







# **ECT AND A/T INDICATOR**

#### SYSTEM OUTLINE

PREVIOUS AUTOMATIC TRANSMISSIONS HAVE SELECTED EACH GEAR SHIFT USING MECHANICALLY CONTROLLED THROTTLE HYDRAULIC PRESSURE, GOVERNOR HYDRAULIC PRESSURE AND LOCK-UP HYDRAULIC PRESSURE. THE ECT, HOWEVER, ELECTRICALLY CONTROLS THE LINE PRESSURE, THROTTLE PRESSURE, LOCK-UP PRESSURE AND ACCUMULATOR PRESSURE ETC. THROUGH THE SOLENOID VALVE. THE ECT IS A SYSTEM WHICH PRECISELY CONTROLS GEAR SHIFT TIMING AND LOCK-UP TIMING IN RESPONSE TO THE VEHICLE'S DRIVING CONDITIONS AND THE ENGINE CONDITION DETECTED BY VARIOUS SENSORS, MAKING SMOOTH DRIVING POSSIBLE BY SHIFT SELECTION FOR EACH GEAR WHICH IS THE MOST APPROPRIATE TO THE DRIVING CONDITIONS AT THAT TIME, AND BY PREVENTING VEHICLE DOWNING, SQUAT AND GEAR SHIFT SHOCK WHEN STARTING OFF.

#### 1. GEAR SHIFT OPERATION

WHEN DRIVING, THE ENGINE WARM UP CONDITION IS INPUT AS A SIGNAL TO **TERMINAL (C)** 5 OF THE ECU FROM THE EFI WATER TEMP. SENSOR AND THE VEHICLE SPEED SIGNAL FROM SPEED SENSOR NO.2 IS INPUT TO **TERMINAL (C)** 10 OF THE ECU. AT THE SAME TIME, THE THROTTLE VALVE OPENING SIGNAL FROM THE THROTTLE POSITION SENSOR (MAIN) IS INPUT TO **TERMINAL (C)** 4 OF THE ECU AS ENGINE RPM CONDITION (IDLING, HIGH LOAD AND ACCELERATION CONDITIONS) SIGNAL.

BASED ON THESE SIGNALS, THE ECU SELECT THE BEST SHIFT POSITION, FOR DRIVING CONDITIONS AND SENDS CURRENT TO THE ECT SOLENOIDS.

WHEN SHIFTING TO 1ST SPEED, THE CURRENT FLOWS FROM **TERMINAL (D) 10** OF THE ECU  $\rightarrow$  **TERMINAL 3** OF ECT SOLENOIDS  $\rightarrow$  **GROUND** AND CONTINUITY TO NO.1 SOLENOID CAUSES THE SHIFT (NO.2 SOLENOID DOES NOT HAVE CONTINUITY AT THIS TIME).

FOR 2ND SPEED, THE CURRENT FLOWS SIMULTANEOUSLY FROM **TERMINAL (D) 9** OF THE ECU  $\rightarrow$  **TERMINAL 6** OF ECT SOLENOIDS  $\rightarrow$  **GROUND**, AND FROM **TERMINAL (D) 10** OF THE ECU  $\rightarrow$  **TERMINAL 3** OF ECT SOLENOIDS  $\rightarrow$  **GROUND**, AND CONTINUITY TO NO.1 AND NO.2 SOLENOIDS CAUSES THE SHIFT.

FOR 3RD SPEED, THERE IS NO CONTINUITY TO NO.1 SOLENOID, ONLY TO NO.2 SOLENOID, CAUSING THE SHIFT.

SHIFTING INTO THE 4TH SPEED (OVERDRIVE) OCCURS WHEN NO CURRENT FLOWS TO NO.1 AND NO.2 SOLENOIDS. THE NO.4 SOLENOID (FOR ACCUMULATOR BACK PRESSURE MODULATION) IS INSTALLED TO ADJUST THE BACK PRESSURE ON THE ACCUMULATOR AND CONTROL THE HYDRAULIC PRESSURE DURING SHIFTING AND LOCK-UP IN ORDER TO PROVIDE SMOOTH SHIFTING WITH LITTLE SHIFT SHOCK.

#### 2. LOCK-UP OPERATION

WHEN THE ECT ECU DECIDES, BASED ON EACH SIGNAL, THAT THE LOCK-UP CONDITION HAS BEEN MET, THE CURRENT THROUGH FUSE FLOWS FROM THE EFI MAIN RELAY  $\rightarrow$  **TERMINAL 2** OF ECT SOLENOIDS  $\rightarrow$  **TERMINAL 5**  $\rightarrow$  **TERMINAL (D) 14** OF THE ECU  $\rightarrow$  **GROUND**, SO CONTINUITY TO NO.3 SOLENOID (FOR LOCK-UP) CAUSES LOCK-UP.

#### 3. STOP LIGHT SW CIRCUIT

IF THE BRAKE PEDAL IS DEPRESSED (STOP LIGHT SW ON) WHEN DRIVING IN LOCK-UP CONDITION, A SIGNAL IS INPUT TO **TERMINAL (A) 19** OF THE ECU. THE ECU OPERATES AND CUTS THE CURRENT TO THE SOLENOID TO RELEASE LOCK-UP.

#### 4. OVERDRIVE CIRCUIT

\* O/D MAIN SW ON

WHEN THE O/D MAIN SW IS TURNED ON (SW POINT IS OPEN), A SIGNAL IS INPUT TO **TERMINAL (A) 3** OF THE ECU AND THE ECT CAUSES SHIFT TO OVERDRIVE WHEN THE CONDITIONS FOR OVERDRIVE ARE MET.

\* O/D MAIN SW OFF

WHEN THE O/D MAIN SW IS TURNED OFF (SW POINT IS CLOSED), THE CURRENT FLOWING THROUGH THE O/D OFF INDICATOR LIGHT FLOWS TO **GROUND** BY WAY OF THE O/D MAIN SW AND CAUSES THE O/D OFF INDICATOR LIGHT TO LIGHT UP. AT THE SAME TIME, A SIGNAL IS INPUT TO **TERMINAL (A) 3** OF THE ECU AND THE ECT PREVENTS SHIFT INTO OVERDRIVE.

### 5. ECT PATTERN SELECT SW CIRCUIT

WHEN THE ECT PATTERN SELECT SW IS CHANGED FROM "NORMAL" TO "POWER", THE CURRENT THROUGH THE GAUGE FUSE FLOWS TO **TERMINAL 1** OF ECT PATTERN SELECT SW  $\rightarrow$  **TERMINAL 2**  $\rightarrow$  **TERMINAL (B) 15** OF A/T INDICATOR  $\rightarrow$  **TERMINAL (C) 10**  $\rightarrow$  **GROUND** AND CAUSES THE INDICATOR LIGHT TO LIGHT UP. AT THE SAME TIME, THE CURRENT FLOWS TO **TERMINAL (A) 17** OF THE ECU AND THE ECU PERFORMS SHIFT UP AND SHIFT DOWN AT A HIGHER VEHICLE SPEED RANGE COMPARED WITH "NORMAL" POSITION.

## 6. KICK DOWN OPERATION

WHEN THE ACCELERATOR IS DEPRESSED FURTHER THAN THE FULL THROTTLE POSITION WHILE DRIVING, THE KICK DOWN SW TURNS ON AND ITS SIGNAL IS INPUT TO **TERMINAL (A) 20** OF THE ECU. THEN, THE ECU CONTROLS THE CURRENT WHICH FLOWS FROM **TERMINALS (D) 10** AND **(D) 9** OF THE ECU TO THE NO.1 AND NO.2 SOLENOIDS AND SHIFTS DOWN BY TURNING THE SOLENOIDS ON AND OFF.

### 7. CRUISE CONTROL

WHEN CRUISE CONTROL OPERATION IS SELECTED A SIGNAL IS INPUT TO **TERMINAL (A) 2** OF THE ECU FROM CRUISE CONTROL ECU. AS A RESULT, THE ECU OPERATES AND CONTROLS OVERDRIVE, LOCK-UP AND SO ON FOR SMOOTH DRIVING.

#### SERVICE HINTS

#### **E 1 ECT SOLENOID**

1–4 : APPROX.  $\mathbf{5.3}\Omega$  2–5 : APPROX.  $\mathbf{2.8}\Omega$ 

3–GROUND: APPROX. 13.2Ω 6–GROUND: APPROX. 13.2Ω E 2 EFI WATER TEMP. SENSOR

1–2 : APPROX. **16.2**KΩ (**–20**°C **–4**°F) APPROX. **2.5**KΩ (**20**°C **68**°F) APPROX. **0.32**KΩ (**80**°C **176**°F)

#### **E7 ECT PATTERN SELECT SW**

1-2 : CLOSED WITH ECT PATTERN SELECT SW AT **POWER** POSITION

### E 8 (D), E 9 (B), E10 (C), E11 (A) ENGINE AND ECT ECU

BATT-E1: ALWAYS APPROX. 12 VOLTS

IGSW-E1: APPROX. 12 VOLTS WITH IGNITION SW ON

BK-E1: APPROX. 12 VOLTS WITH BRAKE PEDAL DEPRESSED

P-E1: APPROX. 12 VOLTS WITH IGNITION SW AT ON POSITION AND ECT PATTERN SELECT SW AT POWER POSITION

KD-GROUND : CONTINUITY WITH KICK DOWN SW ON OD2-E1 : APPROX.  $\bf 12$  VOLTS WITH O/D MAIN SW ON

0 VOLTS WITH O/D MAIN SW OFF

+B-GROUND: APPROX. 12 VOLTS WITH IGNITION SW AT  $\bf ON$  POSITION +B1-GROUND: APPROX. 12 VOLTS WITH IGNITION SW AT  $\bf ON$  POSITION MREL-GROUND: APPROX. 12 VOLTS WITH IGNITION SW AT  $\bf ON$  POSITION

E01 -GROUND: ALWAYS CONTINUITY E02 -GROUND: ALWAYS CONTINUITY

 $\begin{array}{l} L-\text{GROUND}: \text{APPROX}. \ \textbf{12} \ \text{VOLTS} \ \text{WITH SHIFT LEVER AT "L" RANGE} \\ 2-\text{GROUND}: \text{APPROX}. \ \textbf{12} \ \text{VOLTS} \ \text{WITH SHIFT LEVER AT "2" RANGE} \\ R-\text{GROUND}: \text{APPROX}. \ \textbf{12} \ \text{VOLTS} \ \text{WITH SHIFT LEVER AT "R" RANGE} \\ \end{array}$ 

E1-GROUND: ALWAYS CONTINUITY

VC-VTA1: LESS THAN 1 VOLTS WITH THROTTLE VALVE FULLY CLOSED

MORE THAN 3 VOLTS WITH THROTTLE VALVE OPEN

VTA1-E2: CONTINUITY WITH THROTTLE VALVE FULLY CLOSED

APPROX.  $\mathbf{4}$ K $\Omega$  WITH THROTTLE VALVE FULLY OPEN

VC-E2: APPROX. 5 VOLTS

#### 0 1 O/D DIRECT CLUTCH SPEED SENSOR

1–2 : APPROX. **620** $\Omega$ 

S 2 SPEED SENSOR NO.2 (FOR ECT)

1–2 : APPROX.  $620\Omega$  S15 STOP LIGHT SW

1-3 : CLOSED WITH BRAKE PEDAL DEPRESSED

## : PARTS LOCATION

_								
CODE		SEE PAGE	CC	DDE	SEE PAGE	CODE	SEE PAGE	
C 1		24	E 8	D	26	S 1	25	
C 2		24	E 9	В	26	S 2	25	
C 3		24	E10	С	26	S 7	25	
C12	С	26	E11	Α	26	S15	27	
C13	Α	26	J	1	27	T 2	25	
C14	В	26	К	3	27	T 8	27	
Е	1	24	N	l 1	25	T11	27	
E 2		24	О	1	25			
E 7		26	0	5	27			

### : RELAY BLOCKS

CODE	SEE PAGE	RELAY BLOCKS (RELAY BLOCK LOCATION)
7	18	R/B NO.7 (RIGHT SIDE OF J/B NO.1)

# **ECT AND A/T INDICATOR**

## : JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

CODE	SEE PAGE	JUNCTION BLOCK AND WIRE HARNESS (CONNECTOR LOCATION)
1A	18	COWL WIRE AND J/B NO.1 (LEFT SIDE OF STEERING COLUMN TUBE)
1B	18	INSTRUMENT PANEL WIRE AND J/B NO.1 (LEFT SIDE OF STEERING COLUMN TUBE)
1G	18	COWL WIRE AND J/B NO.1 (LEFT SIDE OF STEERING COLUMN TUBE)
2A	20	ENGINE ROOM MAIN WIRE AND J/B NO.2 (ENGINE COMPARTMENT LEFT)
2B	20	COWL WIRE AND J/B NO.2 (ENGINE COMPARTMENT LEFT)
4A		
4B	23	COWL WIRE AND J/B NO.4 (BEHIND THE COMBINATION METER)
4C	1	

# : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

CODE	SEE PAGE	JOINING WIRE HARNESS AND WIRE HARNESS (CONNECTOR LOCATION)		
ED1	32	ENGINE WIRE AND ENGINE NO.4 WIRE (FRONT SIDE OF CYLINDER HEAD COVER LH)		
IH1	34	INSTRUMENT PANEL WIRE AND COWL WIRE (J/B NO.1)		
IH2	34	INSTRUMENT PANEL WIRE AND COWL WIRE (BEHIND GLOVE BOX)		
IL1				
IL2	36	ENGINE WIRE AND COWL WIRE (UNDER THE GLOVE BOX)		
IL3				
BQ3	38	COWL WIRE AND FLOOR NO.2 WIRE (LEFT KICK PANEL)		



# : GROUND POINTS

CODE	SEE PAGE	GROUND POINTS LOCATION
EB	32	FRONT SIDE OF LEFT FENDER
EC	32	REAR SIDE OF CYLINDER HEAD RH
IE	34	LEFT KICK PANEL
IH	34	RIGHT KICK PANEL

# : SPLICE POINTS

CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS	CODE	SEE PAGE	WIRE HARNESS WITH SPLICE POINTS
E 35			I 92		
E 36		ENGINE WIRE	I 107	36	COWL WIRE
E 40			I112		
E 44	32		I129		
E 55			I155	- 36	ENGINE WIRE
E 57			I159		
E 65			I160		
E 70	32	ENGINE NO.4 WIRE	I162		
E 71	- 32		I164		
E 87	32	COWL WIRE	I166		
I 6			I173		
I 58			1177		
l 70			I189	- 36	COWL WIRE
I 82			I190		

C 1 DARK GRAY



C 3 DARK GRAY

















