# LECM Desktop I/O Simulator Kit

**8928-7541**

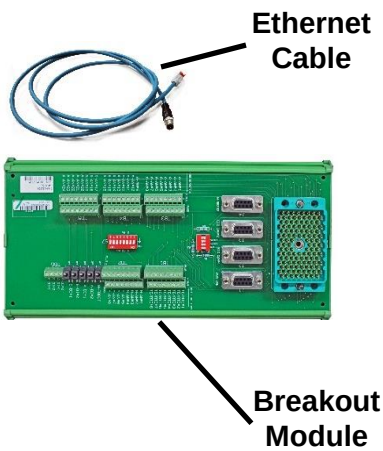
## *Description*

This datasheet explains the LECM Desktop I/O Simulator Harness usage with the 8909-1043 Desktop Simulator. The unique features of the LECM require a modified use of the Desktop Simulator.

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 0–5 V input for sensors, or external sensors can easily be applied as well. In addition, CAN and serial links are available for easy data bus connections. A separate Ethernet cable is also provided.

This datasheet supplements the Desktop Simulator Datasheet 36369.



**Available on Panel:**

- 9 Speed Channels
- 29 Analog Inputs
- 12 Low-Side Outputs
- 8 High-Side Outputs
- 4 Trigger Outputs
- 3 CAN Channels from LECM MAIN Module
- 1 RS-485 Channel
- 16 Digital Inputs
- Power and Grounds Exposed
- Key Switch
- 4 Analog Outputs
- 3 Transducer Power Outputs

**Available on Breakout Module:**

- 1 RS-232 Channel
- 3 CAN Channels with Switchable Termination DIP
- 8 Analog Inputs from MAIN with DIP for mA Jumpers
- 8 TC/RTD Inputs from MAIN
- 24 Analog Inputs from AUX
- 7 Discrete Input Switches

**Available in Harness:**

- 2 UEGO Connectors as a Breakout in the Harness

## Installation

The LECM Simulator Panel Kit 8928-7541 contains:

- A harness to connect the LECM to the Desktop Simulator panel and to a Breakout Module for the signals that don't fit on the Desktop Simulator
- The Breakout Module for the expansion signals
- A 1.5m Ethernet cable to convert from the native M12 connector on LECM to a convenient RJ45 jack to plug into your own Ethernet switch, hub, or computer

**Make the following connections:**

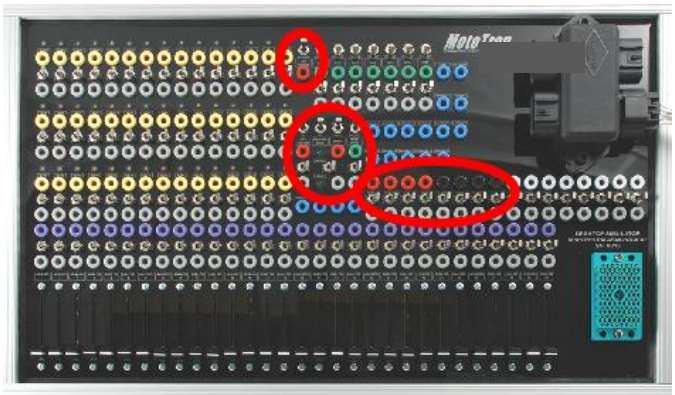
- Insert and tighten the 4 large connectors labeled J1, J2, J4, and J5 into the LECM (separately supplied). If the LECM has a subset of the possible 4 connectors, install only the ones that are available. The harness is designed to work properly for any LECM configuration. A 4mm hex wrench is needed to tighten the connectors.
- Insert the green connector plug labeled Simulator Panel onto the Desktop Simulator panel receptacle.
- Insert the green connector receptacle labeled Breakout Panel onto the Breakout Module plug.
- Power Cables: Plug the power supply cables from the Desktop Simulator into your power supply. Also plug the power supply cables in the LECM harness directly to the power supply. The LECM is NOT powered through the Desktop Simulator. Power supply current sizing is based on what loads you will operate from the LECM. A 0.5A supply is sufficient to just power up and communicate with the LECM.
- Ethernet: Insert the M12 connector end onto the LECM M12 Ethernet port. Plug the RJ45 end into your own equipment.
- CAN: Connect a communications cable (5404-1351 sold separately) into the simulator 4-way junction box to break out the 3 CAN signals into separate DB9 connectors for easy connection to a computer. Connect to the appropriate CAN connection either on the Desktop Simulator 4-way junction box, Desktop Simulator panel jacks, or on the Breakout Module. Note the Desktop Simulator has both termination resistors included within it. It is possible to bypass these by using the Grey Banana jacks to access the CAN signal and turning the switches OFF. Note the Breakout Module has 120 Ohm resistors which may be switched ON/OFF using the DIP switches.
- Make sure the 24V relay is used on the back of the Desktop Simulator Panel.

## Power Sections

The relay connected on the back side of the Desktop Simulator Panel must be changed to the 24V relay or failure may occur. The maximum voltage is 32V.

The Power and Ground Channels located in the center of the simulator (BATT, XDRG, DRVP, DRVG, EST RTN) expose the signals from the LECM. These are not inputs to the LECM. The switches are normally in the ON position to allow measurements of the signals. Turning the switches off will not affect the LECM power.

The Key Switch is an input and controls the KEY input on each of the three LECM modules (EID, MAIN, AUX) so that the harness will also work with a stand-alone LECM module of any type.



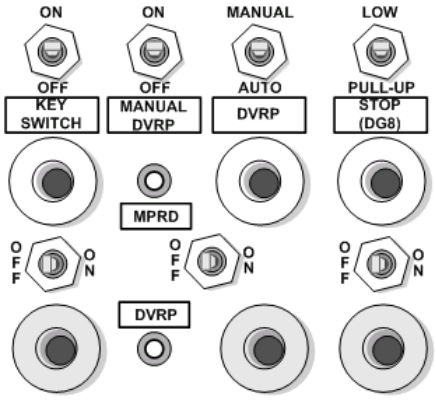
**KEY SWITCH**: The KEY SWITCH interface includes a top, vertical-direction ON/OFF switch which connects directly to the key-switch inputs to the LECM. The other, side-to-side switch, enables/disables the ON/OFF function of the top switch. The red jack allows connection of an external key switch signal.

**MANUAL/DVRP (driver power)**: This switch has no effect for LECM. It is not connected to anything in the LECM.

**DVRP (driver power)**: This switch has no effect for LECM. It is not connected to anything in the LECM.

**STOP (DG8)**: The STOP interface includes a top, vertical-direction LOW/PULL-UP, which connects directly to the Driver Power Enable input to the LECM EID Module. Use the “Pull Up” state to apply a Driver Power Enable signal. Use the “Low” state to disable Driver Power. The other, side-to-side switch enables/disables the ON/OFF function of the top switch. The grey jack allows connection of an external Driver Power Enable signal.

**LED POWER**: This switch provides a power source for the Desktop Simulator Panel LED indicators. The Red jack allows an alternate source for the power when the switch is in the down position. Some (HSO) open circuit fault conditions will be falsely indicated if this switch is UP. Leave it DOWN for best operation.



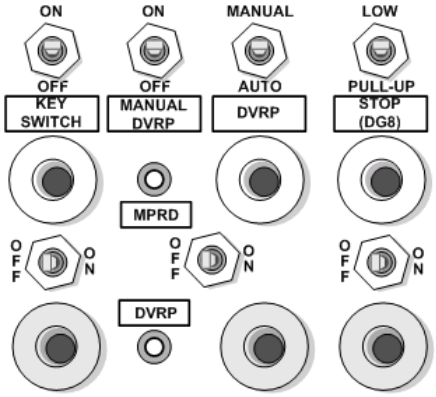

**XDRP A**: The XDRP A jack exposes the MAIN module 5V transducer power output. This is also used on the panel to power the 29 analog slider potentiometers. It includes a side-to-side ON/OFF switch which enables/ disables the red transducer power jack and the analog pot power. The sliders which are connected to “pull-up” inputs will be offset when this power is ON.

**XDRP B**: The XDRP B jack exposes the MAIN module 12/20V transducer power output. It includes a side-to-side ON/OFF switch which enables/ disables the red transducer power jack. There is no other inherent connection within the panel for this signal.

**EID XDRP:** The EID 12/20V transducer output is exposed on BANANA14 and BANANA15 with the (+) signal on BANANA14.

**BATT**: This switch has no effect for LECM. It is not connected to anything in the LECM.

**MPRD**: This switch has no effect for LECM. It is not connected to anything in the LECM.



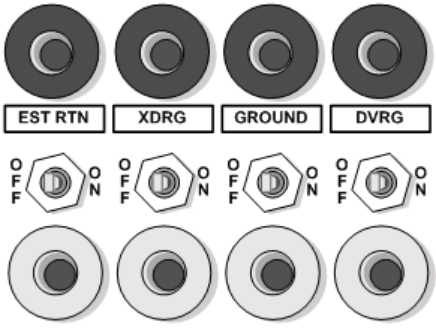

**EST RTN**: The EST RTN jack exposes the AUX module BATT-. It includes a side-to-side ON/OFF switch which enables/disables the black jack. The grey jack is always connected directly to the LECM AUX power ground.

**XDRG**: The XDRG jack exposes the MAIN module XDRG transducer ground reference. It includes a side-to-side ON/OFF switch which enables/ disables the black jack. The grey jack is always connected directly to the LECM MAIN transducer ground.

**GROUND**: The GROUND jack exposes the MAIN module BATT-. It includes a side-to-side ON/OFF switch which enables/disables the black jack. The grey jack is always connected directly to the LECM MAIN power ground.

**DVRG**: The DVRG jack exposes the EID module BATT-. It includes a side-to-side ON/OFF switch which enables/disables the black jack. The grey jack is always connected directly to the LECM EID power ground.

**NOTE:** AUX BATT-, MAIN BATT-, EID BATT-, and XDRG are all spliced together in the harness so they cannot be separated.

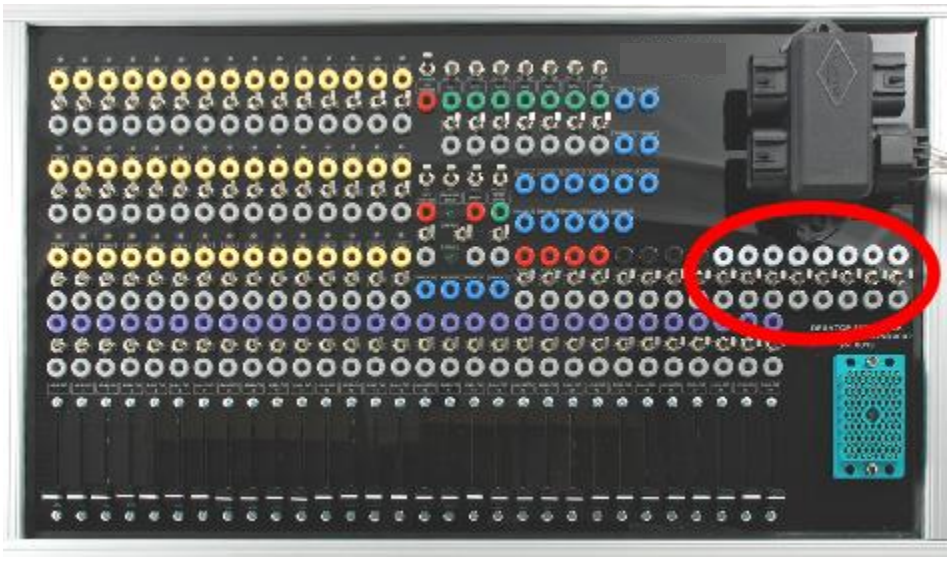


## Communications

The Desktop Simulator exposes the three MAIN module CAN channels and the 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 to the white jacks. The grey jacks are always connected directly to the LECM.

The CAN channels are internally terminated with 62 Ω resistance on the white jack side of the switch. Use of the grey jacks with the switch OFF will eliminate the internal resistance. The 4-port breakout also exposes the CAN channels on the white connector side. Turning off the switches disables the 4-port breakout.

The RS-485 channel has the termination resistors internal to the LECM enabled via jumpers in the harness. The RS485+ and RS485- signals are exposed on the panel front and also on the 2-pin connector hanging off the back of the Desktop Simulator panel. The RS485+ signal is on Pin A of the Delphi Weather Pack 12015792 connector. Turning off the switches disables the 2-pin breakout but not the termination resistors.



The Breakout Module supports connections to the AUX and EID CAN channels. Use DIP switch 1 to enable the 120 Ω termination for AUX CAN. Use DIP switch 2 to enable the 120 Ω termination for EID CAN 1 and DIP switch 3 for EID CAN 2. DIP switch 4 has no connection.

The RS-232 channel is exposed on the Breakout Module. Field Termination module. Use of a gender changer is not necessary.

Ethernet is exposed from the LECM MAIN M12 connector directly using a separate cable (provided in the kit).

## Linear Oxygen Sensors

There are two connectors split out from the harness near the Desktop Simulator end labeled UEGO1 and UEGO2 respectively. Each is intended to connect with a Bosch LSU4.9 sensor (1689-1277).

The heater control is split out using banana receptacles. Connect the red banana receptacle with a patch cord to the appropriate power supply. Connect the black banana receptacle with a patch cord to the appropriate LSO channel on the Desktop Simulator Panel as defined by the application in LECM MAIN.

See LECM installation manual 26757 for UEGO connector pinout if needed.

## Output Sections

These outputs connect to the LECM output pins by designation and in order of resource number. The LECM uses the Desktop Simulator jacks in a way that is different from the standard labeling due to the quantity of I/O. See the end of this guide for LECM/simulator pin cross reference chart. The grey banana jack connects directly to the LECM pins.

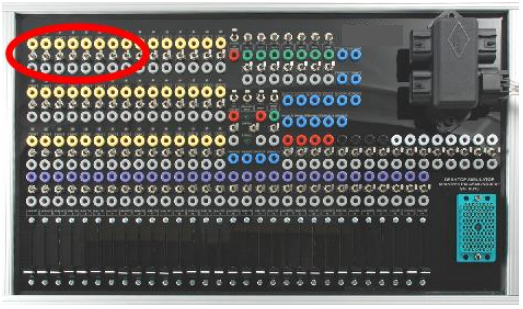
**LEDs**: The LEDs above connect through 1.5 kΩ resistors such that the outputs show current direction. The LEDs turn on green if a Low Side Output is active and set up as “low-side.” The LED shows red if the output is active as “high-side.”

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


**High Side Outputs**
Labeled LSO1-LSO8, eight High Side Outputs from LECM MAIN are located in the upper left corner of the simulator.

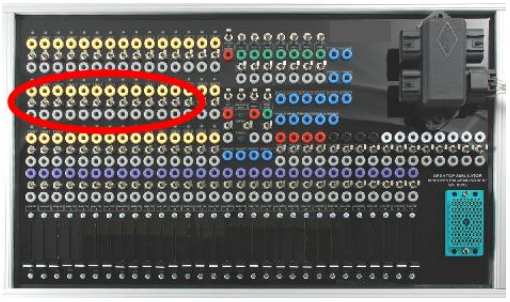
Labeled EST5-EST7, the three High Side Outputs from LECM AUX and EID are connected as AUX DO1 to EST5 and DO2 to EST6. EID DO is connected to EST7.

Set the LED POWER switch to “BANANA” so the Open Fault diagnostics are not falsely triggered.



**Low Side Outputs**
Labeled INJ1-INJ12, twelve Low Side Outputs from LECM MAIN are located at the left side of the simulator second row.

Set the LED POWER switch to “ON” for the LED on each of these outputs to operate properly and so the Open Fault diagnostics are not falsely triggered.

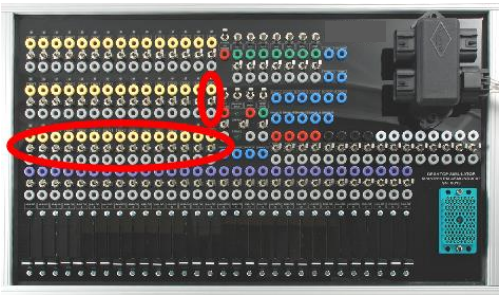


**TRIG Outputs**
Labeled EST1-EST4, the four configurable LSO/HSO/Push-Pull outputs from LECM MAIN are located at the left side of the simulator third row.

**HSO Mode:** Set the LED POWER switch to “BANANA” for the LED on each of these outputs to operate properly and so the Open Fault diagnostics are not falsely triggered.

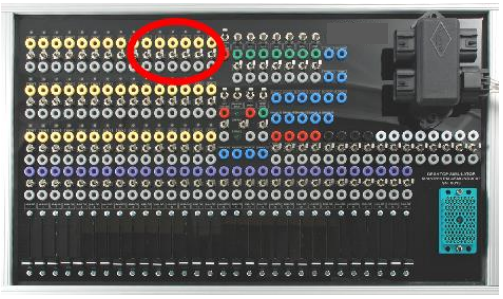
**LSO Mode:** Set the LED POWER switch to “ON” for the LED on each of these outputs to operate properly and so the Open Fault diagnostics are not falsely triggered.

**Push-Pull Mode:** Set the LED POWER switch to “ON” for Green LED operation and to “BANANA” for Red LED operation. Diagnostics are not affected. Push-Pull is the recommended mode.

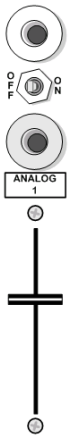
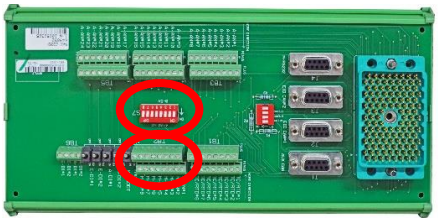
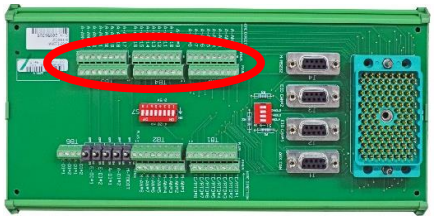
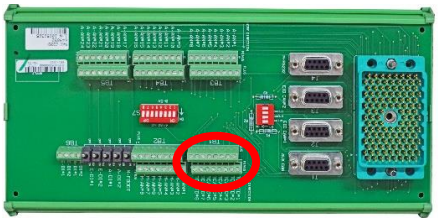


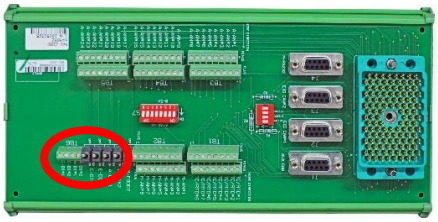
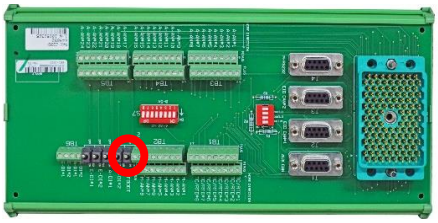
**Analog Outputs (0-22mA)**
Labeled H1+, H1–, H2+, H2–,H3+, H3–, and ETC+, ETC- the eight analog output connections are located at the top center of the simulator occupying jacks in the top and second rows. MAIN AO1 is mapped to H1 and MAIN AO2 is mapped to H2. AUX AO1 is mapped to H3 and AUX AO2 is mapped to ETC.

The switches must be turned OFF and connections made to the grey jacks. Leaving the switches ON will result in incorrect current output.



# *Input Sections*

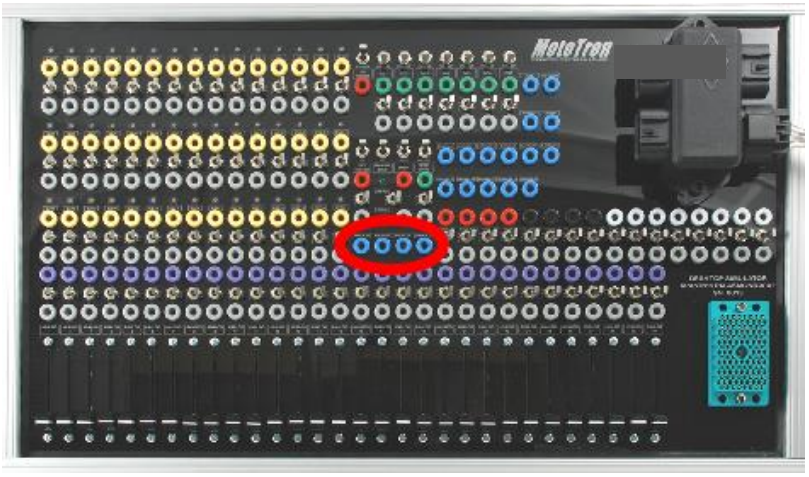
| | |
|---|---|
| **Single-Ended Analog Inputs**<br>Labeled Analog 1 to Analog 29, the single-ended Analog Inputs from LECM MAIN (switchable – On / Off) are located along the bottom of the Desktop Simulator, together with dedicated potentiometer sliders, (0–5 V).<br><br>The slider potentiometers form a voltage divider with XDRP A and XDRG. To connect your own sensor, use the gray jack, and switch the corresponding ON/OFF switch to OFF. |  |
| **Differential Analog Inputs**<br>Labeled M-AN#1 to M-AN#8, the eight software selectable Analog Inputs from LECM MAIN are located along the top edge of the Breakout Module. The (+) signal is on the top row and the (-) signal is on the bottom row.<br><br>To enable the Current Loop jumper within the LECM MAIN, select the DIP switch of the same number as the input channel. |  |
| **Knock/Pressure/Thermocouple Inputs**<br>Labeled A-AN#1 to A-AN#24, the 24 population option Analog Inputs from LECM AUX are located along the bottom edge of the Breakout Module. The (+) signal is on the top row and the (-) signal is on the bottom row. |  |
| **Thermocouple/RTD Inputs**<br>Labeled TC/RTD#1 to TC/RTD#8, the eight software selectable Analog Inputs from LECM MAIN are located along the top edge of the Breakout Module. The (+) signal is on the top row and the (-) signal is on the bottom row.<br><br>The wiring from the Breakout Module to the LECM is 20 AWG copper. If thermocouple accuracy is important, a cold junction sensor should be added near the Breakout Module or wherever the first junction exists. |  |

| | |
|---|---|
| **Digital Inputs 1-7**<br>Labeled DG1-DG7, the first seven of the Discrete Inputs from LECM MAIN 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. The LECM MAIN discrete input behavior is jumper selectable and the harness has these jumpers installed COM-GND to enable “Sourcing” behavior.<br>**LOW/PULL-UP**: Switch input LOW for OFF and PULL-UP for ON.<br>**INPUT JACKS**: The bottom jack (grey) of each output directly connects to the respective LECM input resource.<br>**ON/OFF**: 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 LECM pin via the grey jack. |  |
| **Digital Inputs 8-16**<br>Labeled EST8-EST16, the remaining nine Discrete Inputs from LECM MAIN are located in the second and third rows of the Desktop Simulator. The digital inputs each have an ON/OFF switch. Use OFF for an open circuit and ON to activate the input.<br>**LED POWER**: Switch must be ON in order for the Discrete Input switches to effectively activate the input.<br>**INPUT JACKS**: The bottom jack (grey) of each output directly connects to the respective LECM input resource.<br>**ON/OFF**: Turn the input on/off via the switch. When off, the yellow input (top) jack is inactive, and signal can be sourced from an external Boolean signal to the LECM pin via the grey jack. |  |
| **Module ID Inputs**<br>Labeled A-DI#1 to A-DI#2 and E-DI#1 to E-DI#2, these signals from LECM AUX and EID are located on the Breakout Module top right corner. The digital inputs each have an ON/OFF switch. Use OFF for an open circuit and ON to activate the input. The switches will only work properly if the J2 connector is inserted on LECM MAIN.<br>The signals are also exposed on the terminal strip in front of the switches. The exposed signal is equivalent to the grey jacks on the Desktop Simulator as it connects directly to the LECM. |  |
| **Forced Boot Input**<br>Labeled M-FBOOT this signal from LECM MAIN is located on the Breakout Module top right corner. Use OFF for an open circuit and ON to activate the input. There is no pinout of the signal to a terminal. |  |

**EID Speed Sensor Inputs**
Labeled Knock0 +/- and Knock1 +/-, the four speed sensor connector jacks are located in the center of the simulator. KNOCK0+ is connected to EID SPEED1+ and KNOCK0- is connected to EID SPEED1-. KNOCK1+ is connected to EID SPEED2+ and KNOCK1- is connected to EID SPEED2-.

EID SPEED3+ is connected to BANANA13. EID SPEED3- is the same as BANANA15.

There are no associated switches or monitors; user must supply the speed input signal to the blue jacks.



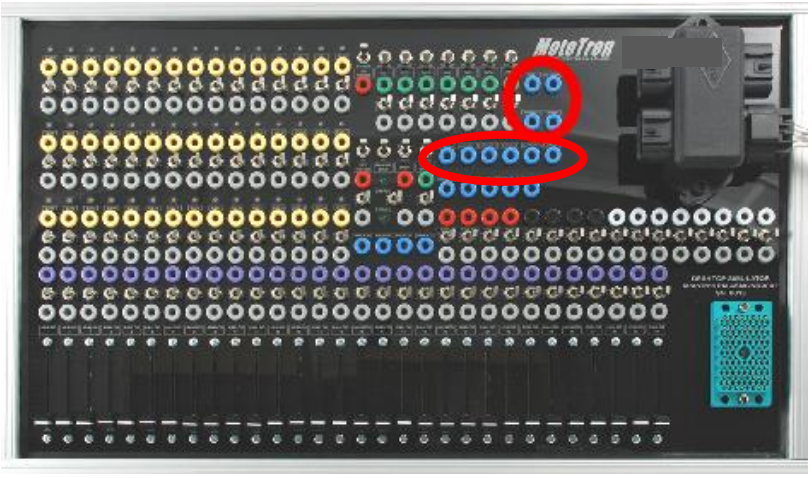
**MAIN Speed Inputs**
MAIN SPEED1 is connected to CRANK+ and CRANK- located in the center of the simulator.

MAIN SPEED2+ is connected to CAM and MAIN SPEED2- is connected to DG CRANK.

MAIN SPEED3+ is connected to BANANA5 and MAIN SPEED3- is connected to BANANA6.

MAIN SPEED4+ is connected to BANANA7 and MAIN SPEED4- is connected to BANANA8.

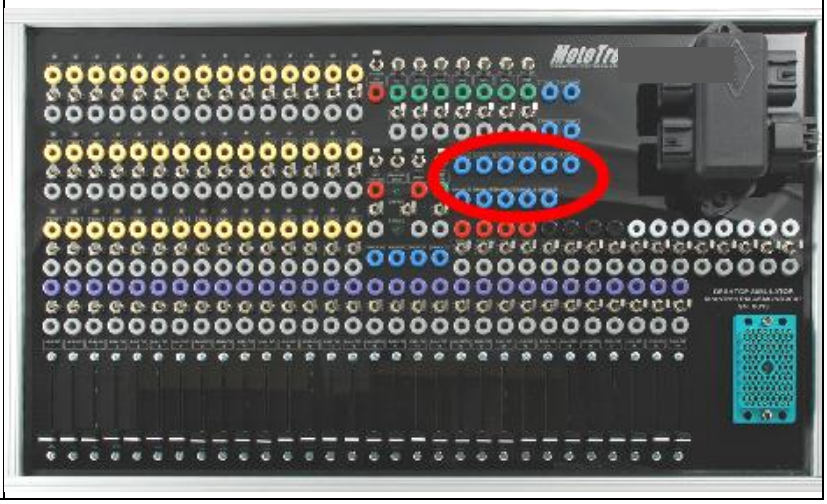
There are no associated switches or monitors; user must supply the respective sensor input signal to the blue jacks.



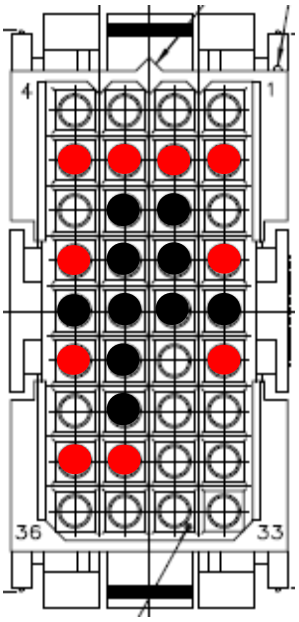
**AUX Speed Sensor Inputs**
AUX SPEED1+ is connected to BANANA9 and AUX SPEED1- is connected to BANANA10.

AUX SPEED2+ is connected to BANANA11. AUX SPEED2- is connected to BANANA12.

There are no associated switches or monitors; user must supply the speed input signal to the blue jacks.



# Pinout of Driver Output Connectors




View as seen looking at the mating face of the provided connector. Both connectors have the same pinout. All ODD channels are on MM1 and all EVEN channels are on MM2.

Mating connector is TYCO 207020-1
Mating connector pins are TYCO 66602-2

MM1 shown. MM2 identical but EVEN driver outputs.

| | | | |
|---|---|---|---|
| 1: No Connect | 2: No Connect | 3: No Connect | 4: No Connect |
| 5: DRVR1(+) | 6: DRVR3(+) | 7: DRVR5(+) | 8: DRVR7(+) |
| 9: No Connect | 10: DRVR1(-) | 11: DRVR7(-) | 12: No Connect |
| 13: DRVR9(+) | 14: DRVR3(-) | 15: DRVR5(-) | 16: DRVR11(+) |
| 17: DRVR9(-) | 18: DRVR13(-) | 19: DRVR11(-) | 20: DRVR15(-) |
| 21: DRVR13(+) | 22: DRVR19(-) | 23: No Connect | 24: DRVR15(+) |
| 25: No Connect | 26: DRVR17(-) | 27: No Connect | 28: No Connect |
| 29: DRVR17(+) | 30: DRVR19(+) | 31: No Connect | 32: No Connect |
| 33: No Connect | 34: No Connect | 35: No Connect | 36: No Connect |

# Use Cases

**Connect HSO to DI**

1. To avoid false “Open Circuit” diagnostics on the HSO channel in LECM, set LED POWER to BANANA.
2. Install patch cord from HSOx (either yellow or grey jack) to the DIx grey jack.
3. Set the DIx switch to OFF to disconnect the LED or PULL UP/DOWN behavior that would otherwise compete with the HSO behavior.
4. Leave the HSOx switch ON so the LED behavior can be seen to correlate with the DI input.
5. Operate the HSO from the LECM and observe the DI state change within the LECM.

**Connect LSO to DI**

This behavior is not supported. The harness configures the DI inputs as “Sourcing” so they expect 24V to be applied in order to activate them.

**Connect TRIG to DI**

1. Select either HSO Mode or Push-Pull mode for the TRIG output (not LSO mode).
2. To avoid false “Open Circuit” diagnostics in the HSO mode, set LED POWER to BANANA. If using Push-Pull mode, the LED POWER position is irrelevant.
3. Install patch cord from TRIGx (either yellow or grey jack) to the DIx grey jack.
4. Set the DIx switch to OFF to disconnect the LED or PULL UP/DOWN behavior that would otherwise compete with the HSO behavior.
5. Leave the TRIGx switch ON so the LED behavior can be seen to correlate with the DI input.
6. Operate the TRIGx from the LECM and observe the DI state change within the LECM.

**Connect Analog Output to Analog Input**

1. Use mA mode on the Differential Analog Input setting within the LECM MAIN software.
2. Set the Breakout Module DIP switch to ON for the Analog Input channel to be used.
3. Connect a patch cord from the Analog Output to the Analog Input connecting both the (+) and the (-) lines.

# *Module – Desktop Simulator & Breakout Module Cross Reference*

| *LECM Name* | *From* | | *Splice* | | *To* | *Panel Resource* |
|---|---|---|---|---|---|---|
| BATT (+) | J1-121 | | | | Red Banana Plug | None |
| BATT (+) | J4-79 | | | | Red Banana Plug | None |
| BATT (+) | J5-84 | | | | Red Banana Plug | None |
| BATT (-) | J1-122 | | | | Black Banana Plug | None |
| BATT (-) | J4-80 | | | | Black Banana Plug | None |
| BATT (-) | J5-81 | | | | Black Banana Plug | None |
| BATT (-) | J1-123 | | S1 | | J6-A | GROUND |
| EID_ID_RTN | J5-75 | | S1 | | J6-B | DRVG |
| AUX_ID_RTN | J4-43 | | S1 | | J6-V | EST RTN |
| XDRG (DGND) | J2-13 | | S1 | | J6-BX | XDRG |
| KEY (+) | J5-52 | | S2 | | J6-BR | KEYSWITCH |
| KEY (+) | J4-78 | | S2 | | | |
| KEY (+) | J1-12 | | S2 | | | |
| SENS POW 20V (+) | J2-2 | | | | J6-BT | XDRP B |
| XDRP 5V (+) | J2-3 | | | | J6-BS | XDRP A |
| EID_20V_XDRP | J5-86 | | S3 | | J6-CB | BANANA 14 |
| EID_XDRG | J5-83 | | S4 | | J6-CC | BANANA 15 |
| XDRG (DGND) | J2-4 | | | | J7-EJ | XDRG (DGND) |
| | | | | | | |
| CAN1H | J1-96 | | | | J6-BP | CAN 1+ (P) |
| CAN1L | J1-108 | | | | J6-BW | CAN 1- (P) |
| CAN2H | J2-7 | | | | J6-BU | CAN 2+ (X) |
| CAN2L | J2-8 | | | | J6-BV | CAN 2- (X) |
| CAN3H | J2-23 | | | | J6-CV | CAN 3+ (V) |
| CAN3L | J2-24 | | | | J6-CW | CAN 3- (V) |
| CAN1H | J4-40 | | | | J7-BC | AUX_CAN |
| CAN1L | J4-39 | | | | J7-BD | AUX_CAN |
| CAN1H | J5-64 | | | | J7-AY | EID_CAN#1 |
| CAN1L | J5-72 | | | | J7-AZ | EID_CAN#1 |
| CAN1 COM | J5-80 | | | | J7-BE | EID_CAN#1 |
| CAN2H | J5-63 | | | | J7-BA | EID_CAN#2 |
| CAN2L | J5-71 | | | | J7-BB | EID_CAN#2 |
| CAN2 COM | J5-79 | | | | J7-BF | EID_CAN#2 |
| RS485 (+) | J2-71 | | | | J6-CD | RS485+ |
| RS485(-) | J2-72 | | | | J6-CE | RS485- |
| TRM JMP IN (+) | J2-55 | | | | J2-63 | *Jumper to J2-63* |
| TRM JMP OUT (+) | J2-63 | | | | J2-55 | *Jumper to J2-55* |
| TRM JMP IN (-) | J2-56 | | | | J2-64 | *Jumper to J2-64* |
| TRM JMP OUT (-) | J2-64 | | | | J2-56 | *Jumper to J2-56* |
| RS232 TX | J2-39 | | | | J7-ED | M-RS232 |
| RS232 RX | J2-40 | | | | J7-EE | M-RS232 |
| RS232 COM | J2-47 | | | | J7-EA | M-RS232 |
| | | | | | | |

| *LECM Name* | *From* | | *Splice* | | *To* | *Panel Resource* |
|---|---|---|---|---|---|---|
| AIN1 (+) | J1-55 | | | | J7-A | M-AN#1 |
| AIN1 (-) | J1-43 | | | | J7-B | M-AN#1 |
| CUR USE JMP IN | J1-31 | | | | J7-C | DIP8-1 |
| CUR USE JMP OUT | J1-19 | | | | J7-D | DIP8-1 |
| AIN2 (+) | J1-79 | | | | J7-E | M-AN#2 |
| AIN2 (-) | J1-91 | | | | J7-F | M-AN#2 |
| CUR USE JMP IN | J1-103 | | | | J7-H | DIP8-2 |
| CUR USE JMP OUT | J1-115 | | | | J7-J | DIP8-2 |
| AIN3 (+) | J1-56 | | | | J7-K | M-AN#3 |
| AIN3 (-) | J1-44 | | | | J7-L | M-AN#3 |
| CUR USE JMP IN | J1-32 | | | | J7-M | DIP8-3 |
| CUR USE JMP OUT | J1-20 | | | | J7-N | DIP8-3 |
| AIN4 (+) | J1-80 | | | | J7-P | M-AN#4 |
| AIN4 (-) | J1-92 | | | | J7-R | M-AN#4 |
| CUR USE JMP IN | J1-104 | | | | J7-S | DIP8-4 |
| CUR USE JMP OUT | J1-116 | | | | J7-T | DIP8-4 |
| AIN5 (+) | J1-57 | | | | J7-U | M-AN#5 |
| AIN5 (-) | J1-45 | | | | J7-V | M-AN#5 |
| CUR USE JMP IN | J1-33 | | | | J7-W | DIP8-5 |
| CUR USE JMP OUT | J1-21 | | | | J7-X | DIP8-5 |
| AIN6 (+) | J1-81 | | | | J7-Y | M-AN#6 |
| AIN6 (-) | J1-93 | | | | J7-Z | M-AN#6 |
| CUR USE JMP IN | J1-105 | | | | J7-AA | DIP8-6 |
| CUR USE JMP OUT | J1-117 | | | | J7-AB | DIP8-6 |
| AIN7 (+) | J2-25 | | | | J7-AC | M-AN#7 |
| AIN7 (-) | J2-17 | | | | J7-AD | M-AN#7 |
| CUR USE JMP IN | J2-9 | | | | J7-AE | DIP8-7 |
| CUR USE JMP OUT | J2-1 | | | | J7-AF | DIP8-7 |
| AIN8 (+) | J2-49 | | | | J7-AH | M-AN#8 |
| AIN8 (-) | J2-57 | | | | J7-AJ | M-AN#8 |
| CUR USE JMP IN | J2-65 | | | | J7-AK | DIP8-8 |
| CUR USE JMP OUT | J2-73 | | | | J7-AL | DIP8-8 |
| AUX AIN1 (+) | J4-1 | | | | J7-BP | A-AN#1 |
| AUX AIN1 (-) | J4-2 | | | | J7-BR | A-AN#1 |
| AUX AIN2 (+) | J4-9 | | | | J7-BV | A-AN#2 |
| AUX AIN2 (-) | J4-10 | | | | J7-BW | A-AN#2 |
| AUX AIN3 (+) | J4-17 | | | | J7-BX | A-AN#3 |
| AUX AIN3 (-) | J4-18 | | | | J7-BY | A-AN#3 |
| AUX AIN4 (+) | J4-25 | | | | J7-BZ | A-AN#4 |
| AUX AIN4 (-) | J4-26 | | | | J7-CA | A-AN#4 |
| AUX AIN5 (+) | J4-49 | | | | J7-CB | A-AN#5 |
| AUX AIN5 (-) | J4-50 | | | | J7-CC | A-AN#5 |
| AUX AIN6 (+) | J4-57 | | | | J7-CD | A-AN#6 |
| AUX AIN6 (-) | J4-58 | | | | J7-CE | A-AN#6 |
| AUX AIN7 (+) | J4-4 | | | | J7-CF | A-AN#7 |
| AUX AIN7 (-) | J4-12 | | | | J7-CH | A-AN#7 |
| AUX AIN8 (+) | J4-20 | | | | J7-CJ | A-AN#8 |

| *LECM Name* | *From* | | *Splice* | | *To* | *Panel Resource* |
|---|---|---|---|---|---|---|
| AUX AIN8 (-) | J4-28 | | | | J7-CK | A-AN#8 |
| AUX AIN9 (+) | J4-52 | | | | J7-CL | A-AN#9 |
| AUX AIN9(-) | J4-60 | | | | J7-CM | A-AN#9 |
| AUX AIN10 (+) | J4-68 | | | | J7-CN | A-AN#10 |
| AUX AIN10 (-) | J4-76 | | | | J7-CP | A-AN#10 |
| AUX AIN11 (+) | J4-5 | | | | J7-CS | A-AN#11 |
| AUX AIN11 (-) | J4-13 | | | | J7-CT | A-AN#11 |
| AUX AIN12 (+) | J4-21 | | | | J7-CU | A-AN#12 |
| AUX AIN12 (-) | J4-29 | | | | J7-CV | A-AN#12 |
| AUX AIN13 (+) | J4-37 | | | | J7-CW | A-AN#13 |
| AUX AIN13 (-) | J4-45 | | | | J7-CX | A-AN#13 |
| AUX AIN14 (+) | J4-53 | | | | J7-CY | A-AN#14 |
| AUX AIN14 (-) | J4-61 | | | | J7-CZ | A-AN#14 |
| AUX AIN15 (+) | J4-69 | | | | J7-DA | A-AN#15 |
| AUX AIN15 (-) | J4-77 | | | | J7-DB | A-AN#15 |
| AUX AIN16 (+) | J4-62 | | | | J7-DC | A-AN#16 |
| AUX AIN16 (-) | J4-70 | | | | J7-DD | A-AN#16 |
| AUX AIN17 (+) | J4-7 | | | | J7-DE | A-AN#17 |
| AUX AIN17 (-) | J4-8 | | | | J7-DF | A-AN#17 |
| AUX AIN18 (+) | J4-15 | | | | J7-DH | A-AN#18 |
| AUX AIN18 (-) | J4-16 | | | | J7-DJ | A-AN#18 |
| AUX AIN19 (+) | J4-23 | | | | J7-DK | A-AN#19 |
| AUX AIN19 (-) | J4-24 | | | | J7-DL | A-AN#19 |
| AUX AIN20 (+) | J4-31 | | | | J7-DN | A-AN#20 |
| AUX AIN20 (-) | J4-32 | | | | J7-DP | A-AN#20 |
| AUX AIN21 (+) | J4-47 | | | | J7-DR | A-AN#21 |
| AUX AIN21 (-) | J4-48 | | | | J7-DS | A-AN#21 |
| AUX AIN22 (+) | J4-55 | | | | J7-DT | A-AN#22 |
| AUX AIN22 (-) | J4-56 | | | | J7-DU | A-AN#22 |
| AUX AIN23 (+) | J4-63 | | | | J7-EF | A-AN#23 |
| AUX AIN23 (-) | J4-64 | | | | J7-EH | A-AN#23 |
| AUX AIN24 (+) | J4-71 | | | | J7-EK | A-AN#24 |
| AUX AIN24 (-) | J4-72 | | | | J7-EL | A-AN#24 |
| | | | | | | |
| AN9 (500Ω PU) | J2-10 | | | | J6-AT | ANALOG 01 |
| AN10 (220kΩ PD) | J2-11 | | | | J6-AU | ANALOG 02 |
| AN11 (500Ω PU) | J2-18 | | | | J6-AV | ANALOG 03 |
| AN12 (220kΩ PD) | J2-19 | | | | J6-AW | ANALOG 04 |
| AN13 (500Ω PU) | J2-26 | | | | J6-AX | ANALOG 05 |
| AN14 (49.9kΩ PD) | J2-27 | | | | J6-AY | ANALOG 06 |
| AN15 (500Ω PU) | J2-34 | | | | J6-AZ | ANALOG 07 |
| AN16 (49.9kΩ PD) | J2-35 | | | | J6-BA | ANALOG 08 |
| AN17 (500Ω PU) | J2-42 | | | | J6-BB | ANALOG 09 |
| AN18 (49.9kΩ PD) | J2-43 | | | | J6-BC | ANALOG 10 |
| AN19 (500Ω PD) | J2-12 | | | | J6-BD | ANALOG 11 |
| AN20 (49.9kΩ PD) | J2-20 | | | | J6-BE | ANALOG 12 |
| AN21 (49.9kΩ PD) | J2-28 | | | | J6-BF | ANALOG 13 |

| *LECM Name* | *From* | | *Splice* | | *To* | *Panel Resource* |
|---|---|---|---|---|---|---|
| AN22 (49.9kΩ PD) | J2-36 | | | | J6-BH | ANALOG 14 |
| AN23 (49.9kΩ PD) | J2-44 | | | | J6-BJ | ANALOG 15 |
| AN24 (49.9kΩ PD) | J2-52 | | | | J6-BK | ANALOG 16 |
| AN25 (49.9kΩ PD) | J2-60 | | | | J6-BL | ANALOG 17 |
| AN26 (49.9kΩ PD) | J2-68 | | | | J6-BM | ANALOG 18 |
| AN27 (49.9kΩ PD) | J2-76 | | | | J6-BN | ANALOG 19 |
| AN28 (49.9kΩ PD) | J2-21 | | | | J6-AR | ANALOG 20 |
| AN29 (49.9kΩ PD) | J2-29 | | | | J6-AS | ANALOG 21 |
| AN30 (1kΩ PU) | J2-37 | | | | J6-Z | ANALOG 22 |
| AN31 (1kΩ PU) | J2-45 | | | | J6-DJ | ANALOG 23 |
| AN32 (1kΩ PU) | J2-53 | | | | J6-DK | ANALOG 24 |
| AN33 (1kΩ PU) | J2-61 | | | | J6-DS | ANALOG 25 |
| AN34 (1kΩ PU) | J2-51 | | | | J6-DR | ANALOG 26 |
| AN35 (1kΩ PU) | J2-59 | | | | J6-DL | ANALOG 27 |
| AN36 (1kΩ PU) | J2-67 | | | | J6-DM | ANALOG 28 |
| AN37 (1kΩ PU) | J2-75 | | | | J6-DN | ANALOG 29 |
| | | | | | | |
| MPU/PROX1 (+) | J1-49 | | | | J6-CF | CRANK+ |
| MPU/PROX1 (-) | J1-50 | | | | J6-CL | CRANK- |
| MPU/PROX2 (+) | J1-52 | | | | J6-CJ | CAM |
| MPU/PROX2 (-) | J1-53 | | | | J6-CK | DG CRANK |
| MPU/PROX3 (+) | J1-61 | | | | J6-CH | BANANA 05 |
| MPU/PROX3 (-) | J1-62 | | | | J6-DH | BANANA 06 |
| MPU/PROX4 (+) | J1-64 | | | | J6-EF | BANANA 07 |
| MPU/PROX4 (-) | J1-65 | | | | J6-DF | BANANA 08 |
| AUX_MPU/PROX1 (+) | J4-65 | | | | J6-K | BANANA 09 |
| AUX_MPU/PROX1 (-) | J4-66 | | | | J6-AB | BANANA 10 |
| AUX_MPU/PROX2 (+) | J4-73 | | | | J6-CX | BANANA 11 |
| AUX_MPU/PROX2 (-) | J4-74 | | | | J6-BZ | BANANA 12 |
| EID_MPU/PROX1 (+) | J5-61 | | | | J6-EH | KNOCK 0+ |
| EID_MPU/PROX1 (-) | J5-62 | | | | J6-EJ | KNOCK 0- |
| EID_MPU/PROX2 (+) | J5-69 | | | | J6-EK | KNOCK 1+ |
| EID_MPU/PROX2 (-) | J5-70 | | | | J6-EL | KNOCK 1- |
| EID_PROX3 (+) | J5-77 | | | | J6-CA | BANANA 13 |
| | | | | | | |
| DI1 | J1-22 | | | | J6-CM | DG1 |
| DI2 | J1-34 | | | | J6-CN | DG2 |
| DI3 | J1-46 | | | | J6-CP | DG3 |
| DI4 | J1-58 | | | | J6-CR | DG4 |
| DI5 | J1-70 | | | | J6-DC | DG5 |
| DI6 | J1-82 | | | | J6-DD | DG6 |
| DI7 | J1-71 | | | | J6-DE | DG7 |
| DI8 | J1-59 | | | | J6-U | EST08 |
| DI9 | J1-47 | | | | J6-DY | EST09 |
| DI10 | J1-35 | | | | J6-DX | EST10 |
| DI11 | J1-23 | | | | J6-EA | EST11 |
| DI12 | J1-24 | | | | J6-ED | EST12 |

| *LECM Name* | *From* | | *Splice* | | *To* | *Panel Resource* |
|---|---|---|---|---|---|---|
| DI13 | J1-36 | | | | J6-EB | EST13 |
| DI14 | J1-48 | | | | J6-EC | EST14 |
| DI15 | J1-60 | | | | J6-DZ | EST15 |
| DI16 | J1-72 | | | | J6-EE | EST16 |
| DIN_COM1 | J1-106 | | | | J1-94 | Jumper |
| DIN_GND1 | J1-94 | | | | J1-106 | Jumper |
| DIN_COM2 | J1-107 | | | | J1-95 | Jumper |
| DIN_GND2 | J1-95 | | | | J1-107 | Jumper |
| DIN_COM3 | J1-84 | | | | J1-83 | Jumper |
| DIN_GND3 | J1-83 | | | | J1-84 | Jumper |
| INJ_ENABLE | J5-60 | | | | J6-AD | STOP (DG8) |
| EID_DI1 | J5-67 | | | | J7-DV | E_DI1 |
| EID_DI2 | J5-68 | | | | J7-DW | E_DI2 |
| AUX_DI1 | J4-35 | | | | J7-DX | A_DI1 |
| AUX_DI2 | J4-51 | | | | J7-DY | A_DI2 |
| EXTBOOT | J1-17 | | | | J7-DZ | M-FBOOT |
| | | | | | | |
| TC/RTD1(+) | J1-73 | | | | J7-AM | TC/RTD1+ |
| TC/RTD1(-) | J1-74 | | | | J7-AN | TC/RTD1- |
| TC/RTD2(+) | J1-76 | | | | J7-AP | TC/RTD2+ |
| TC/RTD2(-) | J1-77 | | | | J7-AR | TC/RTD2- |
| TC/RTD3(+) | J1-85 | | | | J7-AS | TC/RTD3+ |
| TC/RTD3(-) | J1-86 | | | | J7-AT | TC/RTD3- |
| TC/RTD4(+) | J1-88 | | | | J7-AU | TC/RTD4+ |
| TC/RTD4(-) | J1-89 | | | | J7-AV | TC/RTD4- |
| TC/RTD5(+) | J1-97 | | | | J7-AW | TC/RTD5+ |
| TC/RTD5(-) | J1-98 | | | | J7-AX | TC/RTD5- |
| TC/RTD6(+) | J1-100 | | | | J7-BH | TC/RTD6+ |
| TC/RTD6(-) | J1-101 | | | | J7-BJ | TC/RTD6- |
| TC/RTD7(+) | J1-109 | | | | J7-BK | TC/RTD7+ |
| TC/RTD7(-) | J1-110 | | | | J7-BL | TC/RTD7- |
| TC/RTD8(+) | J1-112 | | | | J7-BM | TC/RTD8+ |
| TC/RTD8(-) | J1-113 | | | | J7-BN | TC/RTD8- |
| | | | | | | |
| UEGO1_VM | J1-25 | | | | UEGO1-2 | UEGO Connector |
| UEGO1_UN | J1-26 | | | | UEGO1-6 | |
| UEGO1_IP | J1-28 | | | | UEGO1-1 | |
| UEGO1_IA | J1-29 | | | | UEGO1-5 | |
| Black Banana Receptacle | | | | | UEGO1-3 | |
| Red Banana Receptacle | | | | | UEGO1-4 | |
| UEGO2_VM | J1-37 | | | | UEGO2-2 | UEGO Connector |
| UEGO2_UN | J1-38 | | | | UEGO2-6 | |
| UEGO2_IP | J1-40 | | | | UEGO2-1 | |
| UEGO2_IA | J1-41 | | | | UEGO2-5 | |
| Black Banana Receptacle | | | | | UEGO2-3 | |
| Red Banana Receptacle | | | | | UEGO2-4 | |
| | | | | | | |

| *LECM Name* | *From* | *Splice* | *To* | *Panel Resource* |
|---|---|---|---|---|
| ANOUT1(+) | J2-58 | | J6-CZ | H1+ |
| ANOUT1(-) | J2-50 | | J6-CY | H1- |
| ANOUT2(+) | J2-74 | | J6-DU | H2+ |
| ANOUT2(-) | J2-66 | | J6-DT | H2- |
| AUX_ANOUT1(+) | J4-33 | | J6-DW | H3+ |
| AUX_ANOUT1(-) | J4-41 | | J6-DV | H3- |
| AUX_ANOUT2(+) | J4-34 | | J6-D | ETC A |
| AUX_ANOUT2(-) | J4-42 | | J6-C | ETC B |
| | | | | |
| HSO1 | J1-30 | | J6-AN | LSO1 |
| HSO2 | J1-42 | | J6-AP | LSO2 |
| HSO3 | J1-54 | | J6-AF | LSO3 |
| HSO4 | J1-66 | | J6-CU | LSO4 |
| HSO5 | J1-78 | | J6-AE | LSO5 |
| HSO6 | J1-90 | | J6-N | LSO6 |
| HSO7 | J1-102 | | J6-AL | LSO7 |
| HSO8 | J1-114 | | J6-J | LSO8 |
| LSO1 | J1-1 | | J6-R | INJ01 |
| LSO2 | J1-2 | | J6-M | INJ02 |
| LSO3 | J1-3 | | J6-AM | INJ03 |
| LSO4 | J1-4 | | J6-AK | INJ04 |
| LSO5 | J1-5 | | J6-S | INJ05 |
| LSO6 | J1-6 | | J6-F | INJ06 |
| LSO7 | J1-18 | | J6-P | INJ07 |
| LSO8 | J1-7 | | J6-L | INJ08 |
| LSO9 | J1-8 | | J6-CT | INJ09 |
| LSO10 | J1-9 | | J6-CS | INJ10 |
| LSO11 | J1-10 | | J6-DB | INJ11 |
| LSO12 | J1-11 | | J6-DA | INJ12 |
| TRIG1 | J1-13 | | J6-X | EST01 |
| TRIG2 | J1-14 | | J6-AC | EST02 |
| TRIG3 | J1-15 | | J6-Y | EST03 |
| TRIG4 | J1-16 | | J6-T | EST04 |
| AUX_HSO1 | J4-36 | | J6-W | EST05 |
| AUX_HSO2 | J4-44 | | J6-E | EST06 |
| EID_HSO1 | J5-76 | | J6-H | EST07 |
| | | | | |
| DRVR1 (-) | J5-58 | | MM1-10 | |
| DRVR1 (+) | J5-50 | | MM1-5 | |
| DRVR2 (-) | J5-10 | | MM2-10 | |
| DRVR2 (+) | J5-2 | | MM2-5 | |
| DRVR3 (-) | J5-12 | | MM1-14 | |
| DRVR3 (+) | J5-4 | | MM1-6 | |
| DRVR4 (-) | J5-13 | | MM2-14 | |
| DRVR4 (+) | J5-5 | | MM2-6 | |
| DRVR5 (-) | J5-15 | | MM1-15 | |
| DRVR5 (+) | J5-7 | | MM1-7 | |

| LECM Name | From | | Splice | | To | Panel Resource |
|---|---|---|---|---|---|---|
| DRVR6 (-) | J5-74 | | | | MM2-15 | |
| DRVR6 (+) | J5-66 | | | | MM2-7 | |
| DRVR7 (-) | J5-41 | | | | MM1-11 | |
| DRVR7 (+) | J5-33 | | | | MM1-8 | |
| DRVR8 (-) | J5-44 | | | | MM2-11 | |
| DRVR8 (+) | J5-36 | | | | MM2-8 | |
| DRVR9 (-) | J5-45 | | | | MM1-17 | |
| DRVR9 (+) | J5-37 | | | | MM1-13 | |
| DRVR10 (-) | J5-47 | | | | MM2-17 | |
| DRVR10 (+) | J5-39 | | | | MM2-13 | |
| DRVR11 (-) | J5-73 | | | | MM1-19 | |
| DRVR11 (+) | J5-65 | | | | MM1-16 | |
| DRVR12 (-) | J5-9 | | | | MM2-19 | |
| DRVR12 (+) | J5-1 | | | | MM2-16 | |
| DRVR13 (-) | J5-11 | | | | MM1-18 | |
| DRVR13 (+) | J5-3 | | | | MM1-21 | |
| DRVR14 (-) | J5-14 | | | | MM2-18 | |
| DRVR14 (+) | J5-6 | | | | MM2-21 | |
| DRVR15 (-) | J5-48 | | | | MM1-20 | |
| DRVR15 (+) | J5-40 | | | | MM1-24 | |
| DRVR16 (-) | J5-57 | | | | MM2-20 | |
| DRVR16 (+) | J5-49 | | | | MM2-24 | |
| DRVR17 (-) | J5-42 | | | | MM1-26 | |
| DRVR17 (+) | J5-34 | | | | MM1-29 | |
| DRVR18 (-) | J5-43 | | | | MM2-26 | |
| DRVR18 (+) | J5-35 | | | | MM2-29 | |
| DRVR19 (-) | J5-46 | | | | MM1-22 | |
| DRVR19 (+) | J5-38 | | | | MM1-30 | |
| DRVR20 (-) | J5-16 | | | | MM2-22 | |
| DRVR20 (+) | J5-8 | | | | MM2-30 | |

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