

## MotoHawk Control Solutions

# Desktop I/O Simulator

**8909-1043**

### **Description**

The 8909-1043 Desktop I/O Simulator is a powerful development tool designed to easily simulate signals to the controller and measure signals generated by the controller. The desktop simulator is capable of working with any of our MotoHawk Control Solutions electronic control modules.

The I/O simulator provides easy access points for all signals, making it convenient to connect oscilloscopes, voltmeters, current meters, or other lab devices.

LED loads can easily be added to outputs for measurement and visualization by changing the switch position, or an external load can be applied via the grey banana jack ports. Slider potentiometers are provided to give (0 to 5) V input for sensors, or external sensors can easily be applied as well. In addition, CAN and serial links are available for easy databus connections.

The I/O simulator requires the purchase of a module specific companion harness. You must also supply a DC power source.



- Aluminum frame, 70° mounting for ease of use
- Scratch-free rubber feet
- Over 200 banana jacks for I/O
- 30 channels of analog input (switchable – On / Off)
- 45 channels of low- or high-side output (switchable – On / Off)
- 3 CAN channels (switchable – On / Off)
- 1 RS-485 channel (switchable – On / Off)
- 8 digital inputs (switchable – On / Off or pulled high / low)
- 10 power and ground channels (switchable – On / Off)
- XDRG, MPRD, DRVP, DRVG, and Key Switch
- 4 channels of knock sensor inputs
- 4 channels of encoder inputs
- 11 channels of miscellaneous banana inputs

## Installation

**NOTE:** The 8909-1043 I/O simulator ships with a 12 V relay installed. It is required to change the relay for 24 V applications to avoid damage to the relay.

The 8909-1043 is intended for 12 V or 24 V operation. Voltages exceeding 36 V will burn out the LEDs and damage the simulator.

An external harness to the ECU is also required and is sold separately.

### 8909-1043 / ASMCNDV002 - Front End Harnesses

CONTROLLER	FRONT END HARNESS	
	Item No.	Reference Number
ECMS12-24	5404-1199	HARNINTRO23A
GCMS12-24	5404-1200	HARNINTRO23B
GCM565-24	5404-1199	HARNINTRO23A
ECM555-48	5404-1201	HARNINTRO24A
ECM563-48	5404-1202	HARNINTRO24B
GCM563-48	5404-1203	HARNINTRO24C
HCM563-48	5404-1203	HARNINTRO24C
ECM555-80	5404-1204	HARNINTRO25A
ECM565-128	5404-1206	HARNINTRO27A
ECM5554-112	5404-1205	HARNINTRO26A
ECMS12X-070	5404-1207	HARNINTRO29A

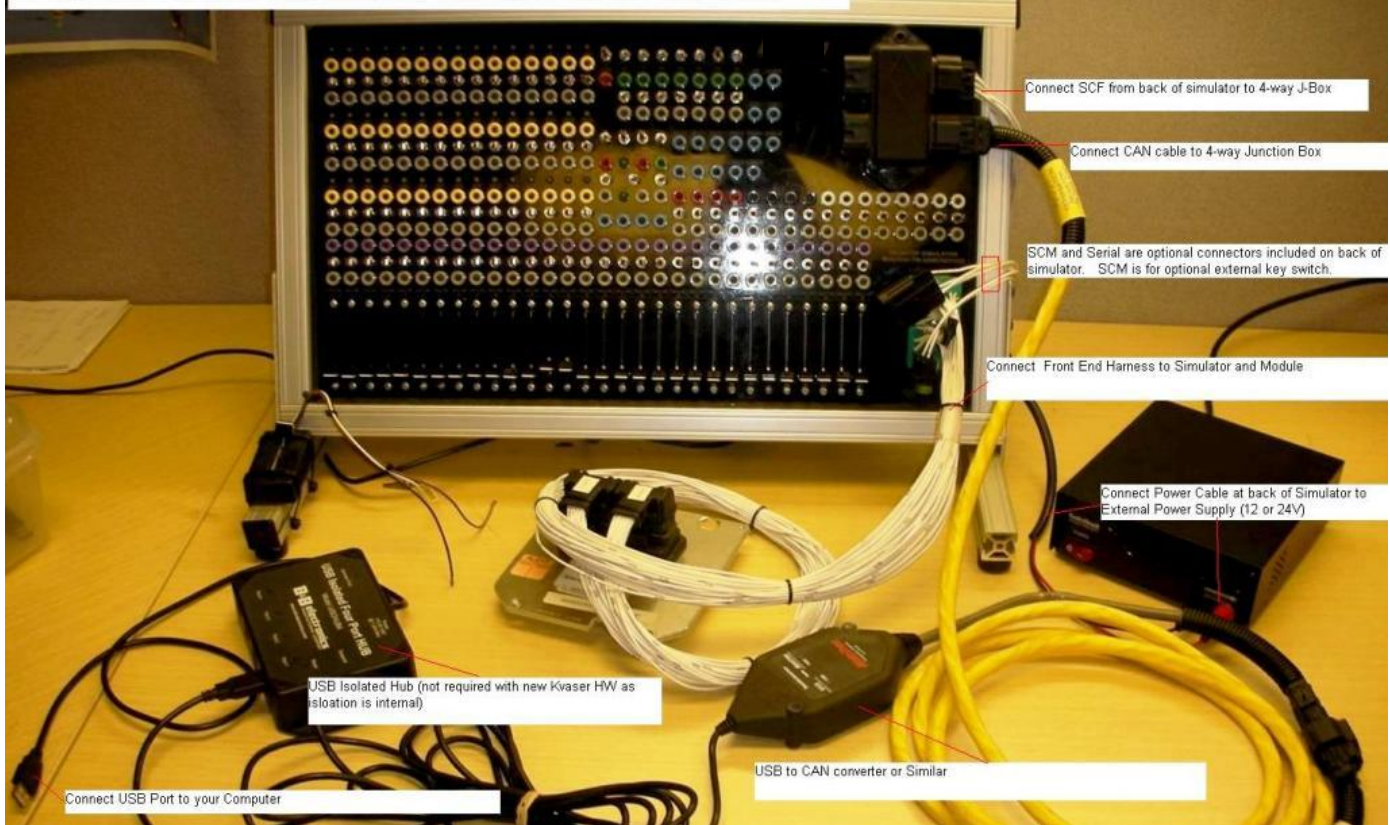
#### Make the following connections:

- SCF: Plug connector labeled SCF on the back of the simulator into the 4-way junction box on the front of the simulator.
- Power Cable: Plug the power supply cables on the back of the simulator into your power supply.
- CAN: Connect your CAN or communications cable (sold separately) into the simulator 4-way junction box.

#### Optional Connections:

- SCM: Optional connector for external key switch
- Serial: Optional connector for external serial communications

Note: Simulator is shipped with 12V relay. For 24V operation, the relay must be changed to the 24V relay or damage could result.

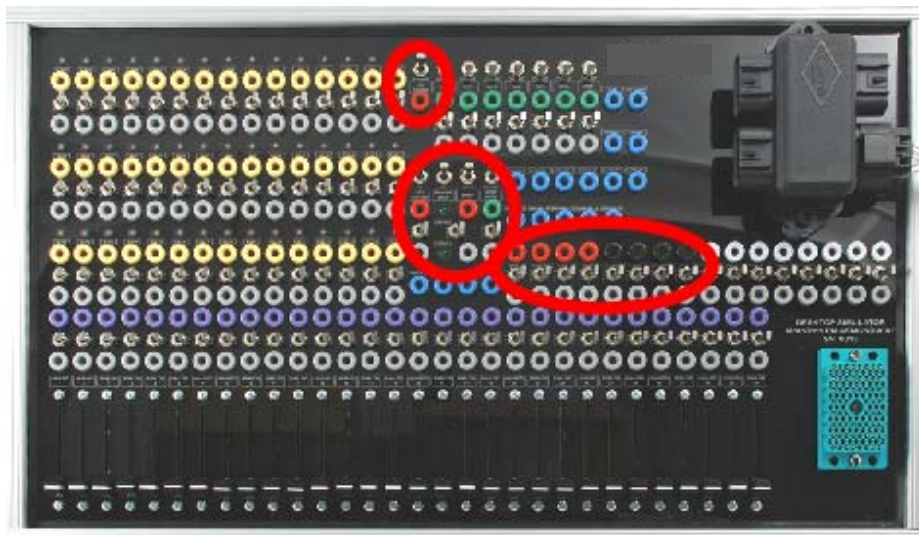


## Specifications

### Power and Ground Channels

The simulator is configured for 12 V systems. For 24 V systems, the relay connected on the back side must be changed to the 24 V relay or failure may occur. The maximum voltage is 36 V, and higher voltages will result in damage to the LEDs.

The Power and Ground Channels are located in the center of the simulator, and include BATT, XDRP A/B, XDRG, MPRD, DRVP, DRVG, EST RTN, and Key Switch. These are connected to the ECM via the harness, though the jacks allow optional external connections. The switches are normally in the ON position for normal operation.



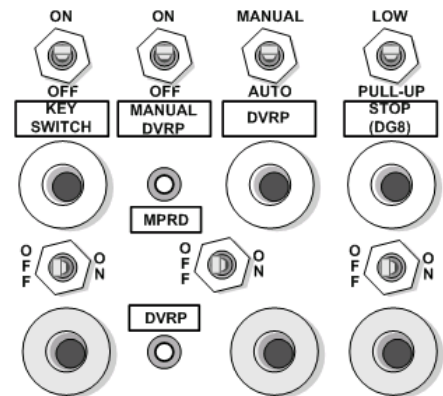


**KEY SWITCH (ECUP):** The KEY SWITCH interface includes a top, vertical-direction ON/OFF switch, which connects directly to the key-switch (ECUP) input to the ECM, to turn the ECM keyswitch on/off. The other, side-to-side switch enables/disables the ON/OFF function of the top switch. The red jack allows connection of an external keyswitch input. Note: Some ECMs use the key switch input, others do not. Refer to the datasheet for your ECM.

**MANUAL/DVRP (driver power):** This switch controls whether DVRP is controlled manually or by the application software. You can turn the DVRP to the ECM on/off via the MANUAL/DVRP ON/OFF switch, if the DVRP switch (below) is set to MANUAL. The other, side-to-side switch enables/disables the ON/OFF function of the top switch.

**DVRP (driver power):** You can turn the MANUAL DVRP on/off via the DVRP ON/OFF switch. When the switch is OFF, the DRVP power is automatically supplied. When ON, use of the MANUAL DVRP ON/OFF switch controls the DVRP power.

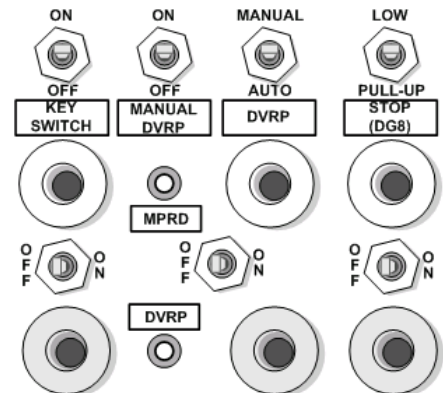
**STOP (DG8):** The STOP interface includes a top, vertical-direction LOW/PULL-UP, which connects directly to the E-STOP input to the ECM (the DG8 input acts as a STOP input on the 128 pin ECM). The other, side-to-side switch enables/disables the ON/OFF function of the top switch. The red jack allows connection of an external STOP input.



**XDRP A/B:** The two XDRP jacks, A and B, each include a side-to-side ON/OFF switch, which turns the respective transducer power on/off.

**BATT:** Battery power to the ECU can be turned on/off via the BATT ON/OFF switch.

**MPRD:** The main power relay driver can be turned on/off via the MPRD ON/OFF switch.

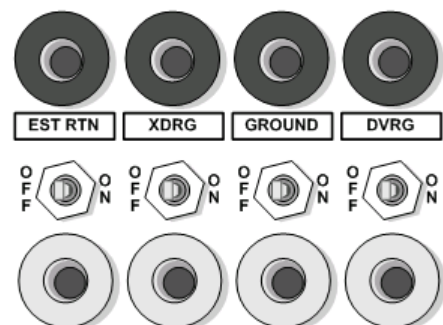


**EST RTN:** The EST RTN input provides connection to the EST return resource on the connected ECM. You can connect or disconnect the EST return to the ECM via the EST RTN ON/OFF switch.

**XDRG:** The transducer ground to the ECM can be turned on/off via the XDRG ON/OFF switch.

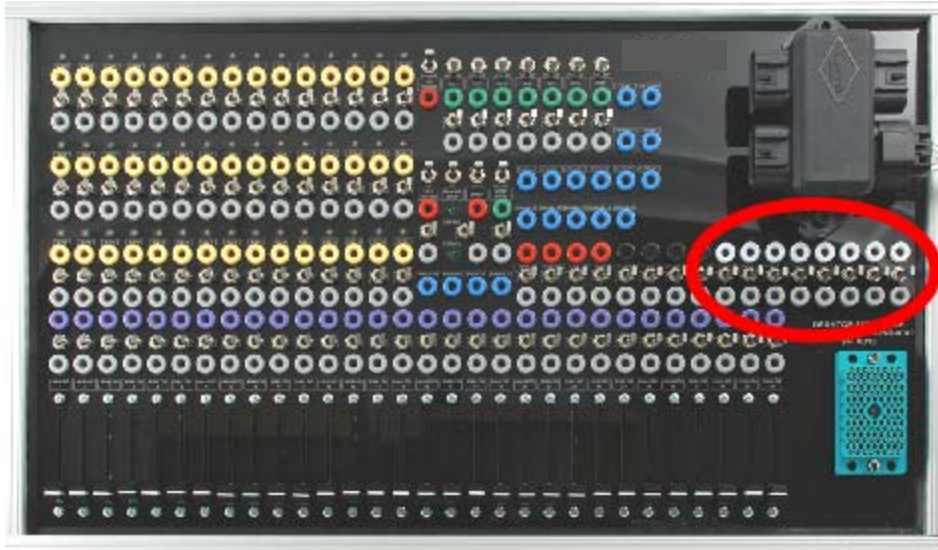
**GROUND:** The power ground to the ECM can be connected/disconnected via the GROUND ON/OFF switch.

**DVRG:** Driver ground can be connected/disconnected via the DRVG ON/OFF switch.



## Communications

The simulator supports connecting up to three CAN channels, and an RS-485 channel. The jacks are located at the right side of the simulator just below the junction box and above the harness connector. Each connection includes an OFF/ON switch to disable/enable the channel connection. The CAN channels are internally terminated with 120  $\Omega$  resistance.



## Output Sections

These outputs connect to your ECM output pins, by designation, and in order of resource number. Refer to the datasheet for your particular ECM for resources available. Depending on the resources of the particular ECM in use, some of the simulator output jacks may not be in use. See the end of this guide for ECU/simulator pin cross reference chart. The grey banana jack connects directly to the ECU pins.

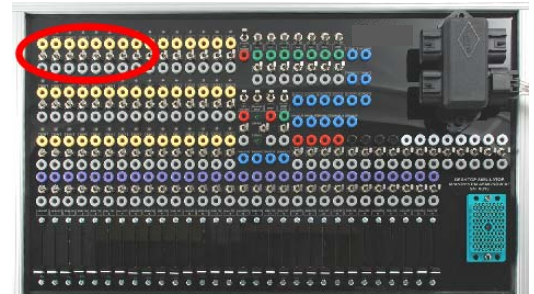
**LEDs:** The LEDs above connect through 1.5 k $\Omega$  resistors such that the outputs show current direction. The LEDs turn on green if a Low Side Output is active and set up as “low-side.” The LED shows red if the output is active as “high-side.”

**ON/OFF:** You can turn the output on/off via the switch. When off, the yellow (top) jack is inactive and the monitor (grey) jack is usable with the switch in either the ON or OFF position. An External load can be connected via the grey input.



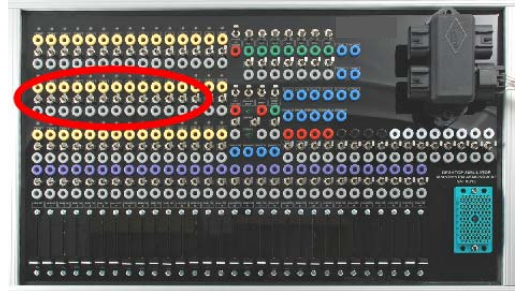
### Low Side Outputs

Labeled LSO1-LSO8, eight Low Side Outputs are located in the upper left corner of the simulator.



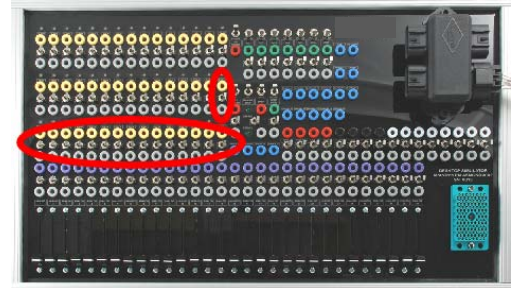
**INJ Outputs**

Labeled INJ1-INJ12, twelve fuel injector Outputs are located at the left side of the simulator.

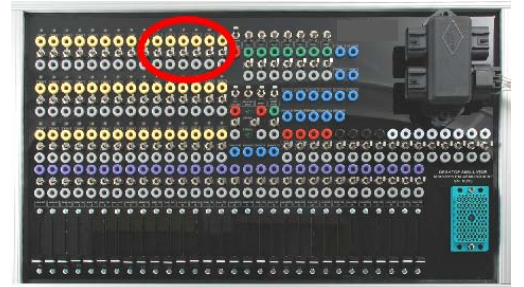
**EST Outputs**

Labeled EST1-EST16, the 16 electronic spark timing outputs are located at the left side of the simulator.

**NOTE:** In order to see EST firing indications, turn the respective EST LED ON/OFF switch to OFF.

**H-Bridge Outputs**

Labeled H1+, H1-, H2+, H2-, and H3+, H3-, the six H-bridge connections are located at the top center of the simulator. The LED will light green when the H-bridge is sinking current, and red when the H-bridge is sourcing current (high side).



## ***Input Sections***

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**Analog Inputs**

Labeled Analog 1 to Analog 30, the Analog Inputs (switchable – On / Off) are located along the bottom of the simulator, together with dedicated potentiometer sliders, (0 to 5) V. The slider potentiometers form a voltage divider with XDRP and XDRG. To connect your own sensor, use the gray jack, and switch the corresponding ON/OFF switch to OFF.





### Digital Inputs

The simulator supports up to seven digital inputs, labeled DG1-DG7. The jacks are located at top center of the simulator. The digital inputs each have a switch for setting input to low or pull-up, along with on-off switches.

**LOW/PULL-UP:** Switch input as needed for either pull-down or pull-up connection.

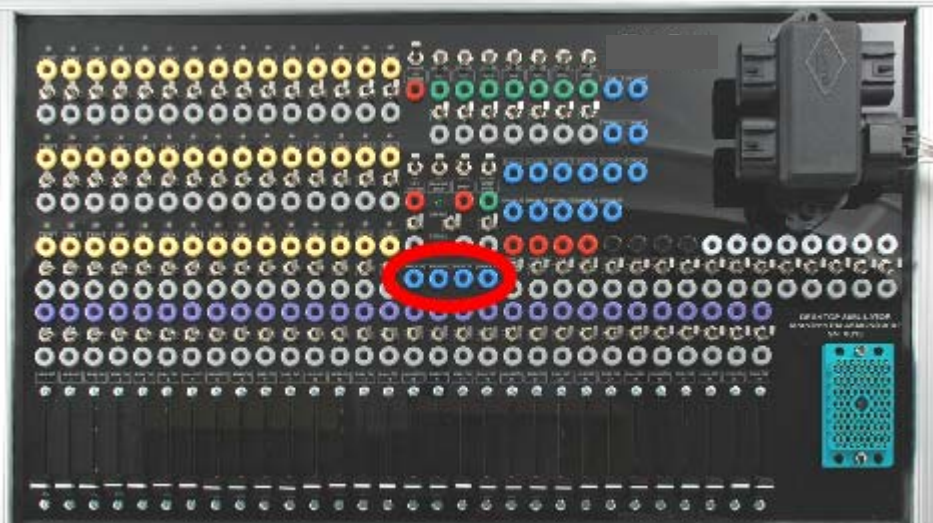
**INPUT JACKS:** The bottom jack (grey) of each output directly connects to the respective ECM input resource.

**ON/OFF:** You can turn the input on/off via the switch. When off, the green input (top) jack is inactive, and signal can be sourced from an external Boolean signal to the ECU pin. When the switch is on, moving the LOW/PULL-UP switch connects a LOW/HIGH signal to the ECU pin from the simulator.



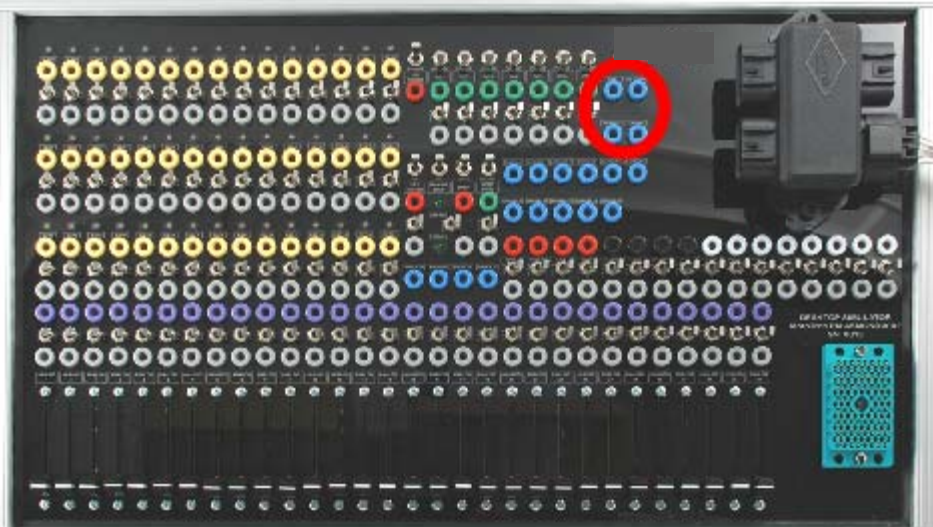
### Knock Sensor Inputs

Labeled Knock0 +/- and Knock1 +/-, the four knock sensor connector jacks are located in the center of the simulator. There are no associated switches or monitors; user must supply the knock input signal to the simulator. These are for modules with knock input and may be disconnected or connected to other module resources. See your module datasheet.



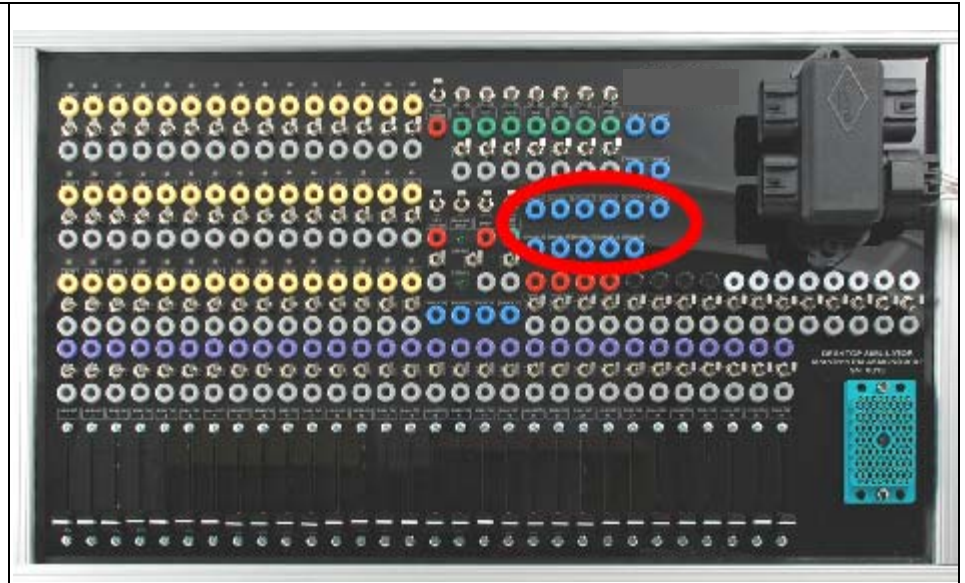
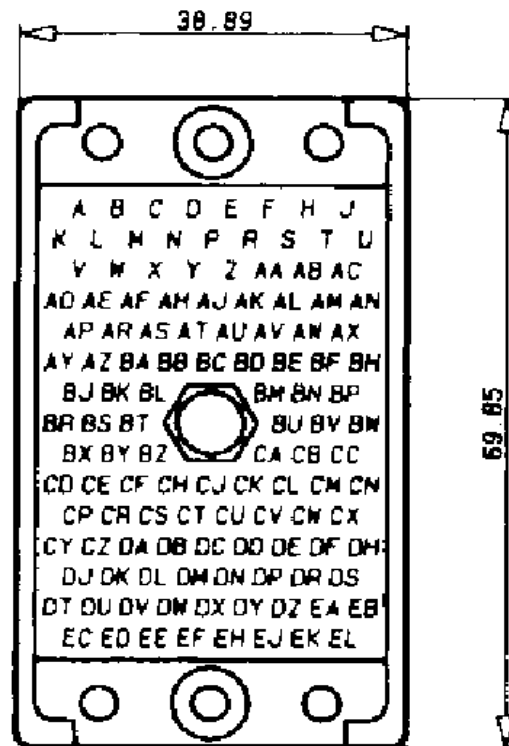
### Cam/Crank Inputs

The four Cam and Crank inputs are located at the top of the simulator, labeled CAM and DG CAM, and Crank+/. There are no associated switches or monitors; user must supply the respective sensor input signal to the simulator.



**Miscellaneous Non-assigned Jacks**

There are 11 general assignment jacks.  
See next page for cross reference to  
your module hardware.

**Pinout of Front Panel Connector**

PLUG



# Module – Simulator Cross Reference

## 24-Pin Modules

Module		Type	GCM-0S12-024		ECM-0S12-024				
Simulator			ALL		0502/0802		0503/0801/ 0803/0804		
Pin	Label	Type	Pin	Name	Pin	Name	Pin	Name	
1	A	GROUND	Ground	A14	DRVG	A14	DRVG		
2	B	DRVG	Ground						
3	C	ETC B	LED						
4	D	ETC A	LED						
5	E	EST6	LED						
6	F	INJ6	LED						
7	H	EST7	LED						
8	J	LSO8	LED						
9	K	BANANA 9	Banana						
10	L	INJ8	LED						
11	M	INJ2	LED						
12	N	LSO6	LED						
13	P	INJ7	LED						
14	R	INJ1	LED						
15	S	INJ5	LED						
16	T	EST4	LED						
17	U	EST8	LED						
18	V	EST RTN	Ground						
19	W	EST5	LED						
20	X	EST1	LED		A07	EST 1	A07	AN10M	
21	Y	EST3	LED		A08	EST 3	A08	AN12M	
22	Z	ANALOG 22	POT						
23	AA	DRVP	Power						
24	AB	BANANA 10	Banana						
25	AC	EST2	LED		A20	EST 2	A20	AN11M	
26	AD	STOP (DG8)	Switch	A21	ESTOP				
27	AE	LSO5	LED						
28	AF	LSO3	LED	A23	LSO3				
29	AH	MPRD	Power						
30	AJ	TACH	LED						
31	AK	INJ4	LED						
32	AL	LSO7	LED						
33	AM	INJ3	LED						
34	AN	LSO1	LED	A12	LSO1	A12	LSO1	A12	LSO1
35	AP	LSO2	LED	A24	LSO2	A21	LSO2	A21	LSO2
36	AR	ANALOG 20	POT						
37	AS	ANALOG 21	POT						
38	AT	ANALOG 1	POT	A05	AN1M				
39	AU	ANALOG 2	POT	A17	AN2M				
40	AV	ANALOG 3	POT	A04	AN3M	A05	AN3M	A05	AN3M
41	AW	ANALOG 4	POT	A16	AN4M	A17	AN4M	A17	AN4M
42	AX	ANALOG 5	POT	A03	AN5M	A04	AN5M	A04	AN5M
43	AY	ANALOG 6	POT	A15	AN6M	A16	AN6M	A16	AN6M
44	AZ	ANALOG 7	POT		A03	AN7M	A03	AN7M	
45	BA	ANALOG 8	POT		A15	AN8M	A15	AN8M	
46	BB	ANALOG 9	POT		A02	AN9M	A02	AN9M	
47	BC	ANALOG 10	POT		A23	AN10M	A23	LSO3	
48	BD	ANALOG 11	POT		A11	TACHLINK	A11	LSO6	
49	BE	ANALOG 12	POT						
50	BF	ANALOG 13	POT						
51	BH	ANALOG 14	POT						
52	BJ	ANALOG 15	POT						
53	BK	ANALOG 16	POT						
54	BL	ANALOG 17	POT						
55	BM	ANALOG 18	POT						
56	BN	ANALOG 19	POT						
57	BP	CAN 1+ (P)	Coms	A09	CAN 1+	A06	CAN 1+	A06	CAN 1+
58	BR	KEYSWITCH	Power	A02	KEYSW	A13	ECUP	A13	ECUP
59	BS	XDRP A	Power	A18	XDRP	A18	XDRP	A18	XDRP
60	BT	XDRP B	Power						
60	BT	XDRP B	Power						
61	BU	CAN 2+ (X)	Coms	A07	CAN2+				
62	BV	CAN 2- (X)	Coms	A06	CAN2-				
63	BW	CAN 1- (P)	Coms	A08	CAN 1-	A19	CAN 1-	A19	CAN 1-
64	BX	XDRG	Ground	A01	XDRG	A01	XDRG	A01	XDRG
65	BY	POW SUP+	Power	A13	BATT				
66	BZ	BANANA 12	Banana						
67	CA	BANANA 13	Banana						
68	CB	BANANA 14	Banana						
69	CC	BANANA 15	Banana						
70	CD	RS485+	Coms						
71	CE	RS485-	Coms						
72	CF	CRANK+	Banana			A09	CNK+	A09	CNK+
73	CH	BANANA 5	Banana						
74	CJ	CAM	Banana						
75	CK	DG CRANK	Banana						
76	CL	CRANK-	Banana			A10	CNK-	A10	CNK-
77	CM	DG1	Switch	A11	DG1M				
78	CN	DG2	Switch	A10	DG2M				
79	CP	DG3	Switch	A20	DG3M				
80	CR	DG4	Switch	A19	DG4M				
81	CS	INJ10	LED						
82	CT	INJ9	LED						
83	CU	LSO4	LED	A22	LSO4				
84	CV	CAN 3+ (V)	Coms						
85	CW	CAN 3- (V)	Coms						
86	CX	BANANA 11	Banana						
87	CY	H1-	LED			A22	H+	A22	LSO5
88	CZ	H1+	LED			A24	H-	A24	LSO4
89	DA	INJ12	LED						
90	DB	INJ11	LED						
91	DC	DG5	Switch						
92	DD	DG6	Switch						
93	DE	DG7	Switch						
94	DF	BANANA 8	Banana						
95	DH	BANANA 6	Banana						
96	DJ	ANALOG 23	POT						
97	DK	ANALOG 24	POT						
98	DL	ANALOG 27	POT						
99	DM	ANALOG 28	POT						
100	DN	ANALOG 29	POT						
101	DP	ANALOG 30	POT						
102	DR	ANALOG 26	POT						
103	DS	ANALOG 25	POT						
104	DT	H2-	LED						
105	DU	H2+	LED						
106	DV	H3-	LED						
107	DW	H3+	LED						
108	DX	EST10	LED						
109	DY	EST9	LED						
110	DZ	EST15	LED						
111	EA	EST11	LED						
112	EB	EST13	LED						
113	EC	EST14	LED						
114	ED	EST12	LED						
115	EE	EST16	LED						
116	EF	BANANA 7	Banana						
117	EH	KNOCK 0+	Banana						
118	EJ	KNOCK 0-	Banana						
119	EK	KNOCK 1+	Banana						
120	EL	KNOCK 1-	Banana						

## 48-Pin Modules 555 Processor

Module		Type	ECM-0555-048									
Simulator		Type	0701		0707		0708		0704		0710	
Pin	Label	Type	Pin	Name	Pin	Name	Pin	Name	Pin	Name	Pin	Name
1	A GROUND	Ground	A16	DRVG	A16	DRVG	A16	DRVG	A16	DRVG	A16	DRVG
2	B DRVG	Ground	A24	DRVG	A24	DRVG	A24	DRVG	A24	DRVG	A24	DRVG
3	C ETC B	LED										
4	D ETC A	LED										
5	E EST6	LED										
6	F INJ6	LED										
7	H EST7	LED										
8	J LSO8	LED										
9	K BANANA 9	Banana										
10	L INJ8	LED										
11	M INJ2	LED	A2	FUEL2	A2	FUEL2	A2	FUEL2	A2	FUEL2	A2	FUEL2
12	N LSO6	LED										
13	P INJ7	LED										
14	R INJ1	LED	A17	FUEL1	A17	FUEL1	A17	FUEL1	A17	FUEL1	A17	FUEL1
15	S INJ5	LED										
16	T EST4	LED	B16	EST4	B16	AN20M	B16	AN20M	B16	EST4	B16	EST4
17	U EST8	LED										
18	V EST RTN	Ground	B17	EST_RTN	B17	EST_RTN	B17	EST_RTN	B17	EST_RTN	B17	EST_RTN
19	W EST5	LED										
20	X EST1	LED	B23	EST 1	B23	EST 1	B23	EST 1	B23	EST 1	B23	EST 1
21	Y EST3	LED	B15	EST3	B15	AN17M	B15	AN17M	B15	EST3	B15	EST3
22	Z ANALOG 22	POT										
23	AA DRVP	Power	A23	DRVP	A23	DRVP	A23	DRVP	A23	DRVP	A23	DRVP
24	AB BANANA 10	Banana										
25	AC EST2	LED	B24	EST2	B24	EST2	B24	AN16M	B24	EST2	B24	EST2
26	AD STOP (DG8)	Switch	A15	STOP	A15	STOP	A15	STOP	A15	STOP	A15	STOP
27	AE LSO5	LED	A03	SPARE	A03	SPARE	A03	SPARE	A03	SPARE	A03	SPARE
28	AF LSO3	LED	A19	FUELP	A19	FUELP	A19	FUELP	A19	FUELP	A19	FUELP
29	AH MPRD	Power	A22	MPRD	A22	MPRD	A22	MPRD	A22	MPRD	A22	MPRD
30	AJ TACH	LED	A10	TACH	A10	TACH	A10	TACH	A10	TACH	A10	TACH
31	AK INJ4	LED	A18	FUEL4	A18	FUEL4	A18	FUEL4	A18	FUEL4	A18	FUEL4
32	AL LSO7	LED										
33	AM INJ3	LED	A01	FUEL3	A01	FUEL3	A01	FUEL3	A01	FUEL3	A01	FUEL3
34	AN LSO1	LED	A20	LAIC	A20	LAIC	A20	LAIC	A20	LAIC	A20	LAIC
35	AP LSO2	LED	A09	HORN	A09	HORN	A09	HORN	A09	HORN	A09	HORN
36	AR ANALOG 20	POT										
37	AS ANALOG 21	POT										
38	AT ANALOG 1	POT	B03	AN1M	B03	AN1M	B03	AN1M	B03	AN1M	B03	AN1M
39	AU ANALOG 2	POT	B11	AN2M	B11	AN2M	B11	AN2M	B11	AN2M	B11	AN2M
40	AV ANALOG 3	POT	B12	AN3M	B12	AN3M	B12	AN3M	B12	AN3M	B12	AN3M
41	AW ANALOG 4	POT	B20	AN4M	B20	AN4M	B20	AN4M	B20	AN4M	B20	AN4M
42	AX ANALOG 5	POT	B08	AN5M	B08	AN5M	B08	AN5M	B08	AN5M	B08	AN5M
43	AY ANALOG 6	POT										
44	AZ ANALOG 7	POT										
45	BA ANALOG 8	POT										
46	BB ANALOG 9	POT	B02	AN9M	B02	AN9M	B02	AN9M	B02	AN9M	B02	AN9M
47	BC ANALOG 10	POT	B14	AN10M	B14	AN10M	B14	AN10M	B14	AN10M	B14	AN10M
48	BD ANALOG 11	POT	B13	AN11M	B13	AN11M	B13	AN11M	B13	AN11M	B13	AN11M
49	BE ANALOG 12	POT										
50	BF ANALOG 13	POT										
51	BH ANALOG 14	POT	B04	AN14M	B04	AN14M	B04	AN14M	B04	AN14M	B04	AN14M
52	BJ ANALOG 15	POT	B19	AN15M	B19	AN15M	B19	AN15M	B19	AN15M	B19	AN15M
53	BK ANALOG 16	POT										
54	BL ANALOG 17	POT										
55	BM ANALOG 18	POT	B07	AN18M	B07	AN18M	B07	AN18M	B07	AN18M	B07	AN18M
56	BN ANALOG 19	POT	B22	AN19M	B22	AN19M	B22	AN19M	B22	AN19M	B22	AN19M
57	BP CAN 1+ (P)	Coms	A04	CAN 1+	A04	CAN 1+	A04	CAN 1+	A04	CAN 1+	A04	CAN 1+

Module		Type	ECM-0555-048									
Simulator		Type	0701		0707		0708		0704		0710	
Pin	Label	Type	Pin	Name	Pin	Name	Pin	Name	Pin	Name	Pin	Name
58	BR KEY SWITCH	Power	B18	ECUP	B18	ECUP	B18	ECUP	B18	ECUP	B18	ECUP
59	BS XDRP A	Power	B21	XDRP	B21	XDRP	B21	XDRP	B21	XDRP	B21	XDRP
60	BT XDRP B	Power										
61	BU CAN 2+ (X)	Coms										
62	BV CAN 2- (X)	Coms										
63	BW CAN 1- (P)	Coms	A11	CAN 1-	A11	CAN 1-	A11	CAN 1-	A11	CAN 1-	A11	CAN 1-
64	BX XDRG	Ground	B01	XDRG	B01	XDRG	B01	XDRG	B01	XDRG	B01	XDRG
65	BY POW SUP+	Power										
66	BZ BANANA 12	Banana										
67	CA BANANA 13	Banana										
68	CB BANANA 14	Banana										
69	CC BANANA 15	Banana										
70	CD RS485+	Coms	A12	SCL+	A12	SCL+	A12	SCL+	A12	SCL+	A12	SCL+
71	CE RS485-	Coms	A05	SCL-	A05	SCL-	A05	SCL-	A05	SCL-	A05	SCL-
72	CF CRANK+	Banana	B05	CNK+	B05	CNK+	B05	CNK+	B05	CNK+	B05	CNK+
73	CH BANANA 5	Banana										
74	CJ CAM	Banana	B10	CAM_DG	B10	CAM_DG	B10	CAM_DG	B10	CAM_DG	B10	CAM_DG
75	CK DG CRANK	Banana										
76	CL CRANK-	Banana	B06	CNK-	B06	CNK-	B06	CNK-	B06	CNK-	B06	CNK-
77	CM DG1	Switch	A21	DG1M	A21	DG1M	A21	DG1M	A21	DG1M	A21	DG1M
78	CN DG2	Switch	A08	DG2M	A08	DG2M	A08	DG2M	A08	DG2M	A08	DG2M
79	CP DG3	Switch										
80	CR DG4	Switch	B09	DG4M	B09	DG4M	B09	DG4M	B09	DG4M	B09	DG4M
81	CS INJ10	LED										
82	CT INJ9	LED										
83	CU LSO4	LED										
84	CV CAN 3+ (V)	Coms										
85	CW CAN 3- (V)	Coms										
86	CX BANANA 11	Banana										
87	CY H1-	LED										
88	CZ H1+	LED										
89	DA INJ12	LED										
90	DB INJ11	LED										
91	DC DG5	Switch										
92	DD DG6	Switch										
93	DE DG7	Switch										
94	DF BANANA 8	Banana										
95	DH BANANA 6	Banana										
96	DJ ANALOG 23	POT										
97	DK ANALOG 24	POT										
98	DL ANALOG 27	POT										
99	DM ANALOG 28	POT										
100	DN ANALOG 29	POT										
101	DP ANALOG 30	POT										
102	DR ANALOG 26	POT										
103	DS ANALOG 25	POT										
104	DT H2-	LED										
105	DU H2+	LED										
106	DV H3-	LED										
107	DW H3+	LED										
108	DX EST10	LED										
109	DY EST9	LED										
110	DZ EST15	LED										
111	EA EST11	LED										
112	EB EST13	LED										
113	EC EST14	LED										
114	ED EST12	LED										
115	EE EST16	LED										
116	EF BANANA 7	Banana										
117	EH KNOCK 0+	Banana	A13	EK0P	A13	EK0P	A13	EK0P	A13	AN12M	A13	EK0P
118	EJ KNOCK 0-	Banana	A06	EK0N	A06	EK0N	A06	EK0N	A06	AN13M	A06	EK0N
119	EK KNOCK 1+	Banana	A14	DG3M	A14	EK1P	A14	EK1P	A14	DG3M	A14	EK1P
120	EL KNOCK 1-	Banana	A07	LSO1	A07	EK1N	A07	EK1N	A07	N/C	A07	EK1N







## 70, 112, and 128-Pin Modules

Module			Type	ECM-0S12-70		ECM-555-80		ECM-5554-112		ECM-0565-128	
Simulator			Type	ALL		ALL		ALL		ALL	
Pin	Label	Type	Pin	Name	Pin	Name	Pin	Name	Pin	Name	
1	A	GROUND	Ground	A68	VBATT-	C15	DRVG	C-G1	PWRGNDA	J2A16	DVRGA
2	B	DRVG	Ground	A70	VBATT-	C16	DRVG	C-G2	PWRGNDB	J1A24	XDRG_B
3	C	ETC B	LED			C02	ETC B	A-C4	LSO14	J2B20	LSO10
4	D	ETC A	LED			C04	ETC A	A-D1	LSO13	J2B18	LSO9
5	E	EST6	LED			C12	EST 6	A-B3	EST6	J2A11	EST6
6	F	INJ6	LED			C21	FI6D	A-G2	INJ6	J2A05	INJ06
7	H	EST7	LED			C13	EST 7	A-B2	EST7	J2A21	EST7
8	J	LSO8	LED	A56	LSO8	C10	HSOL4	A-E2	LSO8	J2B19	LSO8
9	K	BANANA 9	Banana			C24	DRVG	B-K4	O2D+	J1A01	SPD1
10	L	INJ8	LED			C03	A12D(FI8D)	A-F4	INJ8	J2A04	INJ08
11	M	INJ2	LED	A50	INJ2	C11	FI2D	A-H2	INJ2	J2A03	INJ02
12	N	LSO6	LED	43	LSO6	C19	HSOL2	B-M1	LSO6	J2B15	LSO6
13	P	INJ7	LED			C05	A11D(FI7D)	A-F3	INJ7	J2A02	INJ07
14	R	INJ1	LED	A49	INJ1	C06	FI1D	A-H1	INJ1	J2A01	INJ01
15	S	INJ5	LED	A60	LSO9	C23	FI5D	A-G1	INJ5	J2A08	INJ05
16	T	EST4	LED			C07	EST 4	A-A1	EST4	J2A20	EST4
17	U	EST8	LED			C14	EST 8	A-B1	EST8	J2A23	EST8
18	V	EST RTN	Ground			B01	EST_RTN	B-L4	GNDREF	J2A22	EST_RTN
19	W	EST5	LED			B09	EST 5	A-B4	EST5	J2A10	EST5
20	X	EST1	LED	A32	SPRK_IGBT1	B02	EST 1	A-A4	EST1	J2A12	EST1
21	Y	EST3	LED	A66	SPRK_IGBT3	B10	EST 3	A-A2	EST3	J2A14	EST3
22	Z	ANALOG 22	POT					C-E3	AN22	J1C04	AN22M
23	AA	DRVP	Power	A57	DRVP1	B18	DRVP	C-G3	DRIVEPWRA	J2A18	DRVP
24	AB	BANANA 10	Banana			B17	DRVP			J1A12	SPD2
25	AC	EST2	LED	A33	SPRK_IGBT2	C08	EST 2	A-A3	EST2	J2A13	EST2
26	AD	STOP (DG8)	Switch	A41	STOP	B23	STOP	B-H3	STOP	J1C14	EK4NDG8
27	AE	LSO5	LED	A63	LSO5	C01	HSOL1	B-M4	LSO5	J2B12	LSO5
28	AF	LSO3	LED	A16	LSO3	B11	FUEL P	A-F1	LSO3	J1A23	LSO3
29	AH	MPRD	Power	A8	MPRD	B04	MPRD	A-D3	MPRD	J1B18	MPRD
30	AJ	TACH	LED	A4	TACH_LINK	B12	TACH	A-C1	TACH LINK	J1A22	TACH
31	AK	INJ4	LED	A48	INJ4	B20	FI4D	A-G4	INJ4	J2A06	INJ04
32	AL	LSO7	LED	A2	LSO7	C09	HSOL3	B-M2	LSO7	J2B17	LSO7
33	AM	INJ3	LED	A65	INJ3	B22	FI3D	A-G3	INJ3	J2A07	INJ03
34	AN	LSO1	LED	A69	LSO1	B07	OILP	A-F2	LSO1	J1B19	LSO2_LSUH2
35	AP	LSO2	LED	A3	LSO2	B08	START	A-E1	LSO2	J1B20	LSO1_LSUH1
36	AR	ANALOG 20	POT					B-L3	AN20	J1C09	AN20M
37	AS	ANALOG 21	POT					B-B4	AN21	J1C02	AN21M
38	AT	ANALOG 1	POT	A22	AN1	A03	AN1M	B-E3	AN01	J1A14	AN1M
39	AU	ANALOG 2	POT	A20	AN2	A04	AN2M	B-F1	AN02	J1A18	AN2M
40	AV	ANALOG 3	POT	A21	AN3	A05	AN3M	B-F2	AN03	J1A08	AN3M
41	AW	ANALOG 4	POT	A53	AN4	A06	AN4M	C-C3	AN04	J1A29	AN4M
42	AX	ANALOG 5	POT	A54	AN5	A07	AN5M	C-A1	AN05	J1A30	AN5M
43	AY	ANALOG 6	POT	A39	AN6	A08	AN6M	C-A2	AN06	J1A06	AN6M
44	AZ	ANALOG 7	POT	A55	AN7	A09	AN7M	C-F2	AN07	J1A21	AN7M
45	BA	ANALOG 8	POT	A18	AN8	A10	AN8M	C-A4	AN08	J1A17	AN8M
46	BB	ANALOG 9	POT	A12	AN9	A14	AN9M	C-B1	AN09	J1A25	AN9M
47	BC	ANALOG 10	POT	A35	AN10	A15	AN10M	C-B2	AN10	J1A16	AN10M
48	BD	ANALOG 11	POT	A6	AN11	A16	AN11M	C-B3	AN11	J1A26	AN11M
49	BE	ANALOG 12	POT	A38	AN12	A17	AN12M	C-B4	AN12	J1A15	AN12M
50	BF	ANALOG 13	POT	A37	AN13	A25	AN13M	C-C1	AN13	J1A10	AN13M
51	BH	ANALOG 14	POT	A36	AN14	A26	AN14M	B-F3	AN14	J1A28	AN14M
52	BJ	ANALOG 15	POT	A40	AN15	A27	AN15M	C-A3	AN15	J1A05	AN15M
53	BK	ANALOG 16	POT	A7	AN16	A02	AN16M-O2BHI	B-A4	AN16	J1A27	AN16M
54	BL	ANALOG 17	POT	A44	AN17	A12	AN17M-O2BLO	C-E2	AN17	J1A07	AN17M



Module		Type	ECM-0S12-70		ECM-555-80		ECM-5554-112		ECM-0565-128	
Simulator			ALL		ALL		ALL		ALL	
Pin	Label	Type	Pin	Name	Pin	Name	Pin	Name	Pin	Name
52	<b>BJ</b> ANALOG 15	POT	A40	AN15	A27	AN15M	C-A3	AN15	J1A05	AN15M
53	<b>BK</b> ANALOG 16	POT	A7	AN16	A02	AN16M-O2BHI	B-A4	AN16	J1A27	AN16M
54	<b>BL</b> ANALOG 17	POT	A44	AN17	A12	AN17M-O2BLO	C-E2	AN17	J1A07	AN17M
55	<b>BM</b> ANALOG 18	POT	A19	AN18	A24	AN18M-O2ALO	B-C4	AN18	J1C10	AN18M
56	<b>BN</b> ANALOG 19	POT			A13	AN19M-O2AHI	B-D4	AN19	J1C11	AN19M
57	<b>BP</b> CAN 1+ (P)	Coms	A23	CAN1H	A11	CAN 1+	B-A1	CAN1H	J1B09	CAN1+
58	<b>BR</b> KEYSWITCH	Power	A52	KEYSW	A01	ECUP	B-G4	KEY	J1B02	KEY_SW
59	<b>BS</b> XDRP A	Power	A34	XDRP1	A23	XDRP	C-D4	XDRP1	J1B11	XDRP_A
60	<b>BT</b> XDRP B	Power	A51	XDRP2	B24	XDRP_B	C-E4	XDRP2	J1A11	XDRP_B
61	<b>BU</b> CAN 2+ (X)	Coms	A26	CAN2H	A31	CAN 2+	B-C1	CAN2H	J1C17	CAN2+
62	<b>BV</b> CAN 2- (X)	Coms	A25	CAN2L	A32	CAN 2-	B-C2	CAN2L	J1C18	CAN2-
63	<b>BW</b> CAN 1- (P)	Coms	A24	CAN1L	A21	CAN 1-	B-A2	CAN1L	J1B10	CAN1-
64	<b>BX</b> XDRG	Ground	A42	XDRG1	A22	XDRG	B-D3	XDRGND1	J1B24	XDRG_A
65	<b>BY</b> POW SUP+	Power	A67	VBA TT+			C-F4	BATT	J1B08	BATT
66	<b>BZ</b> BANANA 12	Banana					B-L1	O2A-	J1B12	LSU2_UN
67	<b>CA</b> BANANA 13	Banana					B-L2	O2B-	J1B13	LSU2_VM
68	<b>CB</b> BANANA 14	Banana					B-J3	O2C-	J1B16	LSU2_IA
69	<b>CC</b> BANANA 15	Banana					B-J4	O2D-	J1B17	LSU2_IP
70	<b>CD</b> RS485+	Coms	A28	SCL+	A28	SCL+	A-C3	RS485A	J1B22	SC+
71	<b>CE</b> RS485-	Coms	A29	SCL-	A18	SCL-	A-C2	RS485B	J1B23	SC-
72	<b>CF</b> CRANK+	Banana	A14	CNKVR+	B13	CNK+	B-J2	CNKVR+	J1A13	CRANK
73	<b>CH</b> BANANA 5	Banana	A58	DRVP2			C-H3	DRIVEPWRB	J1B21	LSU1_UN
74	<b>CJ</b> CAM	Banana	A30	CAMDG	B06	CAM_DG	B-G1	CAMDG	J1A20	CAM
75	<b>CK</b> DG CRANK	Banana	A5	CNKDG	B14	CNK_DG	B-H4	CNKDG	J1A31	CAM_VR-
76	<b>CL</b> CRANK-	Banana	A13	CNKVR-	B05	CNK-	B-J1	CNKVR-	J1A02	CNK_VR-
77	<b>CM</b> DG1	Sw itch	A11	SWG1	B15	DG1M	C-E1	AN31	J1B07	DG1
78	<b>CN</b> DG2	Sw itch	A9	SWG2	B16	DG2M	C-D2	AN32	J1C16	DG2
79	<b>CP</b> DG3	Sw itch	A31	SWG3			C-D3	AN33	J1A19	DG3
80	<b>CR</b> DG4	Sw itch	A62	SWG4	B03	DG4M			J1A09	DG4
81	<b>CS</b> INJ10	LED			B19	A4D	A-E4	LSO10	J2B02	INJ10
82	<b>CT</b> INJ9	LED			B21	A13D	A-E3	LSO9	J2B03	INJ09
83	<b>CU</b> LSO4	LED	A61	LSO4			B-M3	LSO4	J2B21	LSO4
84	<b>CV</b> CAN 3+ (V)	Coms					B-B2	CAN3H	J1A03	ISO_9141_K
85	<b>CW</b> CAN 3- (V)	Coms					B-B1	CAN3L	J1A04	ISO_9141_L
86	<b>CX</b> BANANA 11	Banana					A-D4	XDRGND2	J1A32	SPD-
87	<b>CY</b> H1-	LED			C18	ESC_B	C-H4	HBRIDGE1B	J2A17	H1-
88	<b>CZ</b> H1+	LED			C17	ESC_A	C-G4	HBRIDGE1A	J2A09	H1+
89	<b>DA</b> INJ12	LED			C20	A16D	A-H3	LSO12	J2B01	INJ12
90	<b>DB</b> INJ11	LED			C22	A15D	A-H4	LSO11	J2B04	INJ11
91	<b>DC</b> DG5	Sw itch	A15	DFRQ			B-G2	SPEED1_DG	J1C23	EK3P/DG5
92	<b>DD</b> DG6	Sw itch					B-H2	SPEED2_DG	J1C24	EK3N/DG6
93	<b>DE</b> DG7	Sw itch					B-H1	SPEED3_DG	J1C13	EK4P/DG7
94	<b>DF</b> BANANA 8	Banana					B-K3	O2C+	J1B01	LSU1_VM
95	<b>DH</b> BANANA 6	Banana					B-K1	O2A+	J1B14	LSU1_IP
96	<b>DJ</b> ANALOG 23	POT					C-C4	AN23	J1C05	AN23M
97	<b>DK</b> ANALOG 24	POT					C-D1	AN24	J1C01	AN24M
98	<b>DL</b> ANALOG 27	POT					B-G3	AN27	J1C15	AN27M
99	<b>DM</b> ANALOG 28	POT					B-E4	AN28	J1C07	AN28M
100	<b>DN</b> ANALOG 29	POT					C-C2	AN29	J1C06	AN29M
101	<b>DP</b> ANALOG 30	POT					C-F3	AN30	J1C08	AN30M
102	<b>DR</b> ANALOG 26	POT					B-F4	AN26	J1C12	AN26M
103	<b>DS</b> ANALOG 25	POT					C-F1	AN25	J1C03	AN25M
104	<b>DT</b> H2-	LED					C-H1	HBRIDGE2B	J2B23	H2-
105	<b>DU</b> H2+	LED					C-H2	HBRIDGE2A	J2B22	H2+
106	<b>DV</b> H3-	LED							J2B24	H3-
107	<b>DW</b> H3+	LED							J2B16	H3+
108	<b>DX</b> EST10	LED							J2B13	EST10
109	<b>DY</b> EST9	LED							J2B14	EST9
110	<b>DZ</b> EST15	LED					B-C3	CANSHIELD3	J2B07	EST15/LAMP3
111	<b>EA</b> EST11	LED							J2B11	EST11
112	<b>EB</b> EST13	LED					B-A3	CANSHIELD1	J2B06	EST13/LAMP1
113	<b>EC</b> EST14	LED					B-B3	CANSHIELD2	J2B05	EST14/LAMP2
114	<b>ED</b> EST12	LED							J2B10	EST12
115	<b>EE</b> EST16	LED					A-D2	FUELPR	J2B08	EST16/LAMP4
116	<b>EF</b> BANANA 7	Banana					B-K2	O2B+	J1B15	LSU1_IA
117	<b>EH</b> KNOCK 0+	Banana			A29	EK0P	B-D1	KNK1+	J1C19	EK1P
118	<b>EJ</b> KNOCK 0-	Banana			A19	EK0N	B-D2	KNK1-	J1C20	EK1N
119	<b>EK</b> KNOCK 1+	Banana			A30	EK1P	B-E2	KNK2+	J1C21	EK2P
120	<b>EL</b> KNOCK 1-	Banana			A20	EK1N	B-E1	KNK2-	J1C22	EK2N



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