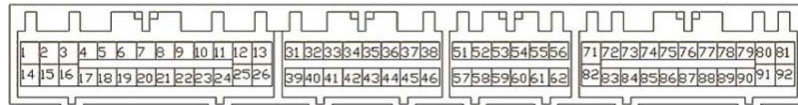


Montero Sport 1997 3.0L ECM/1999 3.5L A/T PCM Pin-Out Table for Piggy-Back AEM F/IC 8 & Innovate LC-1 WBO2

Pin-outs were taken directly from the official Mitsubishi™ factory service manuals and as such may contain errors if the service manual documentation is in error. Not all pin-outs may be listed in the tables below. Note that these pin-outs are untested and use of these tables may result in vehicle component damage. As such, the user of this documentation accepts all liability and may not hold the distributor of this document liable for any damages that may occur. Do not attempt to use these tables without confirming that the pin-outs are correct!

1997 M/T ECM FED MD338139/MD349089 (GREEN 76-pin)



1999 A/T PCM FED MD357516/MD364531 (BLACK 119-pin)



1-20 -- inj 7 IN ----- 12-24 inj 3 IN
3-20 -- inj 7 OUT ----- 20-24 inj 3 OUT

7FU2459

1999 BLACK	1997 GREEN	AWG ³	ECM/PCM Pin Description	F/IC 8 IN	1997 M/T ECM & 1999 A/T PCM F/IC 8 OUT	?CM I/O	LC-1	NOTES ⁴	
1	1	16	No. 1 fuel injector (A-75)	1, 7	1-22	22-24	input	F/IC pin 1,12,12,24,11,23/ECU, F/IC pin 22,21,20,19,18,17/injectors	
9	14	16	No. 2 fuel injector (A-72)		12-22	21-24			
24	2	16	No. 3 fuel injector (A-74)		12-24	20-24			
2	15	16	No. 4 fuel injector (A-71)		24-24	19-24			
10	3	16	No. 5 fuel injector (A-73)		11-24	18-24			
25	16	16	No. 6 fuel injector (A-70)		23-24	17-24			
3	34		Heated oxygen sensor heater (front) FED				input		
6	6	18	EGR solenoid FED						
11	10		Ignition power transistor unit A	2			output		
12	23		Ignition power transistor unit B				output		
13	11		Ignition power transistor unit C				output		
14	4		Stepper motor coil <A1>				input		
28	17		Stepper motor coil <A2>						
15	5		Stepper motor coil <B1>						
29	18		Stepper motor coil <B2>						
34	32	18	Evaporative emission purge solenoid						
18	none		Condenser fan relay						
19	19		Volume air flow sensor reset signal				input		
20	8		Fuel pump relay module						
21	22		A/C compressor clutch relay				input		
22	36		Service engine soon/malfunction indicator lamp				input		
26	42		Heated oxygen sensor heater (rear) FED				input		
35	41	18	Evaporative emission ventilation solenoid						
46	81		Sensor supplied voltage						
45	89		Crankshaft position sensor	7	7-22	14-22	output	F/IC pin 7/crank sensor, F/IC pin 14/ECU	
44	83		Engine coolant temperature sensor				output		
43	51		Spark check signal (RPM signal?)				output		
41	12	16	Power supply (ignition switch: "ON")	5, 7		N/A		red	LC-1 12+, fused with at least a 5A fuse; Innovate SSI-4 12+; switched 12V source on as soon as the ignition on the car is on
47	25	17				16-22	N/A		
48	13	16	Power supply & ignition switch-IG circuit GND (body GND #3, #10)	7		4-22		blue, black	Fuel Injectors, MFI Relay, Backup power supply GND; F/IC 13-22 User Switch Input switch to GND (see below for alternative); LC-1 black calibration wire, momentary switch to GND; Innovate SSI-4 GND
42	26	16				15-22, 13-22	N/A		
56	88		Camshaft position sensor	7	8-24	3-22	output	F/IC pin 8/cam sensor, F/IC pin 3/ECU	

55	85		Barometric pressure sensor				input		
52	37		Power steering pressure switch						
49	38		MFI relay (power supply)						
66	80	16	Backup power supply						
65	90		Volume air flow sensor	7	14-24	15-24	output		F/IC pin 14/MAF sensor, F/IC pin 15/ECU
64	72		Intake air temperature sensor				output		
61	none		A/C switch 2						
59	91	16	Ignition switch-ST GND (body GND #3)						
58	71	16	Ignition switch-ST						
71	76		Heated oxygen sensor (front) FED	7,8	13-24	N/A	input		F/IC should not require resistor noted in AEM documentation
73	79		Heated oxygen sensor (rear) FED	7,8	1-24		input		F/IC should not require resistor noted in AEM documentation
78	84		Throttle position sensor	7	6-22	N/A	input		
79	87		Closed throttle position switch <3.0L Engine>				output		
80	86		Vehicle speed sensor				output		
83	45		A/C switch				input		
85	62		Data link connector circuit (OBD connector pin 7)		N/A	N/A		N/A	Data link connector (1)
84	56		Data link connector circuit (OBD connector pin 1)		N/A	N/A		N/A	Data link connector (1)
57	92		Volume air flow circuit, Baro Pressure Sensor, IAT Sensor, ECT Sensor, TPS Sensor, O2 Sensor (front), O2 Sensor (rear), Evap Emission Control System Pressure Sensor, Closed throttle position switch, MAP Sensor, Fluid temp sensor <A/T>, Input shaft speed sensor <A/T>, Output shaft speed sensor <A/T> GND	7	5-22, 20-20	N/A		white, green	LC-1 sensor GND; Delphi IAT Air Charge Temp Sensor GND; LC-1 analog GND, only present on 7 wire models
91	74		Manifold differential pressure sensor				input		
92	77		Fuel tank differential pressure sensor						
98	82	16	Ignition switch-IG						
50	N/A		A/T control relay						
75	N/A		Auto-cruise signal line system circuit						
77	N/A	14	Solenoid valve power supply						
89	N/A	16							
76	N/A	16	Body GND (#3)						
88	N/A	16							
97	N/A	16							
101	N/A		Park/Neutral position switch P						
102	N/A		Park/Neutral position switch D						
103	N/A		Input shaft speed sensor						
104	N/A		Output shaft speed sensor						
106	N/A		Second solenoid valve						
107	N/A		Torque converter clutch solenoid valve						
108	N/A		Park/Neutral position switch R						
109	N/A		Park/Neutral position switch 3						
110	N/A		Park/Neutral position switch L						
113	N/A		Data link connector circuit (connector pin 26)		N/A	N/A		N/A	Data link connector (2) C-82 12-pin PCM flash pin 26
114	N/A		Data link connector circuit (connector pin 27)		N/A	N/A		N/A	Data link connector (2) C-82 12-pin INVECS-II pin 27
120	N/A		Under drive solenoid valve						
121	N/A		Park/neutral position switch N / "N" range light system circuit						
122	N/A		Park/neutral position switch 2						
123	N/A	17	Stoplight switch						
124	N/A		Fluid temperature sensor						
125	N/A		Transfer low detection switch						

126	N/A		Pattern select switch					
129	N/A		Low-reverse solenoid valve					
130	N/A		Overdrive solenoid valve					
N/A	N/A		Intake air temperature sensor (IAT)	^{7,9}	20-20	N/A	N/A	F/IC AUX Analog C; GM Delphi IAT Air Charge Temp Sensor
N/A	N/A		AEM F/IC User Switch Input connection (internal data logging/dual calibration mode)	⁷	13-22	N/A	N/A	F/IC User Switch Input switch to GND, lug body GND #3 (or see above for alternative)
N/A	N/A					N/A	yellow	LC-1 analog out 1 (O2 NB)
N/A	N/A		AEM F/IC AUX IN	⁷	18-22	N/A	brown	LC-1 analog out 2 (O2 WB), 0V=7.35 AFR and 5V=22.39 AFR; 14.7 Stoichiometric, 13.5 max torque

¹ Firing order 1-2-3-4-5-6

² Unit A - cyl 1,2; Unit B - cyl 3,4; Unit C - cyl 5,6

³

AWG	mm ²	
14	2.00	
16	1.25	
17	0.85	
18	0.75	
20	0.50	unless otherwise noted, wire gauge is 20 AWG (0.5 mm ²)

⁴ Mitsubishi specific notes apply to 1997 5-speed ECM and wiring harness'

⁵ B+ power on during IG ON and ST

⁶ confirm in manual

⁷ AEM F/IC pin and plug number. Example: 1-24 is pin 1 on the 24 pin plug

⁸ Not necessary unless changing fuel delivery by modifying \bar{O} sensor signal

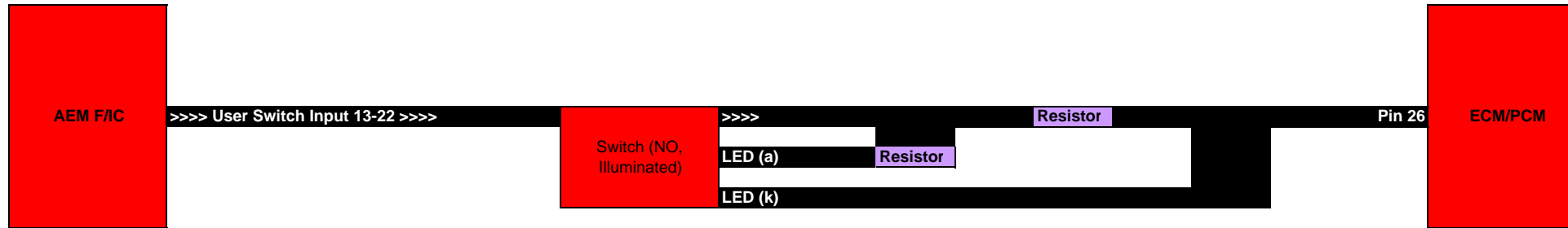
⁹ Not necessary unless an independant IAT source is required



				1997 M/T ECM & 2001-2004? A/T PCM				
1999 BLACK	1997 GREEN	AWG	Description	MS III / MS3X	?CM I/O		NOTES	
7	none		A/T fluid temperature warning light <V4A51> <A/T>					
20	22		A/C compressor clutch relay					
21	8		Fuel pump relay module					
50	none		A/T Control Relay System GND <A/T>					
51	none		Fuel temperature sensor (Fuel temperature sensor circuit)				run wire from fuel level/temperature sensor pin 1 <00-04 fuel temperature signal/sensor>	
59	91		Park/neutral position switch <A/T>					
60	none		Fuel gauge unit (Fuel level sensor circuit)				tap from fuel gauge circuit <97-04 fuel level signal/sensor pin 2>	
75	none		Auto-cruise signal line system circuit					
76	none		GND					

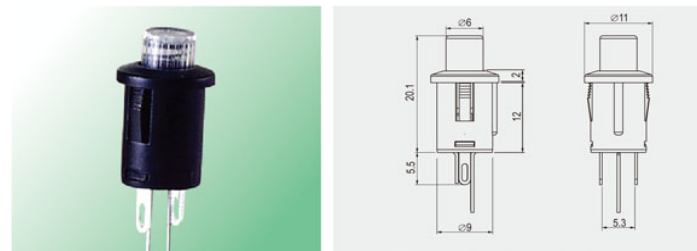
77	none	A/T Control Relay System (solenoid valve PS) <A/T>						
89	none							
88	none	GND						
97	none							
96	none	Fuel level warning light						intercept fuel level warning light signal/sensor pin 1 <97-99>
103	none	Input shaft speed sensor system <A/T>						
104	none	Output shaft speed sensor system <A/T>						
110	none	Park/Neutral Position Switch System (L) <A/T>						
122	none	Park/Neutral Position Switch System (2) <A/T>						
109	none	Park/Neutral Position Switch System (3) <A/T>						
102	none	Park/Neutral Position Switch System (D) <A/T>						
121	none	Park/Neutral Position Switch System (N) <A/T>						
108	none	Park/Neutral Position Switch System (R) <A/T>						
101	none	Park/Neutral Position Switch System (P) <A/T>						
120	none	Low/Reverse solenoid system valve circuit (underdrive) <A/T>						
106	none	Low/Reverse solenoid system valve circuit (second) <A/T>						
130	none	Low/Reverse solenoid system valve circuit (overdrive) <A/T>						
107	none	Low/Reverse solenoid system valve circuit (torque converter clutch) <A/T>						
129	none	Low/Reverse solenoid system valve circuit (low & reverse) <A/T>						
123	none	Stoplight switch system circuit <A/T>						
124	none	A/T fluid temperature sensor system circuit <A/T>						
112	none	Transfer low detection switch <V4A51> <A/T>						
111	none	Immobilizer/PCM communications line						PCM/immobilizer control module must come from same vehicle/additional parts and wiring required

AEM F/IC User Switch Input

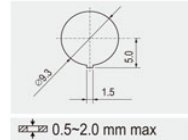


Push-Button Switch 2P SPST OFF-ON RED LED

R13-529



Rating
1A 125V AC 0.5A 250V AC
Contact resistance
50mΩ Max
Insulation resistance
DC 500V 100MΩ Min
Dielectric strength
AC 1000V 1 minute
Cut-out



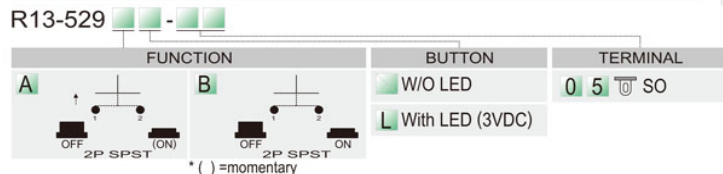
FEATURES
 * MATERIAL: Frame is nylon with glass fiber (UL flame: 94HB). Terminals are silver plated brass. Base is PBT.
 * Illuminated actuator are molded in PC, available with red, amber, green, blue and white colors.
 * Snap-in mounting, easy to install switch into panel.

LED Resistor *

Green	25mA - 2.2V	
	470 ohm 1/2w	13.87v
	120 ohm 1/8w	5.0v
Red	30mA - 1.7V	
	470 ohm 1w	13.87v
	120 ohm 1/4w	5.0v

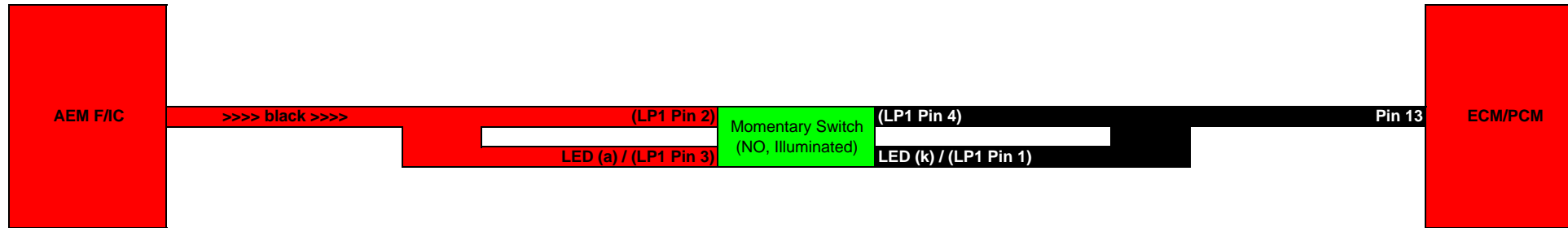
* Resistor may or may not be required depending on type of switch used. Resistor values depend on LED used, confirm correct values. Metal film axial 5% resistor.

Notes: When the User Switch Input from the F/IC is grounded, the F/IC will be in either internal logging mode or operating from calibration two in dual-calibration mode. The switch LED will be off when the circuit is open (no logging/calibration one) and on when closed (logging/calibration two). With the switch and LED configured in this way, care should be taken to make sure that the + and - side of the switch are not reversed or the LED will be damaged. **Operation:** press to enable logging/calibration two (LED ON), press again to disable logging/revert to calibration one (LED OFF).



Shin Chin PN# R13-529BL-05-BRR

Innovate LC-1 Indicator and Calibration



Push-Button Switch 2P SPST OFF-(ON) GREEN LED

E-Switch Series LP1 Momentary Switch

R13-529

Rating	1A 125V AC 0.5A 250V AC
Contact resistance	50mΩ Max
Insulation resistance	DC 500V 100MΩ Min
Dielectric strength	AC 1000V 1 minute
Cut-out	

FEATURES

- * MATERIAL: Frame is nylon with glass fiber (UL flame: 94HB). Terminals are silver plated brass. Base is PBT.
- * Illuminated actuator are molded in PC, available with red, amber, green, blue and white colors.
- * Snap-in mounting, easy to install switch into panel.

SCHEMATIC

±0.2 0.5-2.0 mm max

R13-529

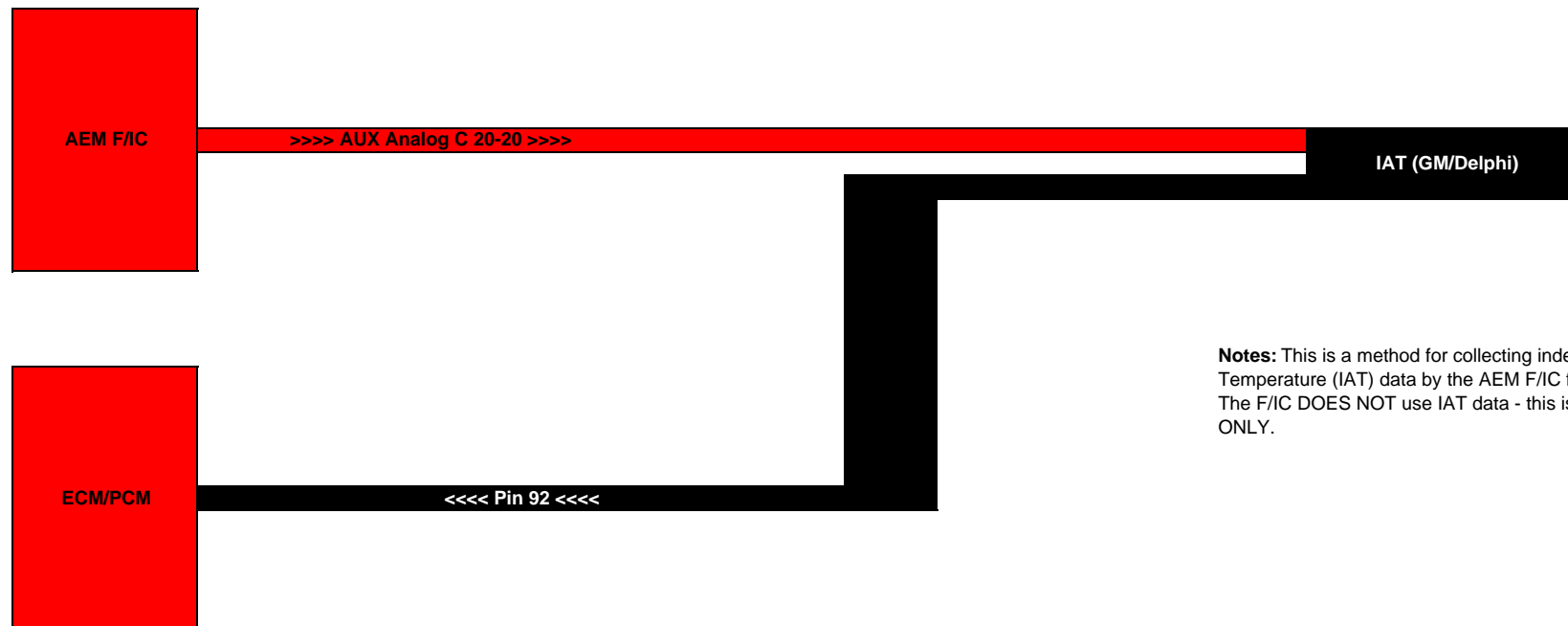
FUNCTION	BUTTON	TERMINAL
A	W/O LED	0 5 U SO
B	With LED (3VDC)	

OFF 2P SPST (ON) OFF 2P SPST ON

* () =momentary

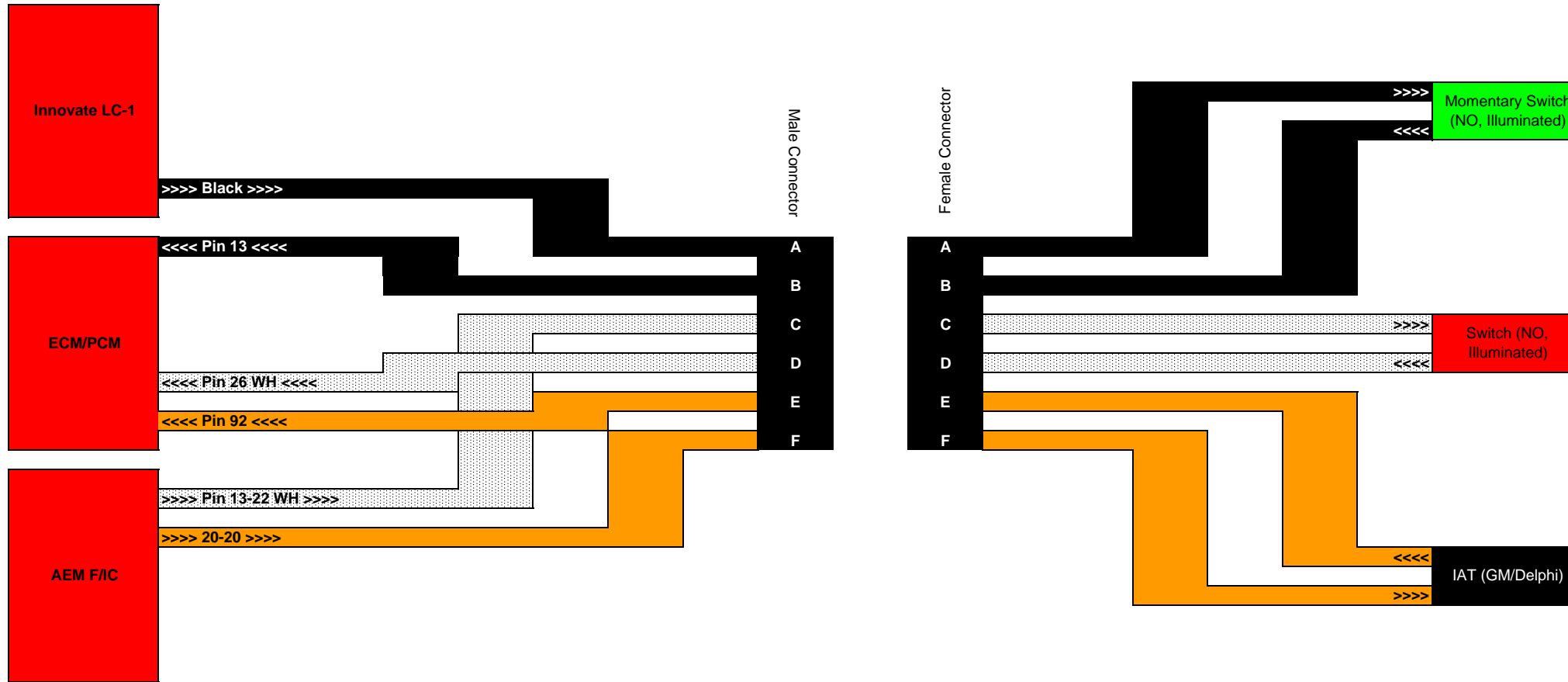
Shin Chin PN# R13-529AL-05-BGG

Engine Intake Air Temperature (IAT)

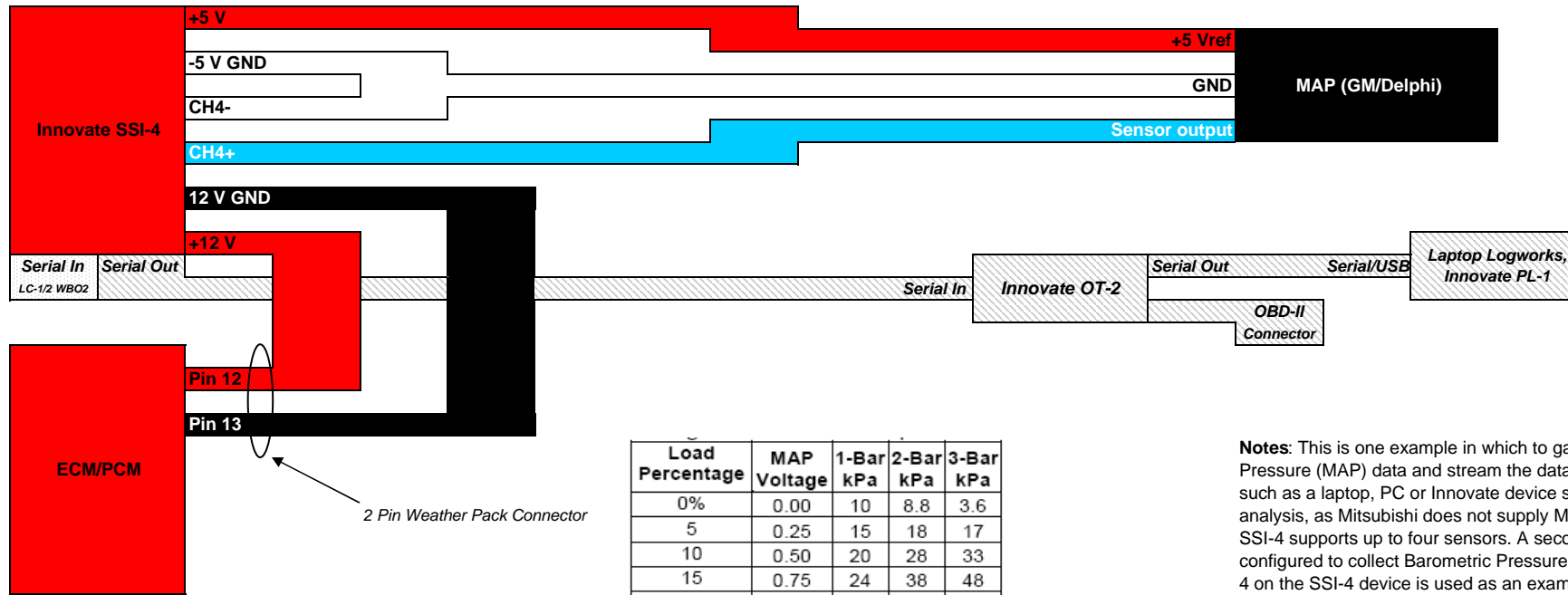


Notes: This is a method for collecting independent Intake Air Temperature (IAT) data by the AEM F/IC for logging purposes. The F/IC DOES NOT use IAT data - this is for logging purposes ONLY.

External Controls Wiring

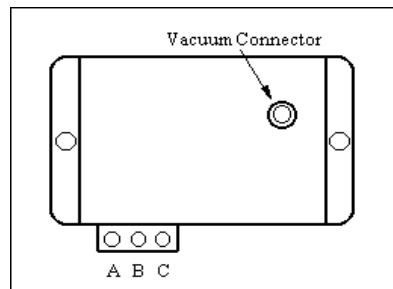


Innovate SSI-4 Sensor Interface - MAP



Part #	Description
SNSR-03056	Delphi / GM 1 Bar Map Sensor
CONN-75558	GM Delphi / Packard - 1 bar MAP Sensor Connector Kit

http://www.bmotorsports.com/shop/product_info.php/products_id/1583



Pin A: GND
Pin B: Sensor output
Pin C: +5 Vref

Load Percentage	MAP Voltage	1-Bar kPa	2-Bar kPa	3-Bar kPa
0%	0.00	10	8.8	3.6
5	0.25	15	18	17
10	0.50	20	28	33
15	0.75	24	38	48
20	1.00	29	48	64
25	1.25	34	58	80
30	1.50	39	68	96
35	1.75	43	78	111
40	2.00	48	88	127
45	2.25	53	98	143
50	2.50	58	108	159
55	2.75	62	118	174
60	3.00	67	128	190
65	3.25	72	138	206
70	3.50	77	148	222
75	3.75	81	158	237
80	4.00	86	168	253
85	4.25	91	178	269
90	4.50	96	188	285
95	4.75	100	198	300
100	5.00	105	208	315

<http://www.robietherobot.com/storm/mapsensor.htm>

Notes: This is one example in which to gather Manifold Air Pressure (MAP) data and stream the data to a logging device such as a laptop, PC or Innovate device such as the PL-1 for latta analysis, as Mitsubishi does not supply MAP data via OBD-II. The SSI-4 supports up to four sensors. A second MAP sensor may be configured to collect Barometric Pressure (BARO) data. Channel 4 on the SSI-4 device is used as an example only for simplicities' sake; the first two channels are pre-configured by Innovate for other purposes. All channels may be reconfigured by the user via Innovate's configuration tool. The Innovate LMA-1 and DS-32 have built-in MAP sensors and either may be substituted for the SSI-4. In this case, a separate MAP sensor would only be necessary to collect BARO data. **Operation:** To generate timing maps via Logworks, its necessary to chain the SSI-4 to Innovate's OT-2 OBD-II data collection device. The OT-2 supplies the necessary timing and RPM data collected from the ECM and the SSI-4 supplies MAP. In Logworks, configure the x axis as RPM, the y axis as MAP and plot Timing.

OT-2 Notes: Configure the following OBD-II PIDS in the OT-2 to collect RPM and Timing: RPM, SparkAdv. DO NOT configure these PIDS for Low Priority.

1997 Mitsubishi Montero Sport 3.0L ECM M/T & A/T



1999 Mitsubishi Montero Sport 3.5L PCM A/T



Wire Gauge Conversion Table

No code indicates 0.5 mm2

American Wire Gauge (AWG)	Diameter (in)	Diameter (mm)	Cross Sectional Area (mm2)
0	0.46	11.68	107.16
0	0.4096	10.4	84.97
0	0.3648	9.27	67.4
0	0.3249	8.25	53.46
1	0.2893	7.35	42.39
2	0.2576	6.54	33.61
3	0.2294	5.83	26.65
4	0.2043	5.19	21.14
5	0.1819	4.62	16.76
6	0.162	4.11	13.29
7	0.1443	3.67	10.55
8	0.1285	3.26	8.36
9	0.1144	2.91	6.63
10	0.1019	2.59	5.26
11	0.0907	2.3	4.17
12	0.0808	2.05	3.31
13	0.072	1.83	2.63
14	0.0641	1.63	2.08
15	0.0571	1.45	1.65
16	0.0508	1.29	1.31
17	0.0453	1.15	1.04
18	0.0403	1.02	0.82
19	0.0359	0.91	0.65
20	0.032	0.81	0.52
21	0.0285	0.72	0.41
22	0.0254	0.65	0.33
23	0.0226	0.57	0.26
24	0.0201	0.51	0.2
25	0.0179	0.45	0.16
26	0.0159	0.4	0.13

AWG	mm2	AWG	mm2	AWG	mm2	AWG	mm2
30	0.05	18	0.75	6	16	4/0	120
28	0.08	17	1	4	25	300MCM	150
26	0.14	16	1.5	2	35	350MCM	185
24	0.25	14	2.5	1	50	500MCM	240
22	0.34	12	4	1/0	55	600MCM	300
21	0.38	10	6	2/0	70	750MCM	400
20	0.5	8	10	3/0	95	1000MCM	500

Pressure Table

Altitude Above Sea Level		Absolute Barometer		Absolute Atmospheric Pressure		
feet	meters	inches Hg	mm Hg	psia	kg/cm2	kPa
-5000	-1524	35.7	908	17.5	1.23	121
-4500	-1372	35.1	892	17.2	1.21	119
-4000	-1219	34.5	876	16.9	1.19	117
-3500	-1067	33.9	861	16.6	1.17	115
-3000	-914	33.3	846	16.4	1.15	113
-2500	-762	32.7	831	16.1	1.13	111
-2000	-610	32.1	816	15.8	1.11	109
-1500	-457	31.6	802	15.5	1.09	107
-1000	-305	31	788	15.2	1.07	105
-500	-152	30.5	774	15	1.05	103
0 ¹	0	29.9	760	14.7	1.03	101
500	152	29.4	746	14.4	1.01	99.5
1000	305	28.9	733	14.2	0.997	97.7
1500	457	28.3	720	13.9	0.979	96
2000	610	27.8	707	13.7	0.961	94.2
2500	762	27.3	694	13.4	0.943	92.5
3000	914	26.8	681	13.2	0.926	90.8
3500	1067	26.3	669	12.9	0.909	89.1
4000	1219	25.8	656	12.7	0.893	87.5
4500	1372	25.4	644	12.5	0.876	85.9
5000	1524	24.9	632	12.2	0.86	84.3
6000	1829	24	609	11.8	0.828	81.2
7000	2134	23.1	586	11.3	0.797	78.2
8000	2438	22.2	564	10.9	0.768	75.3
9000	2743	21.4	543	10.5	0.739	72.4
10000	3048	20.6	523	10.1	0.711	69.7
15000	4572	16.9	429	8.29	0.583	57.2
20000	6096	13.8	349	6.75	0.475	46.6
25000	7620	11.1	282	5.45	0.384	37.6
30000	9144	8.89	226	4.36	0.307	30.1
35000	10668	7.04	179	3.46	0.243	23.8
40000	12192	5.52	140	2.71	0.191	18.7
45000	13716	4.28	109	2.1	0.148	14.5
50000	15240	3.27	83	1.61	0.113	11.1

¹ - Sea Level

(Source unknown)