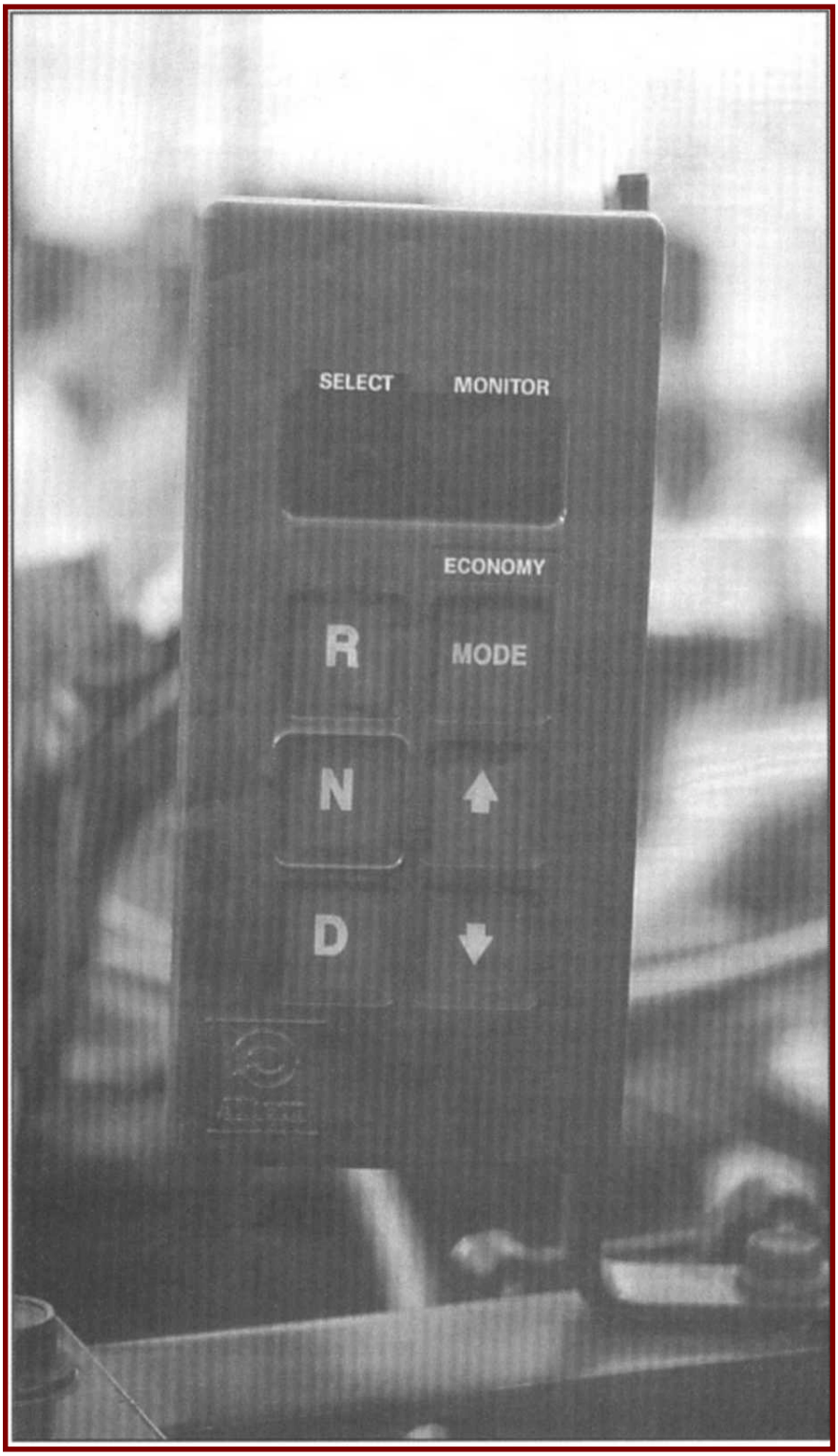
Using The Allison
World Transmission Shift Selector



The touch pad commonly found in motorhomes equipped with this transmission is more than just a gear selector. It serves as a communication link between the transmission and the operator.

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Allison introduced its World Transmission to the motorhome marketplace several years ago. The MD version used in motorhomes was followed by the HD version, which is used in conjunction with engines having horsepower ratings in excess of 300, primarily heavier bus conversions. Although minor programming differences exist to accommodate the extra work load encountered by the HD version both versions of the

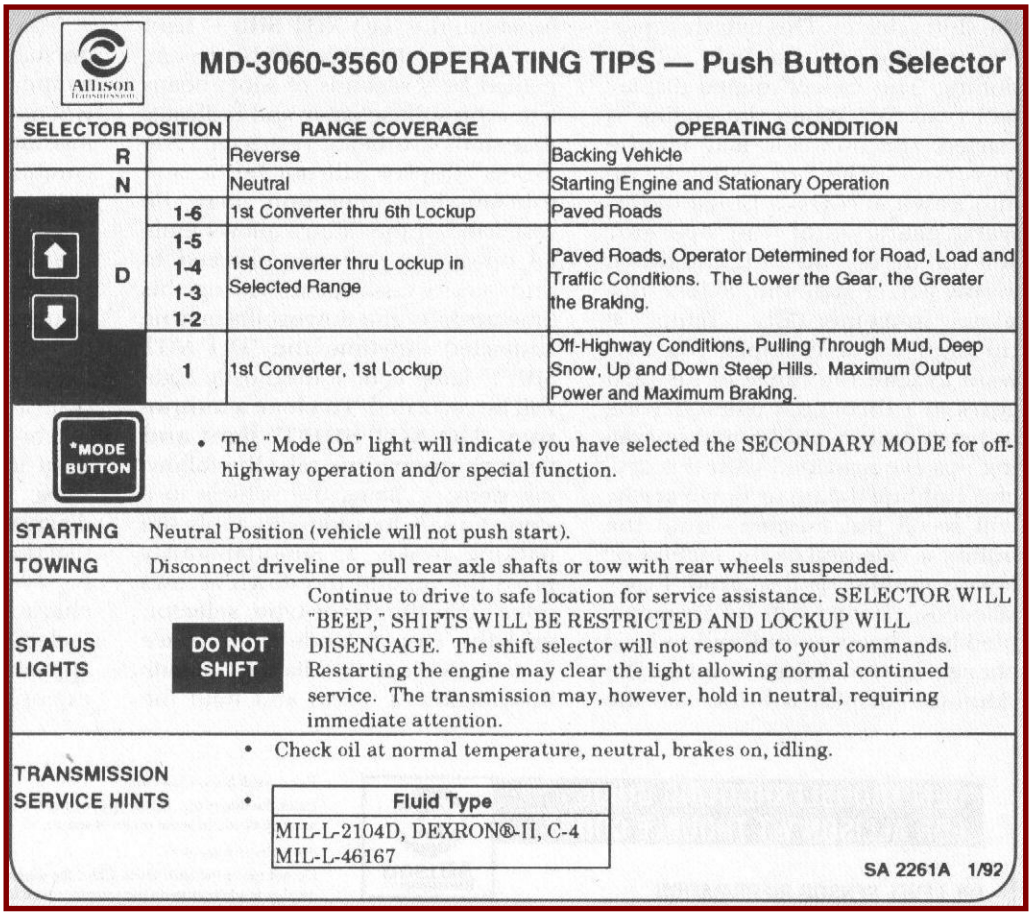
World Transmission are six-speed units with electronic controls that function in a similar fashion. This sophisticated, electronically controlled transmission provides more functions and features than automatic transmissions of the past.

Transmission functions and features. The Allison World Transmission can adapt its shift schedule to accommodate driving habits. It "learns" to shift according to the acceleration pattern and will adapt to a different driver within a short period of time. It is programmed with an alternate shift schedule, or (secondary mode) function, which will be discussed later in the article. It can automatically downshift as many as two gears, within rpm limits, during engine braking to provide maximum brake horsepower. In addition, it will automatically upshift or prevent downshifts to eliminate an engine over-rev condition. Original equipment manufacturer (OEM) specified downshift schedules can be made available for use with exhaust brakes. This causes the transmission to downshift to a lower gear to enhance engine brake performance, provided that this does not exceed maximum engine rpm.

The World Transmission has a shallow oil pan option, which increases ground clearance in pusher applications. It has an oil sensor option to detect transmission oil level, a feature that is now supplied automatically with the shallow oil pan option.

The transmission can detect malfunctions and protects itself by illuminating a dash-mounted "DO NOT SHIFT" warning light. It will then shift hydraulically to a default gear in "Convertor Mode" and release the lock-up clutch. This protects the transmission and allows travel with a restricted gear range to obtain service.

As expected, a sophisticated transmission needs an equally sophisticated shift selector. Allison supplies either a touch pad or lever-type shift selector. Most motorhomes with the MD-3060 transmission have the touch pads so we will focus on that type.



MD-3060-3560 OPERATING TIPS — Push Button Selector

SELECTOR POSITION		RANGE COVERAGE	OPERATING CONDITION
R		Reverse	Backing Vehicle
N		Neutral	Starting Engine and Stationary Operation
D	1-6	1st Converter thru 6th Lockup	Paved Roads
D	1-5, 1-4, 1-3, 1-2	1st Converter thru Lockup in Selected Range	Paved Roads, Operator Determined for Road, Load and Traffic Conditions. The Lower the Gear, the Greater the Braking.
D	1	1st Converter, 1st Lockup	Off-Highway Conditions, Pulling Through Mud, Deep Snow, Up and Down Steep Hills. Maximum Output Power and Maximum Braking.

*MODE BUTTON

- The "Mode On" light will indicate you have selected the SECONDARY MODE for off-highway operation and/or special function.

STARTING — Neutral Position (vehicle will not push start).

TOWING — Disconnect driveline or pull rear axle shafts or tow with rear wheels suspended.

STATUS LIGHTS — DO NOT SHIFT — Continue to drive to safe location for service assistance. SELECTOR WILL "BEEP," SHIFTS WILL BE RESTRICTED AND LOCKUP WILL DISENGAGE. The shift selector will not respond to your commands. Restarting the engine may clear the light allowing normal continued service. The transmission may, however, hold in neutral, requiring immediate attention.

TRANSMISSION SERVICE HINTS

- Check oil at normal temperature, neutral, brakes on, idling.

Fluid Type
MIL-L-2104D, DEXRON®-II, C-4
MIL-L-46167

SA 2261A 1/92

Shift Selector Functions:

- To select gears.
- To indicate the status of the transmission.
- To select a secondary mode of operation.
- To electronically check oil level (if so equipped).
- To clear a temporary "DO NOT SHIFT" light.
- To indicate the fault causing the "DO NOT SHIFT" status.
- To record, store, and play back the last five diagnostic codes.

The pad has six push buttons, labeled "R," "N," "D," "↑" "↓" and "Mode." The first three buttons are used to choose "reverse," "neutral," or "drive" The up and down arrows are used to move through the range of six forward gears in "drive," This is very similar to any other automatic transmission, but the touch pad is much more than just a conventional gear selector. It is the communication link between the transmission and the operator.

The "Mode" button is used to invoke a special function that has been programmed into the electronic control unit (ECU). In motorhomes, this special function is almost always the economy shift schedule that shifts gears at lower rpm to provide better fuel economy. This is an appropriate choice when traveling on flat terrain. In situations where maximum power is required, such as climbing grades and utilizing maximum engine braking capabilities, the standard shift schedule is preferred.

The touch pad has two digital displays: "Select," which shows the gear or range of gears chosen by the operator, and 'Monitor" which indicates the current gear of transmission operation. In addition, a "Mode On" light indicates that the secondary mode has been chosen.

When the ignition is turned on the "DO NOT SHIFT" light, usually located on the dash, illuminates momentarily, accompanied by audible tones (short beeps) coming from the shift selector. This tells the operator that the indicator light is functioning. The "Select" digital display will read "N." When the engine is started, the operator may choose "reverse," "drive," or, using the up and down arrows, a range of forward gears. After the operator selects "drive," pushing the down arrow will change the "Select" display incrementally from 6

through 1. For example, you may want to limit the range of forward gears to 1 through 4 when driving in heavy traffic. (Additional operating tips are provided with this article.) Holding the up or down arrow will scroll the numbers until the button is released or the highest or lowest number is displayed. Every selection change will be accompanied by a "beep' sound, and a visual change in the "Select" display. The "Monitor" display will indicate the gear currently operating.

In the event of a transmission malfunction, the "DO NOT SHIFT" light may illuminate. This will be accompanied by 8 seconds of short beeps from the shift selector and indicates that shifts are being restricted. The "Select" display will not be lit, and transmission operation, may be restricted. If the failure allows limited operation, you can proceed to find service assistance. During this time upshifts and downshifts may be restricted. Anytime the "DO NOT SHIFT" lamp is lit, a diagnostic code will be recorded. **To clear a temporary "DO NOT SHIFT" light and restore operation**, take the following steps: 1. Bring the vehicle to a stop at a safe location and apply the parking brake. 2. Simultaneously press the up and the down arrows once. On the lever-type selector, push the "Display Mode" button once to gain access to the diagnostic code information. 3. Press and hold the "Mode" button until a tone is heard, and then release the button.

The transmission may return to normal operation. If the condition is temporary, the "DO NOT SHIFT" light will not come back on, and the transmission will operate normally. If the condition is not temporary, the "DO NOT SHIFT" light may come back on. The type of operation permitted by the CPU will depend on the type of condition. Under certain circumstances, a shift from neutral to an operating range may not be permitted. This situation will require immediate attention.

The up and down arrows are also used to gain access to the oil level sensor, if present, and to enter the diagnostic display mode. Please note that the selector is capable of displaying two characters at one time. One character will be shown on the "Select" display, and the other will appear on the "Monitor" display. For example, the fact that the oil level is okay will be displayed as follows:

Message	Select Display	Monitor Display
Oil **L**evel	**0**	**L**
Pause	—	—
Okay	**0**	**K**

The troubleshooting guide included with this article outlines the procedure for gaining access to and interpreting the display codes. You may benefit from having this guide on hand while you explore the functions of the shift selector.

For additional information, contact your local Allison distributor or dealer. Check the Yellow Pages for the location nearest you.

OEM TROUBLESHOOTING GUIDE FOR ALLISON WT TROUBLE CODES

OIL LEVEL SENSOR INFORMATION

If the transmission you are troubleshooting has an oil level sensor, oil level information is obtained using the following procedure: (If an oil level sensor is not present, skip to CLEARING CODES section below.)

For a push button selector:

1. Press the up and down arrow buttons once simultaneously. Oil level information is displayed in two minutes (display will flash and 8, 7, - - - 1 count will occur during the two minutes) once the following parameters are met:
   a. Engine at idle
   b. Sump at operating temperature
   c. Transmission in neutral
   d. Transmission output shaft stopped
   e. Oil level sensor present and working
2. After two minutes, the display will flash one of the codes shown below.

CODE	CAUSE OF CODE
OL-OK	Oil level is correct
LO-01	One quart low
LO-02	Two quarts low
HI-01	One quart high
HI-02	Two quarts high

NOTE: Failure to meet any of the above parameters will stop the two-minute countdown. One of the codes shown below will be displayed to show the reason that the countdown was interrupted. Once all parameters are met, the countdown will continue from where it left off.

CODE	CAUSE OF CODE
OL-50	Engine speed (rpm) too low
OL-59	Engine speed (rpm) too high
OL-65	Neutral must be selected
OL-70	Sump oil temperature too low
OL-79	Sump oil temperature too high
OL-89	Output shaft rotation
OL-95	Sensor failure

NOTE: Sensor failure display should be reported to a distributor or dealer in your area (check the telephone directory for an Allison Transmission distributor or dealer nearest you).

For a lever selector:

1. Follow same procedure as push button, except press display mode button instead of up and down arrows.

EXITING THE OIL LEVEL DISPLAY MODE

To exit the oil level display mode, press any range button on the pushbutton shift selector or press the display mode button once on the lever shift selector.

CLEARING CODES

If after vehicle assembly, the DO NOT SHIFT light is illuminated, first clear all trouble codes by the following procedure.

For a push button selector:

Enter the diagnostic mode by pressing the up and down arrow buttons twice simultaneously if you have an oil level sensor; or, once if the oil level sensor is not present.

For a lever selector:

Do not move the shift lever. Enter the diagnostic mode by momentarily depressing the display mode button on the selector twice if you have an oil level sensor; or, once if the oil level sensor is not present.

Hold the MODE button down until the shift selector tone sounds twice (approx. 10 seconds).

Restart and drive the vehicle. If the DO NOT SHIFT light again illuminates, read and record the Trouble Codes by the following procedure.

NOTE: It is required that WT wiring harnesses be procured from Allison Transmission. These procedures apply to the Allison Harness only.

READING CODES

1a. For a push button selector:
Enter the diagnostic display mode by pressing the up and down arrow buttons at the same time. Press twice for troubleshooting codes if there is an oil level sensor present and press once when no oil level sensor is present.

1b. For a lever selector:
Press the display mode button twice for troubleshooting codes when there is an oil level sensor present and press once when no oil level sensor is present.

NOTE: If a DO NOT SHIFT condition is present at this time, the lever should be in the same position as it was when the code was detected. If the lever has been moved, the shift selector will emit a continuous tone. Moving the shift lever to its original position will stop the continuous tone.

2. Read the first code in the first of five code positions on the digital display on the shift selector. For example, we will read Code 25 11 in the first position. The display will change every two seconds as follows:
   a. Code list position — "d1"
   b. Main code — "25"
   c. Sub code — "11"
   d. Display will repeat cycle of a., b., and c. above.
3. Press the MODE button momentarily to view the second position (d2) in the same way as 2. above.
4. To view the third, fourth and fifth positions, (d3, d4 and d5), momentarily press the MODE button as explained above.
5. Pressing the MODE button momentarily after the fifth position is displayed will cause the sequence of queue positions to start over with the first position.

EXITING THE DIAGNOSTIC DISPLAY MODE

The diagnostic display mode can be exited by any of the following procedures:

1. Press the up and down arrow buttons at the same time on a push button shift selector or momentarily push the display mode button on a lever selector.
2. Press any range button, D, N, or R, on a push button selector (the shift will be commanded if it is not inhibited by an active code) or move the shift lever to any position other than the one it was in when the diagnostic display mode was activated (if the shift is inhibited, the ECU will continue to command the current range and sound the tone continuously until the lever is returned to its original position).
3. Do nothing and wait until the calibrated time has passed and the system automatically returns to the normal operating mode.

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TROUBLESHOOTING

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With the trouble codes recorded, follow the troubleshooting procedures given.

CODE LISTINGS AND PROCEDURES

IF CODES READ		RECOMMENDED PROCEDURES
Main Code	Sub Code	
13 **ECU input voltage low** 13 **ECU input voltage high**	12 23	1. Check: a. Battery direct ground and power is connected, tight, and clean. b. Vehicle batteries are charged. c. Vehicle charging system is not over or under charging. d. VIM fuse. e. VIM connections are tight, clean, undamaged. f. Vehicle manufacturer supplied wiring is correct. g. ECU connections tight, clean, undamaged. 2. If all points check, call distributor.
21 **Throttle Sensor**	12, 23	1. Check: a. Throttle sensor connector is properly connected. b. End of throttle sensor cable is pulled out properly. c. Engine fuel lever in idle. d. Engine fuel lever provides correct amount of stroke on throttle sensor cable. e. Harness to TPS for opens, shorts between wires, shorts to ground. 2. Replace TPS, if able. 3. If all points check, call distributor.
22 **Speed Sensors**	14, 15, 16	1. Check: a. Connection for tight, clean, undamaged terminals. b. Speed sensor mounting bolt properly torqued. c. Harness to sensor for opens, shorts between wires, shorts to ground. 2. If all points check, call distributor.
23 **Shift Selectors**	12, 13, 14, 15, 23, 24	1. Check: a. ECU connections – terminals snapped and connected. b. Remote connected and wire loop is cut. c. Harness on remote for opens, shorts between wires, shorts to ground. 2. Replace selector, if available. 3. If all points check, call distributor.
24 **Sump Oil Temperature Cold**	12	1. Check: a. Temperature is below +20 degrees Fahrenheit. 1) If yes, this is a correct response for temperature. 2) If no, check main transmission for connection, tight fit, damaged terminals. 3) ECU for connection, tight fit, damaged terminals. 2. If all points check, call distributor.
24 **Sump Oil Temperature Hot**	23	1. Let vehicle idle. 2. Make sure vehicle is level. 3. Check for correct dipstick installed. 4. Check oil level. 5. If oil level is incorrect, correct it. 6. If level is ok, check engine system for overheat, causing transmission overheat. 7. ECU and transmission connectors connected, tight and undamaged. 8. If all points check, call distributor.
25 **Output Speed Sensor and Reading**	00, 11, 22, 33, 44, 55, 66, 77	1. Check: a. Connector connected. b. Sensor bolt tight. c. ECU connected tight with no damaged terminals. d. Oil level. e. Harness to sensor for opens, shorts between wires, shorts to ground. 2. If all points check, call distributor.
32 **C3 Pressure Switch Open**	00, 33, 55, 77,	1. Allow vehicle to idle in neutral with parking brakes applied. Check: a. Correct dipstick. b. Proper oil level. 2. Check: a. Main transmission connector connected, tight, clean, undamaged. b. ECU connector connected, tight, clean, undamaged. c. Harness for opens, shorts between wires, shorts to ground. 3. If all points check, call distributor.
33 **Sump Oil Sensor Failure**	12, 23,	1. Check: a. Main transmission connector connected, tight, clean, undamaged. b. ECU connector connected, tight, clean, undamaged. c. Harness for opens, shorts between wires, shorts to ground. 2. If all points check, call distributor.
34 **EEPROM**	12, 13, 14, 15, 16	1. If able, recalibrate. 2. If not, replace ECU. 3. If can not replace ECU, call distributor.
35 **Power Interruption EEPROM Write Interruption**	00, 16,	1. Check: a. ECU connected tight, clean, undamaged. b. VIM connected tight, clean, undamaged. c. Vehicle manufacturer supplied wiring for proper power and ground connection. d. Battery direct power. e. Battery direct ground. f. Proper ignition switch connections. 2. If all points check, call distributor.
36 **Hardware/ Software not Compatible**	00	1. Replace ECU if able. 2. Reprogram ECU if able. 3. If can't replace or reprogram, call distributor.
41 **Solenoid Circuit Open or Short**	12, 13, 14, 15, 16, 21 22, 23 24, 25 26	1. Check: a. Main transmission connector connected, tight, clean, undamaged. b. ECU connector connected, tight, clean, undamaged. c. Harness visually for: damage, chafing, pulled too tight, and screws through harness. d. Harness for opens, shorts between wires, shorts to ground. 2. Change harness (optional). 3. If all points check, call distributor.
42 **Short to Battery in Solenoid circuit**	12, 13, 14, 15, 16, 21, 22, 23, 24, 25 26	1. Check: a. Items on Code 41. b. Unauthorized repairs. 2. If all points check, call distributor.
43 **ECU Circuitry**	21, 25, 26	1. Replace ECU. 2. Call distributor.
51 **Offgoing Ratio Test (during shift)**	01, 10, 12, 21, 23, 43, 45, 65	1. Check: a. Output and engine speed sensor are connected, terminals undamaged and clean. b. Sensor wires for opens, shorts between wires, and shorts to ground. 2. Allow vehicle to idle in neutral with brake applied. Check: a. Proper dipstick. b. Oil level. 3. If all points check, call distributor.
52 **Offgoing C3 Pressure Switch (during shift)**	01, 08, 32, 34, 54, 56, 71, 78, 79, 99	1. Follow procedures 1 and 2 on Code 51. 2. Check main harness to transmission for opens, shorts between wires and shorts to ground. 3. If all points check, call distributor.
53 **Offgoing Speed Test (during shift)**	08, 18, 28, 29, 38, 39, 48, 49, 58, 59, 68, 69, 78, 99	1. Follow procedures on Code 51.
54 **Oncoming Ratio Test (after shift)**	01, 07, 10, 12, 17, 21, 23, 32, 34, 43, 45, 54, 56, 65, 70, 71, 80, 81, 83, 85, 86, 92, 93, 95, 96, 97	1. Follow procedures on Code 51.
55 **Oncoming C3 Pressure Switch (after shift)**	17, 87, 97	1. Follow Code 51, steps 1, 2. 2. Check C3 press switch wires for opens, shorts between wires, and shorts to ground. 3. Check: a. Main connector is properly connected, clean, undamaged. b. ECU is properly connected, clean and undamaged. c. Speed sensor is properly connected, clean, undamaged. 4. If all points check, call distributor.
56 **Range Verification Test**	00, 11, 22, 33, 44, 55, 66, 77	1. Follow procedures on Code 51.
57 **Range Verification Test (C3)**	11, 22, 44, 66, 88, 99	1. Follow procedures on Code 55.
65	00	NOT PROGRAMMED AT THIS TIME
66 **Serial Communications Interface Fault**	00	1. Check: a. Serial connection to engine computer is connected, clean, undamaged. b. SCI wires for opens, shorts, shorts to ground. 2. If all points check, call distributor.
69 **ECU Failure**	12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 32, 33, 34, 35, 36	1. Clear and retry vehicle start. 2. If it recurs, replace ECU. 3. If recurs again, call distributor.