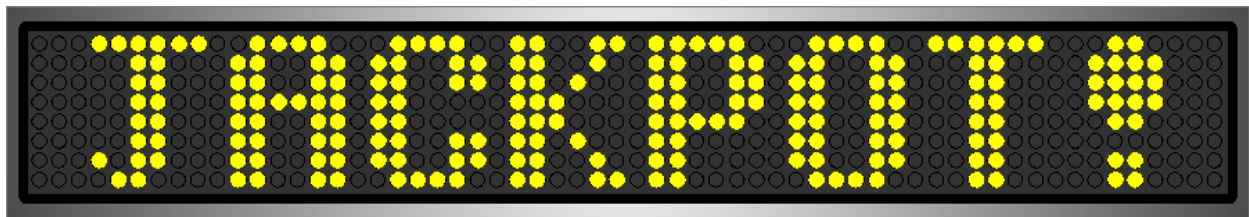


CHAMIII IN-MACHINE DISPLAY



Technical Manual

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About This Manual

Create excitement and attract players to your slot machines with the new Mikohn CHAMIII in-machine meter that presents continuously increasing jackpot amounts and displays jackpot celebrations on jackpot hits. The CHAMIII provides a cost-effect alternative to the CHAMII+, where standalone progressive controller capabilities are not required and progressives are run by a separate controller.

Hardware and Firmware Versions

This manual was written based on the following CHAMIII hardware and software versions:

- Hardware: Assemblies 341-016-20 and 341-016-25, which both include raw PCB board 321-016-20 Rev. C
- Firmware: CHAM3 v1.01

Who Should Use This Manual

This manual is primarily intended for service technicians, but customers, regulatory agencies, and production personnel may also find it useful. It is assumed the reader has general knowledge of slot machines and how displays are used in progressive systems.

Contents Summary

This manual describes the Mikohn CHAMIII display, and is organized as follows:

- **Chapter 1:** Hardware details, including board layout, wiring diagram, and component descriptions.
- **Chapter 2:** Configuration (currently only Mikohn protocol supported)
- **Chapter 3:** Installation guidelines (currently only upgrade instructions provided)
- **Appendix A:** CHAMIII kit descriptions and harness drawings

Technical Manual

Conventions Used

This manual uses the following conventions:

- **Blue** text serves as a hyperlink for online readers to quickly jump to cross-references.
- Notes and warnings are represented by the symbols shown at right. Notes provide helpful and important information, while warnings provide information to minimize or prevent undesirable outcomes.

**Contact Information and Feedback**

Contact Mikohn Customer Service if you have questions or comments about this document or any other Mikohn product.

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Other Mikohn Documentation

You can access other Mikohn documents on the Mikohn extranet:

<https://extranet.mikohn.com>

The following table lists Engineering Change Orders (ECO) and Software Change Orders (SCO) associated with the initial release of the CHAMIII. ECOs and SCOs provide complete information about the products associated with the document. This information is generally for internal MIKOHN use, but may also be valuable to regulatory agencies and customers

Product Description	ECO	SCO
CHAMIII firmware v1.01	N/A	2881
CHAMIII hardware and initial kits	4226	N/A

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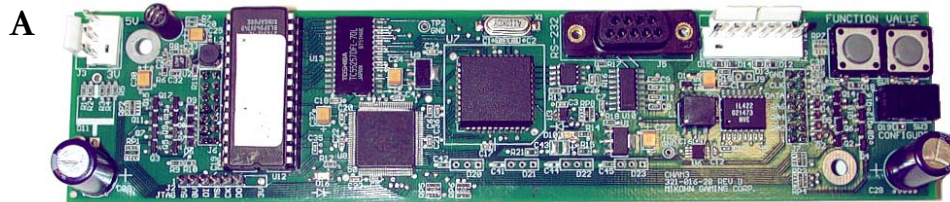
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Chapter 1 - Hardware Details

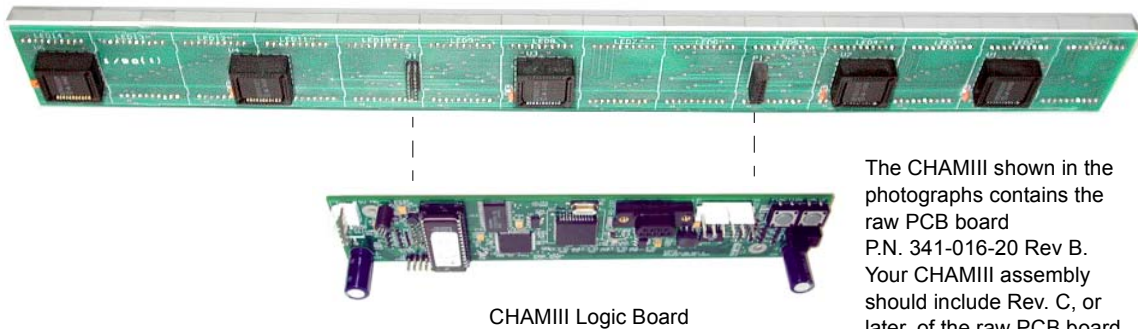
The CHAMIII in-machine display can be used with existing Mikohn panel assemblies (see Appendix A for kit information). It is cost- and space-efficient, containing the logic and LED driver components on a single PCB board that mounts directly to the LED panel. With a single logic board, there are fewer harnesses to route, and more flexibility in installation.

Photograph A shows the component side of the CHAMIII logic board P.N. 341-016-20 (see Note), where the power and system communication connections, and the configuration switches are located. Two connectors on the opposite side connect the logic board to the LED panel assembly. Photograph B shows the CHAMIII board and a 14-cell LED panel, with the connections between the two components aligned.



B

14-cell Mini Display LED Panel



The CHAMIII shown in the photographs contains the raw PCB board P.N. 341-016-20 Rev B. Your CHAMIII assembly should include Rev. C, or later, of the raw PCB board.



For mounting the display logic board, some LED panel assemblies have one male and one female connector, and others have two female connectors. To provide for both combinations of connectors, there are two CHAMIII final assembly part numbers. P.N. 341-016-20 has one male and one female connector, and P.N. 341-016-25 has two male connectors.

Logic Board Layout

The logic board, shown at right, provides the power, memory, interface and configuration for the display. See the next page for specifications on the logic board and associated power supply.

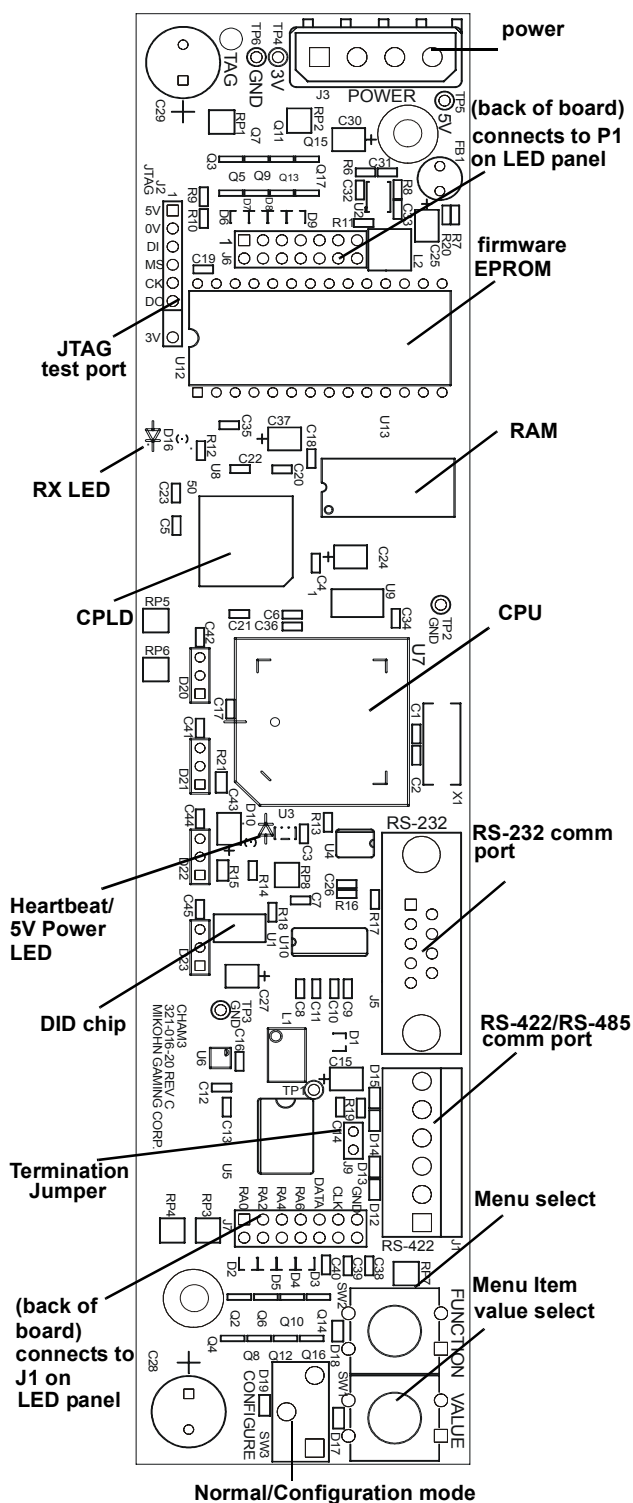
About CHAMIII Kits

The CHAMIII logic board can be purchased separately and used to replace current display logic and LED driver components. The CHAMIII is also available in kits for the various LED panel assemblies. At minimum, kits will include the following:

- Display logic board assembly
- LED panel assembly
- Display-to-system communication harness
- Power supply, cord, and harnessing

Some kits may also include mounting brackets and hardware, or multiple LED panel assemblies.

See Appendix A for additional kit and harnessing information. You may also contact Mikohn Customer Service to find out which kits are right for your applications.



Dimensions: 8" (length) x 1.75" (width) x 1.75" (height)

Logic Board and Power Supply Specifications

Logic Board

CHAMIII logic board final assembly: P.N. 341-016-20 or P.N. 341-016-25

Specification	Value
Power	
Operating voltage	120 — 230 VAC
Operating current	1.05A — .55A
Environmental Specification	
Operating temperatures	0° C to + 70° C
Maximum relative humidity	Non-condensing 0% to 95%

Power Supply

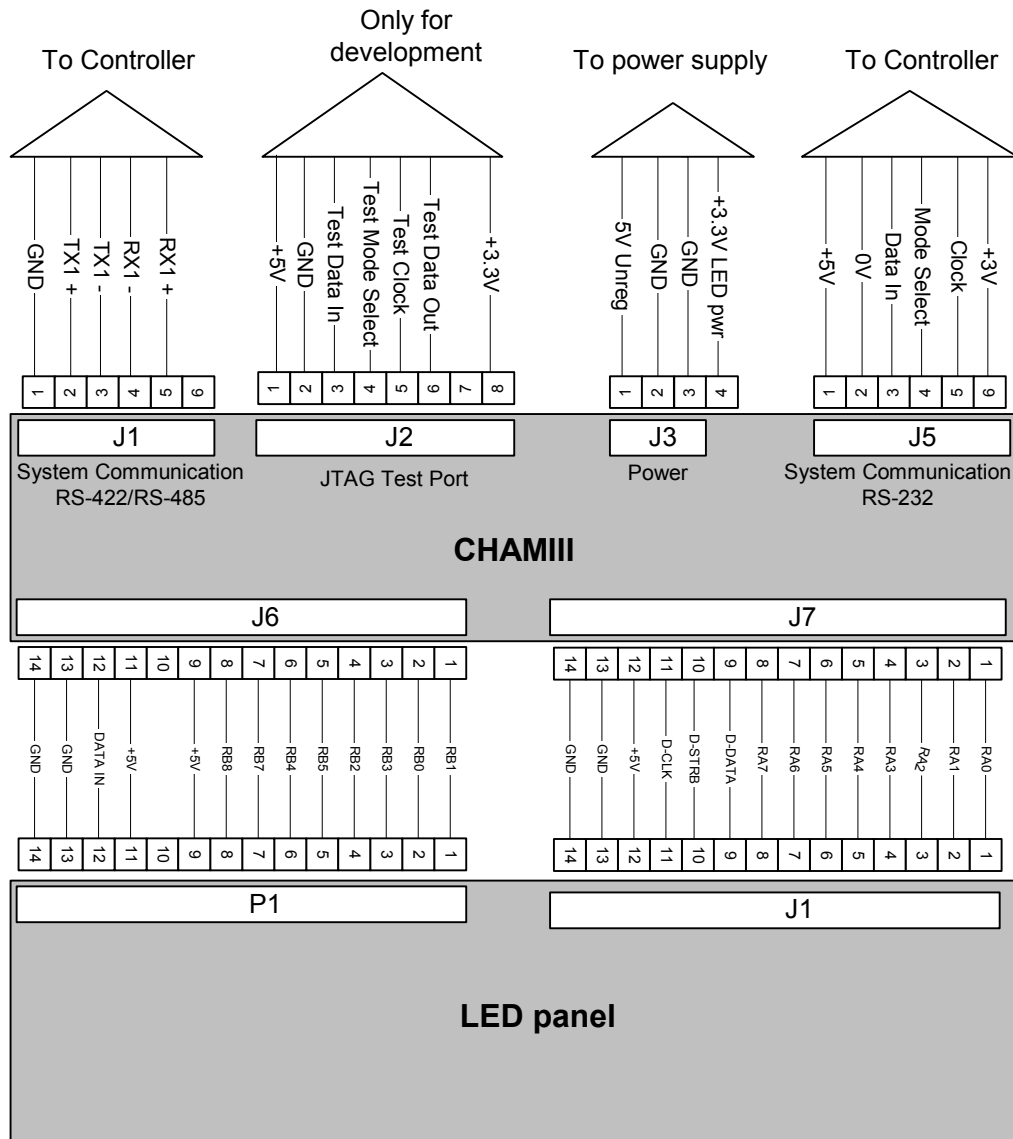
The power supply is shipped in final assembly P.N. 780-029-00, which includes a housing and internal harnessing that connects the power supply to the power inlet and outlet connectors in the housing.

Approximate overall dimensions, excluding connectors:

9.40" (length) x 5.60" (width) x 2.32" (height)

Specification	Value
Power	
Output	5V and 3.3V, $\pm 2\%$
Input	90 — 260 VAC, 1.05A — .55A
Environmental Specification	
Operating temperatures	0° C to + 70° C
Surface ambient temperatures	-40° C to + 85° C
Relative humidity	Non-condensing 5% to 95%

Wiring Diagram: System, LED Panel, and Power Connections



Chip Descriptions

Location	Description
U1	64-bit DID chip
U2	Micropower Synchronous Buck-Boost DC/DC Converter (2.5V to 5.5V I/O range)
U3	Reset chip, w/watchdog timer (5V)
U4	16K serial EEPROM (Electrically Erasable Programmable Read Only Memory)
U5	Isolated RS-422/RS-485 Interface
U6	Transformer Driver for Isolated RS-485 Interface (U5)
U7	CPU (Central Processing Unit)
U8	CPLD (Complex Programmable Logic Device)
U9	Low Dropout Regulator for 5V to 3.3V Conversion
U10	RS-232 driver
U12	EPROM (firmware)
U13	RAM

LEDs D10 and D16

LED	Description
D16	Flashes every 5ms if receiving data.
D10	Heartbeat and 5V power indicator.

J9 Termination Jumper

This jumper is located near the J1 connector. If the display is the last in the daisy-chain, you must install a shunt on this jumper to add a 120 ohm termination resistor between Pin 4 (RX -) and Pin 5 (RX +), on J1.

J1 RS-422/RS-485 Progressive System Connection

Pin	Function
1	GND
2	TX1 +
3	TX1 -
4	RX - (If this is the last display on a daisy-chain, J9 must be jumpered to add 120ohm termination resistor.)
5	RX1 +
6	not connected

J2 Development and Production Use Only

Pin	Function
1	+5V
2	GND
3	TDI (Test data in)
4	TMS (Test mode signal)
5	TCK (Test clock)
6	TDO (Test data out)
7	not connected
8	+3.3V

J3 Power

Pin	Function
1	5V
2	GND
3	GND
4	+3.3V LED power

J5 RS-232 Progressive System Connection

NOTE: Mikohn does not provide harnessing for this connection. If you need to communicate to the sign using the RS-232 communication standard, refer to the following table to construct your harness.

Pin	Function
1	GND through a 1K ohm resistor
2	TX
3	RX
4	not connected
5	GND
6-9	not connected

J6 and J7 Connections to LED Panel

J6 CON14PBOT - to LED Panel J1		J7 CON14PBOT - to LED Panel P1	
Pin	Function	Pin	Function
1	RB1	1	RA0
2	RB0	2	RA1
3	RB3	3	RA2
4	RB2	4	RA3
5	RB5	5	RA4
6	RB4	6	RA5
7	RB7	7	RA6
8	RB8	8	RA7
9	+5V	9	D-DATA
10	not connected	10	D-STRB (Strobe data)
11	+5V	11	D-CLK (Clock data)
12	Data In	12	+5V
13	GND	13	GND
14	GND	14	GND

Chapter 2 - Configuration

The CHAMIII firmware currently supports the Mikohn protocol, which is used in Mikohn progressive and casino management systems. CHAMIII firmware is hard-coded with a default idle file, as well as a celebration file that displays when a jackpot hit occurs. You can customize these default files using the Mikohn PSP software.



Support for other protocols, such as Bally and IGT CCOM will be added in future CHAMIII firmware releases.

After you download any customized messages from PSP to the CHAMIII, you must configure its address, jackpot, and LED panel size settings. All configuration should be complete, prior to installing the CHAMIII.

This chapter contains information about the following:

- Customizing CHAMIII messages in PSP
- Configuring the CHAMIII for Mikohn protocol

Customizing Idle and Celebration Messages

Connect the CHAMIII to PSP

To create the message files to be displayed on the meter, you will need the Mikohn PSP software, on a PC or laptop (see Mikohn Manual P.N. 990-051-00). In configuration mode, both J1 (RS-232) and J5 (RS-422/RS-485) communicate in the Mikohn protocol. You can connect to PSP through either port.



In configuration mode, both serial ports, J5 and J6, are automatically set up for the Mikohn protocol to allow you to connect to PSP using either port.

Overview of File Types and Message Display Features

Display File Types

The idle message is contained in the **JPOT.do** file. The jack hit celebration message is contained in the **Jack1.do** file. These message files can be configured in PSP.

Currency Symbols

The hard-coded currency symbols available in the CHAMIII are the dollar sign (\$), comma (,) and period (.). The integer mode (non-decimal) is not available.

Font and Effects

This initial CHAMIII release supports only a double-wide, 8-pixel high odometer font which is hard-coded in the firmware. Future releases will support up to 16 different fonts. Current effects supported are as follows:

- **Travel:** Characters move across display from right to left. Travel speeds can be configured in PSP.
- **Dance:** Character colors alternate between red, green, and yellow to create an illusion of movement.
- **Flashing:** Message flashes on and off.
- **Odometer:** An effect for the jackpot value, which shows the value increment by the digits rolling up, similar in appearance to the movement of the odometer reels in an automobile. The odometer speed is calculated automatically, and Page 5 in PSP has no effect on the display. The maximum odometer speed is approximately \$4.00 per minute. If jackpot contributions occur at a higher speed, the jackpot value will periodically “jump” forward to keep the value current.
- **Block:** Stationary characters.

Customizing Messages in PSP

This section explains PSP features and limits that are specific to the CHAMIII. Additional information about the fonts and effects are on the previous page. For detailed instructions to use PSP, refer to User Manual P.N. 990-041-00.

Message Size Limit 200 Bytes

Although PSP supports larger sized messages, CHAMIII accepts files no larger than 200 bytes. If you attempt to download a message larger than 200 bytes, the CHAMIII displays a warning that the file is too large.

Tokens for Machine Number, PCID, Hit Value, and Current Jackpot Value

For jackpot hit celebrations, PSP does not have tokens for the machine #, PCID, jackpot hit value, or current jackpot value. These values should be displayed in the celebration message. Tokens for these values were added to CHAMIII, which you can use while configuring the JACK1.do message in PSP:

J	= jackpot hit value (see additional information below)
M	= machine number
P	= PCID (Personal Computer Identification)
C	= current jackpot value

About the Jackpot Hit Value token in the Idle Message

In the initial release of the CHAMIII, there is a known issue related to the display order of the jackpot token and text in the idle message. When configuring the Idle message in PSP, you must set the |J token to display **before** the text. If you set the text to display before the token, the message will display only once, and then the jackpot value appears and remains on the display thereafter.

Configuration

Switches: Mode, Function, and Value

SW3 is the mode switch, and operates as follows:

- **Normal operation** mode: Slide the switch toward the edge of the board.
- **Configuration** mode: Slide the switch toward the center of the board.

In configuration mode, the FUNCTION and VALUE buttons operate as follows:

- FUNCTION scrolls through settings.
- VALUE changes the setting value.
- Pressing both the FUNCTION and VALUE buttons at the same time (see Warning) decrements, or decreases, the setting value. For example, if the value was 12 and you press both buttons, the value changes to 11.



When used in special sequences, pressing the FUNCTION and VALUE switches can power cycle or factory reset the board. See [page 19](#).

About Normal and Configuration Modes

Whether in the normal or configuration mode, when you first power cycle the CHAMIII, it displays the version number (VER = x.xxx), DID, and the configured protocol. If a value is bigger than the meter, it shifts left and right, so that the entire value can be seen.

In the **configuration** mode (SW3 slid toward the center of the board), you can change the configuration settings using the FUNCTION and VALUE switches.

In the **normal** mode (SW3 switch slid toward edge of board), after the initial information displays (version, DID, and protocol), the CHAMIII displays one of the two files described on the previous page, a jackpot hit celebration or an idle message.

Configuration Menu Definitions

Before configuring the display, you should be familiar with the configuration terms listed below. Instructions to configure the display are on the next page.

Menu	Values	Description
PRO (Protocol)	MIK	Currently only the MIK (Mikohn) protocol is available. The method used to transmit and receive data.
GRP (Group)	0 – 255	Display address for a group of machines and tells the CHAMIII where to send the progressive display data. This value ranges from 0 to 255.
ADR (Address)	1 – 64	Address of the display and tells the CHAMIII where to send display data. This value ranges from 1 to 63
LVL (Level)	0 – 7	Progressive jackpot level. Only one level supported. Only one level's value can be displayed.
SIZ (Size)	48, 60, 64, 70	Display pixel width. Settings must correspond with the appropriate Mikohn LED panel, see page 15 .
PWR (Power)	0 (to n)	Displays the number of times the display has been power cycled since the last time it was reset. You can only reset this value to 0. Note that after a RAM clear, this value is set to 1. For an accurate count, you should change the value from 1 to 0, or at least note that when checking the value, you must subtract 1 for an accurate count. This value can be displayed during normal operation.

Summary of Configuration Steps

To configure the CHAMIII, you will perform the following steps:

1. Install the power harness between J3 on the CHAMIII and to J2 on the power supply. Plug the power supply cord into the appropriate power source.
2. To customize idle and jackpot celebration messages, read all information on [page 11](#), and perform the following steps:
 - Connect the appropriate communication harness between the CHAMIII and the computer or laptop with the Mikohn PSP software.
 - Use PSP to configure and upload the customized messages to the CHAMIII.
3. Slide the SW3 switch toward the center of the board to enter the configuration mode.
4. Press the FUNCTION switch, until the PRO (protocol) setting displays. Refer to the following table, and use the VALUE and FUNCTION buttons to configure each menu item. Remember: Currently, only the MIK protocol is supported. If you do not remember the function of a menu item, refer to [page 13](#) for the definition.

Menu	Values	Menu	Values
PRO (Protocol)	MIK	SIZ (Size)	See page 15 , for details.
GRP (Group)	0 – 255	PWR (Power)	You can only reset this value to 0. See previous page.
ADR (Address)	1 – 64		
LVL (Level)	0 – 7		

5. After configurations are complete, slide the SW3 switch toward the edge of the board, to return to the normal mode.
6. Disconnect the PSP and power harnesses.
7. Continue to Chapter 3, for installation guidelines.

About Display Size Configuration

Use the SIZ pixel setting that corresponds with the appropriate Mikohn hardware, as follows:

SIZ (Pixel setting)	LED Panel Assembly
48	P.N. 341-026-00, 8 x 8, 6-cell
60	P.N. 341-010-10, 8 x 5, 12-cell Mini OR P.N. 341-009-80, 7 x 5, 12-cell Micro*
64	P.N. 341-025-00, 8 x 8, 8-cell
70	P.N. 341-010-20, 8 x 5, 14-cell Mini OR P.N. 341-009-90, 7 x 5, 14-cell Micro*

* Micro LED panels, 7 x 5 pixels, will be supported in future CHAMIII firmware releases.

Chapter 3 - Installation

Overview

This chapter currently focuses only on the procedures to upgrade current display hardware with CHAMIII hardware. Future bulletins will be made available for application-specific CHAMIII kit installations.

The CHAMIII was designed specifically to allow upgrades from current in-machine display hardware to the CHAMIII, without a complete component change-out required. The following Mikohn display hardware can be replaced by the CHAMIII:

- CHAMII logic board, driver board, and power supply
- CHAMII+ logic board, driver board, and power supply (only in non-standalone applications)

Preparation notes are provided on the next page. See [page 18](#) for installation guidelines.

Upgrade Preparation



DISCONNECT POWER from machine prior
to accessing internal machine components!

- **Tools:** You will need to access the inside of the machine door where the current display hardware is installed. Tools required depend on the mounting hardware. No special tools are required for the CHAMIII PCB board or power supply.
- **Power:** Check for adequate power outlets. The CHAMIII power supply requires one power outlet connection.
- **Parts:** Ensure that you have the correct hardware. To upgrade current hardware, you should have the following parts:
 - Check your LED panel assembly to ensure that you have the correct CHAMIII logic and LED driver assembly:

341-016-20: one male and one female connection (J6 and J7) to the LED panel assembly

OR

341-016-25: two male connections (J6 and J7) to the LED panel assembly
 - Power supply assembly 780-029-00, power cord 150-007-10, and the appropriate power harness that connects to the CHAMIII (see [page 23](#) or [page 24](#)).



Appendix A contains additional information about CHAMIII hardware and kits, including parts lists for the six currently available kits, and drawings of the power and communication harness that are provided separate from the kits.

Upgrade from Old In-Machine Display Hardware



Prior to installation, the CHAMIII should already be configured and if applicable, have customized message files installed.

Remove Old Display Logic Board, Power Supply, and Harnessing

1. Disconnect power from the gaming machine.
2. Disconnect the harnessing from the old display power supply, and disconnect its power cord from the power source.
3. Remove the old power supply.
4. Disconnect all harnessing from the driver logic board currently installed on the LED panel.
5. Remove the driver logic board.

Install CHAMIII Logic Board, Power Supply, and Harnessing



MAKE SURE CONNECTORS LINE UP between the display logic board and the LED panel. Mis-pinning the connectors can damage the C29 and C28 capacitors, requiring you to replace the board!

1. Install the CHAMIII logic board on the LED panel. Be sure the connectors on the LED panel mate correctly to the connectors on the CHAMIII logic board. Refer to the Warning above.
2. If this is the **last** display on a daisy-chain line, you must set jumper **J9**, located next to the J1 connector.
3. System communication: If using RS-422/RS-485 communication standard, plug harness 311-770-64 into J1 on the CHAMIII and to the system communication line, or splitter device as appropriate. If using RS-232 communication standard, refer to the wiring diagram on [page 4](#) to construct the harness, which must be plugged into J5 on the CHAMIII display board.
4. Plug the power harness into J3 on the CHAMIII. Route the harness down to the location the power supply is to be installed.
5. Install and secure the display power supply in the machine body.
6. Plug the power harness into the inlet connector on the power supply.
7. Plug the female connector of the power cord into the power supply. Plug the male connector into the appropriate power outlet.

Power Cycle Procedure

To **power cycle** the display while in normal mode:

Press both the FUNCTION and VALUE buttons at the same time.

This procedure can release the display from a simple lock-up condition, while retaining current configuration settings.

Factory Reset Procedure

To **factory reset** (or RAM clear) the display, perform the following steps:

1. Power off the display.
2. Move the SW3 switch to configuration mode.
3. Press both the FUNCTION and VALUE switches at the same time.
4. Power up the display.

This procedure may be necessary if the memory becomes corrupt. If you factory reset the display, configuration settings are reset to default values and must be re-configured.

Appendix A: Kit Information and Harnessing

This appendix contains information about CHAMIII display kits and also includes drawings of the power and communication harnesses.

Overview of Display Kits

As of the writing of this manual, there are six CHAMIII display kits available. The parts for each kit are listed in the table that begins on the next page. All kits include the following:

- **CHAMIII logic board assembly:** either P.N. 341-016-20 or P.N. 341-016-25
P.N. 341-016-20 is included in kits for LED panel assemblies that have one male and one female connector to which the CHAMIII connects with one female and one male connector.
P.N. 341-016-25 is included in kits for LED panel assemblies that have two female connectors to which the CHAMIII connects with two male connectors.
- **LED panel assembly** (various models)
- **Communication harness**, RS-422/RS-485 P.N. 311-770-64 (drawing on [page 21](#))
- **Power supply**, power cord, and power harness P.N. 311-023-20 (see [page 23](#)). Note that this harness is included in all kits, is intended for use with a single LED panel assembly and is 36" long. Other power harnesses are available in longer lengths and that support two displays. See [page 23](#) and [page 24](#) for the drawings and part numbers.

Some kits may include more than one CHAMIII logic board and LED panel assembly, and may also include mounting hardware and additional harnessing.

Checking Parts

Before beginning installation, you should check the following:

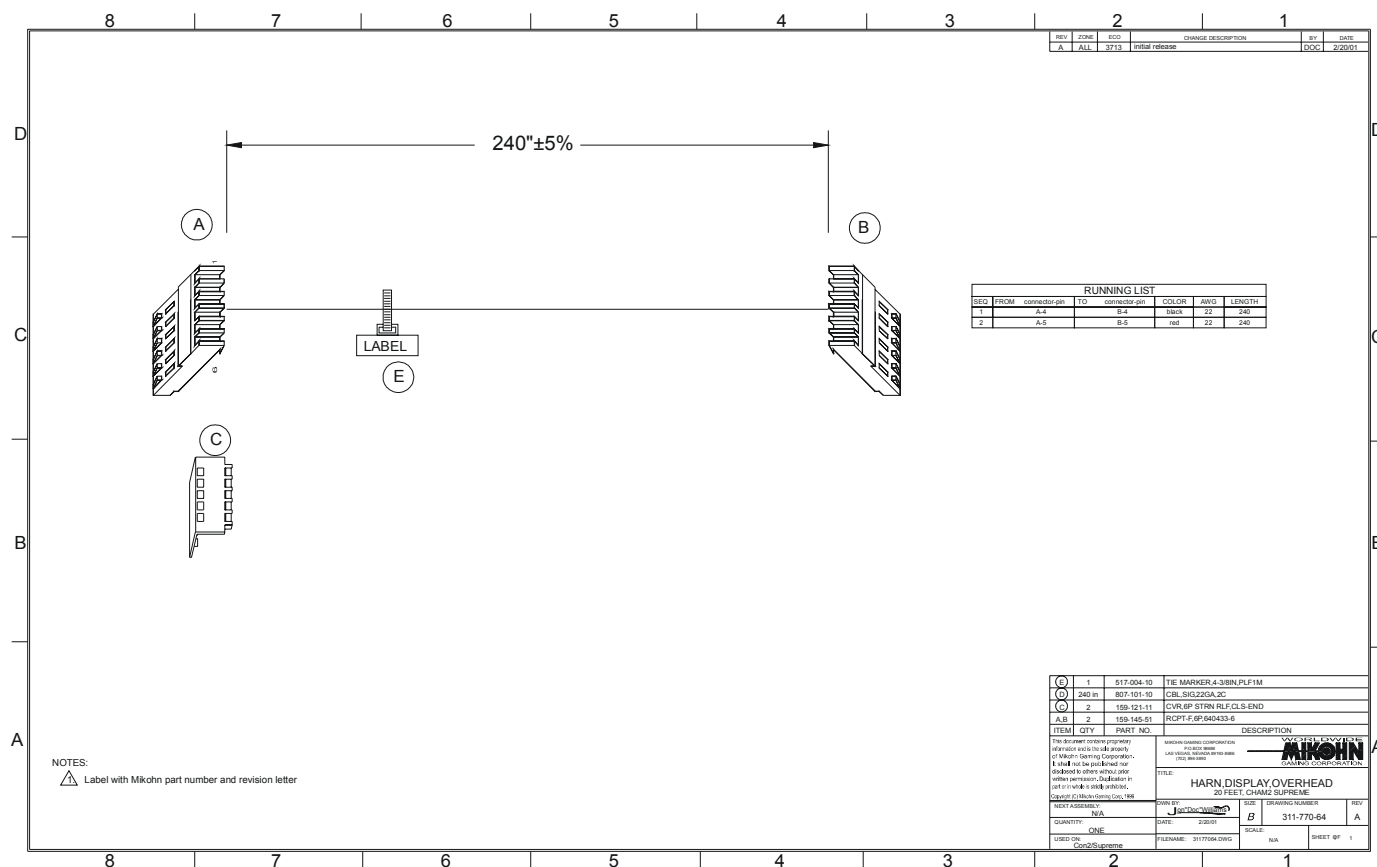
- The LED panel and CHAMIII assemblies in your kit are properly matched, as described in the first bullet of the previous section.
- The correct power harness, in length and number of displays supported, as described in the last bullet of the previous section. Although the power harness included in the kit may not meet your requirements, an additional power harness may have been outside of the kit.
- The correct communication harness, for appropriate communication standard. Mikohn provides an RS-422/RS-485 communication harness, separate from the kits, which is shown on [page 21](#). However, if your establishment requires an RS-232 communication harness, you must construct it on-site. Refer to the wiring diagram on [page 4](#) for pinouts.

CHAMIII Display Kits, Parts Lists

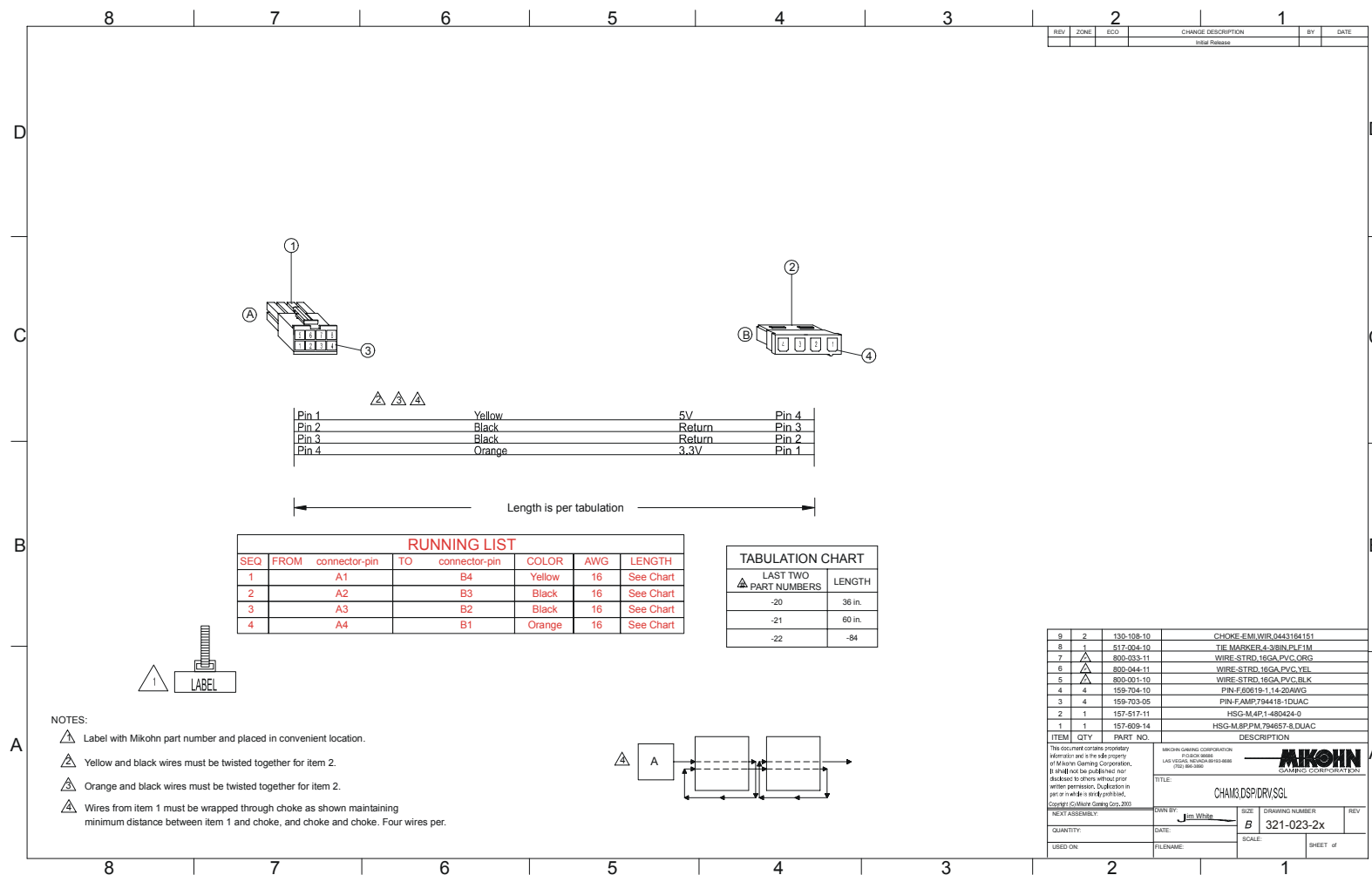
Kit P.N.	Parts Included in Kit
* 002-760-10	311-023-20 Harness: CHAMIII-to-power supply 341-009-80 LED Panel assembly: 7 x 5, 12-cell Micro 341-016-20 CHAMIII display logic and LED driver assembly 780-029-00 Power supply assembly: 70W, 5V, 3.3V 150-007-10 Power cord
002-760-20	311-023-20 Harness: CHAMIII-to-power supply 341-010-10 LED Panel assembly: 8 x 5, 12-cell Mini 341-016-20 CHAMIII display logic and LED driver assembly 780-029-00 Power supply assembly: 70W, 5V, 3.3V 150-007-10 Power cord
* 002-760-30	311-023-20 Harness: CHAMIII-to-power supply 341-009-90 LED Panel assembly: 7 x 5, 14-cell Micro 341-016-20 CHAMIII display logic and LED driver assembly 780-029-00 Power supply assembly: 70W, 5V, 3.3V 150-007-10 Power cord
002-760-40	311-023-20 Harness: CHAMIII-to-power supply 341-010-20 LED Panel assembly: 8 x 5, 14-cell Mini 341-016-20 CHAMIII display logic and LED driver assembly 780-029-00 Power supply assembly: 70W,5V,3.3V 150-007-10 Power cord
002-760-60	311-023-30 Harness: CHAMIII-to-power supply 341-026-00 LED Panel assembly: 8X8, 6-CELL,.187" LEDs 341-016-25 CHAMIII display logic and LED driver assembly 503-020-25 Screw-Phillips M, type A, 4-C .25" 620-096-50 Mount, wood, in-machine, 6-cell 821-002-20 strip, retainer, I, in-machine, 6-cell 780-029-00 Power supply assembly: 70W,5V,3.3V 150-007-10 Power cord

* Kits with Micro panels will be supported in future CHAMIII releases.

RS-422/RS-485 Communication Harness, 311-770-64 (J1 6-Pin)



One-Display Power Harness, 311-023-2x (J3 4-Pin)



Two-Display Power Harness, 311-023-3x (J3 4-Pin)

