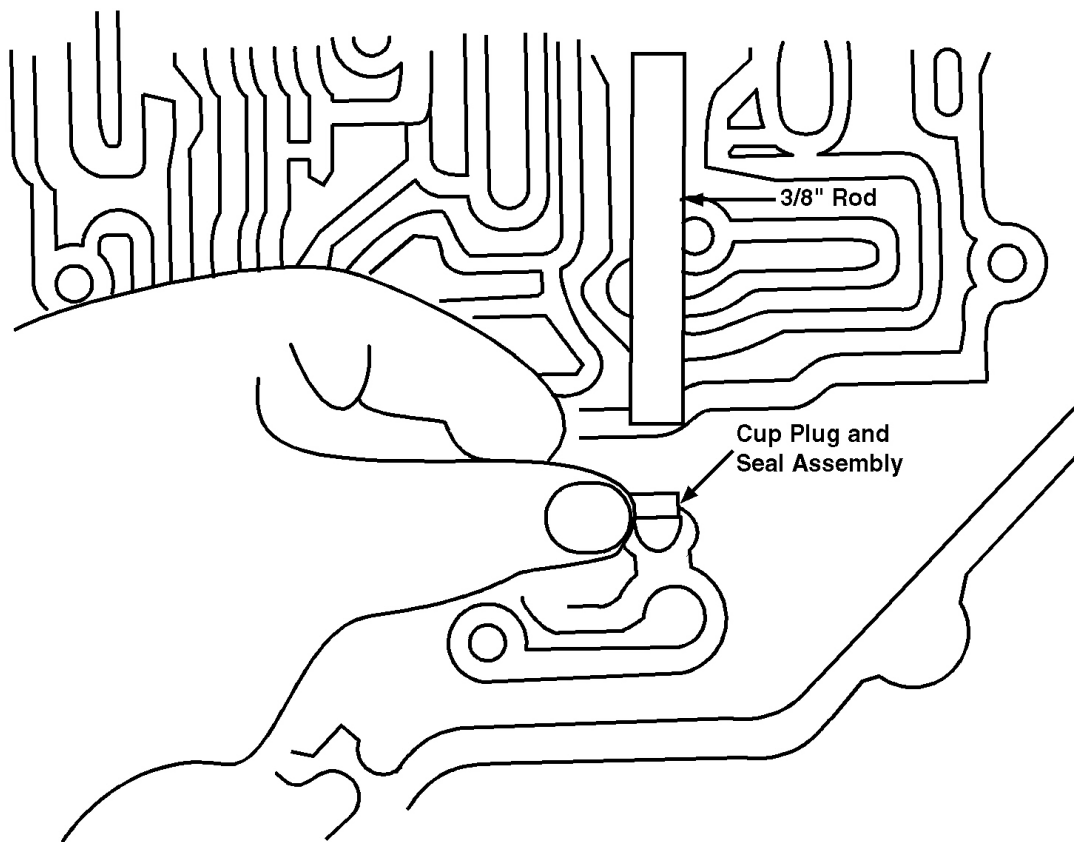
6. Rotate sun gear back and forth, tapping lightly with input drum to align roller clutch race with low-reverse clutch hub splines. Remove input drum and rear sun gear assembly.
7. Install low-reverse clutch-to-case snap ring with flat side against clutch (beveled side up). Position snap ring groove on opposite side of parking pawl rod.

LOW-REVERSE CLUTCH USAGE

Application	Steel	Composition
All Models	(1) 7	6
(1) Installed last is one waved steel plate .077" (1.96 mm) thick.		

NOTE: It may be necessary to loosen adjusting screw on output shaft loading fixture to install clutch-to-case snap ring.

8. If removed, install new low-reverse clutch housing-to-case cup plug and seal. Use a 3/8" diameter rod to drive cup plug and seal assembly into case until it seats against clutch housing. See **Fig. 37**.



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Fig. 37: Installing Low-Reverse Clutch Housing Cup Plug & Seal Assembly
Courtesy of GENERAL MOTORS CORP.

FRONT GEAR PARTS

1. Install 4-tanged thrust washer on input drum over sun gear end. Align tangs into input drum and retain with petroleum jelly. Install rear sun gear and input drum assembly into case.
2. Install front sun gear into case and input drum with face of gear having identification groove against input drum. Install front sun gear-to-front carrier thrust bearing and race assembly into case with needle bearing against sun gear.
3. Install front carrier-to-front internal gear thrust bearing assembly on carrier with small diameter race against carrier. Install front carrier and thrust bearing assembly into transmission.
4. Install thrust washer on front internal gear and retain with petroleum jelly. Install front internal gear and thrust washer into case. Install rear unit end play selective washer into case with identification number on washer toward front of transmission. Install wide retaining snap ring. See **Fig. 14** .

NOTE: **At this point, recheck rear unit end play to verify that correct selective washer has been installed. See Rear Unit End Play in TRANSMISSION DISASSEMBLY .**

5. Install output shaft-to-forward clutch shaft selective thrust washer into case and position washer. See **Fig. 38** .

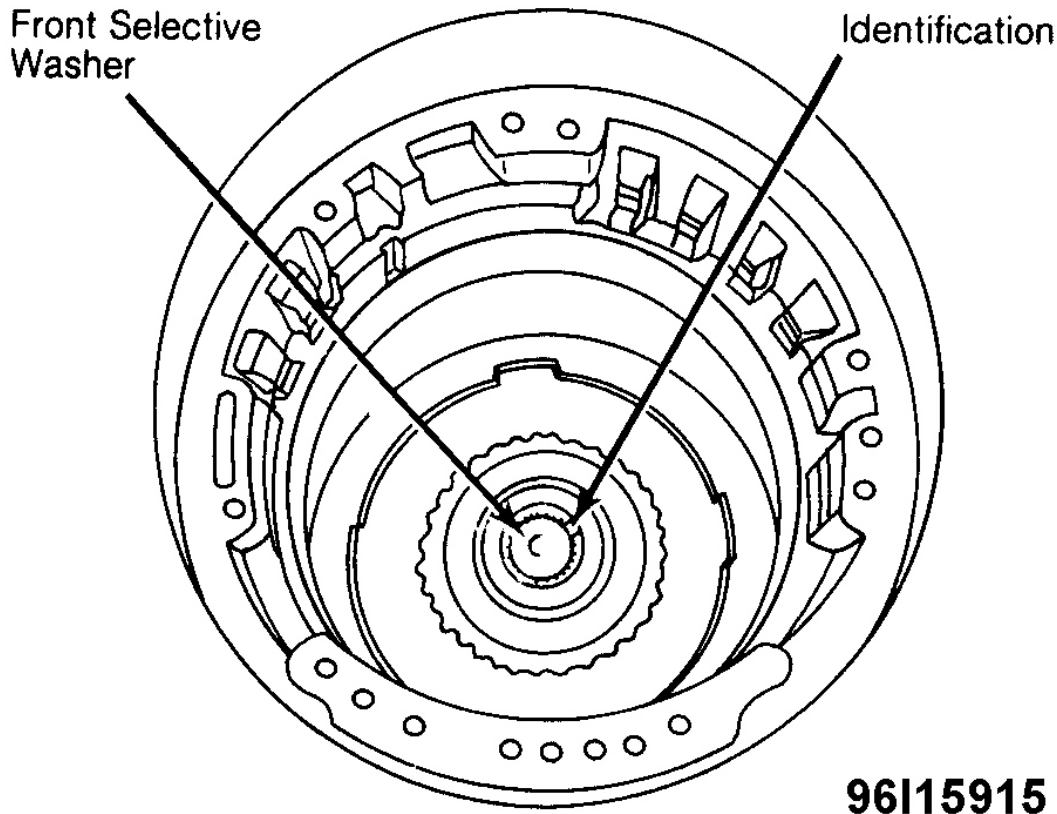


Fig. 38: Installing Front Selective Washer
Courtesy of GENERAL MOTORS CORP.

FRONT UNIT PARTS

1. Install intermediate band into case, locating band apply lug and anchor pin lug in case slot. Install band anchor pin.
2. Position direct clutch assembly, clutch plate end up, over hole in work bench. Align teeth of composition plates in direct clutch. Install forward clutch assembly, shaft first, into direct clutch assembly. Hold direct clutch and rotate forward clutch back and forth until fully seated.

NOTE: When forward clutch is fully seated, it will be approximately 5/8" from tang end of direct clutch housing to end of forward clutch drum.

3. Install direct and forward clutch assemblies into case and rotate into position. When assemblies are correctly installed, it will be approximately 4 1/8" from pump face in case to direct clutch housing.
4. Install center support-to-direct clutch thrust washer on center support. Visually align center support with case bolt holes and install center support into case. Install, but **DO NOT** tighten, center support attaching bolts. Install center support-to-case snap ring with beveled side up. Tighten center support attaching bolts.

NOTE: At this point, recheck input shaft end play to verify that correct front selective washer has been installed. See INPUT SHAFT END PLAY .

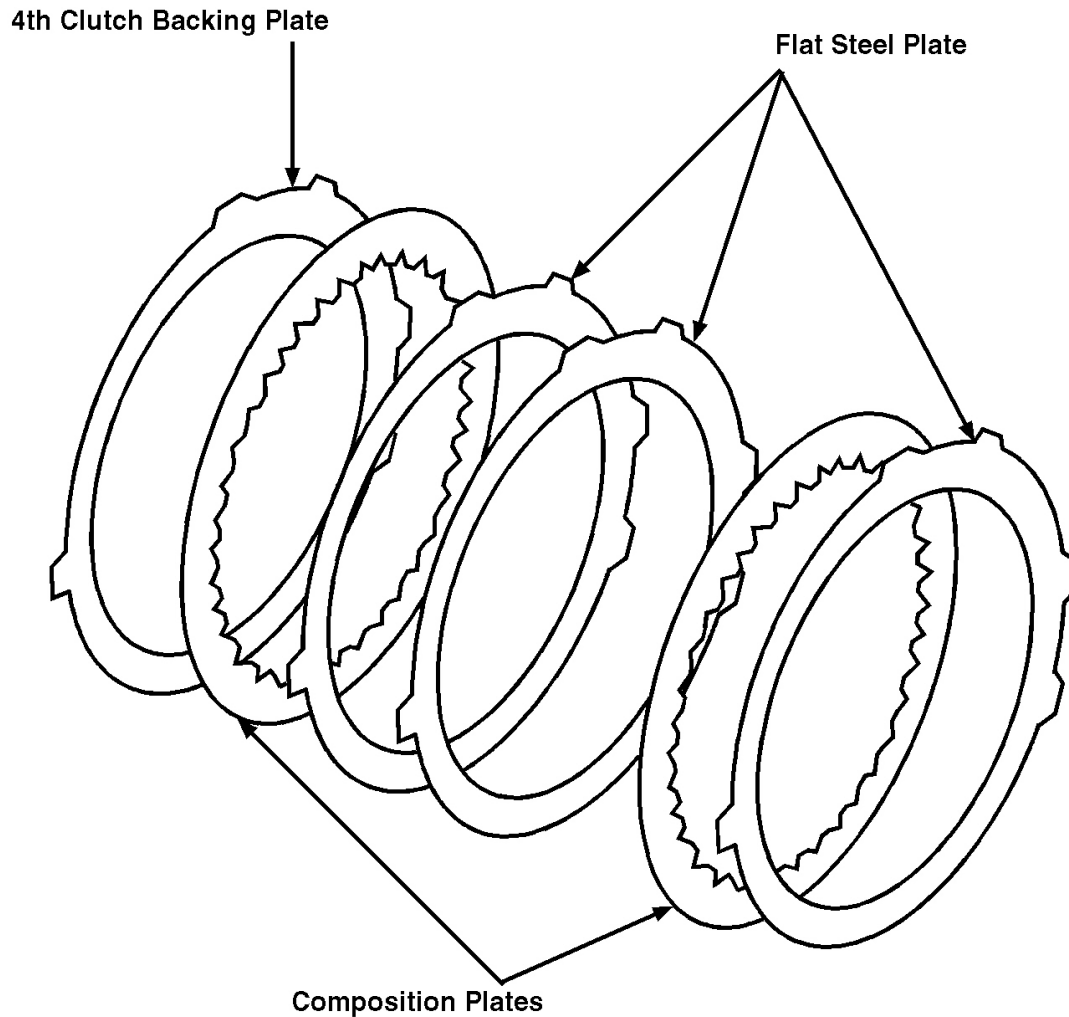
OVERDRIVE UNIT PARTS

1. Install 4th clutch outer and inner seals on center support with lips facing down, apply petroleum jelly to seals. Install 4th clutch piston into case, aligning piston tab with wide case spline. Position return spring and retainer assembly on piston. Compress retainer assembly and install support-to-4th clutch spring snap ring.

NOTE: The 4th clutch inner seal, installed on center support, is identified by a **White stripe**.

2. Install internal gear-to-support thrust washer into case with tangs down. Install overdrive internal gear, hub end first, on forward clutch shaft. Install overdrive carrier-to-sun gear thrust bearing assembly into overdrive internal gear with large diameter race against carrier.
3. Grasp turbine shaft and lower overrun clutch and overdrive carrier assembly into case and rotate into position. Select proper 4th clutch plates. See FOURTH CLUTCH PLATE USAGE . Oil and install 4th clutch plates into case. See Fig. 39 . Install clutch pack retaining snap ring. Install oil deflector plate into case with tangs facing up.

CAUTION: Note installation order of 4th clutch plates. The center has 2 steel plates together and thick plate is on top. Incorrect installation sequence will cause damage.



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Fig. 39: 4th Clutch Plate Installation Sequence
Courtesy of GENERAL MOTORS CORP.

FOURTH CLUTCH PLATE USAGE

Application	Steel	Composition
All Models	3	2

4. Install a new pump-to-case gasket on pump and retain with petroleum jelly. Install 2 alignment pins into pump attaching bolt holes opposite each other. Install pump assembly in case. Install pump attaching bolts with NEW washers. Remove alignment pins and install remaining bolts and washers. Tighten oil pump attaching bolts.

NOTE: At this point, recheck overdrive unit end play to verify that correct overdrive

end play thrust washer has been installed. See Overdrive End Play.

EXTERNAL PARTS

1. Remove output shaft loading fixture and support sleeve from rear of transmission case. Turn transmission to horizontal position with oil pan side up. If removed, install new oil seal ring on governor shaft. Install governor assembly into case. Install governor cover and tighten attaching bolts.

NOTE: Ensure governor shaft is piloted in governor cover before tightening cover attaching bolts.

2. With correct band apply pin installed, as determined during transmission disassembly, install intermediate servo assembly into case. Ensure tapered end of apply pin is properly located against band apply lug. Install servo cover retaining ring and align ring gap with end showing in case slot.

NOTE: Intermediate servo cover seal rings must be well lubricated with petroleum jelly to prevent damage or cutting of ring.

3. Lubricate with petroleum jelly and install new "O" rings on case electrical connector. Install electrical connector with lock tabs facing into case, positioning locator tab in notch on side of case.
4. Install a new Teflon seal on 3-4 accumulator piston. Install accumulator pin in case. Install accumulator piston and spring. See **Fig. 40** .

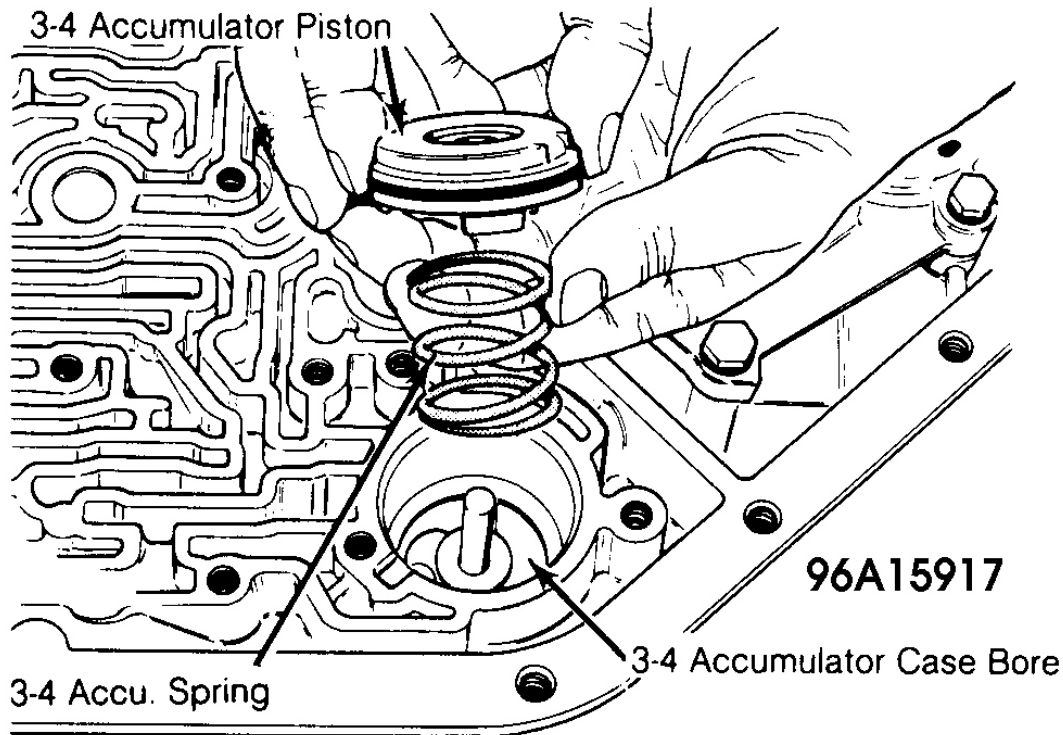


Fig. 40: Installing 3-4 Accumulator Assembly
 Courtesy of GENERAL MOTORS CORP.

5. Install 9 check balls into locations in case. See **Fig. 41** . Install 2 valve body alignment pins into opposing bolt holes. Install spacer plate-to-case gasket (marked "C") on case. Install spacer plate.
6. Install valve body assembly-to-spacer plate gasket (marked "VB") on spacer plate. Position 1-2 accumulator plate and gasket in place on case, install accumulator spring on plate. Install a new Teflon seal on 1-2 accumulator piston, install piston in accumulator housing with dome up. Install 1-2 accumulator assembly. Install and tighten 5 attaching bolts in original positions.
7. Position the remaining 3 check balls in valve body. See **Fig. 34** . Retain with petroleum jelly. Remove alignment pins. Install valve body assembly making sure to align manual valve with detent lever.

NOTE: It is possible during reassembly to position manual valve too far into valve body and still connect selective lever link to it. This will prevent valve body from fitting properly in case.

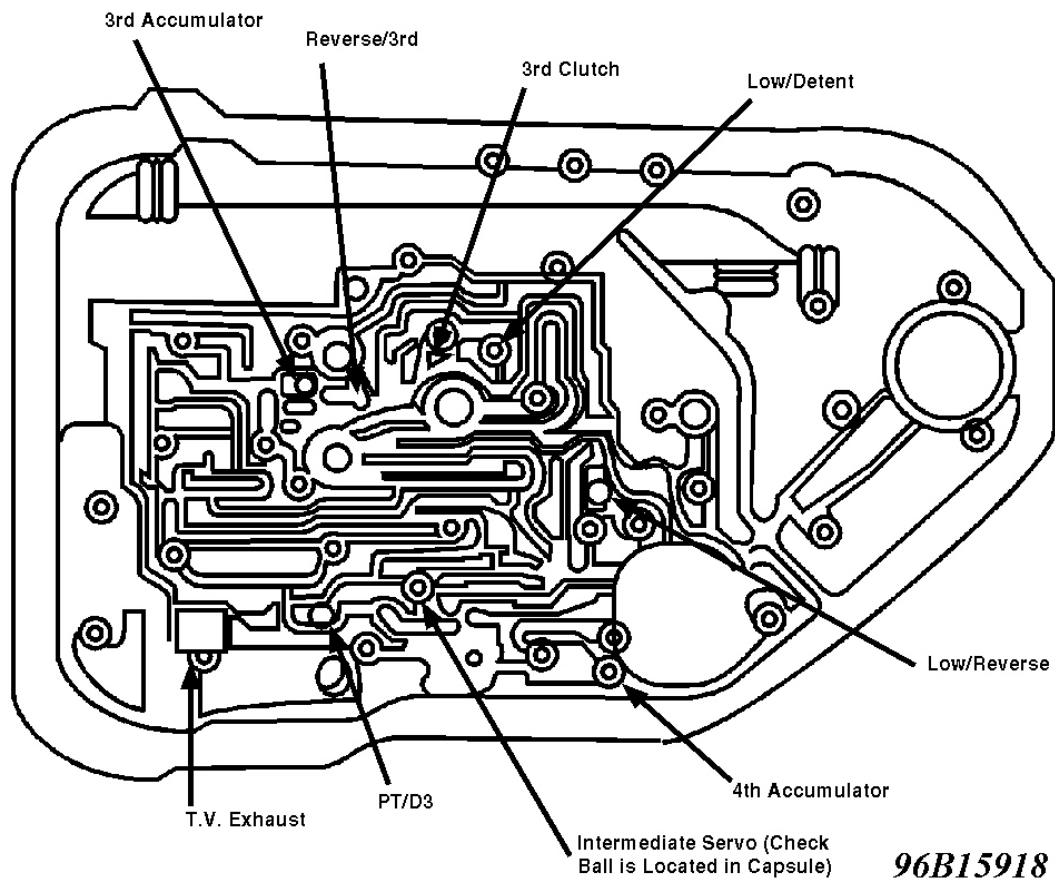


Fig. 41: Location of Check Balls in Bottom of Case
Courtesy of GENERAL MOTORS CORP.

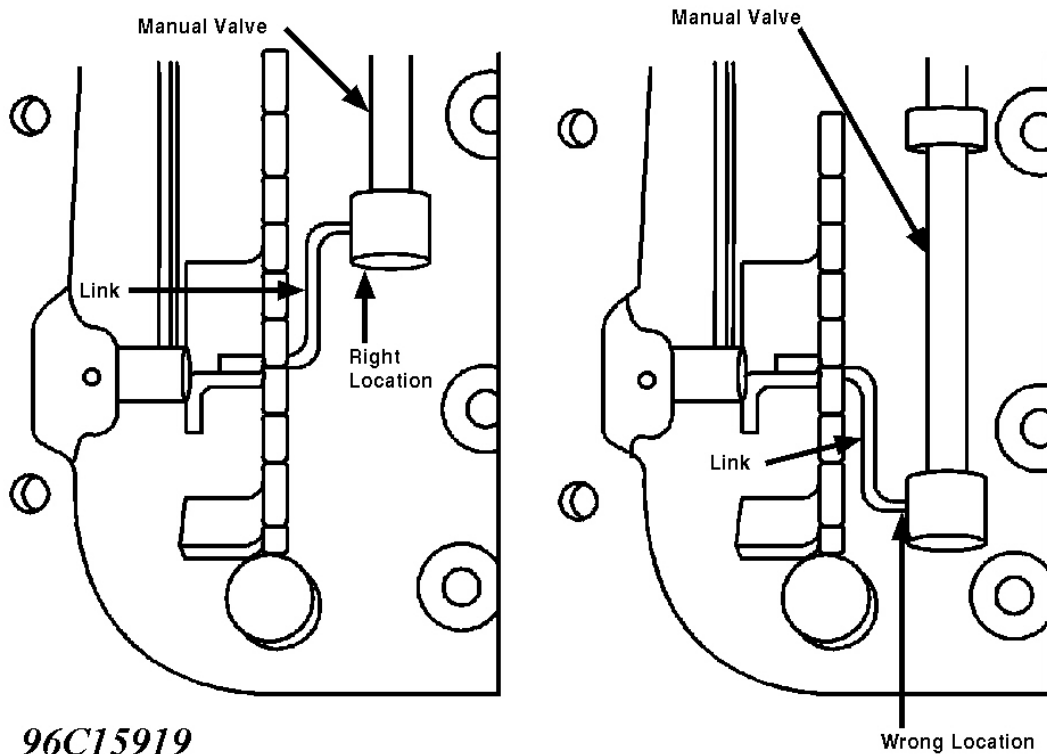


Fig. 42: Proper Positioning of Manual Valve & Selective Lever Link In Valve Body
 Courtesy of GENERAL MOTORS CORP.

8. Start 15 of 20 valve body attaching bolts in original positions. **DO NOT** thread the following bolts at this time: Throttle lever and bracket assembly, manual detent roller and spring assembly, and clip retaining bolts. Install signal oil pipe in valve body assembly.
9. Install manual detent roller and spring assembly, locating tang in valve body and roller on inside detent lever. If removed, install throttle and bracket assembly spring on top of lifter. Install link on throttle. Ensure link is hooked. See **Fig. 43**. Install throttle lever and bracket assembly, locating slot in bracket with roll pin. Align lifter through valve body hole and link through T.V. linkage case bore. Install retaining bolt.
10. With locating pipe in hole, install 4-3 pressure switch (on non Computer Command Control models only) and attaching bolt. Install filter intake pipe "O" ring on pipe and coat with petroleum jelly. Install filter in pump bore. Install oil pan using a new gasket and tighten attaching bolts.

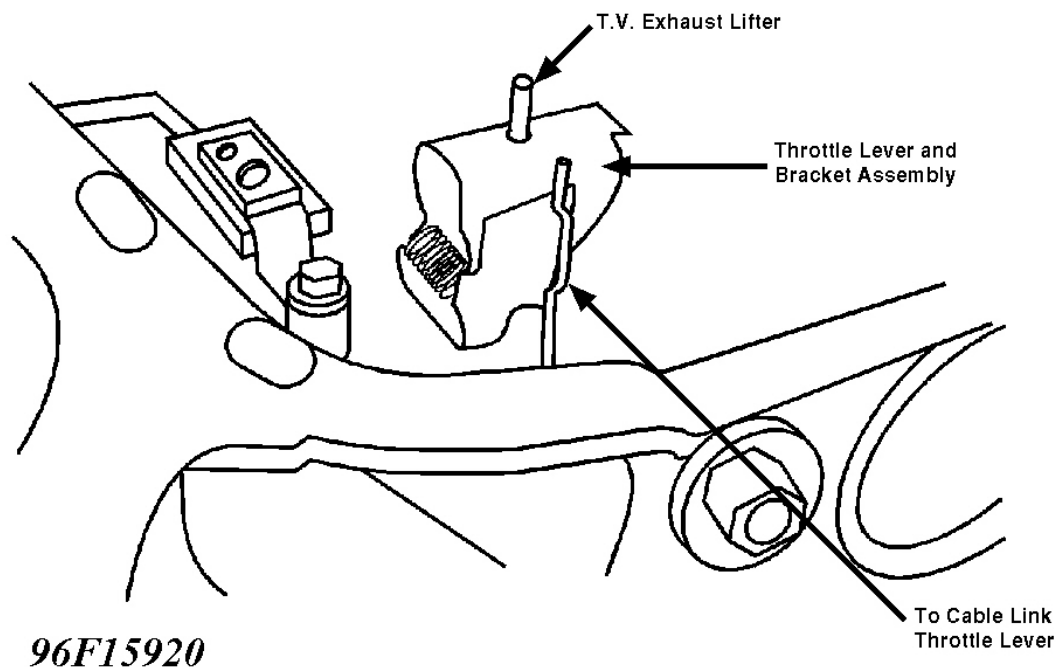


Fig. 43: Throttle Lever & Bracket Installation
 Courtesy of GENERAL MOTORS CORP.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Case-To-Center Support	15-20 (20-27)
Converter-To-Flywheel	41-52 (55-70)
Cooler Connector	26-30 (35-40)
Governor Cover-To-Case	15-20 (20-27)
Manual Shaft-To-Lever Nut	20-25 (27-34)
Oil Pan-To-Case	10-13 (14-18)
Park Lock Bracket-To-Case	15-20 (20-27)
Pump Body-To-Pump Cover	15-20 (20-27)
Pump-To-Case	15-20 (20-27)
Transmission-To-Engine	35 (47)
INCH Lbs. (N.m)	
Accumulator Housing-To-Case	84-120 (10-14)
Pressure Switch	60-120 (7-14)
Pressure Take Off Plugs	60-120 (7-14)

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Solenoid-To-Case	84-120 (10-14)
Speedometer Retainer-To-Case	84-120 (10-14)
Stator Shaft-To-Pump Cover	84-120 (10-14)
Valve Body-To-Case	84-120 (10-14)