ATSG

MEDIUM DUTY TRUCK DIAGNOSTIC CODE BOOK

TECHTRAN™ MANUAL

"1988 to 2013 COVERAGE"

JR403E AW450-43LE

AISIN6 5R110W

ISUZU

GMC MEDIUM DUTY TRUCKS

MEDIUM DUTY TRUCKS

UD

UD TRUCKS

FUSO

HINO TRUCKS

INTERNATIONAL

Ford

AUTOMATIC TRANSMISSION SERVICE GROUP

INTRODUCTION

1st Printing
April, 2013

MEDIUM DUTY TRUCK DIAGNOSTIC CODE MANUAL

This Medium Duty Truck Diagnostic Code Manual has been produced in order to help the diagnostic technician retrieve diagnostic trouble codes from tiltcab trucks such as the Isuzu NPR, Chevrolet Forward, GMC Tiltmaster, Mitsubishi Fuso, Nissan UD and various Hino models. This manual also contains the code retrieval manual process for the Ford and International LCF Series trucks equipped with the 5R110W transmission.
These trucks can be equipped with various transmissions such as the JR403E Electromatic, the Aisin Seiki 450-43LE or the Aisin 6 speed transmission. There is also a reference to the Mitsubishi Fuso manufactured Sterling trucks.
Since most shops do not have a dedicated scan tool to retrieve codes, this manual contains the manual code retrieval process for the above mentioned vehicles as well as code definitions. It also contains the relearn procedures that are necessary for proper transmission operation.

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MEDIUM DUTY TRUCK DIAGNOSTIC CODE MANUAL

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1988-90 CODE RETRIEVAL PROCEDURE

The 1988-90 models use an ***ECONO Indicator Lamp*** (Figure 1) that will flash continuously when the ignition is on and the Automatic Transmission Control Unit (ATCU) senses a fault in the transmission control system.

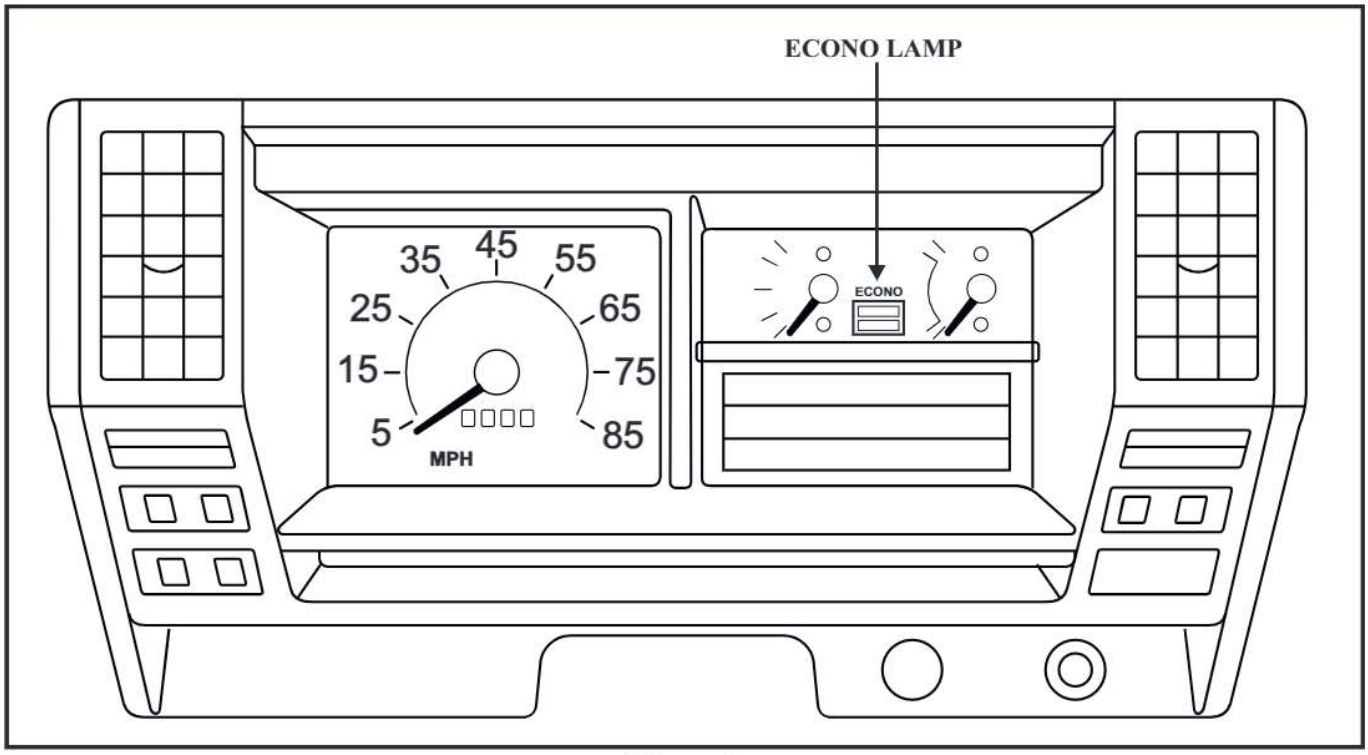


Figure 1

If no codes are stored, the Econo Indicator Lamp will come ON for 2 seconds and then go OUT.
If when the code retrieval procedure is done but there are no codes stored, the Econo Indicator Lamp will flash continuously.
The code retrieval procedure for ***1988-90*** models is shown in Figure 2.

1988-90 CODE RETRIEVAL PROCEDURE

1. Ignition "OFF"
2. Shift lever in "D" range
3. Economy switch in "NORMAL" position
4. Ignition switch "ON"
5. Shift lever in "2" range
6. Economy switch in ECONOMY position
7. Shift lever in "1" range
8. Economy switch in "NORMAL" position
9. Depress accelerator pedal to the floor and release

Figure 2

The **ECONO** Indicator Lamp will flash a judgement flash that will have remained on ***LONGER*** than the other flashes as indicated in Figure 3, ***the LONGER flash is the judgement code.*** The code pattern display is shown in Figure 4.

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1988-90 CODE RETRIEVAL PROCEDURE

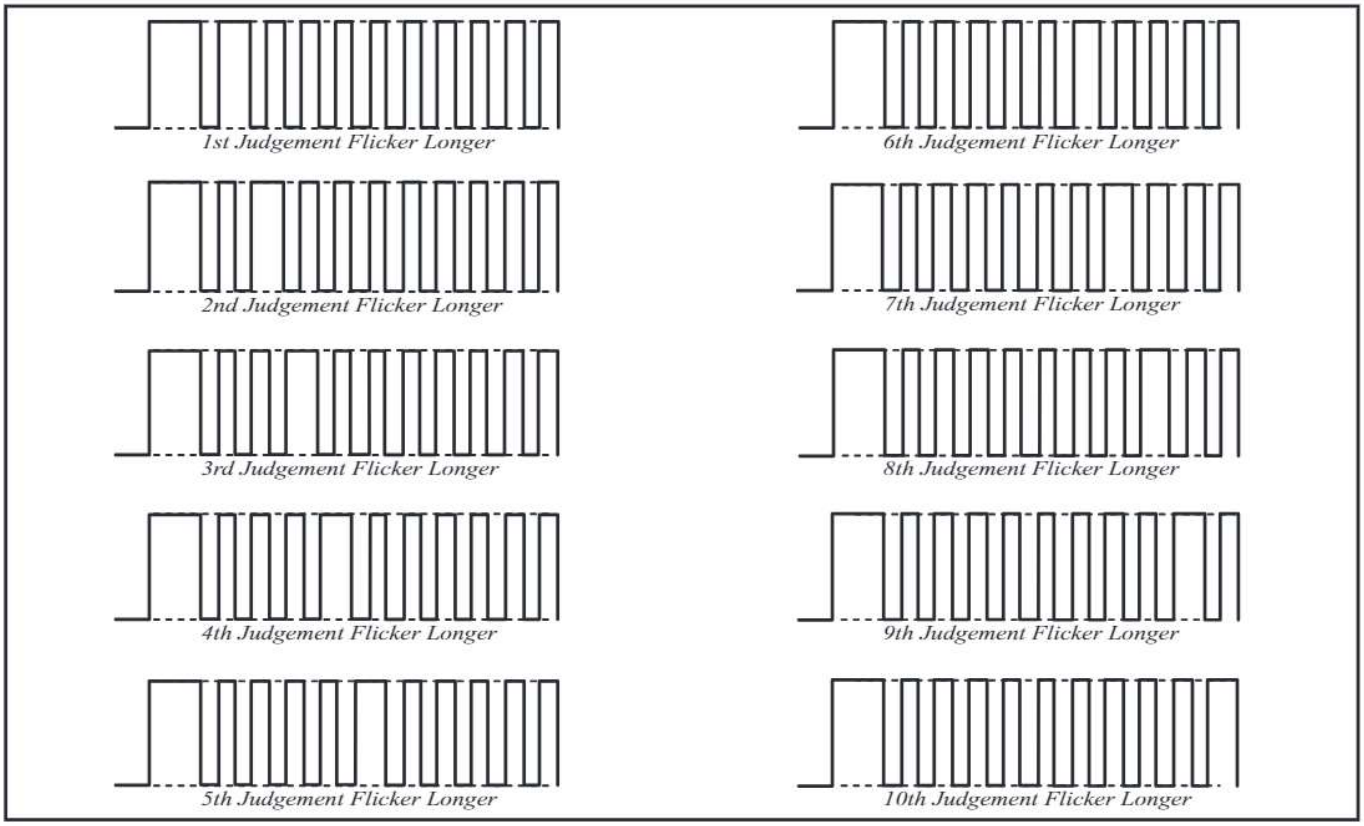


Figure 3

The code patterns listed in Figure 3 are for the 1988-90 trucks which indicate the judgement flash codes the ATCU is capable of storing. If the ECONO Indicator Lamp does **NOT** respond, check operation of the Inhibitor Switch, Economy Switch & Bulb, Kickdown Switch or the Idle Switch.

Use the code chart in Figure 4 for the 1988-90 models

1988-90 CODE CHART		
JUDGEMENT CODE	**COMPONENT AFFECTED**	**PROBABLE CAUSE**
1	SPEED SENSOR #1	SPEED SENSOR ON TRANSMISSION FAULT
2	SPEED SENSOR #2	SPEED SENSOR IN SPEEDOMETER FAULT
3	THROTTLE SENSOR	OUT OF RANGE
4	SHIFT SOLENOID "A"	OPEN OR SHORTED
5	SHIFT SOLENOID "B"	OPEN OR SHORTED
6	OVERRUN CLUTCH SOLENOID	OPEN OR SHORTED
7	LOCK-UP SOLENOID	OPEN OR SHORTED
8	ATF THERMOSENSOR	ATF TEMP SENSOR FAULT
9	ENGINE RPM SENSOR	OPEN CIRCUIT
10	LINE PRESSURE SOLENOID	OPEN OR SHORTED

Figure 4

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1988-90 CODE CLEARING PROCEDURE

Codes can be cleared by removing the #11 fuse from the glove box fuse box for 10 seconds as seen in Figure 5 or by disconnecting the battery cables. The Econo Lamp will flash rapidly to indicate that the memory has been cleared.

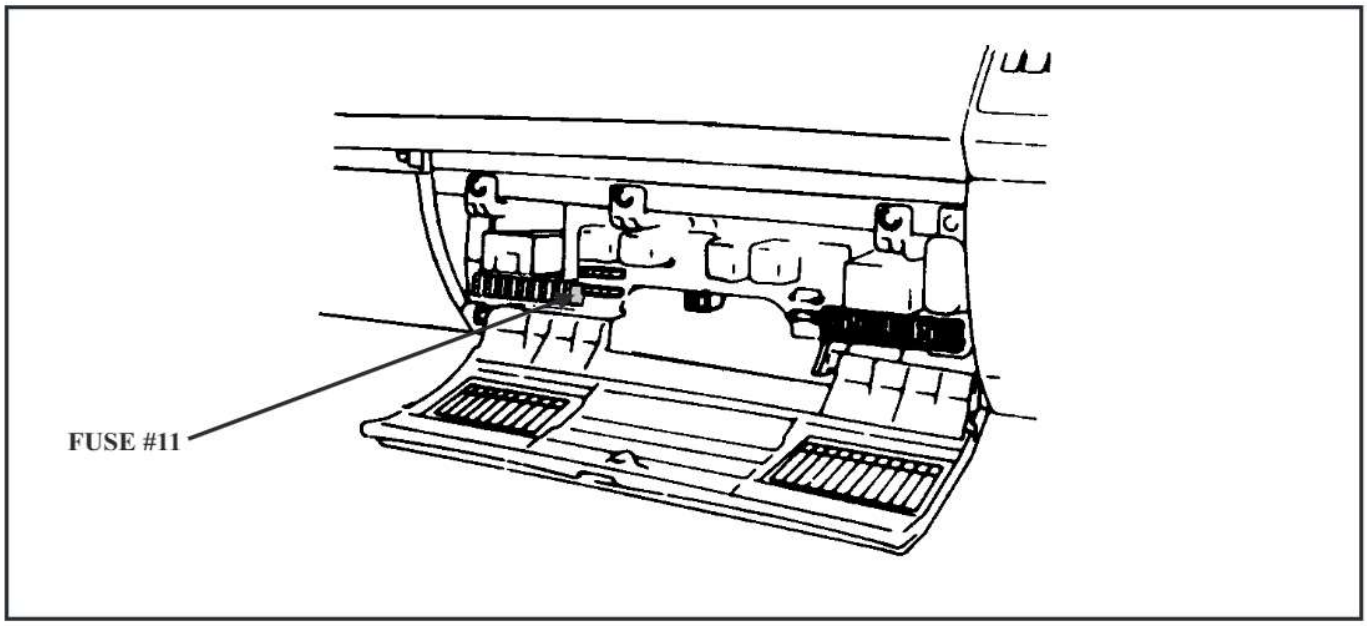


Figure 5

1988 - 1990 TPS RELEARN PROCEDURE

Once repairs have been completed, Code 21 for a Throttle Position Sensor (TPS) may refuse to be cleared. Stacked shifts may also be experienced.
A TPS relearn is required to clear Code 21 as well as to allow correct shift timing.
The TPS relearn procedure is as follows:
1. Turn ignition ON, do not start engine.
2. Depress accelerator pedal to the floor until a "CLICK" is heard, then release the throttle pedal. Upon release of the throttle pedal a "CLICK" should be heard again.
3. Without turning the ignition OFF, start the engine.
4. Quickly depress accelerator the floor and release it.

CAUTION: It is an absolute necessity to insure that the TPS ranges correctly, the throttle cable is not stretched and that the hand throttle, if so equipped, is at an idle position and the hand throttle cable is not frozen or the TPS relearn will not be successful.

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1991 CODE RETRIEVAL PROCEDURE

For 1991 the **ECONO** indicator lamp still flashes continuously when a code is stored by the ATCU.
The 1991 model year code retrieval procedure changed to a diagnostic connector that is jumped which will cause the Econo Indicator Lamp to flash the code patterns, the **TWO WIRE** diagnostic connector is located behind the glove box, next to the ATCU as shown in Figure 6.

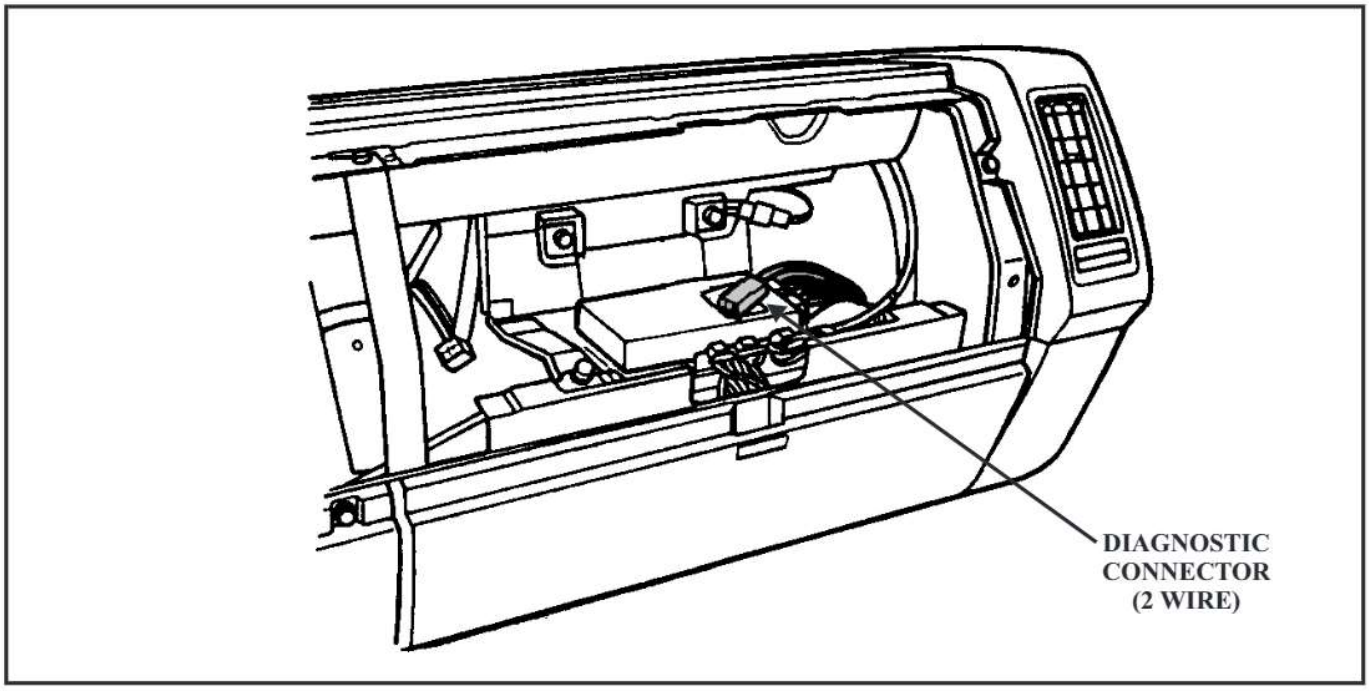


Figure 6

The code pattern also changed which resembles the typical GM code format. The first digit are ***LONG*** flashes, and the second digit are ***SHORT*** flashes as seen in the illustration in Figure 7.
If no codes are stored, the Econo Indicator Lamp will come on for two seconds when the ignition is turned ON, and then go out as seen in Figure 8.

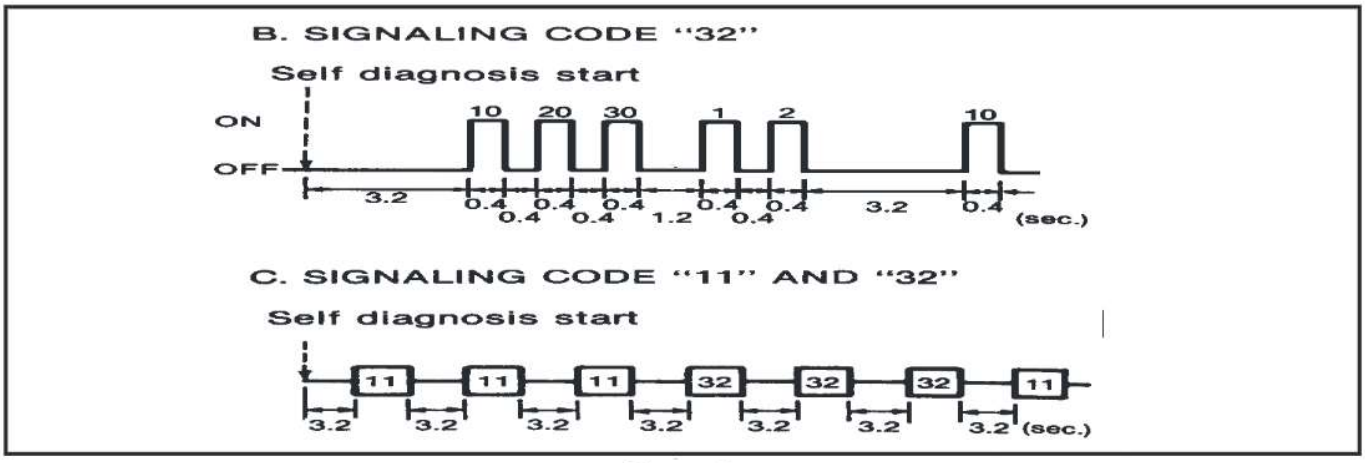


Figure 7

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1991 CODE RETRIEVAL PROCEDURE

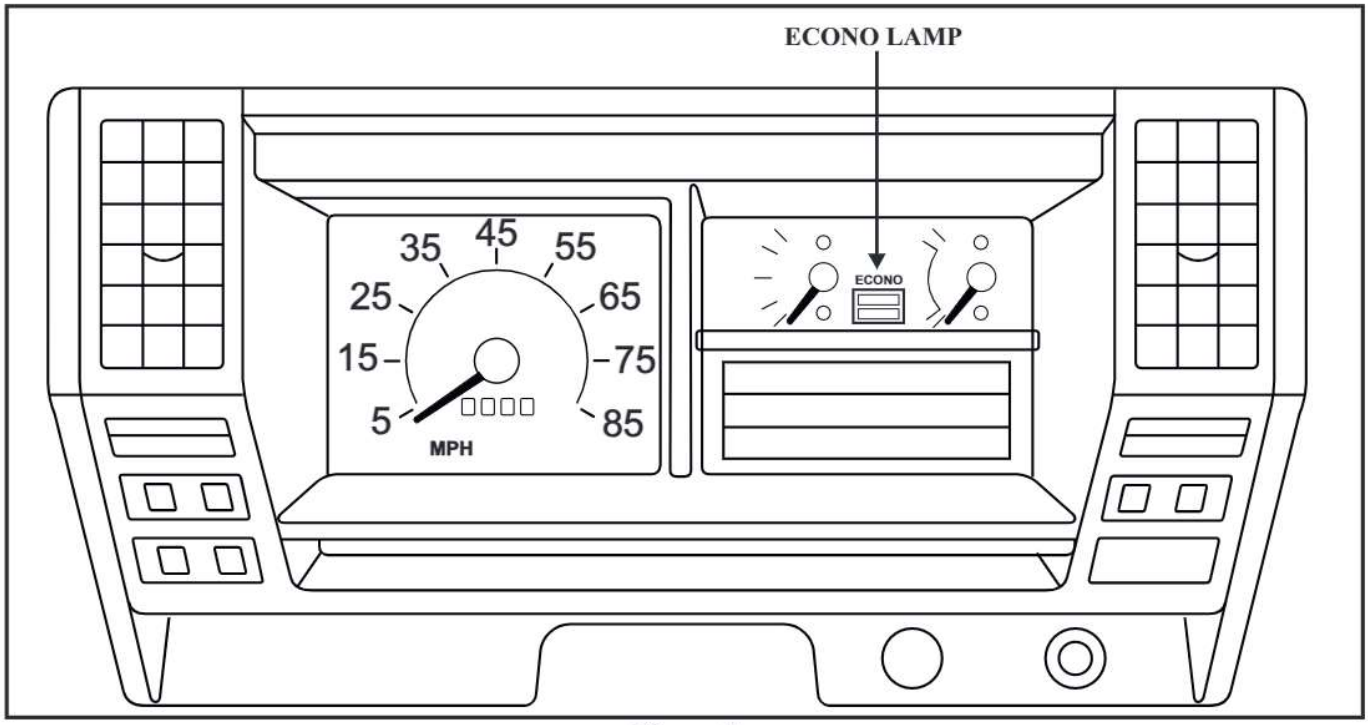


Figure 8

If no codes are stored after the code retrieval procedure is performed, a ***code "1"*** will be flashed repeatedly. If one code is stored, the code will be repeated three times.
When two or more codes are stored, each code will be repeated three times with each code displayed in numerical order.

The code chart for 1991 trucks is illustrated in Figure 9.

1991 CODE CHART		
CODE NUMBER	**COMPONENT AFFECTED**	**PROBABLE CAUSE**
11	SPEED SENSOR #1	SPEED SENSOR ON TRANSMISSION FAULT
24	SPEED SENSOR #2	SPEED SENSOR IN SPEEDOMETER FAULT
13	ENGINE RPM SENSOR	OPEN OR SHORTED
15	ATF THERMOSENSOR	OPEN OR SHORTED
21	THROTTLE SENSOR	OPEN OR SHORTED
31	SHIFT SOLENOID "A"	OPEN OR SHORTED
32	SHIFT SOLENOID "B"	OPEN OR SHORTED
33	OVERRUN CLUTCH SOLENOID	OPEN OR SHORTED
34	LOCK-UP SOLENOID	OPEN OR SHORTED
35	LINE PRESSURE SOLENOID	OPEN OR SHORTED

Figure 9

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1991 CODE CLEARING PROCEDURE

Codes can be cleared by removing the #11 fuse from the glove box fuse box for 10 seconds as seen in Figure 5 or by disconnecting the battery cables. The Econo Lamp will flash rapidly to indicate that the memory has been cleared. On Budget rental trucks, remove Circuit Breaker #8.

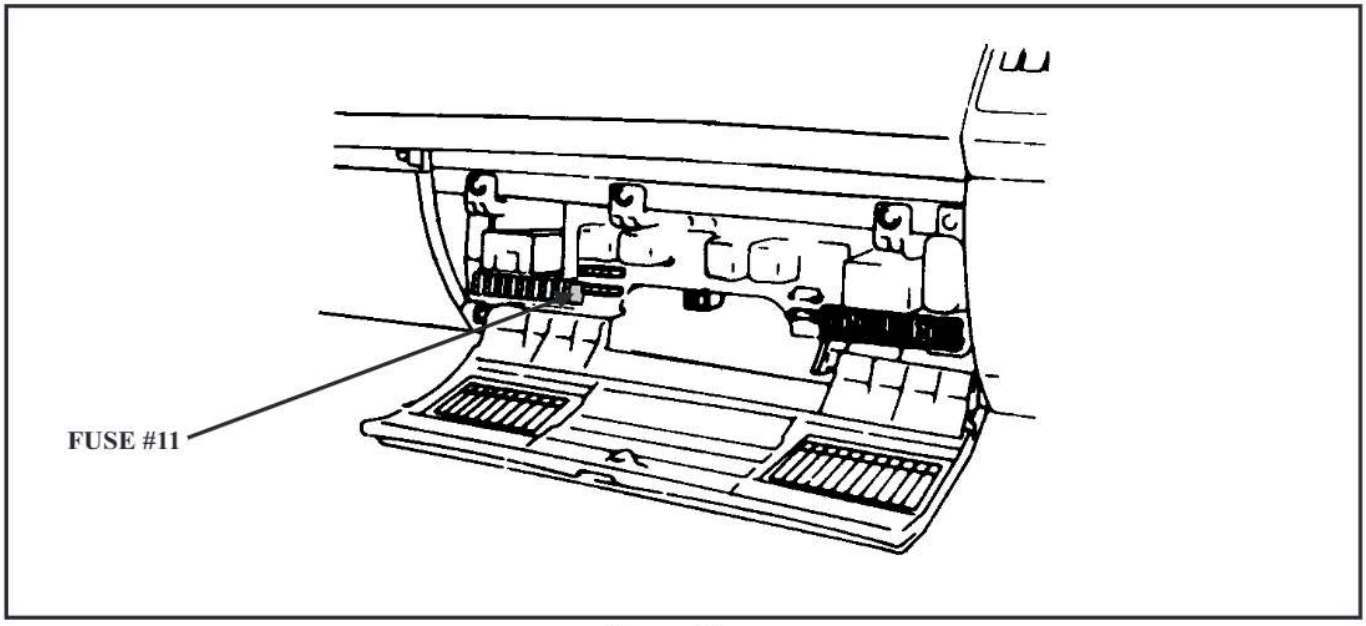


Figure 10

1991 TPS RELEARN PROCEDURE

Once repairs have been completed, Code 21 for a Throttle Position Sensor (TPS) may refuse to be cleared. Stacked shifts may also be experienced.
A TPS relearn is required to clear Code 21 as well as to allow correct shift timing.
The TPS relearn procedure is as follows:
1. Turn ignition ON, do not start engine.
2. Depress accelerator pedal to the floor until a "CLICK" is heard, then release the throttle pedal. Upon release of the throttle pedal a "CLICK" should be heard again.
3. Without turning the ignition OFF, start the engine.
4. Quickly depress accelerator the floor and release it.

CAUTION: It is an absolute necessity to insure that the TPS ranges correctly, the throttle cable is not stretched and that the hand throttle, if so equipped, is at an idle position and the hand throttle cable is not frozen or the TPS relearn will not be successful.

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1992-94 CODE RETRIEVAL PROCEDURE

The **ECONO** Lamp is still used in the 1992-94 model years as shown in Figure 11. The location of the two wire diagnostic connector was ***moved*** to the driver's side kick panel, adjacent to the brake master cylinder as shown in Figure 12.
It is a ***WHITE*** connector with a ***YELLOW/BLACK*** wire and a solid ***BLACK*** wire.

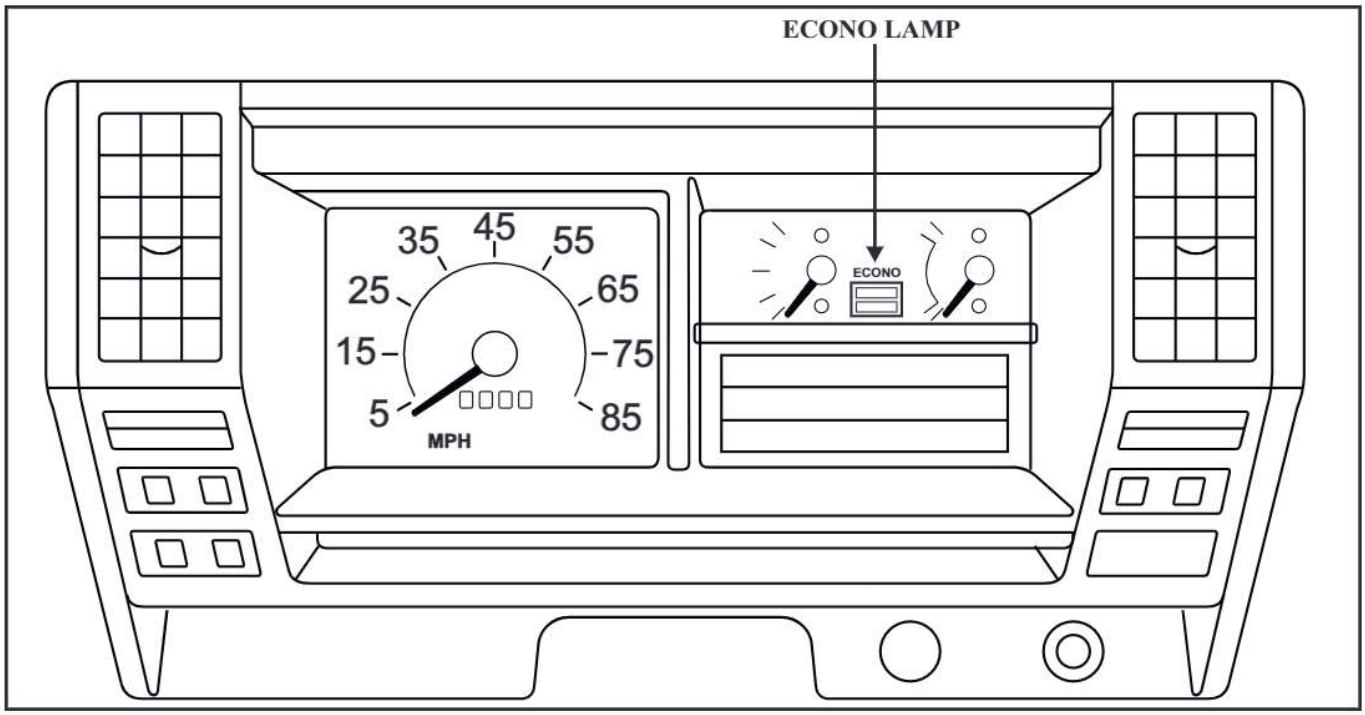


Figure 11

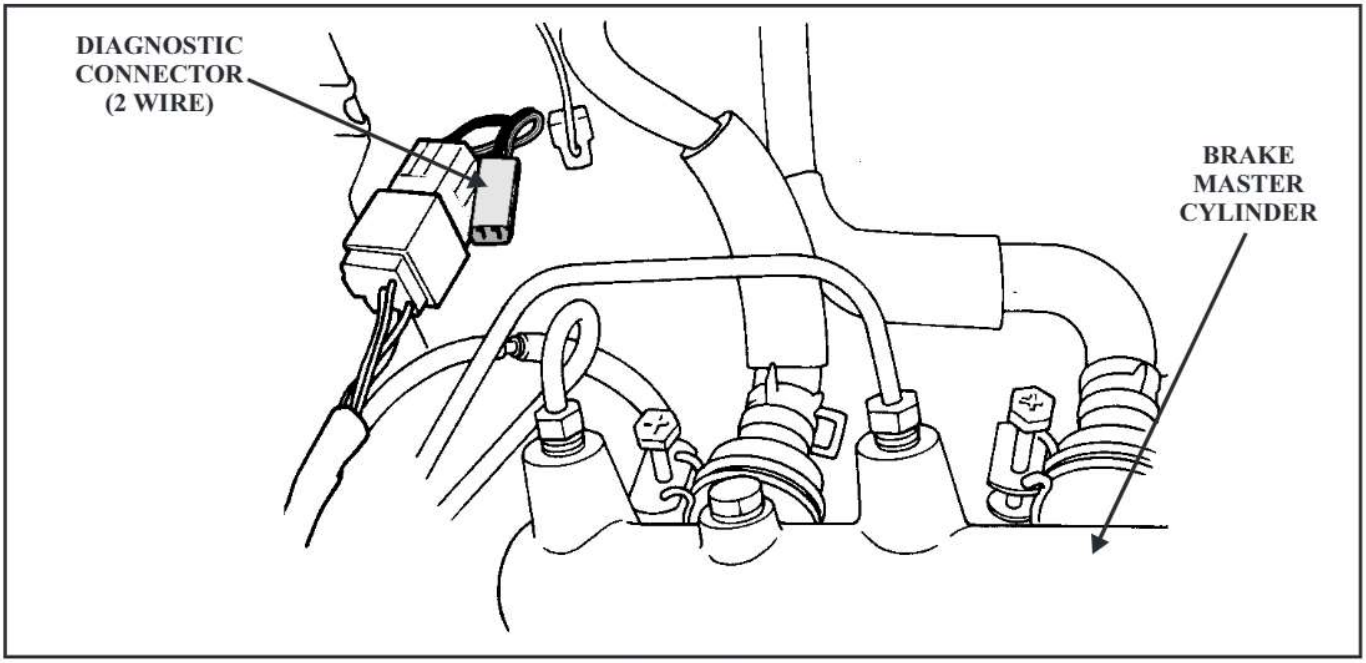


Figure 12

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1992-94 CODE RETRIEVAL PROCEDURE

Inhibitor Switch code capability was added for the 1993 model year as shown in the code chart in Figure 13.

1992-94 CODE CHART		
CODE NUMBER	**COMPONENT AFFECTED**	**PROBABLE CAUSE**
11	SPEED SENSOR #1	SPEED SENSOR ON TRANSMISSION FAULT
13	ENGINE RPM SENSOR	OPEN OR SHORTED
15	ATF THERMOSENSOR	OPEN OR SHORTED
*17	INHIBITOR SWITCH	OPEN OR SHORTED
24	SPEED SENSOR #2	SPEED SENSOR IN SPEEDOMETER FAULT
21	THROTTLE SENSOR	OPEN OR SHORTED
31	SHIFT SOLENOID "A"	OPEN OR SHORTED
32	SHIFT SOLENOID "B"	OPEN OR SHORTED
33	OVERRUN CLUTCH SOLENOID	OPEN OR SHORTED
34	LOCK-UP SOLENOID	OPEN OR SHORTED
35	LINE PRESSURE SOLENOID	OPEN OR SHORTED
***THIS CODE WAS ADDED FOR THE 1993 MODEL YEAR**		

Figure 13

Codes can be cleared by removing the #11 fuse from the glove box fuse box for 10 seconds as seen in Figure 5 or by disconnecting the battery cables. The Econo Lamp will flash rapidly to indicate that the memory has been cleared. On Budget rental trucks, remove Circuit Breaker #8.

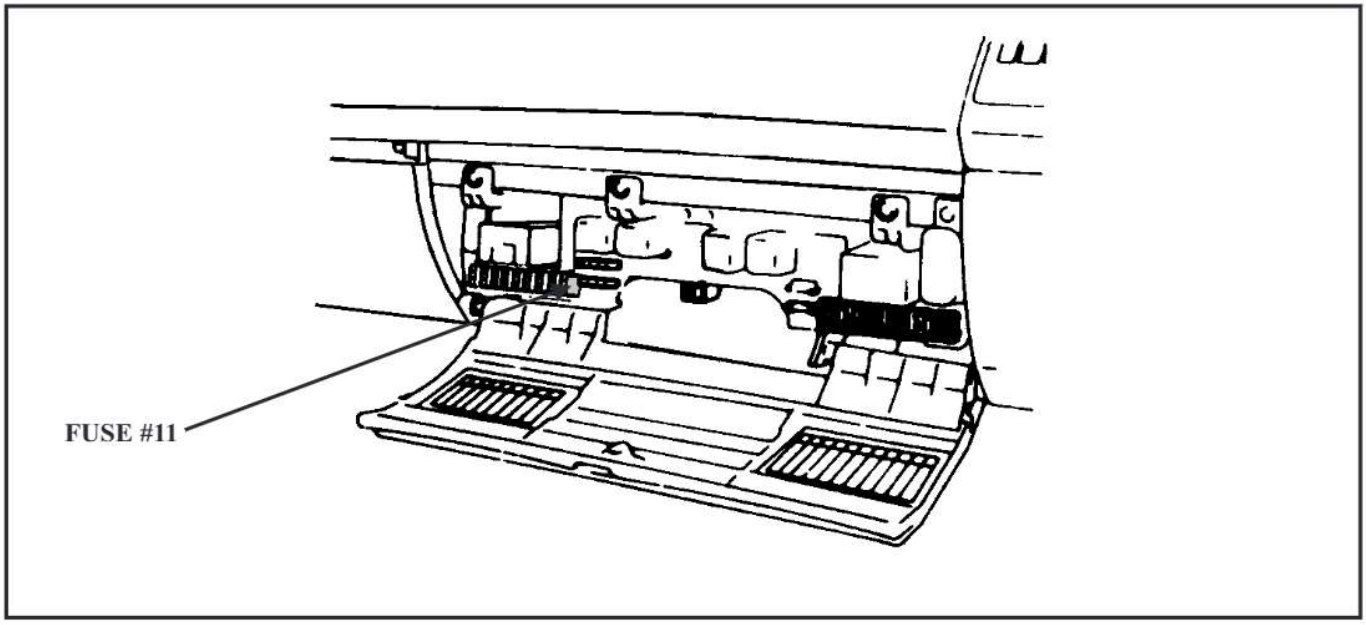


Figure 14

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1992-94 TPS RELEARN PROCEDURE

Once repairs have been completed, Code 21 for a Throttle Position Sensor (TPS) may refuse to be cleared. Stacked shifts may also be experienced.
A TPS relearn is required to clear Code 21 as well as to allow correct shift timing.
The TPS relearn procedure is as follows:
1. Turn ignition ON, do not start engine.
2. Depress accelerator pedal to the floor until a "CLICK" is heard, then release the throttle pedal. Upon release of the throttle pedal a "CLICK" should be heard again.
3. Without turning the ignition OFF, start the engine.
4. Quickly depress accelerator the floor and release it.

CAUTION: It is an absolute necessity to insure that the TPS ranges correctly, the throttle cable is not stretched and that the hand throttle, if so equipped, is at an idle position and the hand throttle cable is not frozen or the TPS relearn will not be successful.

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1995 & 1995½-98 CODE RETRIEVAL PROCEDURE

The 1995 models still uses the **ECONO** Indicator Lamp for code display as shown previously in Figure 11. The 1995½-98 models use a **"CHECK TRANS" LAMP** for code display as seen in Figure 15.
The code display pattern remains the same as1994 models.
Diagnostic connector location is also the same as the 1992-94 models **BUT,** the type of connector has changed to a ***GREEN, THREE*** wire connector. The outer two wires are jumped to retrieve codes as shown in Figure 16. These wires are ***YELLOW/BLACK*** and solid ***BLACK***.

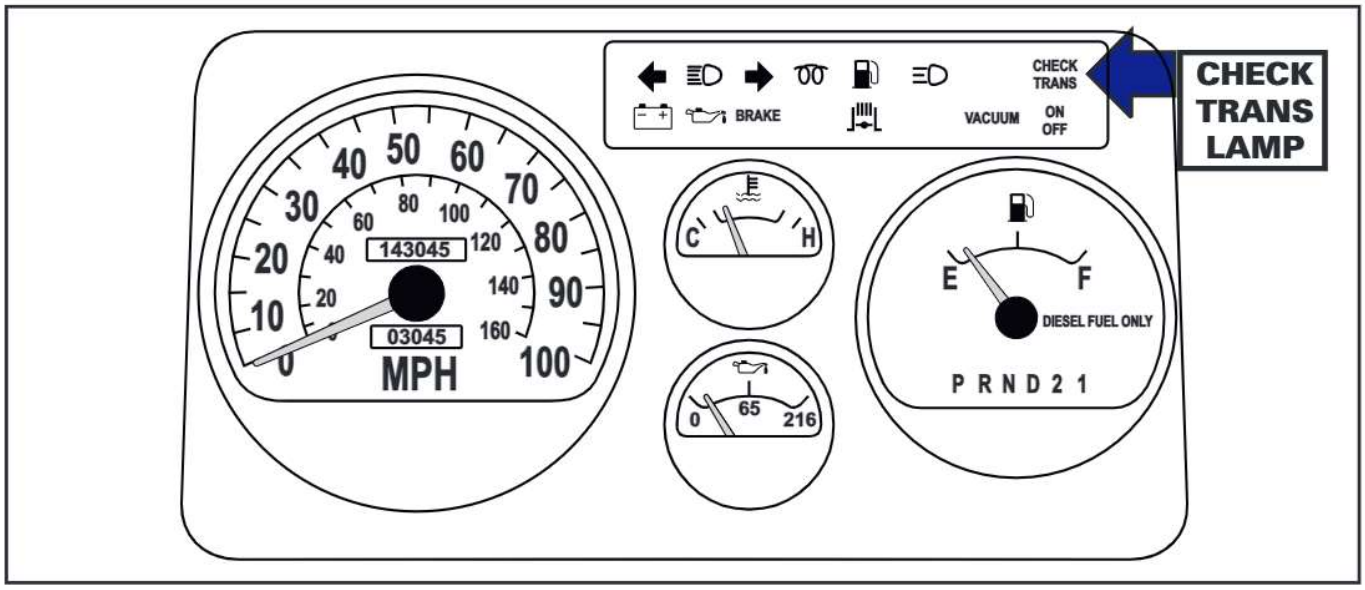


Figure 15

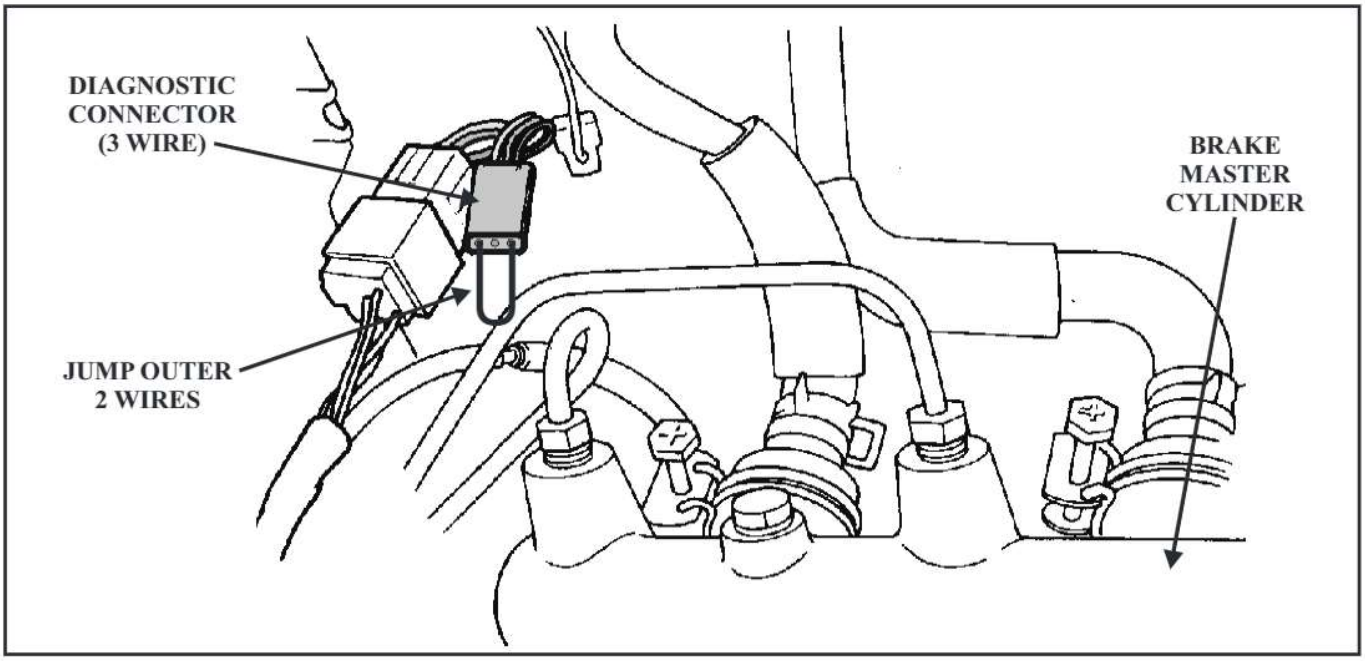


Figure 16

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1995 & 1995½-98 CODE RETRIEVAL PROCEDURE

Use the code chart in Figure 17 for the 1995 & the 1995½-98 models.

1995 & 1995½-98 CODE CHART		
CODE NUMBER	**COMPONENT AFFECTED**	**PROBABLE CAUSE**
11	SPEED SENSOR #1	Fault (On Extension Housing, Pulse Generator.)
13	ENGINE RPM SENSOR	Open or Shorted
15	ATF THERMOSENSOR	Open or Shorted
17	INHIBITOR SWITCH	Open or Shorted
21	THROTTLE SENSOR	Open or Shorted
*24	SPEED SENSOR #2	Fault (On Extension Housing, Gear Driven)
31	SHIFT SOLENOID "A"	Open or Shorted
32	SHIFT SOLENOID "B"	Open or Shorted
33	OVERRUN CLUTCH SOLENOID	Open or Shorted
34	LOCK-UP SOLENOID	Open or Shorted
35	LINE PRESSURE SOLENOID	Open or Shorted
The 1994 models will have the #2 Speed Sensor in the speedometer head.		

Figure 17

1995 & 1995½-98 CODE CLEARING PROCEDURE

Codes can be cleared by removing the #11 fuse from the glove box fuse box for 10 seconds as seen in Figure 5 or by disconnecting the battery cables. The Econo Lamp will flash rapidly to indicate that the memory has been cleared. On Budget rental trucks, remove Circuit Breaker #8.

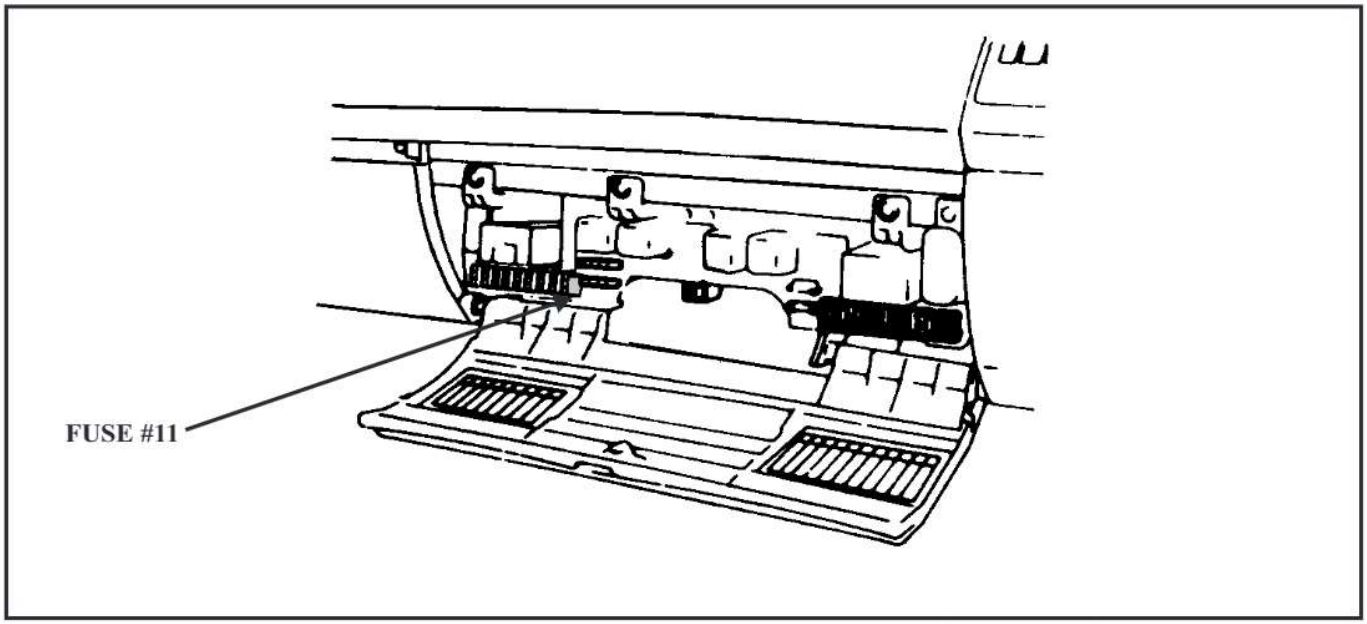


Figure 18

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1995 & 1995½ - 1998 TPS RELEARN PROCEDURE

Once repairs have been completed, Code 21 for a Throttle Position Sensor (TPS) may refuse to be cleared. Stacked shifts may also be experienced.
A TPS relearn is required to clear Code 21 as well as to allow correct shift timing.
The TPS relearn procedure is as follows:
1. Turn ignition ON, do not start engine.
2. Depress accelerator pedal to the floor until a "CLICK" is heard, then release the throttle pedal. Upon release of the throttle pedal a "CLICK" should be heard again.
3. Without turning the ignition OFF, start the engine.
4. Quickly depress accelerator the floor and release it.

CAUTION: It is an absolute necessity to insure that the TPS ranges correctly, the throttle cable is not stretched and that the hand throttle, if so equipped, is at an idle position and the hand throttle cable is not frozen or the TPS relearn will not be successful.

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1999 CODE RETRIEVAL PROCEDURE

Even though the 1999 models received a new type of transmission, they still use a**"CHECK TRANS" Lamp** (Refer to Figure 19) that flashes continuously when the Transmission Control Module (TCM) senses a problem and will flash the code pattern when the diagnostic connector is jumped.

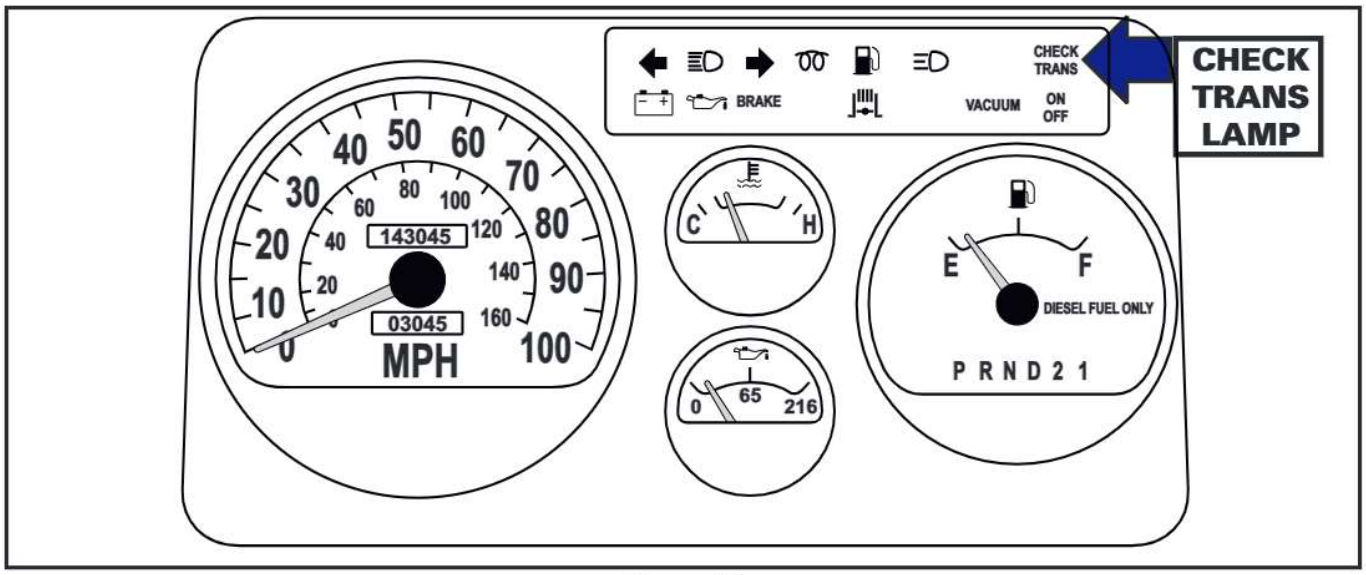


Figure 19

The diagnostic connector is still a three wire ***GREEN*** connector and the outer two wires are jumped to retrieve codes. The wire colors to jump are ***BLACK/WHITE*** and solid ***BLACK*** as seen in Figure 20.
The code format remains the same as in the previous model.

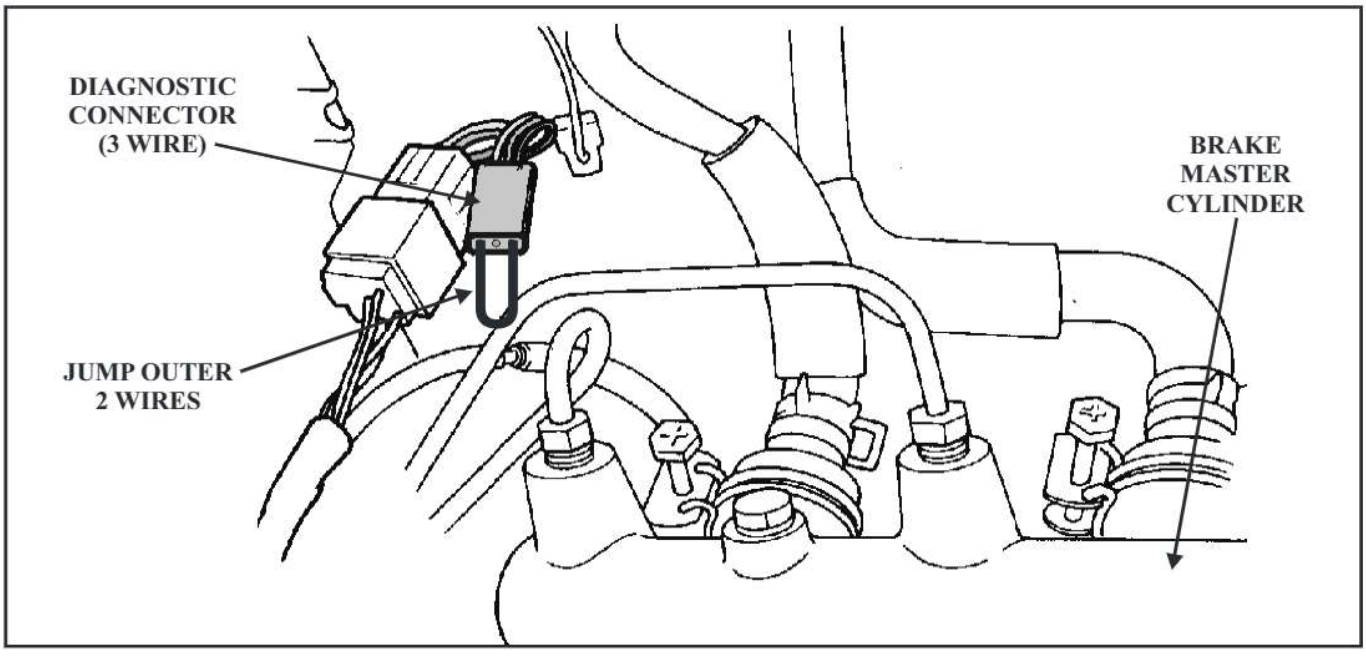


Figure 20

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1999 CODE RETRIEVAL PROCEDURE

Use the chart in Figure 21 For 1999 code definitions.

DTC	CODE PATTERN	CODE DESCRIPTION
11	OFF / ON 	Vehicle Speed Sensor #1 circuit open or shorted (Located on Extension Housing, Pulse Generator)
13		Engine Speed Sensor circuit open or shorted
15		Automatic Transmission Fluid Thermosensor circuit open
17		Inhibitor Switch circuit open or shorted
21		Throttle Position Sensor circuit open or shorted
24		Vehicle Speed Sensor #2 circuit open or shorted (Located On Extension Housing, Gear driven)
31		Shift Solenoid #1 (S1) circuit open or shorted
32		Shift Solenoid #2 (S2) circuit open or shorted
33		Timing Solenoid (ST) circuit open or shorted
34		Lock-Up Solenoid circuit open or shorted
35		Line Pressure Solenoid circuit open or shorted
37		Exhaust brake system circuit open or shorted
38		Engine warm-up cut system circuit open or shorted

Figure 21

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

1999 CODE CLEARING PROCEDURE

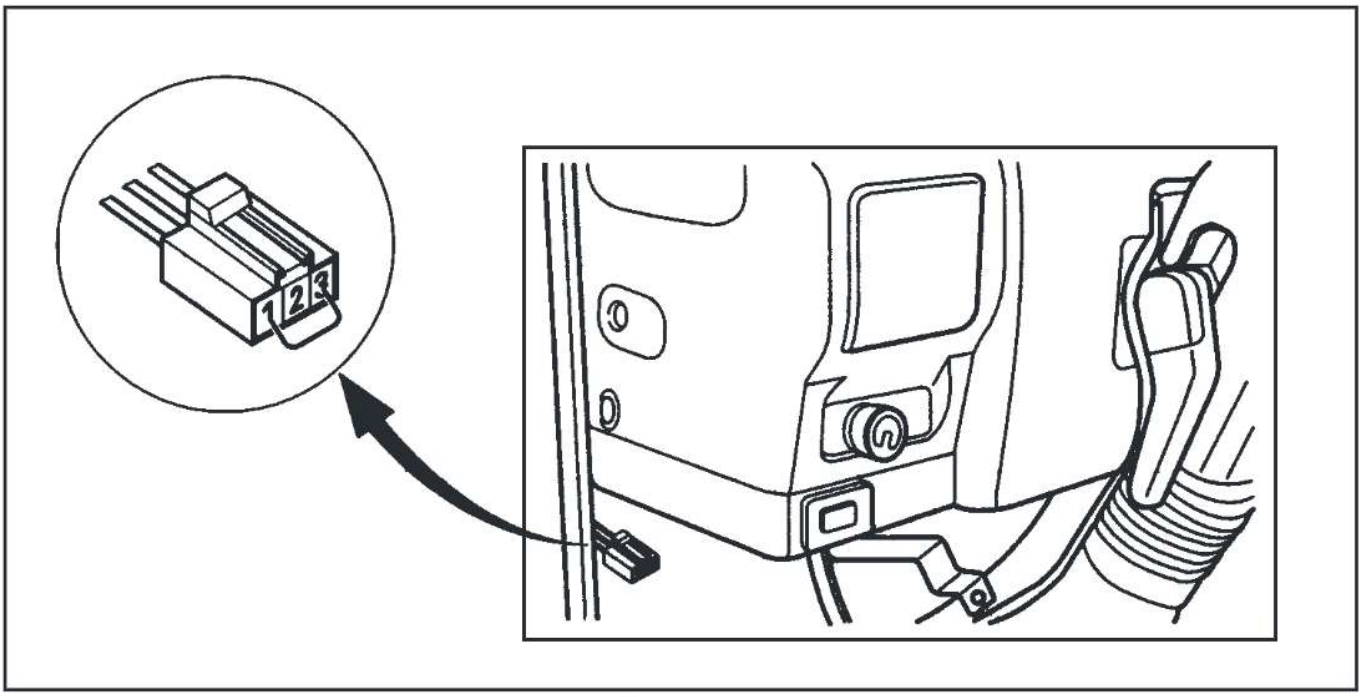


Figure 22

To clear trouble codes on 1999 Isuzu NPR, Chevy Forward and GMC Tiltmaster, the following procedure must be performed. ***Each step must be performed for at least 5 seconds.***

1. Turn key on, do not start engine.
2. Jump diagnostic connector terminals 1 and 3 as seen in Figure 22.
3. Move the manual selector shaft to the Neutral position.
4. Depress the brake fully and hold.
5. Depress the accelerator pedal fully and hold.

If the memory is clear, the "Check Trans" lamp will flash rapidly for 10 seconds.

1999 ISUZU NPR; CHEVY FORWARD; GMC TILTMASTER

TPS RELEARN PROCEDURE

Code 21, for a TPS circuit fault may not clear even though all TPS circuits and related components are within specifications. Stacked shifts may also be experienced.

These vehicles require a TPS relearn procedure whenever the engine, injection pump, accelerator cable, throttle linkage, throttle position sensor, kickdown switch or TCM are replaced. Failure to do so will result in the above complaints.

The following procedure is used for the TPS voltage relearn:

Preliminary Checks:

1. Turn the idle control knob fully counterclockwise (Off).
2. Make sure the idle lever on the injection pump rests against the idle stop.
3. There must be 5 to 10 mm of pedal free play.
4. Depress the accelerator pedal to full throttle, the pedal should stop 0.0 to 2.0 mm above the floor mounted stopper bolt, (Refer to Figure 23).
5. Depress the accelerator pedal to the floor, making certain the engine control lever on the injection pump contacts the full throttle stop bolt.
6. Depress the accelerator pedal by hand while verifying that the Kickdown Switch makes contact between 95 to 100% throttle, (You will here the switch "CLICK").

TCM/TPS Clearing:

1. Move the shift lever to "1".
2. Turn the ignition "ON".
3. Turn the overdrive switch "OFF", (O/D Lamp illuminated).
4. Depress the accelerator pedal to WOT until you hear the Kickdown Switch "CLICK" and HOLD the pedal at 100% throttle opening.
5. Depress and HOLD the brake pedal.
   Early TCMs will flash the "CHECK TRANS" Lamp 5 times.
   Late TCMs will flash the "CHECK TRANS" Lamp 5 times slow and then 6 times fast.
6. Release the accelerator and brake pedals.
7. Turn the ignition "OFF".

TCM DTC Clearing:

1. Move the shift lever to "Neutral".
2. Turn the O/D Switch "ON", (O/D Lamp "OFF").
3. Jump pins 1 and 3 of the GREEN TCM Data Link Connector, (Refer to Figure 24).
4. Turn the ignition "ON", the "CHECK TRANS" Lamp will flash steadily.
5. Depress the accelerator pedal to WOT until you hear the Kickdown Switch "CLICK", and HOLD the throttle pedal at 100% throttle.

continued...

1999 ISUZU NPR; CHEVY FORWARD; GMC TILTMASTER

TPS RELEARN PROCEDURE

TCM DTC Clearing *continued:*

6. Depress and HOLD the brake pedal, the "CHECK TRANS" Lamp will flash 10 times slowly and then flash rapidly.
7. Release the accelerator and brake pedals, DO NOT turn the ignition "OFF".

Wide Open Throttle (WOT) Relearn:

1. Disconnect the Fast Idle Control Device (FICD) connector. (It is a single pin WHITE connector located near the GREEN TCM DLC connector, and is usually wrapped in BLUE tape, Refer to Figure 25).
2. Move the shift lever to Park.
3. Depress the accelerator pedal to "WOT" until the Kickdown Switch "CLICKS" and HOLD it at 100% throttle opening.
4. Depress and HOLD the brake pedal, the "CHECK TRANS" Lamp should turn "ON" for 3 seconds, then flash 3 times slowly, then flash rapidly.
5. Release the accelerator and brake pedals.

Idle Relearn:

1. Start the vehicle.
2. Depress the accelerator to an engine speed of 1000 rpm 3 times slowly, allowing the pedal to return completely to its rest position each time.
3. Turn the ignition "OFF".
4. Remove the jumper wire from the GREEN TCM DLC.
5. Connect the WHITE single pin FICD connector.

Verifying TPS Value Acceptance:

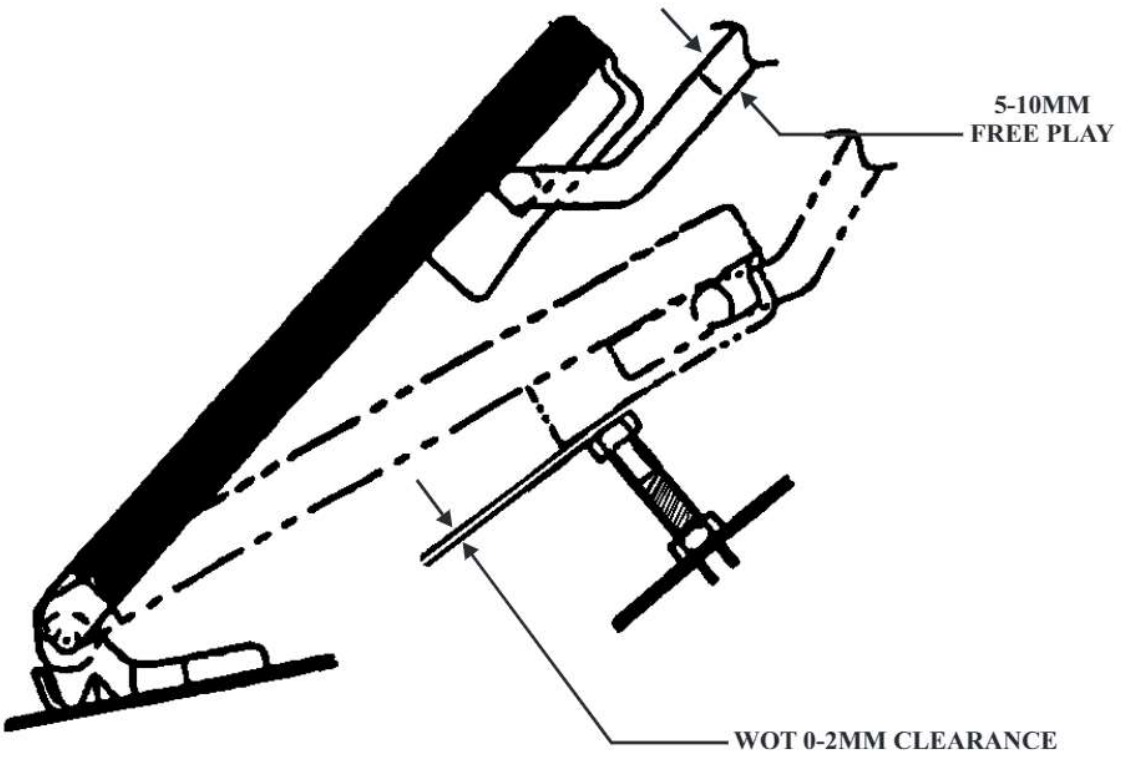
1. Turn ignition "ON", the "CHECK TRANS" Lamp will start flashing.
2. Depress the accelerator pedal to "WOT" until the Kickdown Switch "CLICKS", and HOLD it at 100% throttle opening.
   Early TCMs will turn the "CHECK TRANS" Lamp "OFF", if the procedure was successful.
   Late TCMs will turn "OFF" the "CHECK TRANS" Lamp when you release the accelerator pedal if the procedure was successful.

If the "CHECK TRANS" Lamp continues to flash, you will have to start the procedure over from the "TCM/TPS Clearing" point.
If the procedure continues to fail, check for a problem with the adjustment of the accelerator pedal, Kickdown Switch, TPS, accelerator cable, injection pump adjustment or transmission codes that may be stored.

1999 ISUZU NPR; CHEVY FORWARD; GMC TILTMASTER

TPS RELEARN PROCEDURE

THROTTLE PEDAL ADJUSTMENT



THESE ADJUSTMENTS CAN BE USED FOR THE 2000 & LATER APPLICATIONS

Figure 23

1999 ISUZU NPR; CHEVY FORWARD; GMC TILTMASTER

TPS RELEARN PROCEDURE

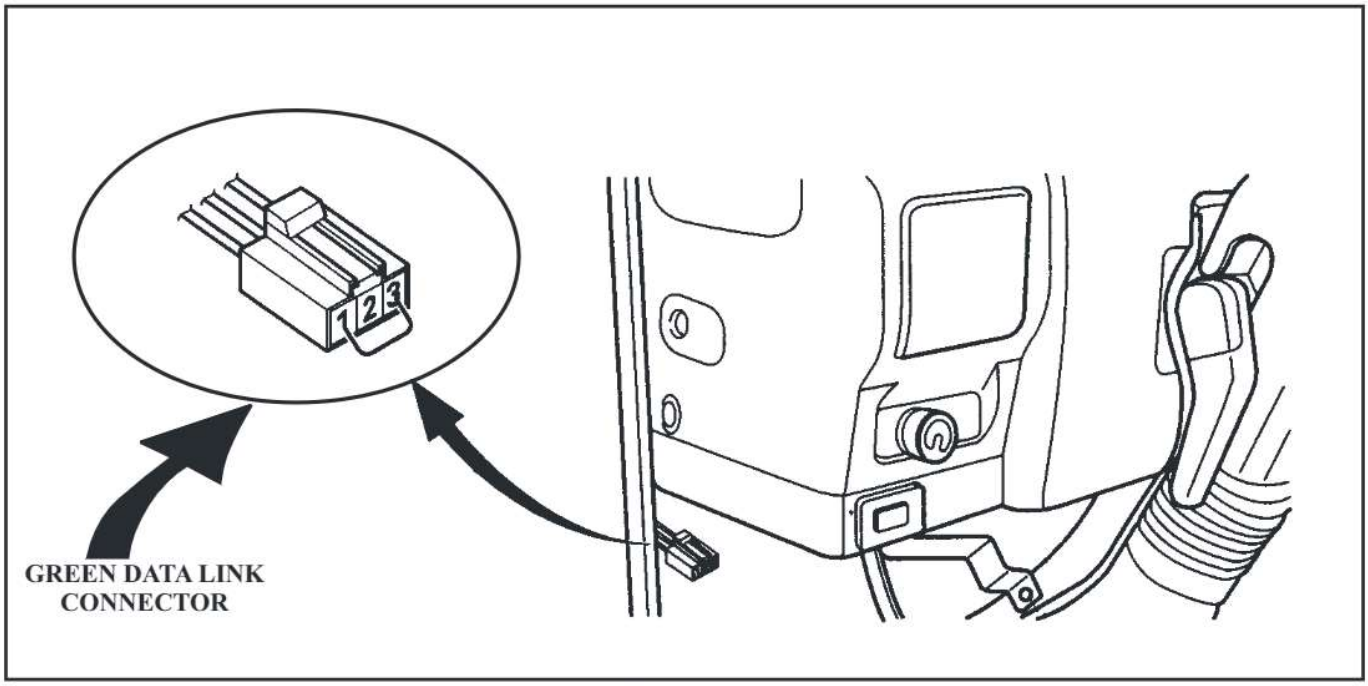


Figure 24

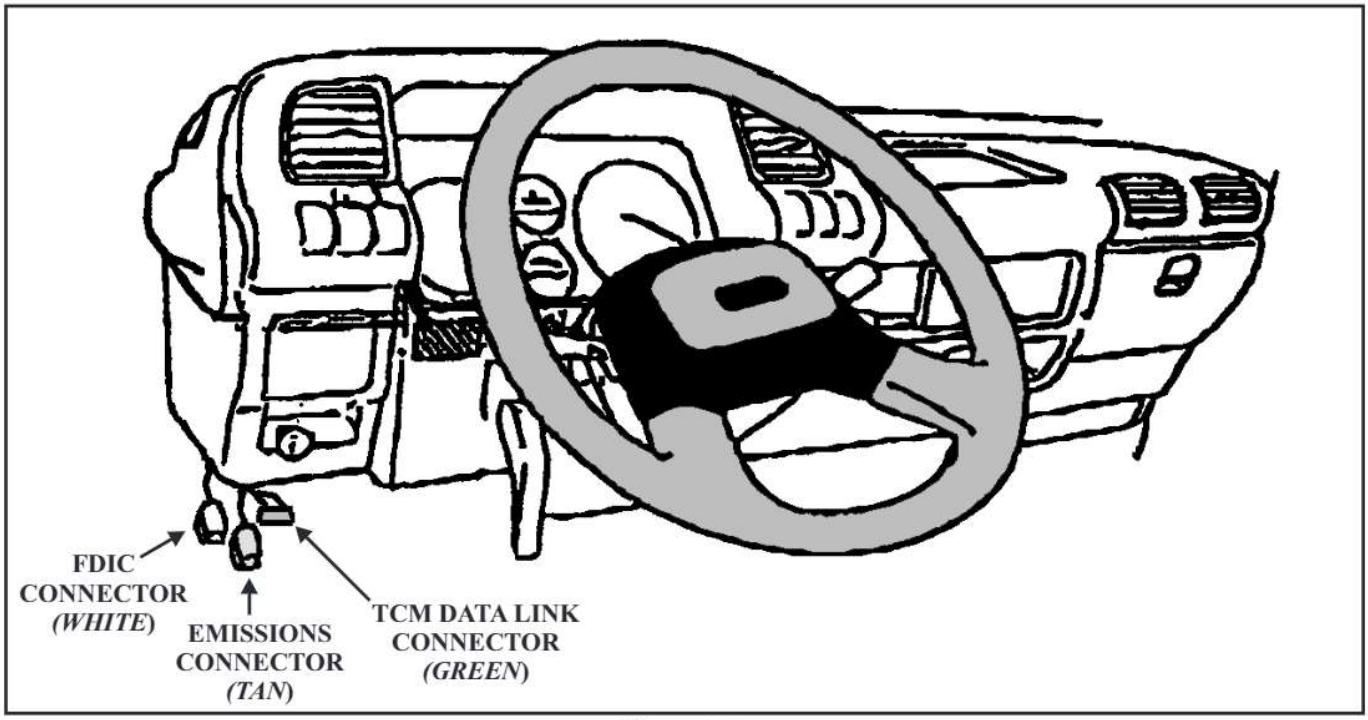


Figure 25

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

2000 - 2006 CODE RETRIEVAL PROCEDURE

To retrieve codes:
The three wire diagnostic jump connector located at the driver side kick panel area has been eliminated.
These vehicles have an OBD-II connector that can be used to retrieve flash codes in the same long and short digit format.
Locate the OBD-II diagnostic connector as shown in Figure 26. ***Jump terminals 4 and 11*** also seen in Figure 26. and read the code pattern using the "Check Trans " lamp on the instrument cluster as seen in Figure 27.

To clear codes, do the following:
1. Turn ignition "ON", but do not start engine.
2. Jump terminals 4 and 11 in the diagnostic connector.
3. Shift the transmission to "Neutral".
4. Depress the brake pedal and hold.
5. Depress the accelerator pedal fully and hold.
When codes are cleared, the "Check Trans" lamp will flash rapidly for 10 seconds.

NOTE: Connecting a scan tool to the OBD-II connector will produce engine diagnostics only.

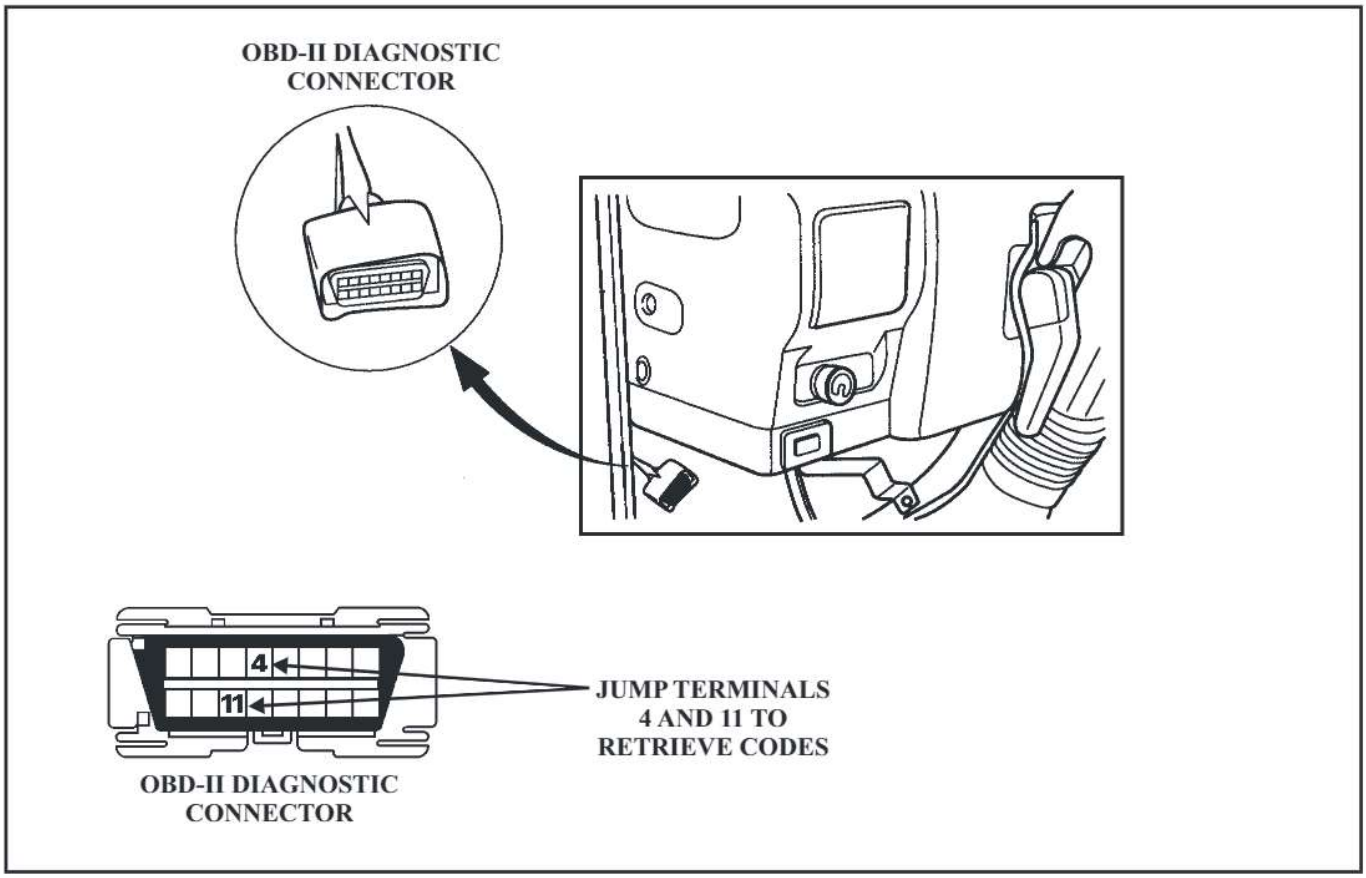


Figure 26

2000 - 2006 CODE RETRIEVAL PROCEDURE

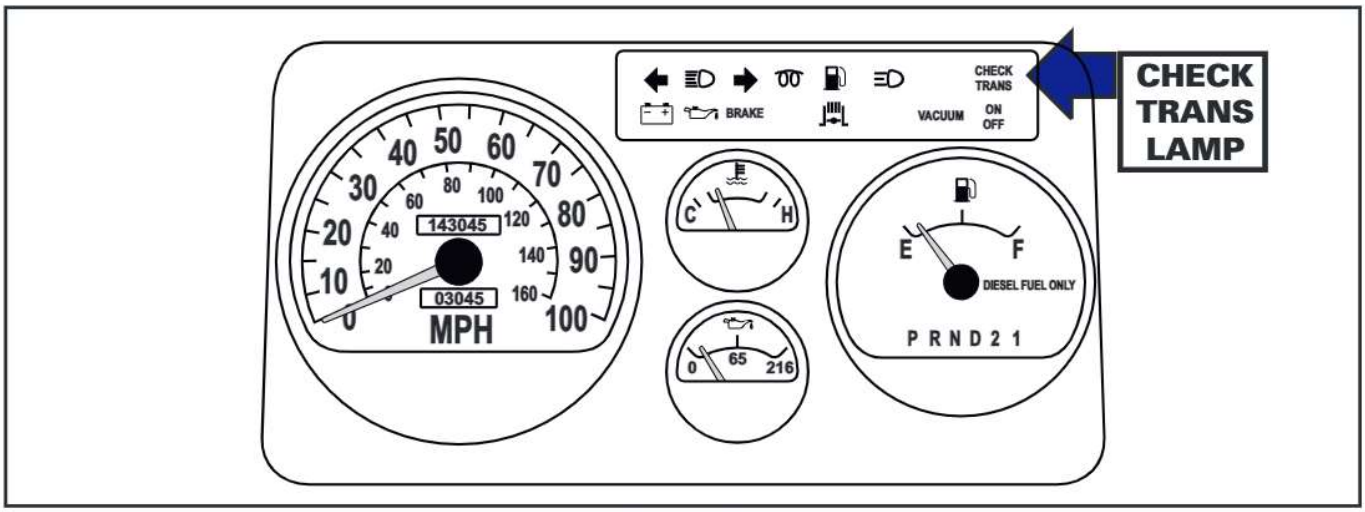


Figure 27

Use the code chart in Figure 28 for the 2000 - 2006 models.

DTC	CODE PATTERN	CODE DESCRIPTION
11	OFF / ON	Vehicle Speed Sensor #1 circuit open or shorted (Located on Extension Housing, Pulse Generator)
13		Engine Speed Sensor circuit open or shorted
15		Automatic Transmission Fluid Thermosensor circuit open
17		Inhibitor Switch circuit open or shorted
21		Throttle Position Sensor circuit open or shorted
24		Vehicle Speed Sensor #2 circuit open or shorted (Located On Extension Housing, Gear Driven)
31		Shift Solenoid #1 (S1) circuit open or shorted
32		Shift Solenoid #2 (S2) circuit open or shorted
33		Timing Solenoid (ST) circuit open or shorted
34		Lock-Up Solenoid circuit open or shorted
35		Line Pressure Solenoid circuit open or shorted
37		Exhaust brake system circuit open or shorted
38		Engine warm-up cut system circuit open or shorted

Figure 28

2000 - 2006 ISUZU NPR; CHEVY FORWARD; GMC TILTMASTER

TPS RELEARN PROCEDURE

Code 21, for a TPS circuit fault may not clear even though all TPS circuits and related components check within specifications. Stacked shifts may also be experienced.

These vehicles require a TPS relearn procedure whenever the engine, injection pump, accelerator cable, throttle linkage, throttle position sensor or kickdown switch are replaced. Failure to do so will result in the above complaints.

The following procedure is used for the TPS voltage relearn:

Clearing TCM Memory of Current TPS Voltage

1. Turn starter switch to the "ON" position.
2. Turn the overdrive switch to the "ON" position.
3. Place the selector lever in the manual "1" range.
4. Depress the accelerator pedal fully, listen for the kickdown switch click.
5. Depress the brake pedal, (brake switch "ON").

If the memory is successfully cleared, the "Check Trans" lamp flashes 5 times.

Preparation For Relearn

1. Turn the starter switch to the "ON" position.
2. Connect terminals 4 and 11 of the Data Link Connector as seen in Figure 29, the "Check Trans" lamp begins flashing at 0.4 second intervals.
3. Place selector lever in the "P" range.

WOT Voltage Relearn

1. Depress accelerator pedal fully.
2. With the accelerator pedal still at WOT, depress brake pedal for more than 3 seconds.
3. The "Check Trans" lamp should now flash intermittently, then illuminate for 3 seconds, then flash 6 times slowly, then flash intermittently again. At this time, release the brake and accelerator pedals. The "Check Trans" lamp should illuminate for 3 seconds. If it does not, do the "Clear Memory" procedure above and repeat the WOT relearn procedure beginning with item 2 under "Preparation".

Idle Position Voltage Relearn

1. Start the engine.
2. Depress the accelerator pedal slowly 3 times.
3. Remove the jumper wire from the Data Link Connector. At this time the "Check Trans" lamp should stop flashing. If it does not, or there is mis-operation, begin the procedure again from the start.

continued...

2000 - 2006 ISUZU NPR; CHEVY FORWARD; GMC TILTMASTER

TPS RELEARN PROCEDURE

Confirmation of Relearn

Stop the engine. Turn the starter switch to the "ON" position, the "Check Trans" lamp should begin flashing again. Depress the accelerator pedal fully and release the pedal slowly.

NOTE: If the WOT voltage is out of spec, or the TCM did not learn any value, the "Check Trans" lamp will continue to flash continuously. In this case begin the relearn procedure over again. If the relearn was successful, the flashing will stop.

NOTE: This manual relearn procedure is complicated at best. If it must be done multiple times because of unsuccessful attempts, it may be wise to have it done at the dealer or by a TECH II or Mastertech scan tool that contains the appropriate software that you own or can acquire.

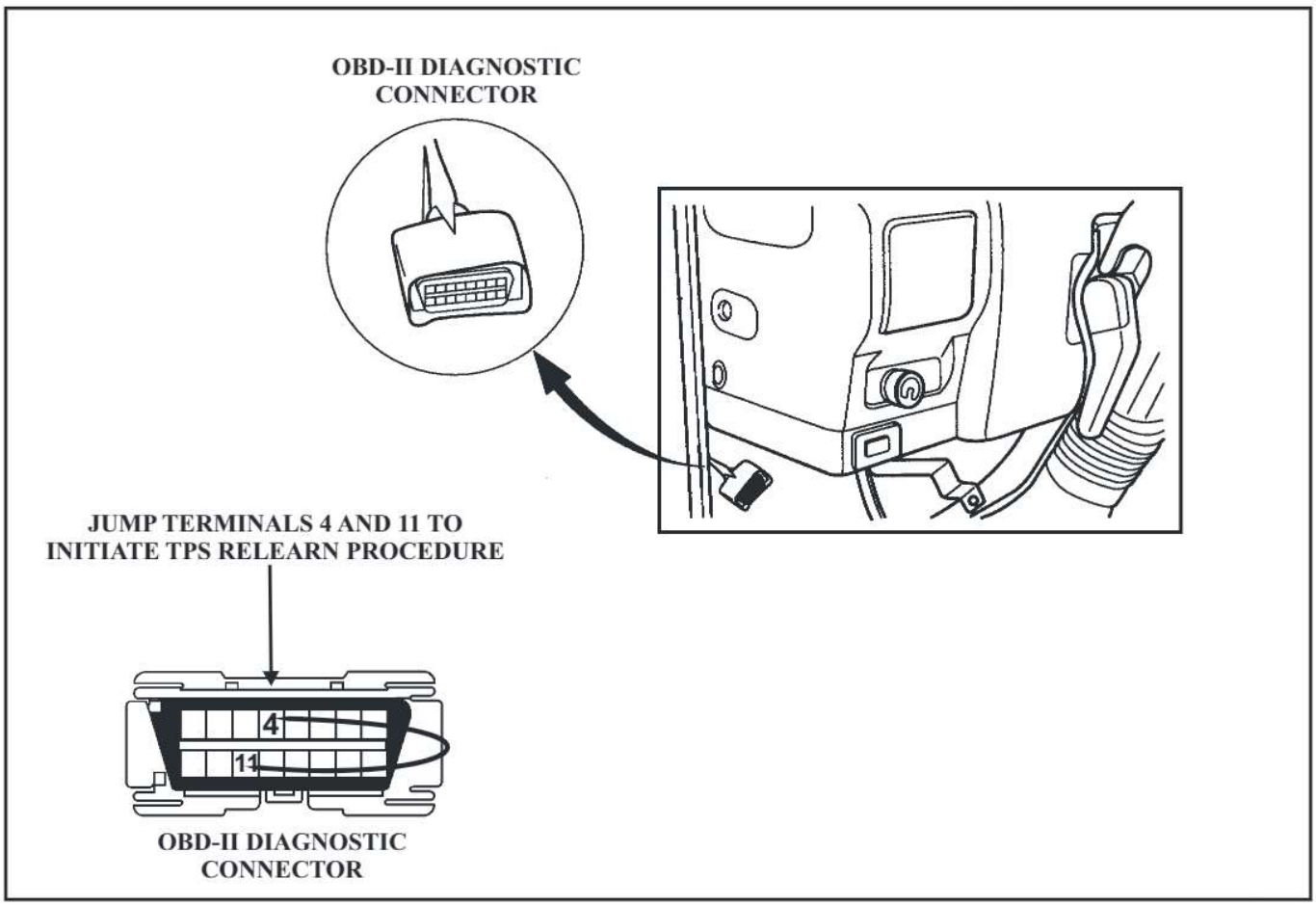


Figure 29

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

2007 - 2013 CODE RETRIEVAL PROCEDURE

Locate the OBD-II diagnostic connector as shown in Figure 30. ***Jump terminals 4 and 11*** also seen in Figure 30 and read the code pattern using the "Check Trans " lamp on the instrument cluster as seen in Figure 31.
The "Check Trans" Lamp will display a DTC 3 times. If more than one code is present, the codes will output in numerical order with each code being repeated 3 times. The display will continue as long as the Data Link Connector is jumped.

To clear codes, do the following:
1. Turn ignition "ON", but do not start engine.
2. Jump terminals 4 and 11 in the diagnostic connector.
3. Shift the transmission to "Neutral".
4. Depress the brake pedal and hold.
5. Turn the Overdrive Off Switch ON & OFF 3 times within 5 seconds.
When codes are cleared, the "Check Trans" lamp will flash rapidly for 10 seconds.

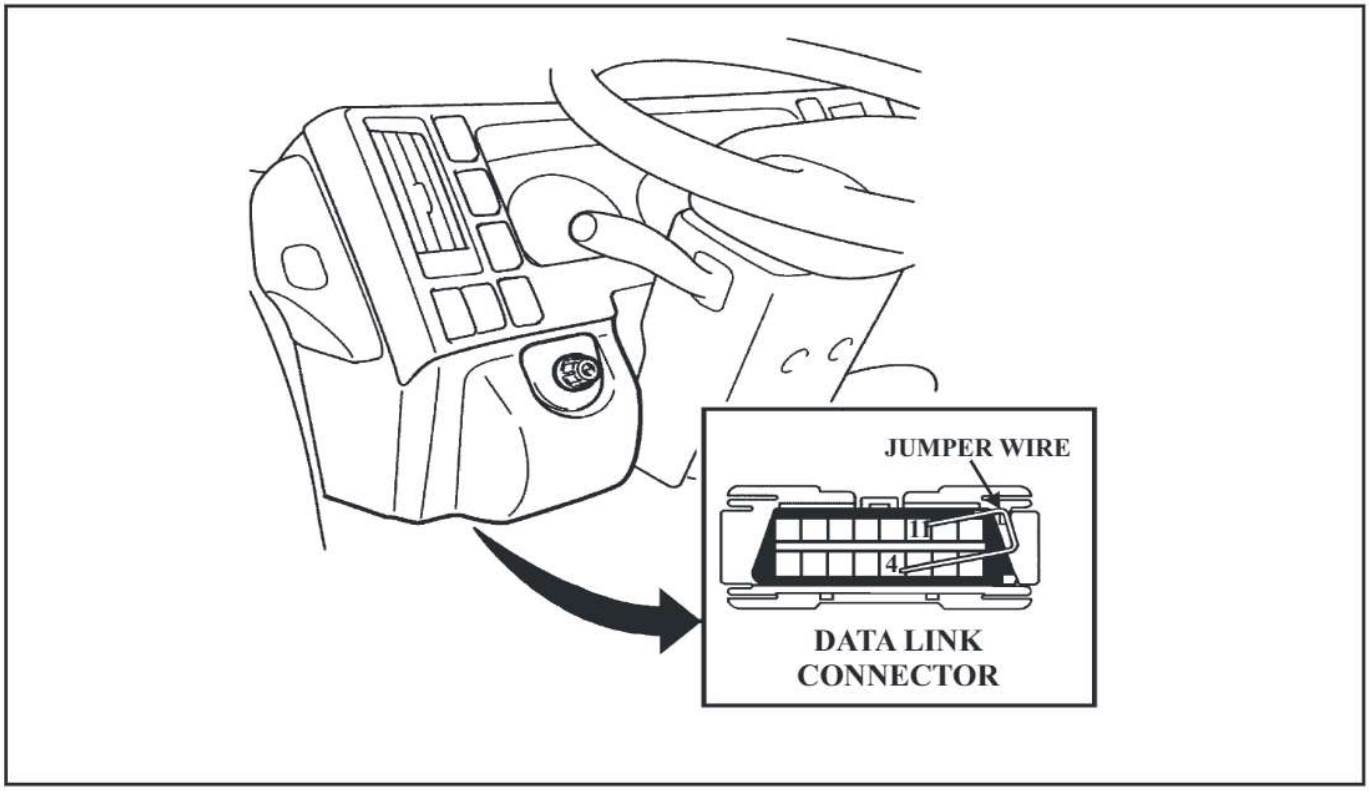


Figure 30

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

2007 -2013 CODE RETRIEVAL PROCEDURE

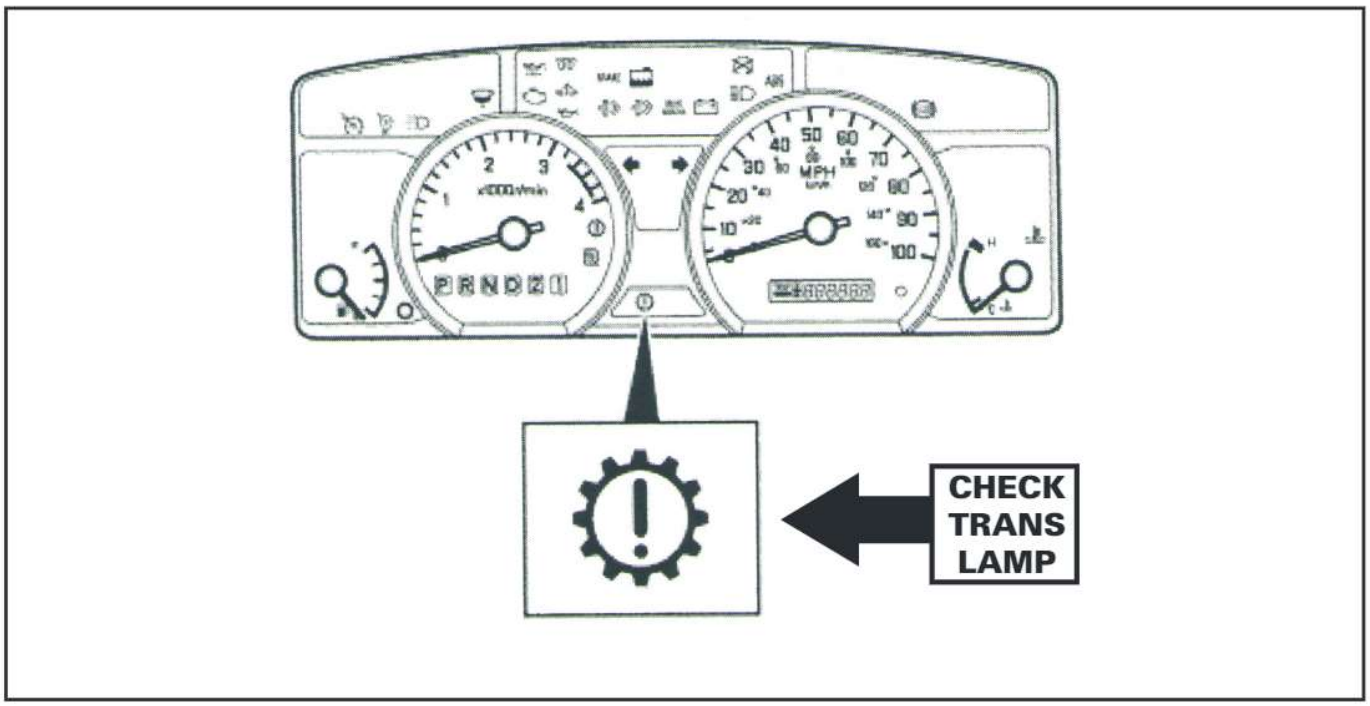


Figure 31

The "Check Trans" Lamp" warning patterns can be seen in Figure 32.

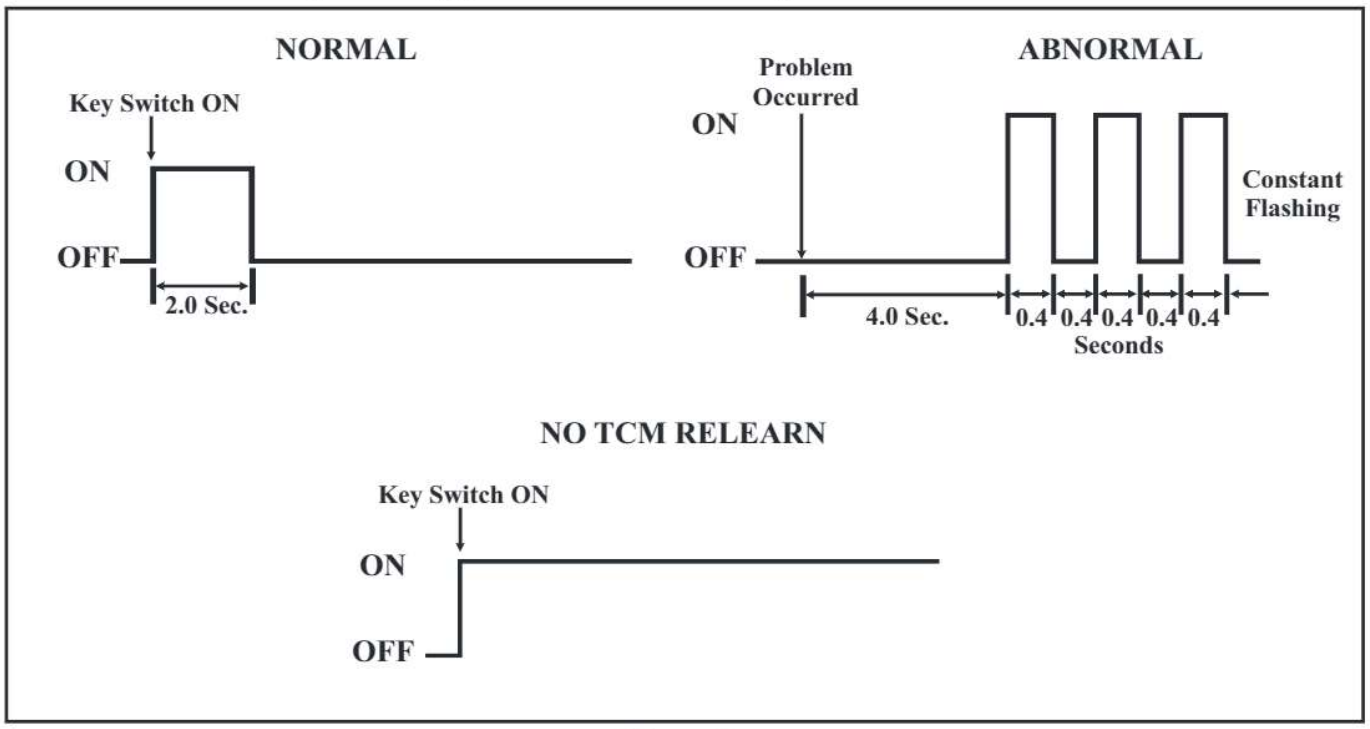


Figure 32

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

2007 - 2013 CODE RETRIEVAL PROCEDURE

Examples of the code pattern can be seen in Figure 33.

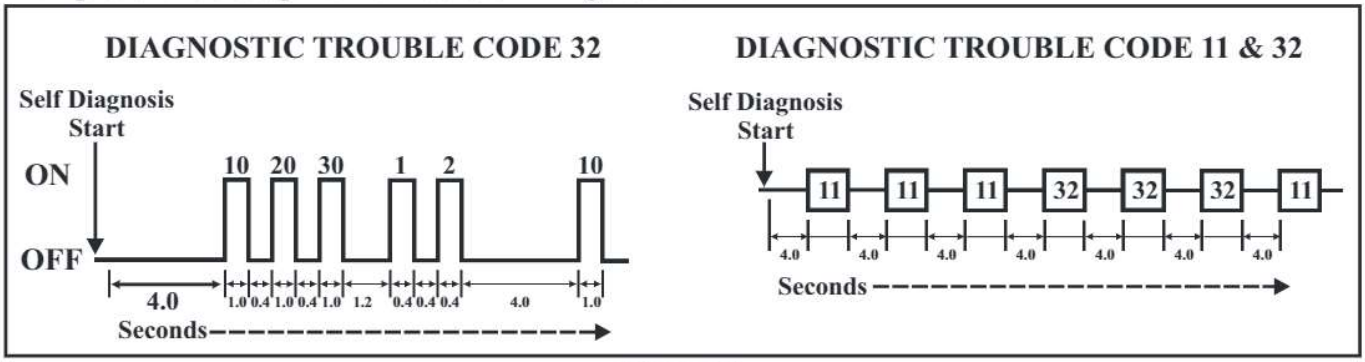


Figure 33

Use the code charts in Figures 34 & 35 for 2007 & Later code definitions. OBD-II codes have also been provided.

FLASH CODE	OBD-II CODE	CODE DEFINITION
11	P0722	Output Speed Sensor Circuit Voltage Low
11	P0723	Output Speed Sensor Circuit Voltage Intermittent
13	P0727	Engine Speed - No Signal
14	P0717	Input Speed Sensor Circuit Voltage Low
15	P0712	Transmission Fluid Temperature Sensor Circuit Voltage Low
16	P0713	Transmission Fluid Temperature Sensor Circuit Voltage High
17	P0707	Transmission Range Sensor Circuit Voltage Low
17	P0708	Transmission Range Sensor Circuit Voltage High
18	P0711	Transmission Fluid Temperature Sensor Performance
19	P1382	Anti-Lock Brake Communication Malfunction
24	P0503	Vehicle Speed Sensor Circuit Intermittent
25	P0880	Transmission Control Module Power Input Signal Malfunction
26	P2742	Transmission Fluid Temperature Sensor 2 Circuit Voltage Low
27	P2743	Transmission Fluid Temperature Sensor 2 Circuit Voltage High
28	P2741	Transmission Fluid Temperature Sensor 2 Performance
31	P0973	Shift Solenoid 1 Control Circuit Voltage Low
31	P0974	Shift Solenoid 1 Control Circuit Voltage High
32	P0976	Shift Solenoid 2 Control Circuit Voltage Low
32	P0977	Shift Solenoid 2 Control Circuit Voltage High

Figure 34

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

2007 - 2013 CODE RETRIEVAL PROCEDURE

FLASH CODE	OBD-II CODE	CODE DEFINITION
33	P0979	Shift Solenoid 3 Control Circuit Voltage Low
33	P0980	Shift Solenoid 3 Control Circuit Voltage High
34	P0982	Shift Solenoid 4 Control Circuit Voltage Low
34	P0983	Shift Solenoid 4 Control Circuit Voltage High
35	P0748	Pressure Control Solenoid 1 Control Circuit Malfunction
36	P0778	Pressure Control Solenoid 2 Control Circuit Malfunction
37	P0475	Exhaust Brake Cut Request Circuit Malfunction
38	P0798	Pressure Control Solenoid 3 Control Circuit Malfunction
39	P2716	Pressure Control Solenoid 4 Control Circuit Malfunction
41	P0751	Shift Solenoid 1 Valve Performance - Stuck Off
42	P0756	Shift Solenoid 2 Valve Performance - Stuck Off
43	P0761	Shift Solenoid 3 Valve Performance - Stuck Off
44	P0766	Shift Solenoid 4 Valve Performance - Stuck Off
45	P0746	Pressure Control Solenoid 1 Performance
46	P0776	Pressure Control Solenoid 2 Performance
48	P0796	Pressure Control Solenoid 3 Performance
61	P1790	Transmission Control Module ROM Failure
62	P1791	Transmission Control Module RAM Failure
63	P0602	Transmission Control Module Not Programmed
65	U2104	CAN Bus Counter Overrun
67	U2105	Lost Communications With Engine Control Module
71	P0561	System Voltage Unstable
72	P0562	System Voltage Low
73	P0563	System Voltage High
78	P084B	Transmission Fluid Pressure Sensor H Circuit Performance
81	P0730	Incorrect Gear Ratio
91	P0741	Torque Converter Clutch System - Stuck Off
92	P0742	Torque Converter Clutch System - Stuck On

Figure 35

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

2007 - 2013 INITIAL LEARN PROCEDURE

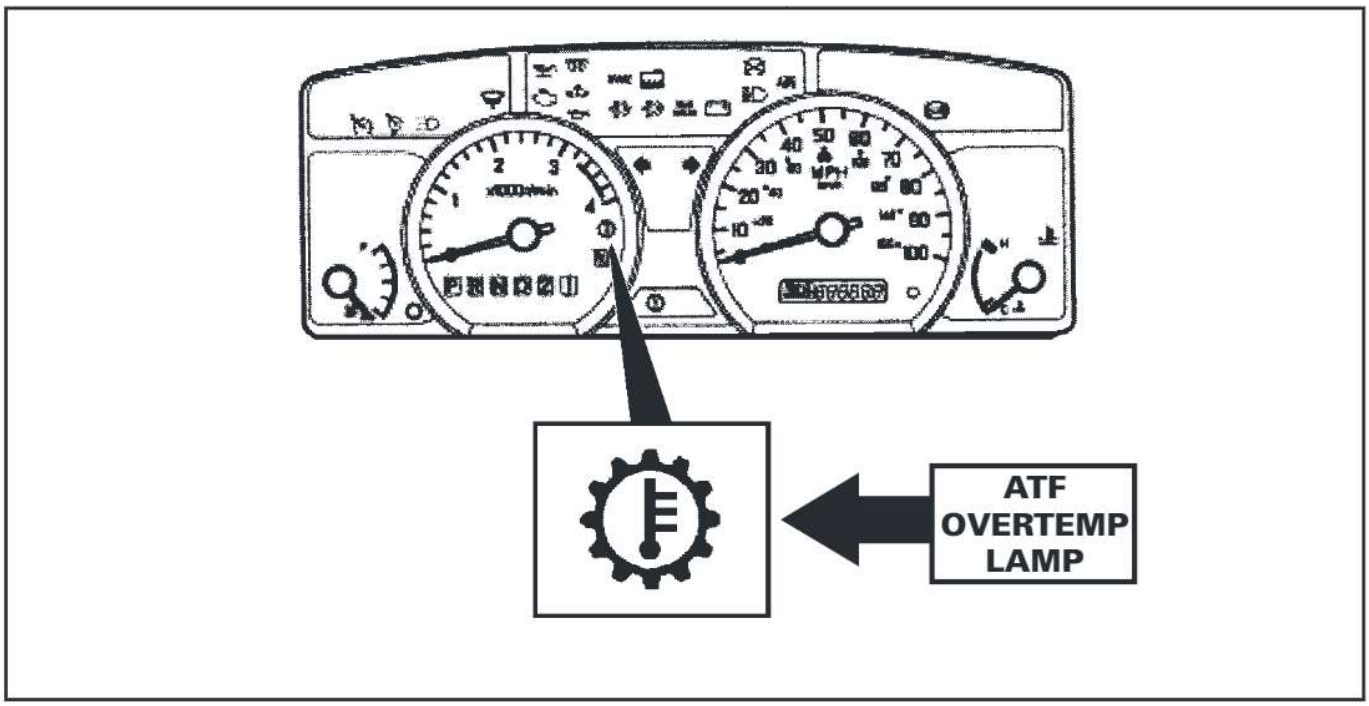


Figure 36

The purpose of the Initial Learn procedure is to reset the TCM shift adapts. The Initial Learn procedure is performed after transmission repairs or TCM replacement to insure proper shift characteristics and to prevent the storage of "ghost" codes.
The ATF Overtemp Lamp shown in Figure 36 will flash during the Initial Learn Mode. If the TCM detects the vehicle is moving, the Initial Learn will be inhibited. To avoid this, follow the Initial Learn Procedure below:

Preparation of the Initial Learn

1. Turn OFF all electrical accessories.
2. Set park brake and chock the wheels.
3. Make certain ATF level is correct.
4. Start the engine.
5. Using a capable scan tool or infra red temperature sensing device to verify that the sump temperature is between 104° F (40° C) and 194° F (90° C).
6. Shift from the N Range to the D Range 5 times.

Important Note: The above procedure must be performed to ensure completion of the learning procedure.

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

2007 - 2013 INITIAL LEARN PROCEDURE

Initial Learn Procedure

Important Note: The vehicle must remain stationary for the remainder of this procedure. If the vehicle moves during any part of the procedure, other than shift shock, the entire procedure will have to repeated from the beginning.

1.Confirm the "Preparation of the Initial Learn" steps were completed.
2. Connect a jumper wire between Data Link Connector (DLC) terminal 4 and 11 as previously shown in Figure 30. This will activate the TCM diagnostic switch and cause the "Check Trans" Lamp to flash in the pattern indicated in Figure 37.

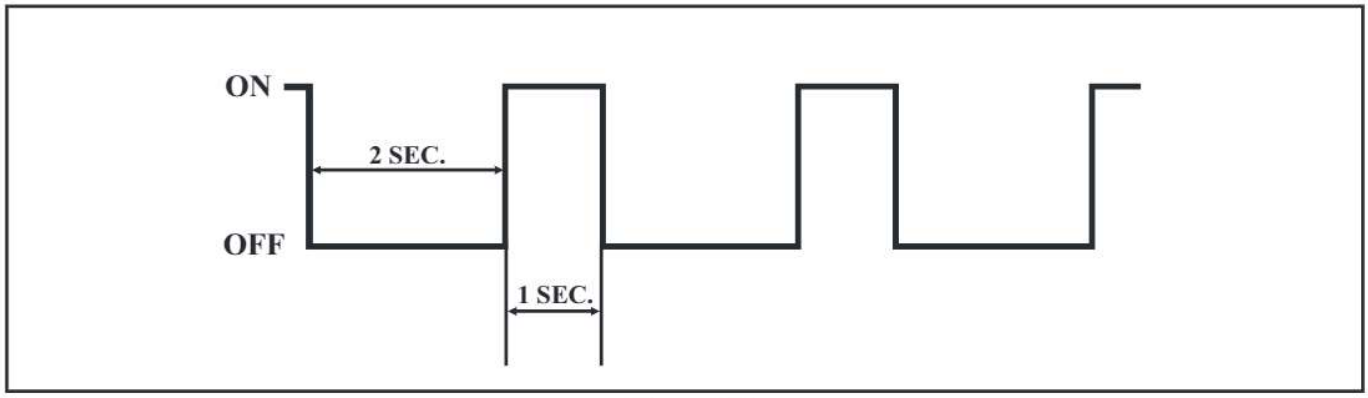


Figure 37

3. Depress the brake pedal with your LEFT foot. **DO NOT RELEASE THE BRAKE PEDAL UNTIL INSTRUCTED TO DO SO.**
4. Confirm the engine is at idle and the Overdrive Switch is ON, (switch is IN).
5. Move the Shift lever from D to 2 Range, then back to D 3 times, (D-2-D-2-D-2-D).
6. Confirm that the Overtemperature Lamp is flashing the pattern seen below in Figure 38.

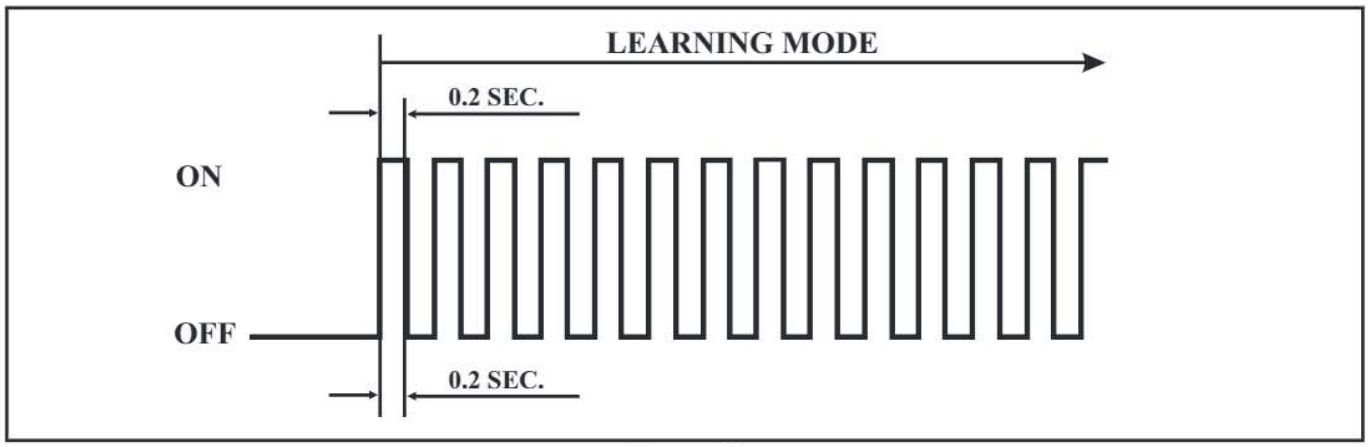


Figure 38

7. Turn Overdrive Switch OFF, (Switch is OUT).

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

2007 - 2013 INITIAL LEARN PROCEDURE

8. Confirm the Overtemperature Lamp is flashing the pattern seen below in Figure 39.

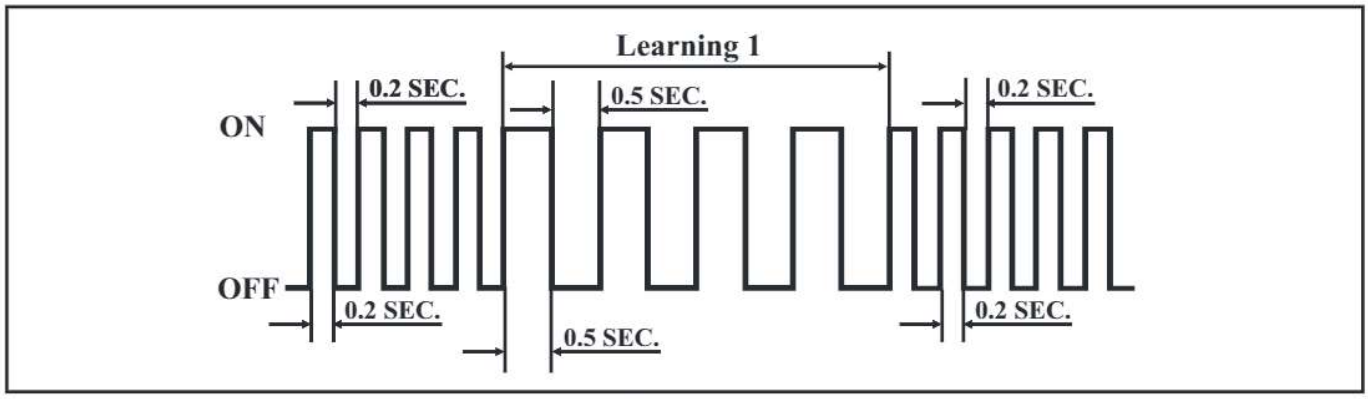


Figure 39

9. When the Overtemperature Lamp begins to blink quickly, using your right foot, accelerate and hold the engine speed between 1000 and 1500 RPM using the accelerator pedal.
10. Turn the Overdrive ON (switch is IN). The Overtemperature Lamp will begin to blink slowly as seen in Figure 40.

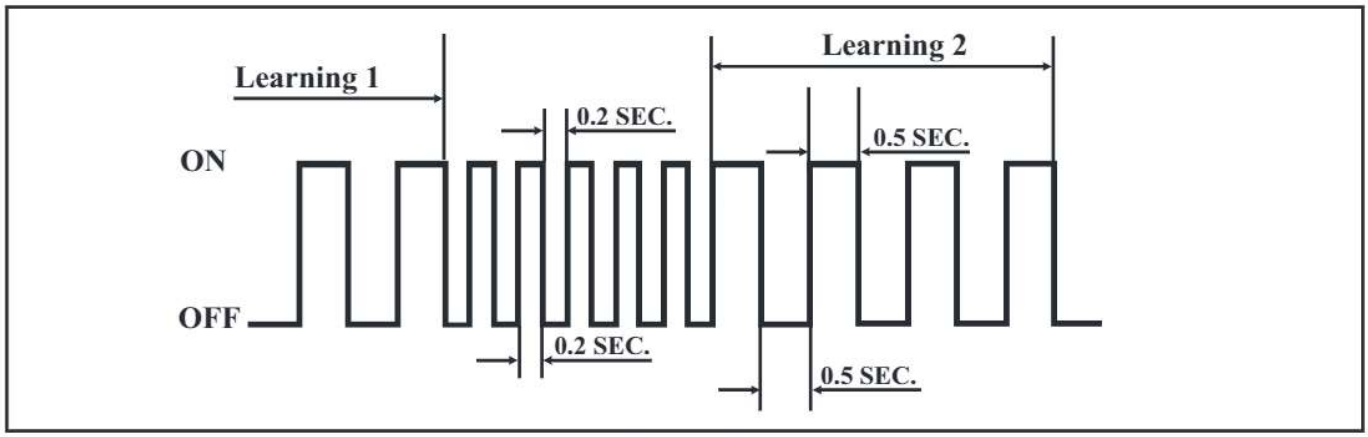


Figure 40

11. When the Overtemperature Lamp turns OFF, release the accelerator pedal.
12. Move the transmission shift lever to the Reverse Range.
13. Turn the Overdrive OFF (switch is OUT). The Overtemperature Lamp will begin to blink slowly as seen in Figure 41.

ISUZU NPR/GMC FORWARD TILTMASTER & CHEVY FORWARD

2007 - 2013 INITIAL LEARN PROCEDURE

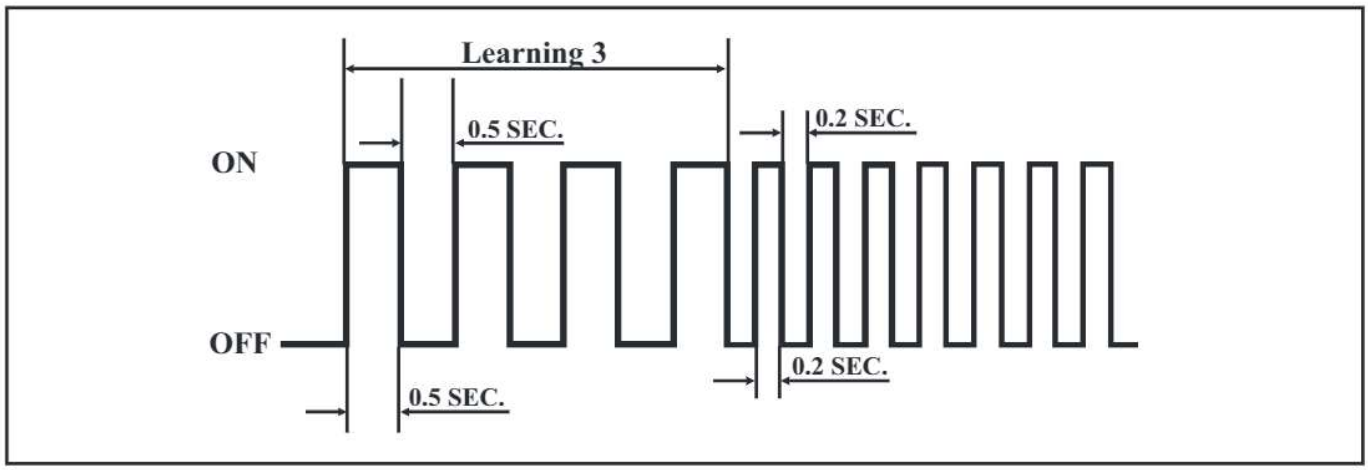


Figure 41

14. When the Overtemperature Lamp begins to blink quickly, using your right foot, accelerate and hold the engine speed between 1000 and 1500 RPM using the accelerator pedal.
15. Turn Overdrive Switch ON (switch is IN). The Overtemperature Lamp will blink slowly.
16. When the Overtemperature Lamp begins to blink 1 second ON and 2 seconds OFF, as seen in Figure 42, release the accelerator pedal.

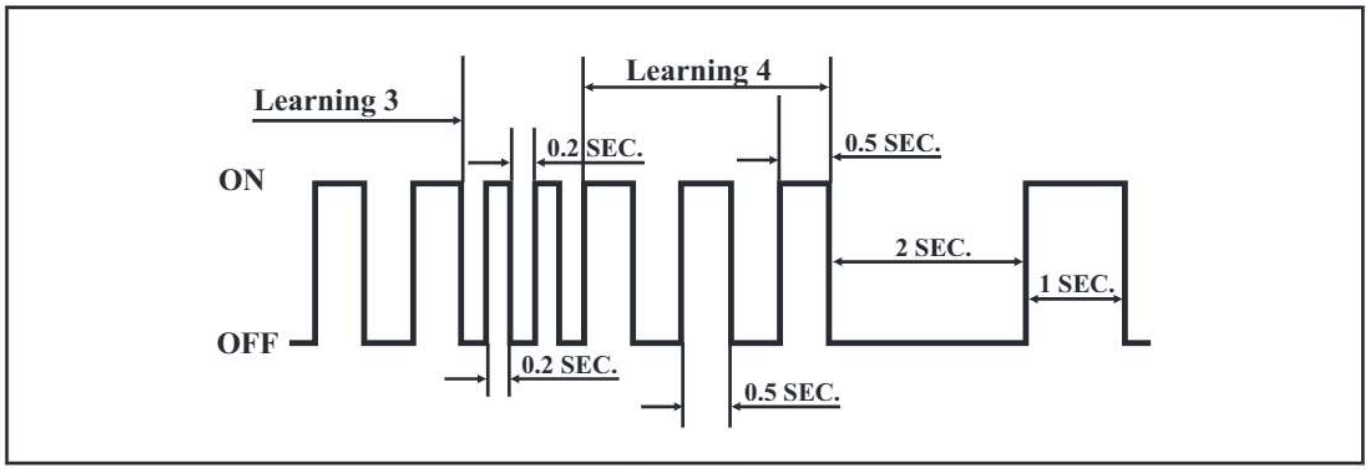


Figure 42

17. Place the transmission in Park.
18. Release the foot brake.
19. Disconnect the jumper wire from the Data Link Connector (DLC).
20. Turn the ignition OFF.
21. Start the engine and verify no transmission warning lamps are illuminated.
22. The Transmission Initial Relearn is now complete.

MITSUBISHI FUSO FE & FG SERIES

1988-94 CODE RETRIEVAL PROCEDURE

The diagnostic lamp shown in Figure 43 will flash 16 times if the Automatic Transmission Control Unit (ATCU) detects a fault, or, will turn off in two seconds if no faults are detected.

NOTE #1: Only those malfunctions detected when the vehicle was previously driven remain in history.

NOTE #2: Codes stored in memory will only be erased if the ignition is turned OFF after performing the code retrieval procedure.

NOTE #3: If Vehicle Speed Sensor #1 and #2 fail simultaneously, the diagnostic lamp will flash continuously.

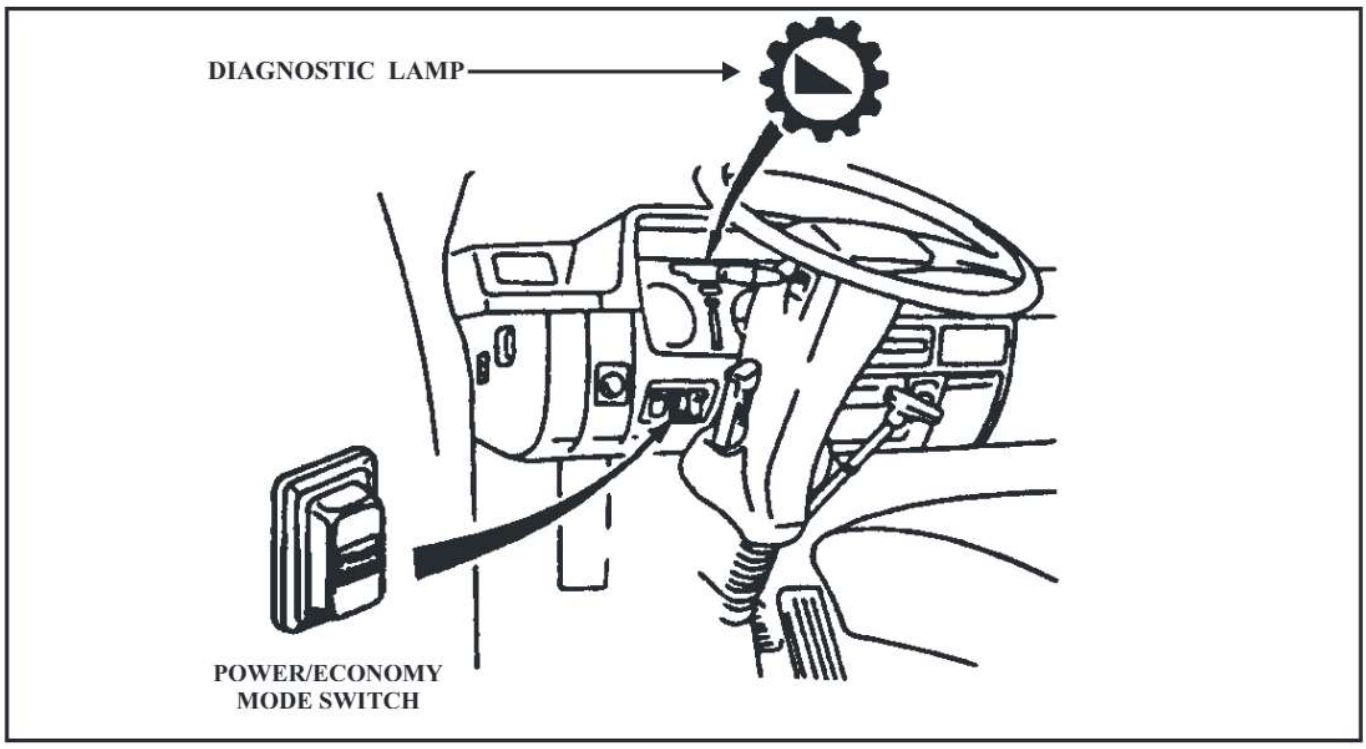


Figure 43

Use the code retrieval procedure in Figure 44 for the 1988-94 models.

CODE RETRIEVAL PROCEDURE

1. Turn power mode switch to "OFF"
2. Turn key "ON"
3. Does the power mode indicator lamp illuminate for 2 seconds?
4. Turn key to "ACC"
5. Confirm accelerator is fully closed
6. Place selector lever to the "D" position
7. Turn power mode switch to "ON"
8. Turn key "ON"
9. Place selector lever to the "2" position
10. Turn power mode switch to "OFF"
11. Place selector lever to the "L" position
12. Turn power mode switch to "ON"
13. Depress accelerator fully

Figure 44

MITSUBISHI FUSO FE & FG SERIES

1988-94 CODE RETRIEVAL

Use the chart in Figure 45 for the judgement of self-diagnosis codes for the 1988-94 models

All judgements flickers same .. .	All circuits that can be checked by self diagnosis are functioning.
1st judgement flicker longer.. .	Vehicle speed sensor #1 circuit is shorted or open. (In transmission)
2nd judgement flicker longer.. .	Vehicle speed sensor #2 circuit is shorted or open. (In speedometer)
3rd judgement flicker longer.. .	Accelerator sensor circuit is shorted or open.
4th judgement flicker longer.. .	Shift solenoid "A" circuit is shorted or open.
5th judgement flicker longer.. .	Shift solenoid "B" circuit is shorted or open.
6th judgement flicker longer.. .	Overrun solenoid is shorted or open.
7th judgement flicker longer.. .	Lock-up solenoid circuit is shorted or open.
8th judgement flicker longer..	ATF temp. sensor is shorted or open, or ATCU control unit power source is shorted or open.
9th . judgement flicker longer.. .	Engine revolution signal circuit is shorted or open.
10th judgement flicker longer..	Line pressure solenoid circuit is shorted or open.

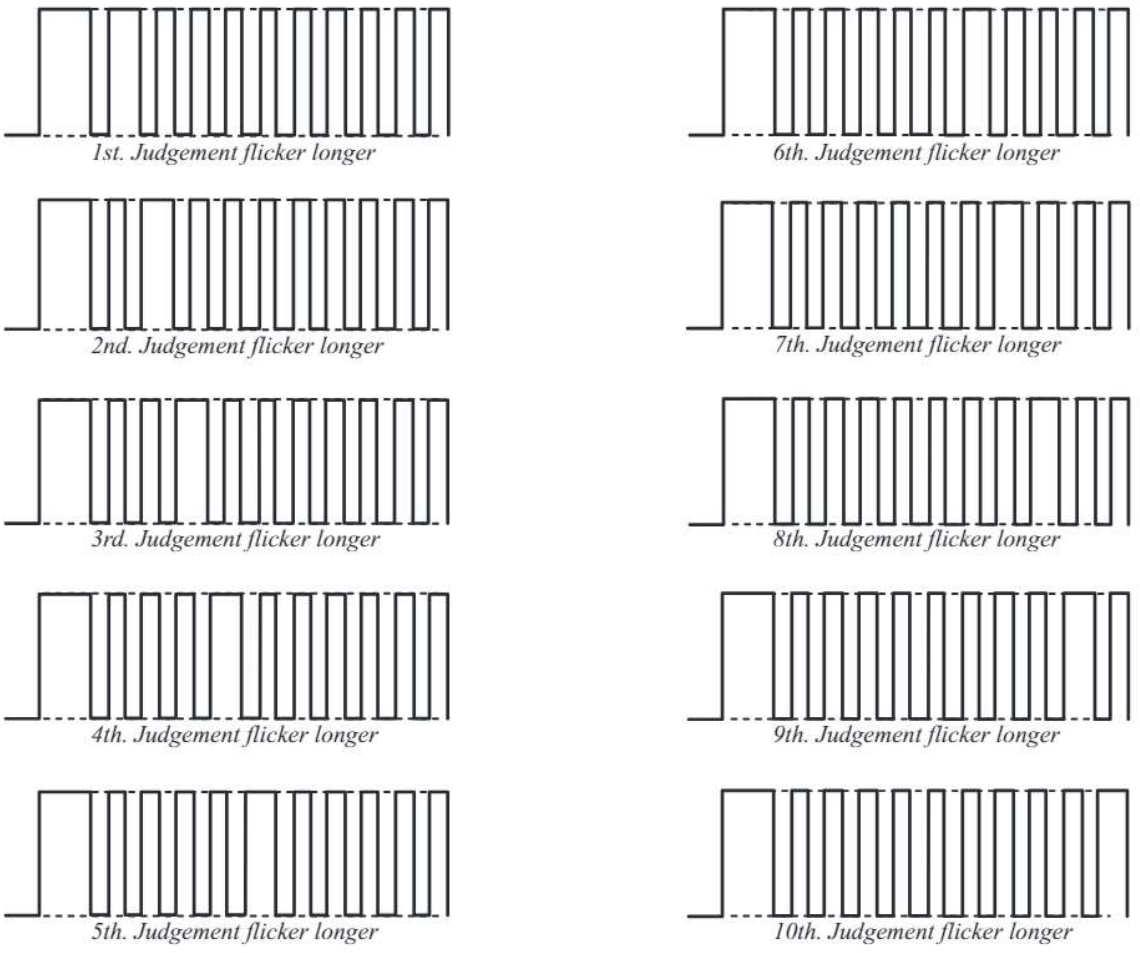


Figure 45

To Clear Codes:

Perform the code retrieval procedure in Figure 44, then turn the ignition “OFF”.
At this time, if no problems persist, all codes will be cleared from the ACTU memory.

MITSUBISHI FUSO FE & FG SERIES

1995-98 CODE RETRIEVAL PROCEDURE

Code retrieval for 1995-98 trucks can have ***TWO*** procedures for retrieving codes:

Procedure #1: Use the same code call-up procedure as the 1988-94 trucks as seen in Figure 44. The code format is the same and is seen in Figure 45.

Procedure #2: Locate the ***single*** wire ***Diagnostic Switch (Connector),*** which is found under the passenger side corner of the dashboard close to the floor as seen in Figure 46.
The wire color on one side of the Diagnostic Switch should have a ***YELLOW/GREEN*** wire, and the wire color on the other side of the connector should have a ***GREEN/BLUE*** wire.
Turn the ignition **"ON"** and then unplug the ***Diagnostic Switch (Connector).***
The Transmission Warning Lamp, See Figure 47, will now flash the codes that are stored in the AT-ECU memory. The code pattern is a two digit type with the first digit producing **LONG** flashes, and the second digit producing **SHORT** flashes.
If no faults are detected when the ignition is turned on, The Transmission Warning Lamp (See Figure 47) will illuminate for two seconds and then go out. If a fault is detected, the Transmission Warning Lamp will flash for eight seconds each time the ignition is cycled.

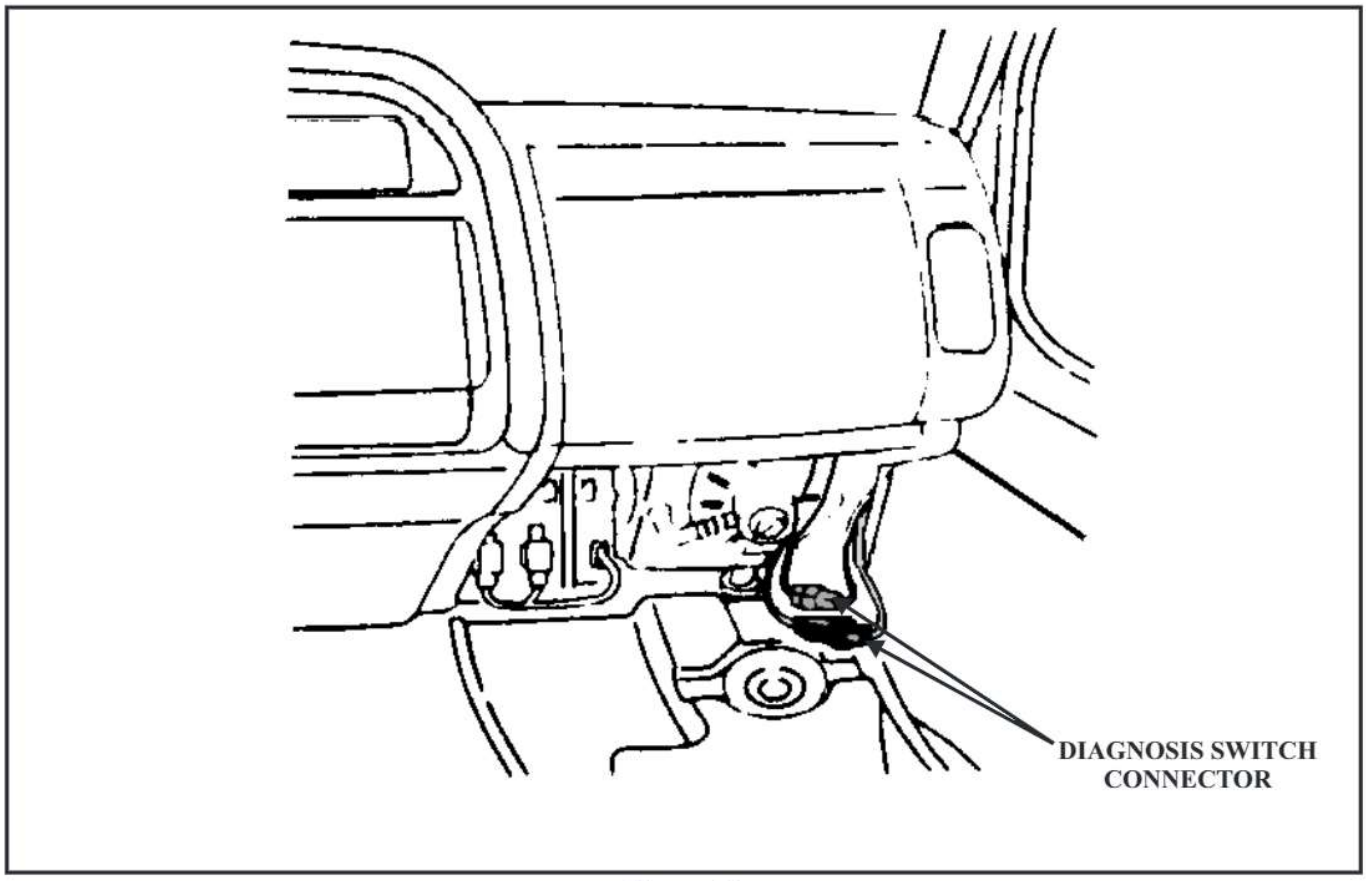


Figure 46

MITSUBISHI FUSO FE & FG SERIES

1995 - 1998 CODE RETRIEVAL

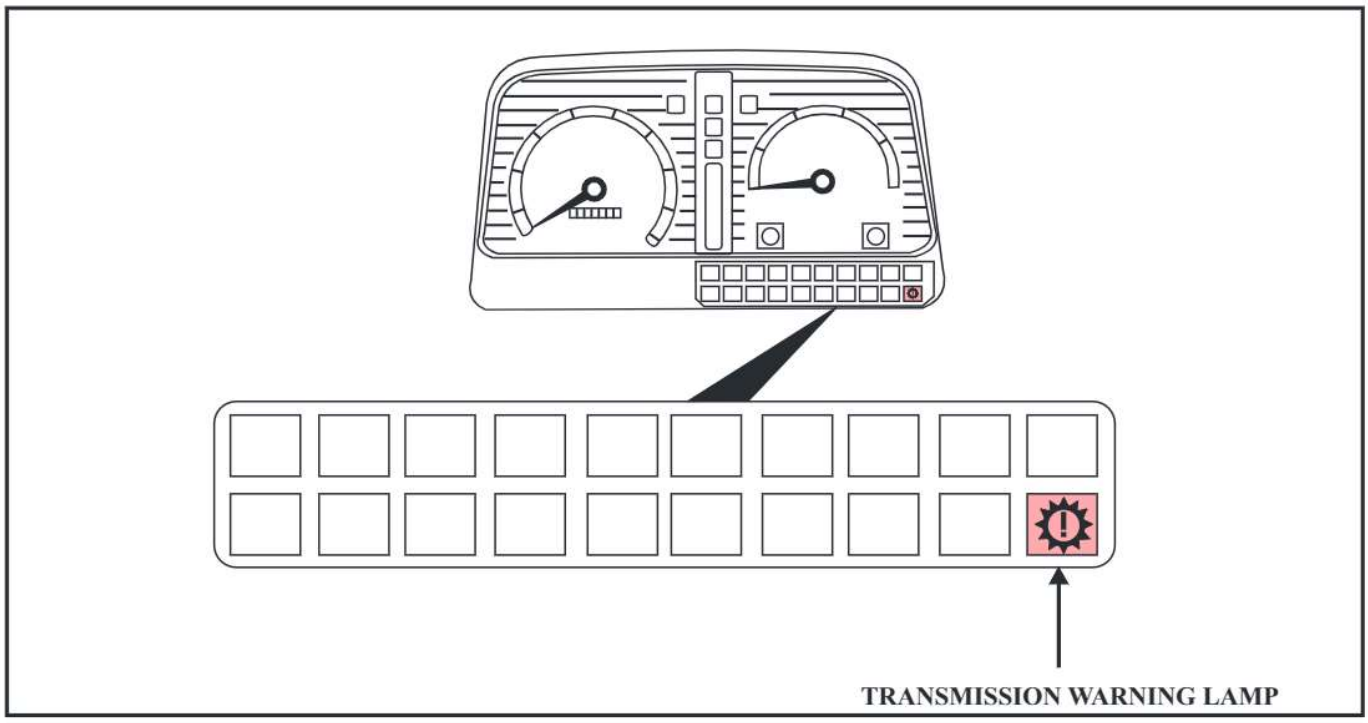


Figure 47

Use the code chart in Figure 48 for 1995-98 models.

Diagnosis code	Trouble point	Judgement standard	Flash code pattern
01	No Faults Detected	Lamp Illuminates for 2 Seconds when Ignition is Turned "ON"	Lamp goes out
11	Power supply voltage	10 volts or less (At vehicle speed of 10 km/h {6.21 mph} or more)	Lamp comes on Lamp goes out
12	Vehicle speed sensor 1	400-650 Ohms	
13	Oil temperature sensor	Indication of –20°C {–4°F} or less (At vehicle speed of 10 km/h {6.21 mph} or more)	
15	Engine revolution sensor	Indication of 500 rpm or less (At vehicle speed of 10 km/h {6.21 mph} or more)	
24	Accelerator sensor	Accelerator sensor voltage 0.1 volt or less, or 4.7 volts or more	
25	Vehicle speed sensor 2	400-650 Ohms	
31	Shift solenoid A	Wiring breakage or short circuit for 30 ms or more	
32	Shift solenoid B	Wiring breakage or short circuit for 30 ms or more	
34	Line pressure solenoid	Wiring breakage or short circuit for 140 ms or more	
35	Lock-up solenoid	Wiring breakage or short circuit for 140 ms or more	
41	Overrunning clutch solenoid	Wiring breakage or short circuit for 30 ms or more	
43	Inhibiter switch	No signal or duplicate signals	

Figure 48

MITSUBISHI FUSO FE & FG SERIES

1995-98 CODE CLEARING PROCEDURE

To clear fault codes stored in memory, locate the under dash fuse box and remove the **F10** fuse as shown in Figure 49, for at least 10 seconds.

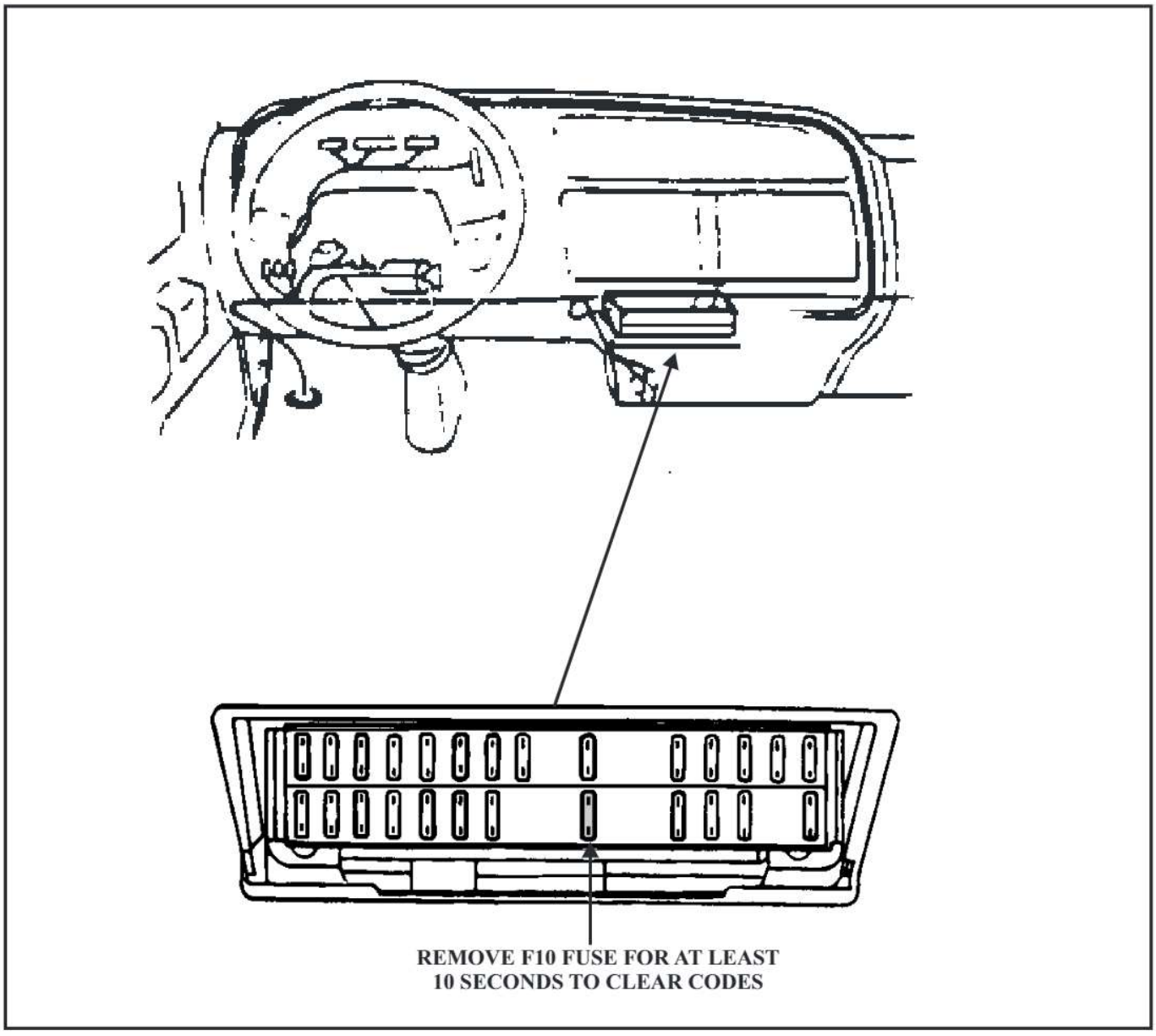


Figure 49

MITSUBISHI FUSO FE & FG SERIES

1999-2004 CODE RETRIEVAL PROCEDURE

Retrieving codes on 1999-2004 Mitsubishi Fuso tilt cab medium duty trucks equipped with the Aisin Seiki, 450-43LE transmission.

The TCM does not communicate with aftermarket scan tools, data is not available and code retrieval must be done via the flash code method.

The illustration in Figure 50 shows the location of the "Diagnosis Switch" and the "Memory Clear Switch", ***both of which are single pin connectors.***

To retrieve current codes do the following:

1 - Turn the ignition "ON".
2 - Disconnect the ***"Diagnosis Switch".*** The ***"Diagnosis Switch"*** connector will have a ***Green/Blue*** wire on one side of the connector and a ***Black*** wire on the other side.
3 - Watch the transmission warning lamp located below the instrument cluster shown in figure 51 for the flash code pattern as seen in Figure 52.

Use the code charts in Figures 53 and 54 for the 1999-2004 models.

To retrieve Current and Historical codes do the following:

1 - Turn the ignition "ON".
2 - Disconnect the "Diagnosis Switch" and the "Memory Clear Switch" connector. The ***"Memory Clear Switch"*** will have a ***Black/White*** wire on one side of the connector and a ***Black*** wire on the other side.
3 - Watch the transmission warning lamp located below the instrument cluster shown in Figure 51 for the flash code patterns and refer to the code charts in Figures 53 and 54.

Reading Diagnostic codes:

1 - The warning lamp will come "ON" when the ignition is turned on for 2.4 seconds, and will then turn "OFF".
2 - The "tens" digit is a 1.2 second long flash, and the "ones" digit flash is 0.4 seconds long. The "tens" and "ones" digit are separated by 0.6 seconds.
3 - There is a 2.4 second lamp "OFF" time period between codes. Code timing is illustrated in Figure 52.

If there is more than one code stored, they will be displayed in numerical order starting with the lowest.
IMPORTANT NOTE: Each code is repeated three times before going on to the next code.
After all codes have been displayed, the process will repeat itself.

To Clear codes do the following:

1 - Keep the "Diagnosis Switch" connector connected.
2 - Turn the ignition "ON".
3 - Disconnect the "Memory Clear Switch" connector. After more than one second, reconnect the ***"Memory Clear Switch".*** After three seconds, all codes will be cleared.

MITSUBISHI FUSO FE & FG SERIES

1999-2004 CODE RETRIEVAL PROCEDURE

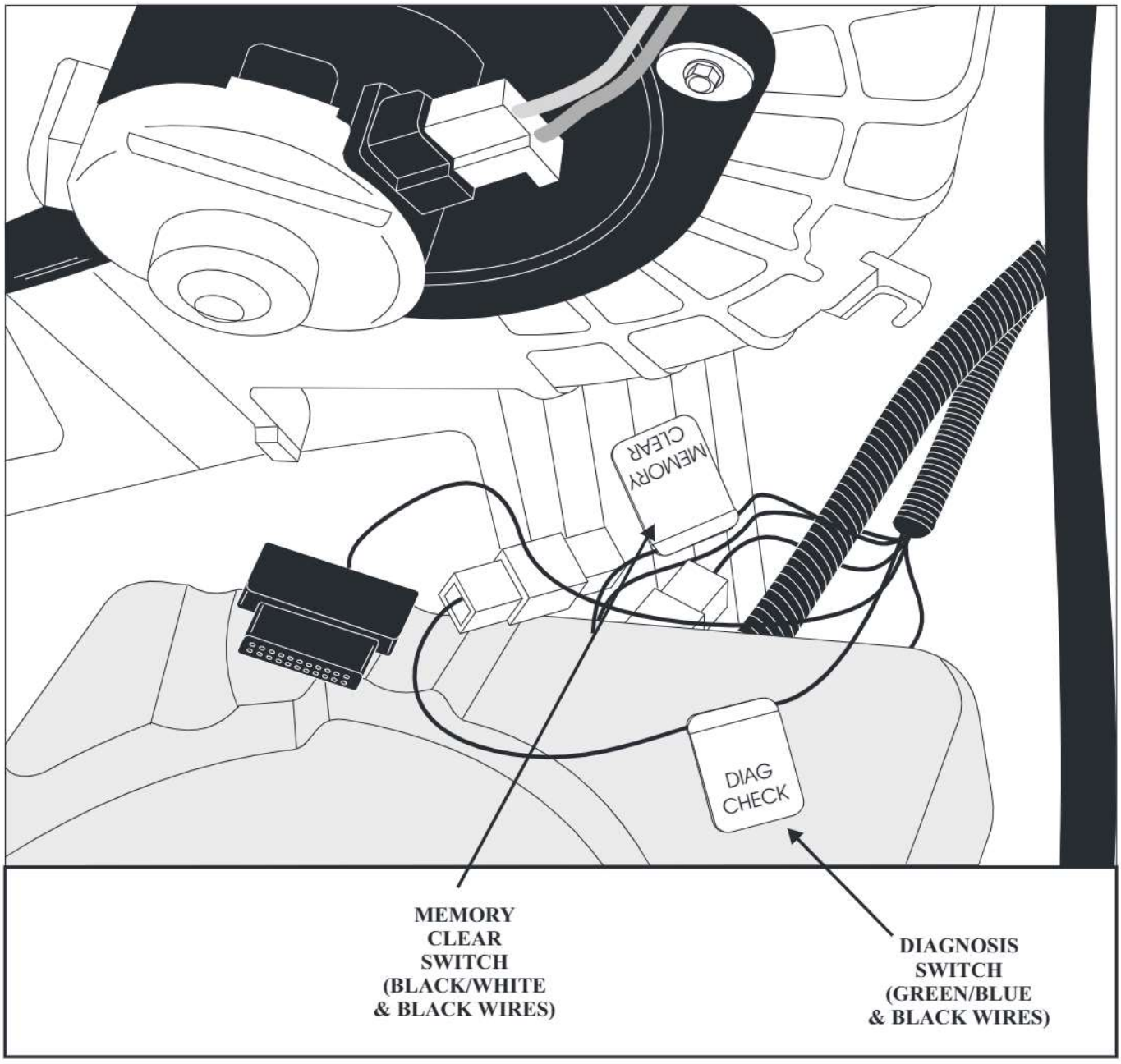


Figure 50

MITSUBISHI FUSO FE & FG SERIES

1999-2004 CODE RETRIEVAL PROCEDURE

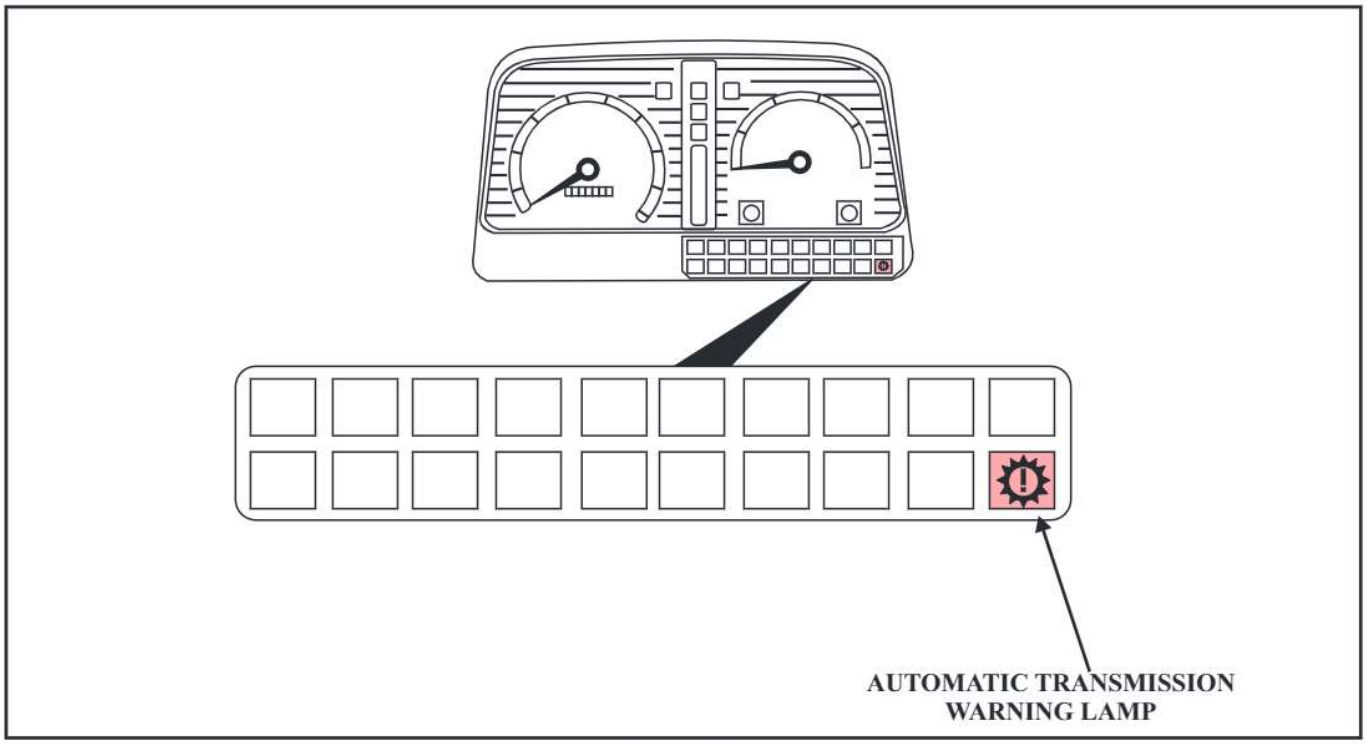


Figure 51

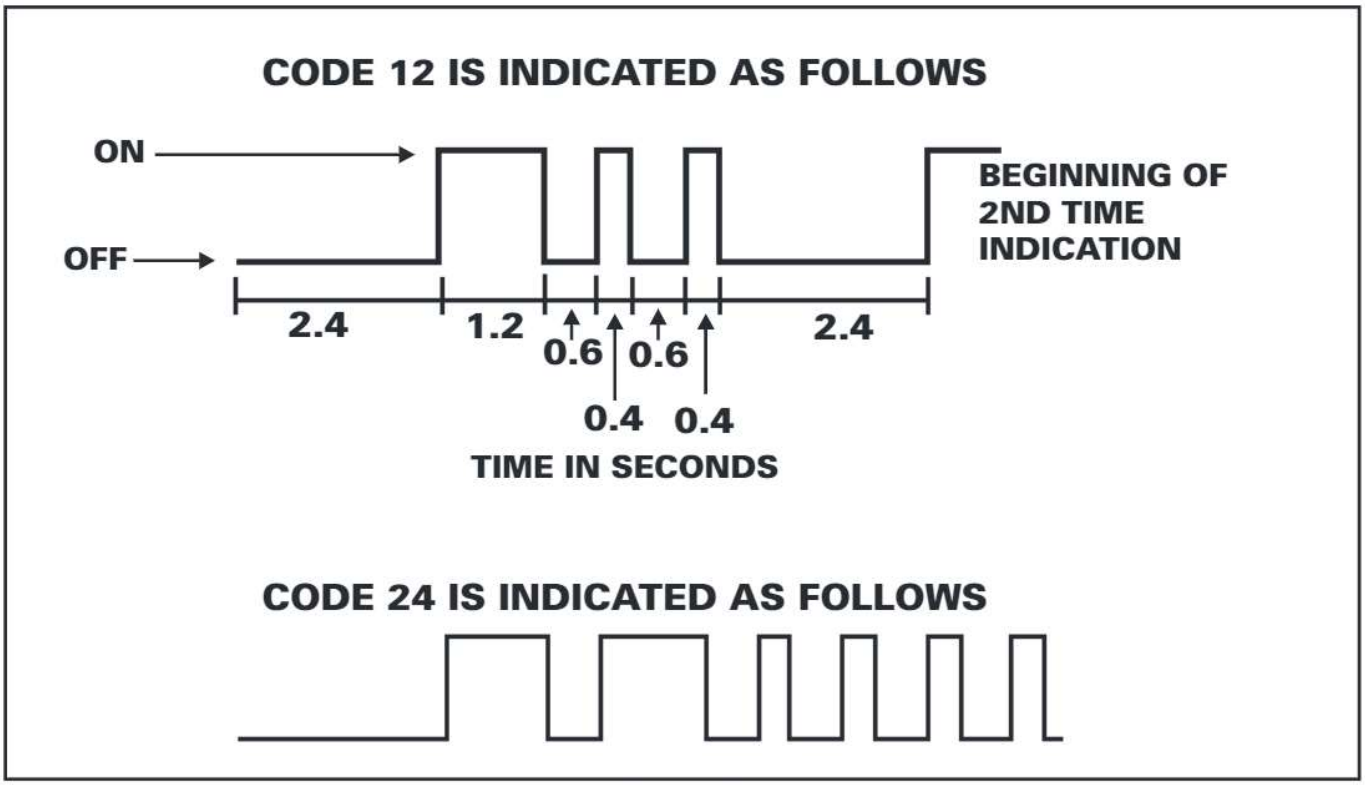


Figure 52

1999-2004 DIAGNOSIS CODE CHART				
DIAGNOSIS CODE		**PROBLEM LOCATION**	**JUDGEMENT CRITERION**	**FAIL-SAFE MEASURE**
01		Normal		
11		Power Supply Voltage	Power supply voltage remains below 7.5 V for 1 second or longer with range selector in a position other than P or N range.	
12		Vehicle Speed Sensor 1	Vehicle speed sensor 1 indicates sudden speed decrease.	·Maintains the gear selected immediately before malfunction. ·Turns off shift solenoids 1 and 2 when engine speed sensor detects a signal or less than 1000 rpm.
13		Oil Temperature Sensor	When oil temperature of more than 135ºC (275ºF) or lower than -50ºC (-58ºF) is detected.	Maximum oil temperature
15		Engine Speed Sensor	Engine speed sensor detects a value of less than 300 rpm when range selector is in a position other than P or N range and when output shaft rotating speed is 1000 rpm or higher.	Prohibits 2-3 shift timing control.
24	Except FE640	Accelerator Sensor	When accelerator sensor voltage is less than 0.4 V or 4.6 V or higher.	·Shift point is set at 0% throttle opening. ·Prohibits throttle learning function. ·Prohibits 2-3 shift timing control. ·Line pressure at maximum. ·Lock-up control change.
	FE640		When accelerator sensor signal input to engine ECU is faulty.	·Shift point is set at 0% throttle opening. ·Prohibits 2-3 shift timing control. ·Executes controls assuming that throttle pressure is at maximum. ·Prohibits lock-up control (lock-up solenoid OFF) except during driving at high speeds.
25		Vehicle Speed Sensor 2	Vehicle speed sensor 2 indicates sudden speed decrease.	·Maintains the gear selected immediately before malfunction detection. ·Turns off shift solenoids 1 and 2 when engine speed sensor detects a value of less than 1000 rpm.
31		Shift Solenoid 1	·When solenoid output short circuit occurs while solenoid is receiving current. ·When solenoid output disconnection occurs while solenoid is not receiving current.	·Turns off malfunctioning shift solenoid. ·Turns off lock-up solenoid and timing solenoid.
32		Shift Solenoid 2	·When solenoid output short circuit occurs while solenoid is receiving current. ·When solenoid output disconnection occurs while solenoid is not receiving current.	·Turns off malfunctioning shift solenoid. ·Turns off lock-up solenoid and timing solenoid.
34		Line Pressure Solenoid	When wire breakage or short circuit occurs.	Turns off line pressure solenoid.
35		Lock-Up Solenoid	·When solenoid output short circuit occurs while solenoid is receiving current. ·When solenoid output disconnection occurs while solenoid is not receiving current.	Turns off lock-up solenoid.
43		Inhibitor Switch	No signal	Operates as D range and prohibits shifting to 4th gear.
			Two or more signals	Control function activates based on priority order of L>R>2>D>N(P).

Figure 53

1999-2004 DIAGNOSIS CODE CHART			
DIAGNOSIS CODE	**PROBLEM LOCATION**	**JUDGEMENT CRITERION**	**FAIL-SAFE MEASURE**
50	PTO Solenoid	·When solenoid output short circuit occurs while solenoid is receiving current. ·When solenoid output is cut off while solenoid is not receiving current.	Turns off PTO solenoid.
51	Timing Solenoid	·When solenoid output short circuit occurs while solenoid is receiving current. ·When solenoid output disconnection occurs while solenoid is not receiving current.	Turns off timing solenoid.
54	Exhaust Brake Cut-Off Signal	Exhaust brake activates when exhaust brake cut-off signal is generated.	·Prohibits exhaust brake cut-off control. ·Allows lock-up only at high cruising speed.
58	TPS PWM Signal	Malfunction of engine electronic control unit (PWM signal fixed at 1 V or lower).	·Shift point is set at 0% throttle opening. ·Prohibits 2-3 shift timing control. ·Line pressure at maximum. ·Prohibits throttle position learning function.
		Wire breakage or short circuit.	Prohibits throttle position learning function.

Figure 54

MITSUBISHI FUSO FE & FG SERIES

2005 - 2010 CODE RETRIEVAL PROCEDURE

Manual code retrieval procedure to retrieve two digit codes from the TCM is as follows:

Reading Diagnostic Codes:
Observe the number of flashes as well as the duration of each flash as the Transmission Warning Lamp (Figure 55) will flash out two digit codes. The first digit will be .4 seconds in length while the second digit will be 1.2 seconds in length. If a zero is part of the code being flashed only the first digit will be displayed.
The diagnostic code 01 will be displayed if the system is free of trouble codes. The same diagnostic code will repeat itself three (3) times before moving on to the next stored code. When all stored codes are displayed, the sequence will begin over again.

The Diagnosis and Memory clear switches are dedicated fuses in the fuse box shown in Figure 56, do not exceed the amp rating of the original fuse.

Present Diagnostic Codes:
1. Turn the ignition switch ON.
2. Remove the Diagnosis Switch, See Figure 56.
3. Present diagnosis codes will begin to be displayed.
4. When the Diagnosis Switch is connected the TCM will stop the code display.

Present & Historical Codes:
1. Turn the ignition switch ON.
2. Remove the Diagnosis and Memory Clear Switches, See Figure 56.
3. Past and present diagnostic codes will be displayed.
4. Turn the ignition switch OFF and install the Memory Clear and Diagnosis Switches and code display will be terminated.

Clearing Diagnostic Codes:
1. Turn the ignition Switch ON.
2. Remove the Memory Clear Switch and then install it, all stored diagnostic codes will be erased.
3. To cancel code clearing, with the Memory Clear Switch removed, turn the ignition OFF and then install the Memory Clear Switch, See Figure 56.

Diagnostic code charts that indicate both the five digit OBD-II codes as well as the two digit flash codes along with the code definition can be found in the charts in Figures 57 and 58.

NOTE: When diagnosing a 2007 to 2009 Sterling 360 cab over truck, use the Mitsubishi Fuso diagnostics because the Sterling 360 trucks during this time period were manufactured by Mitsubishi Fuso.

MITSUBISHI FUSO FE & FG SERIES

2005 - 2010 CODE RETRIEVAL PROCEDURE

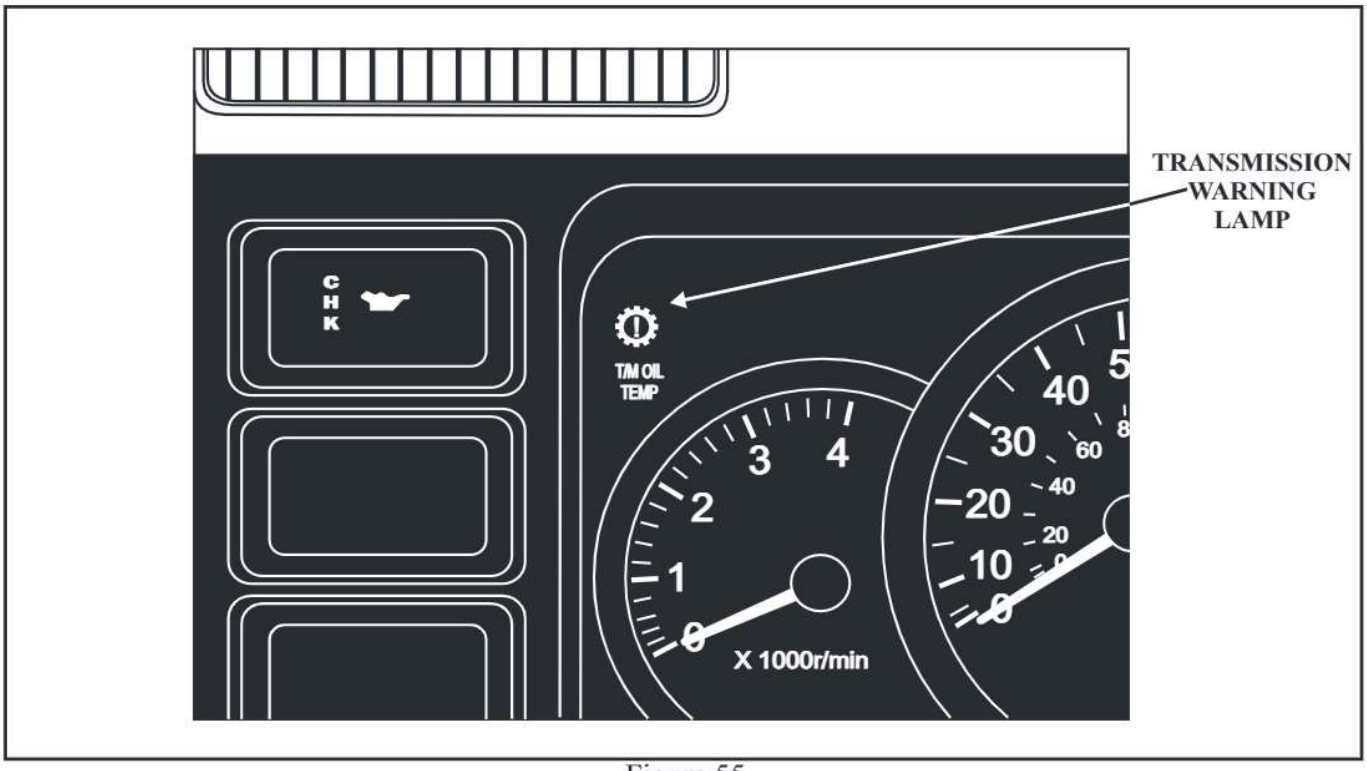


Figure 55

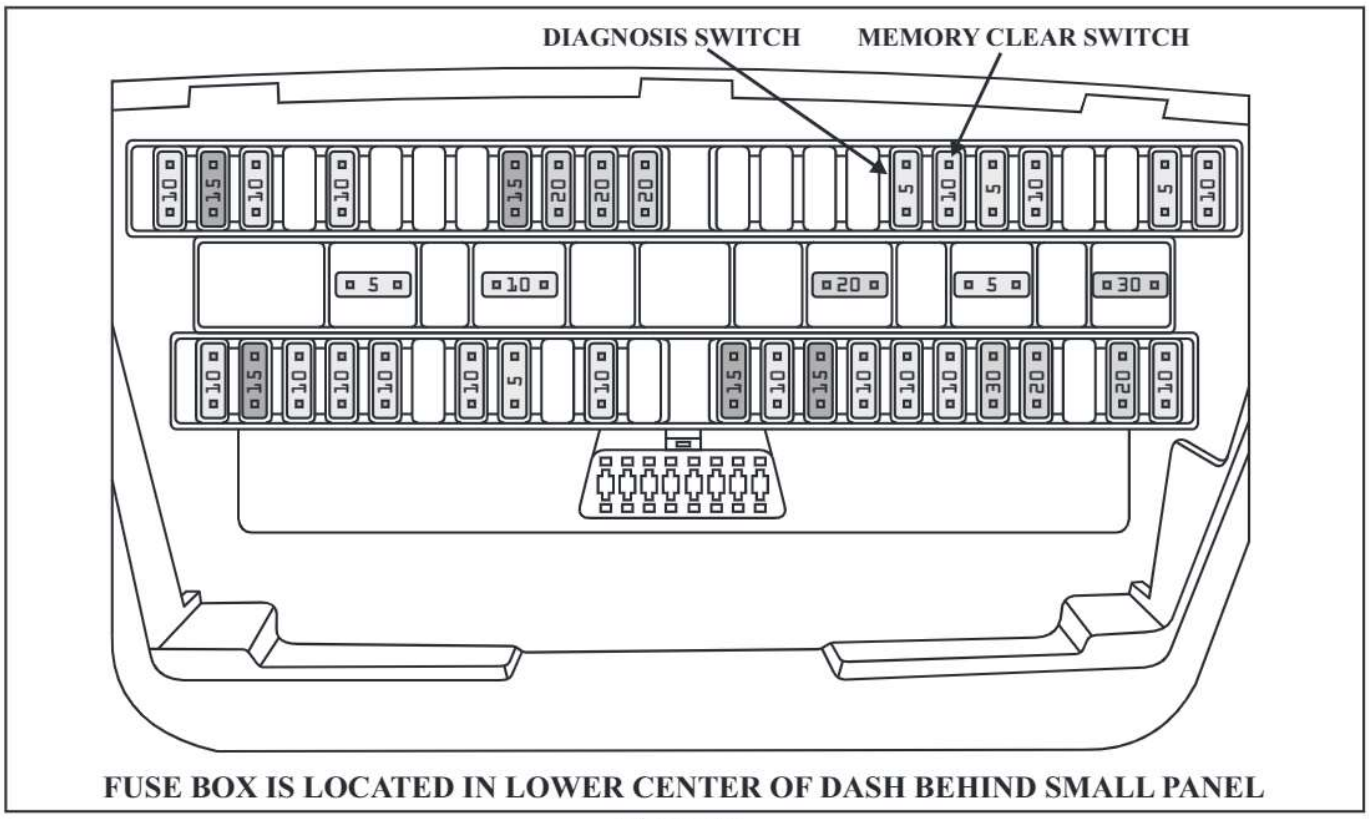


Figure 56

MITSUBISHI FUSO FE & FG SERIES

2005 - 2010 CODE RETRIEVAL PROCEDURE

OBD-II CODE	FLASH CODE	CODE DEFINITION	*FAULT FAILURE PERIOD
P0078	54	Failure of Exhaust Brake Relay	8 TRIPS
P0500	12	Failure of Vehicle Speed Sensor	2DC
P0501	12	Failure of Vehicle Speed Sensor - Performance	IMD or 2DC
P0562	11	Open Circuit of Starter Switch Power Supply Low	IMD
P0604	91	Failure of Transmission Control Module (RAM)	2DC
P0605	92	Failure of Transmission Control Module (Internal Failure)	2DC
P062F	93	Failure of Transmission Control Module (EEPROM)	IMD
P0702	11	Battery Supply Voltage Low	2DC
P0706	49	Failure of Oil Pressure Switch 8 - Performance	IMD
P0707	43	Failure of Inhibitor Switch - Signal Low	IMD
P0708	43	Failure of Inhibitor Switch - Signal Low	IMD
P0711	13	Failure of Sump Oil Temperature Sensor - Performance	IMD
P0712	13	Failure of Sump Oil Temperature Sensor - Signal Low	IMD
P0713	13	Failure of Sump Oil Temperature Sensor - Signal High	IMD
P0714	13	Failure of Sump Oil Temperature Sensor Signal - Intermittent	IMD
P0717	16	Failure of Turbine Speed Sensor - No Signal	2DC
P0721	25	Failure of Output Speed Sensor - Performance	IMD or 2DC
P0722	25	Failure of Output Speed Sensor - No Signal	2DC
P0726	15	Abnormality of Engine Speed Signal	2DC
P0730	37	Incorrect Gear Ratio	IMD
P0746	41	Linear Solenoid 1 Stuck Off	IMD
P0747	41	Linear Solenoid 1 Stuck On	IMD
P0748	26	Linear Solenoid 1 - Shorted or Open	IMD
P0751	45	Shift Solenoid 1 Stuck Off	IMD
P0752	45	Shift Solenoid 1 Stuck On	IMD
P0756	46	Shift Solenoid 2 Stuck Off	IMD
P0757	46	Shift Solenoid 2 Stuck On	IMD
P0761	47	Shift Solenoid 3 Stuck Off	IMD
P0762	47	Shift Solenoid 3 Stuck On	IMD
P0766	55	Shift Solenoid 4 Stuck Off	IMD
P0767	55	Shift Solenoid 4 Stuck On	IMD
P0776	42	Linear Solenoid 2 Stuck Off	IMD
P0777	42	Linear Solenoid 2 Stuck On	IMD

*DC = Drive Cycle - Key ON, Engine Running to Key Off Constitutes One Drive Cycle.
TRIP = Key ON, Engine OFF to Key OFF Constitutes One Trip.
IMD = Immediate Code Storage @ The Time of The Failure.

Figure 57

MITSUBISHI FUSO FE & FG SERIES

2005 - 2010 CODE RETRIEVAL PROCEDURE

OBD-II CODE	FLASH CODE	CODE DEFINITION	*FAULT FAILURE PERIOD
P0778	27	Linear Solenoid 2 - Shorted or Open	IMD
P0796	48	Linear Solenoid 3 Stuck Off	IMD
P0797	48	Linear Solenoid 3 Stuck On	IMD
P083D	48	Failure of Pressure Switch 7 - Voltage High	IMD
P0842	41	Failure of Pressure Switch 1 - Voltage Low	IMD
P0843	41	Failure of Pressure Switch 1 - Voltage High	IMD
P0847	42	Failure of Pressure Switch 2 - Voltage Low	IMD
P0848	42	Failure of Pressure Switch 2 - Voltage High	IMD
P0863	88	Abnormality in CAN Communication	IMD
P0872	45	Failure of Pressure Switch 3 - Voltage Low	IMD
P0873	45	Failure of Pressure Switch 3 - Voltage High	IMD
P0877	46	Failure of Pressure Switch 4 - Voltage Low	IMD
P0878	46	Failure of Pressure Switch 4 - Voltage High	IMD
P0973	31	Failure of Shift Solenoid 1 - Voltage Low	IMD
P0974	31	Failure of Shift Solenoid 1 - Voltage High	IMD
P0976	32	Failure of Shift Solenoid 2 - Voltage Low	IMD
P0977	32	Failure of Shift Solenoid 2 - Voltage High	IMD
P0979	33	Failure of Shift Solenoid 3 - Voltage Low	IMD
P0980	33	Failure of Shift Solenoid 3 - Voltage High	IMD
P0985	52	Failure of Shift Solenoid 4 - Voltage Low	IMD
P0986	52	Failure of Shift Solenoid 4 - Voltage High	IMD
P0989	47	Failure of Pressure Switch 5 - Voltage Low	IMD
P0990	47	Failure of Pressure Switch 5 - Voltage High	IMD
P0994	55	Failure of Pressure Switch 6 - Voltage Low	IMD
P0995	55	Failure of Pressure Switch 6 - Voltage High	IMD
P1604	24	Abnormality in Accelerator Pedal Position Sensor Signal	IMD
P2716	34	Failure of Linear Solenoid 4 - Shorted or Open	IMD
P2742	17	Failure of Torque Converter Temperature Sensor - Signal Low	IMD
P2743	17	Failure of Torque Converter Temperature Sensor - Signal High	IMD or 2DC
P2757	61	Mechanical Failure of The Lockup Clutch (TCC Slip)	2DC
P2759	35	Failure of Linear Solenoid 3 - Shorted or Open	IMD
U0100	88	Abnormality in CAN Communication	IMD

*DC = Drive Cycle - Key ON, Engine Running to Key Off Constitutes One Drive Cycle.
TRIP = Key ON, Engine OFF to Key OFF Constitutes One Trip.
IMD = Immediate Code Storage @ The Time of The Failure.

Figure 58

MITSUBISHI FUSO FE & FG SERIES

2005 - 2010 CODE DEALER ADJUST (MEMORY RESET) PROCEDURE

Mitsubishi Fuso trucks equipped with the M036A6 Aisin 6 speed automatic transmission require a shift adapt reset procedure known as "Dealer Adjust". This is done to allow the TCM to learn the new clutch clearances and clutch apply times in order to produce the proper transmission shift characteristics. Dealer Adjust should be performed whenever the transmission has been overhauled or replaced, or the TCM has been replaced.

The "Dealer Adjust" Procedure is as follows:

1 - Remove the A/T Diagnosis Switch (5 amp fuse) as seen in Figure 59.
2 - Start the engine and bring the transmission up to normal operating temperature.
3 - Set parking brake.
4 - Apply foot brake, use LEFT FOOT.
5 - Make certain the OD Switch located on the shift lever, is OFF, (light on dash is ON, see Figure 60).
6 - Move gear selector lever from "D" to "3", this must be done 3 times within 10 seconds ending in the "D" position.
7 - The Transmission Temperature Lamp will flash rapidly, see Figure 60.
8 - Cycle the OD Switch OFF, ON, OFF, OD Off Lamp should now be back ON. The Transmission Temperature Lamp will now return to a slow steady flash pattern. 4 clutch engagements will be felt, this signifies the beginning of the learning process.
9 - When the Transmission Temp Lamp returns to flashing rapidly, increase engine rpm to 1200. Cycle OD Off Switch, OFF, ON, OFF, the OD Off Lamp should now be back ON. The Transmission Temp Lamp now returns to a slow steady flash pattern. One clutch engagement will now be felt. *Part one of the learning process is now complete.*
10 - When the Transmission Temp Lamp flashes rapidly, decrease engine rpm to an idle within 5 seconds.
11 - Move the shift lever to the reverse position and cycle the OD Switch OFF, ON, OFF, the lamp should now be back ON and the Transmission Temperature Lamp should now return to a slow steady flash pattern. 4 clutch engagements will now be felt.
12 - When the Transmission Temp Lamp returns to a rapid flash pattern, increase engine rpm to1200. Cycle the OD Switch Off, On, Off, the OD Off Lamp should now be back ON and the Transmission Temp Lamp will return to a slow flash pattern. A single clutch engagement will now be felt. *Part two of the learning procedure is now complete.*
13 - The Transmission Temperature Lamp will now go out for 2 seconds and come back on for 1 second. This cycle will continue for 3 times.
14 - The "Dealer Adjust" procedure is now complete.
15 - Move the shift lever to the park position, reinstall the 5 amp fuse, recycle the ignition key. The OD Off Lamp should now be OFF.

NOTE: If at any time the Transmission Temperature Lamp goes out or stops flashing, restart the "Dealer Adjust" procedure from step 8.

MITSUBISHI FUSO FE & FG SERIES

2005 - 2010 CODE DEALER ADJUST (MEMORY RESET) PROCEDURE

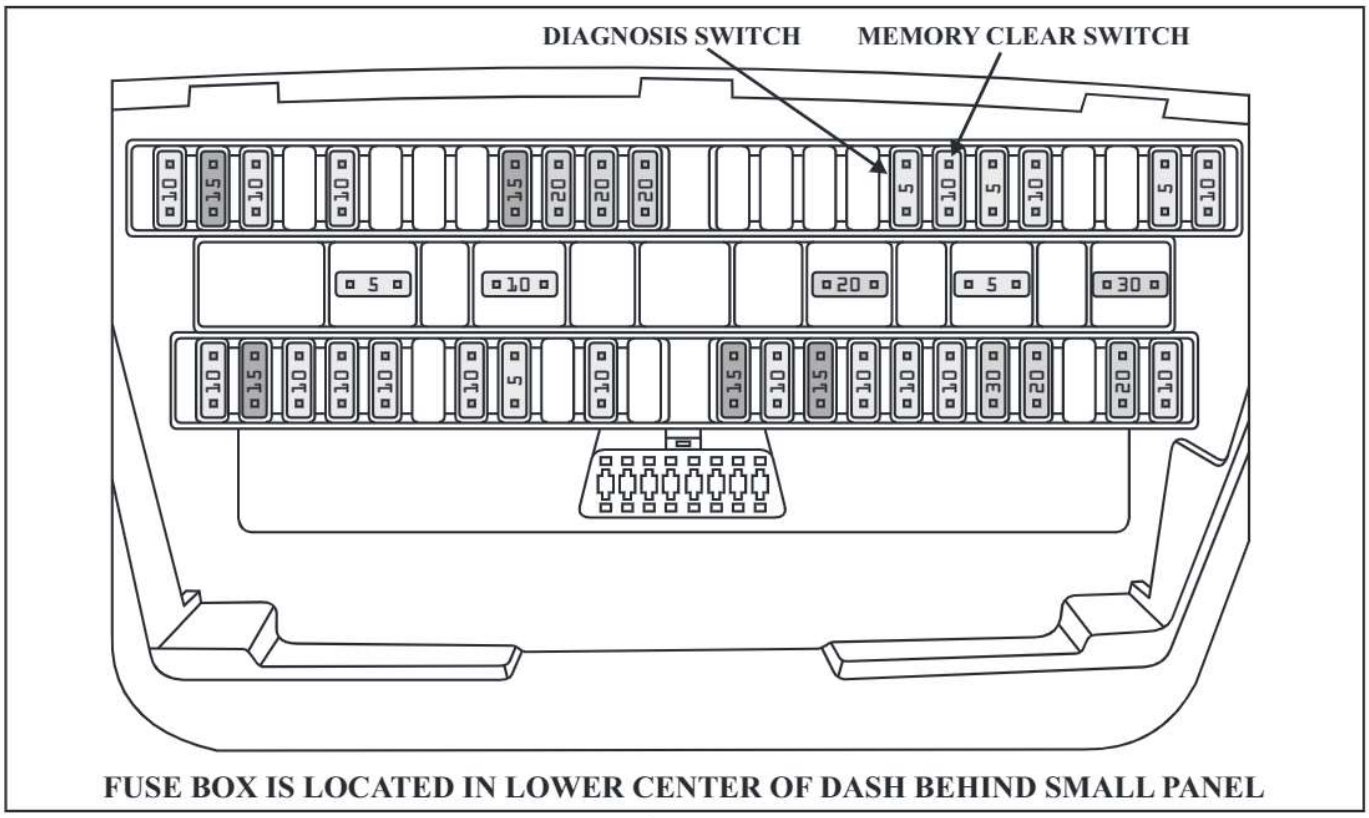


Figure 59

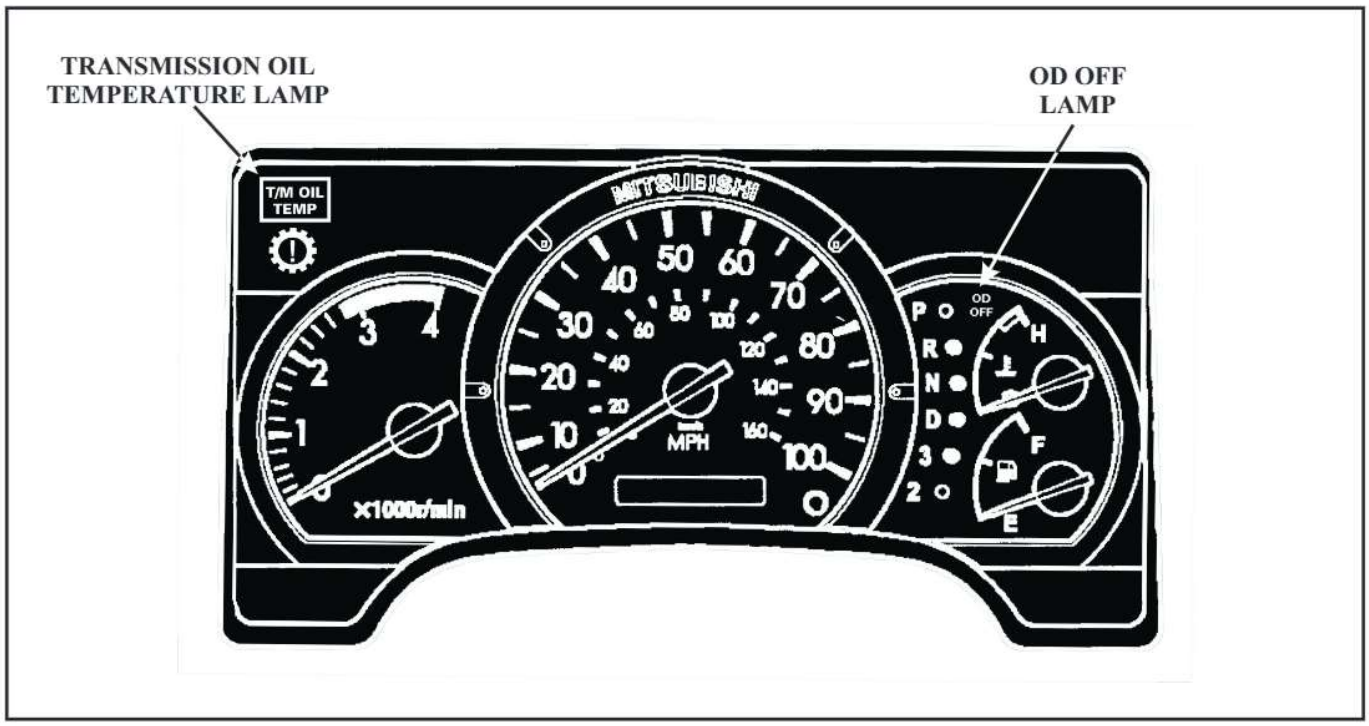


Figure 60

NISSAN UD 1100/1400 SERIES

1988-94 CODE RETRIEVAL PROCEDURE

The code retrieval procedure for the 1988-94 Nissan UD trucks is just like most other Nissan vehicles which means, various controls in the vehicle must be operated in a particular sequence, after which the **"O/D OFF" Lamp** shown in Figure 61 will flash a judgement flash that is longer than the other flashes.
If no faults are detected by the A/T Control Unit, the O/D Lamp will come on for 2 seconds and then go out. When a fault is detected the "O/D OFF" Lamp will flash 16 times to alert the operator that there is a transmission related malfunction. The chart in Figure 62 illustrates the code call-up procedure.

Codes will clear when fault no longer exists.

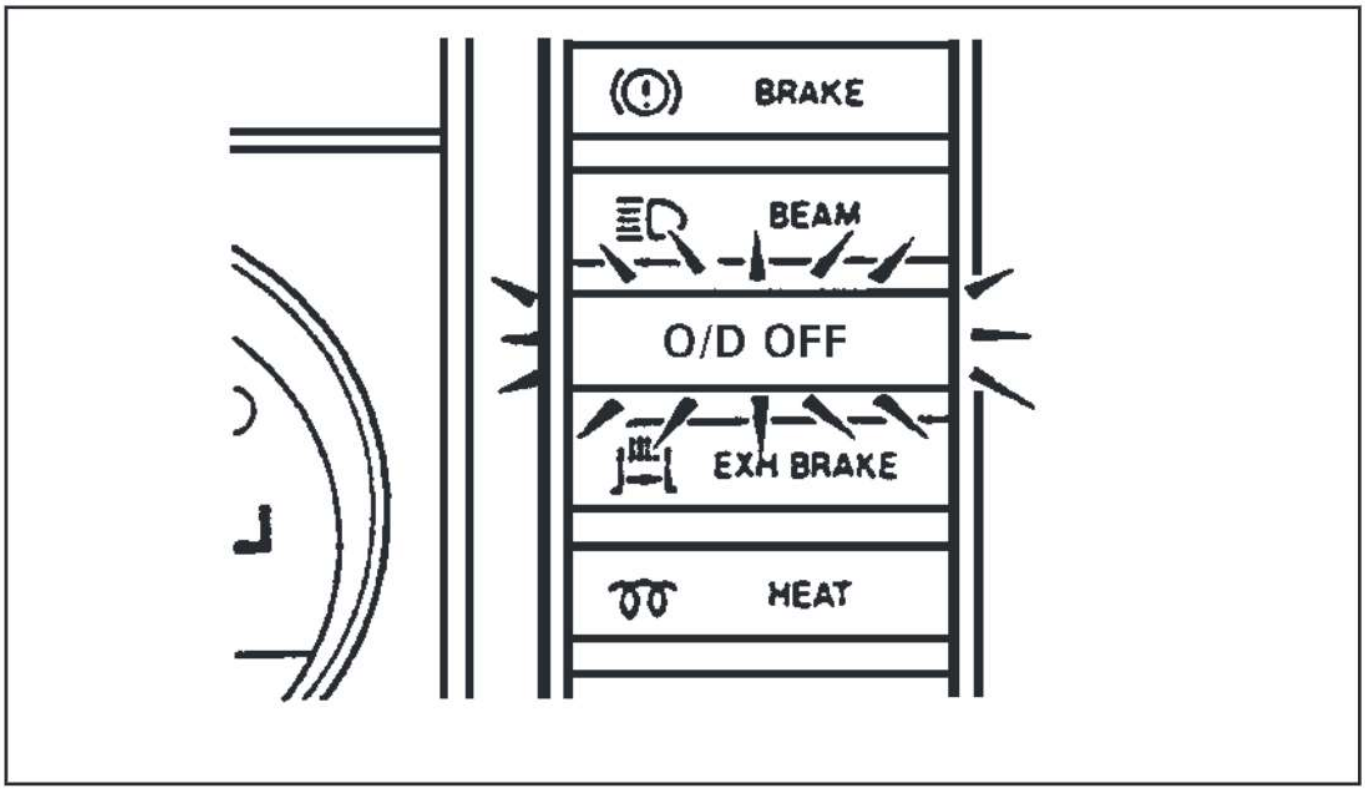


Figure 61

Use the Code Retrieval Procedure chart in Figure 62 for 1988-94 models.

1. Turn ignition switch to "OFF" after warming engine
2. Set O/D switch to "ON"
3. Turn ignition "ON"
4. Does the "O/D OFF" indicator lamp illuminate for 2 seconds?
5. Turn ignition "OFF"
6. Confirm accelerator is fully released
7. Place selector lever to the "D" position
8. Turn O/D switch to "OFF"
9. Turn ignition "ON"
10. Place selector lever to the "2" position
11. Turn O/D switch to "ON"
12. Place selector lever to the "1" position
13. Turn O/D switch to "OFF"
14. Depress accelerator fully and release it

Figure 62

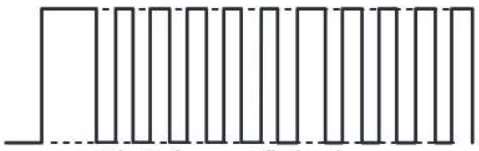
NISSAN UD 1100/1400 SERIES

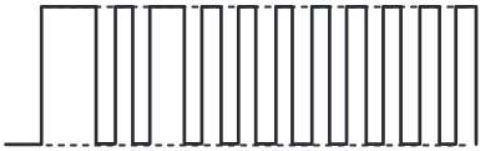
1988-94 CODE RETRIEVAL PROCEDURE

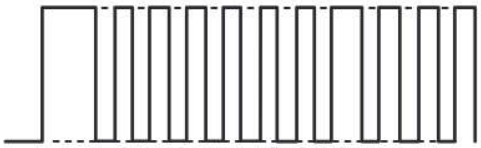
Use the chart in Figure 63 for the judgement of self-diagnosis codes for the 1988-94 models

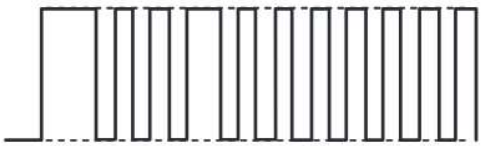
All judgements flickers same . .	All circuits that can be checked by self diagnosis are functioning.
1st judgement flicker longer . . .	Revolution sensor circuit is shorted or open.
2nd judgement flicker longer . . .	Speed sensor circuit is shorted or open.
3rd judgement flicker longer . . .	Control Lever sensor circuit is shorted or open.
4th judgement flicker longer . . .	Shift solenoid "A" circuit is shorted or open.
5th judgement flicker longer . . .	Shift solenoid "B" circuit is shorted or open.
6th judgement flicker longer . . .	Overrun solenoid is shorted or open.
7th judgement flicker longer . . .	Lock-up solenoid circuit is shorted or open.
8th judgement flicker longer . . .	ATF temp. sensor is shorted or open, or A/T control unit power source is shorted or open.
9th judgement flicker longer . . .	Engine revolution signal circuit is shorted or open.
10th judgement flicker longer . . .	EPC solenoid circuit is shorted or open.

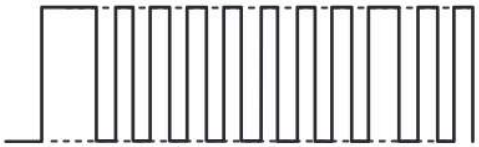

1st. Judgement flicker longer


6th. Judgement flicker longer

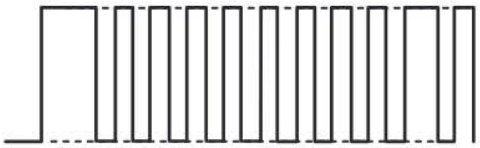

2nd. Judgement flicker longer


7th. Judgement flicker longer


3rd. Judgement flicker longer


8th. Judgement flicker longer


4th. Judgement flicker longer


9th. Judgement flicker longer


5th. Judgement flicker longer

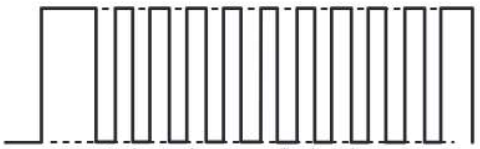

10th. Judgement flicker longer

Figure 63

NISSAN UD 1100/1400 SERIES

1995-98 CODE RETRIEVAL PROCEDURE

The code retrieval procedure for the 1995-98 Nissan UD trucks is just like most other Nissan vehicles which means, various controls in the vehicle must be operated in a particular sequence, as shown in Figure 64, after which the **"O/D OFF" Lamp** shown in Figure 65 will flash a judgement flash that is longer than the other flashes.

If no faults are detected by the A/T Control Unit, the O/D Lamp will come on for 2 seconds and then go out. When a fault is detected the "O/D OFF" Lamp will flash 16 times to alert the operator that there is a transmission related malfunction. The long judgement flash will indicate the fault code(s) that are stored as shown in the chart in Figure 66.

Codes will clear when fault no longer exists.

1. Turn ignition switch to "OFF" after warming engine
2. Set O/D switch to "ON"
3. Turn ignition "ON"
4. Does the "O/D OFF" indicator lamp illuminate for 2 seconds?
5. Turn ignition "OFF"
6. Confirm accelerator is fully released
7. Place selector lever to the "D" position
8. Turn O/D switch to "OFF"
9. Turn ignition "ON"
10. Place selector lever to the "2" position
11. Turn O/D switch to "ON"
12. Place selector lever to the "1" position
13. Turn O/D switch to "OFF"
14. Depress accelerator fully and release it

Figure 64

The O/D "OFF" Lamp will flash the code judgement pattern.

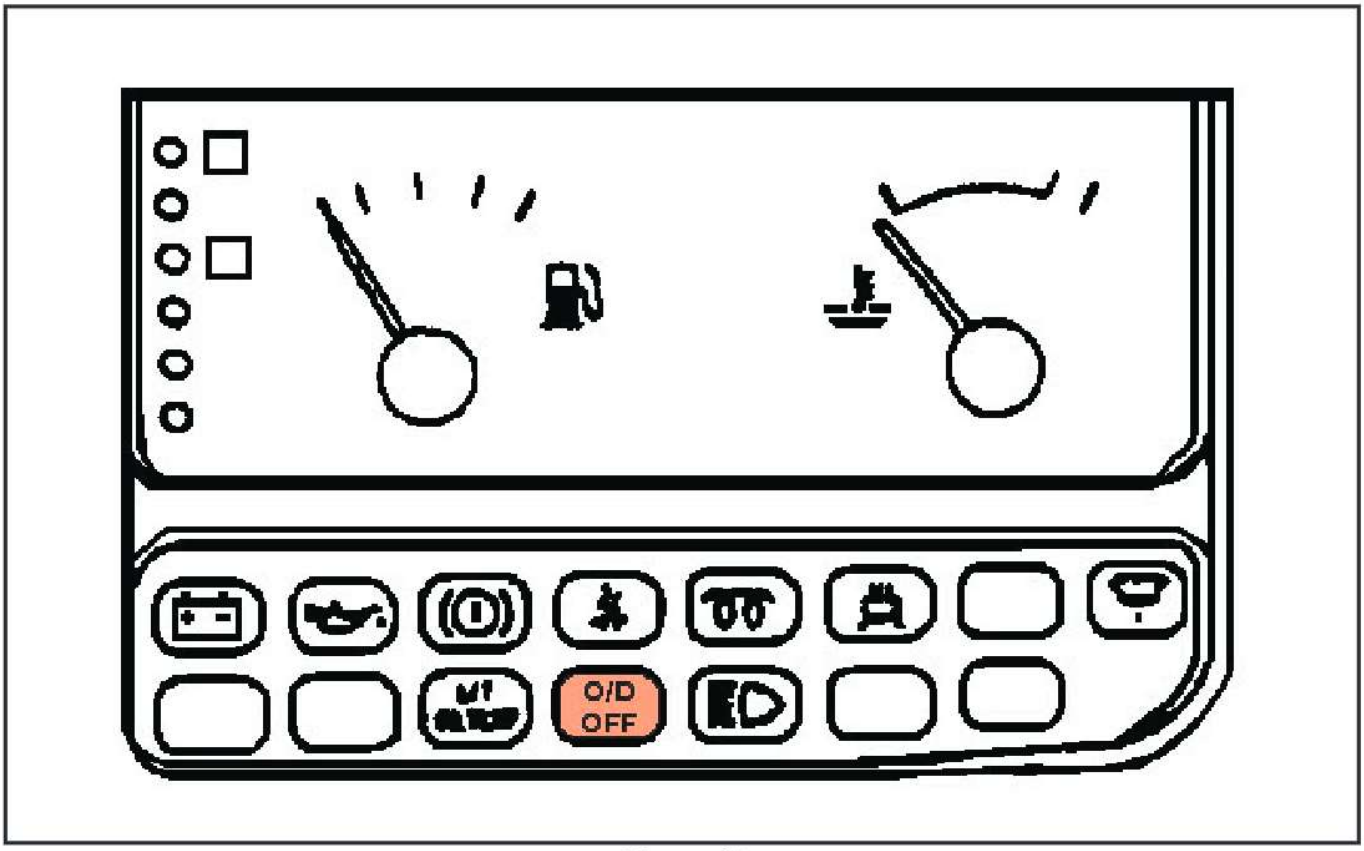


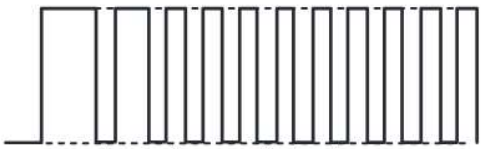
Figure 65

NISSAN UD 1100/1400 SERIES

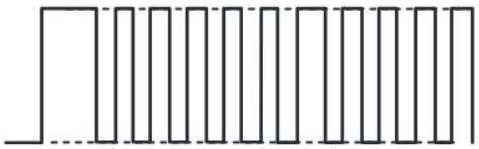
1995-98 CODE RETRIEVAL PROCEDURE

Use this code chart for 1995-98 models.

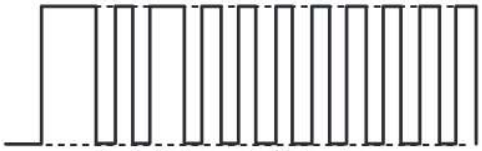
All judgements flickers same . .	All circuits that can be checked by self diagnosis are functioning.
1st judgement flicker longer . . .	Revolution sensor circuit is shorted or open.
2nd judgement flicker longer . . .	Speed sensor circuit is shorted or open.
3rd judgement flicker longer . . .	Control Lever sensor circuit is shorted or open.
4th judgement flicker longer . . .	Shift solenoid "A" circuit is shorted or open.
5th judgement flicker longer . . .	Shift solenoid "B" circuit is shorted or open.
6th judgement flicker longer . . .	Overrun solenoid is shorted or open.
7th judgement flicker longer . . .	Lock-up solenoid circuit is shorted or open.
8th judgement flicker longer . . .	ATF temp. sensor is shorted or open, or A/T control unit power source is shorted or open.
9th judgement flicker longer . . .	Engine revolution signal circuit is shorted or open.
10th judgement flicker longer . . .	EPC solenoid circuit is shorted or open.



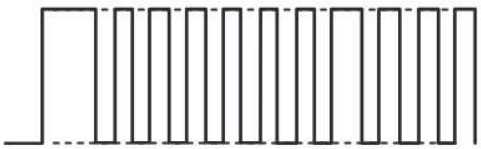
1st. Judgement flicker longer



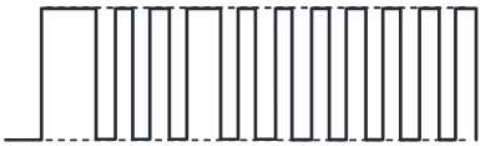
6th. Judgement flicker longer



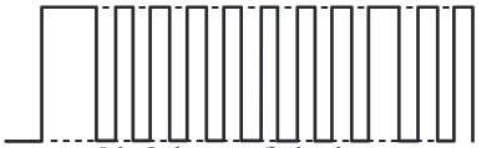
2nd. Judgement flicker longer



7th. Judgement flicker longer

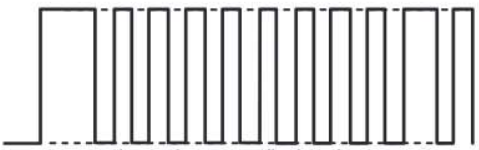


3rd. Judgement flicker longer



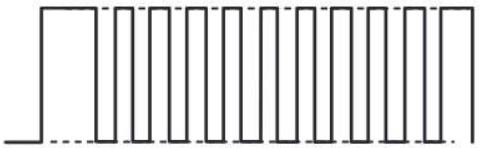
8th. Judgement flicker longer

4th. Judgement flicker longer



9th. Judgement flicker longer

5th. Judgement flicker longer



10th. Judgement flicker longer

Figure 66

NISSAN UD 1200/1400 SERIES

1999-2010 CODE RETRIEVAL PROCEDURE

When the "ATM" Lamp in the instrument cluster is steadily flashing, (Figures 67 for 1998 to 2002 models & Figure 68 for 2003 to 2010 models), at 0.5 second intervals, follow the code retrieval procedure below:

Use the following procedure to retrieve codes:

1. Using a suitable jumper wire, jump diagnostic connectors **1-14** which is a ***BLUE/YELLOW*** wire and **1-15** which is ***BLACK*** which are located in the driver side kick panel area. This pair of diagnostic connectors has an ***"A"*** on the connector identification tag as shown in figure 69.
2. Turn the ignition "on", do not start the engine.
3. Watch the "ATM" Lamp for the flash codes.

Use the code chart in Figure 70 for 1999 to 2004 models and the chart in Figure 71 for 2005 to 2010 models.

If no codes are present, the "ATM" Lamp will flash code 1 continuously.

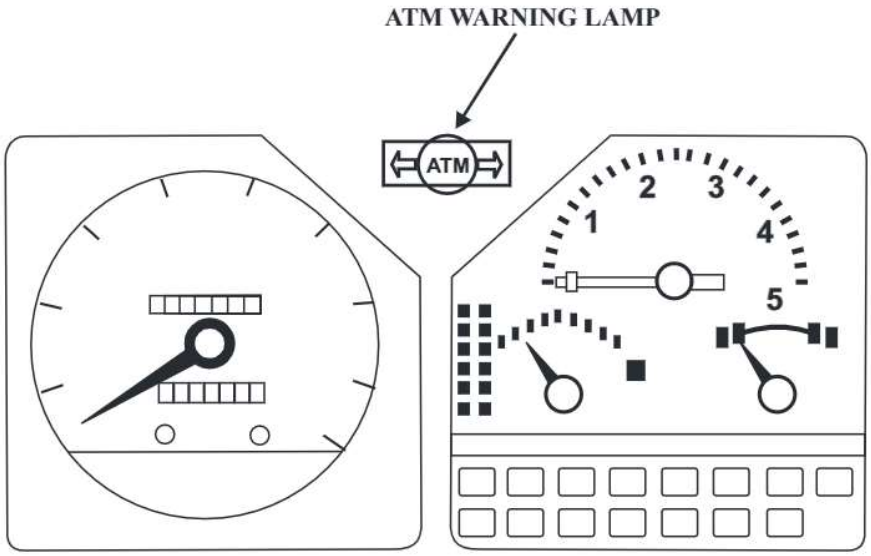
Use the following procedure to clear codes:

1. Turn the ignition "on", do not start the engine.
2. Connect diagnostic terminals 1-14 and 1-15 as described above.
3. Insure that the shift lever is in park
4. Depress brake pedal
5. Depress accelerator pedal fully.

When the memory is cleared, the "ATM" Lamp will flash on and off at 0.2 second intervals for 10 seconds.

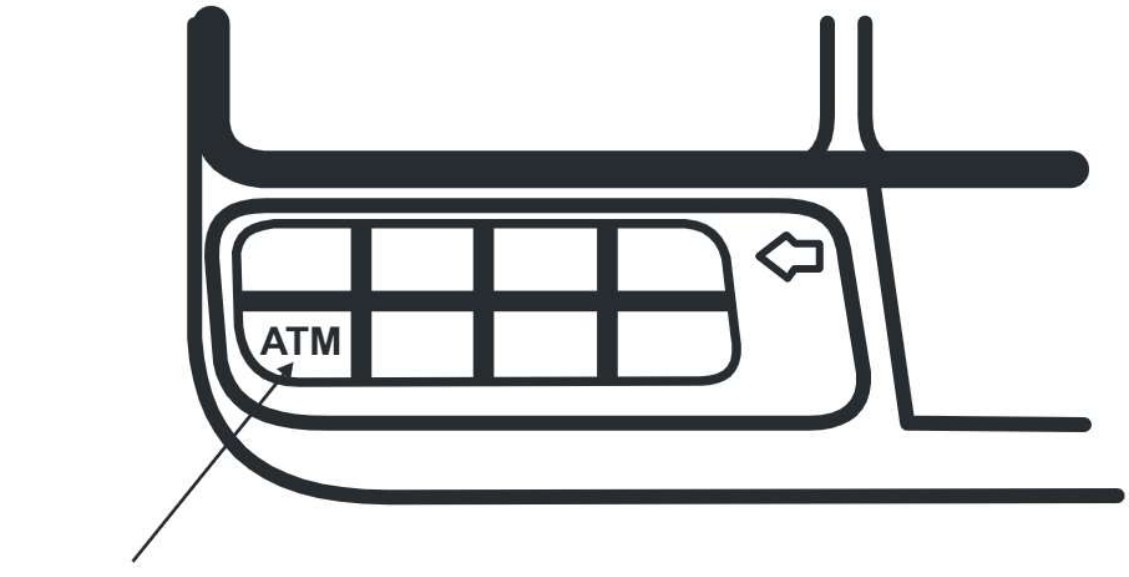
NISSAN UD 1200/1400 SERIES

1999-2010 CODE RETRIEVAL PROCEDURE



1999-2002

Figure 67



2003 - 2010

Figure 68

NISSAN UD 1200/1400 SERIES

1999-2010 CODE RETRIEVAL PROCEDURE

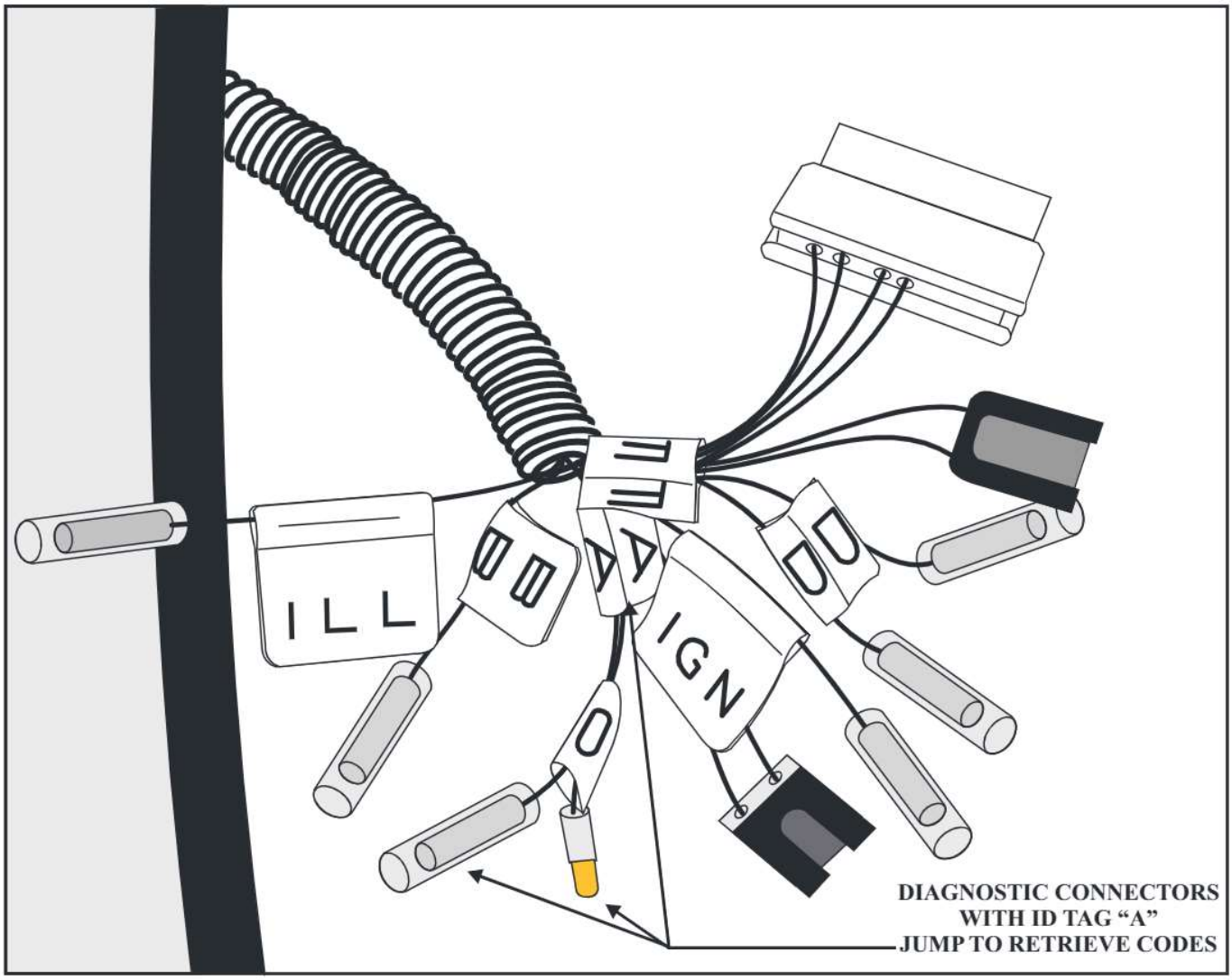


Figure 69

NISSAN UD 1200/1400 SERIES

1999-2010 CODE RETRIEVAL PROCEDURE

Use the code chart in Figure 70 for 1999-2004 models.

DTC	CODE PATTERN	CODE DESCRIPTION
11	OFF / ON 	Vehicle Speed Sensor #1 circuit open or shorted (Located on the extension housing)
13		Engine Speed Sensor circuit open or shorted
15		Automatic Transmission Fluid Thermosensor circuit open
17		Inhibitor Switch circuit open or shorted
21		Throttle Position Sensor circuit open or shorted
24		Vehicle Speed Sensor #2 circuit open or shorted (Built into speedometer)
31		Shift Solenoid #1 (S1) circuit open or shorted
32		Shift Solenoid #2 (S2) circuit open or shorted
33		Timing Solenoid (ST) circuit open or shorted
34		Lock-Up Solenoid circuit open or shorted
35		Line Pressure Solenoid circuit open or shorted
37		Exhaust brake system circuit open or shorted

Figure 70

NISSAN UD 1200/1400 SERIES

1999-2010 CODE RETRIEVAL PROCEDURE

Use the code chart in Figure 71 for 2005 - 2010 models.

DTC	CODE PATTERN	CODE DESCRIPTION
38		Automatic Transmission Fluid Thermosensor circuit open
42		Vehicle Speed Sensor #2 circuit open or shorted (Built into speedometer)
54		Exhaust brake system circuit open or shorted
61		Vehicle Speed Sensor #1 circuit open or shorted (Located on the extension housing)
62		Shift Solenoid #1 (S1) circuit open or shorted
63		Shift Solenoid #2 (S2) circuit open or shorted
64		Lock-Up Solenoid circuit open or shorted
65		Timing Solenoid (ST) circuit open or shorted
77		Line Pressure Solenoid circuit open or shorted
86		Engine Speed Sensor circuit open or shorted
88		CAN Communications Error
97		Inhibitor Switch circuit open or shorted

Figure 71

HINO 145/165/185 WITH AW450-43LE

2005-2010 CODE RETRIEVAL PROCEDURE

1 - Using a jumper lead, jump diagnostic connector terminals TC and SGND as shown below in Figure 72. The location of the Diagnostic Connector can be seen in Figure 73.
2 - Turn the key switch ON.
3 - Read the diagnostic flash pattern displayed by the Overdrive OFF Lamp located in the instrument cluster as seen in Figure 73.

NOTE: The Hino 145/165 and 185 model trucks were not produced for 2011 & 2012.

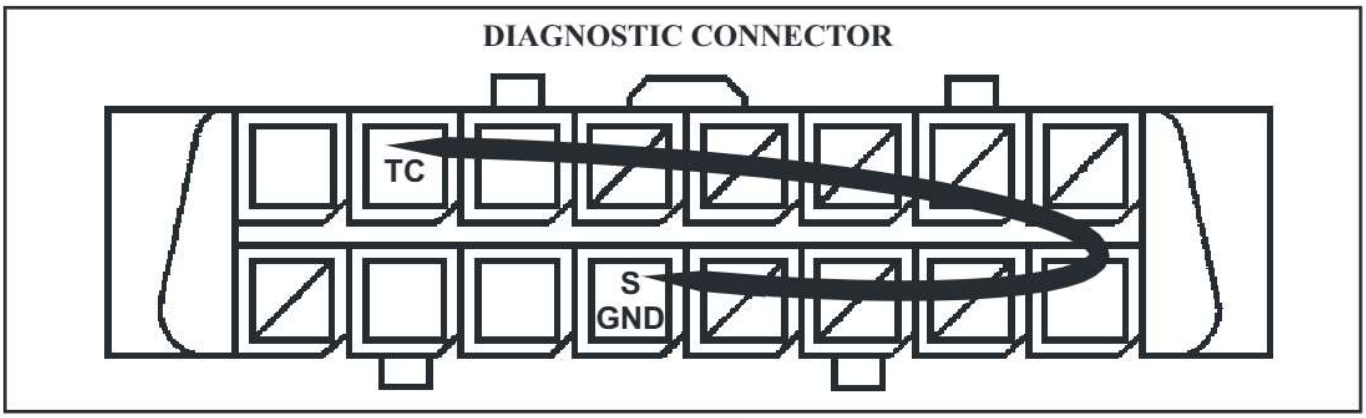


Figure 72

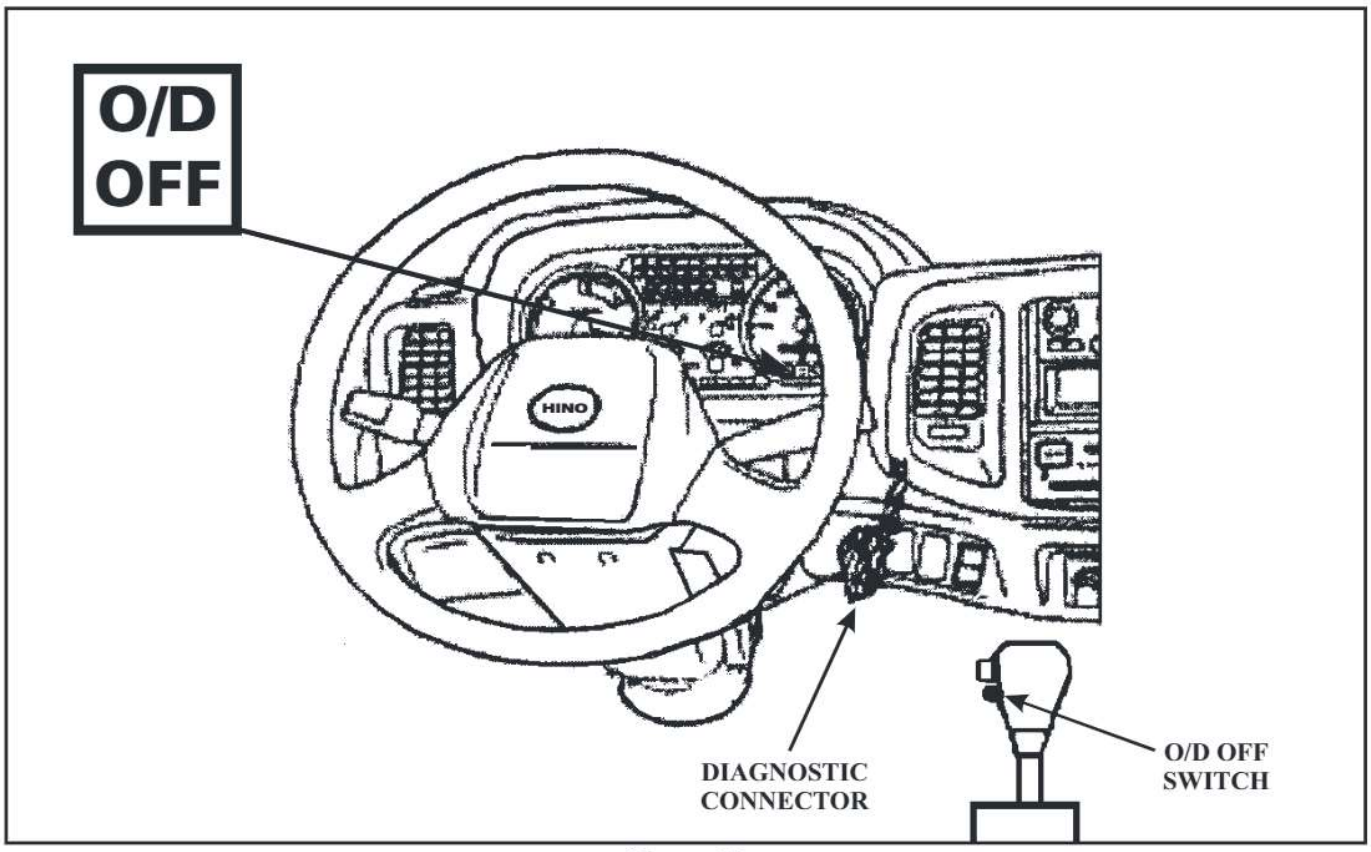


Figure 73

HINO 145/165/185 WITH AW450-43LE

2005-2010 CODE RETRIEVAL PROCEDURE

DIAGNOSTIC NOTES:
If the system is without faults and is operating normally the O/D OFF Lamp will come on for 0.5 seconds and go out for 1.5 seconds repeatedly as shown by the flash pattern in Figure 74.

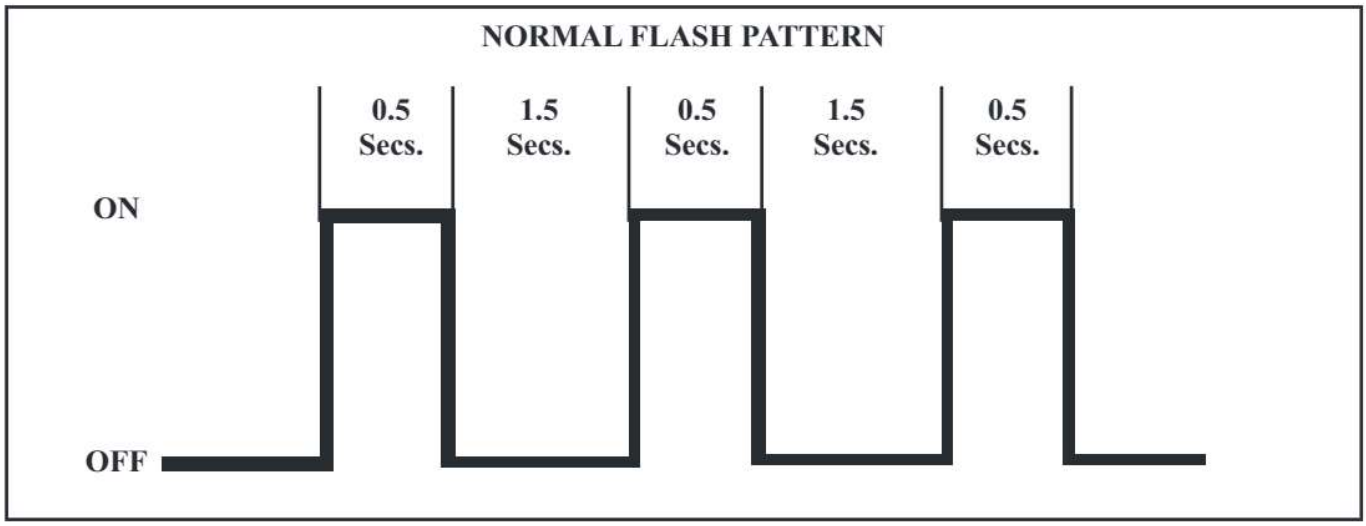


Figure 74

DIAGNOSTIC NOTES:
If one fault code is output, the same code will be output again after an interval of 0.4 seconds, if several codes are output, a different code will be output after a 2.5 second interval. After all codes have been output, the entire cycle will be repeated after a 4.0 second interval, this flash pattern is shown in Figure 75 below. If two or more codes are output, they will be displayed in numerical ascending order.
OBD-II Diagnostic Codes can be retrieved with a capable scan tool using the Diagnostic Connector shown in Figure 73.

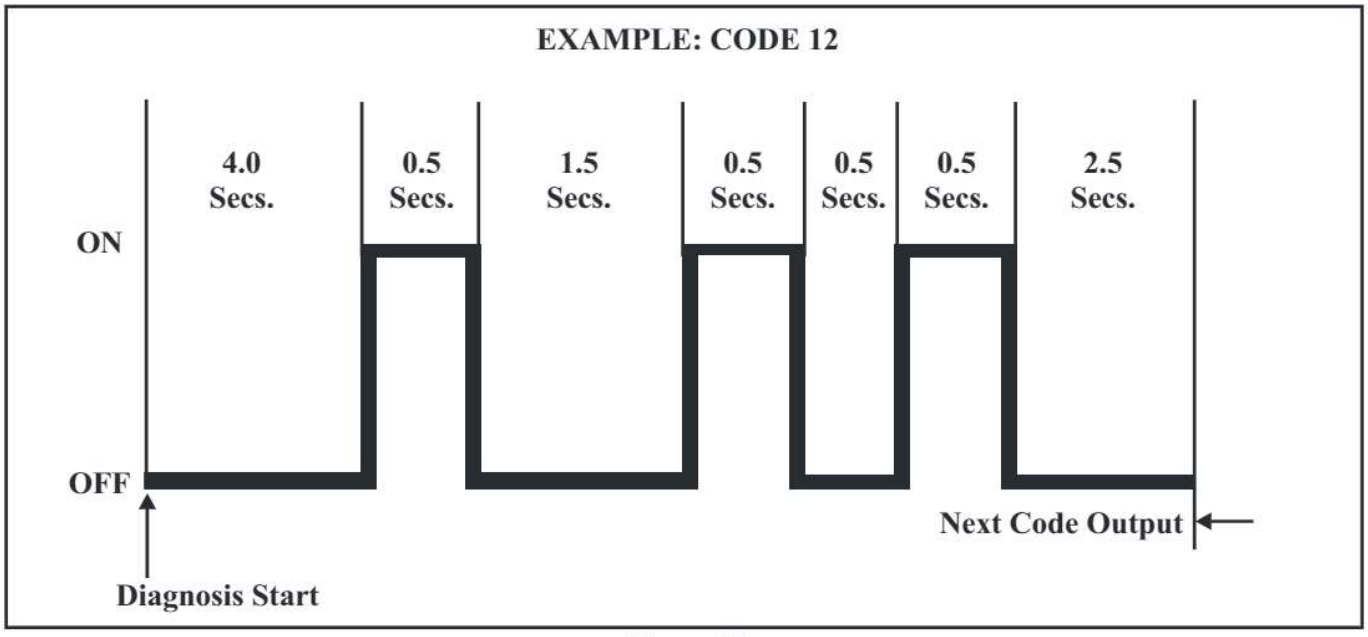


Figure 75

HINO 145/165/185 WITH AW450-43LE

2005-2010 CODE RETRIEVAL PROCEDURE

4 - Turn the key switch OFF.
5 - Remove the jumper wire from the Diagnostic Connector terminals.

Use the code chart in Figure 76 for 2005 - 2010 models.

DTC	CODE PATTERN	CODE DESCRIPTION
38/P0710		Automatic Transmission Fluid Thermosensor circuit open
42/P0500		Vehicle Speed Sensor #2 circuit open or shorted (Built into speedometer)
54/NA		Exhaust brake system circuit open or shorted
61/P1700		Vehicle Speed Sensor #1 circuit open or shorted (Located on the extension housing)
62/P0753		Shift Solenoid #1 (S1) circuit open or shorted
63/P0758		Shift Solenoid #2 (S2) circuit open or shorted
64/P0773		Lock-Up Solenoid circuit open or shorted
65/P1790		Timing Solenoid (ST) circuit open or shorted
77/P1760		Line Pressure Solenoid circuit open or shorted
86/P0725		Engine Speed Sensor circuit open or shorted
88/P1810		CAN Communications Error
97/P1780		Inhibitor Switch circuit open or shorted

Figure 76

HINO 145/165/185 WITH AW450-43LE

2005-2010 CODE DELETE PROCEDURE

1 - Using a jumper lead, jump diagnostic connector terminals TC and SGND as shown below in Figure 77. The location of the Diagnostic Connector can be seen in Figure 73.
2 - Turn the key ON.
3 - Push the Overdrive Cancel Button located on the shift handle so it indicates overdrive has been canceled.
4 - Remove the jumper lead from the diagnostic connector terminals.
5 - Turn the key switch OFF.
6 - Using the jumper lead, reconnect Diagnostic Connector terminals TC and SGND as seen in Figure 77.
7 - Turn the key switch ON.
8 - Check to see that a normal flash pattern is being displayed indicating all codes have been cleared as seen in Figure 78.

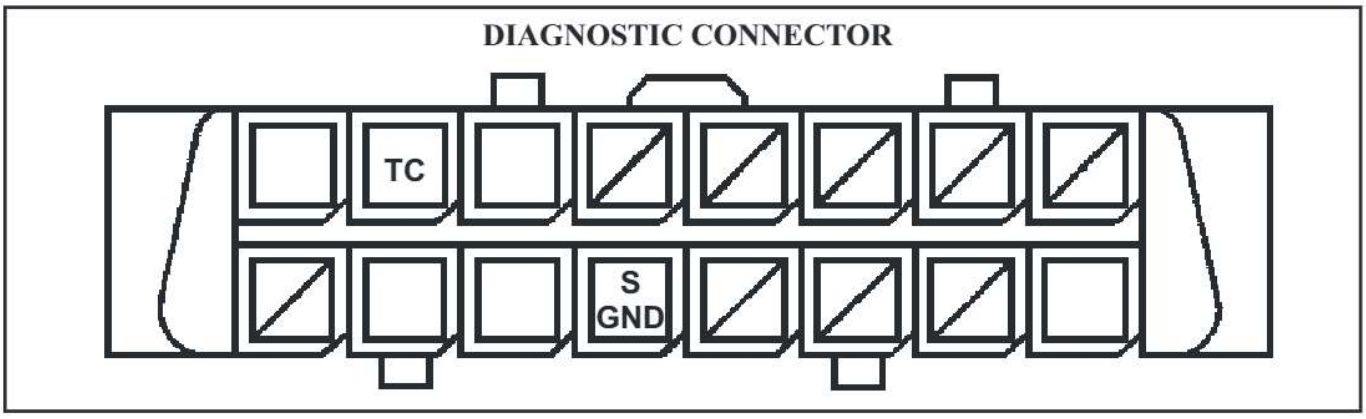


Figure 77

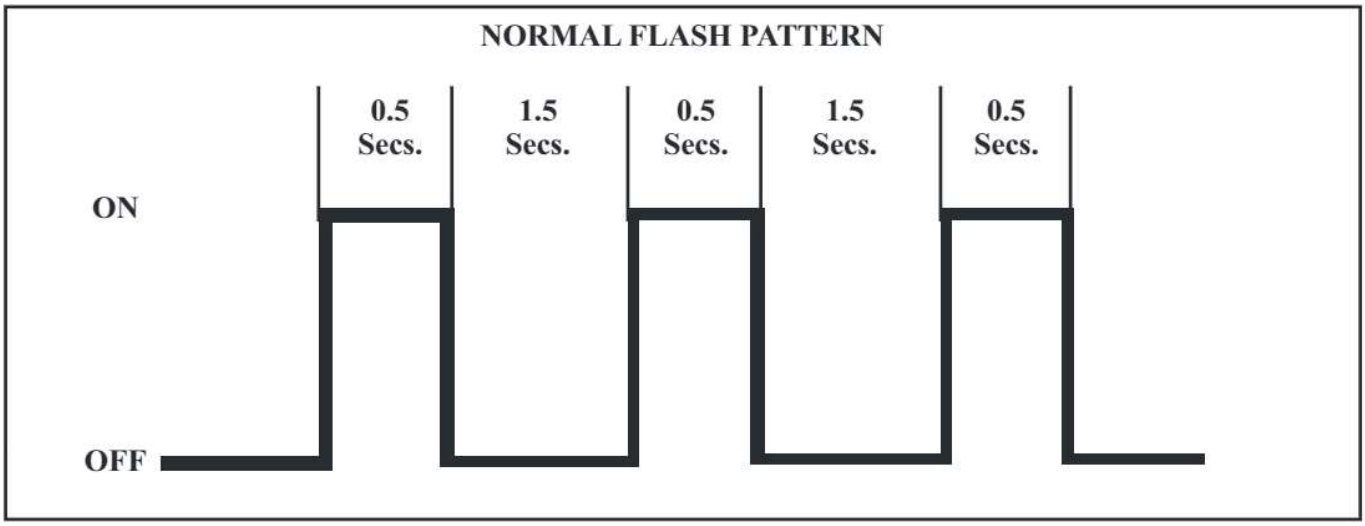


Figure 78

HINO 155/155h/195/195h WITH A465

2013-2014 CODE RETRIEVAL PROCEDURE

Diagnosis Code Retrieval Procedure Using the "Check A/T Lamp:

1 - Locate the Diagnostic Link Connector 3 to the right of the steering column.
2 - Using a jumper lead, connect DLC3 terminals 4 and 13 as shown in Figure 79.
3 - Turn the starter key ON.
4 - Read the flash patterns produced by the A/T Check Lamp, Refer to Figure 80.

Diagnostic Notes:

>If no codes are stored, the A/T Check Lamp will flash ON and OFF at 0.25 second intervals as seen in the flash pattern in Figure 81.
>If there is a single DTC is stored the code will repeat at 4.5 second intervals.
>If more than one DTC is stored, each code flash pattern will be displayed by the A/T Check Lamp at 2.5 second intervals as seen in Figure 82. The DTCs will be displayed in an ascending order.
>When DTC flash patterns have been displayed, the codes will be displayed again in ascending order after a 4.5 second interval.

5 - Turn the starter key to the "LOCK"position.
6 - Disconnect the jumper lead from the DLC3.

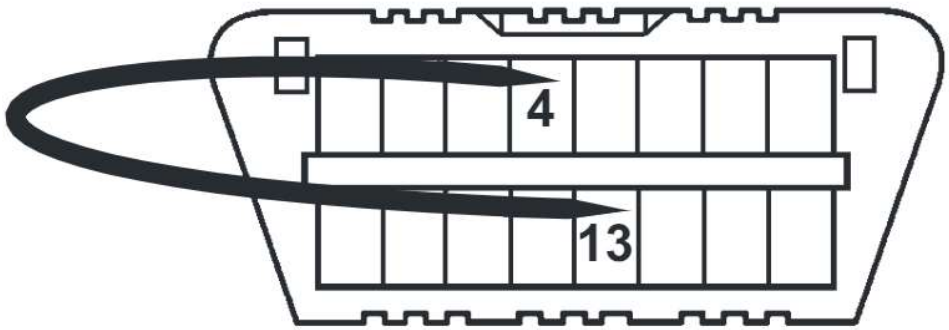
Diagnosis Code Clearing Procedure Using the "Check A/T Lamp:

1 - Turn the starter key ON.
2 - Using a jumper lead, connect DLC3 terminals 4 and 13 as shown in Figure 79.
3 - Turn the Overdrive Switch to OFF (OD Indicator Lamp is ON), Refer to Figure 83.
4 - Disconnect the jumper lead from the DLC3.
5 - Turn the starter key to the "LOCK"position.
6 - Turn the Overdrive Switch to ON (OD Indicator Lamp is OFF).
7 - Using a jumper lead, connect DLC3 terminals 4 and 13.
8 - Turn the starter key ON.
9 - Verify a normal flash pattern displayed by the A/T Check Lamp.

Use the code chart in Figures 84 and 85 for code descriptions.

NOTE: The Hino 155/155h/195 and 195h model trucks were not produced for 2011 & 2012.

DATA LINK CONNECTOR 3



CONNECT TERMINALS 4 & 13 WITH A JUMPER LEAD

Figure 79

HINO 155/155h/195/195h WITH A465

2013-2014 CODE RETRIEVAL PROCEDURE

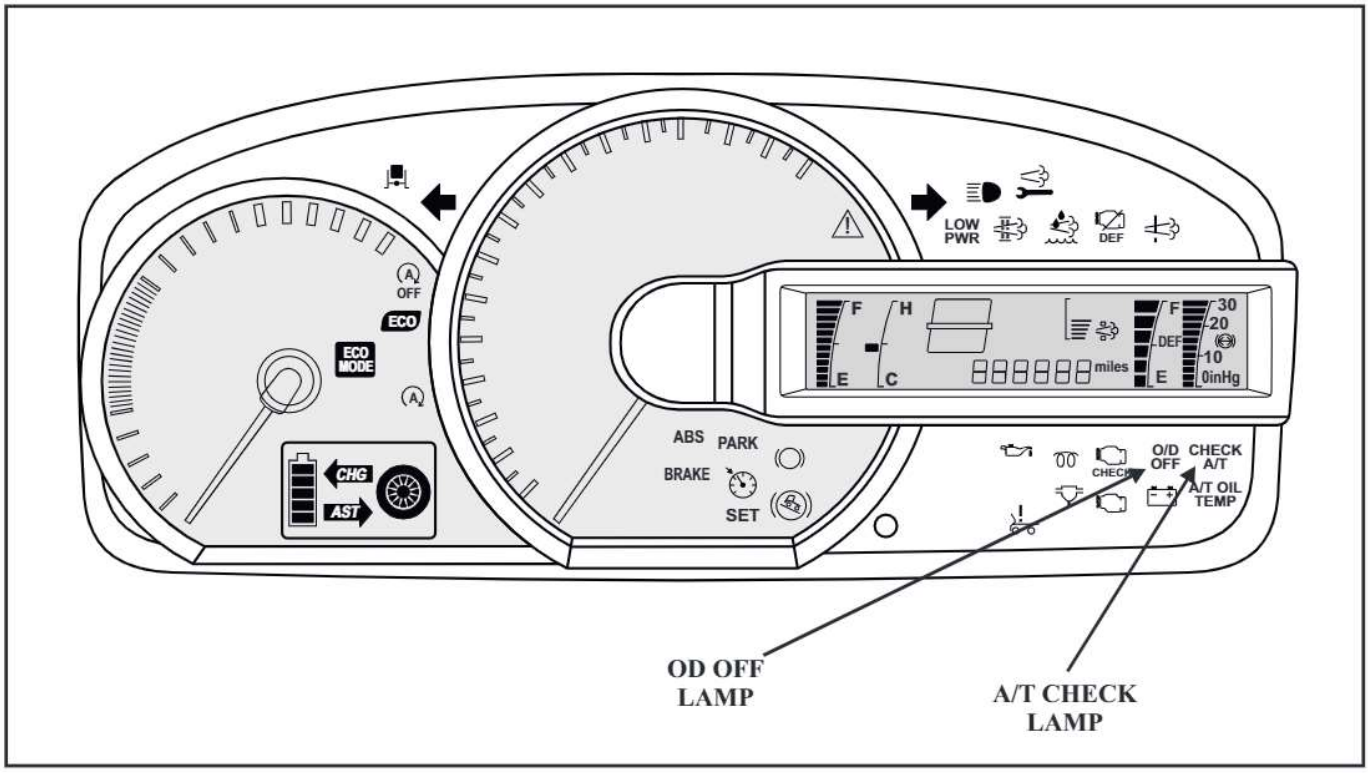


Figure 80

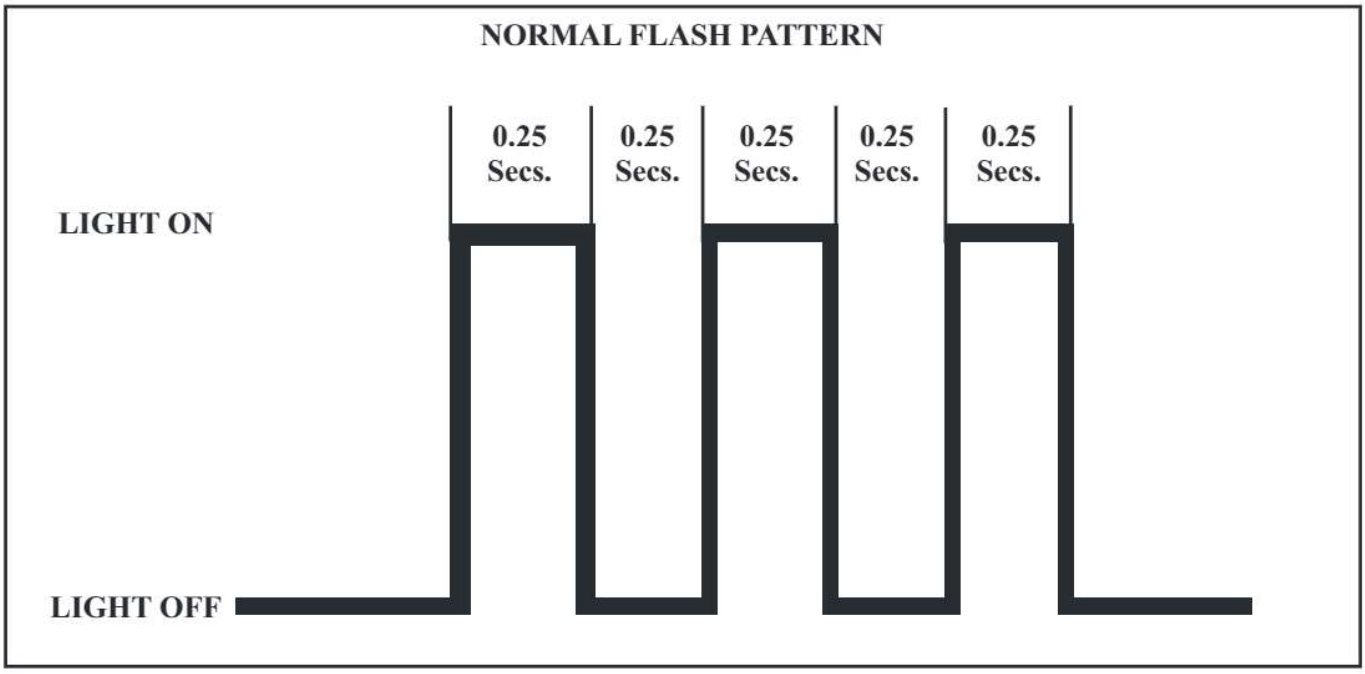


Figure 81

HINO 155/155h/195/195h WITH A465

2013-2014 CODE RETRIEVAL PROCEDURE

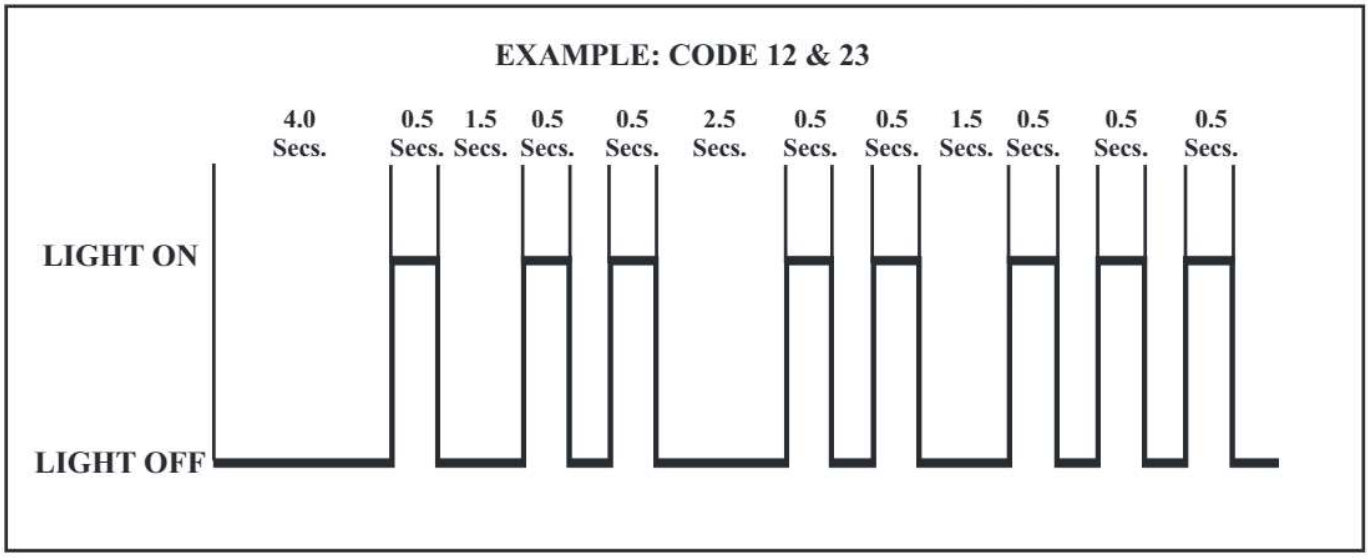


Figure 82

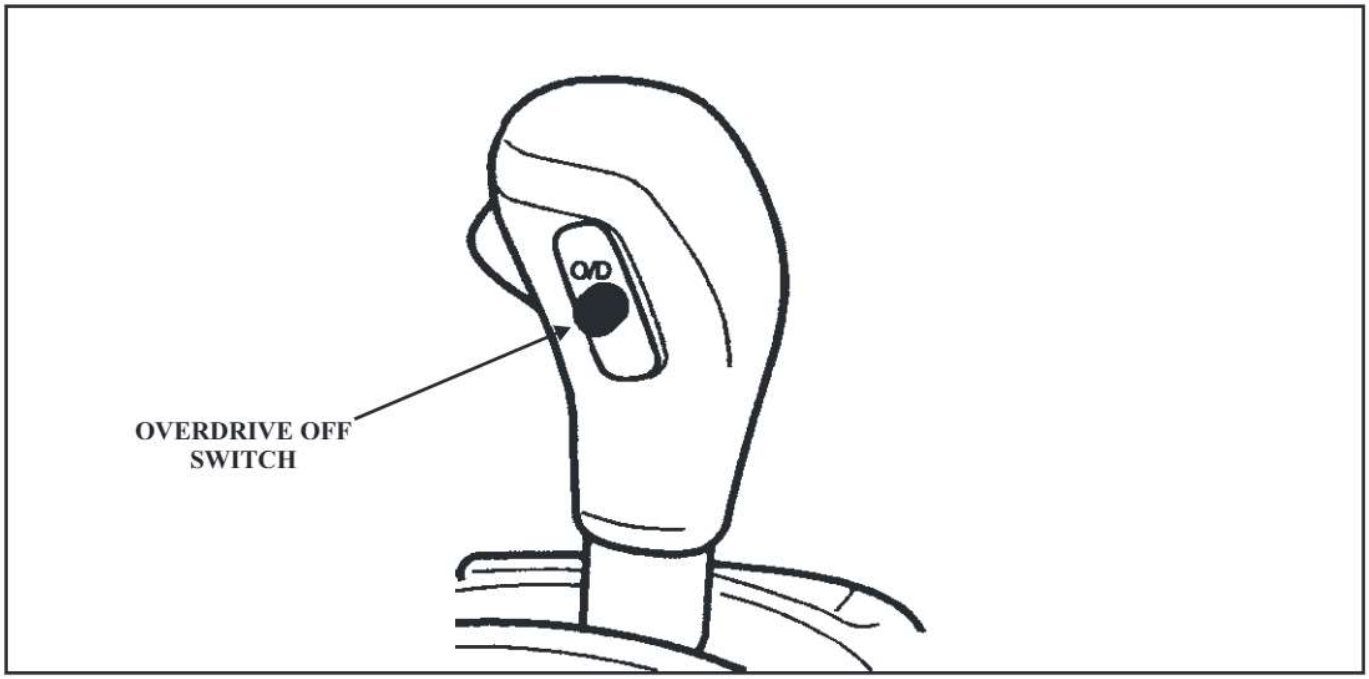


Figure 83

HINO 155/155h/195/195h WITH A465

2013-2014 DIAGNOSTIC CODE DEFINITIONS

FLASH CODE	CODE DEFINITION	OBD-II CODE
11	Failure In Power Supply Line	P0562
12	Turbine Revolution Sensor System Failure	P0715
13	Abnormal A/T Electric Oil Pump Operation	P3156
17	Oil Temperature Sensor #2 System Failure	P2740
24	Abnormality In Accelerator Opening	P1604
25	Abnormality In Linear Solenoid #1	P0748
26	Abnormality In Linear Solenoid #2	P0778
27	Abnormality In Linear Solenoid #3	P2759
28	Pressure Control Solenoid System Failure	P2716
31	Control Valve #1 System Failure	P0746
32	Control Valve #2 System Failure	P0776
33	Control Valve #3 System Failure	P2757
36	Abnormal Lockup	P2764
37	Abnormal Gear Ratio	P0730
38	Oil Temperature Sensor #1 System Failure	P0710
42	Vehicle Speed Sensor System Failure	P0500
43	Shift Position Switch System Failure	P0705
44	Abnormality In “D” Range Pressure	P0706
45	Shift Valve #1 System Failure	P0751
46	Shift Valve #2 System Failure	P0756
47	Shift Valve #3 System Failure	P0761
48	Shift Valve #4 System Failure	P0766
54	Abnormality In The Exhaust Brake Actuation Signal	P1604
61	Vehicle Speed Sensor #2 System Failure	P0720
62	Shift Solenoid 1 System Failure - Circuit Low	P0973
62	Shift Solenoid 1 System Failure - Circuit High	P0974
63	Shift Solenoid 2 System Failure - Circuit Low	P0976
63	Shift Solenoid 2 System Failure - Circuit High	P0977
64	Shift Solenoid 3 System Failure - Circuit Low	P0979
64	Shift Solenoid 3 System Failure - Circuit High	P0980
65	Hydraulic Control Solenoid System Failure - Low	P0985
65	Hydraulic Control Solenoid System Failure - High	P0986
86	Engine Revolution Sensor System Failure	P0725
88	Motor Revolution Failure	P0A40
88	Abnormality In Driver Request System Torque	P2545
88	CAN Communication Blackout	U0100

Figure 84

HINO 155/155h/195/195h WITH A465

2013-2014 DIAGNOSTIC CODE DEFINITIONS

FLASH CODE	CODE DEFINITION	OBD-II CODE
88	AT ECU CAN Communication Blackout	U0101
88	CAN Message Error (Cruise Control Status)	U110A
88	CAN Message Error (From High Voltage System	U0293
94	Abnormal AT Electric Oil Pump Power Supply	P1538
95	Low Voltage Of AT Electric Oil Pump Power Supply	P1539
96	The AT ECU Outputs Abnormal interruption Of AT Electric Oil Pump	P3157

Figure 85

HINO 155/155h/195/195h WITH A465

2013-2014 RELEARN PROCEDURES

Hino truck models 155/155h/195 and 195h equipped with the A465 Aisin 6 speed transmission will require a TCM relearn procedure whenever the transmission is replaced or overhauled or the TCM is replaced.

NOTE: If the A/T oil temperature warning lamp turns ON for 2 seconds, then turns OFF for 1 second repeatedly during A/T learned value initialization mode, turn the starter key to the "Lock" position, make certain the vehicle is at a complete stop and then begin the initialization process from the beginning.

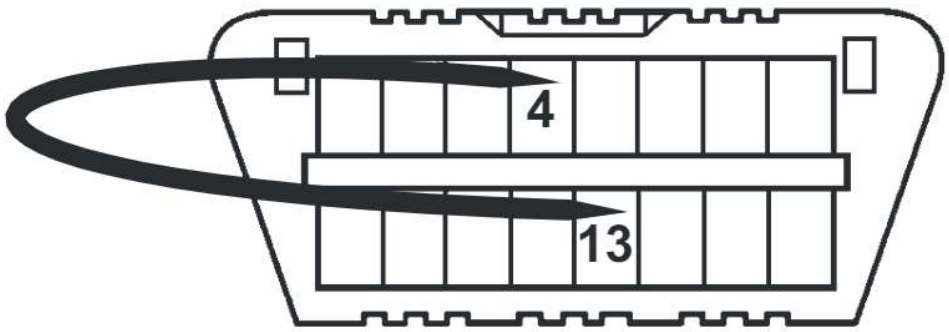
Before beginning the initialization process, turn OFF all electrical loads such as headlights, AC, etc. and apply the parking brake.
Make certain the transmission fluid level is correct and that engine temperature is at normal operating temperature. Move the shift lever from N to D 5 times and then repeat this step moving the shift lever from N to R.

To begin the initialization procedure:

1 - Make certain transmission fluid temperature is between 104 to 194ºF. Using a jumper lead, jump DLC3 terminals 4 and 13 as shown in Figure 86.
2 - Make certain that the overdrive switch located on the shift lever is in the ON position (OD off indicator lamp is OFF).
3 - With the brake pedal depressed, increase engine rpm to at least 500 rpm.
4 - Move the shift lever from D to 4 to D to 4 to D to 4 to D within 10 seconds after DLC3 terminals 4 and 13 have been jumped.
5 - Check to see that the A/T oil temperature warning lamp is flashing at 0.2 second intervals as seen by the flash pattern in Figure 87.

NOTES: If the A/T oil temperature warning lamp is flashing at 0.2 second intervals, this indicates that the vehicle is set in the "A/T Learned Value Initialization Mode".
If the A/T oil temperature warning lamp is out, make certain all the components in the above procedure are functioning correctly and perform the above steps again.
If the A/T oil temperature warning lamp remains ON, this indicates that the attempt to enter the "A/T Learned Value Initialization Mode" has failed, make certain all the components in the above procedure are functioning correctly and perform the above steps again.

DATA LINK CONNECTOR 3



CONNECT TERMINALS 4 & 13 WITH A JUMPER LEAD

Figure 86

HINO 155/155h/195/195h WITH A465

2013-2014 RELEARN PROCEDURES

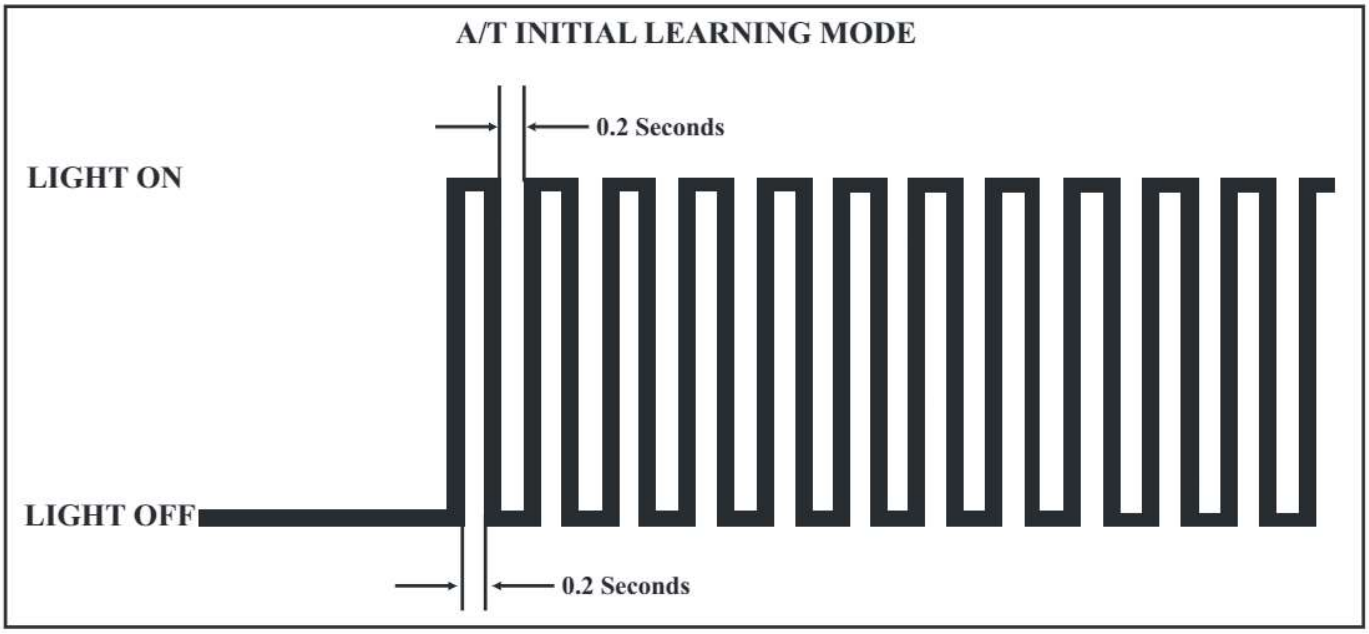


Figure 87

Performing "A/T Learned Value Initialization 1:

1 - Make certain that engine idle rpm is normal and stable.

2 - With the foot brake pedal depressed, move the shift lever to the D position. Do not release the brake or move the shift lever until "A/T Learned Value Initialization 1" has been completed.

3 - Turn the overdrive switch ON (light off) to OFF (light on).

4 - Check to see that the A/T oil temperature warning lamp changes its flash pattern to 0.5 second intervals.

NOTE: If the A/T oil temperature warning lamp flashes at 0.5 second intervals, this indicates that the "A/T Learned Value Initialization 1" is underway.

5 - Check to see that the A/T oil temperature warning lamp flash changes from 0.5 to 0.2 seconds intervals as seen in Figure 88.

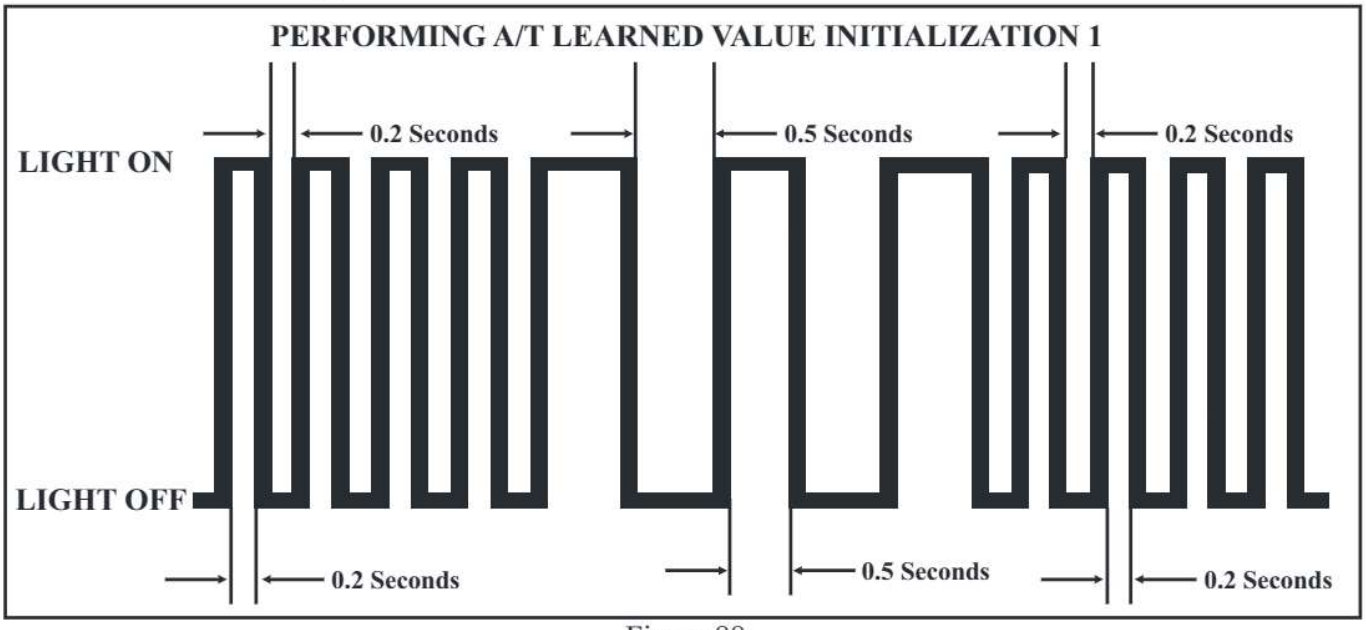


Figure 88

HINO 155/155h/195/195h WITH A465

2013-2014 RELEARN PROCEDURES

NOTES: If the flashing interval of the A/T oil temperature warning lamp changes to 0.2 second intervals, this indicates that the "A/T Learned Value Initialization 1" is completed.
If the A/T oil temperature warning lamp remains ON, this indicates that the attempt to enter the "A/T Learned Value Initialization Mode" has failed, make certain all the components in the above procedure are functioning correctly and perform the above steps again.

Performing "A/T Learned Value Initialization 2:

1 - Depress the accelerator pedal within 30 seconds after the "A/T Learned Value Initialization 1" is completed (after the 0.2 second interval is started) and keep the engine rpm between 1000 and 1500.
2 - Check to see that the flashing interval of the A/T oil temperature warning lamp changes to 0.5 second intervals.

NOTE: If the A/T oil temperature warning lamp flashes at 0.5 second intervals, this indicates that the "A/T Learned Value Initialization 2" is underway as seen in Figure 89.
3 - If the A/T oil temperature warning lamp goes ON or OFF, idle the engine.

NOTES: When the "A/T Learned Value Initialization 2" is completed, the A/T oil temperature warning lamp goes OFF.
If the A/T oil temperature warning lamp goes ON, this indicates that the attempt to perform the "A/T Learned Value Initialization 2" has failed, make certain all the components in the above procedure are functioning correctly and perform the above steps again.
4 - Turn the overdrive switch OFF (lamp is ON) and ON (lamp is OFF).

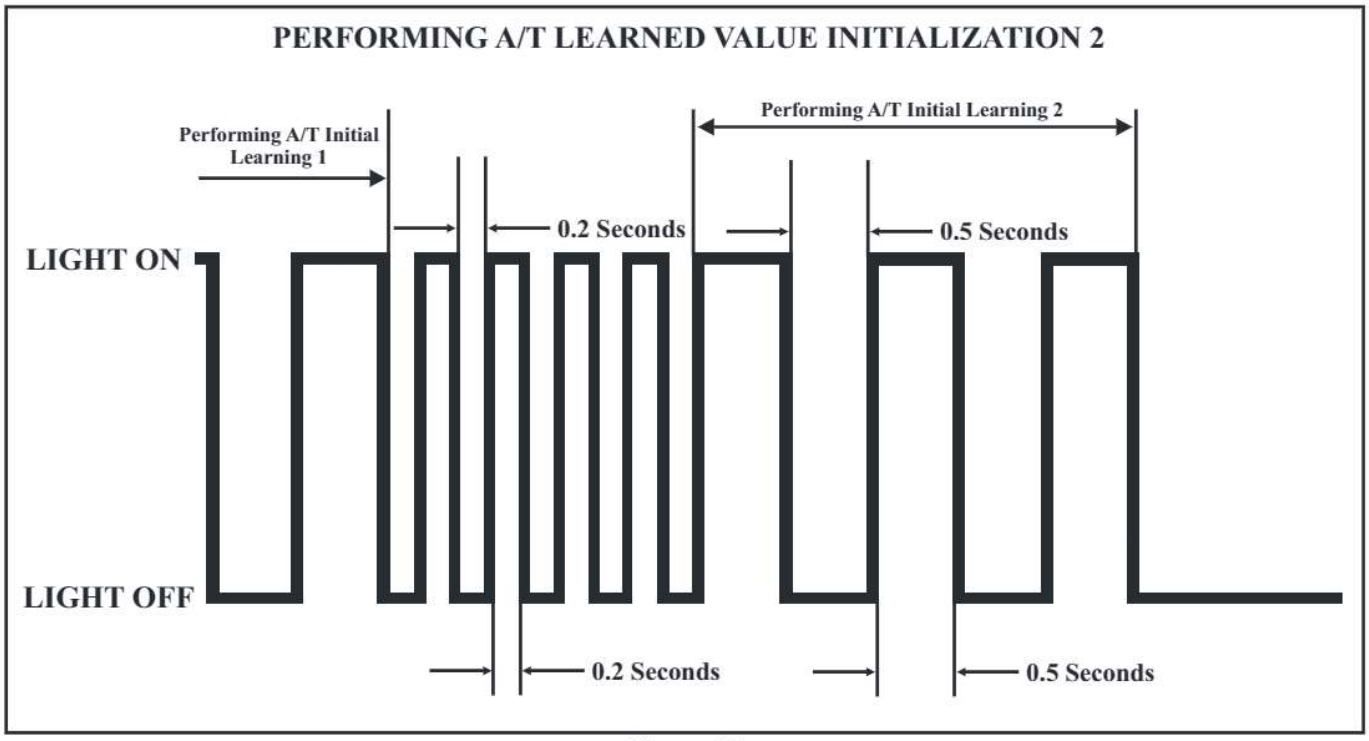


Figure 89

HINO 155/155h/195/195h WITH A465

2013-2014 RELEARN PROCEDURES

Performing "A/T Learned Value Initialization 3":

1 - Check to see that engine idle rpm is normal and stable.

2 - With the foot brake pedal depressed, move the shift lever to the reverse position. Do not release the brake or move the shift lever until "A/T Learned Value Initialization 3" has been completed.

3 - Turn the overdrive switch from ON to OFF (Lamp ON).

4 - Check to see that the flashing interval of the A/T oil temperature warning lamp changes to a 0.5 seconds pattern.

NOTE: If the A/T oil temperature warning lamp flashes slower at 0.5 second intervals, it indicates that "A/T Learned Value Initialization 3" is underway.

5 - Check to see that the flashing interval of the A/T oil temperature warning lamp changes from 0.5 second to 0.2 second intervals as seen in Figure 90.

NOTES: If the flashing interval of the A/T oil temperature warning lamp changes to 0.2 second intervals, this indicates that the "A/T Learned Value Initialization 3" is completed.

If the A/T oil temperature warning lamp goes ON, this indicates that the attempt to perform the "A/T Learned Value Initialization 3" has failed, make certain all the components in the above procedure are functioning correctly and perform the above steps again.

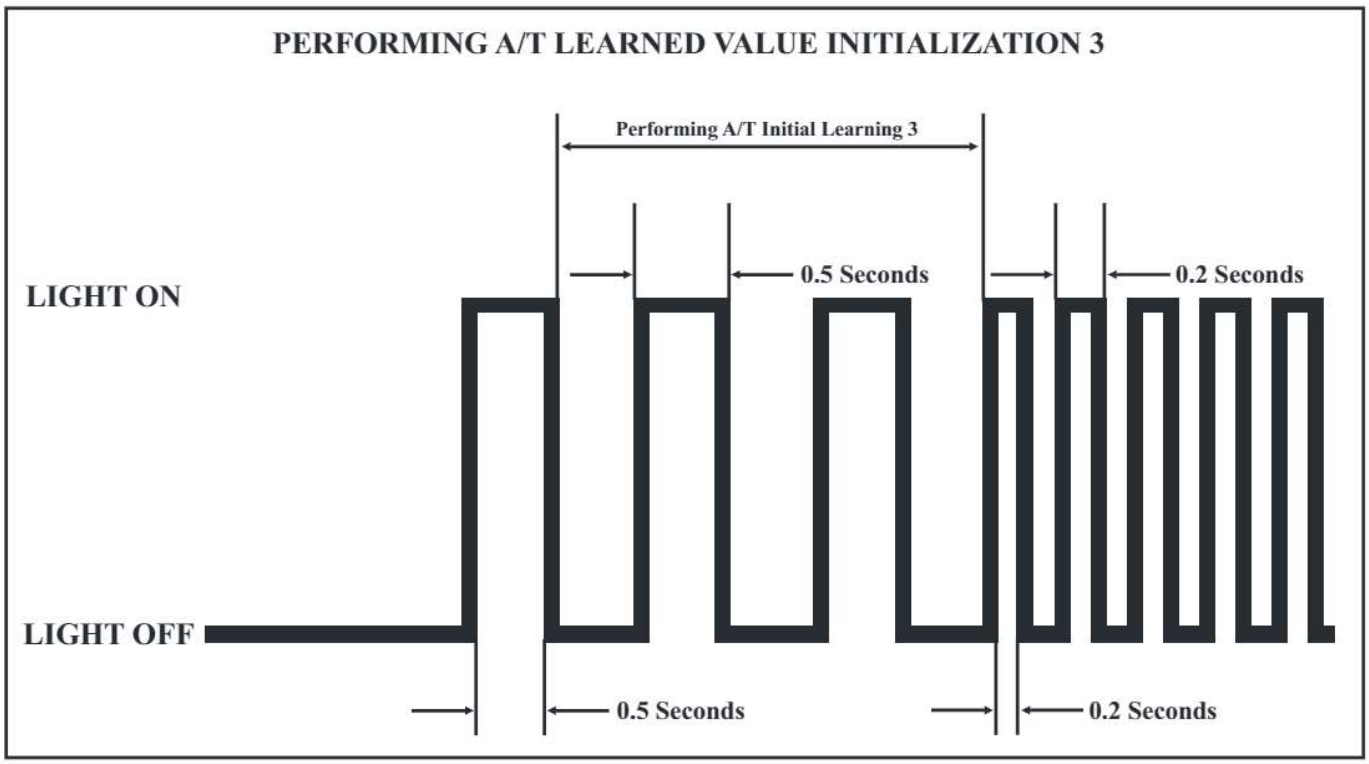


Figure 90

HINO 155/155h/195/195h WITH A465

2013-2014 RELEARN PROCEDURES

Performing "A/T Learned Value Initialization 4":

1 - Depress the accelerator pedal within 30 seconds after the "A/T Learned Value Initialization 3" is completed (after the 0.2 second interval flashing has started) and keep the engine rpm within 1000 to 1500.

NOTES: With the foot brake pedal depressed, move the shift lever to the reverse position. Do not release the brake or move the shift lever until "A/T Learned Value Initialization 4" has been completed.

Keep the engine rpm at a steady rpm to prevent throttle position changes as much as possible.

2 - Check to see that the flashing interval of the A/T oil temperature warning lamp changes to 0.5 a second pattern as seen in Figure 91.

NOTE: If the A/T oil temperature warning lamp flashes slower at 0.5 second intervals, it indicates that "A/T Learned Value Initialization 4" is underway.

3 - If the A/T oil temperature warning lamp goes ON or OFF for 2 seconds, then goes ON for 1 second, Refer to Figure 92, idle the engine.

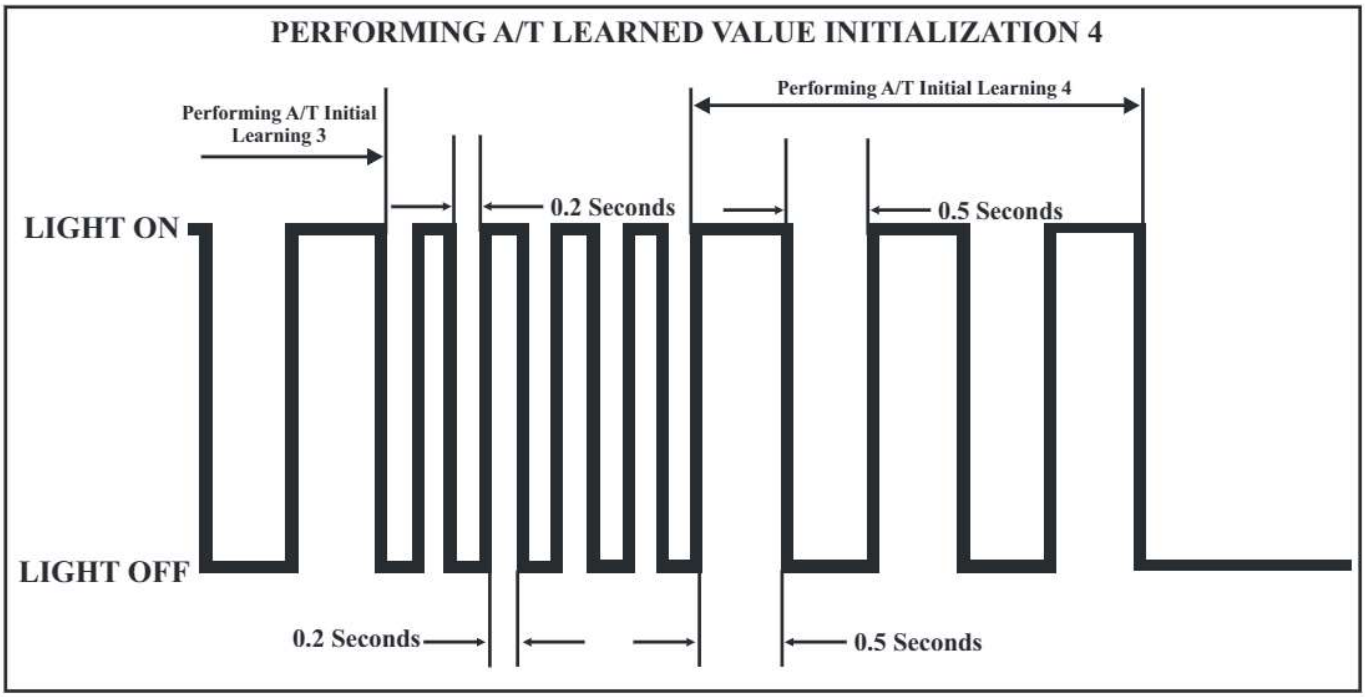


Figure 91

HINO 155/155h/195/195h WITH A465

2013-2014 RELEARN PROCEDURES

NOTES: When the "A/T Learned Value Initialization 4" is completed, the A/T oil temperature warning lamp repeats the cycles of going OFF for 2 seconds followed by going ON for 1 second.
If the "A/T Learned Value Initialization 4" is not completed, the A/T oil temperature warning lamp will turn ON.
If the A/T oil temperature warning lamp goes ON, this indicates that the attempt to perform the "A/T Learned Value Initialization 4" has failed, make certain all the components in the above procedure are functioning correctly and perform the above steps again.
4 - Place the shift lever in the P position.
5 - Remove the jumper lead from the DLC3.
6 - Turn OFF the engine.

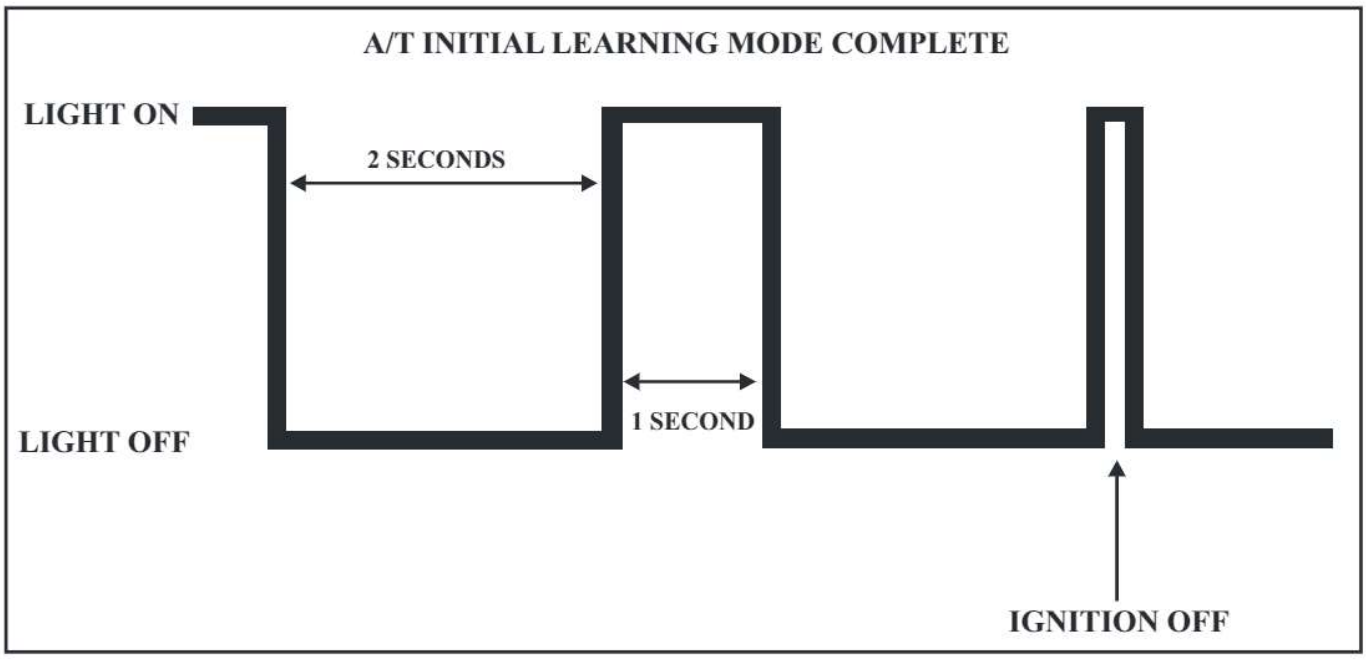


Figure 92

FORD/INTERNATIONAL LCF SERIES with 5R110W

2006-2010 CODE RETRIEVAL PROCEDURE

Ford/International Medium Truck LCF series, equipped with the 5R110W transmission, are capable of Diagnostic Trouble code retrieval through a manual process that does not require a scan tool. Refer to the information in Figures 93 and 94 for this procedure. Since the Tow Haul Switch will be used in the code retrieval process, its location can be seen in Figure 95. The 3 lamps in the instrument cluster that display the retrieval sequence as well as the 3 digit flash codes can be seen in Figure 96.
Refer to Figures 97, 98, 99 and 100 for the 3 digit flash Diagnostic Trouble Code descriptions for the manual process and the OBD-II codes retrieved with a capable scan tool.

MANUAL CODE RETRIEVAL INITIATION

STEP 1: *Place vehicle on a level surface and use wheel chocks to prevent vehicle from moving.*

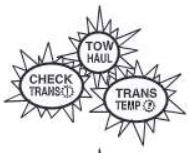
STEP 2: *Turn ignition "ON" DO NOT start engine.*

STEP 3: *Place Shift Selector in "2" Position (See Figure 95)*

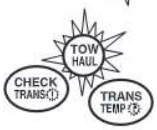
STEP 4: *Press Tow/Haul switch 4 times within 4 seconds, this will initiate Manual Code retrieval. (See Figure 95)*

READING CODES

STEP 5: *The Check Trans, Trans Temp and Tow/Haul all turn ON simultaneously to indicate diagnostic mode has been entered. (See Figure 96)*

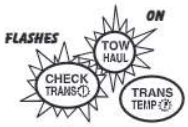


STEP 6: *The Check Trans and Trans Temp turn OFF and the Tow/Haul remains ON.*



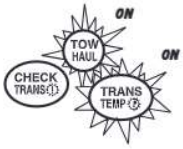
FLASH FORMAT

The Check Trans will communicate each digit of the fault codes by flashing.



Example: 1 Flash-pause-1 Flash-pause 1 Flash= DTC 111
DTC 111= No Codes Present.

If more than one fault code is present the Trans Temp will illuminate between each fault code.



When all Fault Codes have been Flashed, the Trans Temp indicator will Flash twice and the Tow Haul will go OFF.

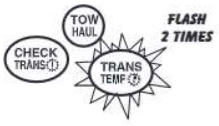


Figure 93

FORD/INTERNATIONAL HARVESTER LCF with 5R110W

2006-2010 CODE RETRIEVAL PROCEDURE

CLEARING CODES AFTER REPAIRS

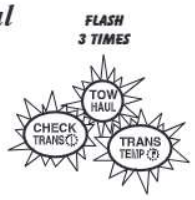
STEP 1: *Turn ignition ON but do not start engine.*

STEP 2: *Place shift selector in D position and push the TOW/Haul switch once.*

STEP 3: *Place shift selector in N position and push the TOW/Haul switch once.*

STEP 4: *Place shift selector in R position and push the TOW/Haul switch once.*

STEP 5: *Place shift selector in P position and push the TOW/Haul switch once.*



The Check Trans Trans Temp and Tow/Haul will flash three times to indicate diagnostic mode has been cleared.

Figure 94

FORD/INTERNATIONAL HARVESTER LCF with 5R110W

2006-2010 CODE RETRIEVAL PROCEDURE

TOW HAUL SWITCH LOCATION

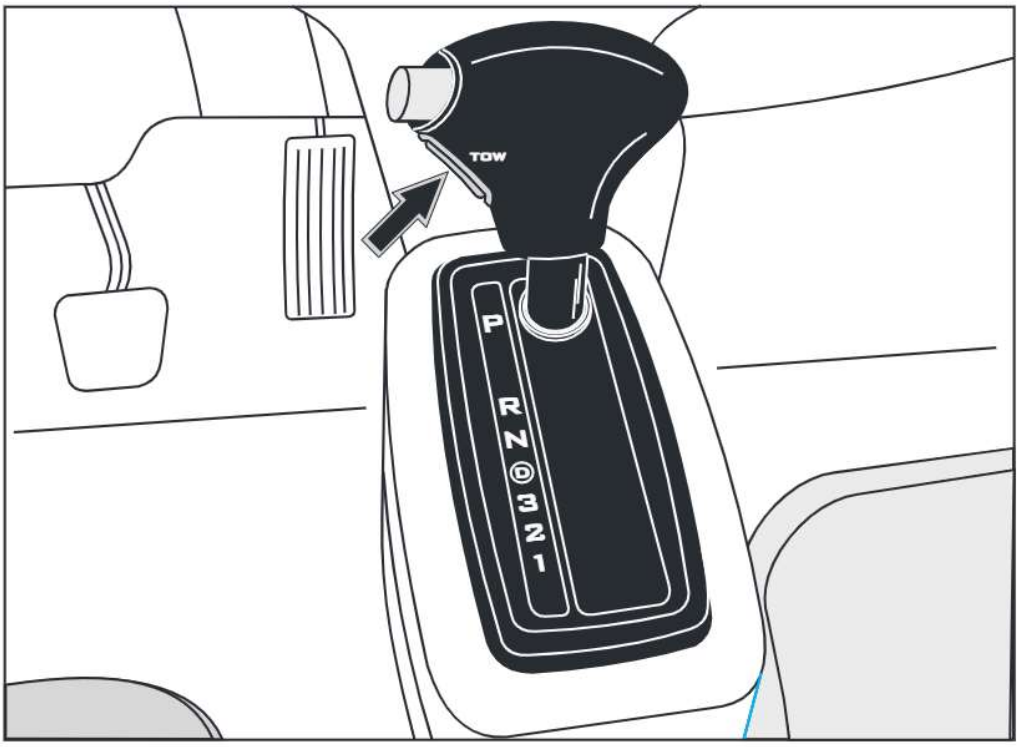


Figure 95

INDICATOR LAMP LOCATIONS

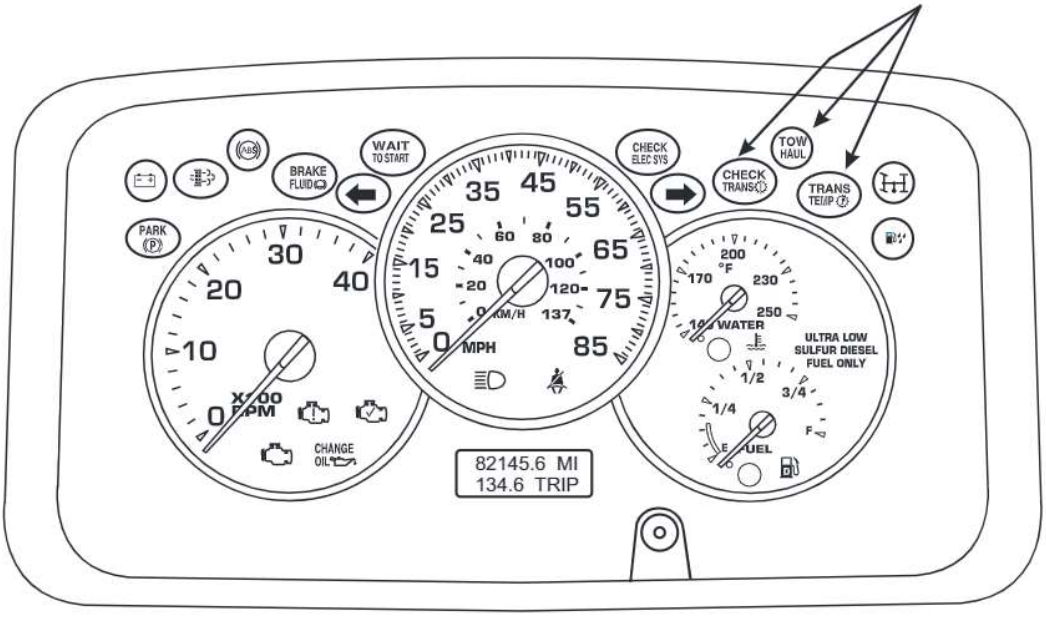


Figure 96

FORD/INTERNATIONAL HARVESTER LCF with 5R110W

5R110W DIAGNOSTIC TROUBLE CODE CHART			
Flash DTC	*OBDll DTC*	*Diagnostic Code Description/Symptom*	*Diagnostic Trouble Code Description*
113 114	P0706 P0707	*Transmission Range (TR-P) Sensor*	Transmission Range sensor signal out of range or duty cycle is below threshold, sensor/circuit elect. malfunction.
115	P0708	*Transmission Range (TR-P) Sensor*	Transmission Range sensor signal duty cycle is above threshold, sensor/circuit elect. malfunction.
412 413	P1702 P1705	*Transmission Range (TR-P) Sensor*	Transmission Range sensor circuit failure, or KOEO or KOER not run in P or N positions.
122	P0711	*Trans Fluid Temp (TFT) Sensor*	PCM has detected no TFT change during operation. Stuck at some normal reading.
123 121	P0712 P0710	*Trans Fluid Temp (TFT) Sensor*	Voltage drop across TFT sensor exceeds scale set for temperature of 315°F.
124 121	P0713 P0710	*Trans Fluid Temp (TFT) Sensor*	Voltage drop across TFT sensor exceeds scale set for temperature of minus 40°F.
414	P1711	*Trans Fluid Temp (TFT) Sensor*	Transmission not operating at normal temperature during On-Board diagnostics.
423	P1783	*Trans Fluid Temp (TFT) Sensor*	Transmission over temp condition indicated.
125	P0715	*Turbine Shaft Speed (TSS) Sensor*	PCM detected a loss of TSS signal during normal operation.
131	P0717	*Turbine Shaft Speed (TSS) Sensor*	PCM has not detected a TSS signal.
132	P0718	*Turbine Shaft Speed (TSS) Sensor*	PCM has detected a noisy TSS signal.
133	P0720	*Output Shaft Speed (OSS) Sensor*	PCM detected a loss of OSS signal during normal operation.
134	P0721	*Output Shaft Speed (OSS) Sensor*	PCM has detected a noisy OSS signal.
136	P0722	*Output Shaft Speed (OSS) Sensor*	PCM has detected no OSS signal.
141	P0730	*Clutch Control Solenoid or Internal Problem*	PCM has detected a gear ratio error.
142	P0740	*TCC Solenoid*	TCC Solenoid, Electrical, Open Circuit.
143	P0741	*TCC Solenoid*	

Figure 97

FORD/INTERNATIONAL HARVESTER LCF with 5R110W

5R110W DIAGNOSTIC TROUBLE CODE CHART			
Flash DTC	*OBDll DTC*	*Diagnostic Code Description/Symptom*	*Diagnostic Trouble Code Description*
144	P0742	*TCC Solenoid*	TCC Solenoid circuit, shorted to ground.
145	P0743	*TCC Solenoid*	TCC Solenoid circuit failure.
151	P0744	*TCC Solenoid*	TCC Solenoid circuit, shorted to power.
421	P1744	*TCC Solenoid*	TCC slippage detected during engagement. Mechanical or Hydraulic concern.
152	P0748	*Line Pressure Control (PC-A) Solenoid*	PC-A Solenoid circuit failure.
314	P0960	*Line Pressure Control (PC-A) Solenoid*	PC-A Solenoid circuit open failure.
315	P0962	*Line Pressure Control (PC-A) Solenoid*	PC-A Solenoid circuit, shorted to ground.
321	P0963	*Line Pressure Control (PC-A) Solenoid*	PC-A Solenoid circuit, shorted to power.
153	P0750	*SSPC-A Solenoid (Coast Clutch)*	SSPC-A Solenoid circuit open failure.
154	P0751	*SSPC-A Solenoid (Coast Clutch)*	SSPC-A Solenoid circuit, or solenoid failure OFF.
155	P0752	*SSPC-A Solenoid (Coast Clutch)*	SSPC-A Solenoid circuit, or solenoid failure ON.
211	P0753	*SSPC-A Solenoid (Coast Clutch)*	SSPC-A Solenoid circuit failure.
323	P0973	*SSPC-A Solenoid (Coast Clutch)*	SSPC-A Solenoid circuit, shorted to ground.
324	P0974	*SSPC-A Solenoid (Coast Clutch)*	SSPC-A Solenoid circuit, shorted to power.
212	P0755	*SSPC-B Solenoid (Overdrive Clutch)*	SSPC-B Solenoid circuit open failure.
213	P0756	*SSPC-B Solenoid (Overdrive Clutch)*	SSPC-B Solenoid circuit, or solenoid failure OFF.
214	P0757	*SSPC-B Solenoid (Overdrive Clutch)*	SSPC-B Solenoid circuit, or solenoid failure ON.

Figure 98

FORD/INTERNATIONAL HARVESTER LCF with 5R110W

5R110W DIAGNOSTIC TROUBLE CODE CHART			
Flash DTC	*OBDII DTC*	*Diagnostic Code Description/Symptom*	*Diagnostic Trouble Code Description*
215	P0758	*SSPC-B Solenoid (Overdrive Clutch)*	SSPC-B Solenoid circuit failure.
331	P0976	*SSPC-B Solenoid (Overdrive Clutch)*	SSPC-B Solenoid, or shorted to ground.
332	P0977	*SSPC-B Solenoid (Overdrive Clutch)*	SSPC-B Solenoid, or shorted to power.
221	P0760	*SSPC-C Solenoid (Intermediate Clutch)*	SSPC-C Solenoid circuit open failure.
222	P0761	*SSPC-C Solenoid (Intermediate Clutch)*	SSPC-C Solenoid circuit, or solenoid failure OFF.
223	P0762	*SSPC-C Solenoid (Intermediate Clutch)*	SSPC-C Solenoid circuit, or solenoid failure ON.
224	P0763	*SSPC-C Solenoid (Intermediate Clutch)*	SSPC-C Solenoid circuit, electrical circuit.
334	P0979	*SSPC-C Solenoid (Intermediate Clutch)*	SSPC-C Solenoid, or circuit shorted to ground.
336	P0980	*SSPC-C Solenoid (Intermediate Clutch)*	SSPC-C Solenoid, or circuit shorted to power.
225	P0765	*SSPC-D Solenoid (Direct Clutch)*	SSPC-D Solenoid circuit open failure.
231	P0766	*SSPC-D Solenoid (Direct Clutch)*	SSPC-D Solenoid circuit, or solenoid failure OFF.
232	P0767	*SSPC-D Solenoid (Direct Clutch)*	SSPC-D Solenoid circuit, or solenoid failure ON.
233	P0768	*SSPC-D Solenoid (Direct Clutch)*	SSPC-D Solenoid electrical circuit.
342	P0982	*SSPC-D Solenoid (Direct Clutch)*	SSPC-D Solenoid, or circuit shorted to ground.
343	P0983	*SSPC-D Solenoid (Direct Clutch)*	SSPC-D Solenoid, or circuit shorted to power.

Figure 99

FORD/INTERNATIONAL HARVESTER LCF with 5R110W

5R110W DIAGNOSTIC TROUBLE CODE CHART			
Flash DTC	*OBDll DTC*	*Diagnostic Code Description/Symptom*	*Diagnostic Trouble Code Description*
345	P0985	*SSPC-E Solenoid (Low/Reverse Clutch)*	SSPC-E Solenoid, or circuit shorted to ground.
351	P0986	*SSPC-E Solenoid (Low/Reverse Clutch)*	SSPC-E Solenoid, or circuit shorted to power.
243	P0791	*Intermediate Shaft Speed Sensor (ISS)*	Insuffcient input from ISS.
244	P0793	*Intermediate Shaft Speed Sensor (ISS)*	No input from ISS.
245	P0794	*Intermediate Shaft Speed Sensor (ISS)*	ISS signal intermittent.
422	P1780	*Transmission Control Switch (TCS)*	Transmission Control Switch voltage incorrect.
435	U0100	*Transmission Control Module (CAN) Control Area Network*	Transmission Control Module loss of Communication with the Engine Control Module thru Control Area Network.

Figure 100