#### ENGINE CONTROL MODULE

ENC	SINE CON	ITROL MODULE		
$\nabla$	Pin	Description	Active	Inactive
ŏ	EM80-01	EVAP VALVE ACTIVATE	GROUND (VALVE OPEN)	B+
0	EM80-02	CANISTER CLOSE VALVE ACTIVATE	GROUND (VALVE OF EN)	B+
Ī	EM80-03	GROUND (POWER)	GROUND	GROUND
0	EM80-04	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
0	EM80-05	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
0	EM80-06	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
0	EM80-07	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
- !	EM80-08	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
- 1	EM80-09 EM80-15	THROTTLE MOTOR POWER SUPPLY EOT FEEDBACK	B+ 2.5 V @ 34 °C; 0.5 V @ 90 °C; (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)	GROUND
D	EM80-17	SERIAL COMMUNICATIONS	2.3 V @ 34 C, 0.3 V @ 70 C, (DECKEASING VOLINGE WITH TEMPERATURE INCKEASE)	
D	EM80-18	SERIAL COMMUNICATIONS		
D	EM80-19	ECM PROGRAMMING		
1	EM80-21	GROUND (THROTTLE MOTOR 1)	GROUND	GROUND
D	EM80-27	ECM PROGRAMMING		
1	EM80-29	GROUND (LOGIC 2)	GROUND	GROUND
ı	EM80-31	GROUND (THROTTLE MOTOR 2)  VARIABLE VALVE TIMING SOLENOID + 'A' BANK	GROUND	GROUND
0	EM81-01 EM81-02	VARIABLE VALVE TIMING SOLENOID + 'A' BANK  VARIABLE VALVE TIMING SOLENOID - 'A' BANK	B+ (12% DUTY CYCLE @ IDLE) (INCREASING WITH ADVANCE) GROUND	GROUND GROUND
0	EM81-03	EMS CONTROLLED RELAY ACTIVATE	GROUND	B+
0	EM81-06	VARIABLE VALVE TIMING SOLENOID + 'B' BANK	B+ (12% DUTY CYCLE @ IDLE) (INCREASING WITH ADVANCE)	GROUND
Ō	EM81-07	VARIABLE VALVE TIMING SOLENOID - 'B' BANK	GROUND	GROUND
1	EM81-08	GROUND (POWER)	GROUND	GROUND
1	EM81-09	PEDAL POSITION FEEDBACK (PPS/1)	0.6 V = FOOT OFF; 3.8 V = PEDAL FULLY DEPRESSED	
1	EM81-10	TPS FEEDBACK (TPS/1)	0.5 V = IDLE; 4.75 V = WOT	
!	EM81-12	PARK / NEUTRAL CONFIRMATION	B+ (P, N)	GROUND (R,D,4,3,2)
- !	EM81-16 EM81-17	FUEL TANK PRESSURE SENSOR FEEDBACK	4.9 V = LOW PRESSURE, 0.2 V = HIGH PRESSURE B+	0 V
- 1	EM81-17 EM81-18	EMS SWITCHED POWER SUPPLY 1 PEDAL POSITION FEEDBACK (PPS/2)	0.8 V = FOOT OFF; 2.4 V = PEDAL FULLY DEPRESSED	UV
i	EM81-19	TPS FEEDBACK (TPS/2)	0.6 V = IDLE; 4.85 V = WOT	
i	EM81-21	GROUND (LOGIC 1)	GROUND	GROUND
1	EM81-22	PARKING BRAKE SWITCH	GROUND (APPLIED)	B+
SG	EM81-24	PEDAL POSITION / THROTTLE POSITION SENSORS SHIELD	GROUND	GROUND
0	EM82-01	SENSOR SUPPLY VOLTAGE 1	5 V	5 V
1	EM82-02	ENGINE CRANK	GROUND (CRANKING)	
1	EM82-04	HO2S, UPSTREAM 'A' BANK - VARIABLE CURRENT (µA)	3.5 V 3.5 V	
0	EM82-05 EM82-06	HO2S, UPSTREAM 'B' BANK – VARIABLE CURRENT (µA) THROTTLE MOTOR POWER RELAY ACTIVATE	GROUND	B+
SG	EM82-07	SENSORS SIGNAL GROUND 1	GROUND	GROUND
I	EM82-08	BRAKE SWITCH	GROUND	B+
1	EM82-09	IGNITION SWITCHED POWER SUPPLY	B+	B+
SG	EM82-10	HO2S, UPSTREAM 'A' BANK - CONSTANT	3.8 V	
SG	EM82-11	HO2S, UPSTREAM 'B' BANK - CONSTANT	3.8 V	
1	EM82-12	INERTIA SWITCH ACTIVATED (VEHICLE IMPACT)	GROUND	B+
!	EM82-13	EMS SWITCHED POWER SUPPLY 2	B+	0 V
I D	EM82-14 EM82-15	ECT FEEDBACK OK TO START	0.41 V @ 90 °C (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)	
D	EM82-16	SECURITY ACKNOWLEDGE	ENCODED COMMUNICATIONS ENCODED COMMUNICATIONS	
ĭ	EM82-17	IATS FEEDBACK	0.98 V @ 10 °C (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)	
Ó	EM83-03	AIR ASSIST CLOSE VALVE ACTIVATE	8 V @ IDLE (78% DUTY CYCLE)	
0	EM83-05	SENSOR SUPPLY VOLTAGE 2	5 V	5 V
SG	EM83-06	SENSOR SHIELD	GROUND	GROUND
SG	EM83-07	CKPS SIGNAL GROUND	GROUND	GROUND
1	EM83-08	CKPS SIGNAL	5 V @ 1000 RPM = 45 Hz; 2000 RPM = 90 Hz	
SG SG	EM83-09	CMPS, 'A' BANK SIGNAL GROUND	GROUND	GROUND
SG	EM83-12 EM83-13	HO2S SHIELD SENSORS SIGNAL GROUND 2	GROUND GROUND	GROUND GROUND
I	EM83-14	KNOCK SENSOR, 'A' BANK FEEDBACK	0 kHz = NO KNOCK, 2 – 20 kHz = KNOCK	GROOND
Ċ	EM83-15	CAN NETWORK	15 – 1500 Hz	
С	EM83-16	CAN NETWORK	15 – 1500 Hz	
SG	EM83-17	CMPS, 'B' BANK SIGNAL GROUND	GROUND	GROUND
1	EM83-18	CMPS, 'B' BANK SIGNAL	0.7 – 1 VAC @ 1000 RPM = 43 Hz; 2000 RPM = 72 Hz	
1	EM83-19	CMPS, 'A' BANK SIGNAL	0.7 – 1 VAC @ 1000 RPM = 43 Hz; 2000 RPM = 72 Hz	_
	EM83-20	BATTERY POWER SUPPLY	B+	B+
- !	EM83-21	HO2S, 'A' BANK DOWNSTREAM	0.1 - 0.9 V @ IDLE (SWING)	
- 1	EM83-22 EM83-23	HO2S, 'B' BANK DOWNSTREAM KNOCK SENSOR, 'B' BANK FEEDBACK	0.1 – 0.9 V @ IDLE (SWING) 0 kHz = NO KNOCK, 2 – 20 kHz = KNOCK	
Ċ	EM83-24	CAN NETWORK	15 – 1500 Hz	
Č	EM83-25	CAN NETWORK	15 – 1500 Hz	
ō	EM83-26	MAFS REFERENCE GROUND	GROUND	GROUND
O	EM83-27	MAFS REFERENCE GROUND	GROUND	GROUND
1	EM83-28	MAFS FEEDBACK	1.2 V @ IDLE, INCREASING WITH RPM INCREASE	
1	EM84-01	GROUND (DOWNSTREAM HO2S HEATERS)	GROUND	GROUND
0	EM84-07	HO2S HEATER, 'A' BANK DOWNSTREAM CONTROL	GROUND (20 – 60% DUTY CYCLE)	B+
0	EM84-15	HO2S HEATER, 'B' BANK DOWNSTREAM CONTROL	GROUND (20 - 60% DUTY CYCLE) GROUND	B+ GROUND
0	EM84-16	GROUND (INJECTORS 1A, 2B, 3B, 4A)		
ı	EM84-17 EM84-22	IGNITION MODULE 4B SWITCHING GROUND (INJECTORS 1B, 2A, 3A, 4B)	GROUND (85 - 90% DUTY CYCLE @ IDLE) GROUND	B+ GROUND
Ó	EM85-01	HO2S HEATER, 'A' BANK UPSTREAM CONTROL	GROUND (85 – 90% DUTY CYCLE AT IDLE)	B+
0	EM85-02	HO2S HEATER, 'B' BANK UPSTREAM CONTROL	GROUND (85 – 90% DUTY CYCLE AT IDLE)	B+
Ö	EM85-05	"COOL BOX" COOLING FAN ACTIVATE	GROUND	B+
1	EM85-06	GROUND (HO2S A UPSTREAM HEATER)	GROUND	GROUND
1	EM85-07	GROUND (HO2S B UPSTREAM HEATER)	GROUND	GROUND
- 1	EM85-08	HO2S HEATERS OBD MONITOR	HEATERS ACTIVE = B+ V	

NOTE: Refer to the Appendix at the rear of this book for CAN and SCP Network messages.

The following abbreviations are used to represent values for Control Module Pin-Out data

I	Input	D	Serial and Encoded Data	B+	Battery Voltage	kHz	Frequency x 1000
0	Output	С	CAN (Network)	V	Voltage (DC)	ms	Milliseconds
SG	Signal Ground	S	SCP Network	Hz	Frequency	mV	Millivolts

CAUTION: The information on this data page is furnished to aid the user in understanding circuit operation. THIS INFORMATION SHOULD BE USED FOR

NOTE: The values listed are approximately those that can be expected at the control module connector pins with all circuit connections made and all components connected and fitted. "Active" means a load is applied or a switch is ON; "Inactive" means a load is not applied or a switch is OFF.

# Fia. 04.1

#### COMPONENTS

Component Connector / Type / Color AIR ASSIST CLOSE VALVE PI29 / 3-WAY SUMITOMO SS / GREY BRAKE SWITCH CCV: CANISTER CLOSE VALVE CC40 / 4-WAY MULTILOCK 070 / WHITE CV1 / 2-WAY YAZAKI 90 / BLACK CKPS: CRANKSHAFT POSITION SENSOR PI17 / 2-WAY ECONOSEAL III HC / BLACK PI16 / 2-WAY YAZAKI / BLACK PI15 / 2-WAY YAZAKI / BLACK CMPS: CAMSHAFT POSITION SENSOR - 'A' BANK CMPS: CAMSHAFT POSITION SENSOR - 'B' BANK ECM AND TCM COOLING FAN EM66 / 2-WAY MULTILOCK 070 / WHITE EM80 / 31-WAY AMP 403 / NATURAL EM81 / 24-WAY AMP 403 / NATURAL EM82 / 17-WAY AMP 403 / NATURAL EM82 / 28-WAY AMP 403 / NATURAL EM84 / 22-WAY AMP 403 / NATURAL ENGINE CONTROL MODULE EM85 / 12-WAY MULTILOCK 070 / WHITE ECTS: ENGINE COOLANT TEMPERATURE SENSOR PI4 / 2-WAY ECONOSEAL E J2 / GREY EOTS: ENGINE OIL TEMPERATURE SENSOR EVAPP: EVAP CANISTER PURGE VALVE PI38 / 2-WAY ECONOSEAL EC J2 / GREY FM39 / 2-WAY FCONOSFAL J2+ / BLACK FTPS: FUEL TANK PRESSURE SENSOR FP1 / 3-WAY ECONOSEAL III LC / BLACK HO2S: HEATED OXYGEN SENSOR (DOWNSTREAM) - 'A' BANK EM22 / 2-WAY SUMITOMO 0902 / BLACK HO2S: HEATED OXYGEN SENSOR (DOWNSTREAM) - 'B' BANK FM24 / 2-WAY SUMITOMO 0902 / BI ACK HO2S: HEATED OXYGEN SENSOR (UPSTREAM) - 'A' BANK EM21 / 4-WAY SUMITOMO 0902 / GREY HO2S: HEATED OXYGEN SENSOR (UPSTREAM) –  $^{\prime}\mathrm{B}^{\prime}$  BANK EM23 / 4-WAY SUMITOMO 0902 / GREY KS: KNOCK SENSOR - 'A' BANK PI26 / 2-WAY FCONOSFAL III LC / BLACK KS: KNOCK SENSOR - 'B' BANK PI27 / 2-WAY ECONOSEAL III LC / BLACK

#### Location / Access

THROTTLE ASSEMBLY ADJACENT TO THE BRAKE PEDAL MOUNTING ASSEMBLY UNDER VEHICLE / RH REAR ENGINE / REAR OF BED PLATE ENGINE COMPARTMENT / 'A' BANK CYLINDER HEAD, REAR ENGINE COMPARTMENT / 'B' BANK CYLINDER HEAD, REAR ENGINE COMPARTMENT / CONTROL MODULE ENCLOSURE ENGINE COMPARTMENT / CONTROL MODULE ENCLOSURE

ENGINE COMPARTMENT / REAR OF ENGINE TOP HOSE ENGINE BLOCK / BELOW GENERATOR ENGINE COMPARTMENT / BUI KHEAD TOP OF FUEL TANK / TRUNK CARPET ENGINE COMPARTMENT / BRACKET ON TOP OF TRANSMISSION ENGINE VEE / UNDER INTAKE MANIFOLD ENGINE VEE / UNDER INTAKE MANIFOLD ENGINE COMPARTMENT / REARWARD OF AIR CLEANER CENTER CONSOLE ASSEMBLY ENGINE COMPARTMENT / ON THROTTLE ASSEMBLY

ENGINE COMPARTMENT / THROTTLE ASSEMBLY

ENGINE COMPARTMENT / ON THROTTLE ASSEMBLY ENGINE COMPARTMENT / 'A' BANK CYLINDER HEAD / FRONT ENGINE COMPARTMENT / 'B' BANK CYLINDER HEAD / FRONT

## RELAYS

MAFS: MASS AIR FLOW SENSOR

PPS: PEDAL POSITION SENSORS

THROTTLE MOTOR
TPS: THROTTLE POSITION SENSORS

VVT SOLENOID VALVE - 'A' BANK

VVT SOLENOID VALVE - 'B' BANK

PARKING BRAKE SWITCH

Relay **Case Color** Connector / Color Location / Access THROTTLE MOTOR POWER RELAY EM49 / BROWN CONTROL MODULE ENCLOSURE RELAYS / ENGINE COMPARTMENT BROWN O2S HEATERS RELAY CONTROL MODULE ENCLOSURE RELAYS / ENGINE COMPARTMENT

PI35 / 5-WAY YAZAKI 92 / BLACK

CC11 / 2-WAY MULTILOCK 040 / BLACK

PI6 / 4-WAY FCONOSFAL J2T / BLACK

PI31 / 2-WAY YAZAKI 0902 / BLACK

PI32 / 2-WAY YAZAKI 0902 / BLACK

PI42 / 5-WAY SUMITOMO TS090 / BLACK

PI33 / 2-WAY SUMITOMO HM250 / BLACK

## HARNESS-TO-HARNESS CONNECTORS

Connector	Type / Color	Location / Access
BT4	54-WAY THROUGH PANEL / GREY	BELOW PARCEL SHELF / TRUNK / REAR BULKHEAD / RH SIDE
BT5	3-WAY MULTILOCK 070 / WHITE	TOP OF FUEL TANK / TRUNK CARPET
CA19	20-WAY MULTILOCK 070 / YELLOW	LH 'A' POST CONNECTOR MOUNTING BRACKET / LOWER 'A' POST FINISHER
CV2	3-WAY MULTILOCK 070 / WHITE	UNDER REAR SEAT
EM1	12-WAY AUGAT 1.6 / BLACK	ENGINE COMPARTMENT / ADJACENT TO ABS PUMP
EM2	20-WAY MULTILOCK 070 / GREY	PASSENGER 'A' POST / LOWER 'A' POST FINISHER
EM3	18-WAY MULTILOCK 070 / WHITE	PASSENGER 'A' POST / LOWER 'A' POST FINISHER
EM53	20-WAY MULTILOCK 070 / WHITE	PASSENGER 'A' POST / LOWER 'A' POST FINISHER
FC1	54-WAY THROUGH PANEL CONNECTOR / GREY	BELOW PASSENGER SIDE AIR VENT / GLOVE BOX ASSEMBLY
LF3	54-WAY THROUGH PANEL CONNECTOR / GREY	LH 'A' POST / LOWER 'A' POST FINISHER
PI1	57-WAY SUMITOMO TS090 / BLACK	ENGINE COMPARTMENT / BULKHEAD / REAR OF ENGINE
PI2	13-WAY ECONOSEAL III LC / BLACK	ENGINE COMPARTMENT / BRACKET ON TOP OF TRANSMISSION

## **GROUNDS**

Ground	Location /	Tv.
Ji Ouriu	Location /	ıyı

EYELET (PAIR) - EMS LH GROUND STUD EM8L EM16L EYELET (PAIR) - EMS BULKHEAD GROUND STUD FM16R EYELET (PAIR) - EMS BULKHEAD GROUND STUD

FOR CONTROL MODULE PIN OUT INFORMATION, UNFOLD PAGE TO LEFT.

Refer to the front of this book for detailed information and illustrations regarding the location and identification of harnesses, relays, grounds, control modules and control module pins.

#### ENGINE CONTROL MODULE

$\nabla$	Pin	Description	Active	Inactive
0	EM80-01	EVAP VALVE ACTIVATE	GROUND (VALVE OPEN)	B+
1	EM80-03	GROUND (POWER)	GROUND	GROUND
0	EM80-04 EM80-05	THROTTLE MOTOR POWER SUPPLY	B+ B+	GROUND
0	EM80-05	THROTTLE MOTOR POWER SUPPLY THROTTLE MOTOR POWER SUPPLY	B+	GROUND GROUND
0	EM80-07	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
1	EM80-08	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
1	EM80-09	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
- 1	EM80-15	EOT FEEDBACK	2.5 V @ 34 °C; 0.5 V @ 90 °C; (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)	
D D	EM80-17	SERIAL COMMUNICATIONS		
D	EM80-18 EM80-19	SERIAL COMMUNICATIONS ECM PROGRAMMING		
ı	EM80-21	GROUND (THROTTLE MOTOR 1)	GROUND	GROUND
D	EM80-27	ECM PROGRAMMING		
1	EM80-29	GROUND (LOGIC 2)	GROUND	GROUND
1	EM80-31	GROUND (THROTTLE MOTOR 2)	GROUND	GROUND
0	EM81-01	VARIABLE VALVE TIMING SOLENOID + 'A' BANK	B+ (12% DUTY CYCLE @ IDLE) (INCREASING WITH ADVANCE)	GROUND
0	EM81-02 EM81-03	VARIABLE VALVE TIMING SOLENOID - 'A' BANK EMS CONTROLLED RELAY ACTIVATE	GROUND GROUND	GROUND B+
0	EM81-06	VARIABLE VALVE TIMING SOLENOID + 'B' BANK	B+ (12% DUTY CYCLE @ IDLE) (INCREASING WITH ADVANCE)	GROUND
0	EM81-07	VARIABLE VALVE TIMING SOLENOID – 'B' BANK	GROUND	GROUND
- 1	EM81-08	GROUND (POWER)	GROUND	GROUND
1	EM81-09 EM81-10	PEDAL POSITION FEEDBACK (PPS/1) TPS FEEDBACK (TPS/1)	0.6 V = FOOT OFF; 3.8 V = PEDAL FULLY DEPRESSED 0.5 V = IDLE; 4.75 V = WOT	
i	EM81-10 EM81-12	PARK / NEUTRAL CONFIRMATION	0.5 V = IDLE; 4.75 V = WOT B+ (P, N)	GROUND (R,D,4,3,2)
1	EM81-17	EMS SWITCHED POWER SUPPLY 1	B+	0 V
1	EM81-18	PEDAL POSITION FEEDBACK (PPS/2)	0.8 V = FOOT OFF; 2.4 V = PEDAL FULLY DEPRESSED	
l J	EM81-19 EM81-21	TPS FEEDBACK (TPS/2) GROUND (LOGIC 1)	0.6 V = IDLE; 4.85 V = WOT GROUND	GROUND
i	EM81-22	PARKING BRAKE SWITCH	GROUND (APPLIED)	B+
SG	EM81-24	PEDAL POSITION / THROTTLE POSITION SENSORS SHIELD	GROUND GROUND	GROUND
0	EM82-01	SENSOR SUPPLY VOLTAGE 1	5 V	5 V
- 1	EM82-02	ENGINE CRANK	GROUND (CRANKING)	
1	EM82-04	HO2S, UPSTREAM 'A' BANK – VARIABLE CURRENT (μA)	3.5 V	
0	EM82-05 EM82-06	HO2S, UPSTREAM 'B' BANK - VARIABLE CURRENT (μΑ) THROTTLE MOTOR POWER RELAY ACTIVATE	3.5 V	D.
SG	EM82-06	SENSORS SIGNAL GROUND 1	GROUND GROUND	B+ GROUND
I	EM82-08	BRAKE SWITCH	GROUND	B+
- 1	EM82-09	IGNITION SWITCHED POWER SUPPLY	B+	B+
SG	EM82-10	HO2S, UPSTREAM 'A' BANK - CONSTANT	3.8 V	
SG	EM82-11	HO2S, UPSTREAM 'B' BANK - CONSTANT	3.8 V	
!	EM82-12	INERTIA SWITCH ACTIVATED (VEHICLE IMPACT)	GROUND	B+
- 1	EM82-13 EM82-14	EMS SWITCHED POWER SUPPLY 2 ECT FEEDBACK	B+ $0.41 \text{ V } @ 90 ^{\circ}\text{C}$ (Decreasing voltage with Temperature Increase)	0 V
D	EM82-15	OK TO START	ENCODED COMMUNICATIONS	
D	EM82-16	SECURITY ACKNOWLEDGE	ENCODED COMMUNICATIONS	
- 1	EM82-17	IATS FEEDBACK	0.98 V @ 10 °C (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)	
0	EM83-03	AIR ASSIST CLOSE VALVE ACTIVATE	8 V @ IDLE (78% DUTY CYCLE)	
0	EM83-05	SENSOR SUPPLY VOLTAGE 2	5 V	5 V
SG SG	EM83-06 EM83-07	SENSOR SHIELD CKPS SIGNAL GROUND	GROUND GROUND	GROUND GROUND
3G 	EM83-07	CKPS SIGNAL GROUND	5 V @ 1000 RPM = 45 Hz; 2000 RPM = 90 Hz	GROUND
SG	EM83-09	CMPS, 'A' BANK SIGNAL GROUND	GROUND	GROUND
SG	EM83-12	HO2S SHIELD	GROUND	GROUND
SG	EM83-13	SENSORS SIGNAL GROUND 2	GROUND	GROUND
1	EM83-14	KNOCK SENSOR, 'A' BANK FEEDBACK	0 kHz = NO KNOCK, 2 – 20 kHz = KNOCK	
C C	EM83-15	CAN NETWORK	15 – 1500 Hz	
SG	EM83-16 EM83-17	CAN NETWORK CMPS, 'B' BANK SIGNAL GROUND	15 – 1500 Hz GROUND	GROUND
I	EM83-17	CMPS, (B' BANK SIGNAL	0.7 – 1 VAC @ 1000 RPM = 43 Hz; 2000 RPM = 72 Hz	SKOOND
1	EM83-19	CMPS, 'A' BANK SIGNAL	0.7 – 1 VAC @ 1000 RPM = 43 Hz; 2000 RPM = 72 Hz	
1	EM83-20	BATTERY POWER SUPPLY	B+	B+
- 1	EM83-21	HO2S, 'A' BANK DOWNSTREAM	0.1 – 0.9 V @ IDLE (SWING)	
1	EM83-22	HO2S, 'B' BANK DOWNSTREAM	0.1 - 0.9 V @ IDLE (SWING)	
C	EM83-23 EM83-24	KNOCK SENSOR, 'B' BANK FEEDBACK CAN NETWORK	0 kHz = NO KNOCK, 2 – 20 kHz = KNOCK 15 – 1500 Hz	
C	EIVI83-24 EM83-25	CAN NETWORK CAN NETWORK	15 – 1500 Hz 15 – 1500 Hz	
0	EM83-26	MAFS REFERENCE GROUND	GROUND	GROUND
0	EM83-27	MAFS REFERENCE GROUND	GROUND	GROUND
1	EM83-28	MAFS FEEDBACK	1.2 V @ IDLE, INCREASING WITH RPM INCREASE	
1	EM84-01	GROUND (DOWNSTREAM HO2S HEATERS)	GROUND	GROUND
0	EM84-07	HO2S HEATER, 'A' BANK DOWNSTREAM CONTROL HO2S HEATER, 'B' BANK DOWNSTREAM CONTROL	GROUND (20 - 60% DUTY CYCLE)	B+
0	EM84-15 EM84-16	GROUND (INJECTORS 1A, 2B, 3B, 4A)	GROUND (20 – 60% DUTY CYCLE) GROUND	B+ GROUND
i	EM84-22	GROUND (INJECTORS 1A, 2B, 3B, 4A) GROUND (INJECTORS 1B, 2A, 3A, 4B)	GROUND	GROUND
o	EM85-01	HO2S HEATER, 'A' BANK UPSTREAM CONTROL	GROUND (85 – 90% DUTY CYCLE AT IDLE)	B+
0	EM85-02	HO2S HEATER, 'B' BANK UPSTREAM CONTROL	GROUND (85 – 90% DUTY CYCLE AT IDLE)	B+
0	EM85-05	"COOL BOX" COOLING FAN ACTIVATE	GROUND	B+
1	EM85-06	GROUND (HO2S A UPSTREAM HEATER)	GROUND	GROUND
	EM85-07	GROUND (HO2S B UPSTREAM HEATER)	GROUND	GROUND
- 1	EM85-08	HO2S HEATERS OBD MONITOR	HEATERS ACTIVE = B+ V	

NOTE: Refer to the Appendix at the rear of this book for CAN and SCP Network Messages.

The following abbreviations are used to represent values for Control Module Pin-Out data

I	Input	D	Serial and Encoded Data	B+	Battery Voltage	kHz	Frequency x 1000
0	Output	С	CAN (Network)	V	Voltage (DC)	ms	Milliseconds
SG	Signal Ground	S	SCP Network	Hz	Frequency	mV	Millivolts

CAUTION: The information on this data page is furnished to aid the user in understanding circuit operation. THIS INFORMATION SHOULD BE USED FOR REFERENCE ONLY.

NOTE: The values listed are approximately those that can be expected at the control module connector pins with all circuit connections made and all components connected and fitted. "Active" means a load is applied or a switch is ON; "Inactive" means a load is not applied or a switch is OFF.

# Fig. 04.2

#### COMPONENTS

Component

AIR ASSIST CLOSE VALVE
BRAKE SWITCH
CKPS: CRANKSHAFT POSITION SENSOR
CMPS: CAMSHAFT POSITION SENSOR - 'A' BANK
CMPS: CAMSHAFT POSITION SENSOR - 'B' BANK
ECM AND TCM COOLING FAN
ENGINE CONTROL MODULE

ECTS: ENGINE COOLANT TEMPERATURE SENSOR
EOTS: ENGINE OIL TEMPERATURE SENSOR
EVAPP: EVAP CANISTER PURGE VALVE
HO2S: HEATED OXYGEN SENSOR (DOWNSTREAM) – 'A' BANK
HO2S: HEATED OXYGEN SENSOR (DOWNSTREAM) – 'B' BANK
HO2S: HEATED OXYGEN SENSOR (UPSTREAM) – 'A' BANK
HO2S: HEATED OXYGEN SENSOR (UPSTREAM) – 'B' BANK
KS: KNOCK SENSOR – 'A' BANK
KS: KNOCK SENSOR – 'B' BANK
MAFS: MASS AIR FLOW SENSOR
PARKING BRAKE SWITCH
PPS: PEDAL POSITION SENSORS

Connector / Type / Color PI29 / 3-WAY SUMITOMO SS / GREY CC40 / 4-WAY MULTILOCK 070 / WHITE PI17 / 2-WAY ECONOSEAL III HC / BLACK PI16 / 2-WAY YAZAKI / BLACK PI15 / 2-WAY YAZAKI / BLACK EM66 / 2-WAY MULTILOCK 070 / WHITE EM80 / 31-WAY AMP 403 / NATURAL EM81 / 24-WAY AMP 403 / NATURAL EM82 / 17-WAY AMP 403 / NATURAL FM83 / 28-WAY AMP 403 / NATURAL FM84 / 22-WAY AMP 403 / NATURAL EM85 / 12-WAY MULTILOCK 070 / WHITE PI4 / 2-WAY ECONOSEAL E J2 / GREY PI38 / 2-WAY ECONOSEAL EC J2 / GREY EM39 / 2-WAY ECONOSEAL J2+ / BLACK FM22 / 2-WAY SUMITOMO 0902 / BI ACK EM24 / 2-WAY SUMITOMO 0902 / BLACK EM21 / 4-WAY SUMITOMO 0902 / GREY FM23 / 4-WAY SUMITOMO 0902 / GREY PI26 / 2-WAY ECONOSEAL III LC / BLACK

PI27 / 2-WAY ECONOSEAL III LC / BLACK

CC11 / 2-WAY MULTILOCK 040 / BLACK

PI42 / 5-WAY SUMITOMO TS090 / BLACK

PI33 / 2-WAY SUMITOMO HM250 / BI ACK

PI6 / 4-WAY ECONOSEAL J2T / BLACK

PI31 / 2-WAY YAZAKI 0902 / BLACK

PI32 / 2-WAY YAZAKI 0902 / BI ACK

PI35 / 5-WAY YAZAKI 92 / BI ACK

## Location / Access

THROTTLE ASSEMBLY
ADJACENT TO THE BRAKE PEDAL MOUNTING ASSEMBLY
ENGINE / REAR OF BED PLATE
ENGINE COMPARTMENT / 'A' BANK CYLINDER HEAD, REAR
ENGINE COMPARTMENT / 'B' BANK CYLINDER HEAD, REAR
ENGINE COMPARTMENT / CONTROL MODULE ENCLOSURE
ENGINE COMPARTMENT / CONTROL MODULE ENCLOSURE

ENGINE COMPARTMENT / REAR OF ENGINE TOP HOSE
ENGINE BLOCK / BELOW GENERATOR
ENGINE COMPARTMENT / BULKHEAD
ENGINE COMPARTMENT / BRACKET ON TOP OF TRANSMISSION
ENGINE VEE / UNDER INTAKE MANIFOLD
ENGINE VEE / UNDER INTAKE MANIFOLD
ENGINE COMPARTMENT / REARWARD OF AIR CLEANER
CENTER CONSOLE ASSEMBLY
ENGINE COMPARTMENT / ON THROTTLE ASSEMBLY
ENGINE COMPARTMENT / THROTTLE ASSEMBLY
ENGINE COMPARTMENT / ON THROTTLE ASSEMBLY
ENGINE COMPARTMENT / BANK CYLINDER HEAD / FRONT

#### RELAYS

THROTTI F MOTOR

TPS: THROTTLE POSITION SENSORS

VVT SOLENOID VALVE - 'A' BANK

VVT SOLENOID VALVE - 'B' BANK

Relay Case Color Connector / Color Location / Access

THROTTLE MOTOR POWER RELAY BROWN EM49 / BROWN CONTROL MODULE ENCLOSURE RELAYS / ENGINE COMPARTMENT
02S HEATERS RELAY BROWN EM75 / BROWN CONTROL MODULE ENCLOSURE RELAYS / ENGINE COMPARTMENT

#### HARNESS-TO-HARNESS CONNECTORS

 Connector
 Type / Color

 CA19
 20-WAY MULTILOCK 070 / YELLOW

 EM1
 12-WAY AUGAT 1.6 / BLACK

 EM53
 20-WAY MULTILOCK 070 / WHITE

 LF3
 54-WAY THROUGH PANEL CONNECTOR / GREY

 PI1
 57-WAY SUMITOMO TS090 / BLACK

 PI2
 13-WAY ECONOSEAL III LC / BLACK

#### Location / Access

LH 'A' POST CONNECTOR MOUNTING BRACKET / LOWER 'A' POST FINISHER ENGINE COMPARTMENT / ADJACENT TO ABS PUMP PASSENGER 'A' POST / LOWER 'A' POST FINISHER LH 'A' POST / LOWER 'A' POST FINISHER ENGINE COMPARTMENT / BULKHEAD / REAR OF ENGINE ENGINE COMPARTMENT / BRACKET ON TOP OF TRANSMISSION

#### GROUNDS

Ground Location / Type

EMBL EYELET (PAIR) – EMS LH GROUND STUD
EM16L EYELET (PAIR) – EMS BULKHEAD GROUND STUD
EM16R EYELET (PAIR) – EMS BULKHEAD GROUND STUD

FOR CONTROL MODULE PIN OUT INFORMATION, UNFOLD PAGE TO LEFT.

Refer to the front of this book for detailed information and illustrations regarding the location and identification of harnesses, relays, grounds, control modules and control module pins.

#### ENGINE CONTROL MODULE

ENG	SINE CON	ITROL MODULE		
$\nabla$	Pin	Description	Active	Inactive
o	EM80-01	EVAP VALVE ACTIVATE	GROUND (VALVE OPEN)	B+
0	EM80-02	CANISTER CLOSE VALVE ACTIVATE	GROUND	B+
Ĭ	EM80-03	GROUND (POWER)	GROUND	GROUND
0	EM80-04	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
0	EM80-05	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
0	EM80-06	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
0	EM80-07	THROTTLE MOTOR POWER SUPPLY	B+	GROUND
- 1	EM80-08 EM80-09	THROTTLE MOTOR POWER SUPPLY THROTTLE MOTOR POWER SUPPLY	B+ B+	GROUND GROUND
- 1	EM80-15	EOT FEEDBACK	2.5 V @ 34 °C; 0.5 V @ 90 °C; (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)	GROUND
D	EM80-17	SERIAL COMMUNICATIONS	2.0 V C V V O, 0.0 V C V O, (DEGREE IONIC VOLINGE WITH TERM ENVIRONE MORE INC.)	
D	EM80-18	SERIAL COMMUNICATIONS		
D	EM80-19	ECM PROGRAMMING		
1	EM80-21	GROUND (THROTTLE MOTOR 1)	GROUND	GROUND
D	EM80-27	ECM PROGRAMMING	ANY IDLE ANY ENGINE OMITALIED OFF	
- !	EM80-28 EM80-29	MAPS FEEDBACK	1.2 V = IDLE; 3.6 V = ENGINE SWITCHED OFF GROUND	GROUND
- 1	EM80-31	GROUND (LOGIC 2) GROUND (THROTTLE MOTOR 2)	GROUND	GROUND
ò	EM81-03	EMS CONTROLLED RELAY ACTIVATE	GROUND	B+
i	EM81-08	GROUND (POWER)	GROUND	GROUND
1	EM81-09	PEDAL POSITION FEEDBACK (PPS/1)	0.6 V = FOOT OFF; 3.8 V = PEDAL FULLY DEPRESSED	
1	EM81-10	TPS FEEDBACK (TPS/1)	0.5 V = IDLE; 4.75 V = WOT	
!	EM81-12	PARK / NEUTRAL CONFIRMATION	B+ (P, N)	GROUND (R,D,4,3,2)
- 1	EM81-16 EM81-17	FUEL TANK PRESSURE SENSOR FEEDBACK EMS SWITCHED POWER SUPPLY 1	4.9 V = LOW PRESSURE, 0.2 V = HIGH PRESSURE B+	0 V
- 1	EM81-18	PEDAL POSITION FEEDBACK (PPS/2)	0.8 V = FOOT OFF; 2.4 V = PEDAL FULLY DEPRESSED	0 V
i	EM81-19	TPS FEEDBACK (TPS/2)	0.6 V = IDLE: 4.85 V = WOT	
i	EM81-21	GROUND (LOGIC 1)	GROUND	GROUND
1	EM81-22	PARKING BRAKE SWITCH	GROUND (APPLIED)	B+
- 1	EM81-23	IATS 2 FEEDBACK	2.38 V @ 20 °C, (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)	
SG	EM81-24	PEDAL POSITION / THROTTLE POSITION SENSORS SHIELD	GROUND	GROUND
0	EM82-01 EM82-02	SENSOR SUPPLY VOLTAGE 1 ENGINE CRANK	5 V GROUND (CRANKING)	5 V
- 1	EM82-04	HO2S, UPSTREAM 'A' BANK - VARIABLE CURRENT (µA)	3.5 V	
i	EM82-05	HO2S, UPSTREAM 'B' BANK – VARIABLE CURRENT (μA)	3.5 V	
0	EM82-06	THROTTLE MOTOR POWER RELAY ACTIVATE	GROUND	B+
SG	EM82-07	SENSORS SIGNAL GROUND 1	GROUND	GROUND
- 1	EM82-08	BRAKE SWITCH	GROUND	B+
1	EM82-09 FM82-10	IGNITION SWITCHED POWER SUPPLY	B+	B+
SG SG	EM82-10 EM82-11	HO2S, UPSTREAM 'A' BANK - CONSTANT	3.8 V 3.8 V	
3G 	EM82-11	HO2S, UPSTREAM 'B' BANK - CONSTANT INERTIA SWITCH ACTIVATED (VEHICLE IMPACT)	GROUND	B+
i	EM82-13	EMS SWITCHED POWER SUPPLY 2	B+	0 V
1	EM82-14	ECT FEEDBACK	0.41 V @ 90 °C (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)	
D	EM82-15	OK TO START	ENCODED COMMUNICATIONS	
D	EM82-16	SECURITY ACKNOWLEDGE	ENCODED COMMUNICATIONS	
- 1	EM82-17	IATS FEEDBACK	0.98 V @ 10 °C (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)	
O SG	EM83-05 EM83-06	SENSOR SUPPLY VOLTAGE 2 SENSOR SHIELD	5 V GROUND	5 V GROUND
SG	EM83-07	CKPS SIGNAL GROUND	GROUND	GROUND
ı	EM83-08	CKPS SIGNAL	5 V @ 1000 RPM = 45 Hz; 2000 RPM = 90 Hz	CHOCHE
SG	EM83-09	CMPS, 'A' BANK SIGNAL GROUND	GROUND	GROUND
SG	EM83-12	HO2S SHIELD	GROUND	GROUND
SG	EM83-13	SENSORS SIGNAL GROUND 2	GROUND	GROUND
I	EM83-14	KNOCK SENSOR, 'A' BANK FEEDBACK	0 kHz = NO KNOCK, 2 – 20 kHz = KNOCK	
C C	EM83-15 EM83-16	CAN NETWORK CAN NETWORK	15 – 1500 Hz 15 – 1500 Hz	
SG	EM83-17	CMPS, 'B' BANK SIGNAL GROUND	GROUND	GROUND
I	EM83-18	CMPS, 'B' BANK SIGNAL	0.7 – 1 VAC @ 1000 RPM = 43 Hz; 2000 RPM = 72 Hz	
1	EM83-19	CMPS, 'A' BANK SIGNAL	0.7 – 1 VAC @ 1000 RPM = 43 Hz; 2000 RPM = 72 Hz	
1	EM83-20	BATTERY POWER SUPPLY	B+	B+
1	EM83-21	HO2S, 'A' BANK DOWNSTREAM	0.1 - 0.9 V @ IDLE (SWING)	
- [	EM83-22 EM83-23	HO2S, 'B' BANK DOWNSTREAM KNOCK SENSOR, 'B' BANK FEEDBACK	0.1 – 0.9 V @ IDLE (SWING) 0 kHz = NO KNOCK, 2 – 20 kHz = KNOCK	
C	EM83-24	CAN NETWORK	0 KHZ = NO KNOCK, 2 – 20 KHZ = KNOCK 15 – 1500 Hz	
C	EM83-25	CAN NETWORK	15 – 1500 Hz 15 – 1500 Hz	
Ö	EM83-26	MAFS REFERENCE GROUND	GROUND	GROUND
0	EM83-27	MAFS REFERENCE GROUND	GROUND	GROUND
1	EM83-28	MAFS FEEDBACK	1.2 V @ IDLE, INCREASING WITH RPM INCREASE	
- 1	EM84-01	GROUND (DOWNSTREAM HO2S HEATERS)	GROUND	GROUND
0	EM84-07	HO2S HEATER, 'A' BANK DOWNSTREAM CONTROL	GROUND (20 – 60% DUTY CYCLE) GROUND (20 – 60% DUTY CYCLE)	B+
0	EM84-15 EM84-16	HO2S HEATER, 'B' BANK DOWNSTREAM CONTROL GROUND (INJECTORS 1A, 2B, 3B, 4A)	GROUND  GROUND	B+ GROUND
1	EM84-16	GROUND (INJECTORS 1A, 2B, 3B, 4A) GROUND (INJECTORS 1B, 2A, 3A, 4B)	GROUND	GROUND
ò	EM85-01	HO2S HEATER, 'A' BANK UPSTREAM CONTROL	GROUND (85 – 90% DUTY CYCLE AT IDLE)	B+
Ö	EM85-02	HO2S HEATER, 'B' BANK UPSTREAM CONTROL	GROUND (85 – 90% DUTY CYCLE AT IDLE)	B+
0	EM85-03	EGR STEPPER MOTOR 'S1' WINDING SUPPLY	GROUND	B+
0	EM85-04	EGR STEPPER MOTOR 'S2' WINDING SUPPLY	GROUND	B+
0	EM85-05	"COOL BOX" COOLING FAN ACTIVATE	GROUND	B+
Į.	EM85-06	GROUND (HO2S A UPSTREAM HEATER)	GROUND	GROUND
1	EM85-07 EM85-08	GROUND (HO2S B UPSTREAM HEATER) HO2S HEATERS OBD MONITOR	GROUND HEATERS ACTIVE = B+ V	GROUND
Ö	EM85-09	EGR STEPPER MOTOR 'S3' WINDING SUPPLY	GROUND	B+
Ö	EM85-10	EGR STEPPER MOTOR 'S4' WINDING SUPPLY	GROUND	B+

NOTE: Refer to the Appendix at the rear of this book for CAN and SCP Network Messages.

The following abbreviations are used to represent values for Control Module Pin-Out data

I	Input	D	Serial and Encoded Data	B+	Battery Voltage	kHz	Frequency x 1000
О	Output	С	CAN (Network)	V	Voltage (DC)	ms	Milliseconds
SG	Signal Ground	S	SCP Network	Hz	Frequency	mV	Millivolts

CAUTION: The information on this data page is furnished to aid the user in understanding circuit operation. THIS INFORMATION SHOULD BE USED FOR REFERENCE ONLY.

NOTE: The values listed are approximately those that can be expected at the control module connector pins with all circuit connections made and all components connected and fitted. "Active" means a load is applied or a switch is ON; "Inactive" means a load is not applied or a switch is OFF.

# Fig. 04.4

#### COMPONENTS

CONTROLLER S	
Component	Connector / Type / Color
BRAKE SWITCH	CC40 / 4-WAY MULTILOCK 070 / WHITE
CCV: CANISTER CLOSE VALVE	CV1 / 2-WAY YAZAKI 90 / BLACK
CKPS: CRANKSHAFT POSITION SENSOR	PI17 / 2-WAY ECONOSEAL III HC / BLACK
CMPS: CAMSHAFT POSITION SENSOR - 'A' BANK	PI16 / 2-WAY YAZAKI / BLACK
CMPS: CAMSHAFT POSITION SENSOR - 'B' BANK	PI15 / 2-WAY YAZAKI / BLACK
ECM AND TCM COOLING FAN	EM66 / 2-WAY MULTILOCK 070 / WHITE
EGR VALVE	PI34 / 6-WAY SUMITOMO 0902 / GREY
ENGINE CONTROL MODULE	EM80 / 31-WAY AMP 403 / NATURAL
	EM81 / 24-WAY AMP 403 / NATURAL
	EM82 / 17-WAY AMP 403 / NATURAL
	EM83 / 28-WAY AMP 403 / NATURAL
	EM84 / 22-WAY AMP 403 / NATURAL FM85 / 12-WAY MUI TII OCK 070 / WHITF
ECTS: ENGINE COOLANT TEMPERATURE SENSOR	PI4 / 2-WAY FCONOSFAL F. J2 / GREY
FOTS: ENGINE OIL TEMPERATURE SENSOR	PI38 / 2-WAY ECONOSEAL EC. J2 / GREY
EVAPP: EVAP CANISTER PURGE VALVE	FM39 / 2-WAY ECONOSEAL J. J.2+ / BLACK
FTPS: FUEL TANK PRESSURE SENSOR	FP1 / 3-WAY ECONOSEAL III LC / BLACK
HO2S: HEATED OXYGEN SENSOR (DOWNSTREAM) - 'A' BANK	EM22 / 2-WAY SUMITOMO 0902 / BLACK
HO2S: HEATED OXYGEN SENSOR (DOWNSTREAM) - 'B' BANK	EM24 / 2-WAY SUMITOMO 0902 / BLACK
HO2S: HEATED OXYGEN SENSOR (UPSTREAM) - 'A' BANK	EM21 / 4-WAY SUMITOMO 0902 / GREY
HO2S: HEATED OXYGEN SENSOR (UPSTREAM) - 'B' BANK	EM23 / 4-WAY SUMITOMO 0902 / GREY
IATS 2: INTAKE AIR TEMPERATURE SENSOR 2	PI3 / 2-WAY AMP JUNIOR POWER TIMER / B

### Location / Access

ADJACENT TO THE BRAKE PEDAL MOUNTING ASSEMBLY UNDER VEHICLE / RH REAR ENGINE / REAR OF BED PLATE ENGINE COMPARTMENT / 'A' BANK CYLINDER HEAD, REAR ENGINE COMPARTMENT / 'B' BANK CYLINDER HEAD, REAR ENGINE COMPARTMENT / CONTROL MODULE ENCLOSURE ENGINE COMPARTMENT / REAR OF THROTTLE ASSEMBLY ENGINE COMPARTMENT / CONTROL MODULE ENCLOSURE ENGINE COMPARTMENT / REAR OF ENGINE TOP HOSE ENGINE BLOCK / BELOW GENERATOR ENGINE COMPARTMENT / BULKHEAD TOP OF FUEL TANK / TRUNK CARPET ENGINE COMPARTMENT / BRACKET ON TOP OF TRANSMISSION ENGINE COMPARTMENT / 'A' BANK INTERCOOLER / REAR ENGINE VEE / UNDER INTAKE MANIFOLD ENGINE VEE / UNDER INTAKE MANIFOLD ENGINE COMPARTMENT / REARWARD OF AIR CLEANER ENGINE COMPARTMENT / CONTROL MODULE ENCLOSURE CENTER CONSOLE ASSEMBLY ENGINE COMPARTMENT / ON THROTTLE ASSEMBLY ENGINE COMPARTMENT / THROTTLE ASSEMBLY

ENGINE COMPARTMENT / ON THROTTLE ASSEMBLY

## RELAYS

KS: KNOCK SENSOR - 'A' BANK

KS: KNOCK SENSOR - 'B' BANK

MAES: MASS AIR FLOW SENSOR

PARKING BRAKE SWITCH
PPS: PEDAL POSITION SENSORS

TPS: THROTTLE POSITION SENSORS

THROTTLE MOTOR

MAPS: MANIFOLD ABSOLUTE PRESSURE SENSOR

Relay	Case Color	Connector / Color	Location / Access
THROTTLE MOTOR POWER RELAY	BROWN	EM49 / BROWN	CONTROL MODULE ENCLOSURE RELAYS / ENGINE COMPARTMENT
O2S HEATERS RELAY	BROWN	EM75 / BROWN	CONTROL MODULE ENCLOSURE RELAYS / ENGINE COMPARTMENT

PI26 / 2-WAY ECONOSEAL III LC / BLACK

PI27 / 2-WAY ECONOSEAL III LC / BLACK

CC11 / 2-WAY MULTILOCK 040 / BLACK

PI6 / 4-WAY ECONOSEAL J2T / BLACK

PI42 / 5-WAY SUMITOMO TS090 / BLACK

PI33 / 2-WAY SUMITOMO HM250 / BLACK

PI35 / 5-WAY YAZAKI 92 / BI ACK

EM10 / 3-WAY SUMITOMO / BLACK

## HARNESS-TO-HARNESS CONNECTORS

Connector	Type / Color	Location / Access
BT4	54-WAY THROUGH PANEL / GREY	BELOW PARCEL SHELF / TRUNK / REAR BULKHEAD / RH SIDE
BT5	3-WAY MULTILOCK 070 / WHITE	TOP OF FUEL TANK / TRUNK CARPET
CA19	20-WAY MULTILOCK 070 / YELLOW	LH 'A' POST CONNECTOR MOUNTING BRACKET / LOWER 'A' POST FINISHER
CV2	3-WAY MULTILOCK 070 / WHITE	UNDER REAR SEAT
EM1	12-WAY AUGAT 1.6 / BLACK	ENGINE COMPARTMENT / ADJACENT TO ABS PUMP
EM2	20-WAY MULTILOCK 070 / GREY	PASSENGER 'A' POST / LOWER 'A' POST FINISHER
EM3	18-WAY MULTILOCK 070 / WHITE	PASSENGER 'A' POST / LOWER 'A' POST FINISHER
EM53	20-WAY MULTILOCK 070 / WHITE	PASSENGER 'A' POST / LOWER 'A' POST FINISHER
FC1	54-WAY THROUGH PANEL CONNECTOR / GREY	BELOW PASSENGER SIDE AIR VENT / GLOVE BOX ASSEMBLY
LF3	54-WAY THROUGH PANEL CONNECTOR / GREY	LH 'A' POST / LOWER 'A' POST FINISHER
PI1	57-WAY SUMITOMO TS090 / BLACK	ENGINE COMPARTMENT / BULKHEAD / REAR OF ENGINE
PI2	13-WAY ECONOSEAL III LC / BLACK	ENGINE COMPARTMENT / BRACKET ON TOP OF TRANSMISSION

## GROUNDS

Ground	Location / Type
EM8L	EYELET (PAIR) - EMS LH GROUND STUD
EM16L	EYELET (PAIR) - EMS BULKHEAD GROUND STUD
EM16R	EYELET (PAIR) - EMS BULKHEAD GROUND STUD

FOR CONTROL MODULE PIN OUT INFORMATION, UNFOLD PAGE TO LEFT.

Refer to the front of this book for detailed information and illustrations regarding the location and identification of harnesses, relays, grounds, control modules and control module pins.

#### FNGINE CONTROL MODULE

ENG	ENGINE CONTROL MODULE										
$\nabla$	Pin	Description	Active	Inactive							
0	EM80-01	EVAP VALVE ACTIVATE	GROUND (VALVE OPEN)	B+							
Ī	EM80-03	GROUND (POWER)	GROUND	GROUND							
0	EM80-04	THROTTLE MOTOR POWER SUPPLY	B+	GROUND							
0	EM80-05	THROTTLE MOTOR POWER SUPPLY	B+	GROUND							
0	EM80-06	THROTTLE MOTOR POWER SUPPLY	B+	GROUND							
0	EM80-07	THROTTLE MOTOR POWER SUPPLY	B+	GROUND							
1	EM80-08	THROTTLE MOTOR POWER SUPPLY	B+	GROUND							
1	EM80-09	THROTTLE MOTOR POWER SUPPLY	B+	GROUND							
1	EM80-15	EOT FEEDBACK	2.5 V @ 34 °C; 0.5 V @ 90 °C; (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)								
D	EM80-17	SERIAL COMMUNICATIONS									
D D	EM80-18 EM80-19	SERIAL COMMUNICATIONS ECM PROGRAMMING									
ı	EM80-19	GROUND (THROTTLE MOTOR 1)	GROUND	GROUND							
D	EM80-27	ECM PROGRAMMING	GROUND	GROUND							
Ī	EM80-29	GROUND (LOGIC 2)	GROUND	GROUND							
1	EM80-31	GROUND (THROTTLE MOTOR 2)	GROUND	GROUND							
0	EM81-03	EMS CONTROLLED RELAY ACTIVATE	GROUND	B+							
1	EM81-08	GROUND (POWER)	GROUND	GROUND							
1	EM81-09	PEDAL POSITION FEEDBACK (PPS/1)	0.5 V = IDLE; 4.75 V = WOT								
1	EM81-10	TPS FEEDBACK (TPS/1)	0.5 V = IDLE; 4.75 V = WOT								
I	EM81-12	PARK / NEUTRAL CONFIRMATION	B+ (P, N)	GROUND (R,D,4,3,2)							
!	EM81-17	EMS SWITCHED POWER SUPPLY 1	B+	0 V							
!	EM81-18 EM81-19	PEDAL POSITION FEEDBACK (PPS/2)	0.4 V = IDLE; 3.25 V = WOT								
- 1	EM81-19 EM81-21	TPS FEEDBACK (TPS/2) GROUND (LOGIC 1)	0.6 V = IDLE; 4.85 V = WOT GROUND	GROUND							
- 1	EM81-22	PARKING BRAKE SWITCH	GROUND (APPLIED)	B+							
i	EM81-23	IATS 2 FEEDBACK	2.38 V @ 20 °C, (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)	D1							
SG	EM81-24	PEDAL POSITION / THROTTLE POSITION SENSORS SHIELD	GROUND	GROUND							
0	EM82-01	SENSOR SUPPLY VOLTAGE 1	5 V	5 V							
1	EM82-02	ENGINE CRANK	GROUND (CRANKING)								
- 1	EM82-04	HO2S, UPSTREAM 'A' BANK - VARIABLE CURRENT (µA)	3.5 V								
1	EM82-05	HO2S, UPSTREAM 'B' BANK - VARIABLE CURRENT (μA)	3.5 V								
0	EM82-06	THROTTLE MOTOR POWER RELAY ACTIVATE	GROUND	B+							
SG I	EM82-07 EM82-08	SENSORS SIGNAL GROUND 1 BRAKE SWITCH	GROUND GROUND	GROUND B+							
i	EM82-08	IGNITION SWITCHED POWER SUPPLY	B+	B+							
SG	EM82-10	HO2S, UPSTREAM 'A' BANK - CONSTANT	3.8 V	D+							
SG	EM82-11	HO2S, UPSTREAM 'B' BANK - CONSTANT	3.8 V								
Ī	EM82-12	INERTIA SWITCH ACTIVATED (VEHICLE IMPACT)	GROUND	B+							
1	EM82-13	EMS SWITCHED POWER SUPPLY 2	B+	0 V							
1	EM82-14	ECT FEEDBACK	0.41 V @ 90 °C (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)								
D	EM82-15	OK TO START	ENCODED COMMUNICATIONS								
D	EM82-16	SECURITY ACKNOWLEDGE	ENCODED COMMUNICATIONS								
0	EM82-17 EM83-05	IATS FEEDBACK	0.98 V @ 10 °C (DECREASING VOLTAGE WITH TEMPERATURE INCREASE)	F.V.							
SG	EM83-05	SENSOR SUPPLY VOLTAGE 2 SENSOR SHIELD	5 V GROUND	5 V GROUND							
SG	EM83-07	CKPS SIGNAL GROUND	GROUND	GROUND							
ı	EM83-08	CKPS SIGNAL	5 V @ 1000 RPM = 45 Hz; 2000 RPM = 90 Hz	OKOOND.							
SG	EM83-09	CMPS, 'A' BANK SIGNAL GROUND	GROUND	GROUND							
SG	EM83-12	HO2S SHIELD	GROUND	GROUND							
SG	EM83-13	SENSORS SIGNAL GROUND 2	GROUND	GROUND							
1	EM83-14	KNOCK SENSOR, 'A' BANK FEEDBACK	0 kHz = NO KNOCK, 2 – 20 kHz = KNOCK								
С	EM83-15	CAN NETWORK	15 – 1500 Hz								
C SG	EM83-16 EM83-17	CAN NETWORK CMPS, 'B' BANK SIGNAL GROUND	15 – 1500 Hz GROUND	GROUND							
3G 	EM83-17 EM83-18	CMPS, 'B' BANK SIGNAL GROUND	0.7 – 1 VAC @ 1000 RPM = 43 Hz; 2000 RPM = 72 Hz	GROUND							
i	EM83-19	CMPS, 'A' BANK SIGNAL	0.7 – 1 VAC @ 1000 RPM = 43 Hz; 2000 RPM = 72 Hz								
i	EM83-20	BATTERY POWER SUPPLY	B+	B+							
1	EM83-21	HO2S, 'A' BANK DOWNSTREAM	0.1 - 0.9 V @ IDLE (SWING)								
1	EM83-22	HO2S, 'B' BANK DOWNSTREAM	0.1 - 0.9 V @ IDLE (SWING)								
1	EM83-23	KNOCK SENSOR, 'B' BANK FEEDBACK	0 kHz = NO KNOCK, 2 – 20 kHz = KNOCK								
С	EM83-24	CAN NETWORK	15 – 1500 Hz								
С	EM83-25	CAN NETWORK	15 – 1500 Hz								
0	EM83-26	MAFS REFERENCE GROUND	GROUND	GROUND							
0	EM83-27 EM83-28	MAFS REFERENCE GROUND MAFS FEEDBACK	GROUND 1.2 V @ IDLE, INCREASING WITH RPM INCREASE	GROUND							
	EM84-01	GROUND (DOWNSTREAM HO2S HEATERS)	GROUND	GROUND							
0	EM84-07	HO2S HEATER, 'A' BANK DOWNSTREAM CONTROL	GROUND (20 - 60% DUTY CYCLE)	B+							
0	EM84-15	HO2S HEATER, 'B' BANK DOWNSTREAM CONTROL	GROUND (20 – 60% DUTY CYCLE)	B+							
Ī	EM84-16	GROUND (INJECTORS 1A, 2B, 3B, 4A)	GROUND	GROUND							
1	EM84-22	GROUND (INJECTORS 1B, 2A, 3A, 4B)	GROUND	GROUND							
0	EM85-01	HO2S HEATER, 'A' BANK UPSTREAM CONTROL	GROUND (85 - 90% DUTY CYCLE AT IDLE)	B+							
0	EM85-02	HO2S HEATER, 'B' BANK UPSTREAM CONTROL	GROUND (85 – 90% DUTY CYCLE AT IDLE)	B+							
0	EM85-05	"COOL BOX" COOLING FAN ACTIVATE	GROUND	B+							
1	EM85-06	GROUND (HO2S A UPSTREAM HEATER)	GROUND	GROUND							
1	EM85-07 EM85-08	GROUND (HO2S B UPSTREAM HEATER) HO2S HEATERS OBD MONITOR	GROUND HEATERS ACTIVE = B+ V	GROUND							
1	FINIO2-00	HOZO HEALENO ODD IVIONITOK	HENTERS ASTIVE - DT V								

NOTE: Refer to the Appendix at the rear of this book for CAN and SCP Network messages.

The following abbreviations are used to represent values for Control Module Pin-Out data

I	Input	D	Serial and Encoded Data	B+	Battery Voltage	kHz	Frequency x 1000
0	Output	С	CAN (Network)	V	Voltage (DC)	ms	Milliseconds
SG	Signal Ground	S	SCP Network	Hz	Frequency	mV	Millivolts

CAUTION: The information on this data page is furnished to aid the user in understanding circuit operation. THIS INFORMATION SHOULD BE USED FOR REFERENCE ONLY.

NOTE: The values listed are approximately those that can be expected at the control module connector pins with all circuit connections made and all components connected and fitted. "Active" means a load is applied or a switch is ON; "Inactive" means a load is not applied or a switch is OFF.

# Fig. 04.5

#### COMPONENTS

Component

BRAKE SWITCH

CKPS: CRANKSHAFT POSITION SENSOR

CMPS: CAMSHAFT POSITION SENSOR - 'A' BANK

CMPS: CAMSHAFT POSITION SENSOR - 'B' BANK

ECM AND TCM COOLING FAN

ENGINE CONTROL MODULE

ECTS: ENGINE COOLANT TEMPERATURE SENSOR

EOTS: ENGINE OIL TEMPERATURE SENSOR
EVAPP: EVAP CANISTER PURGE VALVE
HO2S: HEATED OXYGEN SENSOR (DOWNSTREAM) – 'A' BANK
HO2S: HEATED OXYGEN SENSOR (DOWNSTREAM) – 'B' BANK
HO2S: HEATED OXYGEN SENSOR (UPSTREAM) – 'A' BANK
HO2S: HEATED OXYGEN SENSOR (UPSTREAM) – 'B' BANK
IATS 2: INTAKE AIR TEMPERATURE SENSOR 2
KS: KNOCK SENSOR – 'A' BANK
KS: KNOCK SENSOR – 'B' BANK
MAFS: MASS AIR FLOW SENSOR
PARKING BRAKE SWITCH
PPS: PEDAL POSITION SENSORS

Connector / Type / Color
CC40 / 4-WAY MULTILOCK 070 / WHITE
PI17 / 2-WAY ECONOSEAL III HC / BLACK
PI16 / 2-WAY YAZAKI / BLACK
PI15 / 2-WAY YAZAKI / BLACK
EM66 / 2-WAY MULTILOCK 070 / WHITE
EM80 / 31-WAY AMP 403 / NATURAL
EM81 / 24-WAY AMP 403 / NATURAL
EM81 / 24-WAY AMP 403 / NATURAL
EM83 / 28-WAY AMP 403 / NATURAL
EM83 / 28-WAY AMP 403 / NATURAL
EM86 / 12-WAY MAY EAG / NATURAL
EM86 / 12-WAY MAY EAG / NATURAL
EM86 / 12-WAY MOULTILOCK 070 / WHITE
PI4 / 2-WAY ECONOSEAL E J2 / GREY
EM39 / 2-WAY ECONOSEAL E J2 / GREY
EM39 / 2-WAY ECONOSEAL 12+ / BLACK
EM22 / 2-WAY SUMITOMO 0902 / BLACK

EM24 / 2-WAY SUMITOMO 0902 / BLACK
EM21 / 4-WAY SUMITOMO 0902 / GREY
EM23 / 4-WAY SUMITOMO 0902 / GREY
PI3 / 2-WAY SUMITOMO 0902 / GREY
PI3 / 2-WAY AMP JUNIOR POWER TIMER / BLACK
PI26 / 2-WAY ECONOSEAL III LC / BLACK
PI27 / 2-WAY ECONOSEAL III LC / BLACK
PI35 / 5-WAY YAZAKI 92 / BLACK
CC11 / 2-WAY MULTILOCK 040 / BLACK
PI42 / 5-WAY SUMITOMO TS090 / BLACK
PI33 / 2-WAY SUMITOMO HM250 / BLACK
PI6 / 4-WAY ECONOSEAL J2T / BLACK

## Location / Access

ADJACENT TO THE BRAKE PEDAL MOUNTING ASSEMBLY ENGINE / REAR OF BED PLATE ENGINE COMPARTMENT / 'A' BANK CYLINDER HEAD, REAR ENGINE COMPARTMENT / 'B' BANK CYLINDER HEAD, REAR ENGINE COMPARTMENT / CONTROL MODULE ENCLOSURE

ENGINE COMPARTMENT / CONTROL MODULE ENCLOSURE

ENGINE COMPARTMENT / REAR OF ENGINE TOP HOSE
ENGINE BLOCK / BELOW GENERATOR
ENGINE COMPARTMENT / BULKHEAD
ENGINE COMPARTMENT / BRACKET ON TOP OF TRANSMISSION
ENGINE COMPARTMENT / 'AB BANK INTERCOOLER / REAR
ENGINE VEE / UNDER INTAKE MANIFOLD
ENGINE VEE / UNDER INTAKE MANIFOLD
ENGINE COMPARTMENT / REARWARD OF AIR CLEANER
CENTER CONSOLE ASSEMBLY
ENGINE COMPARTMENT / ON THROTTLE ASSEMBLY
ENGINE COMPARTMENT / THROTTLE ASSEMBLY

ENGINE COMPARTMENT / ON THROTTLE ASSEMBLY

## RELAYS

THROTTI F MOTOR

TPS: THROTTLE POSITION SENSORS

 Relay
 Case Color
 Connector / Color
 Location / Access

 THROTTLE MOTOR POWER RELAY
 BROWN
 EM49 / BROWN
 CONTROL MODULE ENCLOSURE RELAYS / ENGINE COMPARTMENT

 02S HEATERS RELAY
 BROWN
 EM75 / BROWN
 CONTROL MODULE ENCLOSURE RELAYS / ENGINE COMPARTMENT

#### HARNESS-TO-HARNESS CONNECTORS

 Connector
 Type / Color

 CA19
 20-WAY MULTILOCK 070 / YELLOW

 EM1
 12-WAY AUGAT 1.6 / BLACK

 EM53
 20-WAY MULTILOCK 070 / WHITE

 LF3
 54-WAY THROUGH PANEL CONNECTOR / GREY

#### Location / Access

LH 'A' POST CONNECTOR MOUNTING BRACKET / LOWER 'A' POST FINISHER
ENGINE COMPARTMENT / ADJACENT TO ABS PUMP
PASSENGER 'A' POST / LOWER 'A' POST FINISHER
LH 'A' POST / LOWER 'A' POST FINISHER
ENGINE COMPARTMENT / BULKHEAD / REAR OF ENGINE
ENGINE COMPARTMENT / BRACKET ON TOP OF TRANSMISSION

### GROUNDS

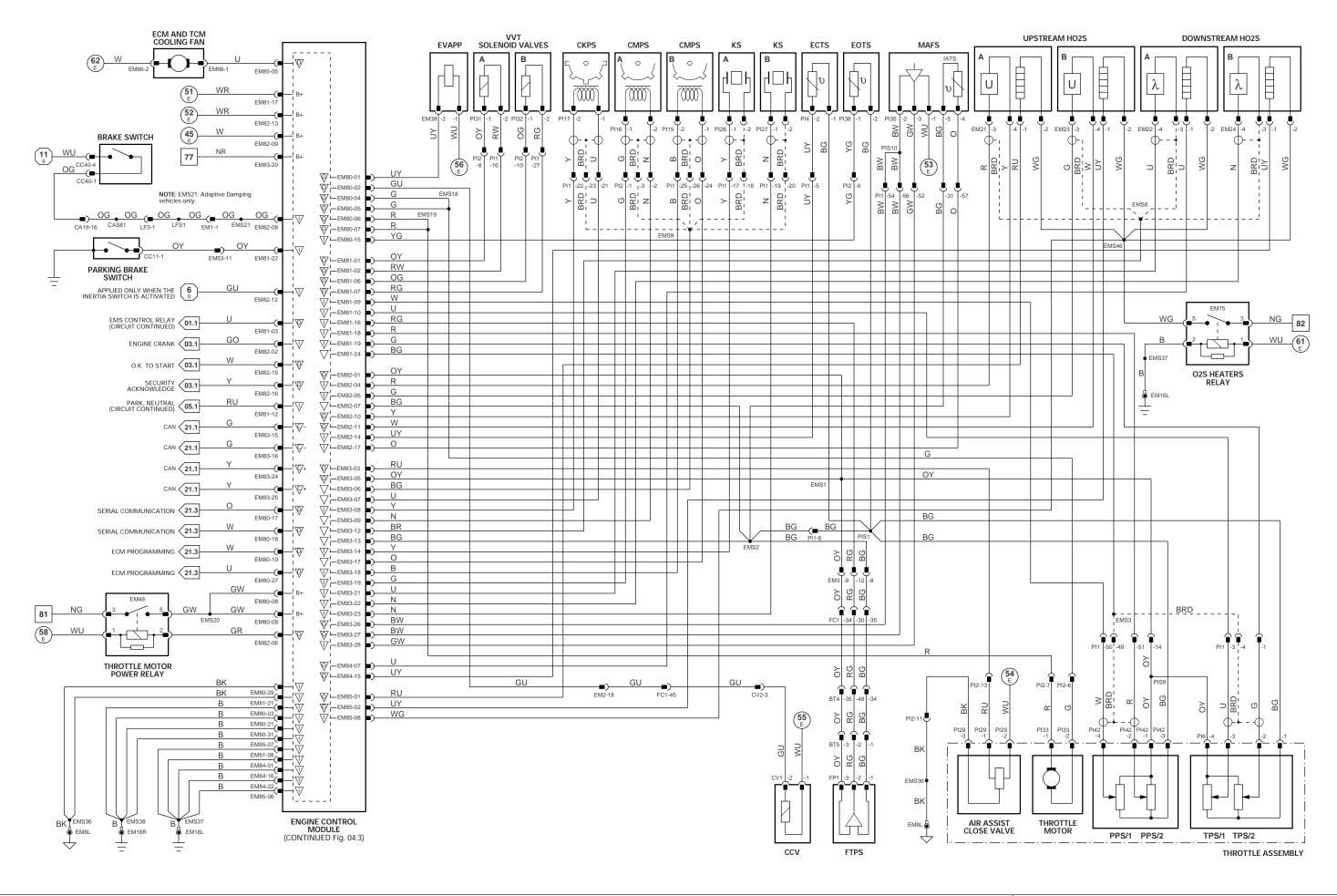
Ground Location / Type

EM8L EYELET (PAIR) – EMS LH GROUND STUD
EM16L EYELET (PAIR) – EMS BULKHEAD GROUND STUD
EM16R EYELET (PAIR) – EMS BULKHEAD GROUND STUD

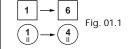
FOR CONTROL MODULE PIN OUT INFORMATION, UNFOLD PAGE TO LEFT.

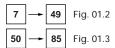
Refer to the front of this book for detailed information and illustrations regarding the location and identification of harnesses, relays, grounds, control modules and control module pins.

Fig. 04.1

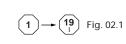


AJ27 4.0 N/A NAS Engine Management: Part 1















VARIANT: AJ27 4.0 N/A NAS Vehicles
VIN RANGE: F00103 →
DATE OF ISSUE: October 1999