UCI-2000-SMPTE ES-Bus

Routing Switcher Protocol Converter

Quick-Start Guide

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CHAPTER 1: PREFACE – ABOUT THIS MANUAL

1.1 DOCUMENTATION AND SAFETY OVERVIEW

This manual provides detailed instructions for the installation, operation, and maintenance of PESA's Premiere Series Matrix Switchers.

It is the responsibility of all personnel involved in the installation, operation, and maintenance of the equipment to know all the applicable safety regulations for the areas that they will be working in. ***Under no circumstances should any person perform any procedure or sequence in this manual if the procedural sequence will directly conflict with local Safe Practices. Local Safe Practices shall remain as the sole determining factor for performing any procedure or sequence outlined in this document.***

1.2 WARNINGS, CAUTIONS, AND NOTES

Throughout this manual you will notice various *Warnings*, *Cautions*, and *Notes*. These addendum statements supply invaluable information pertaining to the text that they address. It is imperative that audiences read and understand the statements to avoid possible loss of life, personal injury, destruction/damage to the equipment, and/or added information that could enhance the operating characteristics of the equipment (i.e., Notes). The following subsection represents a description of the *Warnings*, *Cautions*, and *Notes* statements contained in this manual:

- **WARNING**

	**Warning statements identify conditions or practices that can result in loss of life and/or permanent personal injury if the instructions contained in the statement are not complied with.**

- **CAUTION**

	**Caution statements identify conditions or practices that can result in personal injury and/or damage to, or destruction of, equipment if the instructions contained in the statement are not complied with.**

- **NOTE**

	**Notes are for informational purposes only. However, they may contain invaluable information important to the correct installation, operation, and/or maintenance of the equipment.**

CHAPTER 2: INTRODUCTION

The PESA UCI-2000-SMPTE protocol converter is designed to provide an interface between SMPTE/EBU ES-Bus and PESA routing switchers and control systems. The UCI-2000-SMPTE can operate in one of two distinct modes:

1) Allowing PESA routing matrices to be controlled by a SMPTE/EBU ES-Bus based Control System

Or

2) Allowing SMPTE/EBU ES-Bus compatible routing matrices to be controlled by a PESA 3500 Series Control System.

2.1 ES-BUS TO PESA CONTROL MODE

The ES-Bus to PESA control mode allows the UCI-2000-SMPTE to control up to four levels of PESA PRC-based routing switchers from a 3rd-Party control system employing the SMPTE/EBU ES-Bus control protocol. Each of the four additional PESA levels can support a matrix size of 512x512 inputs and outputs. These control levels must occupy a consecutive block in the level space of the 3rd-Party Control System and cannot share I/O space on an existing 3rd-party routing level. Figure 1 depicts a typical system block diagram of the ES-Bus to PESA control mode.

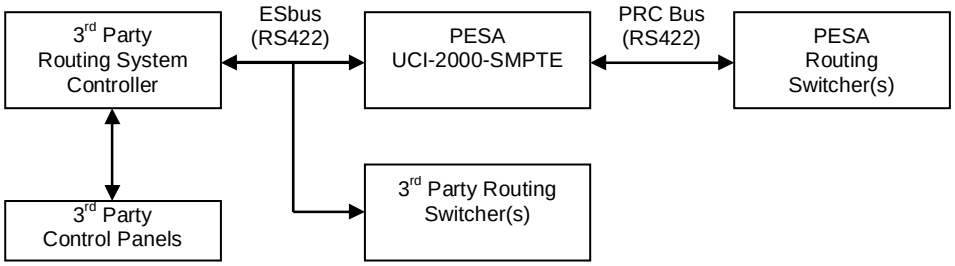


FIGURE 1: ***ES-BUS TO PESA CONTROL MODE***

The UCI-2000-SMPTE receives commands from the 3rd-party control system through the SMPTE ES-Bus connection. All commands received from the 3rd-party controller are translated by the UCI-2000-SMPTE and sent to the controlled PESA routing switchers over the PESA PRC Control Bus. Appropriate Status and Confirm signals are returned to the 3rd-party controller in response to all crosspoint takes.

2.2 PESA TO ES-BUS CONTROL MODE

The PESA to SMPTE/EBU ES-Bus control mode allows the UCI-2000-SMPTE to control up to two levels of 3rd-party ES-Bus compatible routing switchers from a PESA 3500 Series Control System. Each of the additional 3rd-party routing levels (matrices) can support a matrix size of 1024 x 1024 inputs and outputs.

	**These control levels must occupy a consecutive block in the level space of the PESA Control System and cannot share an existing level with a PESA router or the system will not operate properly.**

Figure 2 depicts a typical system block diagram of the PESA to ES-Bus control mode.

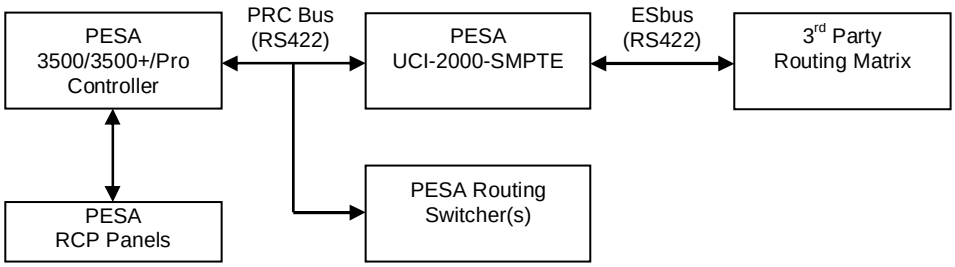


FIGURE 2: ***PESA to SMPTE ES-Bus Control Mode***

The UCI-2000-SMPTE receives commands from the PESA 3500 Series system controller through its PRC Bus connection. These commands are then translated into appropriate SMPTE/EBU ES-Bus commands and transmitted to the 3rd-party routing switchers.

CHAPTER 3: HARDWARE CONFIGURATION

3.1 SETTING THE OPERATING MODE

Dipswitch S1 on the UCI-2000-SMPTE pc board is used to set the card's operating mode. Available operating modes for the UCI-2000-SMPTE are listed in Table 1.

OPERATING MODE	S1-8	S1-7	S1-6	S1-5	S1-4	S1-3	S1-2	S1-1
Controlling PESA Routers	Off	Off	Off	Off	Off	Off	Off	**On**
Controlling 3rd-Party Routers	Off	Off	Off	Off	Off	Off	**On**	Off
Factory Test Mode	**On**	**On**	**On**	**On**	**On**	**On**	**On**	Off
Board Reset	**On**	**On**	**On**	**On**	**On**	**On**	**On**	**On**
All other settings are Reserved								

TABLE 1: ***UCI200-SMPTE Operating Modes***

3.2 SETTING THE PRC BASE STROBE (CONTROL LEVEL) AND NUMBER OF CONTROLLED LEVELS

3.2.1 SMPTE ES-Bus To PESA Mode

Switches 1 – 6 of dipswitch S2 set the starting (base) strobe number of the controlled PESA matrices using a binary representation according to the following table (refer to Table 2).

NOTE	**Valid level numbers are 1 – 63. (ON is to the right when viewing from above and the rear connectors are at the top of the board).**

STARTING LEVEL #	S2-6	S2-5	S2-4	S2-3	S2-2	S2-1
Level 1	Off	Off	Off	Off	Off	**On**
Level 2	Off	Off	Off	Off	**On**	Off
Level 3	Off	Off	Off	Off	**On**	**On**
Level 4	Off	Off	Off	**On**	Off	Off
Level 5	Off	Off	Off	**On**	Off	**On**
Level 6	Off	Off	Off	**On**	**On**	Off
Level 7	Off	Off	Off	**On**	**On**	**On**
Level 8	Off	Off	**On**	Off	Off	Off
UP TO…						
Level 60	**On**	**On**	**On**	**On**	Off	Off
Level 61	**On**	**On**	**On**	**On**	Off	**On**
Level 62	**On**	**On**	**On**	**On**	**On**	Off
Level 63	**On**	**On**	**On**	**On**	**On**	**On**

TABLE 2: ***Base Control Level of PESA Routers***

Switches 7 and 8 of S2 set the number of controlled PESA matrices according to the following table (refer to Table 3):

S2-7	S2-8	FUNCTION
Off	Off	UCI Controls 1 Level
On	Off	UCI Controls 2 Levels
Off	**On**	UCI Controls 3 Levels
On	**On**	UCI Controls 4 Levels

TABLE 3: ***Number of Controlled PESA Levels***

3.2.2 PESA To SMPTE ES-Bus Mode

Switches 1 – 4 of dipswitch S6 set the starting (base) strobe number of the controlled 3rd-party matrices using a binary representation according to the following table (refer to Table 4).

NOTE	**Valid level numbers are 1 – 15. (ON is to the right when viewing from above and the rear connectors are at the top of the board).**

STARTING LEVEL #	S6-4	S6-3	S6-2	S6-1
Level 1	Off	Off	Off	**On**
Level 2	Off	Off	**On**	Off
Level 3	Off	Off	**On**	**On**
Level 4	Off	**On**	Off	Off
Level 5	Off	**On**	Off	**On**
Level 6	Off	**On**	**On**	Off
Level 7	Off	**On**	**On**	**On**
Level 8	**On**	Off	Off	Off
Level 9	**On**	Off	Off	**On**
Level 10	**On**	Off	**On**	Off
Level 11	**On**	Off	**On**	**On**
Level 12	**On**	**On**	Off	Off
Level 13	**On**	**On**	Off	**On**
Level 14	**On**	**On**	**On**	Off
Level 15	**On**	**On**	**On**	**On**

TABLE 4: ***Base Control Level of 3rd-Party Routers***

Because of limitations that may exist with the installed base of 3rd-Party routers in the field that may not support level settings above 8, all 3rd-Party routers are set to start at level 1 regardless of where they "really" exist in the PESA control system. The UCI-2000 automatically offsets the base PRC strobe number when sending commands to the 3rd-Party routers and assumes all 3rd-Party routers exist starting at level 1 (native to the 3rd-Party).

Switches 5 and 6 of S6 set the number of controlled 3rd-Party matrices according to the following table (refer to Table 5):

S6-5	S6-6	FUNCTION
On	Off	UCI Controls 1 Levels
Off	**On**	UCI Controls 2 Levels

TABLE 5: ***Number of Controlled 3rd-Party Levels***

NOTE	**All of the other switches on S6 should be in the OFF position.**

3.3 SETTING THE OPERATION OF THE COM1 AND COM2 SERIAL PORTS

Switches 1 and 2 of dipswitch S4 are used to enable or disable the COM1 serial port on the back of the UCI-2000-SMPTE chassis. Switches 3 and 4 of S4 are used to select between RS232 and RS422 operation for the COM1 and COM 2 serial ports respectively; **OFF** = RS422, **ON** = RS232.

3.3.1 SMPTE ES-Bus To PESA Mode

In SMPTE ES-Bus to PESA Mode, COM1 is used to communicate with PESA routing switcher frames. In this case, COM1 should be enabled and set to RS422 operation. Table 6 illustrates these settings. COM2 is used to communicate with the SMPTE ES-Bus controller and is typically set for RS422 operation

S4-1	S4-2	S4-3	S4-4	FUNCTION
Off	**On**	Off	Off	ES-Bus to PESA Mode, COM1 RS422, COM2 RS422
Off	**On**	Off	**On**	ES-Bus to PESA Mode, COM1 RS422, COM2 RS232

TABLE 6: ***DIP Switch S4 Settings, SMPTE to PESA Mode***

3.3.2 PESA To SMPTE ES-Bus Mode

In PESA to SMPTE ES-Bus Mode, COM1 is not used and S4 DIP switches 1 and 2 must be OFF. COM2 is used to communicate with the 3rd-Party SMPTE ES-Bus routing switchers and is typically set for RS422 operation. Table 7 below illustrates these settings. COM3 is used to communicate with the PESA 3500 Series controller.

S4-1	S4-2	S4-3	S4-4	FUNCTION
Off	Off	Off	Off	PESA to SMPTE ES-Bus Mode, COM2 = RS422
Off	Off	Off	**On**	PESA to SMPTE ES-Bus Mode, COM2 = RS232

TABLE 7: ***DIP SWITCH S4 SETTINGS, PESA TO SMPTE MODE***

CHAPTER 4: SOFTWARE CONFIGURATION

4.1 SMPTE ES-BUS TO PESA MODE

To enable the new PESA routers in the system, they must be added to the configuration in the 3rd-Party control system software. The PESA routers are added and configured exactly as if they were Native 3rd-Party routers. Please refer to the 3rd-Party control system's instruction manual for more information.

4.2 PESA TO SMPTE ES-BUS MODE

To enable the 3rd-Party ES-Bus routing switchers in the system, they must be added to the configuration in the PESA Win 3500 Series control system software. The 3rd-Party routers are added and configured exactly as if they were PESA routers. Please refer to the Win 3500 Plus instruction manual for more information.

CHAPTER 5: REDUNDANT OPERATION

The UCI-2000-SMPTE (see Figure 3) is capable of fully redundant operation when two cards are installed in the dual controller chassis. The front panel toggle switch is used to select one of three redundancy modes: Active, Standby and Automatic.

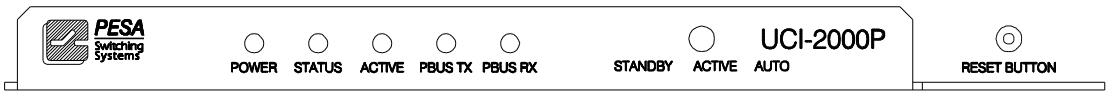


FIGURE 3: ***UCI-2000-SMPTE Card***

In the automatic mode, one card operates in the active mode and the other card operates in standby. If a failure is detected on the active card by the standby, the standby card will automatically disable the active card and assume the active role. The standby card receives and processes the same data from the controller and the routers as the active card, so that in the event of a failure on the active card it can take over instantly and transparently. To enable the automatic mode, set the toggle switch on both cards to the Auto position. The Active light on the front of the card is used to indicate which of the cards is currently operating in the active state.

For the system to operate in manual mode, one card must be set to the active mode and the other to the standby mode. If the toggle switch settings on the cards are invalid, the Status light will continuously flash three times.

CHAPTER 6: REAR CONNECTOR PIN-OUTS

6.1 COM1 AND COM2

(Refer to Table 8.)

PIN	RS232 FN	RS422 FN
1	CD	Ground
2	RXD (in)	RX+ (in)
3	TXD (out)	TX- (out)
4	DTR	Ground
5	Ground	Ground
6	DSR	Ground
7	RTS	RX- (in)
8	CTS	TX+ (out)
9	NC	Ground

TABLE 8: ***COM1, COM2 Connector Pin-out***

6.2 COM4 – DIAGNOSTICS CONNECTION

(Refer to Table 9.)

PIN	RS232 FN
1	CD
2	RXD (in)
3	TXD (out)
4	DTR
5	Ground
6	DSR
7	RTS
8	CTS
9	NC

TABLE 9: ***COM4 Connector Pin-out***

NOTE	**Typically a Null-Modem cable is used between the UCI2000 and a PC type COM port.**

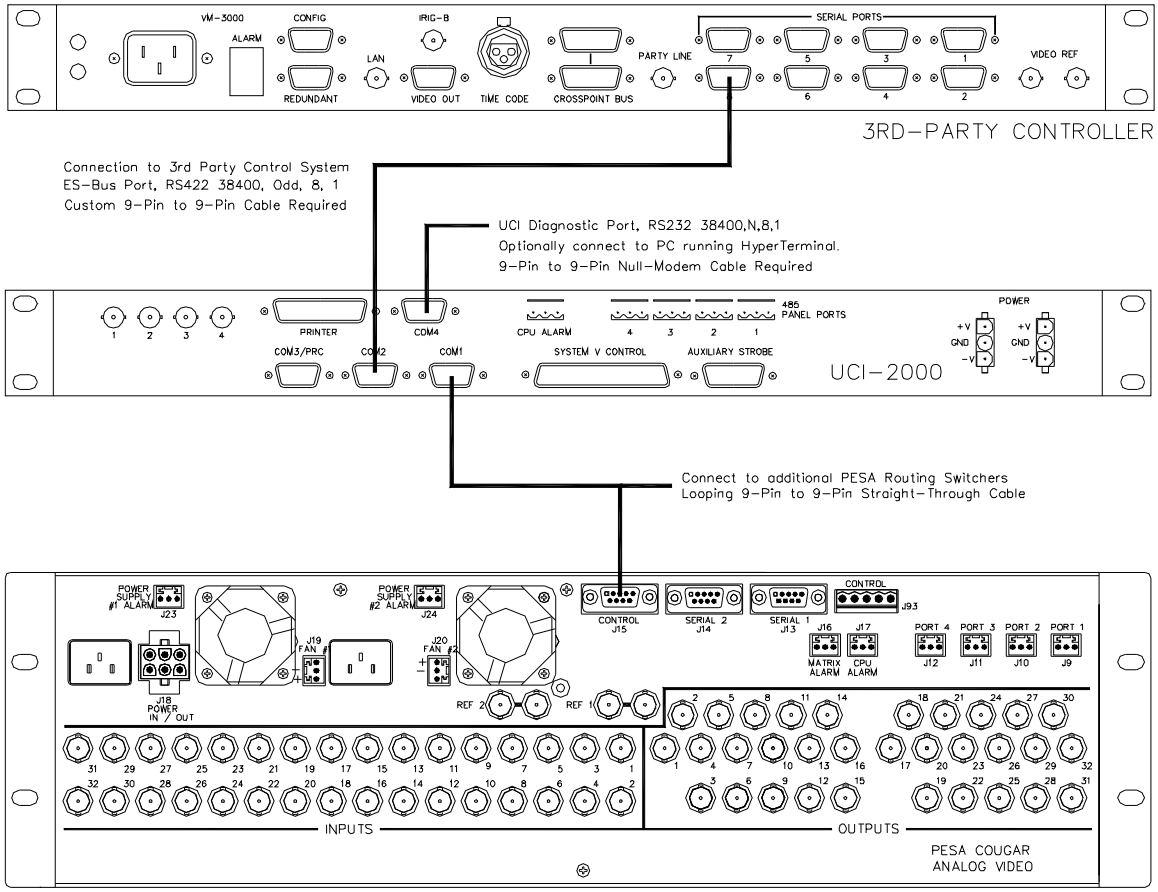
6.3 COM3 – PESA PRC BUS CONNECTION

(Refer to Table 10.)

PIN	RS422 FN
1	Ground
2	TX+ (out)
3	RX- (in)
4	Ground
5	Ground
6	Ground
7	TX- (in)
8	RX+ (out)
9	Ground

TABLE 10: ***COM3 PRC Matrix Connector Pin-out***

CHAPTER 7: CABLE CONNECTIONS



7.1 SMPTE ES-BUS TO PESA MODE

FIGURE 4: ***Control Cable Connections, SMPTE ES-Bus to PESA Mode***

See Figure 4 and perform the following sequence for Control Cabling Connections, SMPTE ES-Bus to PESA Mode:

1) COM1: PRC - Connect to PESA Routers, loop between frames. Pin for Pin cable.

2) COM2: RS422 ES-Bus connection (38400, Odd, 8, 1). Pin as required.

3) COM3: Not Used

4) SYSTEM V CONTROL (37-pin): Not Used

5) Connect the UCI-2000-SMPTE to the PESA routing switcher(s) using the standard 9-pin PESA PRC cable (pin-to pin).

6) Connect the PESA UCI-2000-SMPTE to the 3rd-Party routing system controller using a custom-made RS422 cable. Refer to the UCI-2000 COM2 connector pin-out and the 3rd-Party controller instruction manual for information on how to construct this cable.

7.2 PESA TO SMPTE ES-BUS MODE

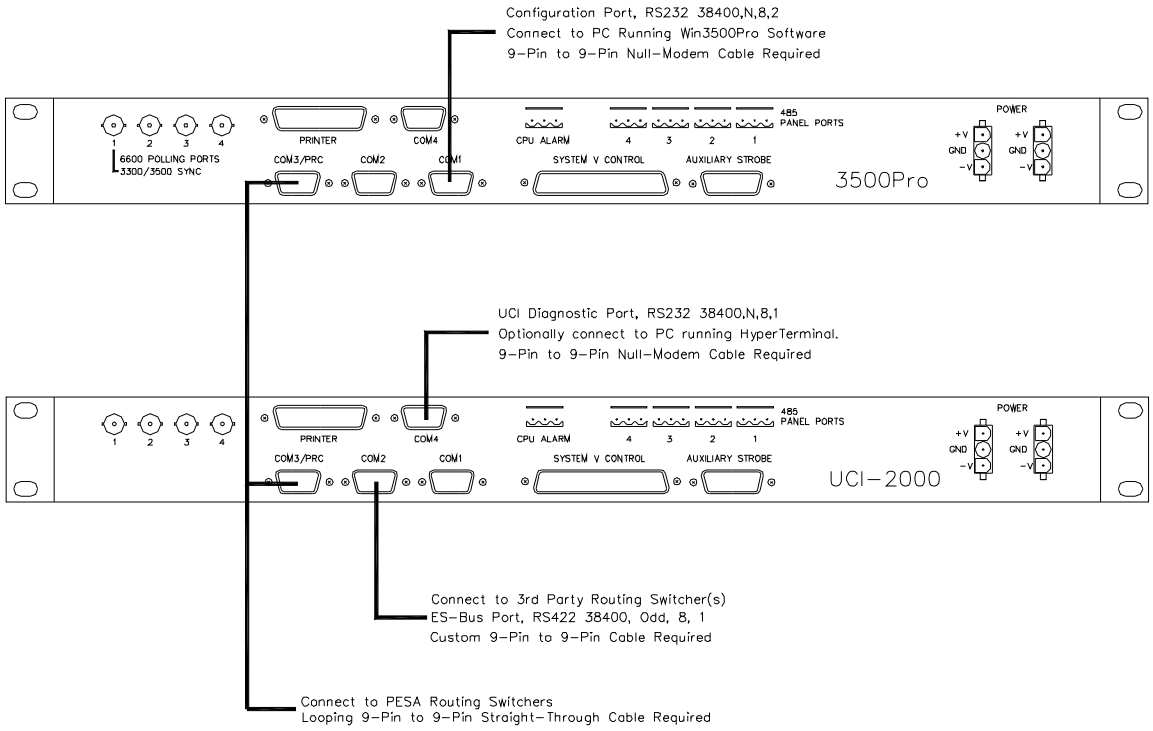


FIGURE 5: ***Control Cable Connections, PESA to SMPTE ES-Bus Mode***

See Figure 5 and perform the following sequence for Control Cabling Connections, PESA to SMPTE ES-Bus Mode:

1) COM1: Not Used
2) COM2: RS422 ES-Bus connection. Connect to 3rd-Party Router (38400, Odd, 8, 1). Pin as required.
3) COM3: PRC - Connect to PESA 3500/3500+/3500Pro Controller
4) SYSTEM V CONTROL (37-pin): Not Used
5) Connect the PESA 3500 series controller to the UCI-2000-SMPTE using the standard 9-pin PESA PRC cable (pin-to pin).
6) Connect the PESA UCI-2000-SMPTE to the 3rd-Party routing switcher(s) using a custom-made RS422 cable. Refer to the UCI-2000 COM2 connector pin-out and the 3rd-Party routing switcher instruction manual for information on how to construct this cable.

CHAPTER 8: UCI-2000-SMPTE PROTOCOL CONVERTER

8.1 INSTALLATION AND INITIALIZATION PROCEDURE - SMPTE ES-BUS TO PESA MODE

This document describes the installation procedure for commissioning a new UCI-2000-SMPTE protocol conversion board. This procedure is performed with the UCI-2000-SMPTE powered up and connected to the 3rd-Party Controller and all PESA routing switchers with the appropriate cables. If your system contains redundant UCI-2000-SMPTE controller cards, this procedure must be performed on each card separately.

Perform the following sequence to install the UCI-2000-SMPTE system:

1) Remove ***all*** UCI-2000-SMPTE boards from the controller chassis.

2) Set the PRC base strobe (level) and number of controlled levels using dip switch S2 as follows:

   - Switches 1 – 6 of S2 set the starting (base) strobe number of the controlled PESA matrices using a binary representation according to the following table (refer to Table 11).

NOTE	**Valid level numbers are 1 – 63. (ON is to the right when viewing from above and the rear connectors are at the top of the board).**

STARTING LEVEL #	S2-6	S2-5	S2-4	S2-3	S2-2	S2-1
Level 1	Off	Off	Off	Off	Off	**On**
Level 2	Off	Off	Off	Off	**On**	Off
Level 3	Off	Off	Off	Off	**On**	**On**
Level 4	Off	Off	Off	On	Off	Off
Level 5	Off	Off	Off	**On**	Off	**On**
Level 6	Off	Off	Off	**On**	**On**	Off
Level 7	Off	Off	Off	**On**	**On**	**On**
Level 8	Off	Off	**On**	Off	Off	Off
UP TO…						
Level 60	**On**	**On**	**On**	**On**	Off	Off
Level 61	**On**	**On**	**On**	**On**	Off	**On**
Level 62	**On**	**On**	**On**	**On**	**On**	Off
Level 63	**On**	**On**	**On**	**On**	**On**	**On**

TABLE 11: ***Base Control Level***

- Switches 7 and 8 of S2 set the number of controlled PESA matrices according to the following table (refer to Table 12):

S2-7	S2-8	FUNCTION
Off	Off	Controls 1 Level
On	Off	Controls 2 Levels
Off	**On**	Controls 3 Levels
On	**On**	Controls 4 Levels

TABLE 12: ***NUMBER OF CONTROL LEVELS***

3) Turn ON ***all*** switches on dipswitch S1 to re-initialize the board's internal memory to factory defaults. This will cause the UCI-2000-SMPTE to query each routing switcher connected to the PESA PRC Bus to determine the number and sizes of each of the matrices the next time the board is powered-up. This should be the default setting when shipped from the factory.

4) Set the front panel toggle switch to the AUTO or ACTIVE setting.

5) Verify that ***only*** switch #2 on dipswitch S4 is ON.

6) Install the UCI-2000-SMPTE card in the chassis and apply power (if necessary). Verify that the Power led is illuminated.

7) Press and hold the front panel Reset Button for about 1 second, then release.

8) The board will now query each PESA router. The TX led will indicate data activity on the PRC Bus. When it is finished, all front panel LEDs will turn off (except for the power LED). This process should take between 30 seconds and two minutes to complete, depending on the number and size of the PESA routers.

9) Remove the UCI-2000-SMPTE card from the chassis.

10) Set the front panel toggle switch to the AUTO setting.

11) Turn OFF all switches on dipswitch S1 ***except*** for switch # 1. This will set the normal mode of operation for the system. Available operating modes for the UCI-2000-SMPTE are listed in Table 13.

OPERATING MODE	S1-8	S1-7	S1-6	S1-5	S1-4	S1-3	S1-2	S1-1
Controlling PESA Routers	Off	Off	Off	Off	Off	Off	Off	**On**
Controlling 3rd-Party Routers	Off	Off	Off	Off	Off	Off	**On**	Off
Factory Test Mode	**On**	**On**	**On**	**On**	**On**	**On**	**On**	Off
Board Reset	**On**	**On**	**On**	**On**	**On**	**On**	**On**	**On**
ALL OTHER SETTINGS ARE RESERVED								

TABLE 13: ***UCI-2000-SMPTE Operating Modes***

12) Repeat steps 1-11 for the redundant UCI-2000-SMPTE card (if equipped).

13) Re-install the UCI-2000-SMPTE card(s) in the chassis

8.2 INSTALLATION AND INITIALIZATION PROCEDURE - PESA TO SMPTE/EBU ES-BUS MODE

This document describes the installation procedure for commissioning a new UCI-2000-SMPTE protocol conversion board. This procedure is performed with the UCI-2000-SMPTE powered up and connected to the PESA System Controller and all 3rd-Party routing switchers with the appropriate cables. If your system contains redundant UCI-2000-SMPTE controller cards, this procedure must be performed on each card separately.

Perform the following sequence to install the UCI-2000-SMPTE system:

1) Remove ***all*** UCI-2000-SMPTE boards from the controller chassis.

2) Set the PRC base strobe (level) and number of controlled levels using dip switch S6 as follows:

   - Switches 1 – 4 of dipswitch S6 set the starting (base) strobe number of the controlled 3rd-Party routing matrices using a binary representation according to the following table (refer to Table 14).

NOTE	**Valid level numbers are 1 – 15. (ON is to the right when viewing from above and the rear connectors are at the top of the board).**

STARTING LEVEL #	S6-4	S6-3	S6-2	S6-1
Level 1	Off	Off	Off	**On**
Level 2	Off	Off	**On**	Off
Level 3	Off	Off	**On**	**On**
Level 4	Off	**On**	Off	Off
Level 5	Off	**On**	Off	**On**
Level 6	Off	**On**	**On**	Off
Level 7	Off	**On**	**On**	**On**
Level 8	**On**	Off	Off	Off
Level 9	**On**	Off	Off	**On**
Level 10	**On**	Off	**On**	Off
Level 11	**On**	Off	**On**	**On**
Level 12	**On**	**On**	Off	Off
Level 13	**On**	**On**	Off	**On**
Level 14	**On**	**On**	**On**	Off
Level 15	**On**	**On**	**On**	**On**

TABLE 14: ***Base Control Level of 3rd-Party Routers***

- Switches 5 and 6 of DIP Switch S6 set the number of controlled 3rd-Party matrices according to the following table (refer to Table 15):

S6-5	S6-6	FUNCTION
On	Off	UCI Controls 1 Levels
Off	**On**	UCI Controls 2 Levels

TABLE 15: ***Number of Controlled 3rd-Party Levels***

3) Turn ON ***all*** switches on dipswitch S1 to re-initialize the board's internal memory to factory defaults.

4) Set the front panel toggle switch to the AUTO or ACTIVE setting.

5) Turn OFF ***all*** switches on dipswitch S4. This selects communication with the 3rd-Party routers using RS422. If the 3rd-Party routers communicate using RS232, turn on switch #4 on S4.

6) Install the UCI-2000-SMPTE card in the chassis and apply power (if necessary). Verify that the Power led is illuminated.

7) Press and hold the front panel Reset Button for about 1 second, then release.

   Result: The board will now initialize its data. The Active and Status LEDs will illuminate during this process. When the process is finished, all front panel LEDs will turn off (except for the power LED). This process should take only a few seconds complete.

8) Remove the UCI-2000-SMPTE card from the chassis.

9) Set the front panel toggle switch to the AUTO setting.

10) Turn OFF all switches on dipswitch S1 ***except*** for switch # 2. This will set the normal mode of operation for the system. Available operating modes for the UCI-2000-SMPTE are listed in Table 16.

OPERATING MODE	S1-8	S1-7	S1-6	S1-5	S1-4	S1-3	S1-2	S1-1
Controlling PESA Routers	Off	Off	Off	Off	Off	Off	Off	**On**
Controlling 3rd-Party Routers	Off	Off	Off	Off	Off	Off	**On**	Off
Factory Test Mode	**On**	**On**	**On**	**On**	**On**	**On**	**On**	Off
Board Reset	**On**	**On**	**On**	**On**	**On**	**On**	**On**	**On**
ALL OTHER SETTINGS ARE RESERVED								

TABLE 16: ***UCI-2000-SMPTE OPERATING MODES***

11) Repeat steps 1-11 for the redundant UCI-2000-SMPTE card (if equipped).

12) Re-install the UCI-2000-SMPTE card(s) in the chassis.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