AUTOMATIC TRANSMISSION

SECTION AT

DESCRIPTION :

The automatic transmission for model Z31 has been modified as follows.

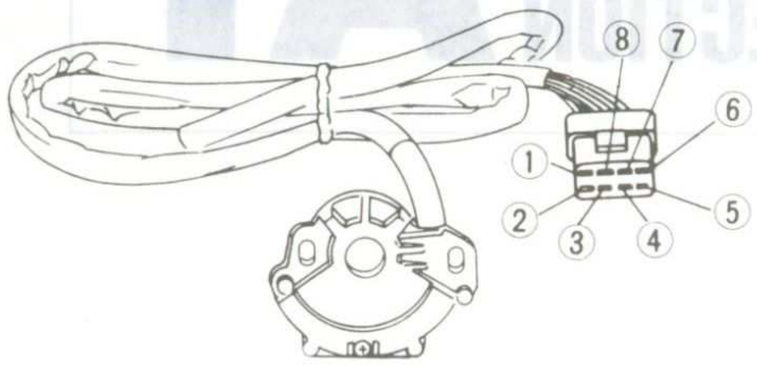
- The E4N71B automatic transmission (model code No. X8203) has been applied to the VG30E engine model.
- The E4N71B automatic transmission (model code No. X8206) has been applied to the VG30ET engine model.
- The major features of the E4N71B A/T are
  1) By use of the A/T control unit, the lock-up function is applied in the D_3 and D_4 range.
  2) The lock-up function is released when a shift is made, the throttle is fully closed, the accelerator pedal is depressed abruptly or the temperature of A.T.F. is low.
  3) Shifting over D_3 and D_4 ranges is controlled by the A/T control unit.
  4) The D_4 range is canceled when the temperature of A.T.F. is low.
  5) The kickdown control is used to prevent the engine from overreving.
  6) The self-diagnosis function is applied.
- The O.D. control switch has been located on the selector lever.
- The manual linkage adjustment has been changed.

ON-VEHICLE SERVICE

Inhibitor Switch Adjustment

Disconnect harness at connector, then remove inhibitor switch.

- Check continuity at all ranges.



	P	R	N	D	2	1
1		○	○	○	○	○
2	○					
3		○				
4			○			
5	○					
6				○		
7					○	
8						○

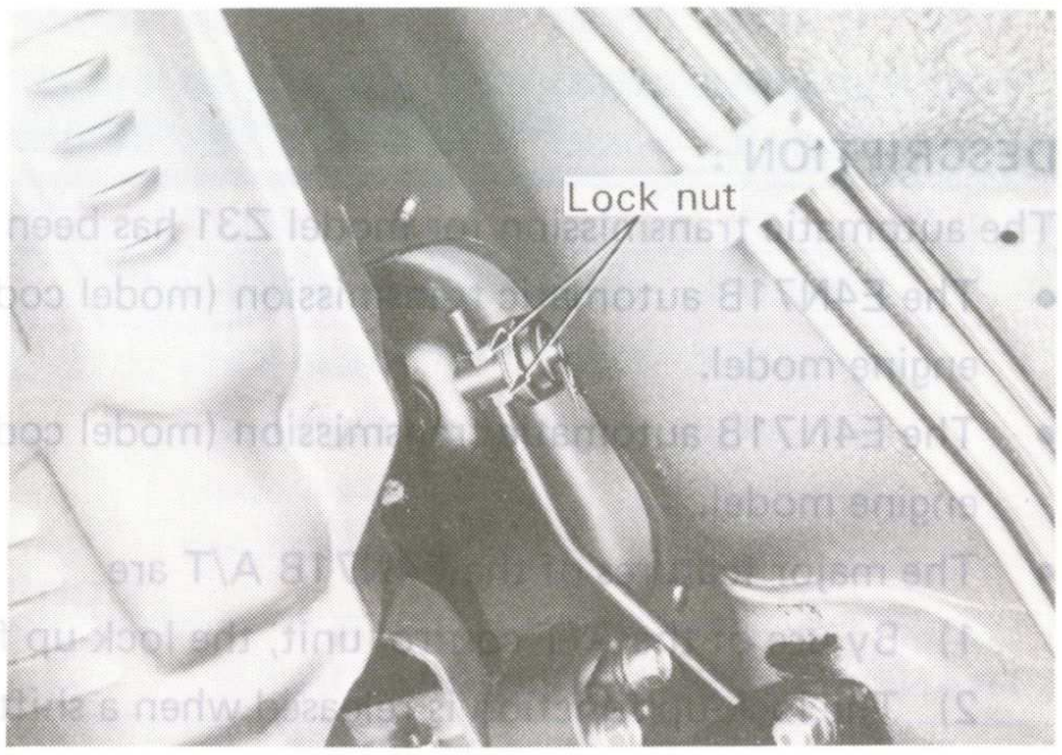
SAT060A

Manual Linkage Adjustment

Move the selector lever from the "P" range to "1" range. You should be able to feel the detents in each range.

If the detents cannot be felt or the pointer indicating the range is improperly aligned, the linkage needs adjustment.

1. Place selector lever in "P" range.
2. Loosen lock nuts.

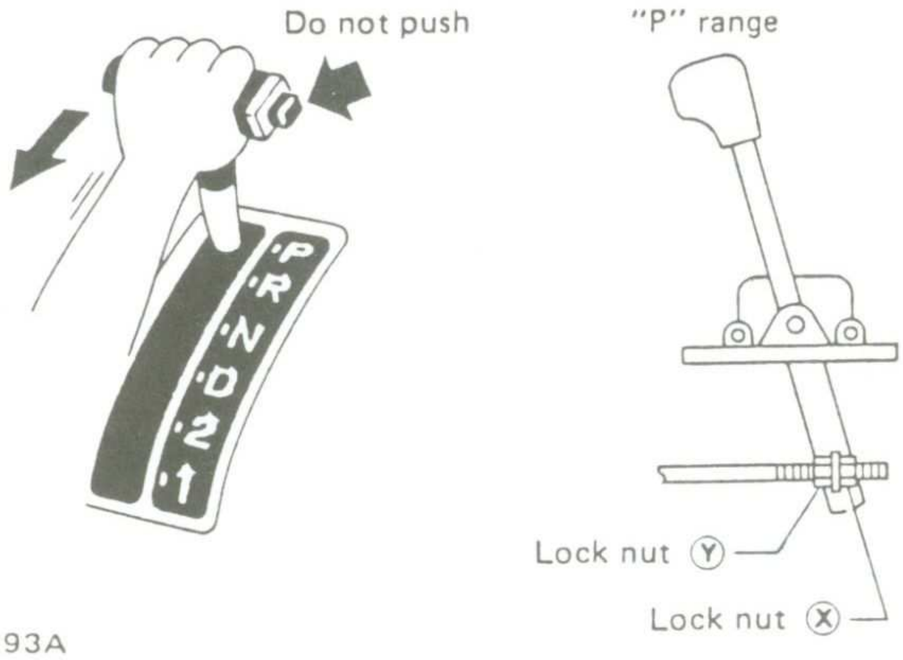


3. Tighten lock nut Ⓧ until it touches trunnion pulling selector lever toward "R" range side without pushing button.
4. Back off lock nut Ⓧ 1/4 - 1/2 turns and tighten lock nut Ⓨ to the specified torque.

Lock nut

8 - 11 N·m

(0.8 - 1.1 kg-m, 5.8 - 8.0 ft-lb)



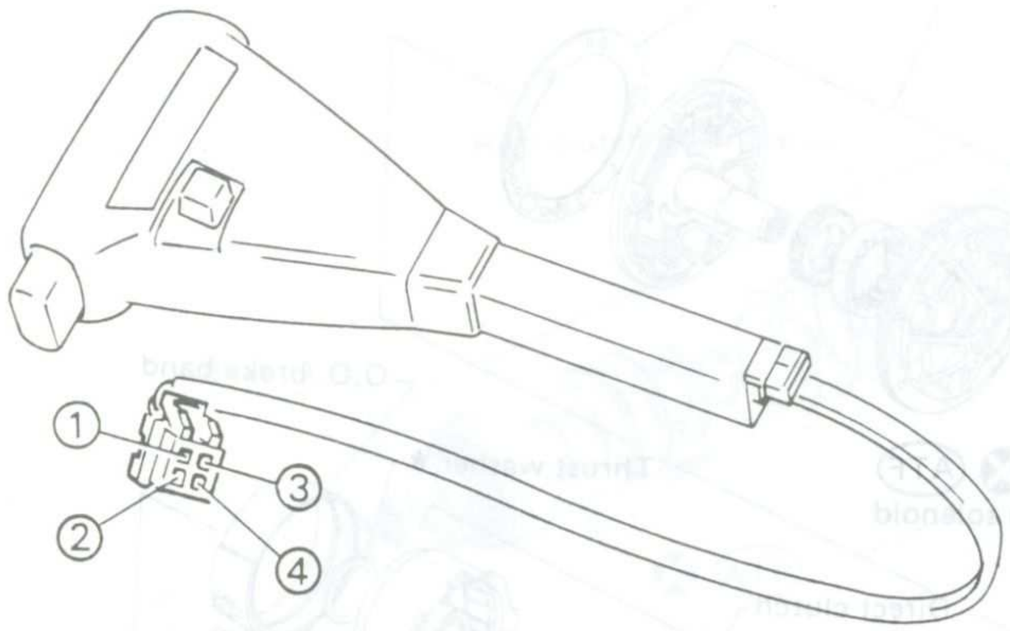
SAT293A

5. Move selector lever from "P" range to "1" range. Make sure that selector lever can move smoothly.

Overdrive and Lockup Control

O.D. CONTROL SWITCH & O.D. INDICATOR LAMP

Inspection

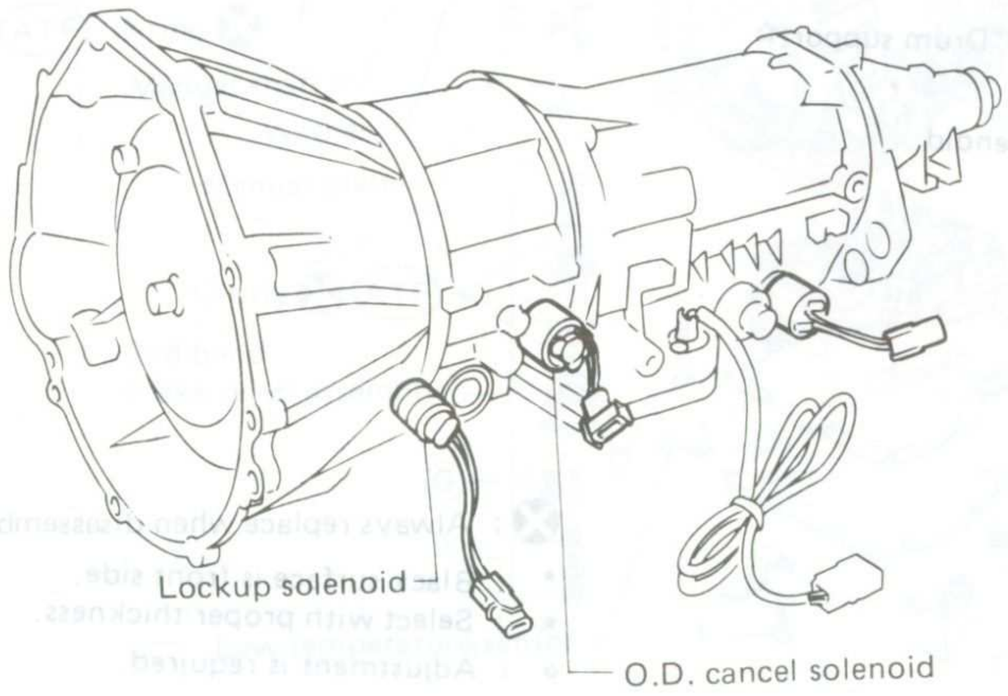


	ON	OFF
1		○
2		○
3	○	○
	⊖	⊖
4	○	○

SAT634A

O.D. CANCEL SOLENOID AND LOCKUP SOLENOID

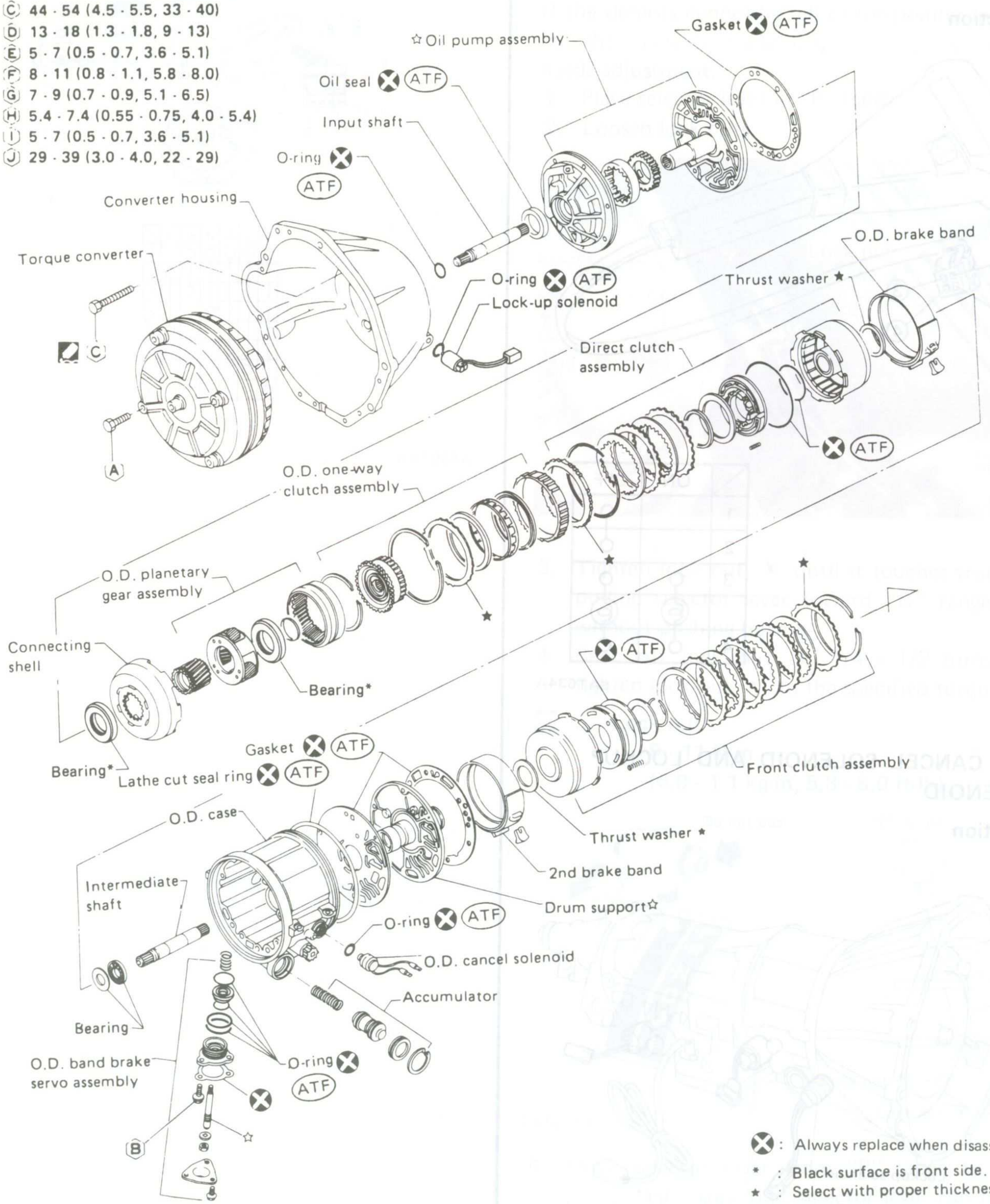
Location



SAT063A

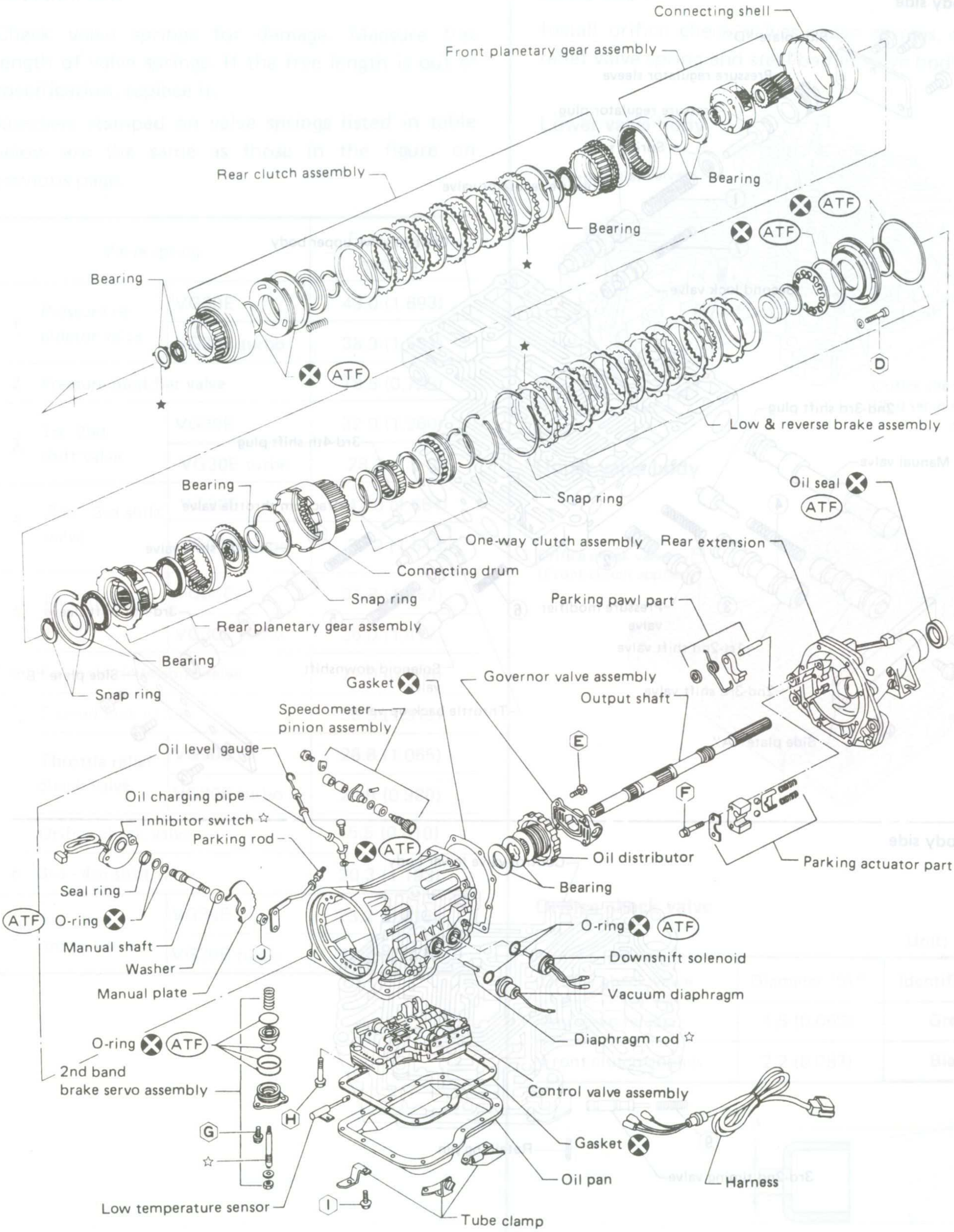
MAJOR OVERHAUL

: N·m (kg-m, ft-lb)
(A) 39 - 49 (4.0 - 5.0, 29 - 36)
(B) 10 - 15 (1.0 - 1.5, 7 - 11)
(C) 44 - 54 (4.5 - 5.5, 33 - 40)
(D) 13 - 18 (1.3 - 1.8, 9 - 13)
(E) 5 - 7 (0.5 - 0.7, 3.6 - 5.1)
(F) 8 - 11 (0.8 - 1.1, 5.8 - 8.0)
(G) 7 - 9 (0.7 - 0.9, 5.1 - 6.5)
(H) 5.4 - 7.4 (0.55 - 0.75, 4.0 - 5.4)
(I) 5 - 7 (0.5 - 0.7, 3.6 - 5.1)
(J) 29 - 39 (3.0 - 4.0, 22 - 29)



: Always replace when disassembled.
* : Black surface is front side.
★ : Select with proper thickness.
☆ : Adjustment is required.
ATF : Apply A.T.F.

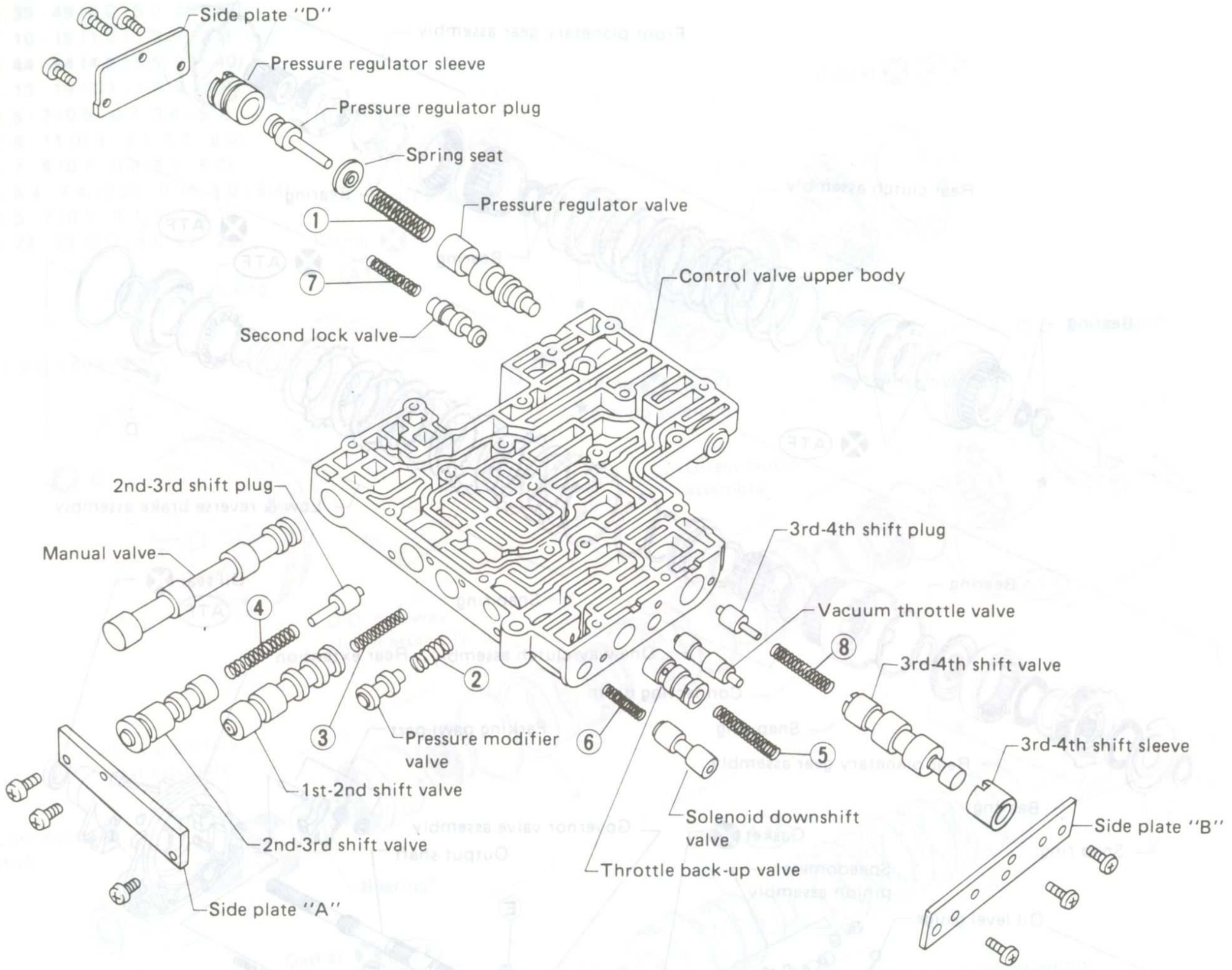
MAJOR OVERHAUL



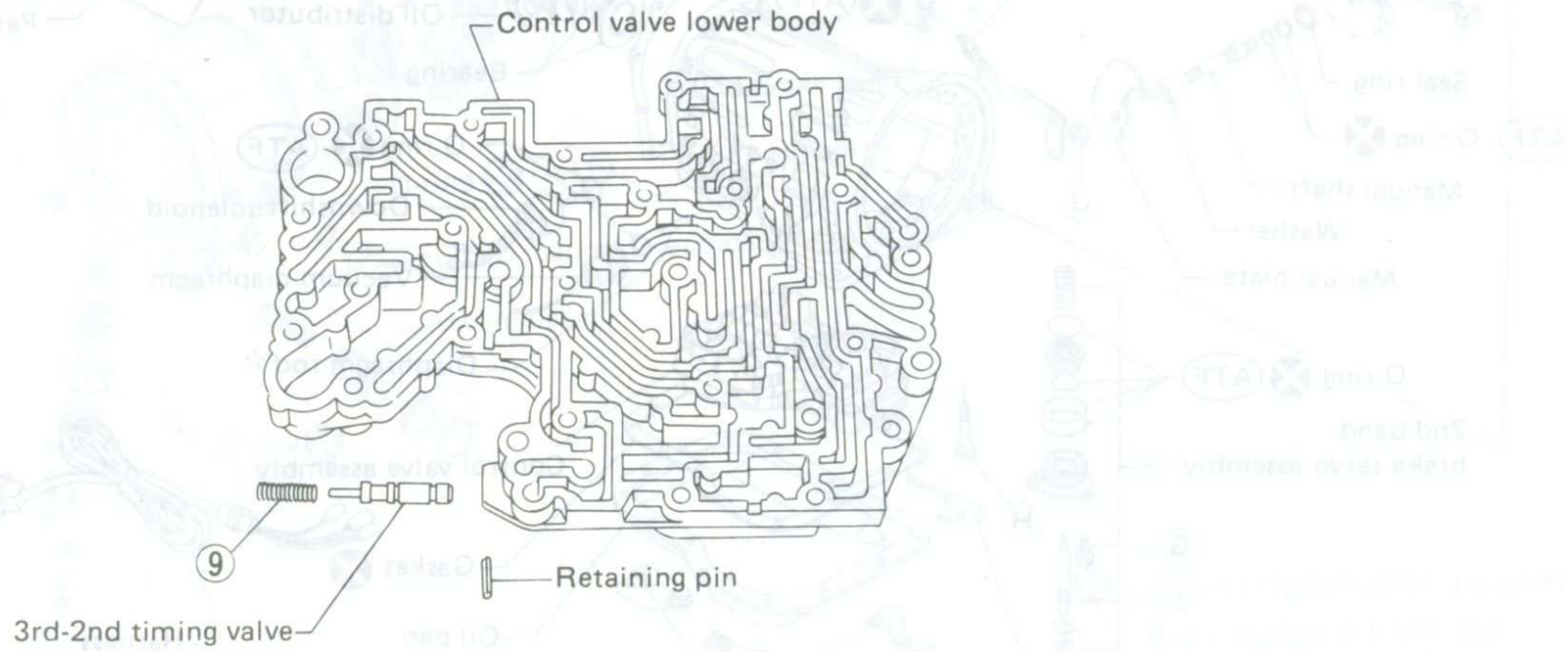
SAT559A

Control Valve Body

Upper body side



Lower body side



SAT621A

Control Valve Body (Cont'd)

INSPECTION

Check valve springs for damage. Measure free length of valve springs. If the free length is out of specification, replace it.

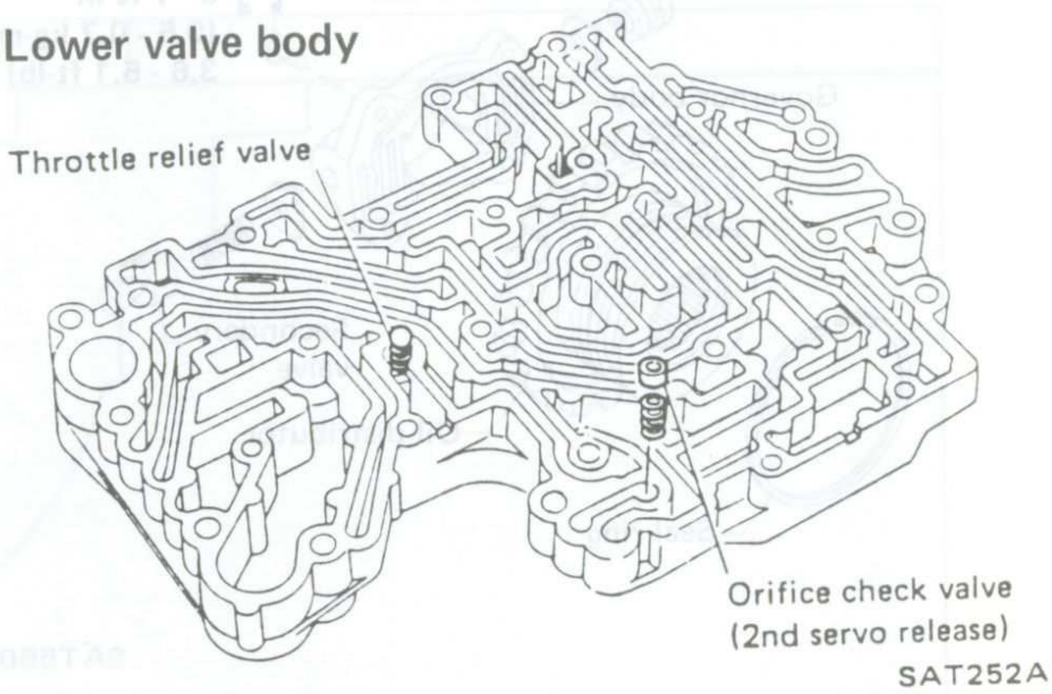
Numbers stamped on valve springs listed in table below are the same as those in the figure on previous page.

Valve spring		Free length mm (in)
① Pressure regulator valve	VG30E	43.0 (1.693)
	VG30E turbo	38.9 (1.531)
② Pressure modifier valve		18.5 (0.728)
③ 1st- 2nd shift valve	VG30E	32.0 (1.260)
	VG30E turbo	28.3 (1.114)
④ 2nd - 3rd shift valve	VG30E	42.0 (1.654)
	VG30E turbo	39.2 (1.543)
⑤ Throttle back-up valve	VG30E	31.8 (1.252)
	VG30E turbo	36.0 (1.417)
⑥ Solenoid downshift valve		22.0 (0.866)
⑦ Second lock valve		33.5 (1.319)
Throttle relief check valve	VG30E	26.8 (1.055)
	VG30E turbo	24.9 (0.980)
Orifice check valve		15.5 (0.610)
⑧ 3rd - 4th shift valve		30.3 (1.193)
⑨ 3rd - 2nd timing valve	VG30E	23.2 (0.913)
	VG30E turbo	22.2 (0.874)

ASSEMBLY

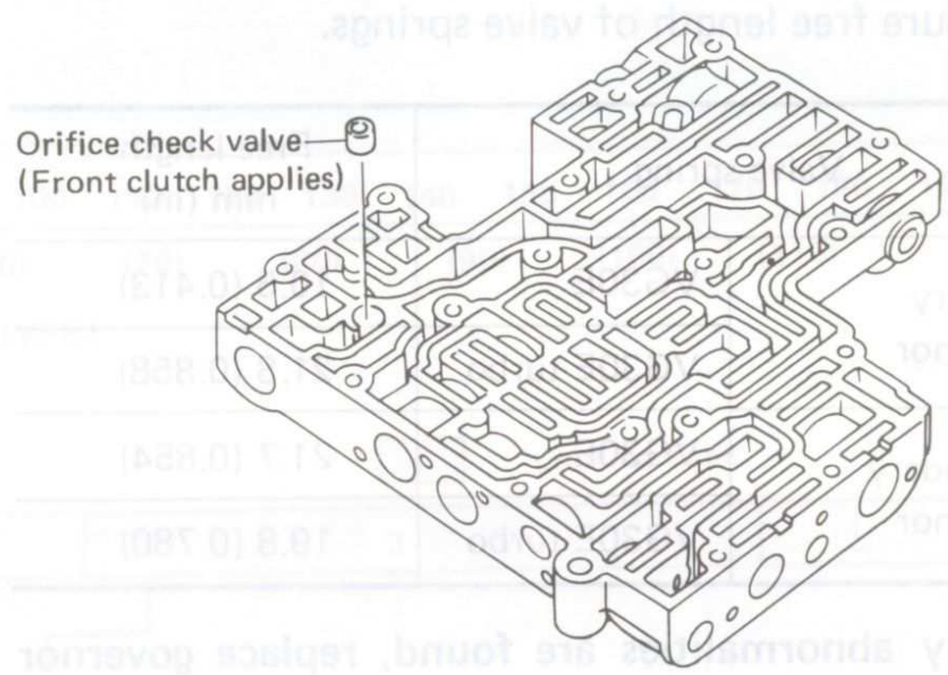
Install orifice check valves, valve springs, throttle relief valve spring and steel ball in valve body.

Lower valve body



SAT252A

Upper valve body

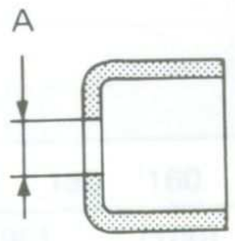


SAT766

Orifice check valve

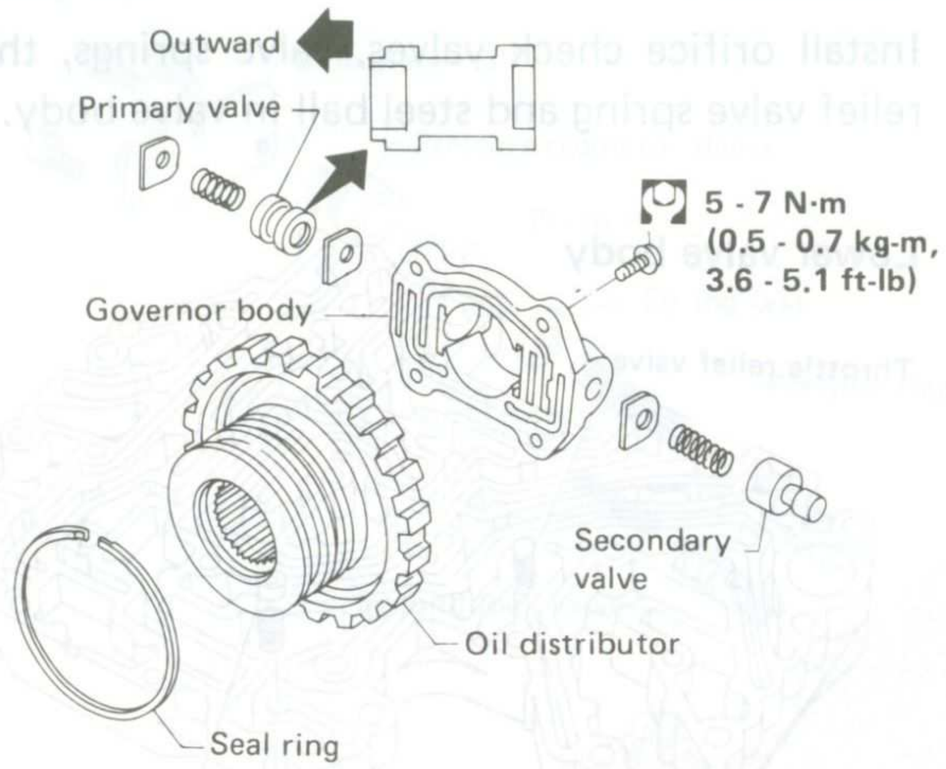
Unit: mm (in)

Orifice check valve	Diameter "A"	Identification
2nd servo release	1.5 (0.059)	Green
Front clutch applies	2.2 (0.087)	Black



SAT924

Governor



SAT560

INSPECTION

Measure free length of valve springs.

Valve spring		Free length mm (in)
Primary governor	VG30E	10.5 (0.413)
	VG30E turbo	21.8 (0.858)
Secondary governor	VG30E	21.7 (0.854)
	VG30E turbo	19.8 (0.780)

If any abnormalities are found, replace governor body, valves and springs as an assembly.

Road Testing

VEHICLE SPEED WHEN SHIFTING GEARS

1. Disconnect harness from A/T control unit. Road test the vehicle to determine if all items listed in the following chart are within their specified values.
2. Reconnect harness to A/T control unit. Road test the vehicle to see if shifting corresponds to the specified shift schedule pattern.

VG30E engine

Throttle position	Gearshift	Vehicle speed km/h (MPH)
Full throttle	$D_1 \rightarrow D_2$	65 - 73 (40 - 45)
	$D_2 \rightarrow D_3$	110 - 118 (68 - 73)
	$D_3 \rightarrow D_4$	—
	$D_4 \rightarrow D_3$	—
	$D_3 \rightarrow D_2$	98 - 106 (61 - 66)
	$D_2 \rightarrow D_1$	44 - 52 (27 - 32)

VG30E turbo engine

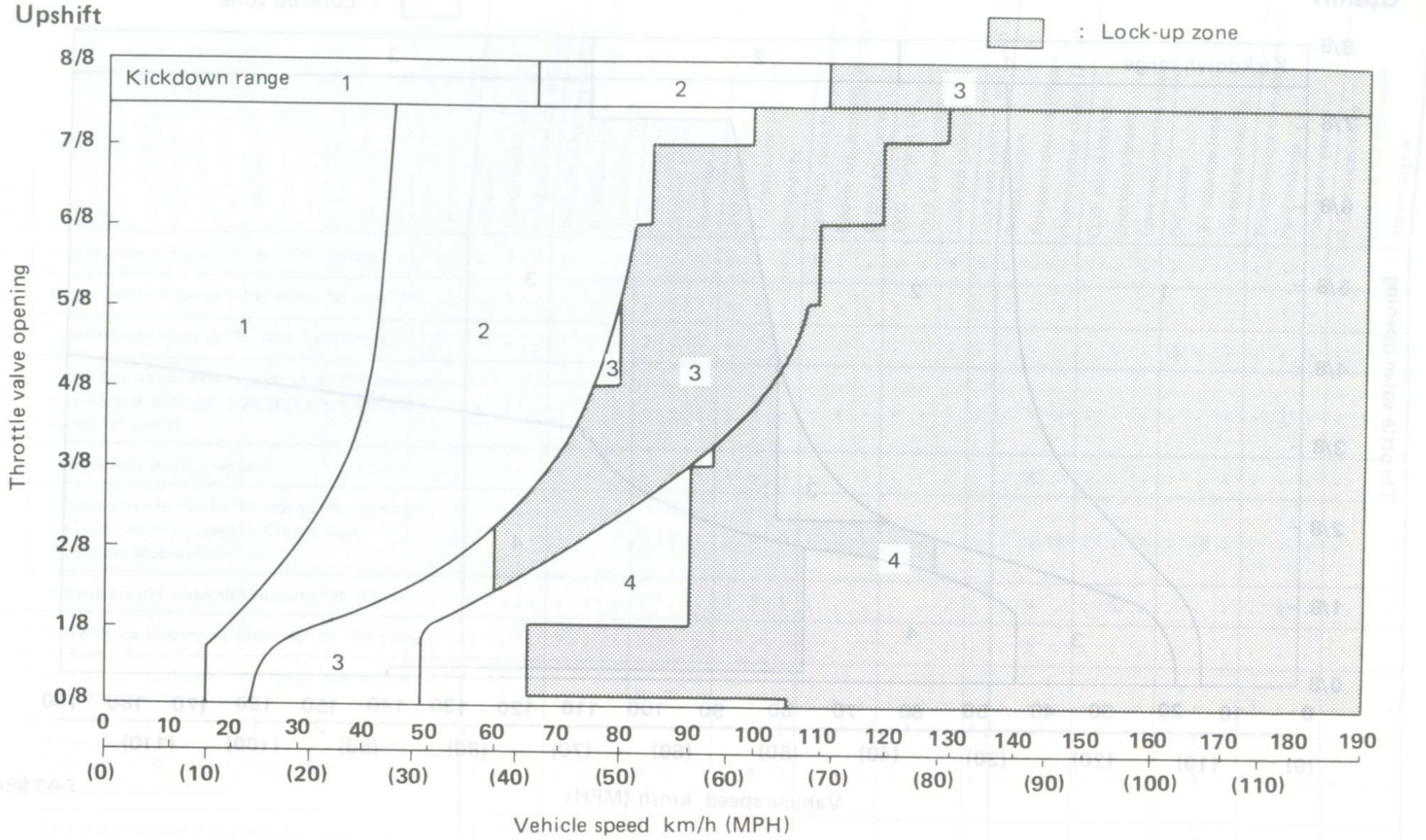
Throttle position	Gearshift	Vehicle speed km/h (MPH)
Full throttle	$D_1 \rightarrow D_2$	62 - 70 (39 - 43)
	$D_2 \rightarrow D_3$	108 - 116 (67 - 72)
	$D_3 \rightarrow D_4$	—
	$D_4 \rightarrow D_3$	—
	$D_3 \rightarrow D_2$	82 - 90 (51 - 56)
	$D_2 \rightarrow D_1$	42 - 50 (26 - 31)

Road Testing (Cont'd)

SHIFT SCHEDULE

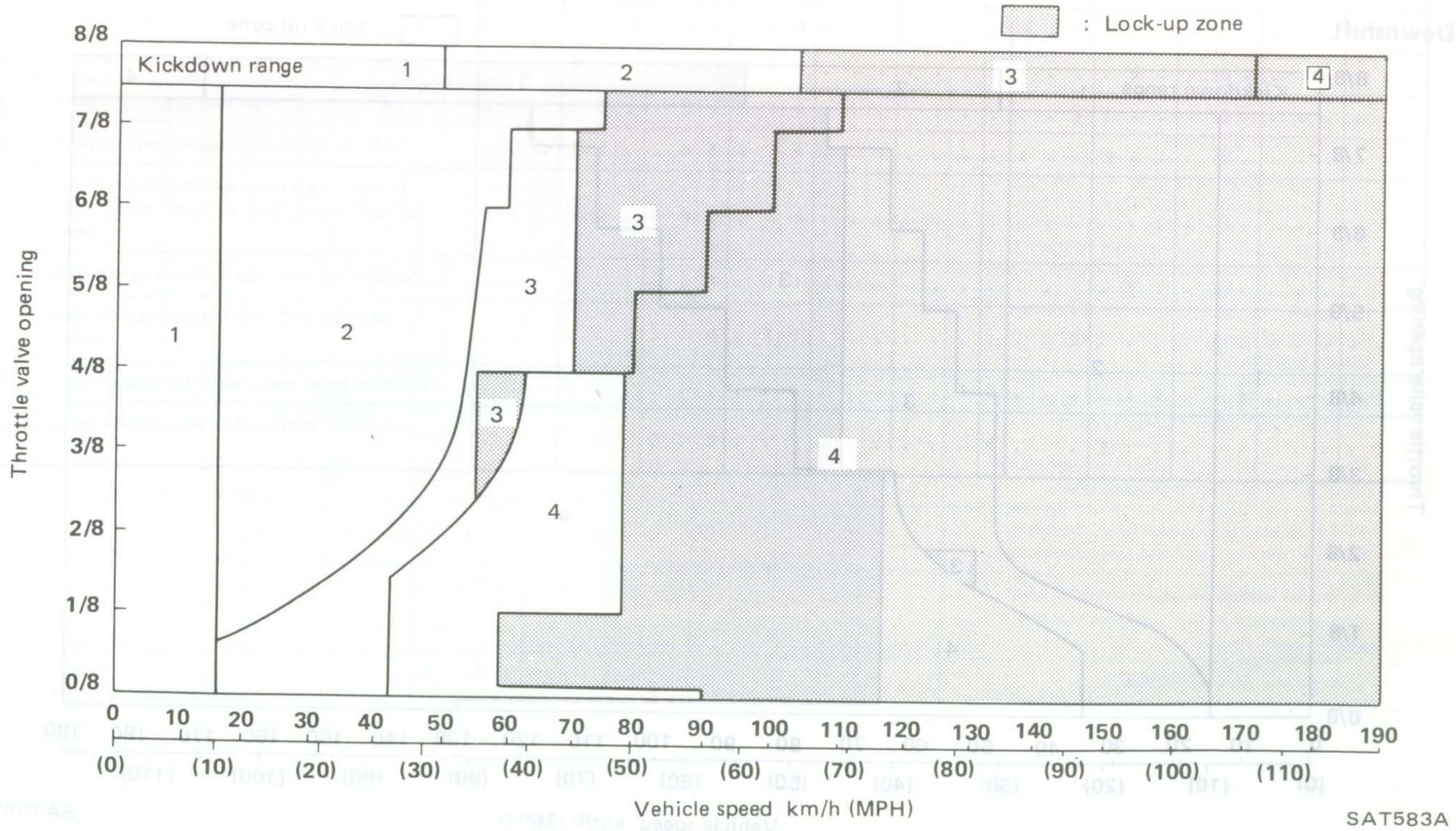
VG30E engine

Upshift



SAT582A

Downshift

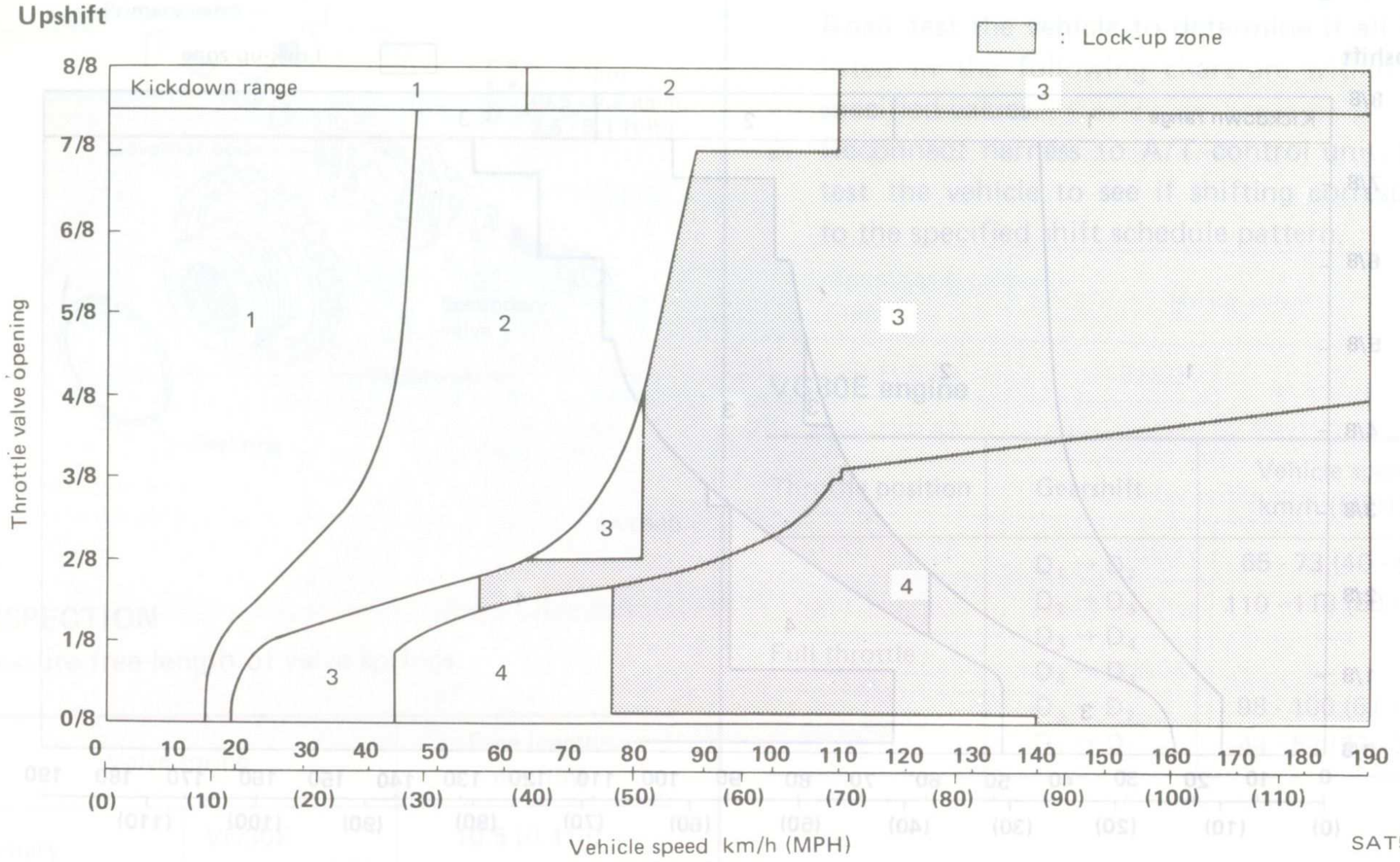


SAT583A

Road Testing (Cont'd)

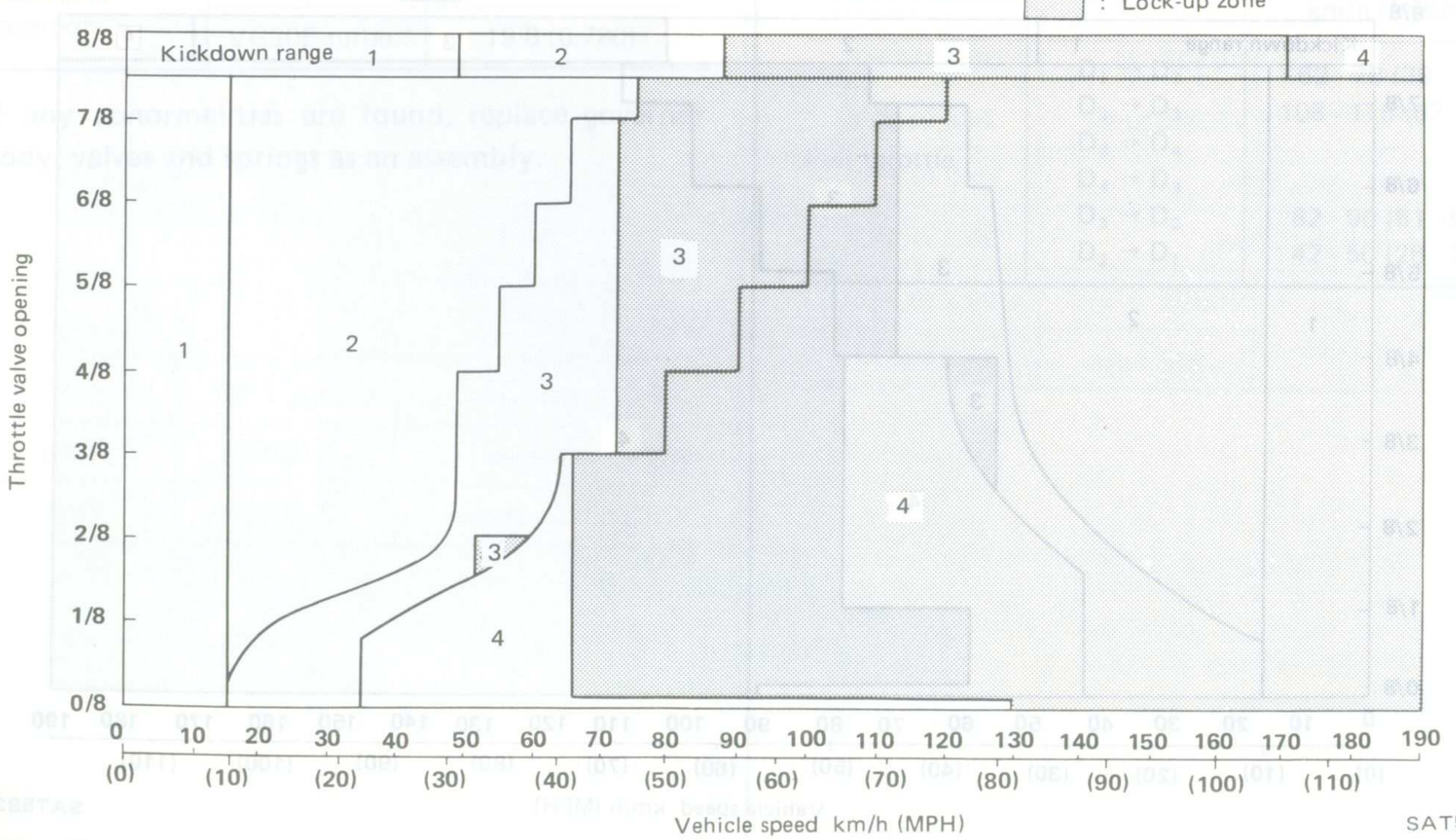
VG30E Turbo engine

Upshift



SAT584A

Downshift



SAT585A

TROUBLE-SHOOTING AND DIAGNOSES

Trouble-shooting Chart

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

Reference		ON vehicle: Oil level	Range select linkage	Inhibitor switch and wiring	Vacuum diaphragm and piping	Kickdown solenoid, switch and wiring	Engine idling rpm	Line pressure	Control valve	Governor	2nd band servo	Transmission air check	Oil quality	Ignition switch and starter motor	Engine adjustment, brake inspection	O.D. band servo	O.D. control SW.	O.D. cancel solenoid	Lock-up solenoid	Lock-up control unit and sensors	OFF vehicle: Direct clutch	Forward clutch (Rear)	High-reverse clutch (Front)	O.D. band brake	2nd band brake	Low and reverse brake	Oil pump	Oil passage leak	Torque converter	Transmission one-way clutch	Park linkage	Planetary gear	O.D. cancel valve	Lock-up control valve	Accumulator
Ⓐ	Engine does not start in "N", "P" ranges.	.	2	3	.	.	.	.	.	.	.	.	.	1	.	.	.	.	4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Engine starts in range other than "N" and "P".	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ⓑ	Transmission noise in "P" and "N" ranges.	1	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.
Ⓒ	Vehicle moves when changing into "P" range or parking gear does not disengage when shifted out of "P" range.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	②	.	.	.	.	.	.
Ⓓ	Vehicle runs in "N" range.	.	1	.	.	.	.	3	.	.	.	2	.	.	.	.	.	.	.	.	.	④	.	.	.	.	.	.	.	.	.	.	.	.	.
Ⓔ	Vehicle will not run in "R" range (but runs in "D", "2" and "1" ranges). Clutch slips. Very poor acceleration.	1	2	.	.	.	.	3	5	.	.	6	4	.	.	.	.	.	.	.	.	.	⑧	.	.	⑦	.	⑩	.	.	.	.	.	.	.
	Vehicle braked when shifting into "R" range.	.	.	.	.	.	.	.	.	.	3	2	1	.	.	.	.	.	.	.	.	④	.	.	⑤	.	.	.	.	.	⑥	.	.	.	.
Ⓕ	Sharp shock in shifting from "N" to "D" range.	.	.	.	2	.	1	3	4	.	.	.	.	.	.	.	.	.	.	.	.	⑤	.	.	.	.	.	.	.	.	.	.	.	.	.
Ⓖ	Vehicle will not run in "D" range (but runs in "2", "1" and "R" ranges).	.	1	.	.	.	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	④	.	.	.	.	.
Ⓗ	Vehicle will not run in "D", "1", "2" ranges (but runs in "R" range). Clutch ships. Very poor acceleration.	1	2	.	.	.	.	4	5	.	.	6	3	.	7	.	.	.	.	.	.	⑧	⑩	.	.	.	⑨	.	.	.	.	.	.	.	.
Ⓘ	Clutches or brakes slip somewhat in starting.	1	2	.	6	.	.	3	5	.	.	7	4	.	.	.	.	.	.	.	.	.	.	.	.	.	⑧	⑨	.	.	.	.	.	.	.
	Excessive creep.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	No creep at all.	1	2	.	.	.	3	.	5	.	.	.	4	.	.	.	.	.	.	.	.	⑧	⑨	⑩	.	.	.	⑥	⑦	.	.	.	.	.	.	.
Ⓙ	Failure to change gear from "1st" to "2nd".	.	1	.	2	3	.	.	5	6	8	7	4	.	.	.	.	.	.	.	.	.	.	.	.	⑨	.	.	⑩	.	.	.	.	.	.	.
Ⓚ	Failure to change gear from "2nd" to "3rd".	.	1	.	2	3	.	.	5	6	8	7	4	.	.	.	.	.	.	.	.	.	.	⑨	.	.	.	.	⑩	.	.	.	.	.	.	.
Ⓛ	Failure to change gear from "3rd" to "4th".	.	1	.	2	3	.	.	5	6	8	7	4	.	.	.	.	.	.	.	.	.	.	.	⑨	.	.	.	⑩	.	.	.	.	.	.	.
	Too high a gear change point from "1st" to "2nd", from "2nd" to "3rd", from "3rd" to "4th".	.	.	.	1	2	.	3	5	6	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	⑦	.	.	.	.	.	.	.
	Gear change directly from "1st" to "3rd" occurs.	.	.	.	.	.	.	.	2	4	.	3	1	.	.	.	.	.	.	.	.	.	.	.	⑤	.	.	.	⑥	.	.	.	.	.	.	.
	Gear change directly from "2nd" to "4th" occurs.	.	.	.	.	.	.	.	2	4	.	3	1	.	.	.	.	.	.	.	.	.	.	⑤	.	.	.	.	⑥	.	.	.	.	.	.	.
Ⓜ	Lock-up does not occur in any range (E4N71B).	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	3	.	.	.	.	④	.	.
Ⓝ	Large jolt changing from lock-up "OFF" to "ON".	.	.	.	.	.	.	2	.	3	.	.	1	.	.	.	.	.	.	4	.	.	.	⑥	.	.	.	.	.	.	.	.	.	⑤	.	.

TROUBLE-SHOOTING AND DIAGNOSES

Trouble-shooting Chart (Cont'd)

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

Reference		ON vehicle																OFF vehicle																	
		Oil level	Range select linkage	Inhibitor switch and wiring	Vacuum diaphragm and piping	Kickdown solenoid, switch and wiring	Engine idling rpm	Line pressure	Control valve	Governor	2nd band servo	Transmission air check	Oil quality	Ignition switch and starter motor	Engine adjustment, brake inspection	O.D. band servo	O.D. control SW.	O.D. cancel solenoid	Lock-up solenoid	Lock-up control unit and sensors	Direct clutch	Forward clutch (Rear)	High-reverse clutch (Front)	O.D. band brake	2nd band brake	Low and reverse brake	Oil pump	Oil passage leak	Torque converter	Transmission one-way clutch	Park linkage	Planetary gear	O.D. cancel valve	Lock-up control valve	Accumulator
Ⓞ	Too sharp a shock in change from "1st" to "2nd".	.	.	.	1	.	2	.	4	.	5	.	3	.	.	.	.	.	6	7	.	.	.	.	⑧	.	.	.	⑩	.	.	.	.	⑨	.
Ⓟ	Too sharp a shock in change from "2nd" to "3rd".	.	.	.	1	.	.	2	3	.	5	4	.	.	.	.	.	.	6	7	.	.	⑧	.	.	.	.	.	⑩	.	.	.	.	⑨	.
Ⓠ	Too sharp a shock in change from "3rd" to "4th".	.	.	.	1	.	.	2	3	.	.	7	.	.	.	4	.	.	5	6	.	.	.	⑧	.	.	.	.	⑩	.	.	.	.	⑨	.
Ⓡ	Almost no shock or clutches slipping in change from "1st" to "2nd".	1	2	.	3	.	.	4	6	.	8	7	5	.	.	.	.	.	.	.	.	.	.	.	⑨	.	.	⑩	.	.	.	.	.	.	.
Ⓢ	Almost no shock or slipping in change from "2nd" to "3rd". Engine races extremely fast.	1	2	.	3	.	.	4	6	.	8	7	5	.	.	.	.	.	.	.	.	.	⑨	.	.	.	.	⑩	.	.	.	.	.	.	.
Ⓣ	Almost no shock or slipping in change from "3rd" to "4th".	1	2	.	3	.	.	4	6	.	8	7	5	.	.	.	.	.	.	.	.	.	.	⑨	.	.	.	⑩	.	.	.	.	.	.	.
	Vehicle braked by gear change from "1st" to "2nd".	.	.	.	.	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	④	.	.	③	.	.	.	⑤	.	.	.	.	.
	Vehicle braked by gear change from "2nd" to "3rd".	.	.	.	.	.	.	.	3	.	2	.	1	.	.	.	.	.	.	.	.	.	.	.	④	.	.	.	.	.	.	.	.	.	.
	Vehicle braked by gear change from "3rd" to "4th".	.	.	.	.	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	③	.	④	.	.	.	.	.	.	.	.	.	.	.	.
Ⓤ	Maximum speed not attained. Acceleration poor.	1	2	.	.	.	5	4	7	.	6	.	3	.	8	.	.	.	.	.	.	⑪	⑫	.	⑨	⑩	⑬	.	⑭	.	.	.	.	.	.	.
Ⓥ	Failure to change gear from "4th" to "3rd".	.	.	.	1	.	.	.	3	4	.	5	2	.	.	.	6	7	8	.	⑨	.	⑩	⑪	.	.	.	⑫	.	.	.	.	.	⑬	.	.
Ⓦ	Failure to change gear from "3rd" to "2nd" and from "4th" to "2nd".	.	.	.	1	.	.	.	3	4	6	5	2	.	.	.	.	.	.	.	.	.	⑦	⑩	⑧	.	.	⑨	.	.	.	.	.	.	.	.
Ⓧ	Failure to change gear from "2nd" to "1st" or from "3rd" to "1st".	.	.	.	1	.	.	.	3	4	6	5	2	.	.	.	.	.	.	.	.	.	.	.	⑦	.	.	.	.	⑧	.	.	.	.	.
	Gear change shock felt during deceleration by releasing accelerator pedal.	.	1	.	2	3	.	4	5	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	⑦	.	.	.	.	.	.	.	⑧
	Too high a change point from "4th" to "3rd", from "3rd" to "2nd", from "2nd" to "1st".	.	1	.	2	3	.	4	5	6	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	⑧	.	.	.	.	.	.	.	.
Ⓨ	Kickdown does not operate when depressing pedal in "3rd" within kickdown vehicle speed.	.	.	.	2	1	.	.	4	5	.	.	3	.	.	.	.	.	.	.	.	.	.	⑥	.	.	⑦	.	.	.	.	.	.	.	.
	Kickdown operates or engine overruns when depressing pedal in "3rd" beyond kickdown vehicle speed limit.	.	1	.	2	.	.	3	5	6	.	7	4	.	.	.	.	.	.	.	.	.	⑧	.	.	.	⑨	.	.	.	.	.	.	.	.
Ⓩ	Races extremely fast or slips in changing from "4th" to "3rd" when depressing pedal.	.	.	.	1	.	.	2	4	.	6	5	3	.	.	.	.	.	.	.	.	⑦	⑧	⑨	.	.	.	⑩	.	.	.	.	.	.	.
(A1)	Races extremely fast or slips in changing from "3rd" to "2nd" when depressing pedal.	.	.	.	1	.	.	2	4	.	6	5	3	.	.	.	.	.	.	.	.	.	⑦	.	⑧	.	.	⑨	.	.	.	.	.	.	.
(A2)	Kickdown does not operate when depressing pedal in "4th" within kickdown vehicle speed.	.	.	.	2	1	.	.	4	5	.	.	3	.	.	.	.	.	.	.	⑦	.	⑥	.	.	.	.	⑧	.	.	.	.	.	.	.	.
	Kickdown operates or engine overruns when depressing pedal in "4th" beyond kickdown vehicle speed limit.	.	1	.	2	.	.	3	5	6	.	7	4	.	.	.	.	.	.	.	.	.	.	⑧	.	.	.	⑨	.	.	.	.	.	.	.
	Shift pattern does not change.	.	.	.	1	3	.	.	7	.	.	.	.	.	5	.	2	4	.	6	.	.	.	.	.	.	.	.	.	.	.	.	⑧	.	.

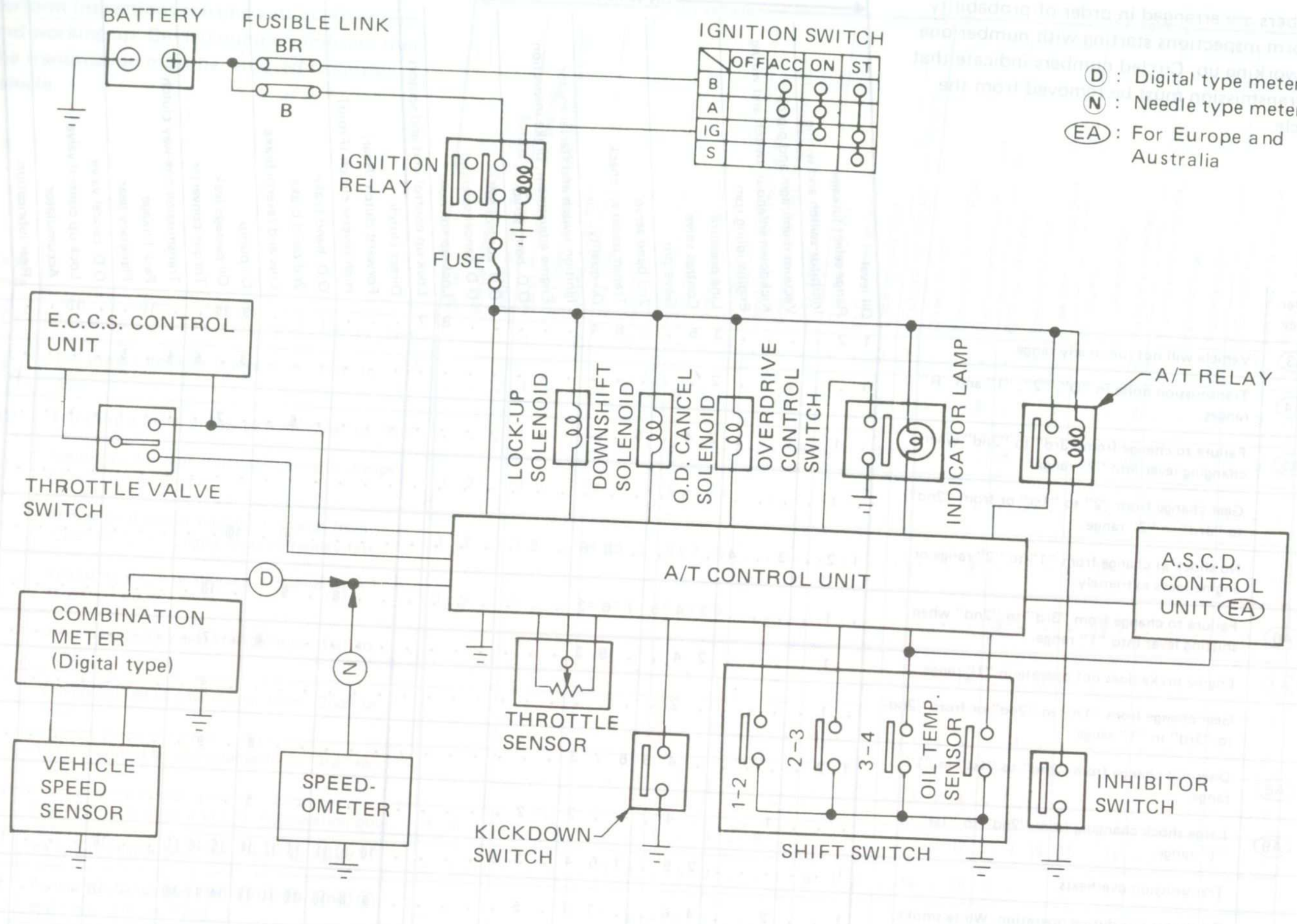
TROUBLE-SHOOTING AND DIAGNOSES

Trouble-shooting Chart (Cont'd)

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

Reference		ON vehicle: Oil level	Range select linkage	Inhibitor switch and wiring	Vacuum diaphragm and piping	Kickdown solenoid, switch and wiring	Engine idling rpm	Line pressure	Control valve	Governor	2nd band servo	Transmission air check	Oil quality	Ignition switch and starter motor	Engine adjustment, brake inspection	O.D. band servo	O.D. control SW.	O.D. cancel solenoid	Lock-up solenoid	Lock-up control unit and sensors	OFF vehicle: Direct clutch	Forward clutch (Rear)	High-reverse clutch (Front)	O.D. band brake	2nd band brake	Low and reverse brake	Oil pump	Oil passage leak	Torque converter	Transmission one-way clutch	Park linkage	Planetary gear	O.D. cancel valve	Lock-up control valve	Accumulator	Rear lubrication
A3	Vehicle will not run in any range.	1	2	.	.	.	.	3	5	.	.	6	4	.	.	.	.	.	8	7	.	.	.	.	.	.	⑨	⑩	.	.	⑪	.	.	⑫	.	.
A4	Transmission noise in "D", "2", "1" and "R" ranges.	1	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	③	.	⑥	④	.	⑤	.	.	.	.
A5	Failure to change from "3rd" to "2nd" when changing lever into "2" range.	.	1	.	.	.	.	2	4	.	5	.	3	.	.	.	.	.	.	.	.	.	.	⑥	.	.	⑦	.	.	.	.	.	.	.	.	.
	Gear change from "2" to "1st" or from "2nd" to "3rd" in "2" range.	.	1	.	.	.	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	No shock at change from "1" to "2" range or engine races extremely.	1	2	.	3	.	4	.	7	.	.	8	6	.	5	.	.	.	.	.	.	.	.	⑨	.	⑩	.	.	.	.	.	.	.	.	.	.
A6	Failure to change from "3rd" to "2nd" when shifting lever into "1" range.	.	1	.	.	.	.	2	4	5	7	6	3	.	.	.	.	.	.	.	.	.	⑧	.	⑨	.	.	⑩	.	.	.	.	.	.	.	.
A7	Engine brake does not operate in "1" range.	.	1	.	.	.	.	2	4	.	.	5	3	.	.	.	.	.	.	.	.	.	.	.	⑥	.	.	⑦	.	.	.	.	.	.	.	.
	Gear change from "1st" to "2nd" or from "2nd" to "3rd" in "1" range.	.	1	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	③	.	.	.	.	.	.	.	.
A8	Does not change from "2nd" to "1st" in "1" range.	1	2	.	.	.	.	.	4	5	6	7	3	.	.	.	.	.	.	.	.	.	.	.	⑧	.	⑨	.	.	.	.	.	.	.	.	.
A9	Large shock changing from "2nd" to "1st" in "1" range.	.	.	.	1	.	.	.	4	.	.	.	3	.	2	.	.	.	.	.	.	.	.	.	⑤	.	.	.	.	.	.	.	.	.	.	.
	Transmission overheats.	1	.	.	.	.	.	2	5	.	7	6	4	.	3	8	.	.	.	.	⑩	⑨	⑪	⑬	⑫	⑭	⑮	⑯	⑰	.	.	⑱	.	.	.	⑲
	Oil shoots out during operation. White smoke emitted from exhaust pipe during operation.	1	.	.	2	.	.	4	6	.	.	7	3	.	5	.	.	.	.	.	⑨	⑧	⑩	⑫	⑪	⑬	⑭	⑮	⑯	.	.	⑰	.	.	.	⑱
	Offensive smell at oil charging pipe.	1	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	.	.	⑫	.	.	.	.
	Transmission shifts to overdrive even if O.D. control switch is turned to "ON"	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	3	.	.	.	.	.	.	.	.	.	.	.	.	④	.	.	.
	Lamp inside O.D. control switch does not glow even if ignition switch is turned to "ON" (engine not started).	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Lamp inside O.D. cancel switch does not glow even if transmission is shifted to O.D.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

E4N71B Electrical System/Schematic

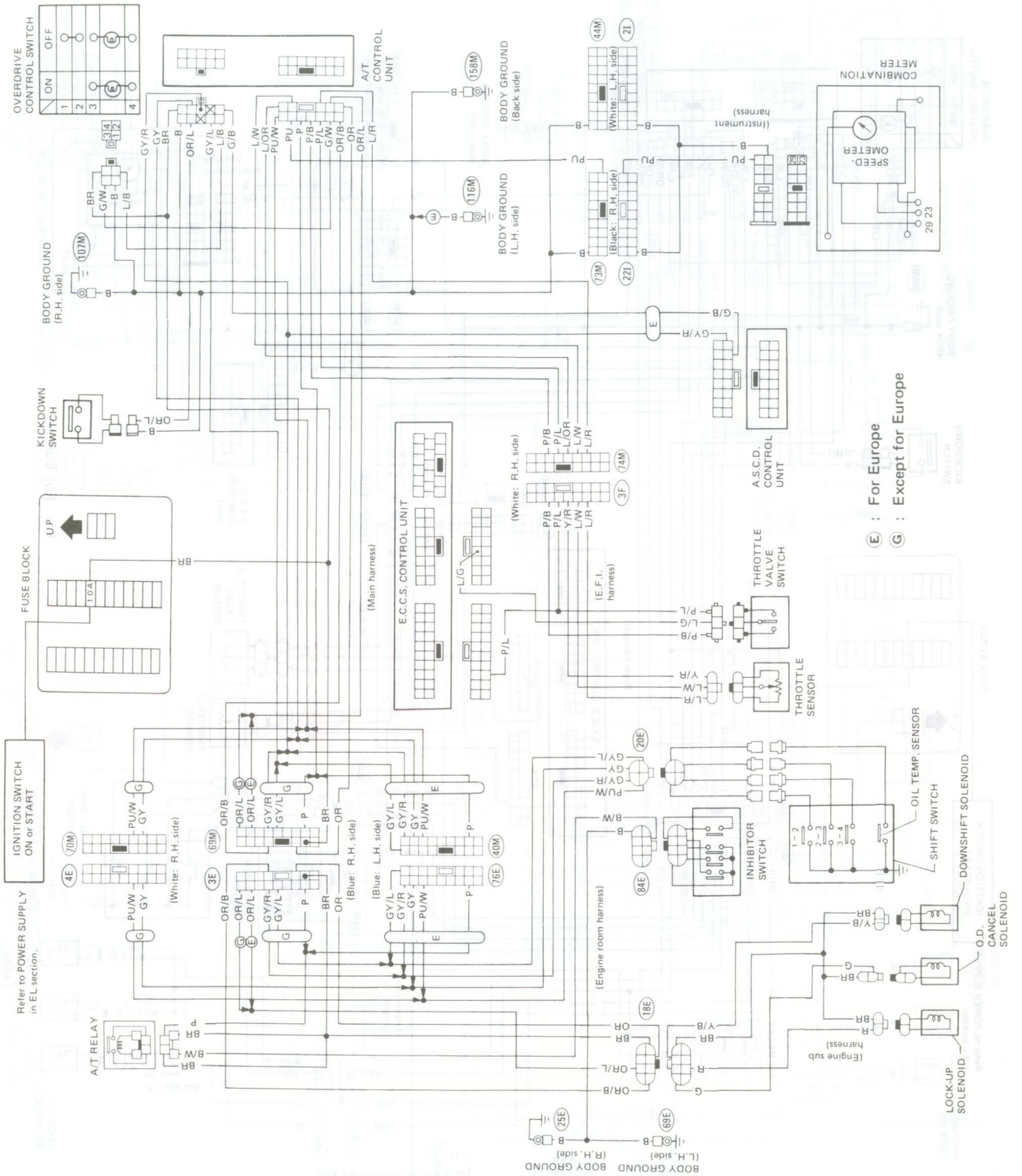


(D) : Digital type meter
(N) : Needle type meter
(EA) : For Europe and Australia

SAT630A

E4N71B Electrical System/Wiring Diagram

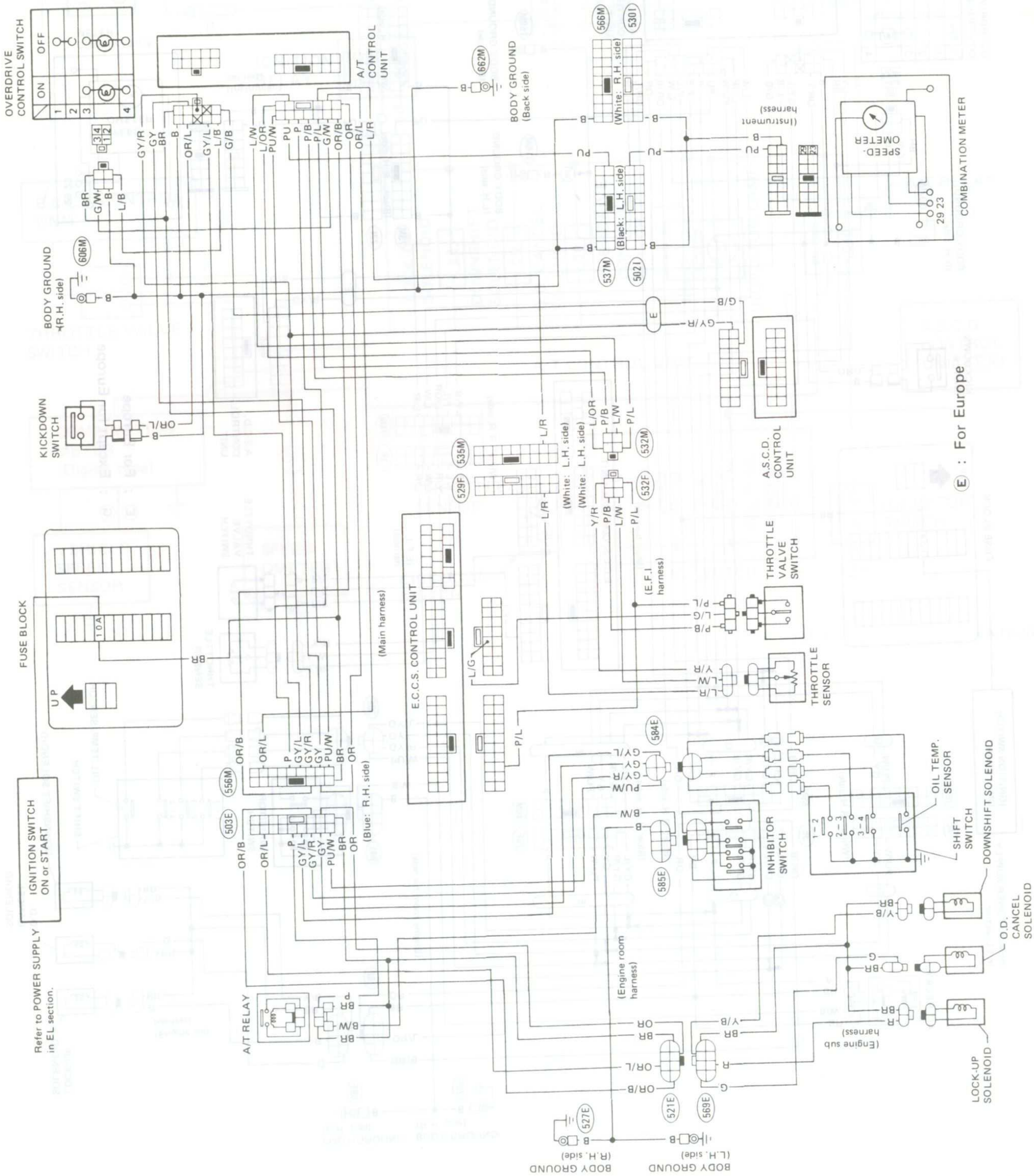
L.H. DRIVE MODELS



SAT631A

E4N71B Electrical System/Wiring Diagram (Cont'd)

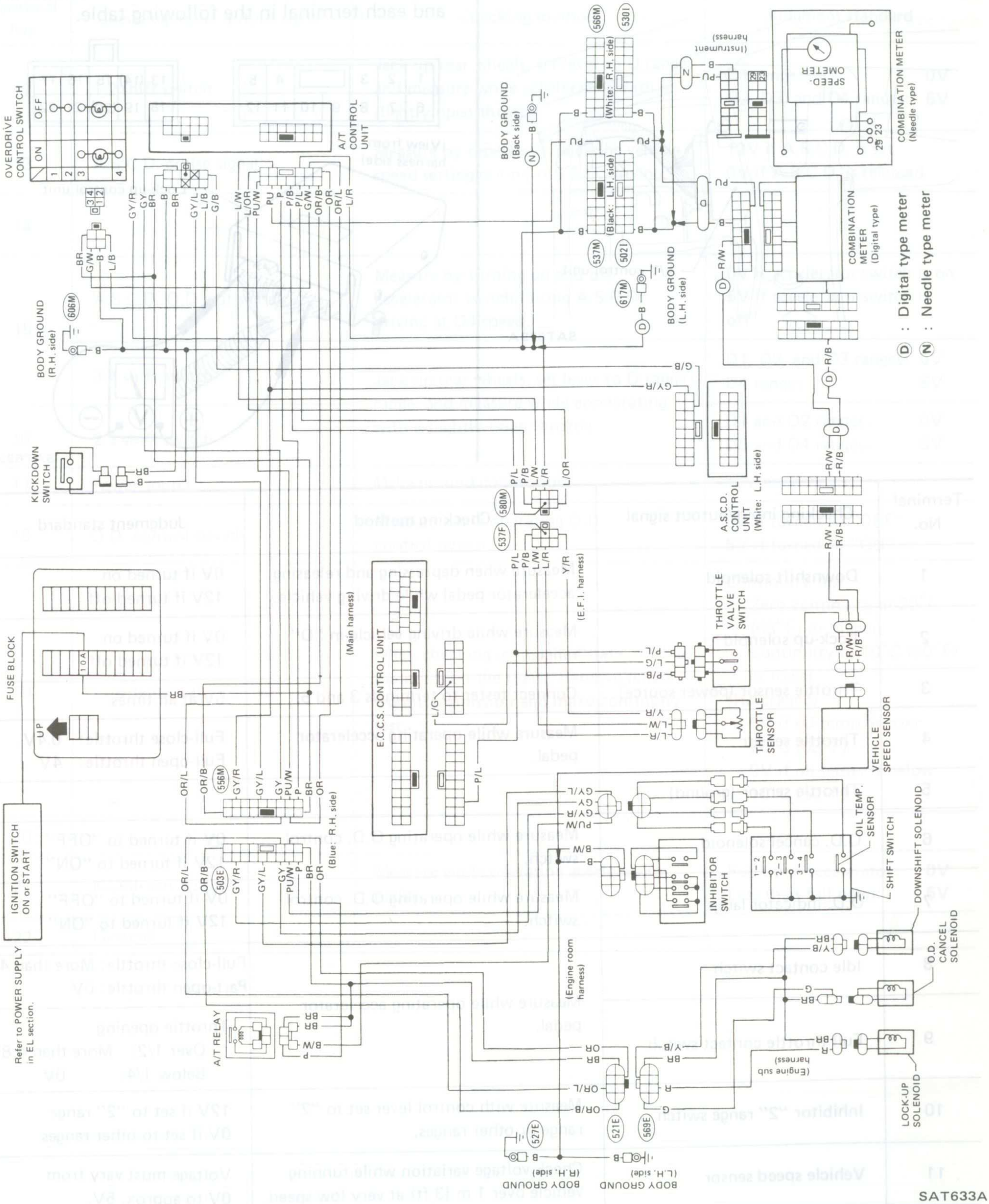
R.H. DRIVE MODELS EXCEPT FOR AUSTRALIA



SAT632A

E4N71B Electrical System/Wiring Diagram (Cont'd)

FOR AUSTRALIA

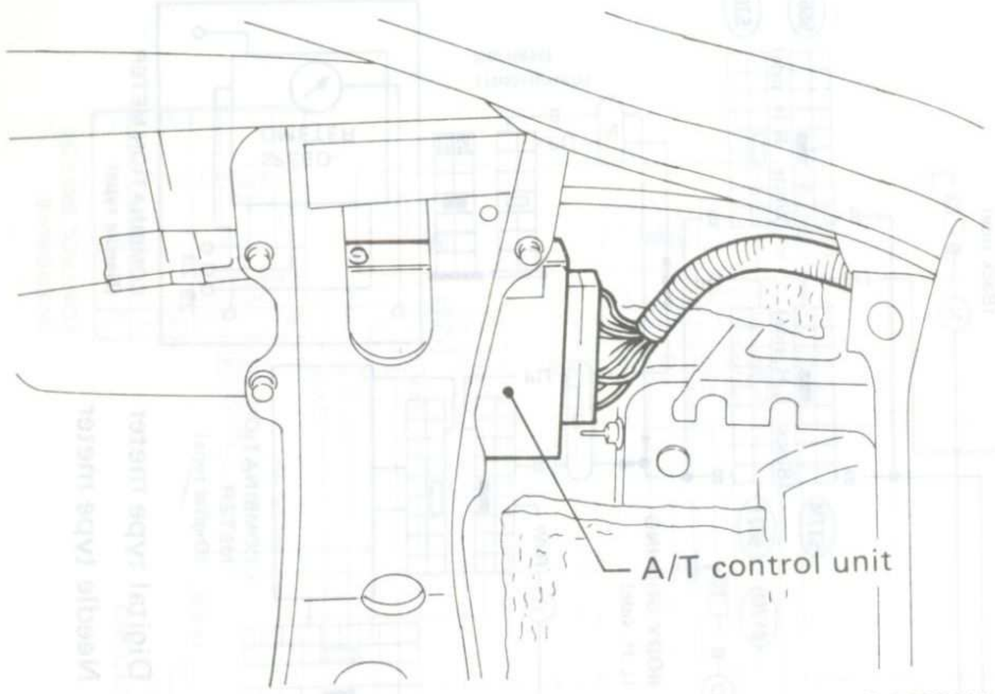


SAT633A

TROUBLE-SHOOTING AND DIAGNOSES

Location of A/T Control Unit

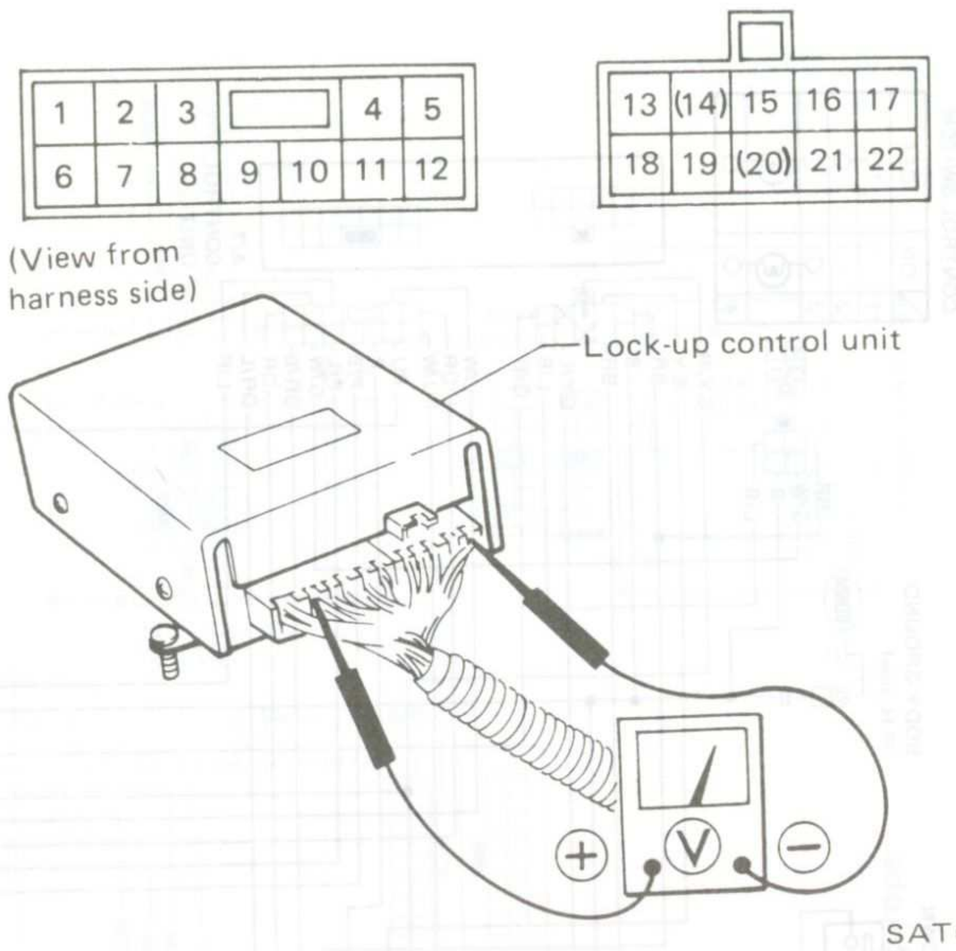
A/T control unit is located on R.H. rear side panel.



SAT629A

Inspection of A/T Control Unit

Check voltage between No. 22 terminal (Ground) and each terminal in the following table.



SAT622A

Terminal No.	Checking input/output signal	Checking method	Judgment standard
1	Downshift solenoid	Measure when depressing and releasing accelerator pedal while driving vehicle.	0V if turned on 12V if turned off
2	Lock-up solenoid	Measure while driving vehicle in "D" range.	0V if turned on 12V if turned off
3	Throttle sensor (power source)	Connect tester to terminals 3 and 5.	5V at all times
4	Throttle sensor	Measure while operating accelerator pedal.	Full-close throttle: 0.4V Full-open throttle: 4V
5	Throttle sensor (ground)	—	—
6	O.D. cancel solenoid	Measure while operating O.D. control switch.	0V if turned to "OFF" 12V if turned to "ON"
7	O.D. indicator lamp	Measure while operating O.D. control switch.	0V if turned to "OFF" 12V if turned to "ON"
8	Idle contact switch	Measure while operating accelerator pedal.	Full-close throttle: More than 4.8V Part-open throttle: 0V
9	Full throttle contact switch		Throttle opening Over 1/2: More than 4.8V Below 1/4: 0V
10	Inhibitor "2" range switch	Measure with control lever set to "2" range or other ranges.	12V if set to "2" range 0V if set to other ranges
11	Vehicle speed sensor	Check voltage variation while running vehicle over 1 m (3 ft) at very low speed.	Voltage must vary from 0V to approx. 5V.

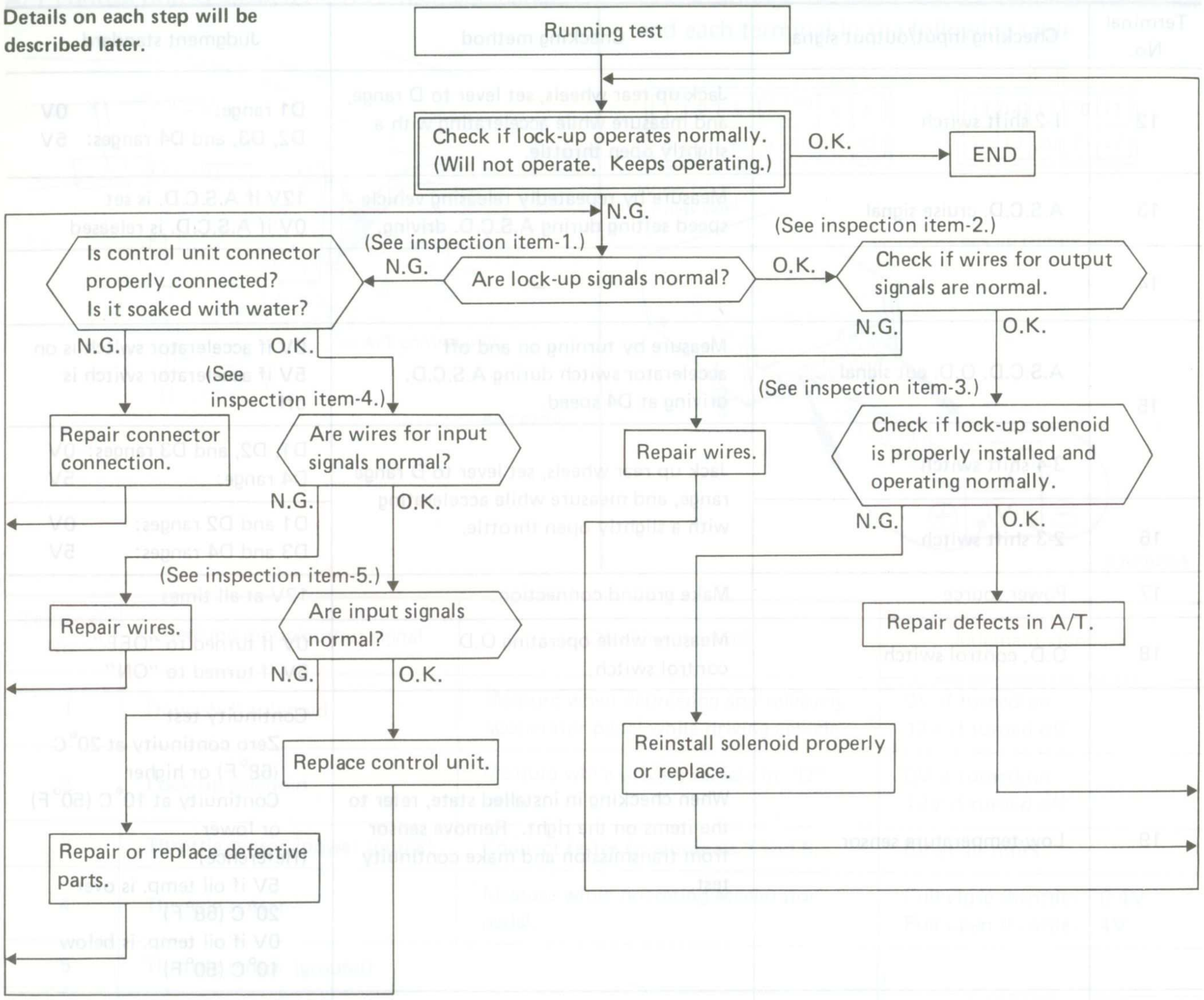
Inspection of A/T Control Unit (Cont'd)

Terminal No.	Checking input/output signal	Checking method	Judgment standard
12	1-2 shift switch	Jack up rear wheels, set lever to D range, and measure while accelerating with a slightly open throttle.	D1 range: 0V D2, D3, and D4 ranges: 5V
13	A.S.C.D. cruise signal	Measure by repeatedly releasing vehicle speed setting during A.S.C.D. driving.	12V if A.S.C.D. is set 0V if A.S.C.D. is released
14	—	—	—
15	A.S.C.D. O.D. cut signal	Measure by turning on and off accelerator switch during A.S.C.D. driving at D4 speed.	0V if accelerator switch is on 5V if accelerator switch is off
	3-4 shift switch	Jack up rear wheels, set lever to D range range, and measure while accelerating with a slightly open throttle.	D1, D2, and D3 ranges: 0V D4 range: 5V
16	2-3 shift switch		D1 and D2 ranges: 0V D3 and D4 ranges: 5V
17	Power source	Make ground connection.	12V at all times
18	O.D. control switch	Measure while operating O.D. control switch.	0V if turned to "OFF" 5V if turned to "ON"
19	Low-temperature sensor	When checking in installed state, refer to the items on the right. Remove sensor from transmission and make continuity test.	Continuity test Zero continuity at 20°C (68°F) or higher Continuity at 10°C (50°F) or lower (Reference) 5V if oil temp. is over 20°C (68°F) 0V if oil temp. is below 10°C (50°F)
20	—	—	—
21	Kickdown switch	Measure while operating accelerator pedal.	Full-open accelerator: 0V Less than full open: 5V
22	Ground	—	—

TROUBLE-SHOOTING AND DIAGNOSES

Inspection of Lockup Control

Details on each step will be described later.

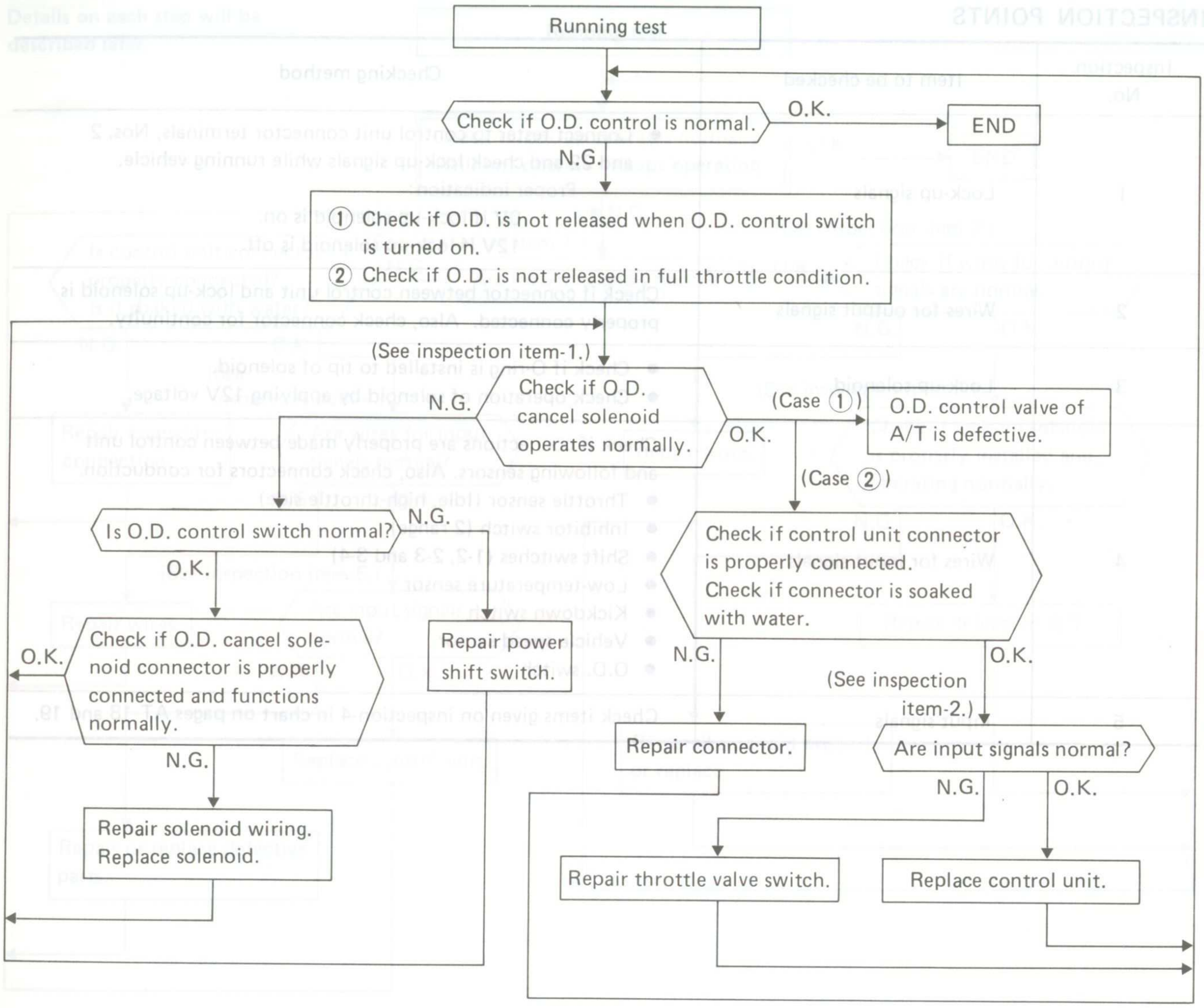


Inspection of Lockup Control (Cont'd)

INSPECTION POINTS

Inspection No.	Item to be checked	Checking method
1	Lock-up signals	• Connect tester to control unit connector terminals, Nos. 2 and 22 and check lock-up signals while running vehicle. Proper indication: 0V if lock-up solenoid is on. 12V if lock-up solenoid is off.
2	Wires for output signals	Check if connector between control unit and lock-up solenoid is properly connected. Also, check connector for continuity.
3	Lock-up solenoid	• Check if O-ring is installed to tip of solenoid. • Check operation of solenoid by applying 12V voltage.
4	Wires for input signals	Check if connections are properly made between control unit and following sensors. Also, check connectors for conduction. • Throttle sensor (Idle, high-throttle side) • Inhibitor switch (2 range) • Shift switches (1-2, 2-3 and 3-4) • Low-temperature sensor • Kickdown switch • Vehicle speed sensor • O.D. switch
5	Input signals	Check items given on inspection-4 in chart on pages AT-18 and 19.

Inspection of O.D. Control

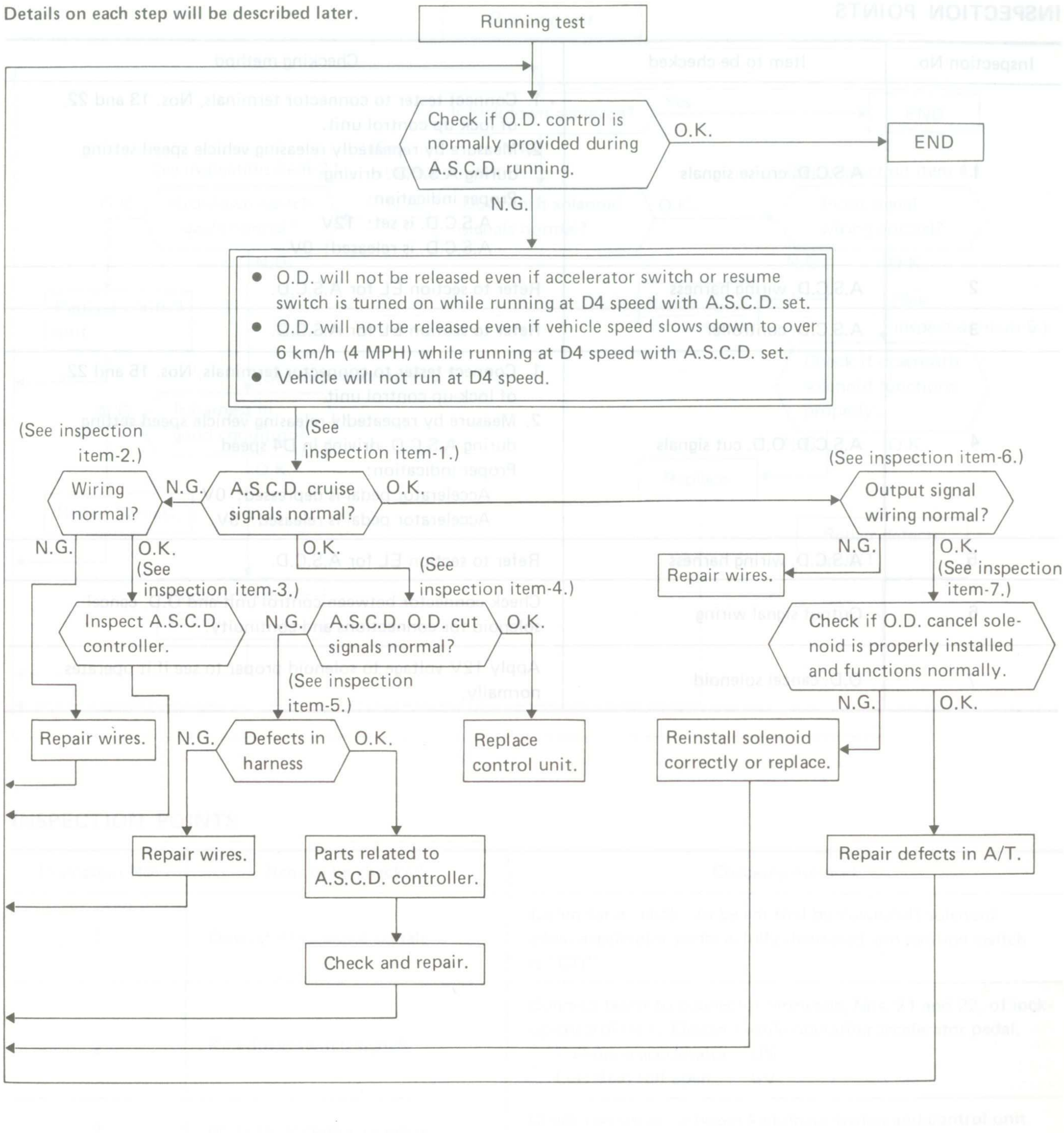


INSPECTION POINTS

Inspection No.	Item to be checked	Checking method
1	O.D. solenoid	Turn on key and set O.D. switch to "O.D. release" position to see if O.D. solenoid clicks.
2	Input signals	Inspect following items given in flow chart on pages AT-18 and 19. • Shift switches (1-2, 2-3 and 3-4) • Vehicle speed sensor • Full throttle contact switch • Throttle sensor • Low-temperature sensor

Inspection of Parts Related to A.S.C.D.

Details on each step will be described later.

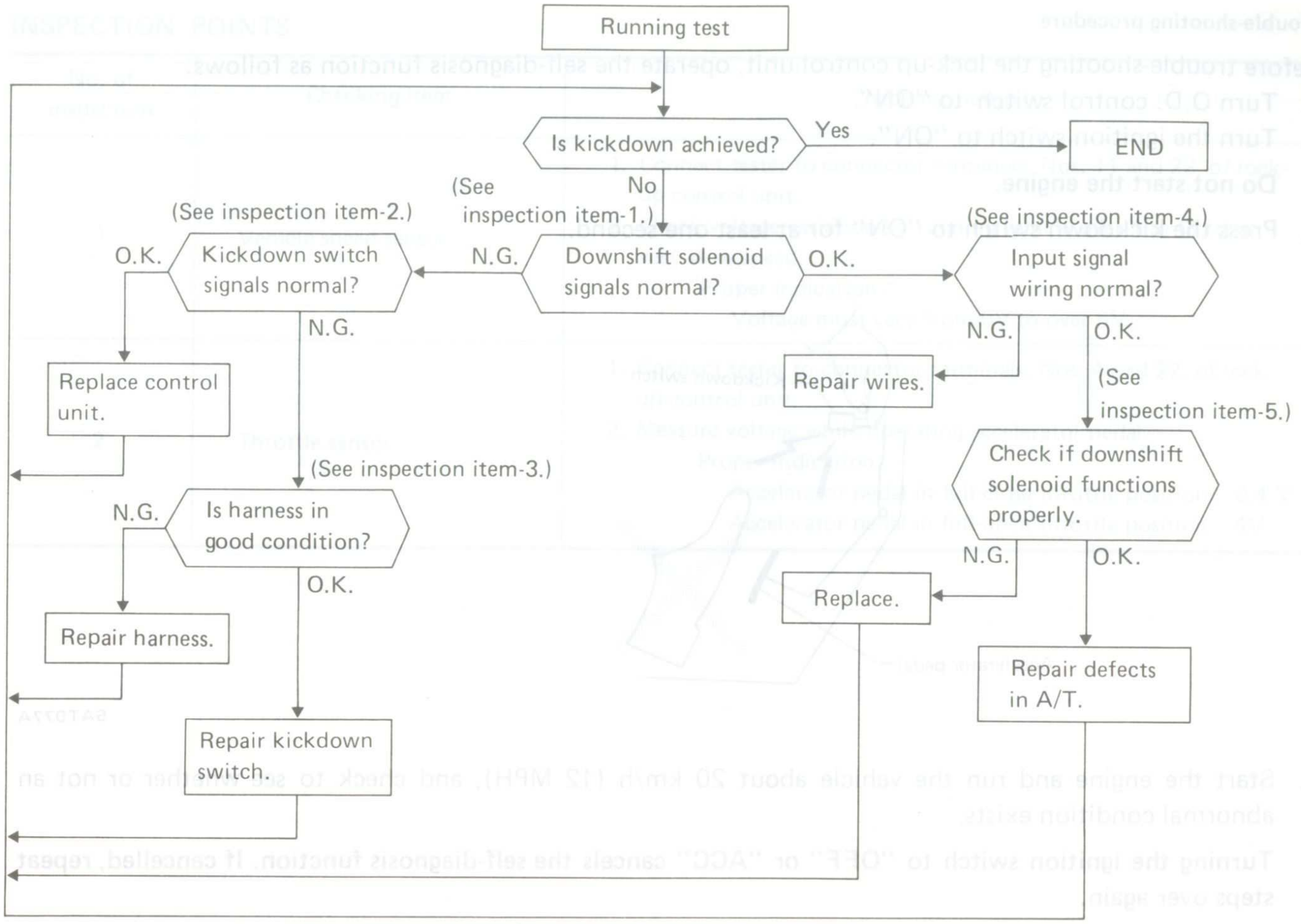


Inspection of Parts Related to A.S.C.D. (Cont'd)

INSPECTION POINTS

Inspection No.	Item to be checked	Checking method
1	A.S.C.D. cruise signals	1. Connect tester to connector terminals, Nos. 13 and 22, of lock-up control unit. 2. Measure by repeatedly releasing vehicle speed setting during A.S.C.D. driving. Proper indication: A.S.C.D. is set: 12V A.S.C.D. is released: 0V
2	A.S.C.D. wiring harness	Refer to section EL for A.S.C.D.
3	A.S.C.D. controller	Refer to section EL for A.S.C.D.
4	A.S.C.D. O.D. cut signals	1. Connect tester to connector terminals, Nos. 15 and 22, of lock-up control unit. 2. Measure by repeatedly releasing vehicle speed setting during A.S.C.D. driving in D4 speed. Proper indication: Accelerator pedal is depressed: 0V Accelerator pedal is released: 5V
5	A.S.C.D. wiring harness	Refer to section EL for A.S.C.D.
6	Output signal wiring	Check connector between control unit and O.D. cancel solenoid for connections and continuity.
7	O.D. cancel solenoid	Apply 12V voltage to solenoid proper to see if it operates normally.

Inspection of Kickdown Control



INSPECTION POINTS

Inspection No.	Item to be checked	Checking method
1	Downshift solenoid signals	Listen for a "click" to be emitted by downshift solenoid when accelerator pedal is fully depressed and ignition switch is "ON".
2	Kickdown switch signals	Connect tester to connector terminals, Nos. 21 and 22, of lock-up control unit. Measure while operating accelerator pedal. Full-open accelerator: 0V Less than full open: 5V
3	Wires for kickdown switch	Check connector between kickdown switch and control unit for proper connection and continuity.
4	Input signal wiring	Check connector between downshift solenoid and control unit for proper connection and continuity.
5	Downshift solenoid	Apply 12V voltage to solenoid proper to see if it functions normally.

TROUBLE-SHOOTING AND DIAGNOSES

Troubles Detected by Self-diagnosing and Their Indication

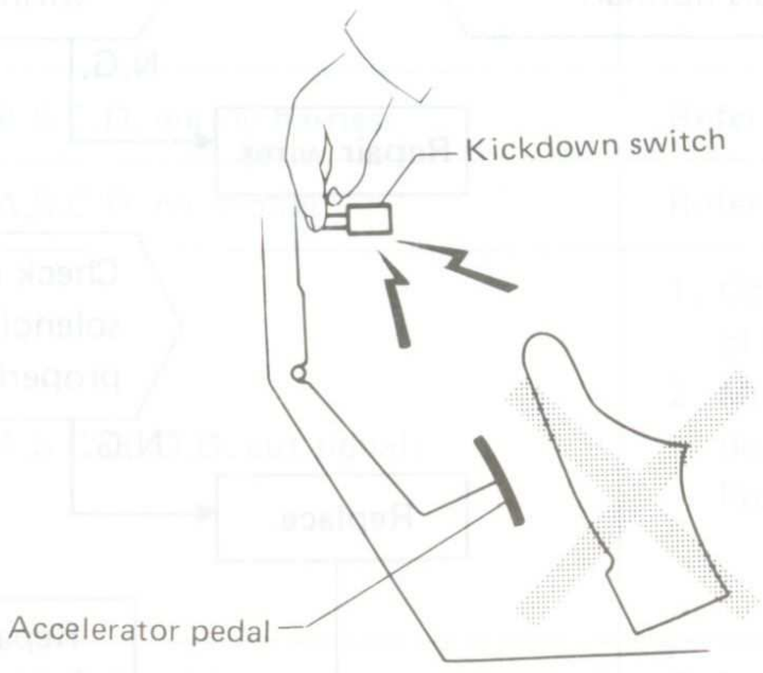
Trouble-shooting procedure

Before trouble-shooting the lock-up control unit, operate the self-diagnosis function as follows:

1. Turn O.D. control switch to "ON".
2. Turn the ignition switch to "ON".

   Do not start the engine.

3. Press the kickdown switch to "ON" for at least one second.



SAT077A

4. Start the engine and run the vehicle about 20 km/h (12 MPH), and check to see whether or not an abnormal condition exists.

   Turning the ignition switch to "OFF" or "ACC" cancels the self-diagnosis function. If cancelled, repeat steps over again.

5. If an abnormal condition is indicated, track down the cause of the problem in accordance with the chart as shown below.

O.D. indicator flickers at intervals of 1 second.		O.D. indicator flickers at intervals of 1/4 second.
Indicator flickers when vehicle is operated at speeds of 13 to 15 km/h (8 to 9 MPH) and before the 1-2 shift occurs.	Indicator flickers when vehicle is in second gear or faster than 13 to 15 km/h (8 to 9 MPH).	① Throttle sensor defective (Inspection-2). ② Harness is broken between throttle sensor and lock-up control unit. ③ Lock-up control unit malfunctions.
① Broken wires between shift switch and lock-up control unit harness. ② Shift switch malfunctions.	① Vehicle speed sensor defective (Inspection-1) ② Harness is broken between vehicle speed sensor and lock-up control unit.	

Troubles Detected by Self-diagnosing and Their Indication (Cont'd)

INSPECTION POINTS

No. of inspection	Checking item	Checking method
1	Vehicle speed sensor	1. Connect tester to connector terminals, Nos. 11 and 22, of lock-up control unit. 2. Check voltage variation by running vehicle over 1 m (3 ft) at very slow speed. Proper indication: Voltage must vary from 0V to over 5V.
2	Throttle sensor	1. Connect tester to connector terminals, Nos. 4 and 22, of lock-up control unit. 2. Measure voltage while operating accelerator pedal. Proper indication: Accelerator pedal in full-close throttle position: 0.4 V Accelerator pedal in full-open throttle position: 4V

Pressure Testing

At idling

VG30E engine without turbo

Range	Line pressure kPa (bar, kg/cm^2, psi)
R	569 - 755 (5.69 - 7.55, 5.8 - 7.7, 82 - 109)
D	314 - 373 (3.14 - 3.73, 3.2 - 3.8, 46 - 54)
2	569 - 1,128 (5.69 - 11.28, 5.8 - 11.5, 82 - 164)
1	314 - 373 (3.14 - 3.73, 3.2 - 3.8, 46 - 54)

VG30E turbo engine

Range	Line pressure kPa (bar, kg/cm^2, psi)
R	392 - 490 (3.92 - 4.90, 4.0 - 5.0, 57 - 71)
D	255 - 353 (2.55 - 3.53, 2.6 - 3.6, 37 - 51)
2	588 - 1,177 (5.88 - 11.77, 6.0 - 12.0, 85 - 171)
1	255 - 353 (2.55 - 3.53, 2.6 - 3.6, 37 - 51)

At stall test

VG30E engine without turbo

Range	Line pressure kPa (bar, kg/cm^2, psi)
R	2,089 - 2,393 (20.89 - 23.93, 21.3 - 24.4, 303 - 347)
D	1,128 - 1,275 (11.28 - 12.75, 11.5 - 13.0, 164 - 185)
2	1,128 - 1,275 (11.28 - 12.75, 11.5 - 13.0, 164 - 185)
1	1,128 - 1,275 (11.28 - 12.75, 11.5 - 13.0, 164 - 185)

VG30E turbo engine

Range	Line pressure kPa (bar, kg/cm^2, psi)
R	2,530 - 2,824 (25.30 - 28.24, 25.8 - 28.8, 367 - 410)
D	1,824 - 1,981 (18.24 - 19.81, 18.6 - 20.2, 264 - 287)
2	1,824 - 1,981 (18.24 - 19.81, 18.6 - 20.2, 264 - 287)
1	1,824 - 1,981 (18.24 - 19.81, 18.6 - 20.2, 264 - 287)

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

General Specifications

Engine model	VG30E	VG30E turbo
Automatic transmission model	E4N71B	E4N71B
Transmission model code number	X8203	X8206
Stall torque ratio	2.0 : 1	
Transmission gear ratio		
1st	2.458	
2nd	1.458	
Top	1.000	
O.D.	0.686	
Reverse	2.182	
Recommended oil	Automatic transmission fluid "Dexron" type	
Oil capacity	7.0 liters (6-1/8 Imp qt)	

Specifications and Adjustment

Transmission model code number	X8203	X8206
Torque converter assembly Stamped mark on the torque converter	GXA	G
Direct clutch		
Number of drive plates	2	2
Number of driven plates	2	2
Clearance mm (in)		
Standard	0 - 0.2 (0 - 0.008)	
Allowable limit	0.2 (0.008)	
Drive plate thickness mm (in)		
Standard	1.50 - 1.65 (0.0591 - 0.0650)	
Allowable limit	1.4 (0.055)	

Thickness of race side	Thickness mm (in)	Part number
	0.4 (0.016)	31606-X8501
	0.6 (0.024)	31606-X8502
	0.8 (0.031)	31606-X8500
	1.0 (0.039)	31606-X8503
	1.2 (0.047)	31606-X8504

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

Specifications and Adjustment (Cont'd)

Transmission model code number	X8203	X8206
Front clutch (High-reverse)		
Number of drive plates	3	4
Number of driven plates	5	5
Clearance mm (in)		
Standard	1.6 - 1.8 (0.063 - 0.071)	
Allowable limit	2.2 (0.087)	2.4 (0.094)
Drive plate thickness mm (in)		
Standard	1.50 - 1.65 (0.0591 - 0.0650)	
Allowable limit	1.4 (0.055)	
Thickness of retaining plate	Thickness mm (in) / Part number	
	5.0 (0.197)	31567-X2900
	5.2 (0.205)	31567-X2901
	5.4 (0.213)	31567-X2902
	5.6 (0.220)	31567-X2903
	5.8 (0.228)	31567-X2904
	6.0 (0.236)	31567-X2905
	6.2 (0.244)	31567-X2906
Rear cltuch (Forward)		
Number of drive plates	6	6
Number of driven plates	6	6
Clearance mm (in)		
Standard	0.8 - 1.0 (0.031 - 0.039)	0.8 - 1.0 (0.031 - 0.039)
Allowable limit	1.5 (0.059)	1.5 (0.059)
Drive plate thickness mm (in)		
Standard	1.50 - 1.65 (0.0591 - 0.0650)	
Allowable limit	1.4 (0.055)	
Thickness of retaining plate	Thickness mm (in) / Part number	
	6.2 (0.244)	31567-X2906
	6.4 (0.252)	31507-X8600
	6.6 (0.260)	31507-X8601
	6.8 (0.268)	31537-X2800
	7.0 (0.276)	31537-X2801
	7.2 (0.283)	31537-X0900
	7.4 (0.291)	31537-X0901
	7.6 (0.295)	31537-X0902

Transmission model code number	X8203	X8206
Low & reverse brake		
Number of drive plates	6	8
Number of driven plates	6	8
Clearance mm (in)		
Standard	0.80 - 1.05 (0.0315 - 0.0413)	
Allowable limit	2.0 (0.079)	2.4 (0.094)
Drive plate thickness mm (in)		
Standard	1.90 - 2.05 (0.0748 - 0.0807)	
Allowable limit	1.8 (0.071)	
Thickness of retaining plate	Thickness mm (in) / Part number	
	11.8 (0.465)	31667-X0300
	12.0 (0.472)	31667-X0301
	12.2 (0.480)	31667-X0302
	12.4 (0.488)	31667-X0303
	12.6 (0.496)	31667-X0304
	12.8 (0.504)	31667-X0305
Thickness of retaining plate	Thickness mm (in) / Part number	
	9.8 (0.386)	31667-X2900
	10.0 (0.394)	31667-X2901
	10.2 (0.402)	31667-X2902
	10.4 (0.409)	31667-X2903
	10.6 (0.417)	31667-X2904
	10.8 (0.425)	31667-X2905
2nd brake band		
Piston size mm (in)		
Big dia.	72 (2.83)	80 (3.15)
Small dia.	50 (1.97)	44 (1.73)
O.D. brake band		
Piston size mm (in)		
Big dia.	60 (2.36)	60 (2.36)
Small dia.	40 (1.57)	40 (1.57)
Front end play mm (in)	0.5 - 0.8 (0.020 - 0.031)	
Thickness of high-reverse clutch (Front) thrust washer	Thickness mm (in) / Part number	
	1.3 (0.051)	31528-X0107
	1.5 (0.059)	31528-X0105
	1.7 (0.067)	31528-X0106
	1.9 (0.075)	31528-X0100
	2.1 (0.083)	31528-X0101
	2.3 (0.091)	31528-X0102
	2.5 (0.098)	31528-X0103
	2.7 (0.106)	31528-X0104

Specifications and Adjustment (Cont'd)

Total end play mm (in)	0.25 - 0.50 (0.0098 - 0.0197)	
Thickness of oil pump cover bearing race	Thickness mm (in)	Part number
	1.2 (0.047)	31556-X0100
	1.4 (0.055)	31556-X0101
	1.6 (0.063)	31556-X0102
	1.8 (0.071)	31556-X0103
	2.0 (0.079)	31556-X0104
	2.2 (0.087)	31556-X0105
O.D. pack end play mm (in)	0.5 - 0.8 (0.020 - 0.031)	
Thickness of O.D. thrust washer	Thickness mm (in)	Part number
	1.3 (0.051)	31528-X0107
	1.5 (0.059)	31528-X0105
	1.7 (0.067)	31528-X0106
	1.9 (0.075)	31528-X0100
	2.1 (0.083)	31528-X0101
	2.3 (0.091)	31528-X0102
	2.5 (0.098)	31528-X0103
	2.7 (0.106)	31528-X0104
O.D. total end play mm (in)	0.25 - 0.50 (0.0098 - 0.0197)	
Thickness of O.D. bearing race	Thickness mm (in)	Part number
	1.2 (0.047)	31603-X8600
	1.4 (0.055)	31603-X8601
	1.6 (0.063)	31603-X8602
	1.8 (0.071)	31603-X8603
	2.0 (0.079)	31603-X8604
	2.2 (0.087)	31603-X8605

Oil pump clearance mm (in)	
Outer gear-pump housing	
Standard	0.05 - 0.20 (0.0020 - 0.0079)
Allowable limit	0.25 (0.0098)
Outer gear-crescent	
Standard	0.14 - 0.21 (0.0055 - 0.0083)
Allowable limit	0.25 (0.0098)
Gears-pump cover	
Standard	0.02 - 0.04 (0.0008 - 0.0016)
Allowable limit	0.08 (0.0031)
Drum support	
Seal ring-ring groove	
Standard	0.05 - 0.20 (0.0020 - 0.0079)
Allowable limit	0.20 (0.0079)
Oil distributor	
Seal ring-ring groove	
Standard	0.04 - 0.16 (0.0016 - 0.0063)
Allowable limit	0.16 (0.0063)
Planetary carrier mm (in)	
Clearance between pinion washer and planetary carrier	
Standard	0.20 - 0.70 (0.0079 - 0.0276)
Allowable limit	0.80 (0.0315)
Run-out of oil pump cover to housing mm (in)	Less than 0.07 (0.0028)
Run-out of drum support to O.D. case mm (in)	Less than 0.05 (0.0020)

STALL REVOLUTION

VG30E engine without turbo	2,150 - 2,450 rpm
VG30E turbo engine	2,500 - 2,800 rpm