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MINI-SCREEN™ Muting Control Box with DeviceNet™ Addendum

Supplement to Primary MINI-SCREEN Instruction Manual P/N 64723 and 61409

Features

- Offers all of the features of standard MINI-SCREEN controllers (see Primary Instruction Manual P/N 64723 or 61409), plus DeviceNet BUS network communications for non-safety monitoring of status and diagnostic information
- Wires to network using simple junction boxes or "T" connectors
- The following information is available to DeviceNet:

  System Identification: Product name, manufacturer, model, etc.

  System Status:
  - Operating mode: Stop/Go, Mute, Override, Lockout
  - Status of defined area: blocked or clear
  - FSD and SSD Output relay status

  Diagnostic Information:
  - Light Screen and System Lockout Error codes*
  - Problem description (cause of lockout)
  - Troubleshooting suggestions
- An Electronic Data Sheet (EDS) is supplied with each controller to assist in device configuration.
- Manual MAC ID Address switches and LED
- Autobaud

MINI-SCREEN Controllers with DeviceNet™

Model	Primary Instruction Manual	Enclosure	Supply Voltage	Output Type	Blanking
MSCC-2T..MD	64723	Welded steel box NEMA13; IEC IP64	115/230V ac +24V dc	Trip	Fixed and 1- or 2-beam floating blanking
MSCC-2L..MD	61409			Latch	

*NOTE: These Lockout Error codes are listed in figures 5-1 and 5-2 in the instruction manuals. Latch Error Codes #50 and #51 are not directly available, though can be inferred by using System Status DeviceNet information (see Parameter 1).

For MSCC-2T..MD models:
Parameter 1 = "0 System Stop - L.S. Clear" is caused by Code #50;
Parameter 1 = "1 System Stop - L.S. Blocked" is caused by a Code #51, Defined area is interupted, or Defined are is out of alignment.

For MSCC-2L..MD models:
Parameter 1 = "0 System Stop - L.S. Clear" is caused by Code #50, or a Latched Output condition;
Parameter 1 = "1 System Stop - L.S. Blocked" is caused by a Code #51, Defined area is interupted, or Defined are is out of alignment.

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DeviceNet Specifications

See Primary MINI-SCREEN Instruction Manual (P/N 64723 or 61409) for additional information	
DeviceNet Power	11 to 25V dc; 80 mA – supplied by DeviceNet BUS network
Indicators	**MAC ID Yellow LED** associated with the address setting of the Mac ID switches **Bi-colored Network Status LED** (red/green) indicates network status: **Green** Steady On-line, connected/allocated to master Flashing On-line, not connected/allocated to master; if Autobaud is ON, address and baud rate OK **Red** Steady Critical network fault or duplicate node address detected Flashing Connection time-out or no power to control box OFF No network power or off-line **Red/Green/OFF** Autobaud detecting network baud rate **Yellow COMM Status LED** indicates communication between the DeviceNet board and the Light Screen and System boards. Steady ON if communication is detected. **Red Fault LED** Steady ON if internal checks fail. **Green Power ON LED**
DeviceNet Configuration	**Vendor Code** = 12 (Banner Engineering Corp.) **Device Type** = 130 (Safety Light Screen) **Product Code, MSCC-2..MD** = 5 **Product Name** = "MINI-SCREEN with muting" **Connection Types Supported** = Explicit Message, Poll, Change of State **Network Address** = 0-63 (Manual Switches or Network configured) **Baud Rate Supported:** Autobaud or Network configured (125K, 250K, 500K) (Factory setting is Autobaud ON) **EDS File Names, MSCC-2..MD** = 130_5_2.eds **Bit Map Icon File Name:** 130.bmp, 130.ico EDS and Bitmap files on 3.5" disk supplied with controller (P/N 52243) For custom EDS or bitmap files, contact Banner Application Department.
Poll and COS I/O Assembly Instances	The MINI-SCREEN device I/O assemblies consist of: • **Poll:** One product-specific input assembly containing system status, light screen status, status of output relays, system fault type, light screen fault type. • **COS:** One product-specific input assembly containing the same information as the Poll assembly.

I/O Assembly Data Attribute Format		**Assembly Instance 1** is used as the response data for the **Poll** command. Produced connection size is 4 bytes. Consumed connection size is 0 bytes for all models.							
Instance	**Byte**	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
1	0	Light Screen Status (Parameter 2)				System Status (Parameter 1)			
	1	SSD Status (Parameter 4)				FSD Status (Parameter 3)			
	2	Light Screen Fault (Parameter 9)				System Fault (Parameter 5)			
	3	Reserved	Reserved	Reserved	Reserved	Autobaud Configuration (Parameter 13)			

I/O Assembly Data Attribute Format		**Assembly Instance 2** is used as the data for the **COS** command. A **COS** command is issued in response to a change in the system status. Produced connection size is 4 bytes. Consumed connection size is 0 bytes for all models.							
Instance	**Bytes**	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
2	0-3	same as Instance 1 above							

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DeviceNet™ Information

Poll provides Parameters 1, 2, 3, 4, 5, 9, 13; COS provides Parameters 1 & 2
Explicit Message can be obtained at Class 100, Instance 100, Attribute = Parameter number
Parameter 13 (Autobaud) is available at: Class 3, Instance 1, Attribute 100

Parameter 1, System Status

0: System STOP - Light Screen clear
1: System STOP - Light Screen blocked
2: Light Screen is in LOCKOUT
3: System GO
4: System is in MUTED - Light Screen clear
5: System is in MUTED - Light Screen blocked
6: System is in LOCKOUT - Light Screen clear
7: System is in LOCKOUT - Light Screen blocked
8: System is in LOCKOUT
9: System is in OVERRIDE
10: Internal comm error

Parameter 2, Light Screen Status

0: Light Screen clear
1: Light Screen blocked
2: Light Screen is in LOCKOUT
3: Internal comm error

Parameter 3, System FSD Output

0: FSD is open (OFF)
1: FSD is closed (ON)
2: Internal comm error

Parameter 4, System SSD Output

0: System SSD is open (OFF)
1: System SSD is closed (ON)
2: Internal comm error

Parameter 5,6,7,8, System Board Fault Type and Troubleshooting Action

0: No fault
1: Relay module error (31):
Action 1: Replace relay
Action 2: Replace System board
Action 3: Replace PS board
2: Reset key error (32):
Action 1: Check key position
Action 2: Do a valid reset
Action 3: Replace key switch
3: Mute control error (33):
Action 1: Replace System board
4: Light Screen error (34):
Action 1: Check Light Screen diagnostics
Action 2: Replace Light Screen board
5: Override error (35):
Action 1: Check override wiring
Action 2: Replace override switch
6: Mute lamp error (36):
Action 1: Check lamp wiring
Action 2: Replace lamp
7: DIP switch error (37):
Action 1: Check DIP switches
Action 2: Replace System board
8: MPCE 1 error (38):
Action 1: Check MPCE1 wiring
Action 2: Check DIP switches
Action 3: Replace System board
9: MPCE 2 Error (39):
Action 1: Check MPCE2 wiring
Action 2: Check DIP switches
Action 3: Replace System board
10: MPCE 1 and 2 Error (40):
Action 1: Check MPCE 1 and 2 wiring
Action 2: Check DIP switches
Action 3: Replace System board
11: Internal comm error
Action 1: Check System power
Action 2: Replace Light Screen or System board
Action 3: Replace Power Supply board

Parameter 9,10,11,12, Light Screen Board Fault Type and Troubleshooting Action

0: No fault
1: Screen relay error (1):
Action 1: Replace relay
Action 2: Replace Light Screen board
Action 3: Replace PS board
2: Reset key error (2):
Action 1: Check key position
Action 2: Do a valid reset
Action 3: Replace key switch
3: Light Screen Control error (3):
Action 1: Replace Light Screen board
4: Receiver error (4):
Action 1: Check receiver cable
Action 2: Replace receiver
5: Emitter error (5):
Action 1: Check emitter cable
Action 2: Replace emitter
6: Communication error (6):
Action 1: Check cables
Action 2: Observe noise indicator
Action 3: Replace emitter/receiver
7: DIP Switch Error (7):
Action 1: Check DIP switches
Action 2: Replace Light Screen board
8: CPU Error (8):
Action 1: Replace Light Screen board
9: Not used
10: System error (10):
Action 1: Check fixed beams
11: Powerup error (10):
Action 1: Check Program/Run switch
12: Programming error (11):
Action 1: Too much time
Action 2: Floating blanking ON
13: Internal comm error
Action 1: Check System power
Action 2: Replace Light Screen or System board
Action 3: Replace Power Supply board

Parameter 13, Autobaud

0: OFF
1: ON

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Selecting the Autobaud Feature

The MINI-SCREEN has an autobaud feature, which allows for automatic recognition of the baud rate on the network into which the MINI-SCREEN is installed. This convenient feature automatically matches the MINI-SCREEN baud rate to the network without requiring a baud rate configuration step. The autobaud feature is set to ON at the factory. When the autobaud parameter is set to ON, the baud rate parameter may not be set via the DeviceNet network. The autobaud parameter may be turned off by setting the DeviceNet autobaud parameter to OFF (see the EDS file for path information). When the autobaud parameter is set to OFF, the baud rate parameter may be set via the DeviceNet network to the desired baud rate.

To determine if autobaud is set to ON, power the MINI-SCREEN at the DeviceNet power inputs while it is not connected to the DeviceNet network; the Bus Status indicator will flash green, then red, then OFF in a repetitive sequence. If autobaud is set to OFF, the Bus Status indicator will flash green (or red) after the initial green/red sequence at power-up.

The COS Trigger

The COS trigger is set to operating mode change only at the factory. Only changes in the operating mode of the MINI-SCREEN will generate the COS data message (see I/O Assembly Data Attribute Format; Instance 2 for details).

Setting the MAC ID Address

For the DeviceNet controller to process information from its individual inputs, each input must have a unique 2-digit address. (For example, two devices on the same bus network may not both have 26 as their address; however, two devices within the same factory may have addresses of 26, if they are on separate bus networks.)

The MINI-SCREEN's address may be assigned in two ways: locally, using the two rotary selectors on the front of the module (see Figure 1), or remotely, using the rotary selectors and the DeviceNet controller. To set the address locally, set the rotary selectors to a number between 00 and 63 and cycle power to the DeviceNet connection. To allow the DeviceNet controller to set the address, set the rotary selectors to a number higher than 63; the address can then be set using the controller.

The MAC ID LED will be OFF when the MAC ID Address rotary switches match the current address of the MINI-SCREEN (as recognized by the DeviceNet controller). If the addresses do not agree, the LED will flash. (To correct this problem, see DeviceNet Troubleshooting.) The MAC ID LED will be ON steady when the MAC ID Address rotary switches are above 63 and the current address of the MINI-SCREEN (as recognized by the DeviceNet controller) was set with the MAC ID Address rotary switches above 63.

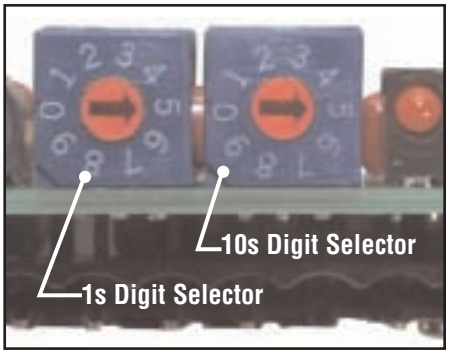

Figure 1. MAC ID Address rotary selectors and LED

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DeviceNet Troubleshooting

MINI-SCREEN Network Status Indicator (Bi-color)	Description	Recommended Action
Green ON Steady	On-line, connected/allocated to master	No action required.
Green Flashing	On-line, not connected/allocated to master; If autobaud is ON, address and baud rate OK	1) Connect/allocate the device to the master. 2) Check that all connectors and wiring are correct and tightly connected. 3) Check that the overall network is functional by connecting to some other device on the same DeviceNet network. 4) If autobaud is turned OFF, set the autobaud parameter (off-line) to ON or set the MAC ID switches to a value known not to be in use and off-line. Try to connect at 125K (factory default), then 250K, then 500K baud until successful. If unsuccessful, repeat step 2.
Red ON Steady	Critical network fault or duplicate node address detected	1) Check to ensure that no other device on the network has the same MAC ID (network address). Each DeviceNet device must have a unique MAC ID. Use the MAC ID address switches (set at 00 to 63) or set the MAC ID over the network by setting the MAC ID parameter to the desired value (the MAC ID switches must be set to 64 or higher to allow setting of the MAC ID via the network). 2) If autobaud is turned OFF, check that the configured baud rate matches the baud rate of the network. 3) Ensure that the DeviceNet network is properly terminated and grounded per DeviceNet specifications. 4) Check for insufficient network power supply.
Red Flashing	Connection timeout	Check DeviceNet I/O connection time-out expected packet rate (EPR) parameter setting and/or for problem with DeviceNet master.
OFF	No network power or off-line	1) Check the DeviceNet connector(s) for proper supply voltage and wiring for loose or incorrect connections.
Green/Red/OFF	Autobaud detecting network baud rate	1) Check that all connectors and wiring are correct and tightly connected. 2) Check that the overall network is functional by connecting/allocating to some other device on the same DeviceNet network. 3) Create repetitive network communication to some other device on the same DeviceNet network. This will allow detection of the baud rate.

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MINI-SCREEN MAC ID Indicator	Description	Recommended Action
ON Steady	MAC ID address is controlled by the master.	No action required.
Flashing	The address indicated by the MAC ID switches does not match the current address. This indicates that the switch setting has been changed while the device was ON. This is normal if the user is in the process of changing the address.	1) If switches have been changed, return the switches to the correct address (the indicator will stop flashing). 2) If trying to change the address, complete the address change procedure.
OFF	MAC ID address is controlled by the MAC ID switches.	No action required.

DeviceNet Status Indicators (Green, Red, Yellow)	Description	Recommended Action
Green ON Steady	Power ON	No action required.
Green OFF	Power OFF	No power to the DeviceNet board. Check power connections at +V (red) and –V (black).
Red OFF	Internal checks OK	No action required.
Red ON Steady	Internal checks failed	Replace DeviceNet board.
Yellow ON Steady	Communication with Light Screen and System boards OK	No action required.
Yellow Flashing	Communication with Light Screen and System boards not detected	1) A reset of either or both Light Screen board or the System board(s) is required. 2) Reseat DeviceNet board. 3) Possible hardware fault; replace controller.
Yellow OFF (Bi-color cycling)	Searching for autobaud	Wait for baud rate capture.

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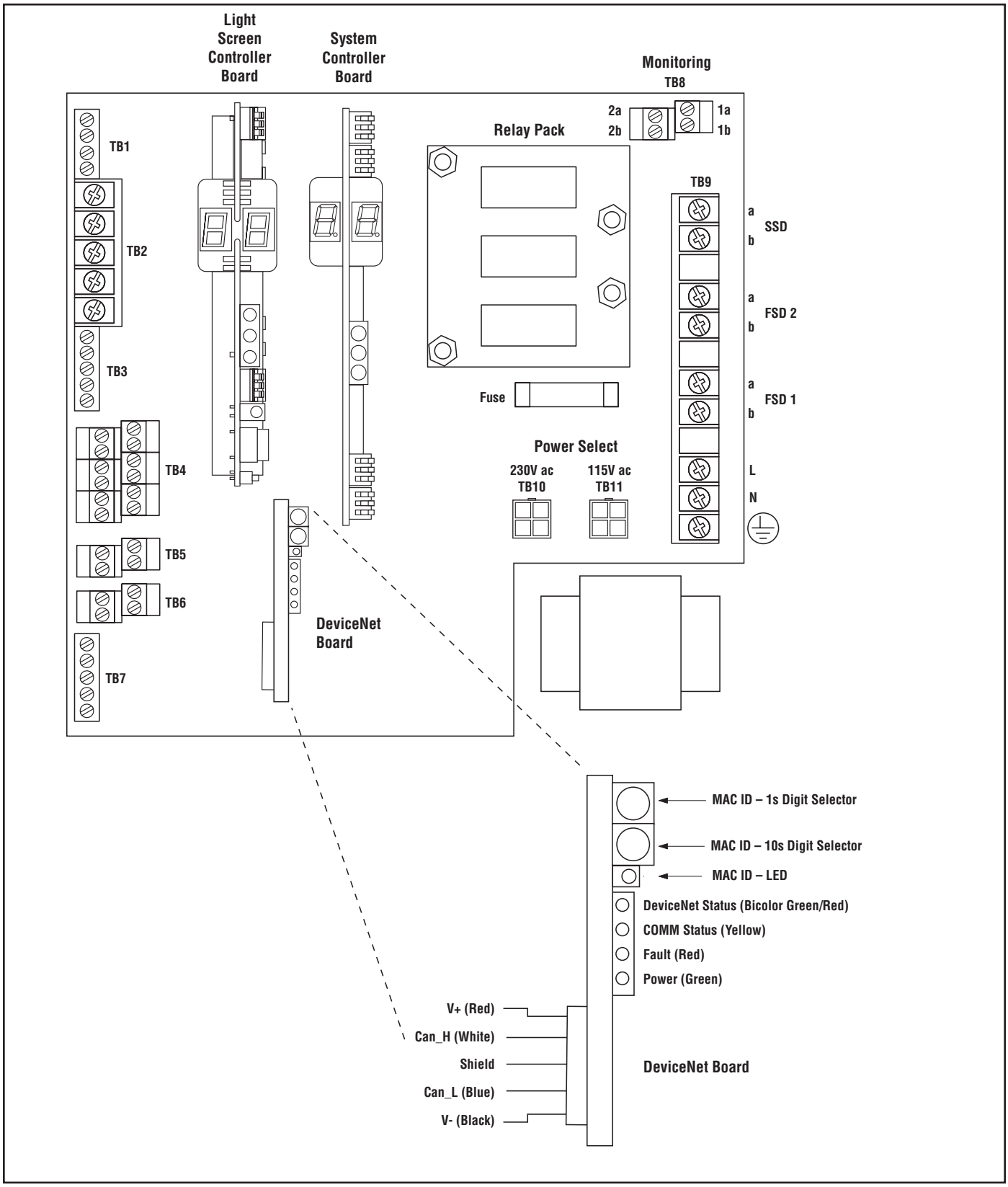

Figure 2. System electrical connections

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