

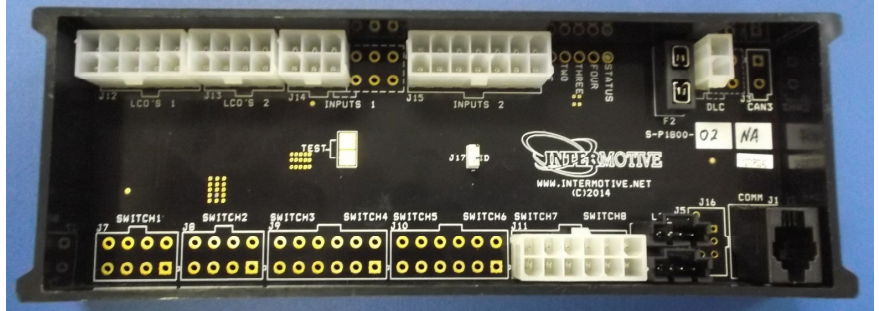
SBB8/4-B

FlexTech Switch Backer Board

This product is not vehicle specific

Introduction

The **Switch Backer Board (SBB)** is an add-on module to the **PRPC** in the **FlexTech System**. The SBB8 provides 8 switch inputs (2 with 3 inputs each and 6 with 1 input each), 4 general purpose active low inputs, 6 Low Current Outputs, LCOs (2 at 1A and 4 at 1/2A), and 8 outputs at 1/2A to drive load LEDs for the switches. There are half as many inputs and outputs for the SBB4: 4 switch inputs (1 with 3 inputs and 3 with 1 input each), 2 general purpose active low inputs, 3 LCOs (1 at 1A and 2 at 1/2A), and 4 outputs at 1/2A to drive load LEDs for the switches. In addition, both SBBs have a backlight output which can have its intensity set by the PRPC configuration or it can be controlled by the dimmer on the vehicle's instrument cluster. Refer to the instructions for the specific PRPC version that you are connecting this module to for information on programming (configuration).



SBB8/4-B Enclosures

The SBB8/4-B comes in a full height enclosure that gives backing support and protection to the board.

Multiple Units

The FlexTech System can have 0, 1, or 2 SBB modules connected in a LIN Bus daisy chain along with 0, 1, or 2 EXP modules (Expander Module). In most systems there can also be a Gateway or AFIS control and display panel on the daisy chain. In some cases there could also be a PTM (Pre-Trip Module). See page 5 for instructions on installing modules in this daisy chain.

Since there cannot be more than 2 SBB modules in 1 FlexTech system the following are the only possible configurations:

- For up to 4 switches use 1 SBB4 or 1 SSB8
- For up to 8 switches use 1 SBB8, or 2 SBB4's (if the switches are in different locations)
- For up to 12 switches use 1 SBB8 and 1 SBB4
- For up to 16 switches use 2 SBB8's

Installation Instructions

Disconnect the battery before proceeding with the installation.



WARNING

Disconnect the battery to prevent setting a check engine light.

IMPORTANT—READ BEFORE INSTALLATION

It is the installer's responsibility to route and secure all wiring harnesses where they cannot be damaged by sharp objects, mechanical moving parts or high heat sources. Failure to do so could result in damage to the system or vehicle, and create possible safety concerns for the operator and passengers. Avoid placing the module where it could encounter strong magnetic fields from high current cabling connected to motors, solenoids, etc. Avoid radio frequency energy from antennas or inverters next to the module. Avoid high voltage spikes in vehicle wiring by always using diode clamped relays when installing upfitter circuits.

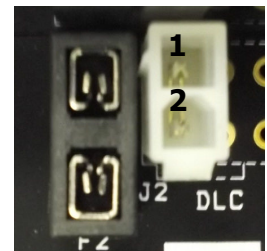
SBB8/4-B Module

Find a suitable location to mount the SBB8/4-B module. Do not mount the module where it will be exposed to excessive heat. Do not mount the module until all wire harnesses are routed and secure. The last step of the installation is to mount and connect the module. There is a drawing on the last page of these instructions that shows where each connector is located on the module. Consider this when picking the location and orientation of the module and the wiring harnesses such that connecting and mounting of the module does not stress the wiring harnesses. This module will only operate if it is connected to a PRPC using a LIN Bus cable.

SBB Power Connection

Connect a VBAT source to pin 1 of the 2-pin Molex Mini-Fit Junior connector J2. Connect a ground source to pin 2 of J2. Make sure the ground connection is firmly attached to a clean bare metal point on the vehicle chassis. The installer **must** provide strain relief on the cable outside of the SBB's enclosure. It is recommended that the strain relief is within 6" of the enclosure. The absence of strain relief could result in damage to the module.

Install a 10A fuse in the fuse holder (F2) next to connector J2. Do not exceed 10A for this fuse.



10-pin Connector (labeled LCO'S 1)

On the SBB8, the Molex Mini-Fit Junior connector J12 contains 6 general purpose Low Current Output pins (LCO's). Two of these outputs can supply up to 1A each, the remaining 4 can supply ½A each. On the SBB4, this connector contains 3 general purpose LCO's with 1 of them supplying up to 1A. These outputs are activated/de-activated by the attached PRPC using the configuration in the PRPC, and are intended to drive relay coils or other low current loads. This connector also has two additional pins to drive the switch panel backlights. If there are separate locations where backlights are needed both pins could be used. The total current available from either pin OR from both pins combined is 2A. The brightness of the backlight is set in the PRPC configuration. It is also possible to have the backlight track the vehicle's main instrument cluster backlight. This is described on the next page for INPUTS 1 on J14. **Note: when driving relays, a diode-protected type must be used. InterMotive recommends Digi-Key #PB682-ND Relay.**

The output pins on connector J12 are defined as follows:

- Pin #1 - Backlighting.
- Pin #2 - No connection.
- Pin #3 - LCO 1, 1A maximum.
- Pin #4 - LCO 2, 0.5A maximum.
- Pin #5 - LCO 3, 0.5A maximum.
- Pin #6 - Backlighting.
- Pin #7 - No connection.
- Pin #8 - LCO 4, 1A maximum (SBB8 only).
- Pin #9 - LCO 5, 0.5A maximum (SBB8 only).
- Pin #10 - LCO 6, 0.5A maximum (SBB8 only).



Connect the desired outputs to vehicle equipment as needed.

8-Pin Connector (labeled LCO'S 2)

On the SBB8 the Molex Mini-Fit Junior connector J13 contains 8, ½A maximum, Low Current Output pins (LCO's). These outputs are for driving the load LEDs on each switch. On the SBB4 this connector contains 4 LCO's. These outputs are activated and de-activated by the attached PRPC using the configuration in the PRPC. The LCO output pins on connector J13 are defined as follows:

- Pin #1 - Load LED 1, for Switch 1.
- Pin #2 - Load LED 2, for Switch 2 (SBB8 only).
- Pin #3 - Load LED 3, for Switch 3.
- Pin #4 - Load LED 4, for Switch 4.
- Pin #5 - Load LED 5, for Switch 5.
- Pin #6 - Load LED 6, for Switch 6 (SBB8 only).
- Pin #7 - Load LED 7, for Switch 7 (SBB8 only).
- Pin #8 - Load LED 8, for Switch 8 (SBB8 only).

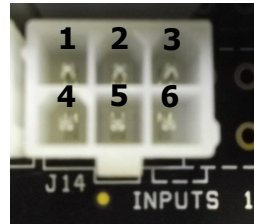


Connect the desired outputs to vehicle equipment as needed.

6-Pin Connector (labeled INPUTS 1)

On the SBB8, the Molex Mini-Fit Junior connector J14 contains 4 general purpose active low inputs. These inputs can be used in the PRPC configuration logic to control other outputs. On the SBB4, this connector contains 2 general purpose active low inputs. In addition (for both SBB4 and 8) there are 2 inputs related to the backlight. One is a Pulse Width Modulation (PWM) input from the vehicle's main instrument cluster dimmer module. The other is the backlight adjust input. See page 7 to learn more about the backlight adjustments that can be done. The input pins on connector J14 are defined as follows:

- Pin #1 - Backlight Dimmer PWM Input
- Pin #2 - General Purpose Input 1
- Pin #3 - General Purpose Input 2
- Pin #4 - Backlight Adjust Input
- Pin #5 - General Purpose Input 3 (SBB8 only)
- Pin #6 - General Purpose Input 4 (SBB8 only)

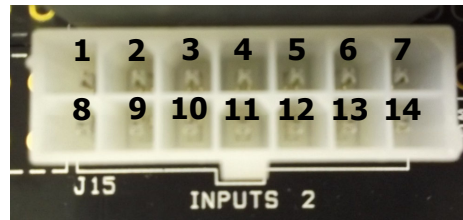


Connect the desired inputs to vehicle equipment as needed.

14-Pin Connector (labeled INPUTS 2)

On the SBB8, the Molex Mini-Fit Junior connector J15 contains the inputs from all 8 of the switches being read by this module (2 with 3 inputs each and 6 with 1 input each). On the SBB4, there are 4 switch inputs (1 with 3 inputs and 3 with 1 input each). These switch inputs are reported to the PRPC where they are part of the configuration logic to control any output in the FlexTech system. There are 2 pins that are only for test purposes, one is the +5V on the board and the other is the +12V (VBAT) on the board. The input connections on J15 are defined as follows:

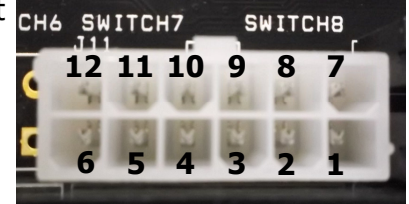
- Pin #1 - Switch 1A
- Pin #2 - Switch 1B
- Pin #3 - Switch 1C
- Pin #4 - Switch 2A (SBB8 only)
- Pin #5 - Switch 2B (SBB8 only)
- Pin #6 - Switch 2C (SBB8 only)
- Pin #7 - +5V (for test purposes only)
- Pin #8 - Switch 3
- Pin #9 - Switch 4
- Pin #10 - Switch 5
- Pin #11 - Switch 6 (SBB8 only)
- Pin #12 - Switch 7 (SBB8 only)
- Pin #13 - Switch 8 (SBB8 only)
- Pin #14 - +12V (VBAT, for test purposes only)



Connect the desired inputs to switches as needed.

12-Pin Connector (labeled SWITCH7 SWITCH8)

On both the SBB4 and SBB8, this Molex Mini-Fit Junior connector just supplies 6 ground pins. The labeling is not indicative of what is on this connector. Pins 1-6 are all ground and at least one of these needs to be connected to the ground on the switch panel. This provides the reference point for the switches and return path for the LEDs on the panel. Use the additional pins for the other panels when there is more than one. Pins 7-12 are not connected and are not to be used. Please do not connect anything to these pins.

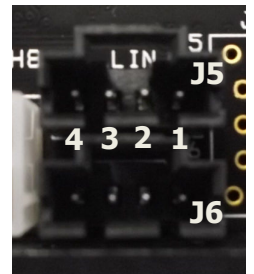


Connect grounds as needed.

Connecting the SBB8/4-B to the PRPC and Other Modules:

The SBB8/4-B must be connected to a PRPC to work. This connection is done with the supplied LIN Bus cable. In the simplest system with a PRPC and 1 SBB module just connect one end of the LIN Bus cable to J5 on the PRPC and the other end to either J5 or J6 on the SBB module.

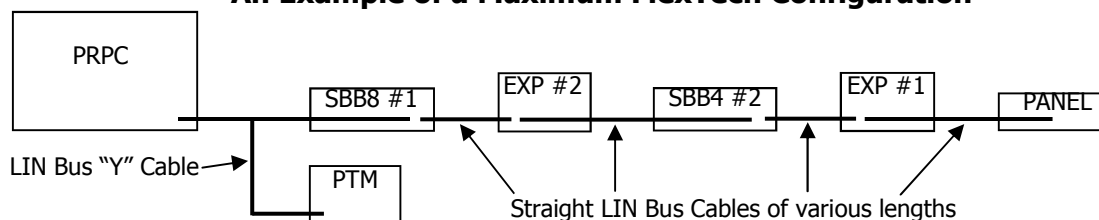
For more complex FlexTech configurations the modules are connected in a "daisy chain." The PRPC is always at the "Head End" of the chain and any Gateway or AFIS panel will be at the "Tail End" of the chain. The other modules can be connected in any order. This will be decided by their physical location. There can be 0, 1, or 2 SBB modules and 0, 1, or 2 EXP modules in the chain. In some systems there could also be a PTM module. A PTM is frequently added with a LIN Bus "Y" cable as shown in the example below. In connecting the SBB in the daisy chain, it does not matter what order the modules are in nor does it matter which LIN connector is used.



In order to use 2 SBB modules in one system a shunt (3M part number 929950-00) must be slid onto the 2 pin header J17 on one of the SBB modules. See the adjacent photo for the location of this connector (near the middle of the board). Keep track of which module has the shunt and which does not. For programming the configuration into the PRPC the SBB module without the shunt will be designated Switch Board 1 and the SBB module with the shunt will be designated Switch Board 2. Again, it does not matter in what physical order the modules are placed in the daisy chain.



An Example of a Maximum FlexTech Configuration



Finishing the Installation and Testing Operation

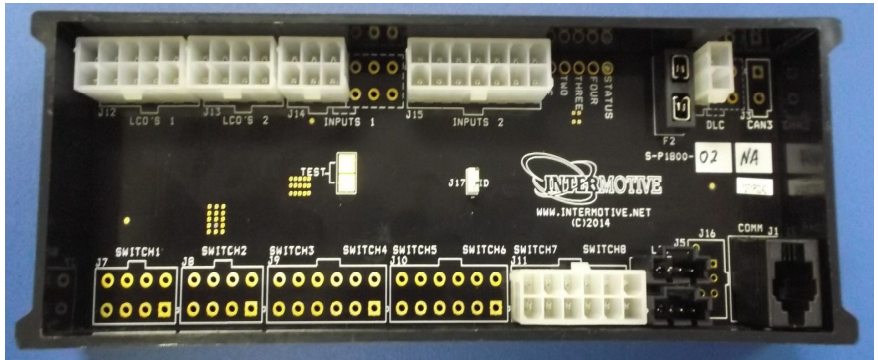
Module Mounting

1. Ensure all the harnesses are properly routed with strain relief where needed.
2. Mount the SBB8/4-B module as described on page two.
3. Verify that the module is in an area away from any external heat sources (engine heat, heater ducts, etc.).
4. Secure using screws or double sided tape.

Connect the Harnessing:

The following sequence should be performed **prior to** reconnecting the vehicle battery:

1. Connect each of the harness connectors to the corresponding connector on the SBB8/4-B. Each connector has a different number of pins and will only fit into the connector on the board with the same number of pins. Do not use force to insert a connector.
2. Ensure that the PRPC has been completely installed.
3. Confirm that there is a 10A fuse firmly seated in the fuse holder (F2) on the SBB8/4-B.
4. The vehicle battery may now be reconnected.



Post Installation Testing

1. Turn the ignition ON to wake up and initialize the PRPC module.
2. When the PRPC is up and operating it will tell the SBB to wake up.
3. With these conditions met, ensure that **all** desired outputs are responding correctly per their programmed set of conditions in the PRPC configuration (For example, depending on the actual configuration, PRPC relay 4 activates when SBB switch 3 is turned on).

The SBB8/4-B is properly installed only if it passes the above tests. If any irregular operational issues persist, recheck the set of conditions in the PRPC configuration. Contact InterMotive at 530-823-1048 for technical assistance.

FlexTech System Operation:

Turning the vehicle ignition ON will wake up and initialize the attached PRPC. The PRPC will then wake up the SBB8/4-B through the LIN Bus. Outputs are controlled based on the PRPC's configuration.

When the key is turned OFF, the attached PRPC will tell the SBB8/4-B to go into low power sleep mode, and then the PRPC will go into low power sleep mode. This may take up to TEN minutes. Other vehicle activity such as opening doors, inserting key in the ignition, etc. may delay sleep mode.

Backlight Adjustment

There are two primary ways that the intensity of the backlight for the switches can be set. In addition, in each of these ways, there is a method for further adjustment.

1. The backlight intensity can be set by the PRPC configuration. This can set the intensity anywhere between 0% (off) to 100% (very bright). This method gives the user a fixed backlight intensity at all times. The backlight adjust input on J14 (see page 4) can be used to make adjustments to this fixed value without needing to redo the PRPC configuration. The method of using the backlight adjust input is described in step 3 below.
2. The backlight intensity can be set up to track the intensity of the vehicle's main instrument cluster. By connecting a wire from the main cluster dimmer PWM output to pin 1 on J14 (see page 4), the backlight output will adjust with the main cluster (this needs to be enabled in the PRPC configuration). The configuration can be set such that the backlight output from the SBB will give from 0% to 125% of that of the main cluster. This allows for variations in intensity that can be caused by where the switch panel is located compared to the main cluster as well as differences in the lights used. This "multiplier," set in the configuration, can be adjusted using the backlight adjust input as described in step 3 below.
3. The backlight adjust input can be used by the installer to adjust the intensity of the fixed backlight (step 1 above) or to adjust the relative intensity between the main instrument cluster and the switch panel controlled by the SBB (step 2 above). To do this adjustment a wire needs to be connected to pin 4 of J14 (see page 4). This wire will then be manually touched momentarily to ground as described in the following steps.
 - a. Touch the end of this wire to ground and hold it there (at least 5 seconds) until the backlights on the switch panel blink on and off 3 times then lift the wire away from ground. This puts the SBB into the adjust mode.
 - b. Touch the wire to ground and lift it. The backlights on the switch panel will increase in intensity by 10% (or the relative intensity between the main cluster and the switch panel will increase by 10%).
 - c. This touch and release can be repeated as needed to achieve the desired backlight intensity (or desired relative difference).
 - d. To reduce the intensity (or difference) continue doing step c until the intensity (or difference) reaches the maximum point. It will then "roll over" to the minimum intensity (or the difference will be below that of the main cluster). Continue until the desired effect is reached.
 - e. When done, simply stop touching the wire to ground. After 5 seconds of no ground touches the backlights will, again, blink 3 times and the mode is exited.
 - f. If needed, simply repeat this process from the beginning until the result is correct.

This wire can be left in the installation for future adjustments if needed. Make sure the bare part of the wire is taped, and the wire is secured such that it won't inadvertently contact ground.

Diagnostic Displays

The SBB8/4-B uses the same type of part to supply the LCOs and the load LEDs (LLEDs). These parts monitor the LCO/LLED for overvoltage or overcurrent faults. An overcurrent fault could be caused by a short in the load being driven by that LCO/LLED. The part shuts off the faulted output when a fault is detected, and keeps it off until the fault is cleared.

There is a fault code display available while the SSB4/8-B is powered up. To enter the Fault Code display mode, momentarily short the test pads together. The on-board amber status LED will blink in a way that indicates whether there is a fault or not and, if so, which output is faulted.



When everything is working properly the status LED will blink twice with about a half second between blinks and will repeat this after a 1 full second delay. This is a code of 1-1 which means NO fault has been detected.

When there is a fault the status LED will blink a two digit code that tells what the fault condition is. The first digit will be from 1 to 5 blinks quickly to indicate the type of fault, after about half a second the status LED will blink the second digit quickly. The status LED will repeat the fault code after a full second delay. This blinking will continue until the fault is cleared or the test pads are again shorted momentarily which turns

- | | | | |
|-------|----------------------------|-------|-------------------------------------|
| • 1-1 | No faults detected | • 3-3 | Fault detected for LLED #3 |
| • 2-1 | Fault detected for LCO #1 | • 3-4 | Fault detected for LLED #4 |
| • 2-2 | Fault detected for LCO #2 | • 3-5 | Fault detected for LLED #5 |
| • 2-3 | Fault detected for LCO #3 | • 3-6 | Fault detected for LLED #6 |
| • 2-4 | Fault detected for LCO #4 | • 3-7 | Fault detected for LLED #7 |
| • 2-5 | Fault detected for LCO #5 | • 3-8 | Fault detected for LLED #8 |
| • 2-6 | Fault detected for LCO #6 | • 4-1 | Fault detected for Backlight Output |
| • 3-1 | Fault detected for LLED #1 | • 4-2 | Input hardware failure |
| • 3-2 | Fault detected for LLED #2 | • 5-3 | LCO/LLED hardware failure |

Only 1 fault can be shown with this method. If there is more than 1 fault in the board only the highest numbered fault will be shown. For example, if both LCO #6 is in fault and the backlight output is in fault then only the backlight fault will be shown. Likewise, if both LLED #3 and LLED #7 are in fault, only LLED #7 will be shown.

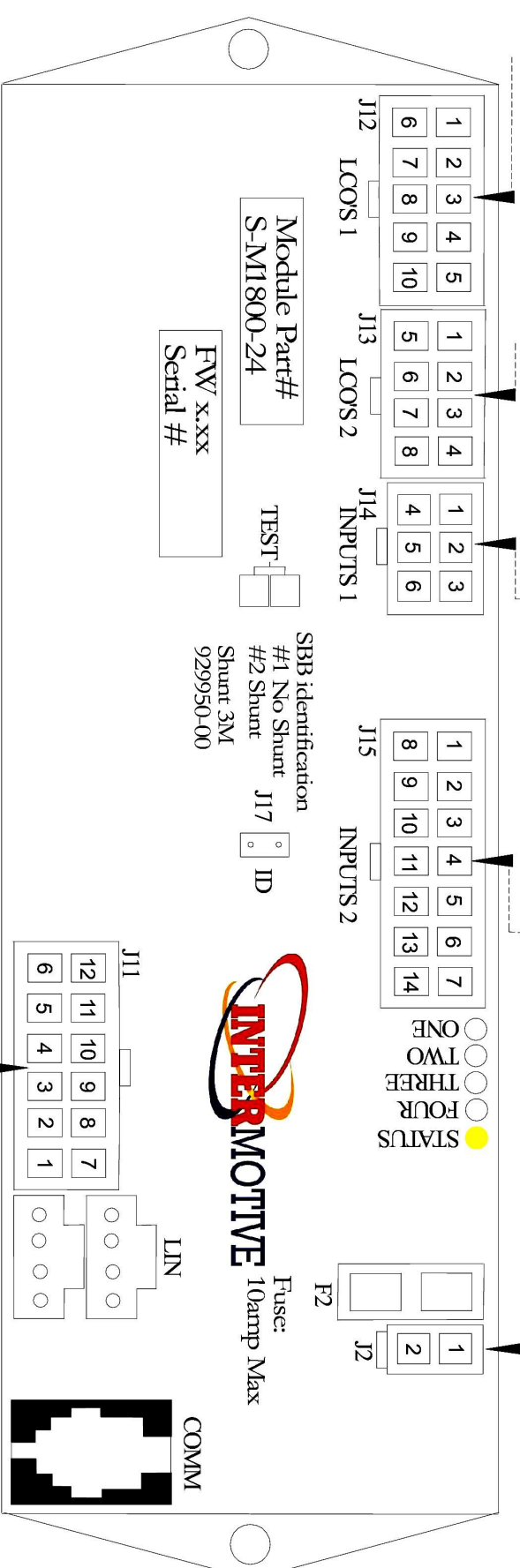
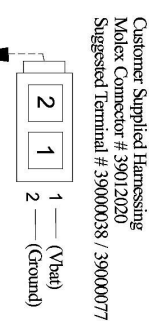
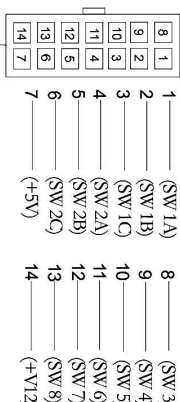
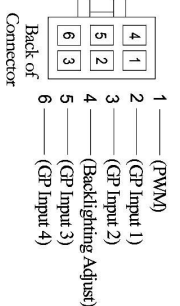
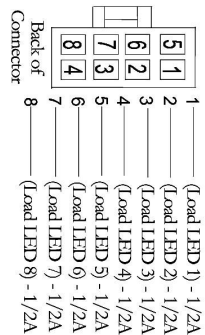
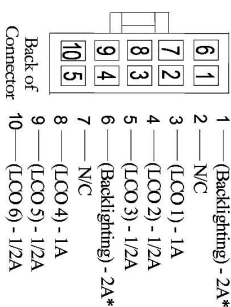
Customer Supplied Harnessing
Molex Connector # 39012110
Suggested Terminal # 39000038 / 39000077

Customer Supplied Harnessing
Molex Connector # 39012080
Suggested Terminal # 39000038 / 39000077

Customer Supplied Harnessing
Molex Connector # 39012060
Suggested Terminal # 39000038 / 39000077

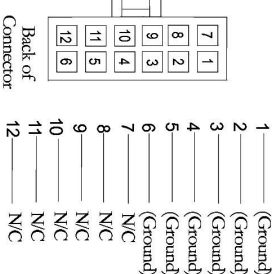
Customer Supplied Harnessing
Molex Connector # 39012140
Suggested Terminal # 39000038 / 39000077

*Total Combined
Current is 2A



SBB8

Customer Supplied Harnessing
Molex Connector # 39012120
Suggested Terminal # 39000038 / 39000077



Part# S-H32DX-\$\$
\$\$ = Intermotive
Supplied LIN
Harness length(ft)

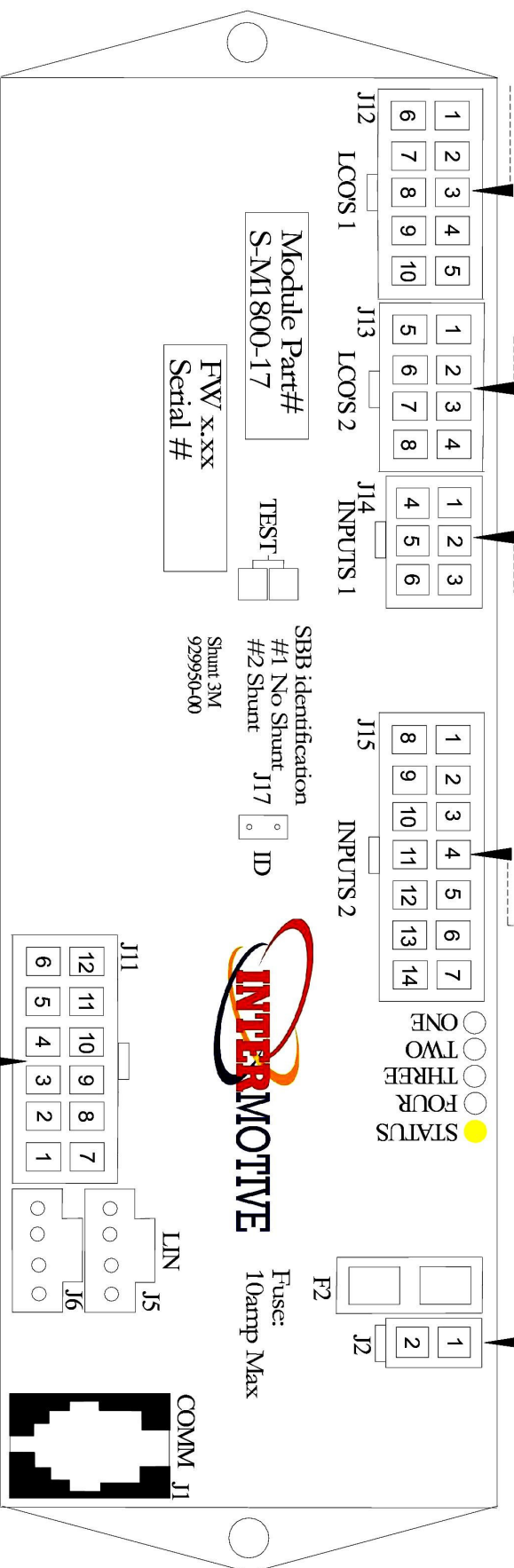
Submit product registration at www.intermotive.net

If the SBB8 fails any step in the Post Installation Test, review the installation instructions and the loaded PRPC configuration by running the FlexTech Programming Utility application. If necessary, call

InterMotive technical support @ (530) 823-1048.

SBB8-4-B-070915-INS

Customer Supplied Harnessing
Molex Connector # 39012140
Suggested Terminal # 39000038 / 39000077



SBB4

Submit product registration at www.intermotive.net

If the SBB4 fails any step in the Post Installation Test, review the installation instructions and the loaded PRC configuration by running the FlexTech Programming Utility application. If necessary, call

InterMotive technical support @ (530) 823-1048.

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