



WORKSHOP MANUAL

Section 4

Automatic Transmission

a LONDON TAXIS INTERNATIONAL HOLYHEAD ROAD COVENTRY CV5 8JJ

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<u>Automatic Transmission – Glossary</u> of Terms

- ATF Automatic Transmission Fluids
- A/T Automatic Transmission
- S.D.S. Service Data & Specifications

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PREPARATION

Special Service Tools

	Tool Number Tool Name	Description
	 ST2505S001 Oil pressure gauge set 1. ST25051001 Oil pressure gauge 2. ST25052000 Hose 3. ST25053000 Joint pipe 4. ST25054000 Adapter 5. ST25055000 Adapter 	Measuring line pressure
J.C.	ST07870000 Transmission case stand	Disassembling and assembling A/T
	KV311021 00 Torque converter one- way clutch check tool	Checking one-way clutch in torque converter
	ST25850000 Sliding hammer	Removing oil pump assembly
	KV31102400 Clutch spring compressor	Removing and installing clutch return springs
·	ST33200000 Drift Installing rear oil seal	Installing oil pump housing oil seal a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752

PREPARATION

Special Service Tools (Cont'd)

- Before proceeding with dismantling, thoroughly clean the outside of the transmission. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Dismantling should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common workshop rags can leave fibres that could interfere with the operation of the transmission.
- When dismantling parts, place them in order in a parts rack so that they can be put back into the unit in their proper positions.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and 0-rings should be replaced any time the transmission is dismantling.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place removed parts in order on a parts rack so they can be put back in the valve body in the same positions and sequences. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along their bores in the valve body under their own weight.
- Before assembly, apply a coat of recommended A.T.F. to all parts. Petroleum jelly may be applied to 0-rings and seals and used to hold small bearings and washers in place during reassembly.
 Do not use grease.

PREPARATION

Special Service Tools (Cont'd)

- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- After overhaul, refill the transmission with new A.T.F.

Note: In LTI application torque converter lockup is disabled. Whilst references to lock-up have been removed from the text of this manual, certain illustrations will show the lockup control, because it is impractical to alter complex hydraulic circuit diagrams.

A/T Control Diagram

Hydraulic Control Circuits



A/T Control Diagram



Cross-Sectional View

A/T Control Diagram

Mechanical Operation

\$	hift	Reverse	High	Forward	Overrun		Band servo)	Forward	Low	Low &		
рс	sition	clutch	clutch	clutch	clutch	2 nd apply	3 rd apply	4 th apply	One-way clutch	One-way clutch	Reverse brake	Lock-up	Remarks
	Ρ												PARK
	R	0									0		REVERSE
	Ν												NEUTRAL
	1 st			0	*				-	-			Automatic
*	2 nd			0	*1 ●	0							Shift
4	3 rd		0	0	•	*2□			-				1↔2↔3↔4
	4 th		0			*3∎		0				0	
2	1 st			0	•								Automatic
2	2 nd			0	•	0			-				Shift 1↔2
1	1 st			0	0						0		Locks (held
	2 nd			0	0	0							1 st speed 1↔2

- *1. Operates when overdrive switch is set in "OFF" position.
- *2. Oil pressure is applied to both 2nd "apply" side and 3rd "release" side of band servo piston. However, because oil pressure area on the "release" side is greater than that on the "apply" side, brake band does not contract.
- *3. Oil pressure is applied to 4th "apply" side in condition *2 above, and brake band contracts.
- *4. A/T will not shift to 4th when overdrive switch is set in "OFF" position.
- O: Operates.
- •: Operates when throttle opening is less than 1/16. Engine brake activates.
- ■: Operates during "progressive" acceleration.
- □: Operates but does not affect power transmission.
- •: Operates when throttle opening is less than 1/16 but does not affect engine brake.









Control Valve Assembly and Accumulators Inspection

- 1. Drain fluid by removing drain plug.
- 2. Remove oil pan and gasket.
- 3. Remove oil strainer.
- 4. Disconnect harness connector.

5. Remove control valve assembly by removing fixing bolts.

Bolt length and location

Bolt symbol	l mm (in)
۲	33 (1.30)
B	45 (1.77)

Be careful not to drop manual valve out of valve body.

- 6. Remove solenoids and valves from valve body if necessary.
- 7. Remove terminal cord assembly if necessary.
- 8. Remove accumulator A, B, C and D by applying compressed air if necessary.

Hold each piston with rag.

9. Reinstall any part removed.

Always use new sealing parts.







Governor velve assembly

On-Vehicle Service

Rear Oil Seal Replacement

- 1. Remove propeller shaft from vehicle.
- 2. Remove rear oil seal.
- 3. Install rear oil seal.

Apply A.T.F. before installing.

4. Reinstall any part removed.

Parking Components Inspection

- 1. Remove propeller shaft from vehicle.
- 2. Support A/T assembly with a jack.
- 3. Remove rear engine mounting member.
- 4. Remove rear extension from transmission case.
- 5. Replace parking components if necessary.
- 6. Reinstall any part removed.

Always use new sealing parts.

Governor Valve

- 1. Remove propeller shaft from vehicle.
- 2. Support A/T assembly with a jack.
- 3. Remove rear engine mounting member from A/T assembly.
- 4. Remove rear extension from transmission case.

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Governor Valve (Cont'd)

- 5. Remove governor valve assembly.
- Inspect and repair governor valve assembly. Refer to "REPAIR FOR COMPONENT PARTS".

Kickdown cable adjustment



- 1. Slacken both lock nuts N1 & N2 to extreme ends of threaded outer cable Q.
- 2. Block injector pump throttle lever R at full-throttle.
- 3. Pull outer cable threaded portion Q fully in direction T.
- 4. Tighten nut N1 in direction U until it contacts back of bracket S.
- 5. Immediately slacken nut N1 by 1 to $1\frac{1}{2}$ turns.
- 6. Hold nut N1 with a spanner so that it does not move from position set in operation 5.
- 7. Tighten nut N2 until it contacts bracket S.
- 8. Fully tighten nut N2.
- 9. Unblock throttle lever R.
- Check stroke of kickdown cable between idle position P2 and full throttle position P1. This should be 41 mm ± 2 mm.



Kickdown cable adjustment (Cont'd)

If the kickdown cable is incorrectly adjusted the following problems may occur.

- If the kickdown cable full throttle position P1 is set towards direction T, the shift schedule will function as shown by line ① in illustration at left.
- If the kickdown cable idle position P2 is set towards direction U, the shift schedule will function as shown by line 2 in illustration at left.

It is possible to adjust the shift pattern to individual requirements by adjusting the cable by small increments. Never move the cable lock nuts by more that ½ turn at a time. Never move the adjustment by more than a total of 2 full turns in each direction from the original adjustment position. Transmission internal pressures are affected by running with the kickdown out of adjustment, resulting in serious and premature damage.

Note: Access to the kickdown cable adjustment is limited by the coded fuel valve that is part of the TX1 security system. The coded fuel valve must be removed for access.

Inhibitor Switch Adjustment

- 1. Remove manual control linkage from manual shaft of A/T assembly.
- 2. Set manual shaft of A/T assembly in "N" position.
- 3. Loosen inhibitor switch fixing bolts.





- Insert pin into adjustment holes in both inhibitor switch and manual shaft of A/T assembly as near vertical as possible.
- 5. Reinstall any part removed.
- 6. Check continuity of inhibitor switch. -Refer to "Electrical System".





Manual Control Linkage Adjustment

Move the selector lever from 'P' range to '1' range. You should be able to feel the detents in each range. The control should move smoothly and without resistance except for the operation of the detents.

Put the floor selector lever in 'N'.

Underneath the vehicle:

1. Slacken the lock nut at the ball end of the selector cable.

Manual Control Linkage Adjustment (Cont'd)

- Slide back the sleeve on the ball end of the selector cable and pull the ball housing off the ball.
- Ensure that the transmission side lever is in 'N' position. (See detail of Inhibitor switch adjustment on page 13.)
- 4. Turn ball housing on end of selector cable until it locates on ball on transmission side lever without resistance.
- 5. Refit the ball housing and ensure the sliding sleeve is fully in place.
- 6. Tighten the lock nut at the ball end of the selector cable.



Preliminary Check (Prior to Road Testing)

FLUID LEAKAGE CHECK

- 1. Clean area suspected of leaking, for example, mating surface of converter housing and transmission case.
- Start engine, apply foot brake, place selector lever in "D" range and wait a few minutes.
- 3. Stop engine.
- 4. Check for fresh leakage.

FLUID CONDITION CHECK





Fluid color	Suspected problem
Dark or black with burned odor	Wear of frictional material
Milky pink	Water contamination - Road water entering through filler tube or breather
Varnished fluid, light to dark brown and tacky	Oxidation - Over or under filling - Overheating

FLUID LEVEL CHECK

The transmission fluid should be at normal operating temperature with the vehicle standing level. Start the engine with the handbrake and footbrake applied. Run the engine for 2 to 3 minutes at idle speed, passing the selector lever through the complete range of positions two or three times, pausing for about 10 seconds in each position to ensure the transmission is fully primed.

Select 'P' (Park) position and keep the handbrake applied. Leave the engine running at idle speed, remove the dipstick (A) which is situated to the right hand side of the engine adjacent to the engine compartment rear bulkhead, and wipe it clean with a clean paper wiper. Reinsert the dipstick all the way, being careful to insert it in a position to allow it to manoeuvre the bend in the dipstick tube.

Remove the dipstick again and check the fluid level, which should be in the cross lined sector **(B)** marked on the 'HOT' side of the dipstick. If the level is near the low end of the sector, add small amounts of fluid of the correct specification through the dipstick tube until the level is to the high mark. Do not fill above the top of the cross hatched sector marked on the dipstick.

Road Testing

Perform road tests referring to "Symptom" chart. Refer to page 19.

"P" RANGE

- 1. Place selector lever in "P" range and start the engine. Stop the engine and repeat the procedure in all ranges, including neutral position.
- Stop vehicle on a slight upgrade and place selector lever in "P" range. Release parking brake to make sure vehicle remains locked.

"R" RANGE

Ø

- 1. Manually move selector lever from "P" or "R", and note shift quality.
- 2. Drive vehicle in reverse long enough to detect slippage or other abnormalities.



"N" RANGE

- 1. Manually move selector lever from "R" and "D" to "N" and note quality.
- Release parking brake with selector lever in "N" range. Lightly depress accelerator pedal to make sure vehicle does not move. (When vehicle is new or soon after clutches have been replaced, vehicle may move slightly. This is not a concern.)







Road Testing (Cont'd)

"D" RANGE

- 1. Manually shift selector lever from "N" to "D" range, and note shift quality.
- Using the shift schedule as a reference, drive vehicle in "D" range. Record respective vehicle speeds at which up-shifting and down-shifting occur. These speeds are to be read at three different throttle positions (light, half and full), respectively. Also determine the timing at which shocks are encountered during shifting and which clutches are engaged.
- Check to determine if shifting to overdrive gear cannot be made while O.D. control switch is "OFF".
- 4. When vehicle is being driven in the 65 to 80 km/h (40 to 50 MPH) range in "D₃" range at half to light throttle position, fully depress accelerator pedal to make sure it downshifts from 3rd to 2nd gear.
- When vehicle is being driven in the 35 to 45 km/h (22 to 28 MPH) ("D₂"- range) at half to light throttle position, fully depress accelerator pedal to make sure it downshifts from 2nd to 1st gear.

"2" RANGE

- 1. Shift to "2" range and make sure vehicle begins to move in "1st gear.
- 2. Increase vehicle speed to make sure it upshifts from "1st to 2nd gear.
- 3. Further increase vehicle speed. Make sure it does not upshift to 3rd gear.

Road Testing (Cont'd)

- 4. While driving vehicle at the 35 to 45 km/h (22 to 28 MPH) with throttle at half to light position ("2₂" range), fully depress accelerator pedal to make sure it downshifts from 2nd to 1st gear.
- Allow vehicle to run idle while in "2" range to make sure that it downshifts to "1st gear.
- Move selector lever to "D" range and allow vehicle to operate at 40 to 50 km/h (25 to 31 MPH). Then, shift to "2" range to make sure it downshifts to 2nd gear.

"1" RANGE

- Place selector lever in "1" range and accelerate vehicle. Make sure it does not shift from 1st to 2nd gear although vehicle speed increases.
- 2. While vehicle is being driven in "1" range, release accelerator pedal to make sure that engine compression acts as a brake.
- Place selector lever in "D" or "2" range and allow vehicle to run at 20 to 30 km/h (12 to 19 MPH). Then move selector lever to "1" range to make sure it downshifts to 1st gear.



SHIFT SCHEDULE

Road Testing (Cont'd)

ROAD TEST SYMPTOM CHART

Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle.

								: Va	lve	expe	cted	l to l	be m	alfu	nctio	ning	J
			-		-	_			— c	N VE	HICLE						►
		Oil level and oil quality	Control linkage Inhibibtor switch and wiring	6 HIII	Throttle wire	Line pressure		Control valve	4 th speed cut valve	Pressure regulator valve	Pressure modifier valve	1-2 shift valve	2-3 shift valve	3-4 shift valve	Accumulator control valve	3-2 downshift valve	2-3 throttle modifier valve
Sharp shocks in shifting fr	om "N" to "D" range	1	2		5	3	4	8									
	When shifting from 1^{st} to 2^{nd} or 2^{nd} to 3^{rd}	1	2	•	4	•	3	7									
	When shifting from 3 rd to 4 th	1	2		4		3	6									
Shift shocks	When shifting from D to 2 and 1 range. When O.D. switch is set from "ON" to "OFF"	1	2		4		3	5									
	When shifting from 2 nd to 1 st in "1" range	1	2	•	4		3	5									
	When shifting from 1 st to 2 nd	1	2		4		3	6									
Shift slippage when upshifting	When shifting from 2 nd to 3 rd	1	2		4	•	3	6									
	When shifting from 3 rd to 4 th	1	2		4		3	6									
	When shifting from 4 th to 2 nd	1	2		5		3	7									
Shift slippage with accelerator pedal depressed	When shifting from 4 th to 3 rd	1	2		4		3	6									
	When shifting from 4^{th} to 1^{st} and shifting from 3^{rd} to 1^{st}	1	2	·	5		3	7									
Poor power/acceleration	When vehicle starts	1	2		5		3	10									
	When upshifting	1	2		4		3	8									
	When shifting from "D" to "2" and "1" range	1	2	•	4	•	3	6									
No engine braking	When O.D. switch is set from "ON" to "OFF"	1	2		4		3	8									
	When shifitng from 2 nd to 1 st in "1"range	1	2	•	4	•	3	6									
	Too low a gear change point from 2^{nd} to 3^{rd} and from 3^{rd} to 2^{nd}	1	2		4		2	5									
Shift quality	Too high a gear change point from 2 nd to 3 rd and from 3 rd to 2 nd	1	2	•	4		2	5									
	Too low a gear change point from 2 nd to 1 st in "1" range	1	2	•	4	•	2	5									
	Too high a gear change point from 2 nd to 1 st in "1" range	1	2	•	4	•	2	5									

Road Testing (Cont'd)

-									ON	VEHI I	CLE											◀			_	OFF	VEH	CLE	_			
Lockup control valve	Throttle valve & dent valve	Manual valve	Kickdown modifier valve	1 st reducing valve	Overrun clutch reducing valve	3-2 timing clutch	Torque converter relief valve	4-2 sequence valve	Governor pressure	Governor valve	Primary governor valve	Secondary governor valv (1)	Secondary governor valve (2)	O.D. cancel solenoid	Lock-up cancel solenoid	Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R)	Ignition switch and starter motor	O.D.control switch and wiring	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse clutch	Brake band	Parking components
																6			7					9								
																	5	6										·				
																			5									8			7	
																									7			· .			6	
																													6			
																	5														7	•
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																			5						8			<u> </u>			7	
									4	11						6	8	9	7			12	13	14	15	17	18	19	20	21	16	•
																	5	6	7				9		10			12		13	11	•
									4	8				·			•	6	•			•		•	9		11	•		•	10	•
										•							•	5	•			•		•	7	8	•	•		•		•
									4	8				·			•	6	•			•		•		9	•	•				•
										•							•	5	•			•		•			•	7				•
														7		•		5			6	•		•				9		•		•
																•			•	•		•	•	•		•	•	7		8		•
									3	6				ŀ								•	•	•	•	•		ŀ.		•		•
									3	6				Ŀ						•		•	•	•	•			Ŀ		· .		•
									3	6				ŀ							•	•	+	•				ŀ		•		•
									3	6				· .		•				•								·				•

Road Testing (Cont'd)

Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle.



: Valve expected to be malfunctioning

		◀								ON VE	HICLE						▶
		Oil level and oil quality	Control linkage	Inhibibtor switch and wiring	Throttle wire	Engline idling rpm	Line pressure	Control valve	4 th speed cut valve	Pressure regulator valve	Pressure modifier valve	1-2 shift valve	2-3 shift valve	3-4 shift valve	Accumulator control valve	3-2 downshift valve	2-3 throttle modifier valve
	Failure to change gear from 4 th to 2 nd with accelerator pedal depressed	1			4		2	5									
	Failure to change gear from 3 rd to 2 nd with accelerator pedal depressed	1	•	·	4		2	5									
	Failure to change gear from 1 st to 2 nd in "D" and "2" range	1	•		4		2	5									
Shift quality	Vehicle does not start from "1 st " in "D" and "2" range	1	•	•	4		2	5									
	Failure to change gear to 3 rd and 4 th in "D" range	1	•	•	4		2	7									
	Changes gear to 1 st directly when selector lever is from "D" to "1"	1	•	·	4		2	5									
	Changes to gear to 2 nd in "1" range	1			4		2	5									
	Too high or low a change point when lock-up operates	1			4		2	5									
Lock-up quality	Lock-up point is extremely high or low	1			4		2	5									
	Torque converter does not lock-up	1			4		2	5									
	Lock-up is not released when accelerator pedal is released	1			4		2	5									
Engine does not s	start in "P" and "N" ranges		2	3													
Engine starts in r	anges other than "P" and "N" ranges		2	3													

Road Testing (Cont'd)

						•			-	ON	VEHI	CLE					•					-	◀				OFF	VEH	ICLE	_			
4.3 relay valve	Lockup control valve	Throttle valve & dent valve	Manual valve	Kickdown modifier valve	1st reducing valve	Overrun clutch reducing valve	3-2 timing clutch	Torque converter relief valve	4-2 sequence valve	Governor pressure	Governor valve	Primary governor valve	Secondary governor valv (1)	Secondary governor valve (2)	O.D. cancel solenoid	Lock-up cancel solenoid	Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R)	Ignition switch and starter motor	O.D.control switch and wiring	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way cl;utch	Overrun clutch	Low one-way clutch	Low & reverse clutch	Brake band	Parking components
										3	6																						•
										3	6																						
										3	6																						
										3	6																						
										3	8				6							5			•								
										3	6														•								
										3	6																						
										3	6																						
										3	6																						
										3	6												7										
																2																	
																					1												



Stall Testing

STALL TEST PROCEDURE

- 1. Check A/T and engine fluid levels. If necessary, add fluid.
- Warm up engine until engine oil and A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.

A.T.F. operating temperature:

50 –80° C (122 –176°)

- 3. Set parking brake and block wheels.
- 4. Install a tachometer where it can be seen by driver during test.

It is good practice to put a mark on point of specified engine speed on indicator.





5. Start engine, apply foot brake, and place selector lever in "D" range.



Stall Testing

- 6. Accelerate to wide-pen throttle gradually while applying foot brake.
- 7. Quickly note the engine stall revolution and immediately release throttle.

During test, never hold throttle wide-open for more than 5 seconds.

Stall revolution:

2,100 - 2,300 rpm

- 8. Shift selector lever to "N".
- 9. Cool off A.T.F.

Run engine at idle for at least one minute.

10. Perform stall tests in the same manner as in steps 5 through 9 with selector lever in "2", "1" and "R", respectively.



Stall Testing (Cont'd)

JUDGEMENT OF STALL TEST











Pressure Testing

- Location of line pressure test port
- Line pressure plugs are hexagon headed bolts.
- Always replace line pressure plugs as they are self-ealig bolts.

LINE PRESSURE TEST PROCEDURE

- 1. Check A/T and engine fluid levels. If necessary, add.
- Warm up engine until engine oil and A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.

A.T.F. operating temperature:

50 -80° C (122 -176°)

- 3. Install pressure gauge to line pressure port.
- D, 2 and 1 ranges

R range



SATE43A

Fault Diagnosis

Pressure Testing (Cont'd)

4. Set parking brake and block wheels.

Continue to depress brake pedal fully while line pressure test at stall speed is performed.

- 5. Start engine and measure line pressure at idle and stall speed.
- When measuring line pressure at stall speed, follow the stall test procedure.

Line pressure:

Engine	Line pressure kPa	(bar, kg/cm2, psi)
speed rpm	D, 2 and 1 ranges	R range
Idle	422 - 461 (4.22 - 5.61, 4.3, 4.7, 61 - 67)	667 – 706 (6.67 – 7.06, 6.8 – 7.2 97 – 102)
Stall	883 – 961 (8.83 – 9.61, 9.0 – 9.8 128 – 139)	1,393 – 1,471 (13.93 – 14.71, 14.2 – 15.0 202 – 213)

Judgement of Line Pressure Test

	Judgement	Suspected parts
	Line pressure is low in all ranges.	 Oil pump wear Control piston damage Pressure regulator valve or plug sticking Spring for pressure regulator valve damaged Fluid pressure leakage between oil strainer and pressure regulator valve
At idle	Line pressure is low in particular range.	 Fluid pressure leakage between manual valve and particular clutch. For example; If line pressure is low in "R" and "1" ranges but is
	Line pressure	 normal around low & reverse brake circuit. Mal-adjustment of throttle sensor Fluid temperature sensor damgaged Line pressure solenoid sticking Short circuit of line pressure solenoid circuit Pressure modifier valve or plug sticking Pressure regulator valve or plug sticking
At stall speed	Line pressure is low	 Mal-adjustment of throttle sensor Control piston damgaged Line pressure solenoid sticking Short circuit of line pressure solenoid circuit Pressure regulator valve or plug sticking Pressure modifier valve sticking Pilot valve sticking

Wiring Diagram

For details of wiring diagrams see Section 8, Electrical Wiring diagrams.

Electrical Components Inspection

OVERDRIVE CONTROL SWITCH

• Check continuity between two terminals

O.D. switch position	Continuity
ON	No
OFF	YEs

INHIBITOR SWITCH

Check continuity between terminals ①

 and ② between terminals ③ and ④, ⑤,
 ⑥, ⑦, ⑧, ⑨ while moving selector lever through each range.

Terminal No. Lever Position	0	0	3	4	6	6	Ø	8	9
Р	0-	ρ	0	ρ					
R			P		p				
N	6	þ	0			φ			
D			9				P		
2			0					P	
1			9						Ą







Electrical Components Inspection (Cont'd)

O.D. CANCEL SOLENOID

 Check resistance between terminals of each solenoid.
 Resistance: 20 – 30W



Solenoid	Terminal No.	Resistance		
O.D. cancel solenoid	1 - 2	20 - 30Ω		

Removal

- Remove fluid charging pipe from A/T assembly.
- Remove oil cooler pipe from A/T assembly.
- Plug up openings such as the fluid charging pipe hole, etc.
- Remove propeller shaft..
- Insert plug into rear oil seal after removing rear propeller shaft.
- Be careful not to damage spline, sleeve yoke and rear oil seal.
- Remove speedometer cable from A/T assembly.

Removal (Cont'd)

- Remove A/T control linkage from selector lever.
- Disconnect A/T harness connectors.
- Remove starter motor.
- Remove bolts securing torque converter to drive plate.
 Remove the bolts by turning crankshaft.
- Support A/T assembly with a jack.
- Remove rear mounting bracket from body and A/T assembly.
- Remove bolts securing AIT assembly to engine.
- Pull A/T assembly backwards.
- Secure torque converter to prevent it from dropping.
- Secure A/T assembly to a jack.
- Slant and lower A/T assembly.











Installation

Drive plate runout

Maximum allowable runout:

0.5 mm (0.020 in)

If this runout is out of specification, replace drive plate with ring gear.

 When connecting torque converter to transmission, measure distance "A" to be certain that they are correctly assembled.

Distance "A":

26.0 mm (1.024 in) or more

- Install converter to drive plate.
- After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.
- Tighten bolts securing transmission.
 - A Bolt (4) Gearbox to Engine 44 - 55 lb/ft
 - B Bolt (2) Starter Motor 30 - 38 lb/ft
 - C Bolt and Nut (2) Gearbox to Gusset 36 - 45 lb/ft
 - D Bolt (2) Gearbox to Gusset 36 - 45 lb/ft
 - E Screw (2) Sandwich Plate to Dust Cover 6 - 8 lb/ft

Not Shown

Bolt (4) Gusset to Engine 36 - 45 lb/ft

Bolt (4) Drive Plate to Torque Converter 32 - 43 lb/ft

Installation (Cont'd)

- Reinstall any part removed.
- Check fluid level in transmission.
- Move selector lever through all position to be sure that transmission operates correctly.
 With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R". A slight shock should be felt by hand gripping selector each time transmission is shifted.
- Perform road test. Refer to "ROAD TESTING".



Major Overhaul



Major Overhaul (Cont'd)


Major Overhaul (Cont'd)

Oil Channel



Major Overhaul (Cont'd)

Location of Needle Bearings, Thrust Washers and Snap Rings











Dismantling

1. Remove torque converter by holding it firmly and turning while pulling straight out.

- 2. Check torque converter one-way clutch.
- a. Insert Tool into spline of one-way clutch inner race.
- b. Hook bearing support unitized with oneway clutch outer race with suitable wire.
- c. Check that one-way clutch inner race rotates only clock-wise with Tool while holding bearing support with wire.
- 3. Remove inhibitor switch from transmission case.

- 4. Remove oil pan.
- a. Drain A.T.F. from rear extension.
- b. Raise oil pan by placing wooden blocks under converter housing and rear extension.
- c. Separate the oil pan and transmission case.
- Always place oil pan straight down so that foreign particles inside will not move.









5. Place transmission into Tool with the control valve facing up.

- 6. Check oil pan and oil strainer for accumulation of foreign particles.
- If materials of clutch facing are found, clutch plates may be worn.
- If metal filings are found, clutch plates, brake bands, etc may be worn.
- If aluminum filings are found, bushings or aluminum cast parts may be worn.

In above cases, replace torque converter and check unit for cause of particle accumulation.

7. Remove lock-up cancel solenoid and O.D. cancel solenoid connectors.

- 8. Remove oil strainer.
- a. Remove oil strainer from control valve assembly.Then remove O-ring from oil strainer.







b. Check oil strainer screen for damage.

- 9. Remove control valve assembly.
- a. Straighten terminal clips to free terminal cords then remove terminal clips.

b. Remove bolts (A) and (B), and remove control valve assembly from_transmission.

Bolt	Length (⁰)		
۲	33 mm (1.30 in)		
B	45 mm (1.77 in)		









c. Remove manual valve from control valve assembly.

- 10. Remove terminal cord assembly from transmission case while pushing on stopper.
- Be careful not to damage cord.
- Do not remove terminal cord assembly unless it is damaged.
- 11. Remove converter housing.
- a. Remove converter housing from transmission case.

- b. Remove O-rings from converter housing.
- c. Remove traces of sealant.
- Be careful not to scratch converter housing.









12. Remove O-ring from input shaft.

- 13. Remove oil pump assembly.
- a. Attach Tool to oil pump assembly and extract it evenly from transmission case.

- b. Remove O-ring from oil pump assembly.
- c. Remove traces of sealant from oil pump housing.
- Be careful not to scratch pump housing.

d. Remove needle bearing and thrust washer from oil pump assembly.









14. Remove input shaft and oil pump gasket.

- 15. Remove brake band and band strut.
- a. Loosen lock nut and remove band servo anchor end pin from transmission case.

b. Remove brake band and band strut from transmission case.

c. Hold brake band in a circular shape with clip.









- 16. Remove front side clutch and gear components.
- a. Remove clutch pack (reverse clutch, high clutch and front sun gear) from transmission case.

- b. Remove front bearing race from clutch pack.
- c. Remove rear bearing race from clutch pack.

d. Remove front planetary carrier from transmission case.

- e. Remove front needle bearing from front planetary carrier.
- f. Remove rear bearing from front planetary carrier.









g. Remove rear sun gear from transmission case.

- 17. Remove rear extension.
- a. Remove rear extension from transmission case.
- b. Remove rear extension gasket from transmission case.
- c. Remove oil seal from rear extension.
- Do not remove oil seal unless it is to be replaced.

- 18. Remove output shaft, governor valve assembly and parking gear.
- a. Remove governor valve assembly.









b. Remove rear snap ring frim output shaft.

- c. Slowly push output shaft all the way forward.
- Do not use excessive force.
- d. Remove snap ring from output shaft

- e. Remove output shaft and parking gear as a unit from transmission case.
- f. Remove parking gear from output shaft.

g. Remove needle bearing from transmission case.

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Dismantling (Cont'd)

- 19. Remove rear side clutch and gear components.
- a. Remove front internal gear.

b. Remove bearing race from front internal gear.

c. Remove needle bearing from rear internal gear.

d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.









e. Remove needle bearing from overrun clutch hub.

f. Remove overrun clutch hub from rear internal gear and forward clutch hub.

g. Remove thrust washer from overrun clutch hub.

h. Remove forward clutch assembly from transmission case.



- 20. Remove band servo and accumulator components.
- a. Remove band servo retainer from transmission case.

- b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
- Hold piston with a rag and gradually direct air to oil hole.
- c. Remove return springs.
- d. Remove springs from accumulator pistons B, C and D.
- e. Apply compressed air to each oil hole until piston comes out.
- Hold piston with a rag and gradually direct air to oil hole.

Identification of accumulator pistons	А	В	С	D
Identification of Oil holes	а	b	С	d

f. Remove O-ring from each piston.



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С

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- 21. Remove kickdown cable components if necessary.
- a. Remove kickdown cable from A/T assembly.

- b. Remove internal kickdown lever shaft E-ring.
- c. Remove return spring.
- d. Remove throttle lever.

e. Remove internal kickdown lever shaft retaining pin and throttle lever shaft.

- 22. Remove manual shaft components, if necessary.
- Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.









b. Remove retaining pin from transmission case.

c. While pushing detent spring down, remove manual plate and parking rod from transmission case.

d. Remove manual shaft from transmission case.

e. Remove spacer and detent spring from transmission case.

f. Remove oil seal from transmission case.



Oil Pump









Disassembly

- 1. Loosen bolts in numerical order and remove oil pump cover.
- 2. Remove rotor, vane rings and vanes.
- Inscribe a mark on back of rotor for identification of foreaft direction when reassembling rotor. Then remove rotor.
- 3. While pushing on cam ring remove pivot pin.
- Be careful not to scratch oil pump housing.









Oil Pump (Cont'd)

- 4. While holding cam ring and spring lift out cam ring spring.
- Be careful not to damage oil pump housing.
- Hold cam ring spring to prevent it from jumping.
- 5. Remove cam ring and cam ring spring from oil pump housing.

6. Remove pivot pin from control piston and remove control piston assembly.

- 7. Remove oil seal from oil pump housing.
- Be careful not to scratch oil pump housing.





Oil Pump (Cont'd)

INSPECTION

Oil pump cover, rotor, vanes, control piston, side seals, camring and friction ring

• Check for wear or damage.

Side clearances

- Measure side clearances between end of oil pump housing and cam ring, rotor, vanes and control piston in at least four places along their circumferences.
 Maximum measured values should be within specified ranges.
- Before measuring side clearance, check that friction rings, O-ring, control piston side seals and cam ring spring are removed.



Standard clearance (Cam ring, rotor, vanes and control piston):

Refer to S.D.S.

 If not within standard clearance, replace oil pump assembly except oil pump cover assembly.

Seal ring clearance

• Measure clearance between seal ring and ring groove.

Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Wear limit:

0.25 mm (0.0098 in)

• If not within wear limit, replace oil pump cover assembly.









Oil Pump (Cont'd)

ASSEMBLY

- 1. Drive oil seal into oil pump housing.
- Apply A.T.F. to outer periphery and lip surface.
- 2. Install cam ring in oil pump housing by the following steps.
- a. Install side seal on control piston.
- Pay attention to its direction Black surface goes toward control piston.
- Apply petroleum jelly to side seal.
- b. Install control piston on oil pump.
- c. Install O-ring and friction ring on cam ring.
- Apply petroleum jelly to O-ring.

d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing.







Oil Pump (Cont'd)

e. While pushing on cam ring install pivot pin.

- 3. Install rotor, vanes and vane rings.
- Pay attention to direction of rotor.

- 4. Install oil pump housing and oil pump cover.
- Wrap making tape around splines of oil pump cover assembly to protect seal.
 Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.
- b. Tighten bolts in a criss-cross pattern.



Oil Pump (Cont'd)

- 5. Install seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly to a close fit.
- Seal rings come in two different diameters. Check fit carefully in each groove.

Small dia. Seal ring:

No mark

Large dia. Seal ring:

Yellow mark in area shown by arrow

 Do not spread gap of seal ring excessively while instaling. It may deform ring.

Control Valve Assembly











Control Valve Assembly (Cont'd)

DISASSEMBLY

- 1. Remove solenoids.
- a. Remove O.D. cancel solenoid and side plate from lower body.
- b Remove O-ring from solenoid.
- c. Remove lock-up cancel solenoid from upper body.
- d. Remove O-ring from solenoid.

Note: This valve is not functional in Lti application.

- 2. Dissassemble upper and lower bodies.
- a. Place upper body facedown, and remove bolts, reamer bolts and support plates.
- b. Remove lower body, separator plate and separate gasket as a unit from upper body.
- Be careful not to drop orifice check valve, spring and steel balls.
- c. Place lower body facedown, and remove seperator plate.
- d. Remove orifice check valve and orifice check spring.









Control Valve Assembly (Cont'd)

e. Check to see that steel balls are properly positioned in upper body and then remove them from upper body.

INSPECTION

Lower and upper bodies

• Check to see that there are pins and retainer plates in lower body.

- Check to see that there are pins and retainer plates in upper body.
- Be careful not to lose these parts.

- Check to make sure that oil circuits are clean and free from damage.
- Check tube brackets and tube connectors for damage.









Control Valve Assembly (Cont'd)

Separator plates

• Check to make sure that separator plate is free of damage and not deformed and oil holes are clean.

O.D. cancel solenoid

- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Electrical Components Inspection".

ASSEMBLY

- 1. Install upper and lower bodies.
- a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

b. Install reamer bolts from bottom of upper body and install separate gaskets.





Control Valve Assembly (Cont'd)

c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve.

D: mm (in)

- ① 1.1 (0.043)
- ② 2.0 (0.079)
- d. Install separator plates on lower body.
- e. Install and temporarily tighten support plates and tube brackets.









Control Valve Assembly (Cont'd)

- f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.
- Be careful not to dislocate or drop steel balls, orifice check spring and orifice check valve.
- g. Install and temporarily tighten bolts and tube brackets in their proper locations.

Bolt length and location:

Bolt symbol Item	а	b
Bolt length mm (in)	45 (1.77)	33 (1.30)

- 2. Install solenoids.
- a. Attach O-ring and install O.D. cancel solenoid and side plates onto lower body.

- b. Attach O-ring and install lock-up cancel solenoid onto upper body.
- 3. Tighten bolt.

Note: This valve is not functional in Lti application.

Control Valve Upper Body





Control Valve Upper Body (Cont'd)

DISASSEMBLY

- 1. Remove valves at parallel pins.
- Do not use a magnetic tool.
- a. Use a wire paper clip to push out parallel pins.

- b. Remove parallel pins while pressing their corresponding plugs and sleeves.
- Remove plug slowly to prevent internal parts from jumping out.

- c. Place mating surface of valve facedown, and remove internal parts.
- If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.
- Be careful not to drop or damage valves and sleeves.









Control Valve Upper Body (Cont'd)

- 2. Remove valves at retainer plates.
- a. Pry out retainer plate with wire paper clip.
- b. Remove retainer plates while holding spring.

- c. Place mating surface of valve facedown, and remove internal parts.
- If a valve is hard to remove, lightly tap valve body with a soft hammer.
- Be careful not to drop or damage valves, sleeves, etc.

INSPECTION

Valve springs

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.
- Numbers of each valve spring listed in table below are the same as those in the figure, page 65.

Control Valve Upper Body (Cont'd)

Inspection standard

Unit: mm (in)

	Item	Part No.	Q	D
Parts				
1	4 th speed cut valve spring	31756-48X09	23.5 (0.925)	7.0(0.276)
2	Pressure regulator valve spring	31742-48X16	48.5 (1.909)	12.1 (0.476)
3	Pressure modifier valve spring	31742-48X13	40.83 (1.6075)	8.0 (0.315)
4	1-2 shift valve spring	31762-48X00	43.4 (1.709)	6.0 (0.236)
5	2-3 shift valve spring	31762-48X01	42.7 (1.681)	9.0(0.354)
6	3-4 shift valve spring	31762-48X06	44.03 (1.7335)	8.0(0.315)
\bigcirc	Accumulator control valve spring	31742-48X02	29.3 (1.154)	8.0 (0.315)
8	2-3 throttle modifier valve spring	31742-41X21	33.0 (1.299)	6.5 (0.256)
9	4-2 throttle modifier valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
10	Lock-up control valve spring	31742-48X07	20.0 (0.787)	5.45 (0.2146)

Replace valve springs if deformed or fatigued. **Control valves**

• Check sliding surfaces of valves, sleeves and plugs.

ASSEMBLY

1. Lubricate the control valve body and all valves with A.T.F. Install control valves by sliding them carefully into their bores.

Be careful not to scratch or damage valve body.

• Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position.

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Vinyl tape







Control Valve Upper Body (Cont'd)

Accumulator control plug

- Align protrusion of accumulator control sleeve with notch in plug.
- Align parallel pin groove in plug with parallel pin, and install accumulator control valve.
- 2. Install parallel pins and retainer plates.

- While pushing plug, install parallel pin.
- Insert retainer plate while pushing spring.








Control Valve Lower Body (Cont'd)

DISASSEMBLY

- 1. Remove valves at parallel pins.
- 2. Remove valves at retainer plates. For removal procedures, refer to "DISASSEMBLY" of Control Valve Upper Body.

INSPECTION

Valve springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.
- Numbers of each valve spring listed in table below are the same as those in the figure in AT-55.

Inspection standard

Unit: mm (in)

	Item	Part No.	Q	D
Parts				
1	Throttle valve & detent valve spring	31802-48X02	34.23 (1.3476)	11.0(0.433)
2	Kickdown modifier valve spring	31756-48X01	45.3 (1.783)	7.0 (0.276)
3	1 st reducing valve spring	31756-48X08	29.7 (1.169)	7.2 (0.283)
4	Overrun clutch reducing valve spring	31742-48X04	45.0 (1.772)	7.45 (0.2933)
5	Overrun clutch reducing valve spring	31742-48X05	31.0 (1.220)	5.2 (0.205)
6	3-2 shift valve spring	31742-48X15	23.0 (0.906)	7.0 (0.276)
7	Torque converter relief valve spring	31742-48X23	38.0 (1.496)	9.0 (0.354)
8	4-2 throttle modifier valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)

Control Valve Lower Body (Cont'd)

 Replace valve springs if deformed or fatigued.

Control valves

• Check sliding surfaces of control valves, sleeves and plugs for damage.



 Install control valves. For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body.



Governor Valve Assembly



Governor Valve Assembly (Cont'd)

INSPECTION

Governor valves and valve body

• Check governor valves and valve body for indication of burning or scratches.

Valve springs

 Measure free length and outer diameter of each valve spring. Also check for damage or deformation.

Inspection standard

Unit: mm (in)

Parts	Item	Part No.	٤	D
1	Governor valve spring	31742-48X11	19.1 (0.752)	9.05 (0.3563)
2	Governor valve spring I	31742-48X09	30.58 (1.2039)	9.2 (0.362)
3	Governor valve spring II	31742-48X10	16.79 (0.6610)	9.0 (0.354)





Oil Distributor

INSPECTION

• Check contacting surface of oil distributor and ring groove areas for wear.



Oil Distributor (Cont'd)

• Measure clearance between seal ring and ring groove.

Standard clearance:

0.15 - 0.40 mm (0.0059 - 0.0157 in)

Wear limit:

0.40 mm (0.0157 in)

Reverse Clutch











Reverse Clutch (Cont'd)

DISASSEMBLY

- 1. Remove reverse clutch assembly from clutch pack.
- 2. Check operation of reverse clutch.
- a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
- b. Check to see that retaining plate moves to snap ring.
- c. If retaining plate does not move to snap ring, D-ring or oil seal may be damaged or fluid may be leaking at piston check ball.
- 3. Remove drive plates, driven plates, retaining plate, dish plate and snap ring.

- 4. Remove snap ring from clutch drum while compressing clutch springs.
- Do not expand snap ring excessively.
- 5. Remove spring retainer and return spring.



Reverse Clutch (Cont'd)

- 6. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed.
- Do not apply compressed air abruptly.
- 7. Remove D-ring and oil seal from piston.

INSPECTION

Reverse clutch snap ring and spring retainer

• Check for deformation, fatigue or damage.

Reverse clutch return springs

 Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard

Part No.	Q	D
31505-41X02	19.69 (0.7752)	11.6 (0.457)

Reverse clutch drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate

Standard value

1.90 - 2.05 mm (0.0748 - 0.0807 in) Wear limit 1.80 mm (0.0709 in)

If not within wear limit, replace.





Reverse clutch dish plate

• Check for deformation or damage.



Reverse Clutch (Cont'd)

Reverse clutch piston

- Shake piston to assure that balls are not seized.
- Apply compressed air to check ball oil hole opposite the return spring to assure that there is no air leakage.
- Also apply compressed air to oil hole on return spring side to assure that air leaks past ball.

ASSEMBLY

- 1. Install D-ring and oil seal on piston.
- Apply A.T.F. to both parts.

- Install piston assembly by turning it slowly and evenly.
 - Apply A.T.F. to inner surface of drum.













Reverse Clutch (Cont'd)

3. Install return springs and spring retainer.

4. Install snap ring while compressing clutch springs.

• Do not align snap ring gap with spring retainer stopper.

5. Install drive plates, driven plates, retaining plate and dish plate.





Reverse Clutch (Cont'd)

6. Install snap ring.

7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance:

Standard

0.5 - 0.8 mm (0.020 - 0.031 in)

Allowable limit

1.2 mm (0.047 in)

Retaining plate:

Refer to S.D.S.

 Check operation of reverse clutch. Refer to "DISASSEMBLY" of Reverse Clutch.



High Clutch



Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception:

• Check of high clutch operation









High Clutch (Cont'd)

Removal and installation of return spring

• Inspection of high clutch return springs

Inspection standard

Unit: mm (in)

Part No.	Q	D
31505-21X03	22.06 (0.8685)	11.6 (0.457)

 Inspection of high clutch drive plate Thickness of drive plate:

Standard

1.52 - 1.67 mm (0.0598 - 0.0657 in)

Wear limit

1.40 mm (0.0551 in)

 Measurement of clearance between retaining plate and snap ring

Specified clearance:

Standard

1.8 - 2.2 mm (0.071 - 0.087 in)

Allowable limit

2.8 mm (0.110 in)

Retaining plate:

Refer to S.D.S.

For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section. Direction of dish plate Snap ring Direction of dish plate Retaining plate * Snap ring Drive plate ATF - Retaining plate * Driven plate Drive plate ATF Dish plate Driven plate Dish plate Overrun clutch plate Forward clutch drum ATF Forward clutch plate D-ring CATE Oil seal & ATF D-ring ATE Forward clutch piston Spring Snap ring 🐼 retainer Oil seal 🕄 ATE Return spring-Overrun clutch piston -Direction of oil seal Direction of oil seal Driven plate Driven plate Drive plate-1.1 Drive plate 3 ATE Apply A.T.F. : Select with proper thickness. SAT950F

Forward and Overrun Clutches









Forward and Overrun Clutches (Cont'd)

Service procedures for forward and overrun clutches are essentially the same as those for reverse clutch, with the following exception:

- Check of forward clutch operation.
- Check of overrun clutch operation.

 Removal of forward clutch drum Remove forward clutch drum from transmission case by holding snap ring.

- Removal of forward clutch and overrun clutch pistons
- 1. While holding overrun clutch piston, gradually apply compressed air to oil hole.



Forward and Overrun Clutches (Cont'd)

2. Remove overrun clutch from forward clutch.

Removal and installation of return springs

 Inspection of forward clutch and overrun clutch return springs

Inspection standard

Unit: mm (in)

Part No.	Q	D
31505-41X01	35.77 (1.4083)	9.7 (0.382)

• Inspection of forward clutch drive plate

Thickness of drive plate:

Standard

1.90 - 2.05 mm (0.0748 - 0.0807 in)

Wear limit

1.80 mm (0.0709 in)

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Forward and Overrun Clutches (Cont'd)

• Inspection of overrun clutch drive plate

Thickness of drive plate:

Standard

1.90 - 2.05 mm (0.0748 - 0.0807 in)

Wear limit

1.80 mm (0.0709 in)

- Installation of forward clutch piston and overrun clutch piston
- 1. Install forward clutch piston by turning it slowly and evenly.
- Apply A.T.F. to inner surface of clutch drum.
- Align notch in forward clutch piston with groove in forward clutch drum.





Forward and Overrun Clutches (Cont'd)

- 2. Install overrun clutch by turning it slowly and evenly.
- Apply A.T.F. to inner surface of forward clutch piston.
- Measurement of clearance between retaining plate and snap ring of overrun clutch

Specified clearance:

Standard

1.0 - 1.4 mm (0.039 - 0.055 in)

Allowable limit

2.0 mm (0.079 in)

Retaining plate:

Refer to Service Data and Specifications.

Measurement of clearance between retaining plate and snap ring of forward clutch

Specified clearance:

Standard

0.45 - 0.85 mm (0.0177 - 0.0335 in)

Allowable limit

Refer to Service Data and Specifications.

Retaining plate:

Refer to Service Data and Specifications.



Low & Reverse Brake - RL4R01A





DISASSEMBLY

- 1. Check operation of low & reverse brake.
- a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
- b. Check to see that retaining plate moves to snap ring.
- c. If retaining plate does not move to snap ring, D-ring or oil seal may be damaged or fluid may be leaking at piston check ball.
- 2. Remove snap ring, low & reverse brake drive plates, driven plates and dish plate.







R : Free length

Repair of Component Parts

Low & Reverse Brake (Cont'd)

 Remove low one-way clutch inner race, spring retainer and return spring from transmission case.

- 4. Remove seal rings from low one-way clutch inner race.
- 5. Remove needle bearing from low one-way clutch inner race.

- 6. Remove low & reverse brake piston using compressed air.
- 7. Remove oil seal and D-ring from piston.

INSPECTION

Low & reverse brake snap ring and spring retainer

• Check for deformation, or damage.

Low & reverse brake return springs

• Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard

Unit: mm (in)

Part No.	Q	D

31521-21X00 23.7 (0.933) 11.6 (0.457)



Low & Reverse Brake (Cont'd)

Low & reverse brake drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

Standard value

1.90 - 2.05 mm (0.0748 - 0.0807 in)

Wear limit

1.8 mm (0.071 in)

• If not within wear limit, replace.

Low one-way clutch inner race

• Check frictional surface of inner race for wear or damage.



- Install a new seal rings onto low one-way clutch inner race.
- Be careful not to expand seal ring gap excessively.
- Measure seal ring-to-groove clearance.

Inspection standard:

Standard value

0.10 - 0.25 mm (0.0039 - 0.0098 in) Allowable limit 0.25 mm (0.0098 in)



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Low & Reverse Brake (Cont'd)

• If not within allowable limit, replace low one-way clutch inner race.

ASSEMBLY

- 1. Install bearing onto one-way clutch inner race.
- Pay attention to its direction Black surface goes to rear side.
- Apply petroleum jelly to needle bearing.
- 2. Install oil seal and D-ring onto piston.
- Apply A.T.F. to oil seal and D-ring.



D-ring ATF)

- 3. Install piston by rotating it slowly and evenly.
- Apply A.T.F. to inner surface of transmission case.



T.P









Low & Reverse Brake (Cont'd)

4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.

- Install dish plate low & reverse brake drive plates, driven plates and retaining plate.
- 6. Install snap ring on transmission case.

7. Check operation of low & reverse brake clutch piston. Refer to "DISASSEMBLY".

8. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Low & Reverse Brake (Cont'd)

Specified clearance:

Standard

0.7 - 1.1 mm (0.028 - 0.043 in)

Allowable limit

2.3 mm (0.091 in)

Retaining plate:

Refer to Service and Data Specification.

- 9. Install low one-way clutch inner race seal ring.
- Apply petroleum jelly to seal ring.
- Make sure seal rings are pressed firmly into place and held by petroleum jelly.

Forward Clutch Drum Assembly













Forward Clutch Drum Assembly (Cont'd)

DISMANTLING

- 1. Remove snap ring from forward clutch drum.
- 2. Remove side plate from forward clutch drum.

3. Remove low one-way clutch from forward clutch drum.

4. Remove snap ring from forward clutch drum.





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Repair of Component Parts

Forward Clutch Drum Assembly (Cont'd)

5. Remove needle bearing from forward clutch drum.

INSPECTION

Forward clutch drum

- Check spline portion for wear or damage.
- Check frictional surfaces of low one-way clutch and needle bearing for wear or damage.

Needle bearing and low one-way clutch

• Check frictional surface for wear or damage.

ASSEMBLY

1. Install needle bearing in forward clutch drum.



Forward Clutch Drum Assembly (Cont'd)

2. Install snap ring onto forward clutch drum.

3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.

• Install low one-way clutch with flange facing rearward.

- 4. Install side plate onto forward clutch drum.
- 5. Install snap ring onto forward clutch drum.

SAT887A

Rear Internal Gear and Forward Clutch Hub





DISMANTLING

1. Remove rear internal gear by pushing forward clutch hub forward.



2. Remove thrust washer from rear internal gear.



Rear Internal Gear and Forward Clutch Hub (Cont'd)

3. Remove snap ring from forward clutch hub.

4. Remove end bearing.

5. Remove forward one-way clutch and end bearing as a unit from forward clutch hub.

6. Remove snap ring from forward clutch hub.


Rear Internal Gear and Forward Clutch Hub (Cont'd)

INSPECTION

Rear internal gear and forward clutch hub

- Check gear for excessive wear, chips or cracks.
- Check frictional surfaces of forward oneway clutch and thrust washer for wear or damage.
- Check spline for wear or damage.

Snap ring and end bearing

• Check for deformation or damage.



ASSEMBLY

- 1. Install snap ring onto forward clutch hub.
- 2. Install end bearing.











Rear Internal Gear and Forward Clutch Hub (Cont'd)

- 3. Install forward one-way clutch onto clutch hub.
- Install forward one-way clutch with flange facing rearward.
- 4. Install end bearing.
- 5. Install snap ring onto forward clutch hub.
- 6. Install thrust washer onto rear internal gear.
- Apply petroleum jelly to thrust washer.
- Securely insert pawls of thrust washer into holes in rear internal gear.
- 7. Position forward clutch hub in rear internal gear.

8. After installing, check to assure that forward clutch hub rotates clockwise.







DISMANTLING

- 1. Block one oil hole in O.D. servo piston retainer and the center hole in O.D. band servo piston.
- 2. Apply compressed air to the other oil hole in piston retainer to remove O.D. band servo piston from retainer.
- 3. Remove D-ring from O.D. band servo piston.
- 4. Remove band servo piston assembly from servo piston retainer by pushing it forward.



SAT912A





Repair of Component Parts

Band Servo Piston Assembly (Cont'd)

- 5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.
- 6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston.

7. Remove E-ring from band servo piston.

- 8. Remove servo cushion spring retainer from band servo piston.
- 9. Remove D-rings from band servo piston.
- 10. Remove O-rings from servo piston retainer.









Band Servo Piston Assembly (Cont'd)

INSPECTION

Pistons, retainers and piston stem

• Check frictional surfaces for abnormal wear or damage.

Return springs

Check for deformation or damage.
Measure free length and outer diameter.

Inspection standard

Unit: mm (in)

Parts	Free length	Outer diameter
Spring A	45.6 (1.795)	34.3 (1.350)
Spring B	53.8 (2.118)	40.3 (1.587)
Spring C	29.7 (1.169)	27.6 (1.087)

ASSEMBLY

- 1. Install O-rings onto servo piston retainer.
- Apply A.T.F. to O-rings.
- Pay attention to position of each Oring.
- 2. Install servo cushion spring retainer onto band servo piston.





SAT912A



Repair of Component Parts

Band Servo Piston Assembly (Cont'd)

3. Install E-ring onto servo cushion spring retainer.

- 4. Install D-rings onto band servo piston.
- Apply A.T.F. to D-rings.

5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.

 Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.







Band Servo Piston Assembly (Cont'd)

- Install band servo piston assembly onto servo piston retainer by pushing it inward.
- 8. Install D-ring on O.D. band servo piston.
- Apply A.T.F. to D-ring.

9. Install O.D. band servo piston onto servo piston retainer by pushing it inward.

Parking Pawl Components





DISMANTLING

1. Slide return spring to the front of rear extension flange.



- 2. Remove return spring, pawl spacer and parking pawl from rear extension.
- 3. Remove parking pawl shaft from rear extension.





SAT930A



Repair of Component Parts

Parking Pawl Components (Cont'd)

4. Remove parking actuator support and rod guide from rear extension.

INSPECTION

Parking pawl and parking actuator support

• Check contact surface of parking rod for wear.

ASSEMBLY

- 1. Install rod guide and parking actuator support onto rear extension.
- 2. Insert parking pawl shaft into rear extension.
- 3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.



Parking Pawl Components (Cont'd)

4. Bend return spring upward and install it onto rear extension.



Assembly

- 1. Install manual shaft components.
- a. Install oil seal onto manual shaft.
- Apply A.T.F. to oil seal.
- Wrap threads of manual shaft with masking tape.
- b. Insert manual shaft and oil seal as a unit into transmission case.
- c. Remove masking tape.
- d. Push oil seal evenly and install it onto transmission case.





e. Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left.

Assembly (Cont'd)

f. Install detent spring and spacer.

g. While pushing detent spring down, install manual plate onto manual shaft.

h. Install lock nuts onto manual shaft.

- 2. Install throttle lever components.
- a. Install throttle lever shaft.
- Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left.

Retaining pin

SAT148C





5 mm (0.20 in)

Throttle lever shaft 5

Assembly (Cont'd)

C. Install internal kickdown lever, return spring, spring retainer and E-ring.

d. Install kickdown cable.

Apply A.T.F. to O-ring.

- 3. Install accumulator piston.
- Install O-rings onto accumulator piston. а.
- Apply A.T.F. to O-rings.

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- O-ring (ATF) SAT150C Front 🔿 Accumulator Accumulator piston B piston D
- Accumulator Accumulator piston A piston C





Assembly (Cont'd)

Accumulator piston O-rings

Unit: mm (in)

Accumulat or	Α	В	С	D
Small diameter end	29 (1.14)	26.9 (1.059)	39.4 (1.551)	29 (1.14)
Large diameter end	39.4 (1.551)	44.2 (1.740)	44.2 (1.740)	39.4 (1.551)

b. Install return spring for accumulator A onto transmission case.

Free length of return spring

Unit: mm (in)

Accumulator	А	
Free length	43 (1.69)	

- c. Install accumulator pistons A, B, C and D.
- Apply A.T.F. to transmission case.



Accumulator

Accumulator piston C

piston B

SAT938A

Accumulator

piston D

- 4. Install band servo piston.
- a. Install return springs onto servo piston.

Accumulator

piston A

SAT941A









Assembly (Cont'd)

- b. Install band servo piston onto transmission case.
- Apply A.T.F. to O-ring of band servo piston and transmission case.
- c. Install gasket for band servo onto transmission case.
- d. Install band servo retainer onto transmission case.

- 5. Install rear side clutch and gear components.
- a. Place transmission case in vertical position.

b. Slightly lift forward clutch drum assembly and slowly rotate it clockwise until its hub passes fully over the clutch inner race inside transmission case.









Assembly (Cont'd)

Check to be sure that rotation direction of forward clutch assembly is correct.

- d. Install thrust washer onto front of overrun clutch hub.
- Apply petroleum jelly to the thrust washer.
- Insert pawls of thrust washer securely into holes in over-run clutch hub.
- Install overrun clutch hub onto rear e. internal gear assembly.

- f. Install needle bearing onto rear of overrun clutch hub.
- Apply petroleum jelly to needle bearing.

C.

SAT949A







Assembly

Assembly (Cont'd)

g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.

h. Place transmission case into horizontal position.

i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.

- j. Install needle bearing onto rear internal gear.
- Apply petroleum jelly to needle bearing.





Assembly (Cont'd)

- k. Install bearing race onto rear of front internal gear.
- Apply petroleum jelly to bearing race.
- Securely engage pawls of bearing race with holes in front internal gear.
- I. Install front internal gear on transmission case.

Adjustment

When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted.

I tem Part name	Total end play	Reverse clutch end play
Transmission case	•	•
Low one-way clutch inner race	•	●
Overrun clutch hub		•
Rear internal gear		•
Rear planetary carrier		•
Rear sun gear		•
Front planetary carrier		•
Front sun gear	•	•
High clutch hub	•	•
High clutch drum	•	•

Oil pump cover	•	
Reverse clutch drum	-	•









Adjustment (Cont'd)

- 1. Install front side clutch and gear components.
- a. Install rear sun gear on transmission case.
- Pay attention to its direction.
- b. Install needle bearing on front of front planetary carrier.
- Apply petroleum jelly to needle bearing.
- c. Install needle bearing on rear of front planetary carrier.
- Apply petroleum jelly to bearing.
- Pay attention to its direction Black side goes to front.
- While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.

 Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.









Adjustment (Cont'd)

- e. Install bearing races on rear of clutch pack.
- Apply petroleum jelly to bearing races.
- Securely engage pawls of bearing race with hole in clutch pack.
- f. Place transmission case in vertical position.

g. Install clutch pack into transmission case.

- 2. Adjust total end play.
- a. Install new oil pump gasket on transmission case.



Adjustment (Cont'd)

b. Install pump cover bearing race on clutch pack.

c. Measure distance "B" between front end of transmission case and oil pump cover bearing race.

d. Measure distance "C" between front end of transmission case and oil pump gasket.

e. Determine dimension "A" by using the following equation.

$\mathsf{A} = \mathsf{B} - \mathsf{C}$

Oil pump gasket Transmission case Bearing race Clutch pack SAT210B



Adjustment (Cont'd)

- f. Install needle bearing on oil pump assembly.
- g. Measure distance "D" between needle bearing and machined surface of oil pump cover assembly.

h. Determine total end play "T₁" by using the following equation.

$\begin{array}{l} T_1 = A - D - 0.1 \\ Total end play "T_1" \end{array}$

0.25 - 0.55 mm (0.0098 - 0.0217 in)

 If end play is out of specification, decrease or increase thickness of oil pump cover bearing race as necessary.

Available oil pump cover bearing race:

Refer to Service and Data Specifications.





Adjustment (Cont'd)

- 3. Adjust reverse clutch drum end play.
- a. Install oil pump thrust washer on clutch pack.

- b. Measure distance "F" between front end of transmission case and oil pump thrust washer.
- c. Measure distance "G" between front end of transmission case and gasket.

d. Determine dimension "E" by using the following equation.

$\mathsf{E} = \mathsf{F} - \mathsf{G}$

case

Clutch pack

SAT214B



Adjustment (Cont'd)

e. Measure distance "H".

f. Determine reverse clutch drum end play T_2 " by using the following equation.

 $T_2 = E - H - 0.1$

Reverse clutch drum end play "T2"

0.55 - 0.90 mm (0.0217 - 0.0354 in)

• If end play is out of specification, decrease or increase thickness of oil pump thrust washer as necessary.

Available oil pump thrust washer:

Refer to Service Data Specifications.

4. Remove any part installed to adjust end plays.











Assembly

- 1. Install output shaft governor valve assembly and oil distributor.
- a. Insert output shaft from rear of transmission case while slightly lifting front internal gear.
- Do not force output shaft against front of transmission case.
- b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.
- Check to be sure output shaft cannot be removed in rear direction.

- c. Install needle bearing on transmission case.
- Pay attention to its direction Black side goes to front.
- Apply petroleum jelly to needle bearing.
- d. Install oil distributor on transmission case.

SAT152C







Assembly

Assembly (Cont'd)

- e. Install snap ring on rear of output shaft.
- Check to be sure output shaft cannot be removed in forward direction.
- f. Install governor valve assembly on oil distributor.

- 2. Install rear extension.
- a. Install oil seal on rear extension.
- Apply A.T.F. to oil seal.

b. Install rear extension gasket on transmission case.

Assembly (Cont'd)

C. Install parking rod on transmission case.

d. Install rear extension on transmission case.

- 3. Install front side clutch and gear components.
- a. Install rear sun gear on transmission case.
- Pay attention to its direction.
- b. Make sure needle bearing is on front of front planetary carrier.
- Apply petroleum jelly to needle bearing.
- Make sure needle bearing is on rear of C. front planetary carrier.
- Apply petroleum jelly to bearing.
- Pay attention to its direction Black side goes to ront.







SAT189B









Assembly (Cont'd)

d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.

Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.

- e. Install bearing races on front and rear of clutch pack.
- Apply petroleum jelly to bearing races.
- Securely engage pawls of bearing races with holes in clutch pack.
- f. Install clutch pack into transmission case.



Assembly (Cont'd)

- 4. Install brake band and band strut.
- a. Install band strut on brake band.
- Apply petroleum jelly to band strut.
- b. Place brake band on periphery of reverse clutch drum, and insert band strut into end of band servo piston stem.

SAT987A

SAT986A



c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.

- 5. Install input shaft on transmission case.
- Pay attention to its direction Oring groove side is front.
- 6. Install gasket on transmission case.







Assembly (Cont'd)

- 7. Install oil pump assembly.
- a. Install needle bearing on oil pump assembly.
- Apply petroleum jelly to the needle bearing.
- b. Install selected thrust washer on oil pump assembly.
- Apply petroleum jelly to thrust washer.
- c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.

- d. Install O-ring on oil pump assembly.
- Apply petroleum jelly to O-ring.









Assembly (Cont'd)

e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.

- f. Install oil pump assembly.
- Install two converter housing securing bolts in bolt holes in oil pump assembly as guides.

• Insert oil pump assembly to the specified position in transmission, as shown at left.

- 8. Install O-ring on input shaft.
- Apply A.T.F. to O-rings.



O-ring SAT997A





Assembly

Assembly (Cont'd)

- 9. Install converter housing.
- a. Install O-rings on converter housing.

- Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to outer periphery of bolt holes in converter housing.
- Do not apply too much sealant.

c. Apply recommended sealant (Nissan genuine part: K1361000250 or equivalent) to seating surfaces of bolts that secure front of converter housing.

d. Install converter housing on transmission case.



Assembly (Cont'd)

- 10. Adjust brake band.
- a. Tighten anchor end bolt to specified torque.

Anchor end bolt:

4 - 6 N.m (0.4 - 0.6 kg-m, 2.9 - 4.3 ft-lb)

- b. Back off anchor end bolt two and a half turns.
- c. While holding anchor end pin, tighten lock nut.





- 11. Install terminal cord assembly.
- a. Install O-ring on terminal cord assembly.
- Apply petroleum jelly to O-ring.
- b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.



Assembly (Cont'd)

- 12. Install control valve assembly.
- a. Install accumulator piston return springs B, C and D.

Free length of return springs:

Unit:	mm	(in)
		····/

Accumulator Item	В	С	D
Free length	66	45	58.4
	(2.60)	(1.77)	(2.299)

- b. Install manual valve on control valve.
- Apply A.T.F. to manual valve.





c. Place control valve assembly on transmission case.







Assembly (Cont'd)

- d. Install control valve assembly on transmission case.
- e. Install connector tube brackets and tighten bolts (A) and (B).
- Check that terminal assembly harness does not catch.

Bolt	Length	
A	45 mm (1.77 in)	
B	33 mm (1.30 in)	

- f. Install O-ring on oil strainer.
- Apply petroleum jelly to O-ring.
- g. Install oil strainer on control valve.

h. Securely fasten terminal harness with clips.
Connectors Connectors SAT132C







Assembly

Assembly (Cont'd)

i. Install O.D. cancel solenoid and idle solenoid connectors.

- 13. Install oil pan.
- a. Attach a magnet to oil pan.

- b. Install oil pan gasket on transmission case.
- c. Install oil pan and bracket on transmission case.
- Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.
- 14. Install inhibitor switch.
- a. Check that manual shaft is in "1" range.
- b. Temporarily install inhibitor switch on manual shaft.
- c. Move manual shaft to "N".









Assembly

Assembly (Cont'd)

- Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in inhibitor switch and manual shaft.
- 15. Install torque converter.
- a. Pour A.T.F. into torque converter.
- Approximately 2 liters (11-3/4 Imp qt) of fluid are required for a new torque converter.
- When reusing old torque converter, add the same amount of fluid as was drained.
- b. Install torque converter while aligning notches and oil pump.

c. Measure distance A to check that torque converter is in proper position.

Distance "A":

26.0 mm (1.024 in) or more

Specifications and Adjustment

STALL REVOLUTION

Stall revolution rpm	
2,100 - 2,300	

LINE PRESSURE

Engine speed	Line pressure kPa (bar, kg/cm², psi)		
rpm	D, 2 and 1 ranges	R range	
Idle	422 - 461 (4.22 - 4.61, 4.3 - 47, 61 - 67)	667 – 706 (6.67 – 7.06, 6.8 – 7.2, 97 – 102)	
Stall	883 – 961 (8.83 – 9.61, 9.0 – 9.8, 128 – 139)	1,393 – 1,471 (13.93 – 14.71, 14.2 – 15.0, 202 – 213)	

Specifications and Adjustment (Cont'd)

RETURN SPRINGS

Unit: mm (in)

		Item	Part	Free	Outer
Parts			No.	length	diameter
	4th speed cut va	lve spring	31756-48X09	23.5 (0.925)	7.0 (0.276)
	Pressure regulat	or valve spring	31742-48X16	48.5 (1.909)	12.1 (0.476)
	Pressure modifie	r valve spring	31742-48X13	40.83 (1.6075)	8.0 (0.315)
	1-2 shift valve sp	pring	31762-48X00	43.4 (1.709)	6.0 (0.236)
	2-3 shift valve sp	pring	31762-48X01	42.7 (1.681)	9.0 (0.354)
	3-4 shift valve sp	pring	31762-48X06	44.03 (1.7335)	8.0 (0.315)
	Accumulator con	trol valve spring	31742-48X02	29.3 (1.154)	8.0 (0.315)
	3-2 downshift va	lve spring	-	-	-
	2-3 throttle mod	ifier valve spring	31742-41X21	33.0 (1.299)	6.5 (0.256)
Control valve	4-2 relay valve s	pring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
	Lock-up control	valve spring	31742-48X07	20.0 (0.787)	5.45 (0.2146)
	Throttle valve & spring	detent valve	31802-48X02	34.23 (1.3476)	11.0 (0.433)
	Kickdown modifi	er valve spring	31756-48X01	45.3 (1.783)	7.0 (0.276)
	1st reducing valv	ve spring	31756-48X08	29.7 (1.169)	7.2 (0.283)
	Overrun clutch reducing valve		31742-48X04	45.0 (1.772)	7.45 (0.2933)
	spring	-	31742-48X05	31.0 (1.220)	5.2 (0.205)
	3-2 timing valve	spring	31742-48X15	23.0 (0.906)	7.0 (0.276)
	Torque converter relief valve		31742-41X23	38.0 (1.496)	9.0 (0.354)
	4-2 sequence va	lve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
		Primary	31742-48X11	19.1 (0.752)	9.05 (0.3563)
Governor valve	Governor valve	Secondary ①	31742-48X09	30.58 (1.2039)	9.2 (0.362)
	spring	Secondary 2	31742-48X10	16.79 (0.6610)	9.0 (0.354)
Reverse clutch		16 pcs	31505-41X02	19.69 (0.7752)	11.6 (0.457)
High clutch		16 pcs	31505-21X03	22.06 (0.8685)	11.6 (0.457)
Forward clutch (Overrun clutch)		20 pcs	31505-41X01	35.77 (1.4083)	9.7 (0.382)
Low & reverse brake	18 pcs		31521-21X00	23.7 (0.933)	11.6 (0.457)
Spring A		31605-41X05	45.6 (1.795)	34.3 (1.350)	
Band servo	Spring B		31605-41X00	53.8 (2.118)	40.3 (1.587)
Spring C		31605-41X01	29.7 (1.169)	27.6 (1.087)	
	Accumulator A		31605-41X02	43.0 (1.693)	-
Accumulator	Accumulator B		31605-41X10	66.0 (2.598)	-
	Accumulator C		31605-41X09	45.0 (1.772)	-
	Accumulator D		31605-41X06	58.4 (2.299)	-

Specifications and Adjustment (Cont'd)

ACCUMULATOR O-RING

Accumulato	Diameter mm (in)				
r	А	В	С	D	
Small	29	26.9	39.4	29	
diameter end	(1.14)	(1.059)	(1.551)	(1.14)	
Large	39.4	44.2	44.2	39.4	
diameter end	(1.551)	(1.740)	(1.740)	(1.551)	

CLUTCHES ABD BRAKES

Code number		49X05	45X60	
Reverse clutch		2		
Number of drive plates				
Number of driven plates			2	
Thickness of drive plate	mm (in)			
Standard		1.90 – 2.05 (0.	0748 – 0.0807)	
Wear limit		1.80 (0	0.0709)	
Clearance	mm (in)			
Standard		0.5 – 0.8 (0.0	020 – 0.031)	
Wear limit		1.2 (0).047)	
		Thickness mm (in)	Part number	
		4.6 (0.181)	31537-21X00	
		4.8 (0.189)	31537-21X01	
Thickness of retaining plate		5.0 (0.197)	31537-21X02	
		5.2 (0.205)	31537-21X03	
		5.4 (0.213)	31537-21804	
		5.8 (0.228)	31567-21X13	
High clutch				
Number of drive plates		4	5	
Number of driven plates	mm (in)	4	5	
Thickness of drive plate mm (in)				
Standard		1.52 – 1.67 (0.0598 – 0.0657)		
Wear limit		1.40 (0.0551)		
Clearance mm (in)		`		
Standard		1.8 – 2.2 (0.071 – 0.087)		
Allowable limit		2.8 (0.110)		

Specifications and Adjustment (Cont'd)

Code number		49X05		45X60	
		Thickness mm (in)	Part number	Thickness mm (in)	Part number
Thickness of retaining plate		3.6 (0.142) 3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)	31537-41X61 31537-41X62 31537-41X63 31537-41X64 31537-41X65 31537-41X66 31537-41X67 31537-41X68	3.4 (0.134) 3.6 (0.142) 3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189)	31537-41X71 31537-41X61 31537-41X62 31537-41X63 31537-41X64 31537-41X65 31537-41X66 31537-41X66
Forward clutch					
Number of drive plates			Į	5	
Number of driven plates			Į	5	
Thickness of drive plate mm (in) Standard Wear limit		1.90 – 2.05 (0.0748 – 0.0807) 1.80 (0.0709)			
Clearance	mm (in)			,	
Standard			0.45 – 0.85 (0.	0177 – 0.0335	5)
Allowable limit		1.85 90.0728)			
		Thicknes	ss mm (in)	Part	number
Thickness of retaining plate		8.0 (8.2 (8.4 (8.6 (8.8 (9.0 (9.2 ((0.315) (0.323) (0.331) (0.339) (0.346) (0.354) (0.362)	3153 3153 3153 3153 3153 3153 3153 3153	7-41X00 7-41X01 7-41X02 7-41X03 7-41X04 7-41X05 7-41X06
Overrun clutch					
Number of drive plates		3			
Number of driven plates			Ę	5	
Thickness of drive plate mm (in)					
Standard		1.90 – 2.05 (0.0748 – 0.0807)			
Wear limit			1.80 (0	0.0709)	
Clearance	mm (in)				
Standard		1.0 – 1.4 (0.039 – 0.055)			
Allowable limit		2.0 (0.079)			

Specifications and Adjustment (Cont'd)

Code number	49X05	45X60	
	Thickness mm (in)	Part number	
Thickness of retaining plate	4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197) 5.2 (0.205)	31537-41X79 31537-41X80 31537-41X81 31537-41X82 31537-41X83 31537-41X83 31537-41X84 31537-41X85	
Low & reverse brake			
Number of drive plates	6)	
Number of driven plates)	
Thickness of drive plate mm (in) Standard Wear limit	1.90 – 2.05 (0.0748 – 0.0807) 1.80 (0.0709)		
Clearance mm (in)			
Standard	0.7 – 1.1 (0.028 – 0.043)		
Allowable limit	2.3 (0.091)		
	Thickness mm (in)	Part number	
Thickness of retaining plate	8.6 (0.339)31667-41X188.8 (0.346)31667-41X199.0 (0.354)31667-41X059.2 (0.362)31667-41X069.4 (0.370)31667-41X099.6 (0.378)31667-41X10		
Brake band			
Anchor end bolt tightening torque Nm (kg-m, ft-lb)	4 - 6 (0.4 - 0.6, 2.9 - 4.3)		
Number of retaining revolutions for anchor end bolt	2.5		

Specifications and Adjustment (Cont'd)

OIL PUMP AND LOW ONE-WAY CLUTCH

Oil pump clearance mm (in) Cam ring – oil pump housing	
Standard	0.01 – 0.024 (0.0004 – 0.0009)
Rotor, vanes and control piston – oil pump housing	
Standard	0.03 – 0.044 (0.0012 – 0.0017)
Seal ring clearance mm (in)	
Standard	0.10 – 0.25 (0.0039 – 0.0098)
Allowable limit	0.25 (0.0089)

TOTAL END PLAY

Total end play "T ₁ "	0.25 – 0.55 mm (0.0098 – 0.0217 in)		
	Thickness mm (in)	Part number	
Thickness of oil pump cover bearing race	0.8 (0.031) 1.0 (0.039) 1.2 (0.047) 1.4 (0.055) 1.6 (0.063) 1.8 (0.071) 2.0 (0.079)	31429-41X00 31429-41X01 31429-41X02 31429-41X03 31429-41X04 31429-41X05 31429-41X05	

OIL DISTRIBUTOR

Seal ring – ring groove	
mm (m)	
Standard	0.15 – 0.40 (0.0059 – 0.0157)
Allowable limit	0.40 (0.0157)

Specifications and Adjustment (Cont'd)

REVERSE CLUTCH DRUM END PLAY

Total end play "T ₂ "	0.55 – 0.90 mm (0.0217 – 0.0354 in)		
	Thickness mm (in)	Part number	
Thickness of oil pump thrust washer	0.7 (0.028) 0.9 (0.035) 1.1 (0.043) 1.3 (0.051) 1.5 (0.059) 1.7 (0.067) 1.9 (0.075)	31528-41X00 31528-41X01 31528-41X02 31528-41X03 31528-41X04 31528-41X05 31528-41X05 31528-41X06	

REMOVAL AND INSTALLATION

Manual control linkage	
Lock nut tightening torque	11 – 15 (1.1 – 1.5, 8 – 11)
Nm (kg-m, ft-lb)	
Distance between end of clutch housing and torque converter mm (in)	26.0 (1.024) or more
Drive plate runout limit mm (in)	0.5 (0.020)