

AUTOMATIC TRANSAXLE

(Electronically Controlled and 4-Speed)

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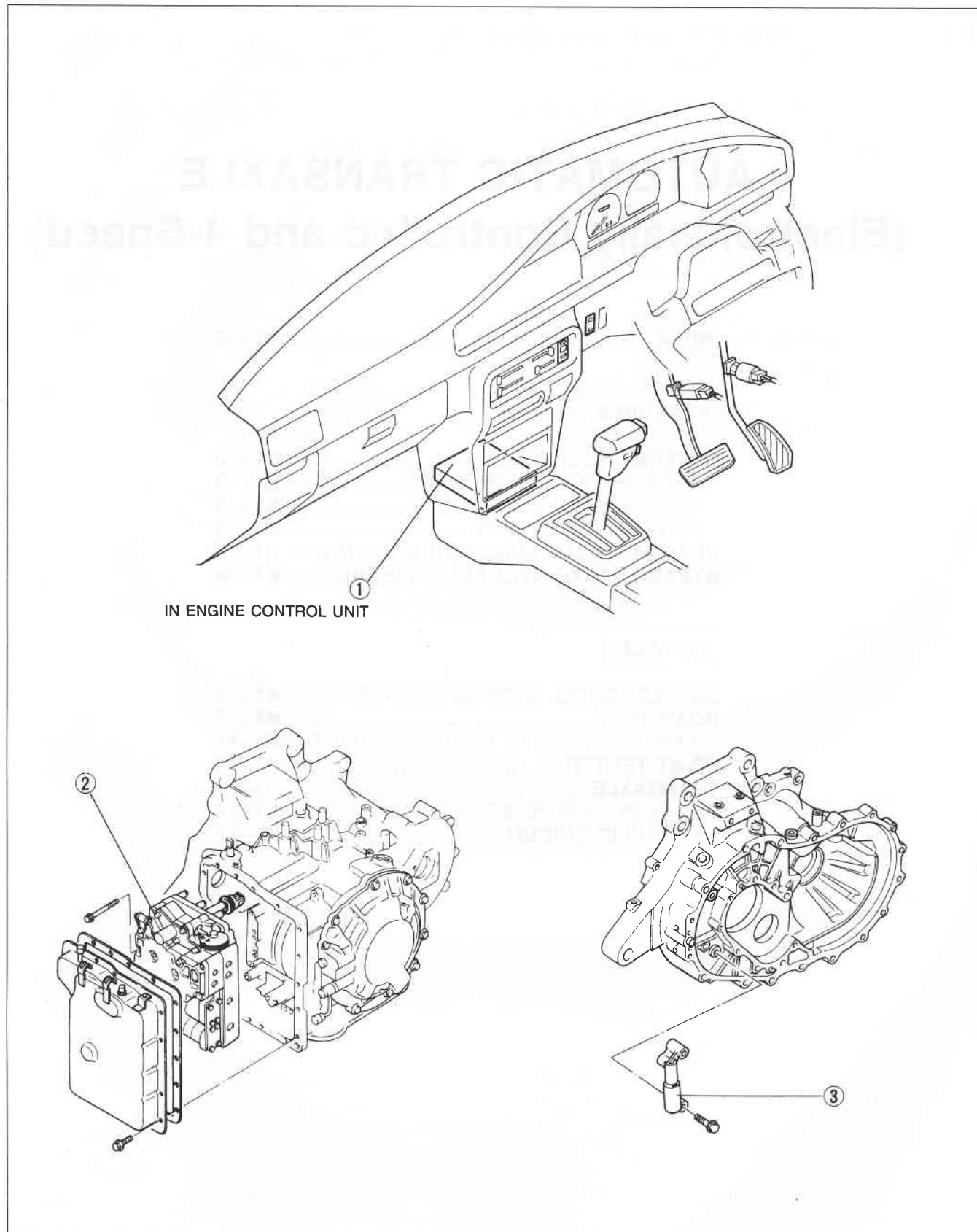
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OUTLINE

OUTLINE OF CONSTRUCTION

EC-AT Control Unit (EC-AT only)

1. The EC-AT system is changed as follows.
 - 1) The EC-AT control system is programmed within the engine control unit (ECU).
 - 2) The service connectors (1-pin and 6-pin) for the EC-AT system are made common with the connectors of the engine control system (In engine compartment).
 - 3) The display of the malfunction codes is changed.
2. Shift and lockup points are changed to improve drivability.
3. A new EC-AT tester harness is established to check all input/output signals of the EC-AT control unit.

Transaxle

EC-AT

1. The size of the 2-3 and 1-2 accumulators is enlarged to reduce shift shock.
2. The specifications of the springs and orifices in the control body are redefined to improve drivability.
3. A hydraulic circuit of the bypass valve in the control body is changed.

HAT*

The construction is the same as that of the previous models.

96G0K1-503

SPECIFICATIONS

Model		G4A-EL (EC-AT)	G4A-HL (4-speed)
		F2 engine	FE engine
Torque converter stall torque ratio		1.700—1.900 : 1	1.900—2.100 : 1
Gear ratio	First	2.800	
	Second	1.540	
	Third	1.000	
	Fourth (OD)	0.700	
	Reverse	2.333	
Final gear ratio		3.700 : 1	
Number of drive plates/ driven plates	Forward clutch	3/3	
	Coasting clutch	2/2	
	3-4 clutch	5/5	4/4
	Reverse clutch	2/2	
	Low and reverse brake	4/4	
Servo diameter (Piston outer dia./Retainer inner dia.) mm (in)		78/40 (3.07/1.57)	78/49 (3.07/1.93)
Speedometer gear ratio (Driven/Drive gear)		20/25 or 21/25	
Automatic transaxle fluid	Type	Dexron-II or M-III	
	Capacity liters (US qt, Imp qt)	6.8 (7.2, 6.0)	

*: Hydraulically controlled automatic transmission

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INTERCHANGEABILITY (EC-AT)

The following chart shows interchangeability of the major parts between the new transaxles and the previous transaxles.

Symbols: ○....Interchangeable

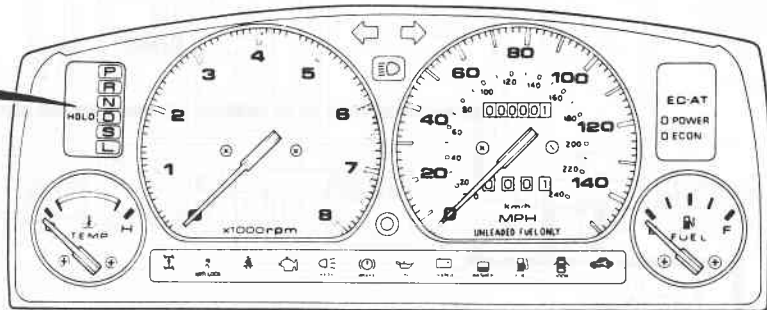
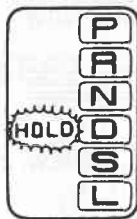
X....Not interchangeable

Part name		Interchangeability	Remark
EC-AT control unit		X	EC-AT controlled by ECU
Converter housing		○	
Transaxle case		○	
Torque converter		○	
Oil pump assembly		○	
Differential gear set		○	
2-3 accumulator piston		X	Diameter enlarged
2-3 accumulator spring		X	Free length increased
Control valve body	Solenoid valve assembly	○	
	Front control body	X	Shape changed
	Premain control body	X	Shape changed
	Main control body	○	
	Rear control body	○	
	1-2 accumulator piston	X	Diameter enlarged
	1-2 accumulator small spring	X	Free length increased
	1-2 accumulator large spring	X	Free length increased
	N-D accumulator piston	○	
	N-D accumulator spring	X	Free length increased
	N-R accumulator piston	○	
	N-R accumulator spring	○	
Clutch (Reverse/forward) assembly		○	
3-4 clutch assembly		○	
Low and reverse brake		○	
Carrier hub assembly		○	
One-way clutch		○	
Output gear		○	
Idler gear		○	
2nd band servo		○	
Turbine shaft		○	
Oil pump shaft		○	
Bearing cover assembly		○	
Bearing housing		○	
Throttle cable		X	Length increased

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DISPLAY OF MALFUNCTION CODE NO. (EC-AT)

HOLD INDICATOR



96GOK1-506

The display of malfunction code numbers is changed as follows because the ECU now controls the EC-AT.

	HOLD INDICATOR ILLUMINATION	
	NEW	PREVIOUS
WITHOUT 1-pin connector grounded		
WITH 1-pin connector grounded	No illumination	Shows specified malfunction signal pattern Example: Throttle sensor No.12

96EOKX-007

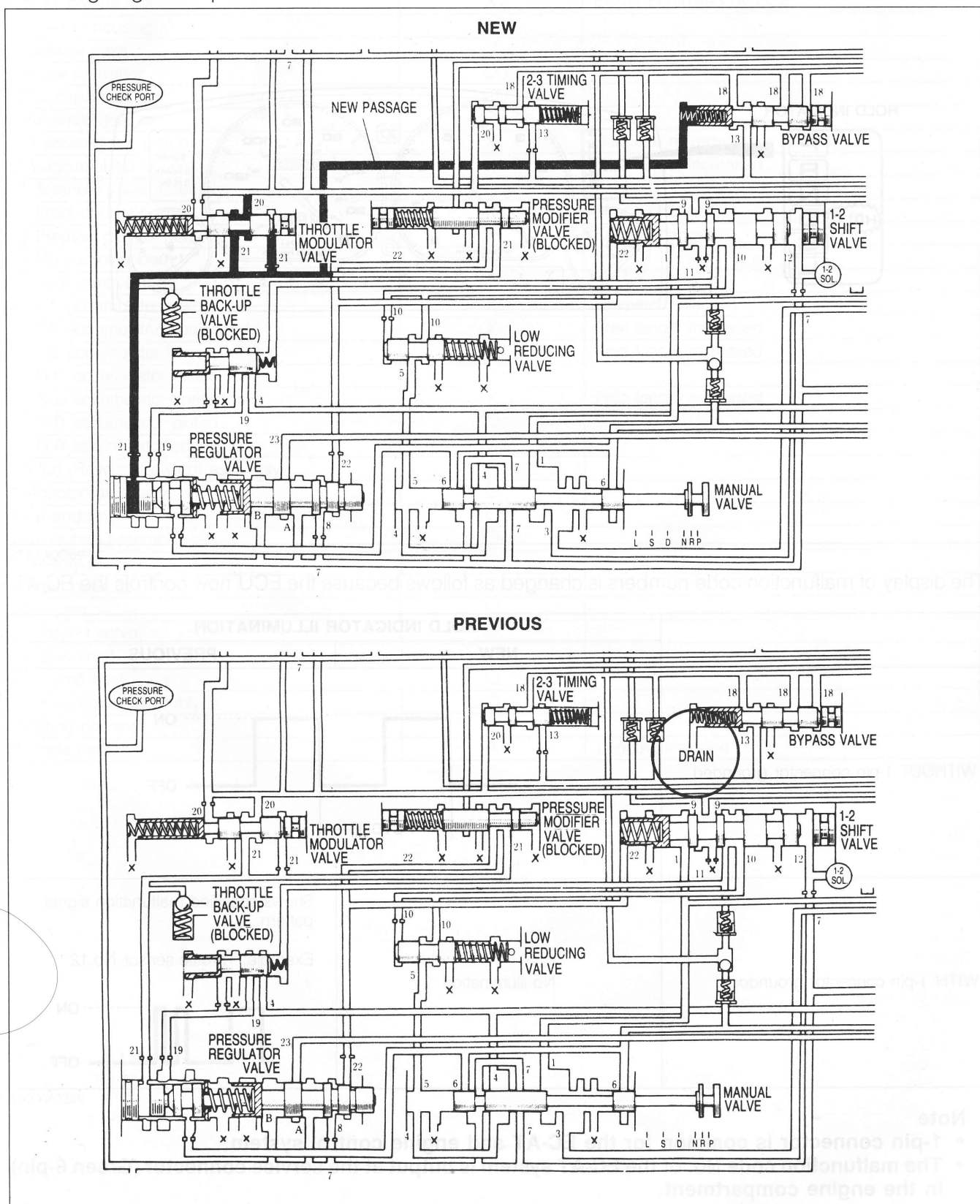
Note

- 1-pin connector is common for the EC-AT and engine control system.
- The malfunction code No. of the EC-AT system is output at the service connector (Green 6-pin) in the engine compartment.

BYPASS VALVE HYDRAULIC CIRCUIT (EC-AT)

The former drain circuit at the left end of the bypass valve is changed to the throttle modulator valve. By this new circuit, the 3-4 clutch hydraulic pressure is controlled based on the throttle valve opening during the 2-3 upshift.

When the throttle valve is wide open, the throttle modulated pressure is high, moving the bypass valve to the right. This provides a rapidly rising line pressure at the 3-4 clutch to give positive engagement against the strong engine torque.



SUPPLEMENTAL SERVICE INFORMATION

The following points in this section are changed in comparison with the following manuals.

- Mazda 626 Workshop Manual 7/87 (1163-10-87G) for Europe and General
- Mazda 626/MX-6 Workshop Manual 6/87 (1175-10-87F) for Australia
- Mazda 626 Station Wagon Workshop Manual Supplement 2/88 (1182-10-88B)

Road test (EC-AT)

- Shift and lockup point

EC-AT tester

- EC-AT tester components

Control valve body (EC-AT)

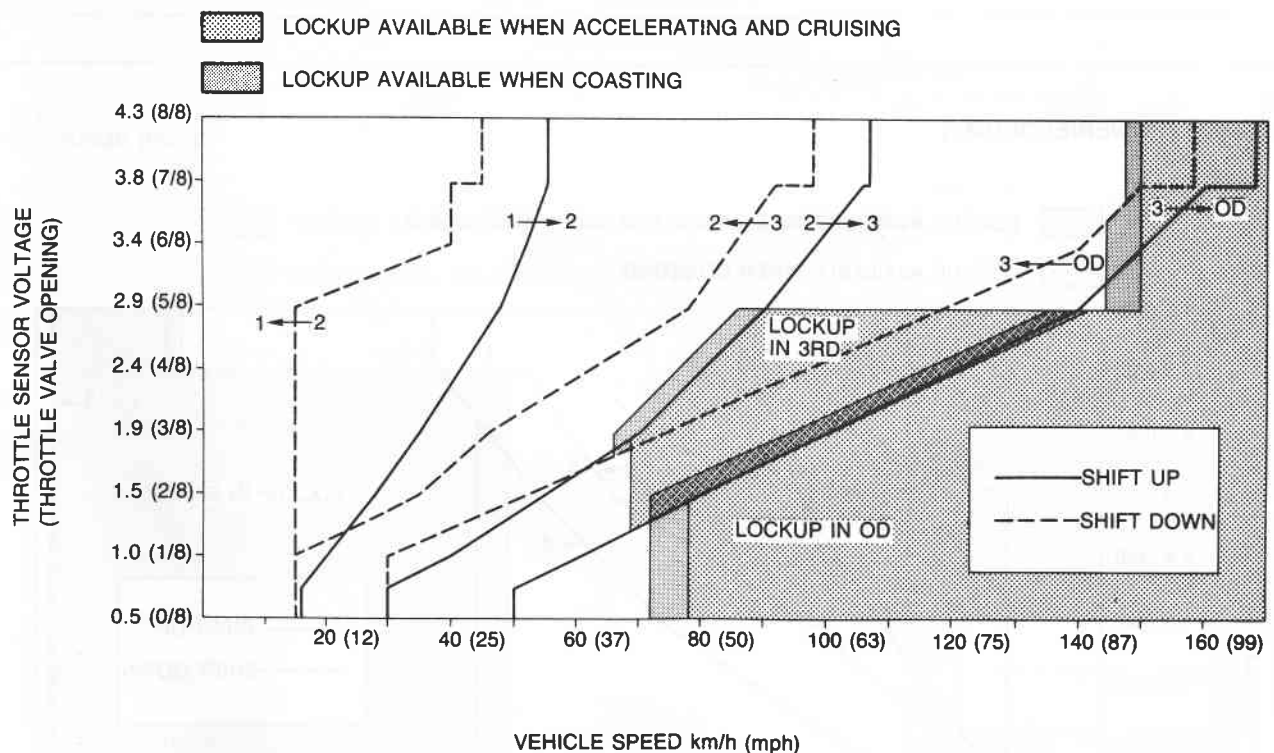
- Orifice specifications
- Spring specifications

96G0K1-507

ROAD TEST (EC-AT)

Caution

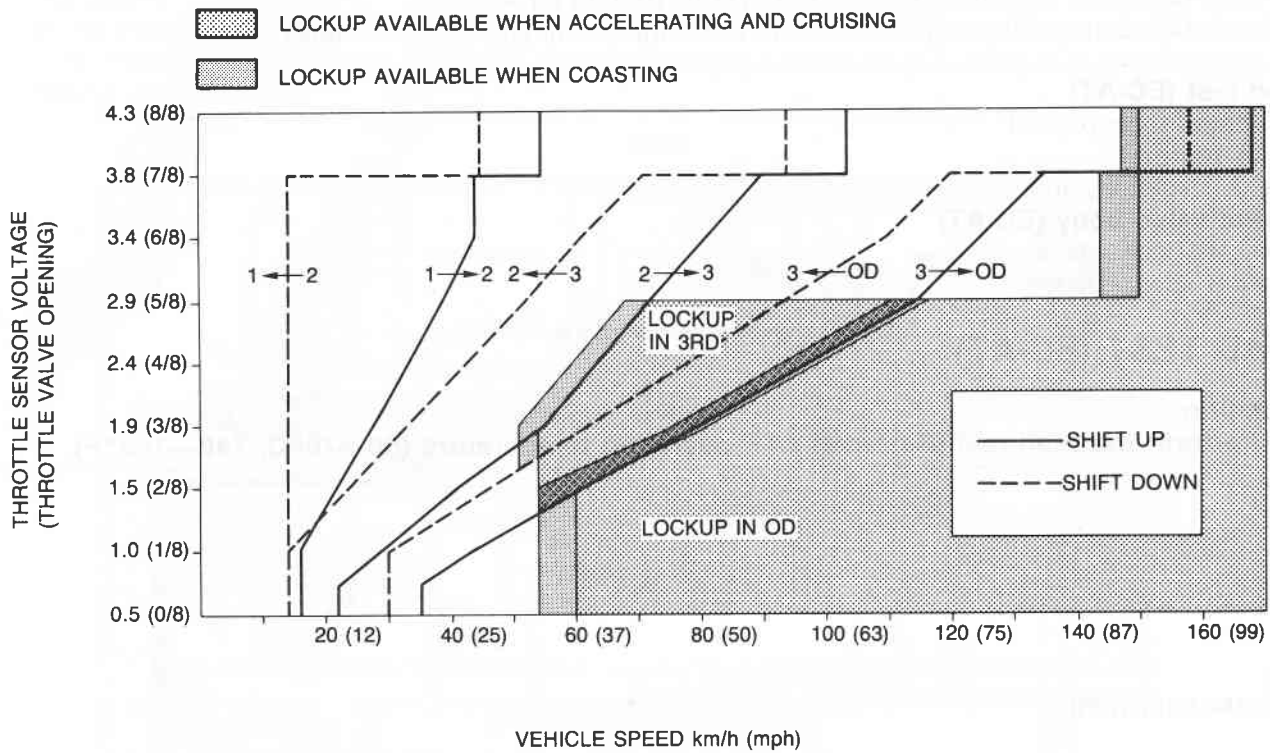
- Perform the road test at normal ATF operating temperature (60—70°C, 140—158°F).

F2**D RANGE (POWER)**

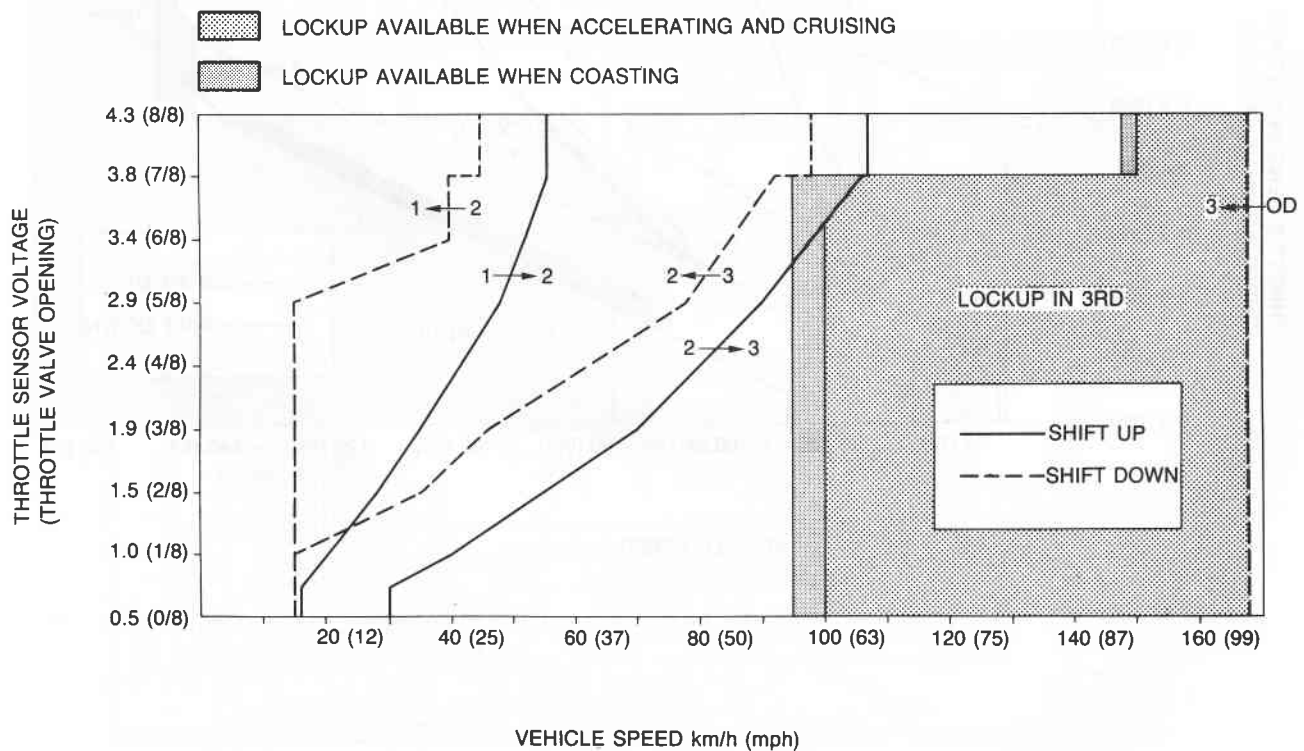
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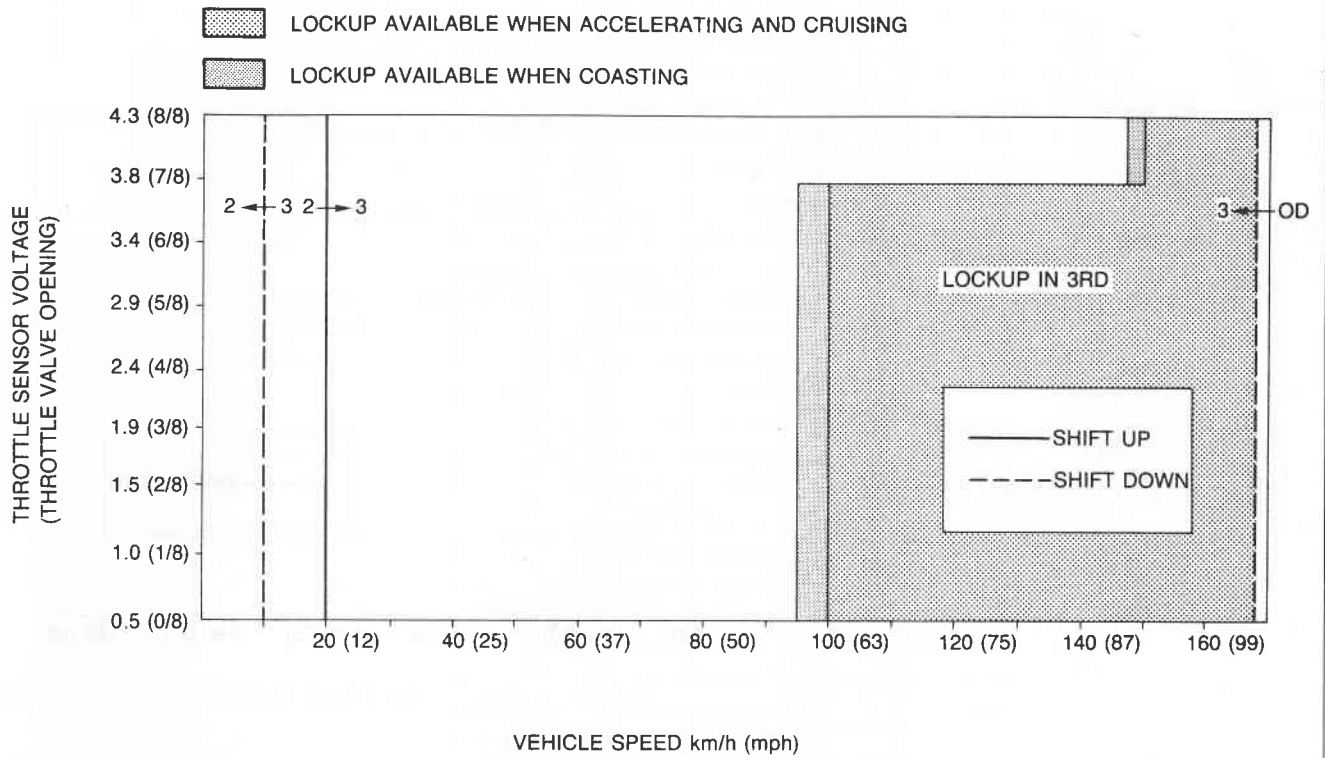
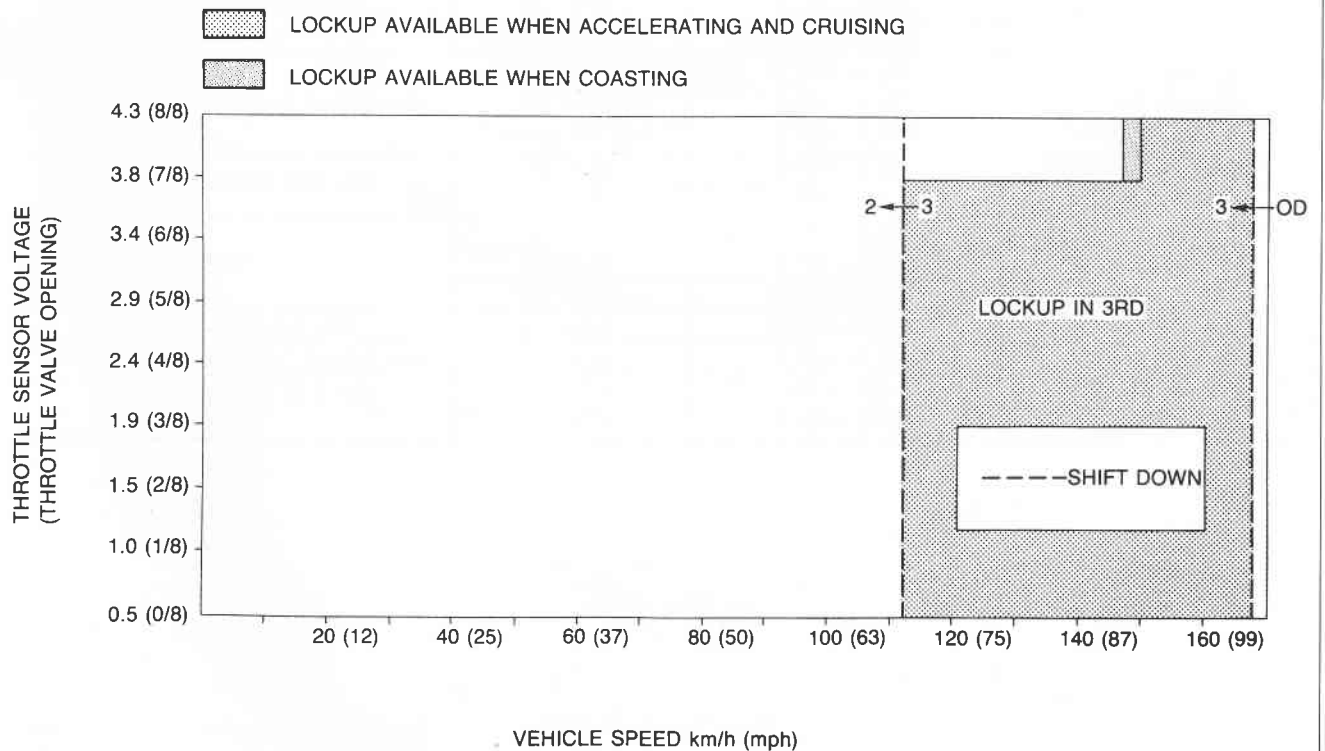
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F2 D RANGE (ECONOMY)

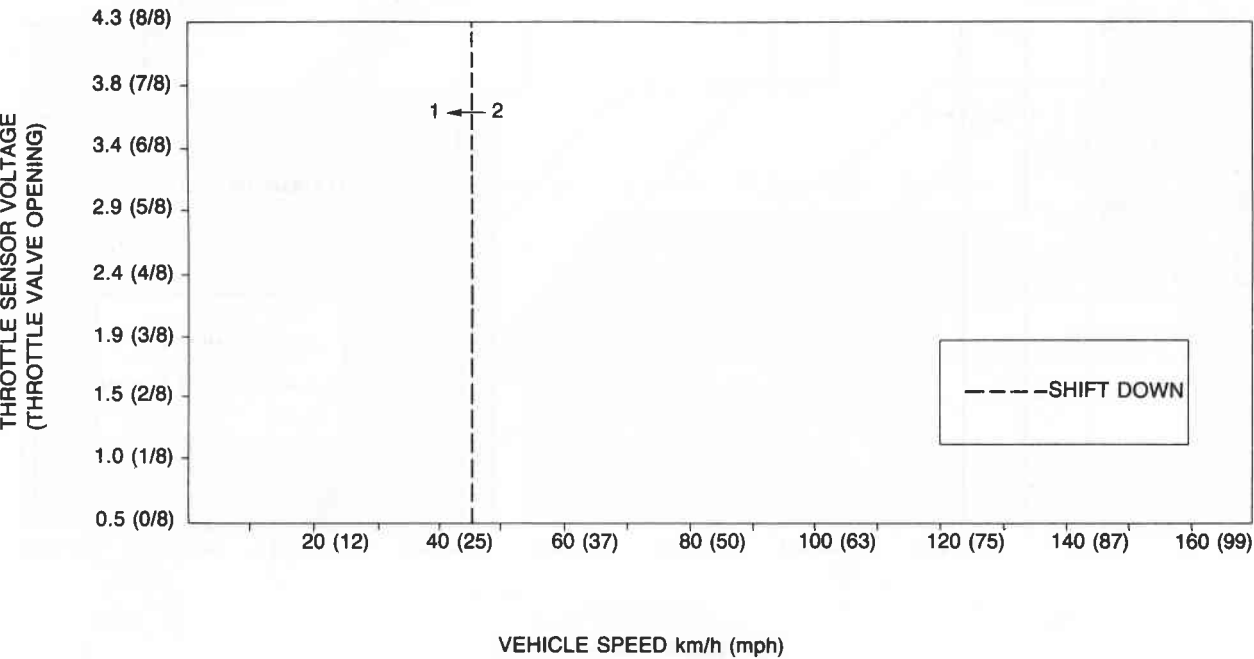


F2 S RANGE (POWER/ECONOMY)



F2
D RANGE (HOLD)

F2
S RANGE (HOLD)


F2
L RANGE (HOLD)



VEHICLE SPEED AT GEARSHIFT TABLE

Range/Mode		Throttle condition (Throttle sensor voltage)	Shift	Drum speed rpm	Vehicle speed km/h (mph)
Power	D	Fully open (4.3 volt)	D1 → D2	4,900—5,550	54—61 (33—38)
			D2 → D3	5,250—5,750	105—115 (65—72)
			Lockup ON (D3)	4,900—5,150	148—156 (93—98)
			D3 → OD	5,450—5,800	165—175 (102—109)
			Lockup ON (OD)	3,400—3,600	147—157 (92—98)
		Half throttle (1.6—2.2 volt)	D1 → D2	3,350—4,200	37—46 (23—29)
			D2 → D3	3,500—4,400	70—88 (44—55)
			Lockup ON (D3)	2,300—2,850	69—87 (43—54)
			D3 → OD	3,500—4,400	106—133 (66—83)
			Lockup ON (OD)	2,450—3,100	106—135 (66—84)
		Fully closed (0.5 volt)	OD → D3	600—750	27—33 (17—21)
			D3 → D1	400—600	12—18 (8—11)
		Kickdown	OD → D3	3,500—3,750	153—163 (95—101)
			D3 → D2	3,100—3,350	94—102 (40—63)
			D2 → D1	2,100—2,400	42—48 (26—30)
	Economy	Fully open (4.3 volt)	D1 → D2	4,900—5,450	54—60 (33—37)
			D2 → D3	5,100—5,500	102—110 (63—68)
			Lockup ON (D3)	4,900—5,150	148—156 (93—98)
			D3 → OD	5,450—5,800	165—175 (102—109)
			Lockup ON (OD)	3,400—3,600	147—157 (92—98)
		Half throttle (1.6—2.2 volt)	D1 → D2	2,650—3,350	29—37 (18—23)
			D2 → D3	2,750—3,600	55—72 (34—45)
			Lockup ON (D3)	1,800—2,750	54—83 (34—52)
			D3 → OD	2,800—3,650	85—111 (53—69)
			Lockup ON (OD)	2,000—2,600	86—113 (54—71)
		Fully closed (0.5 volt)	OD → D3	600—750	27—33 (17—21)
			D3 → D1	350—550	11—17 (7—11)
		Kickdown	OD → D3	3,500—3,750	153—163 (95—101)
			D3 → D2	2,950—3,250	90—98 (56—61)
			D2 → D1	2,100—2,400	42—48 (26—30)
S	Fully open (4.3 volt)	S1 → S2	S1 → S2	5,000—5,550	55—61 (34—38)
			S2 → S3	5,250—5,650	105—113 (65—70)
			Lockup ON (S3)	4,900—5,150	148—156 (93—98)
		Half throttle (1.6—2.2 volt)	S1 → S2	3,350—4,200	37—46 (23—29)
			S2 → S3	3,500—4,450	70—89 (44—56)
			Lockup ON (S3)	3,100—3,500	94—106 (59—66)
		Fully closed (0.5 volt)	S4 → S3	3,800—3,950	165—171 (103—107)
			S3 → S1	400—600	12—18 (8—11)
		Kickdown	S4 → S3	3,750—4,000	163—173 (102—108)
			S3 → S2	3,100—3,350	94—102 (59—64)
			S2 → S1	2,100—2,400	42—48 (26—30)
L		Fully open (4.3 volt)	L1 → L2	5,000—5,550	55—61 (34—38)
		Half throttle (1.6—2.2 volt)	L1 → L2	3,350—4,200	37—46 (23—29)
		Fully closed (0.5 volt)	L2 → L1	600—900	12—18 (8—11)
		Kickdown	L2 → L1	2,100—2,400	42—48 (26—30)

Range/Mode		Throttle condition (Throttle sensor voltage)	Shift	Drum speed rpm	Vehicle speed km/h (mph)
HOLD	D	Any condition	D2 → D3	750—1,250	15—25 (9—16)
			Lockup ON (D3)	3,150—3,450* ¹ 4,800—5,100* ²	95—105 (59—66)* ¹ 145—155 (91—97)* ²
				OD → D3	3,800—3,950
			D3 → D2	250—450	7—13 (4—8)
	S		Lockup ON (S3)	3,150—3,450* ¹ 4,800—5,100* ²	95—105 (59—66)* ¹ 145—155 (91—97)* ²
				S4 → S3	3,750—4,000
			S3 → S2	3,600—3,800	109—115 (68—72)
	L		L2 → L1	2,150—2,450	43—49 (27—31)

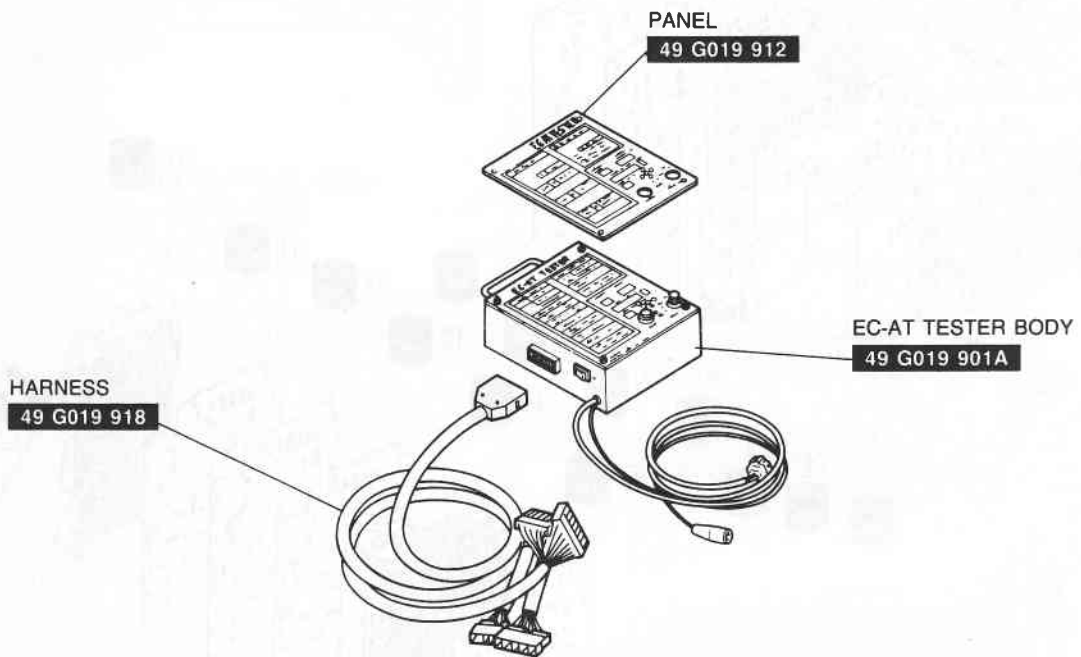
*1: Less than 7/8 throttle opening.

*2: More than 7/8 throttle opening.

96G0K1-509

EC-AT TESTER

A new EC-AT tester adapter harness is established to inspect the EC-AT system.



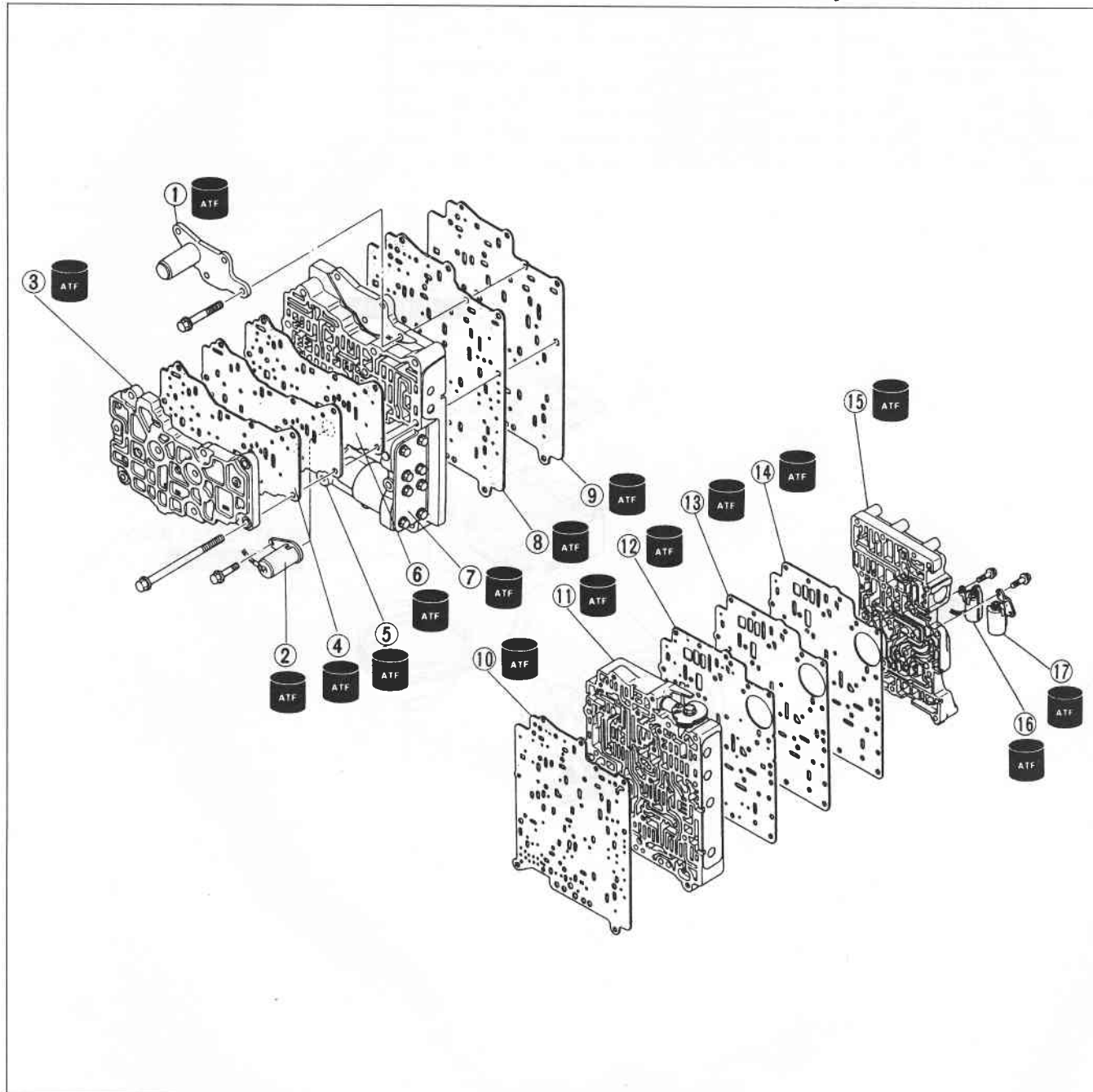
96G0K1-510

Set the new **Harness** (49 G019 918) and the **Panel** (49 G019 912) onto the **EC-AT Tester Body** (49 G019 901A).

TRANSAXLE (EC-AT)

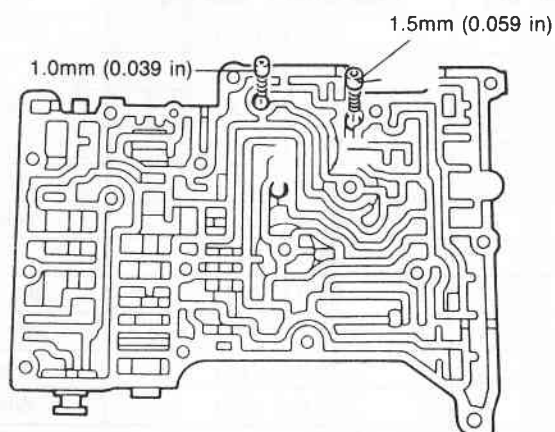
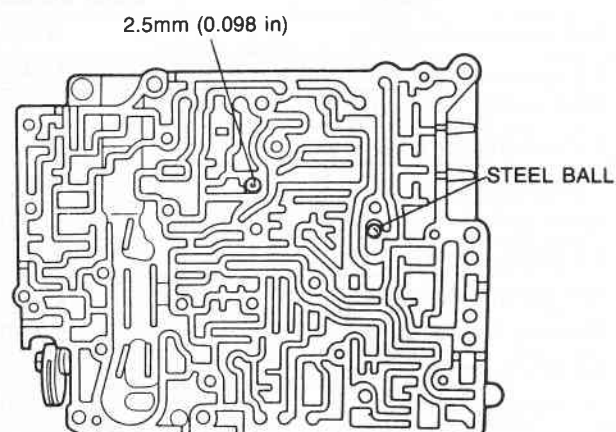
CONTROL VALVE BODY
Disassembly / Assembly

1. Disassemble in the sequence shown in the figure.
2. Assemble in the reverse order of the disassembly, referring to the **Assembly Note**.

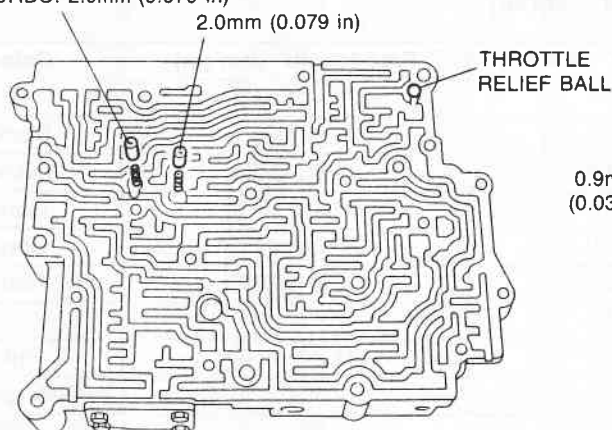
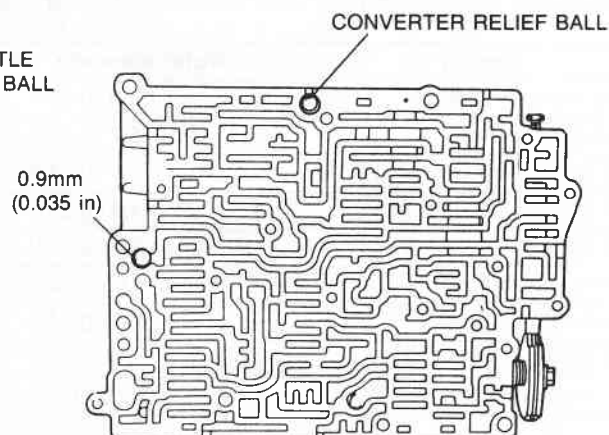
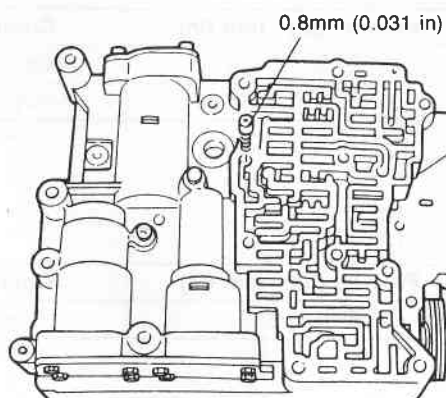


96G0K1-511

- | | |
|-------------------------------|-------------------------------|
| 1. 1-2 solenoid valve | 10. Premain/main rear gasket |
| 2. 2-3 solenoid valve | 11. Main control body |
| 3. Front control body | Assembly Note..... page K1-23 |
| 4. Front/premain front gasket | 12. Main/rear front gasket |
| 5. Premain separator | 13. Rear separator |
| 6. Front/premain rear gasket | 14. Main/rear rear gasket |
| 7. Premain control body | 15. Rear control body |
| Assembly Note..... page K1-23 | Assembly Note..... page K1-23 |
| 8. Premain/main front gasket | 16. 3-4 solenoid valve |
| 9. Main separator | 17. Lockup solenoid valve |

Assembly note**Locations of orifices and check balls****REAR CONTROL BODY****MAIN CONTROL BODY (REAR SIDE)****PREMAIN CONTROL BODY (REAR SIDE)**

TURBO: 2.5mm (0.098 in)
NON-TURBO: 2.0mm (0.079 in)

**MAIN CONTROL BODY (FRONT SIDE)****PREMAIN CONTROL BODY (FRONT SIDE)**

Premain Control Body**Inspection****Spring**

1. Measure the outer diameter and free length of the spring.

Spring		Outer diameter mm (in)	Free length mm (in)	Color
N-D accumulator spring		9.8 (0.386)	68.0 (2.677)	Orange
1-2 accumulator small spring	Non-turbo	14.4 (0.567)	86.0 (3.386)	—
	Turbo	14.4 (0.567)	73.8 (2.906)	Gray
1-2 accumulator large spring		20.0 (0.787)	97.1 (3.823)	Gray
Bypass valve spring		4.9 (0.193)	27.6 (1.087)	Yellow
Servo control valve spring		4.9 (0.193)	27.6 (1.087)	Yellow
2-3 timing spring		8.3 (0.327)	26.5 (1.043)	—
N-R accumulator spring		11.1 (0.437)	62.0 (2.441)	Light green
Coasting bypass spring		5.8 (0.228)	37.7 (1.484)	Dark blue
3-2 timing spring		8.2 (0.323)	28.6 (1.126)	Red
3-2 capacity spring		5.4 (0.213)	30.6 (1.205)	White

96A0KX-019

Main Control Body**Inspection****Spring**

1. Measure the outer diameter and free length of the spring.

Spring		Outer diameter mm (in)	Free length mm (in)	Color
Pressure modifier spring		8.3 (0.327)	26.5 (1.043)	—
Low reducing spring		8.7 (0.343)	38.3 (1.508)	Black
1-2 shift spring		8.7 (0.343)	41.3 (1.626)	Yellow
2-3 shift spring		7.4 (0.291)	36.6 (1.441)	Gray
3-4 shift spring		7.4 (0.291)	36.6 (1.441)	Gray
Throttle backup spring		9.65 (0.380)	26.9 (1.059)	Red
Throttle modulator spring		6.3 (0.248)	47.9 (1.886)	—
Throttle spring		5.4 (0.213)	47.2 (1.858)	Pink
Throttle assist spring		5.15 (0.203)	32.3 (1.272)	Dark green

96A0KX-020

Rear Control Body**Inspection****Spring**

1. Measure the outer diameter and free length of the spring.

Spring		Outer diameter mm (in)	Free length mm (in)	Color
Pressure regulator spring		11.5 (0.453)	26.5 (1.043)	Maroon
Lockup control spring		5.0 (0.197)	35.2 (1.386)	Purple

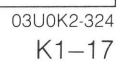
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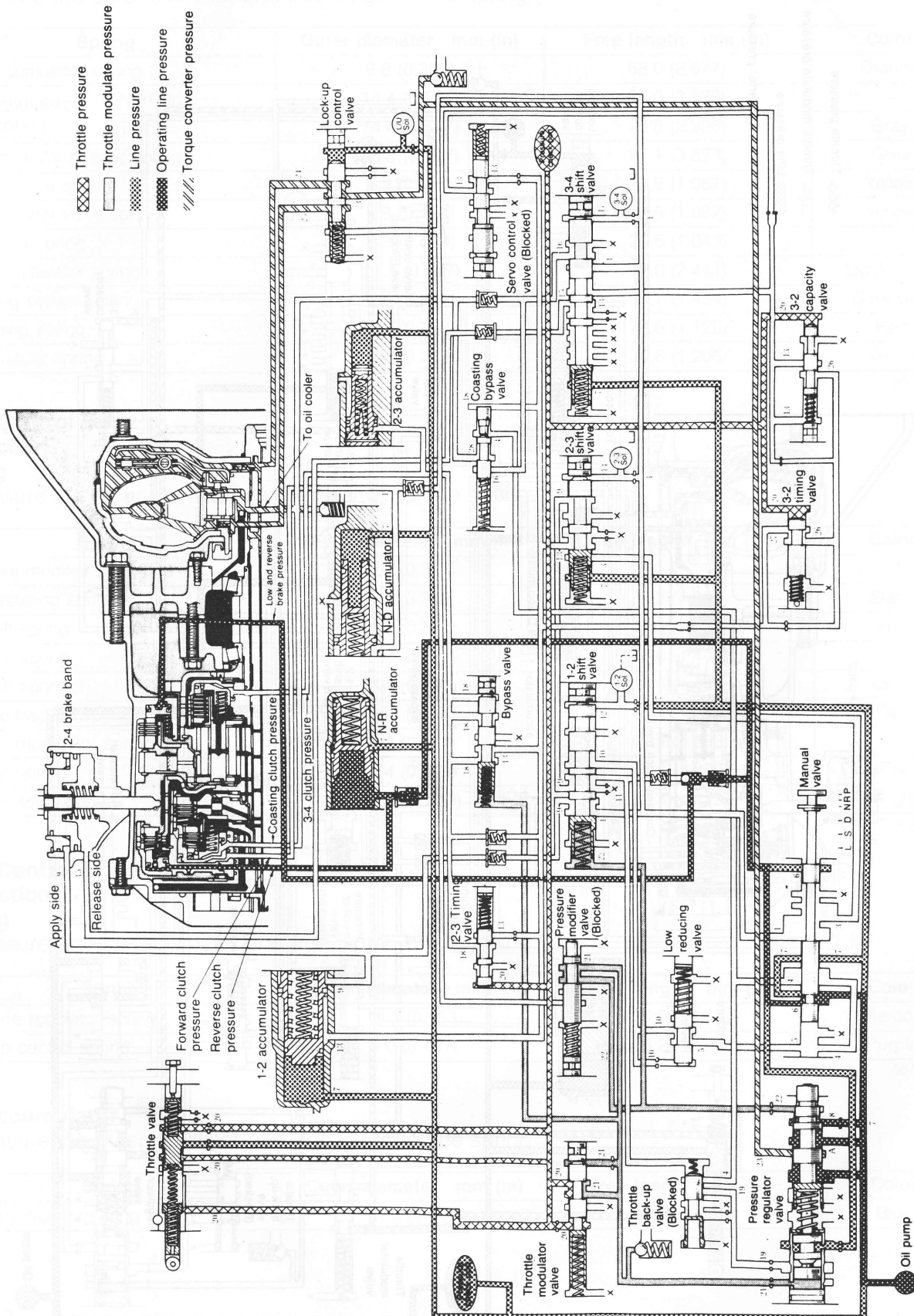
2-3 Accumulator

1. Measure the outer diameter and free length of the spring.

Spring		Outer diameter mm (in)	Free length mm (in)	Color
2-3 accumulator spring		11.3 (0.445)	85.0 (3.346)	Blue

96A0KX-022

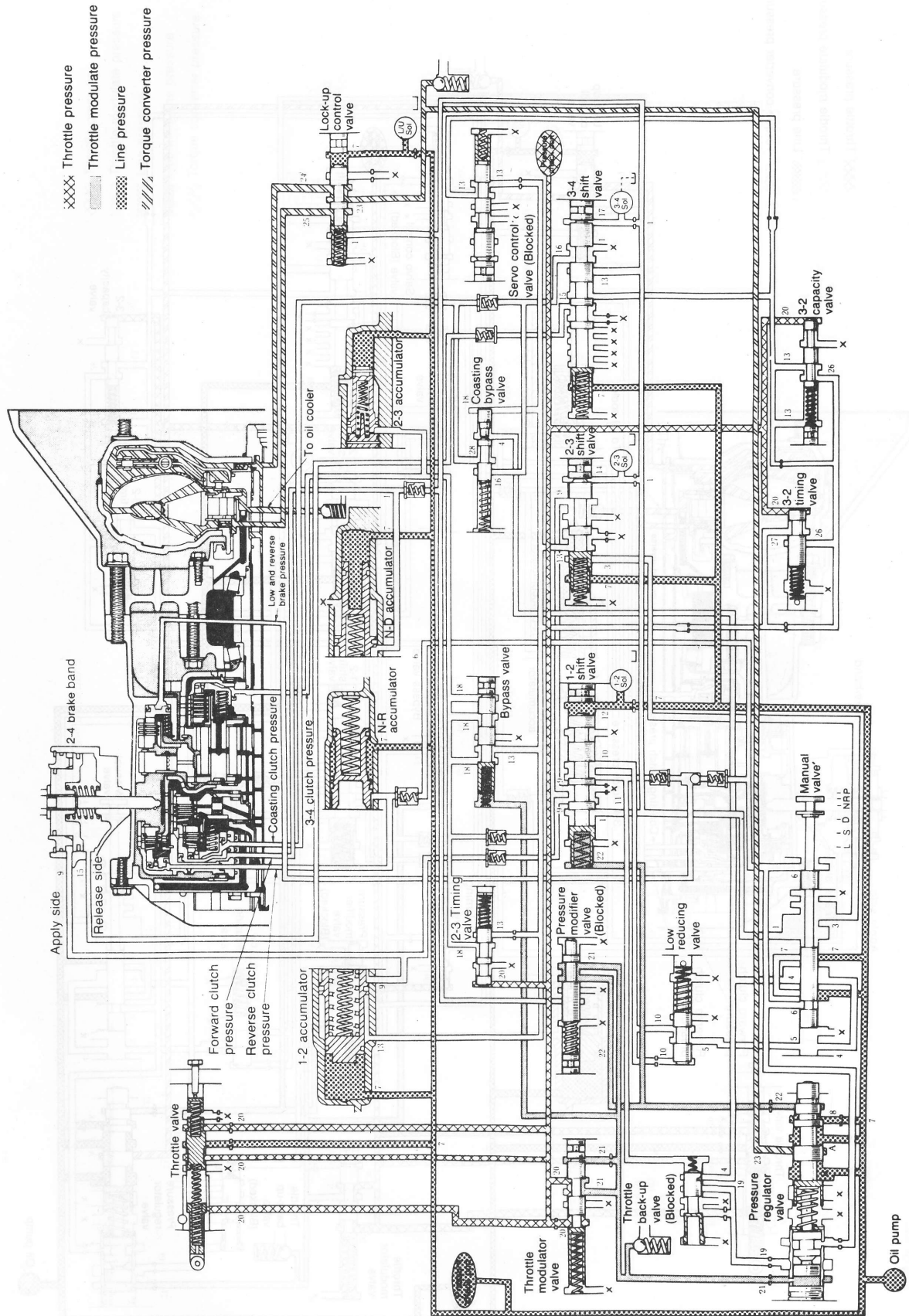




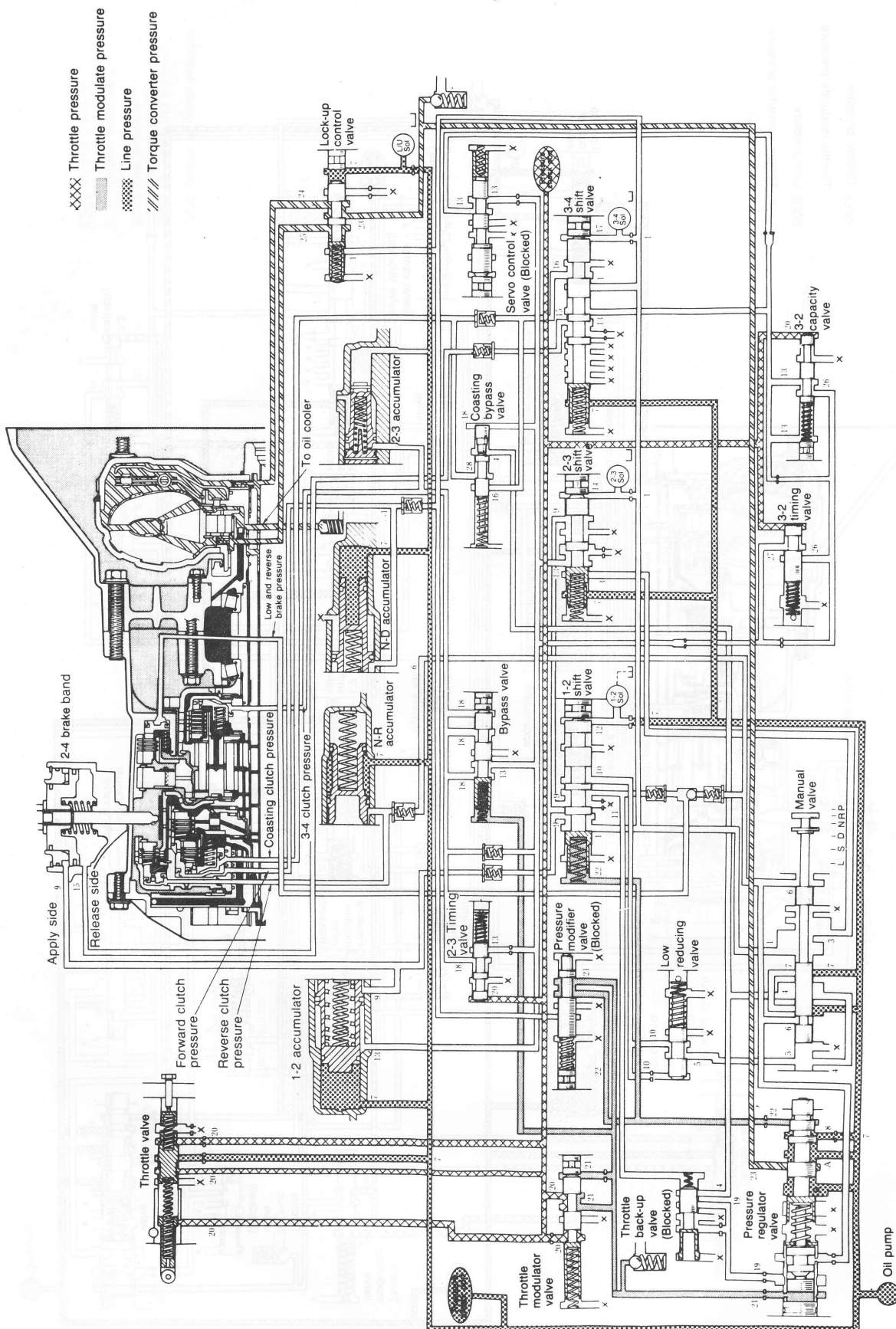
HYDRAULIC CIRCUIT

K1

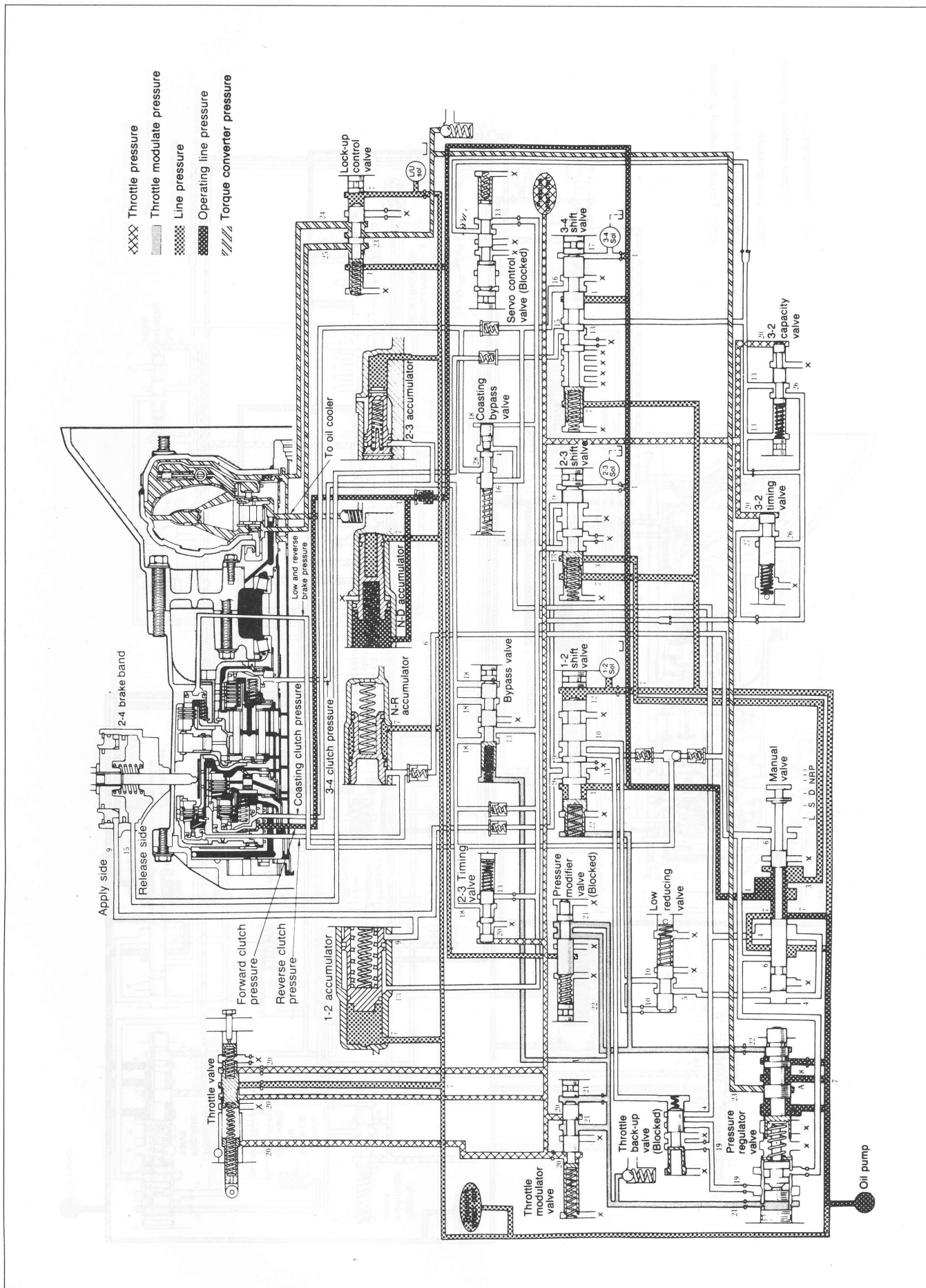
N RANGE; BELOW APPROX. 18 km/h (11 mph)



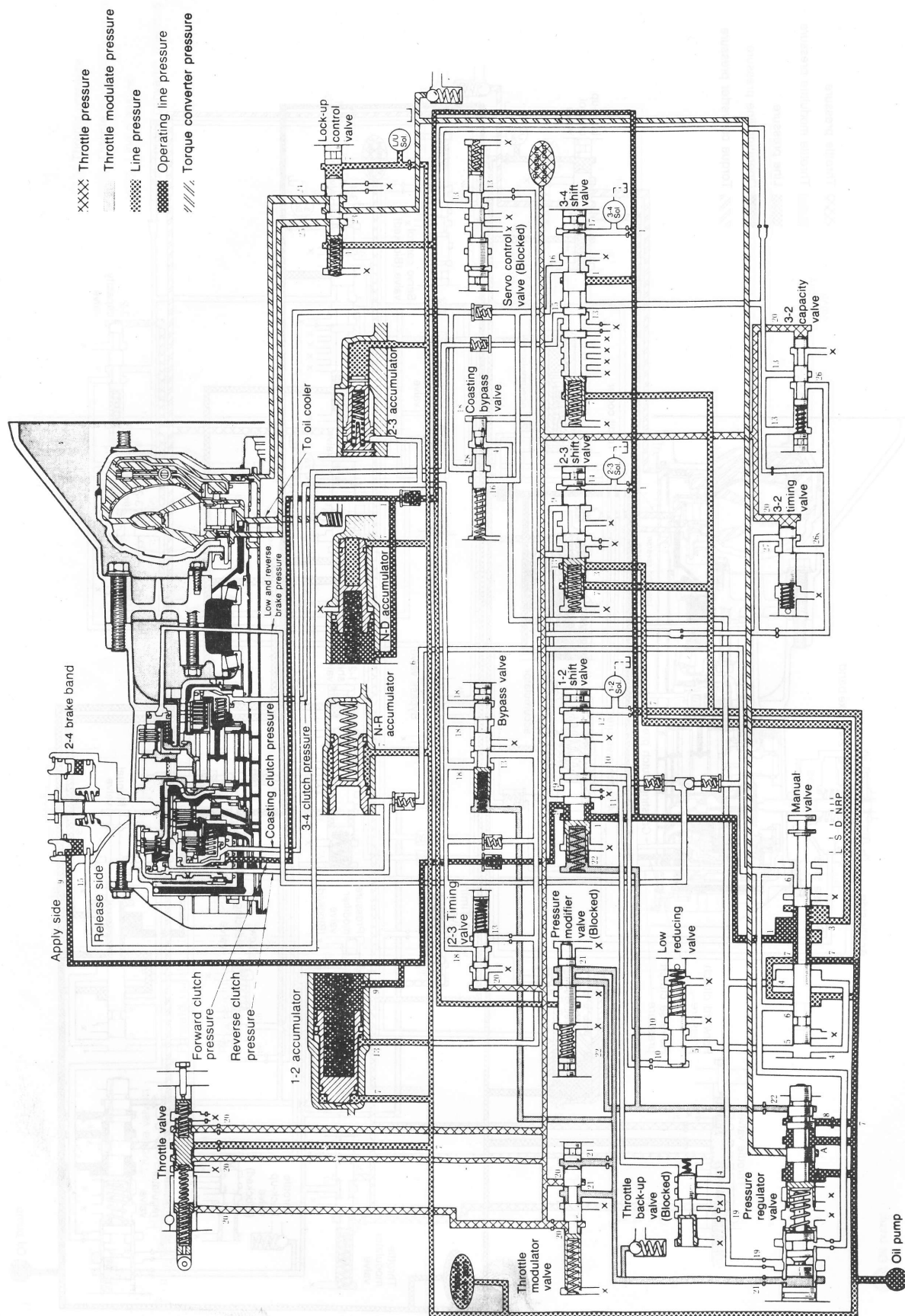
N RANGE; ABOVE APPROX. 18 km/h (11 mph)

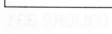


D RANGE; 1ST GEAR

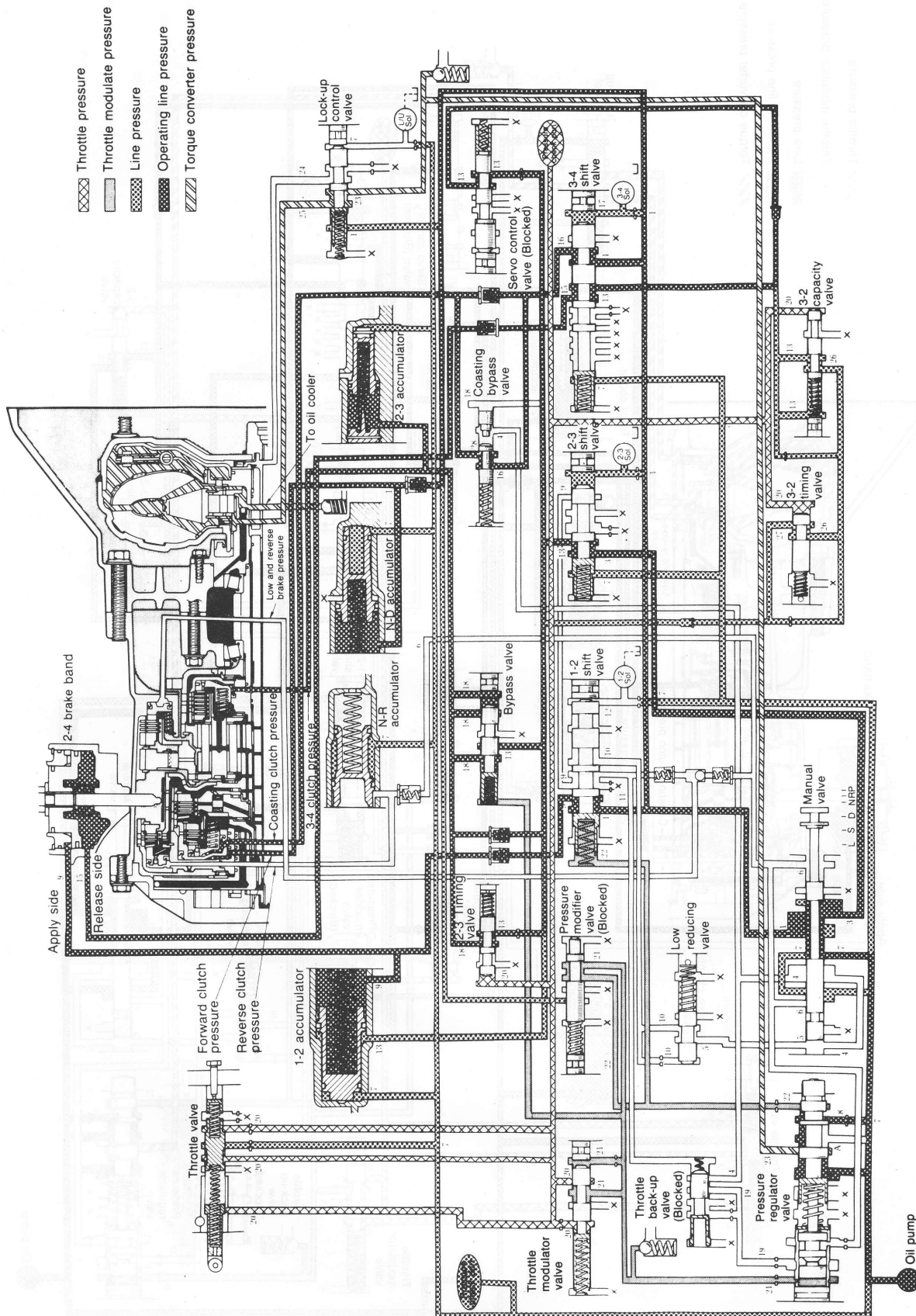


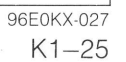
D RANGE; 2ND GEAR

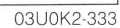




D RANGE; 3RD GEAR ABOVE APPROX. 40 km/h (25 mph)

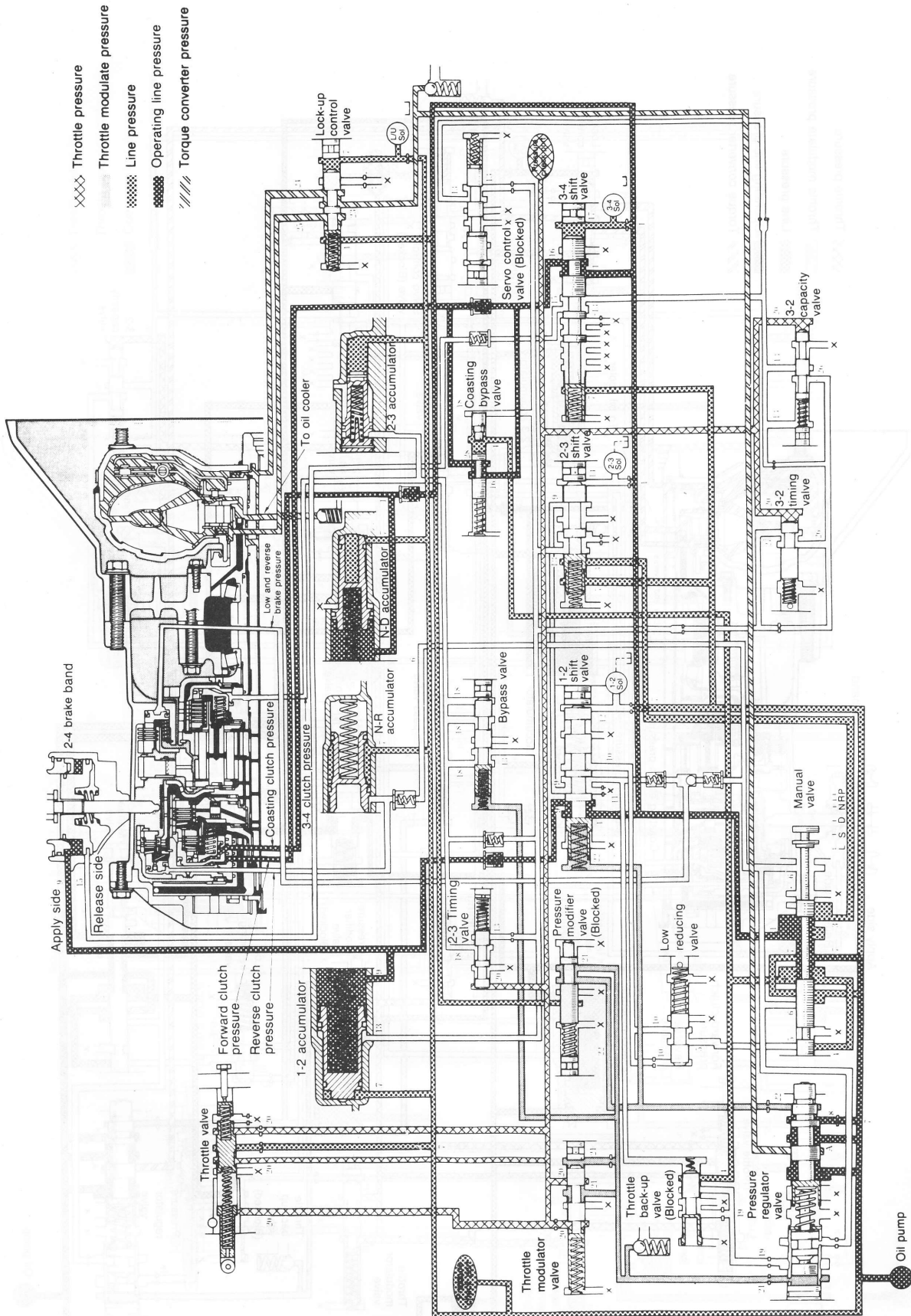




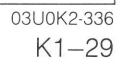




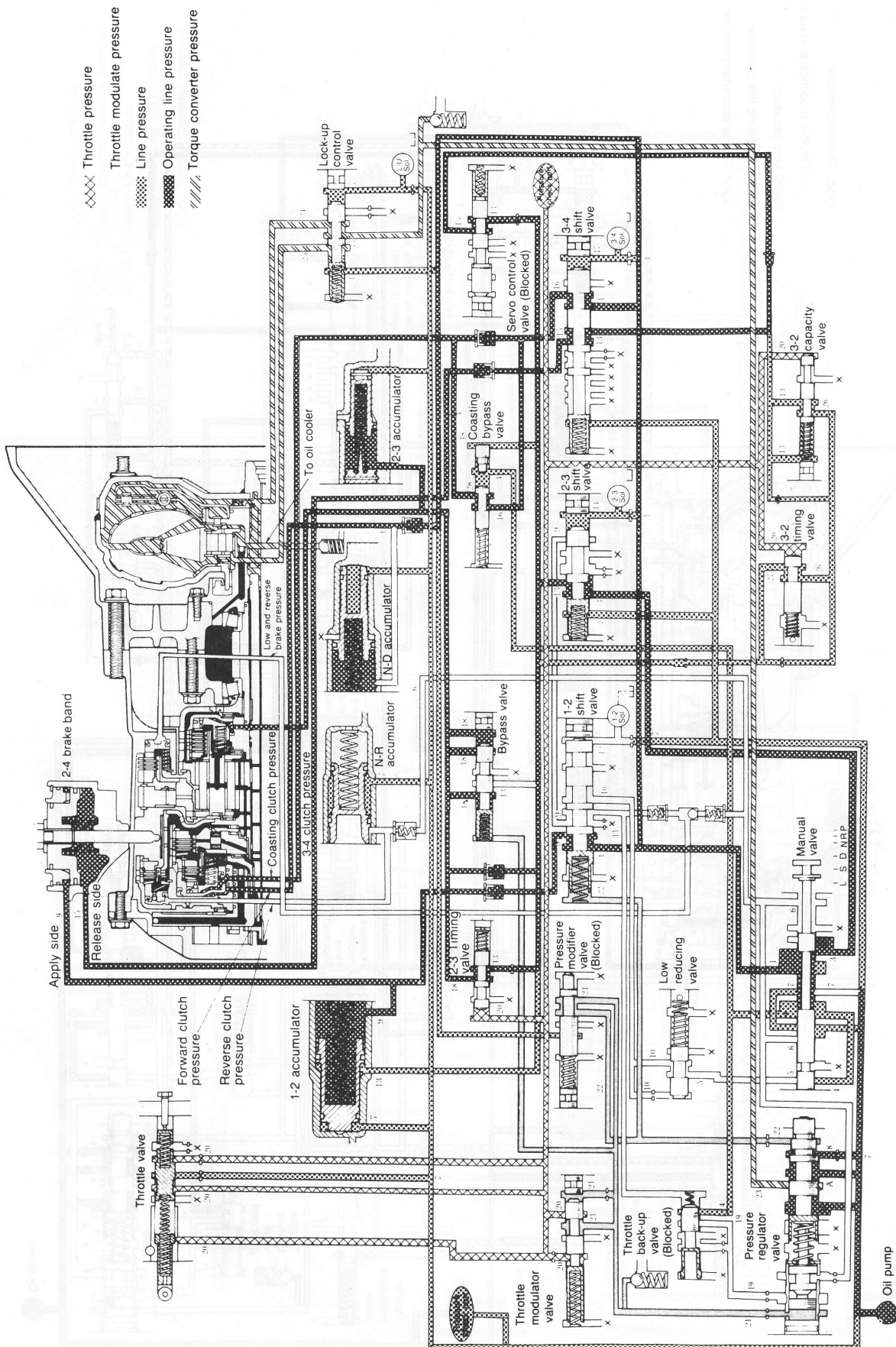
S RANGE; HOLD 2ND GEAR



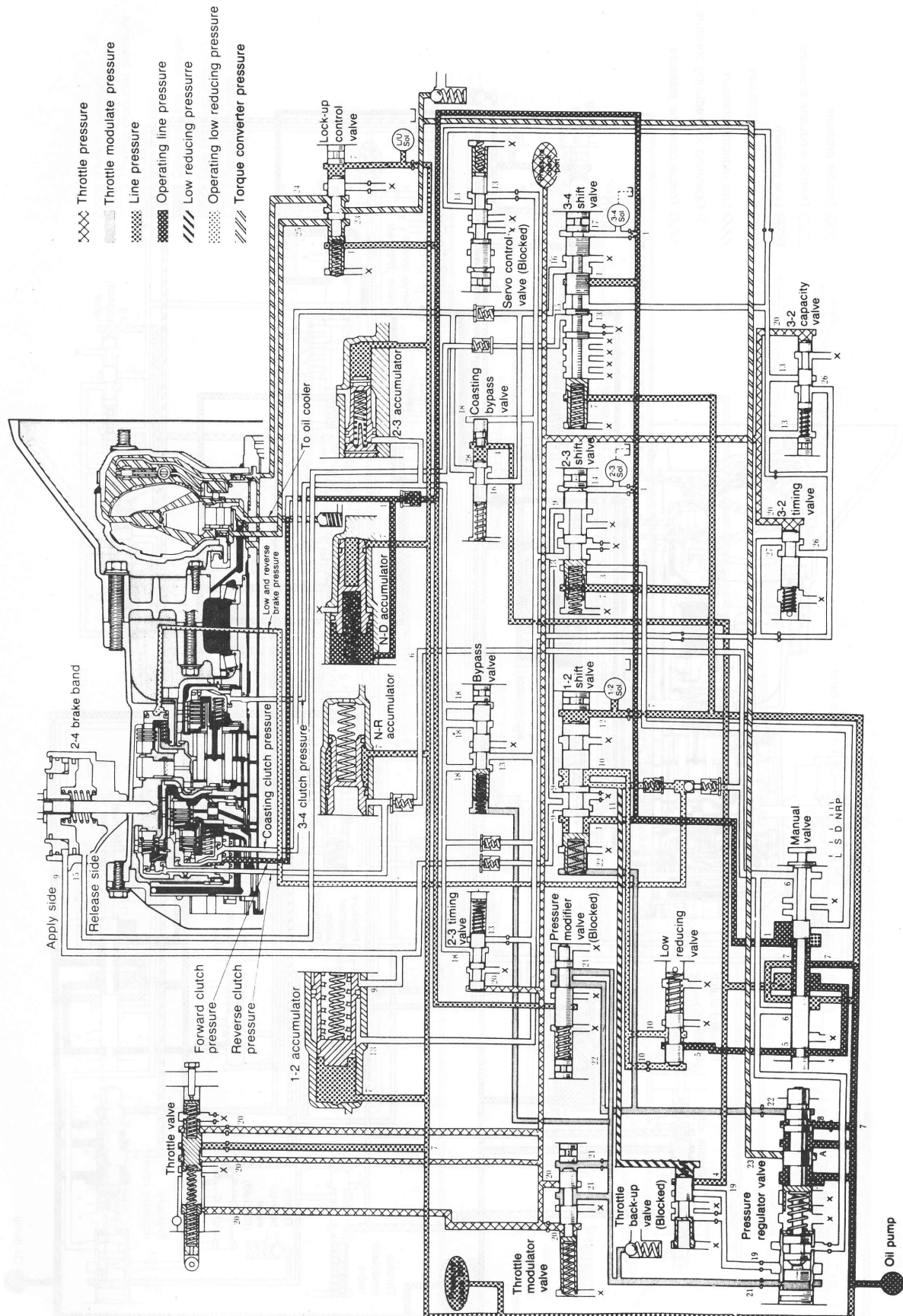
K1



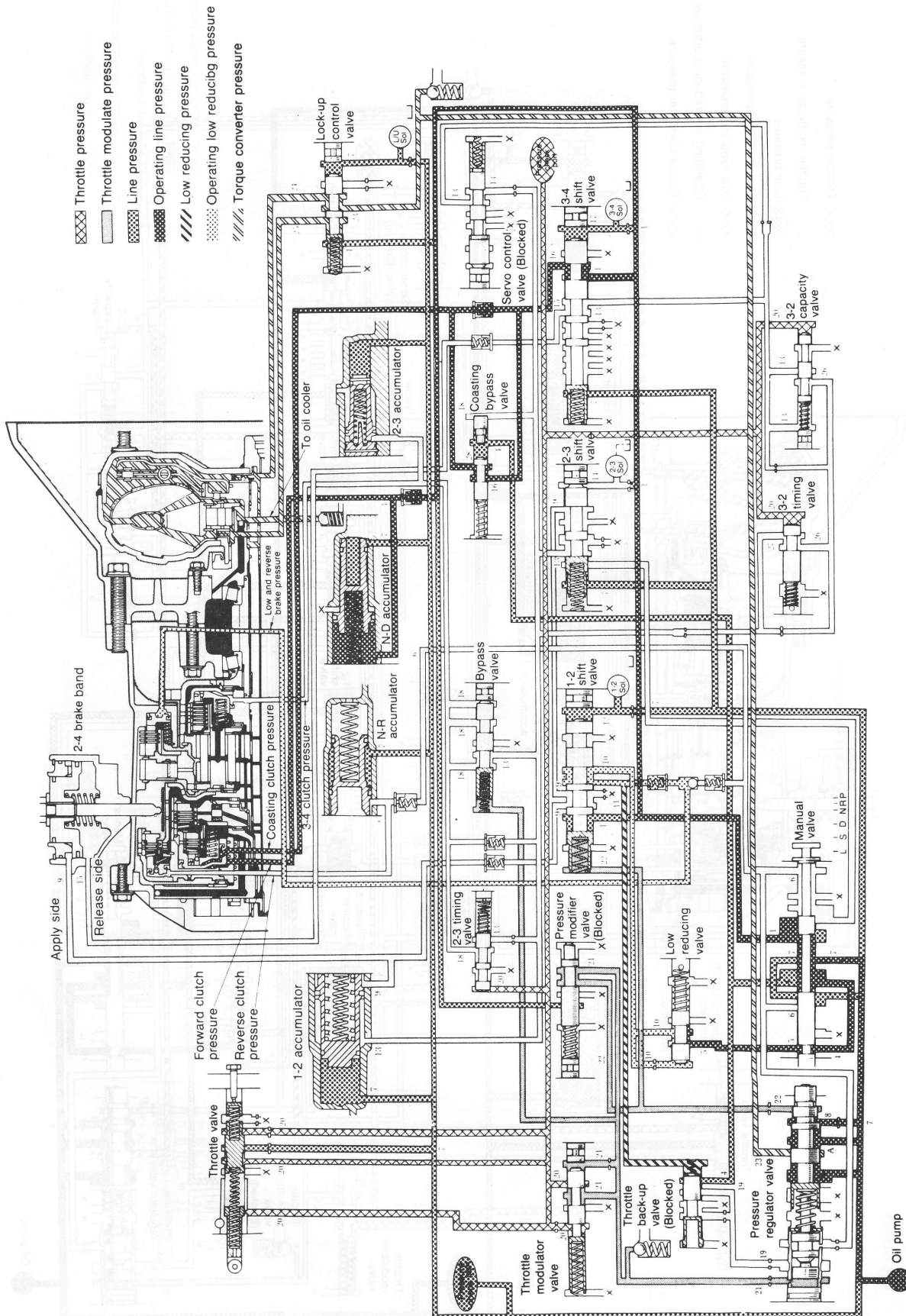
S RANGE; 3RD GEAR ABOVE APPROX. 40 km/h (25 mph)

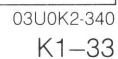


L RANGE; 1ST GEAR



L RANGE; HOLD 1ST GEAR





L RANGE; 2ND GEAR ABOVE APPROX. 110 km/h (68 mph)

