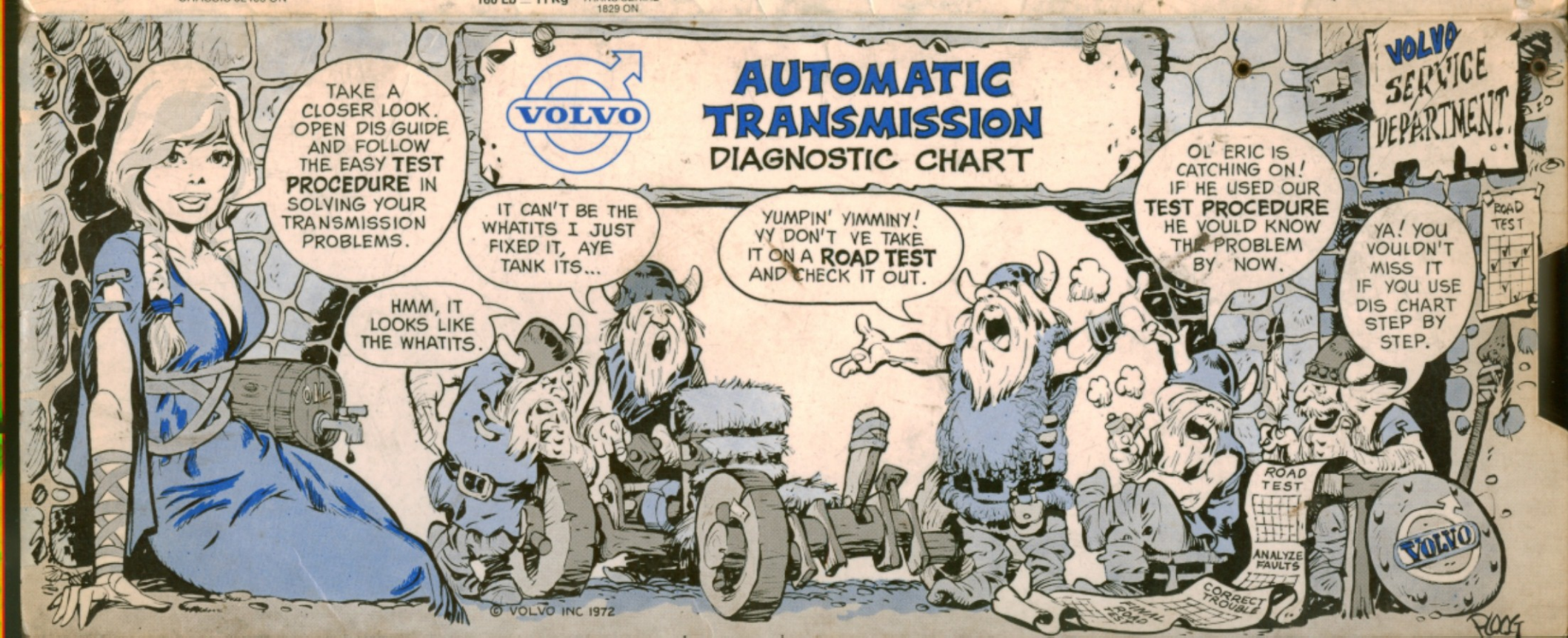
VOLVO
AUTOMATIC TRANSMISSION
DIAGNOSTIC CHART
VOLVO SERVICE DEPARTMENT
TAKE A CLOSER LOOK. OPEN DIS GUIDE AND FOLLOW THE EASY TEST PROCEDURE IN SOLVING YOUR TRANSMISSION PROBLEMS.
HMM, IT LOOKS LIKE THE WHATITS.
IT CAN'T BE THE WHATITS I JUST FIXED IT, AYE TANK ITS...
YUMPIN' YIMMINY! VY DON'T VE TAKE IT ON A ROAD TEST AND CHECK IT OUT.
OL' ERIC IS CATCHING ON! IF HE USED OUR TEST PROCEDURE HE VOULD KNOW THE PROBLEM BY NOW.
YA! YOU VOULDN'T MISS IT IF YOU USE DIS CHART STEP BY STEP.
ROAD TEST
ANALYZE FAULTS
CORRECT TROUBLE
OIL
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VOLVO AUTOMATIC BW35 TRANSMISSION

(THIS IS THE BACK)

YEAR	U.S.A. MODELS	ID PLATE NUMBER & COLOR	STALL SPEED R.P.M.	LINE PRESSURE P.S.I. At Stall Speed	LINE PRESSURE P.S.I. At Idle 55-60 P.S.I. Then Add With Increase of 500 R.P.M.		SHIFT SPEEDS M.P.H. F — FULL THROTTLE K — KICKDOWN 1—2	2—3	3—2	2—1	3—1
1969	142, 144, 145	7EN LIGHT BUFF	2100	160	15-20	F	27	43	36	8	—
						K	**37**	**59**	**53**	**32**	—
	164 EARLY 164 LATE**	5 EN DARK BLUE	1800 2100	160 200	15-20 25-30	F	30	54	41	9	—
						K	**39**	**70**	**62**	**32**	—
1970	142, 144	7EN LIGHT BUFF	1800	160	15-20	F	27	43	36	8	—
						K	**37**	**59**	**53**	**32**	—
	145	7EN LIGHT BUFF	1800	160	15-20	F	25	41	35	8	—
						K	**35**	**56**	**51**	**31**	—
	164	5EN DARK BLUE	2100	200	15-20 25-40*	F	30	54	41	9	—
						K	**39**	**70**	**62**	**32**	—
1971	142, 144, 145	13EN GREY	2100	160	15-20	F	29	48	—	—	—
						K	**41**	**65**	**59**	—	**35**
	142E, 144E, 145E	211 YELLOW	2550	160	15-20	F	28	49	—	—	—
						K	**40**	**70**	**62**	—	**34**
	164	15EN LIGHT BLUE	2100	225	15-20	F	28	49	—	—	—
						K	**40**	**70**	**62**	—	**33**
	1800E	9EN RED	2550	160	15-20	F	28	49	—	—	—
						K	**40**	**70**	**62**	—	**34**
1972	142, 144, 145	325 BRIGHT GREEN	2100	160	15-20	F	26	46	—	—	—
						K	**39**	**65**	**58**	—	**31**
	142E, 144E	351 ORANGE	2450	160	15-20	F	28	49	—	—	—
						K	**40**	**70**	**62**	—	**34**
	145E	321 GREY	2450	160	15-20	F	28	49	—	—	—
						K	**40**	**70**	**62**	—	**34**
	164	323 LIGHT BLUE	2100	160	15-20	F	31	56	—	—	—
						K	**40**	**73**	**65**	—	**31**
	164E	319 LIGHT GREEN	2200	160	15-20	F	34	60	—	—	—
						K	**44**	**79**	**69**	—	**35**
	1800E, 1800ES	351 ORANGE	2450	160	15-20	F	28	49	—	—	—
						K	**40**	**70**	**62**	—	**34**

**CHASSIS 32400 ON

160 Lb = 11 Kg

*TRANS SERIAL 1829 ON

CHART OF POWER FLOW

	A	B	C	D	E
1st gear, L	●			●	
1st gear D	●				
2nd gear	●		●		
3rd gear	●	●			
neutral					
reverse		●		●	
park					

A. Front clutch
B. Rear clutch
C. Front brake band
D. Rear brake band
E. One-way clutch

ADJUST STARTER INHIBITOR SWITCH

(4 Post — 1972 or earlier)

1. Back out switch.
2. Hook up test light to terminals that light.
3. Turn switch in till light goes out and mark.
4. Change terminals. Turn in till light goes out. Mark.
5. Back up ½ way between marks, and lock.

TEST PROCEDURE TEST PROCEDURE TEST PROCEDURE

THIS CHART IS ONLY A GUIDE! LIKELY ACTIONS ARE GIVEN, BUT YOU MUST THINK -- ESPECIALLY WHEN THERE IS MORE THAN ONE FAULT.

1. **VERIFY THE COMPLAINT.** Road test it. If possible get the customer to show you what happens. Let customer drive.
2. **USE THE SLIDE RULE** to isolate the trouble. Do more road tests to save work time. If the test is 4, 5 or 6 do tests 4 through 8 completely.
3. **MOVE SLIDE RULE** to each fault and note down the actions if two or more faults have been found. Put SOFT pencil checks near action.
4. **TAKE ACTIONS IN ORDER,** top to bottom, starting with the most check marks. If overhaul is indicated, do TESTS 1, 3, 9, 10 & 11 using tachometer and pressure gauge.
5. **CHECK FOR PROPER OPERATION.** Road test after you have done the work. Go through all the TESTS you did before.

PULL SLIDE TO LINE UP MARK WITH FAULT

A

D

STARTER | ENGAGEMENT | STARTING FROM REST | UPSHIFT | UPSHIFT QUALITY | DOWNSHIFT | DOWNSHIFT QUALITY | STALL SPEED | LINE PRESSURE | MISC.

- Starter will not operate in P or N
- Starter operates in all selector positions
- Excessive bump on engagement of D, 1, L or R
- No drive in D (Try 1 or L) Abnormal 1 or L
- No drive in D, normal 1 or L
- No drive in D, 2, 1, L or R
- No drive in R -- no engine braking in 1 or L
- No drive in R and engine brakes in 1 or L
- Delay in engagement D, 1, L or R
- No 1-2 shift, or delayed
- No 2-3 shift, or delayed (Try R) Abnormal R
- No 2-3 shift or delayed, Normal R
- Full throttle take-off in 1 or L, slip and squawk or judder
- Full throttle take-off in D, slip and squawk or judder
- Full throttle take-off in R, slip and squawk or judder
- Full R, slip but no judder -- no engine braking in L
- Full R, slip but no judder and engine brakes in L
- Drag in R
- Transmission upshifts too easily
- No 1-2 or L-D
- No 2-D
- Above normal shift speeds
- Below normal shift speeds
- Slip on 1-2 shift
- Slip or engine run-up on 2-3 shift
- Bumpy gear shifts
- Drag in Drive 2 and Drive 3
- Drag on 2-3 shift
- Transmission downshifts too easily
- Transmission will not downshift
- No 3-2 downshift or engine braking
- No 2-1 downshift or engine braking
- Involuntary high speed 3-2-3-2
- Slip on 3-2
- Slip on 2-1
- Rough on 3-2
- Rough on 2-1
- Stall speed lower than specified (see R.P.M. on back)
- Stall speed more than 600 r.p.m. lower than specified
- Stall speed high with slip and squawk in 1 (see back)
- Stall speed high with slip and squawk in R (see back)
- Low increase (From Normal Idle, increase 500 R.P.M.)
- High increase (From Normal Idle, increase 500 R.P.M.)
- Low line pressure at stall speed
- High line pressure at stall speed
- No rear wheel start in D, only 1971 Volvo or earlier
- Overheating, loss of engine performance in D
- No park
- Screech or whine, increasing with engine speed

ROAD TEST B

ACTION E

C ROAD TEST

1. **Check that starter operates with the selector in P & N and that reversing light operates only in R. Try starter in other positions, brake on.**
2. Apply brakes and, with engine at normal idle, select N-D, N-2, N-1 and N-R. Trans engagement should be felt in each position selected.
3. **Check converter stall speed in 1 and R. Check for slip or clutch or squawk.** **(See back for speeds.)**
   Note: Do not stall longer than 10 seconds or trans will overheat. Cool in N.
4. With trans at normal temperature, select D. Release the brakes and accelerate with minimum throttle opening. Check for 1-2 and 2-3 shifts.
   Note. At minimum throttle openings, shifts may be difficult to detect. Confirm that trans is in 3rd gear by selecting 2 or 1 (L) when a 3-2 downshift should be felt.

5a. **Stop and restart using full throttle acceleration. Check for 1-2 and 2-3 shifts according to shift speed table, see back of slide.**
   b. **At 25 m.p.h. (40 km.p.h.) in 3rd gear, depress to full throttle position. Car should downshift to 2nd gear. Repeat at 40 m.p.h. (65 km.p.h.). Car should accelerate in 3rd gear and should not downshift to 2nd**
   c. **At 30 m.p.h. (50 km.p.h.) in 3rd gear, depress the accelerator kick-down position. Trans should downshift, see chart.**
   d. **At 15 m.p.h. (25 km.p.h.) in 3rd gear, depress accelerator to kick-down position. Trans should downshift to 1st gear.**

6a. Stop and restart using kickdown acceleration. Check for 1-2 and 2-3 shifts according to shift speed table, see back slide.
   b. At 40 m.p.h. (65 km.p.h.) in 3rd gear, release accelerator and select L (1). Check for 3-2 downshift and engine braking. Check for roll-out 2-1 downshift at about 5 m.p.h. (8 km.p.h.) and engine braking.

7. **Stop, and with L (1) still engaged, use full throttle to 20 m.p.h. (30 km.p.h.). Check for no slip or clutch squawk and no upshifts.**
8. Stop and select R. Reverse using full throttle if possible. Check for no slip or clutch squawk. Use care!
9. **Stop. Facing downhill on a grade, select P. Release brakes and check that parking pawl will hold. Re-apply the brakes before disengaging parking pawl. Repeat facing uphill. Check that selector is trapped by the gate in P.**
10. Check line pressures when engine goes from normal idle to 500 R.P.M. increase and at stall speed. (See back for pressures.)
11. **Only for 1971 or earlier — at just over 30 m.p.h. (50 km.p.h.), select N, switch off ignition and coast. At 30 m.p.h. switch on ignition and select D. The engine should then start through rear wheels.**

F ACTION

EXTERNAL CHECKS WITH TRANSMISSION AND OIL PAN IN PLACE

_____ **1. Check fluid level.**
_____ 2. Check manual linkage adjustment.
_____ **3. Check adjustment of downshift valve cable.**
_____ 4. Check engine idling speed.
_____ **5. Check engine performance, compression & tune-up.**
_____ 6. Check rear band adjustment.
_____ **7. Adjust starter inhibitor switch.**

TRANSMISSION IN CAR, REMOVE OIL PAN OR REAR HOUSING

_____ 8. Check front servo seals and tubes for leakage.
_____ **9. Check rear servo seals and fit of tubes.**
_____ 10. Strip governor valve and clean.
_____ **11. Strip valve bodies and clean.**
_____ 12. Check rear pump for wear and for broken drive key.
_____ **13. Check front band adjustment.**
_____ 14. Examine parking pawl, gear and internal linkage.
_____ **15. Remove pan and visually inspect.**

TRANSMISSION OUT OF CAR

_____ 16. Examine front clutch and seals, also front sun gear shaft sealing rings. Check cup plug in driven shaft.
_____ **17. Examine rear clutch, check valve, and seals. Check fit of tubes.**
_____ 18. Strip and examine front pump and drive fingers.
_____ **19. Check front band for wear.**
_____ 20. Check rear band for wear.
_____ **21. Examine one-way clutch.**
_____ 22. Examine torque converter drive plate for cracks or fracture.
_____ **23. Replace torque converter.**
_____ 24. Check input shaft for break.

LISTEN	9	5a	11	10	10	10	10	3	3	3	3	5c 6b	6b	5d	5b 5c	4	6b	6b	5c 5d	5b	4	4	4	4	4
18	2 14	1 6 5 13 22 23	1 2 6 13 11 12	10 11	1 3 11 18	3 4 11	1 2 4 11 18	1 2 6 3 11 17	1 2 6 3 11 16	5 23	5	3 11 21 16 17	13 11 8 17 19	21	13 8 11 19 17	2 17	6 9 20	2 13 8 19 17	3 10 11	3	13 8	6	3	1 3 2 13 11 17	1 3 2 13 8 19 11

LISTEN	5a	5a	4	4	7	8	8	8	8	5a	7	4	4	4	4	4	4	4	4	4	2	1	1
18	3 10 11	3 10 11	2 10 11 17	2 13 10 11 19 17	1 2 3 10 11 16	13	1 2 3 17	1 2 3 6 9 20	1 2 3 11 17	1 2 3 11 16	1 2 3 11 16	1 2 3 11 13 8	3 10 11 13 8 17	3 10 11 13 8	1 2 11 16 17	1 2 3 11 17	1 2 3 6 11 9 20 17	1 2 3 11 16 21 18 24	1 2 3 21	1 2 3 11 16 21	4 3	7	7

PULL

YEAR	U.S.A. MODELS	ID PLATE NUMBER & COLOR	STALL SPEED *R.P.M.*	LINE PRESSURE *P.S.I.* At Stall Speed	At Idle 55-60 P.S.I. Then Add With Increase of 500 R.P.M.	SHIFT SPEEDS *M.P.H.* F — FULL THROTTLE K — KICKDOWN	1—2	2—3	3—2	2—1	3—1
1973	142E, 144E	351 ORANGE	2450	160	15-20	F	28	49	—	—	—
						K	37	66	60	—	30
	142E, 145E 45E	321 GREY	2550	160	15-20	F	28	49	—	—	—
						K	37	66	60	—	30
	164E	319 LIGHT GREEN	2200	160	15-20	F	34	60	—	—	—
						K	40	77	68	—	30
	1800ES	351 ORANGE	2450	160	15-20	F	28	49	—	—	—
						K	37	66	60	—	30

160 Lb = 11 Kg