MICROLOK® II HB2X Cardfile

ASTS USA Part Nos.
N18005201
N18005301

- Installation
- Operation

Proprietary Notice

Important Notice

ASTS USA constantly strives to improve our products and keep our customers apprised of changes in technology. Following the recommendations contained in the attached service manual will provide our customers with optimum operational reliability. The data contained herein purports solely to describe the product, and does not create any warranties.

Within the scope of the attached manual, it is impossible to take into account every eventuality that may arise with technical equipment in service. Please consult an ASTS USA local sales representative in the event of any irregularities with our product.

ASTS USA expressly disclaims liability resulting from any improper handling or use of our equipment, even if these instructions contain no specific indication in this respect. We strongly recommend that only approved ASTS USA spare parts are used as replacements.

Revision History

REV.	DATE	NATURE OF REVISION
1	April 2010	Initial release
2	August 2011	Added information for LCP PCB: Section 3.3, Figure 3-6, Figure 3-7, Section 4.4, and Figure 4-5.

Table of Contents

List of Figures

List of Tables

1. GENERAL INFORMATION

1.1. Abbreviations and Acronyms

The following are abbreviations and acronyms used in this manual along with their associated meanings.

ASTS USA	Ansaldso STS USA (formerly known as Union Switch & Signal)
DB	D-subminiature (a common type of computer connector)
DCD	Data Carrier Detect
LCP	Local Control Panel
RS-232	Recommended Standard 232
RX	Receive
RXD	Receive Data
RTS	Request to Send
SEC	Serial-to-Ethernet Converter
TX	Transmit
TXD	Transmit data
VDC	Volts Direct Current

1.2. Specifications

The operating specifications for the HB2X Cardfile are given in Table 1-1.

Table 1-1. Operating Specifications

PARAMETER	VALUE
System Power Source Voltage	+9.8 to +16.2VDC, Fuse Protected (10A) Minimum voltage required for system start is 11.2VDC.
Power Connection	Six position WAGO connector on upper right panel of cardfile
Temperature Range	-40° C to +70°C
Humidity	0% to 95% non-condensing

The mechanical specifications for the HB2X Cardfile are shown in Table 1-2.

Table 1-2. Mechanical Specifications

PARAMETER	VALUE
Height	17.19 in. (43.7 cm)
Width	19.0 in. (48.26 cm)
Depth	11.0 in. (27.9 cm)
Material	Stainless steel
Weight	22.25 lb. (10.09 kg) for the assembled unit.
Mounting	Wall or Shelf Mount, cardfile is equipped with mounting ears on the rear and bottom sides.

2. GENERAL DESCRIPTION

The MICROLOK II® HB2X is a cardfile that can be configured as a multi-purpose vital and/or non-vital monitoring and control system for railroad and rail mass transit wayside interlocking equipment. The MICROLOK II HB2X cardfile has twenty slots (fourteen configurable) and can be wall or shelf mounted. Two PCB motherboards interconnect the MICROLOK II CPUs, Power Supply, and up to fourteen I/O PCBs to the I/O field connectors at the top of the cardfile motherboard.

The cardfile is available in two versions. Part number N18005201 contains 48-pin upper connectors in all slots. Part number N18005301 contains 96-pin upper connectors in slots 1 thru 3 (to accommodate the 32 I/O boards) and 48-pin connectors in slots 4 thru 14.

2.1. Product Functions

Basic applications and uses of the MICROLOK II HB2X include:

- Direct control of wayside signals (color light signal lamps, LED signal, and searchlight signal mechanisms)
- Switch machine control and switch point position monitoring
- Switch lock position monitoring
- Monitoring of mainline track circuits for track occupancy indications and track circuit problems such as faulty insulated joint or broken rail (Microtrax or Ecode)
- Through-the-rails communications to adjacent wayside control systems: Microtrax or Ecode.
- Monitors interlocking OS track circuits
- Cab signal carrier/code generation
- Line wire communications interface
- Local manual control of wayside signals and switch machines for maintenance and contingency operations
- Vital serial communications to other compatible interlocking control and coded track circuit systems. Protocol is a function of the CPU software
- Non-vital controller logic
- Non-vital (code line) communications to remote office
- PTC signal and switch status

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The MICROLOK II HB2X implements these functions in any combination, from basic to complex through the use of application-specific hardware configurations. The modular design of the MICROLOK II system enables each customer to configure a system that will meet the specific control and interface requirements for their application. The operational configuration of the MICROLOK II system is primarily defined within the Application logic software, which is custom-developed using the MICROLOK II programming tools.

3. FUNCTIONAL DESCRIPTION

The MICROLOK II HB2X cardfile accommodates standard MICROLOK II plug-in PCBs (see Figure 3-1 and Figure 3-2). The cardfile is twenty slots wide. Three double-width PCB slots are reserved for the Power Supply PCB in Slots 15 and 16, the vital CPU PCB (MICROLOK II) in Slots 17 and 18, and the non vital CPU PCB (Genisys II) in Slots 19 and 20. The remaining fourteen slots can accommodate any standard MICROLOK II I/O PCBs. The 32 I/O PCB can only be installed in slots 1, 2, and 3 of cardfile part number N18005301.

The cardfile has an upper and a lower motherboard. The cable connectors for external cables are mounted on the front of the upper motherboard. The lower motherboard contains keying strips for the lower connectors to prevent insertion of an improper board type.

The motherboard uses nominal 12 volt battery power (9.8V to 16.2V) as the system operating power.

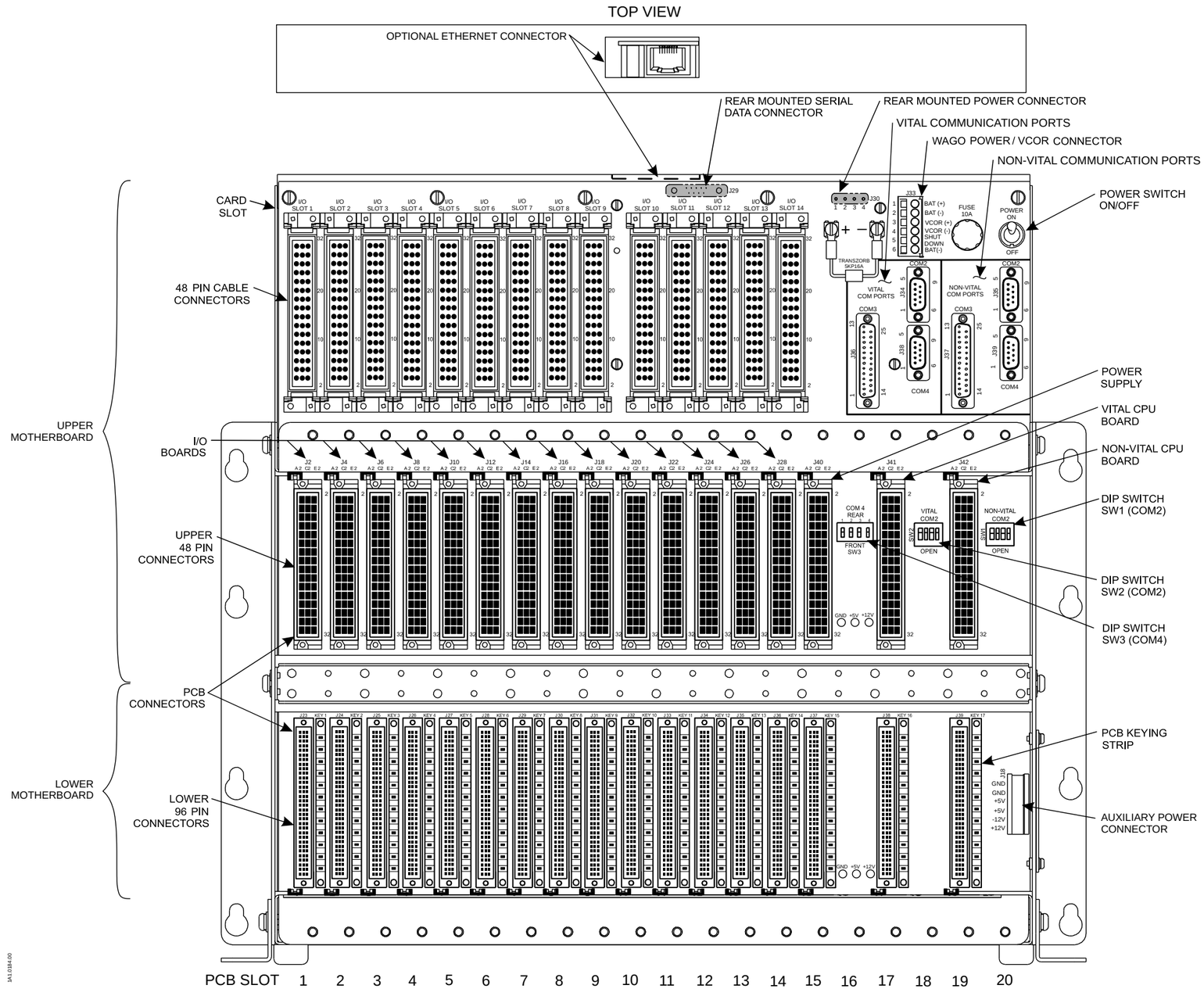

Figure 3-1. N18005201 Cardfile Front View

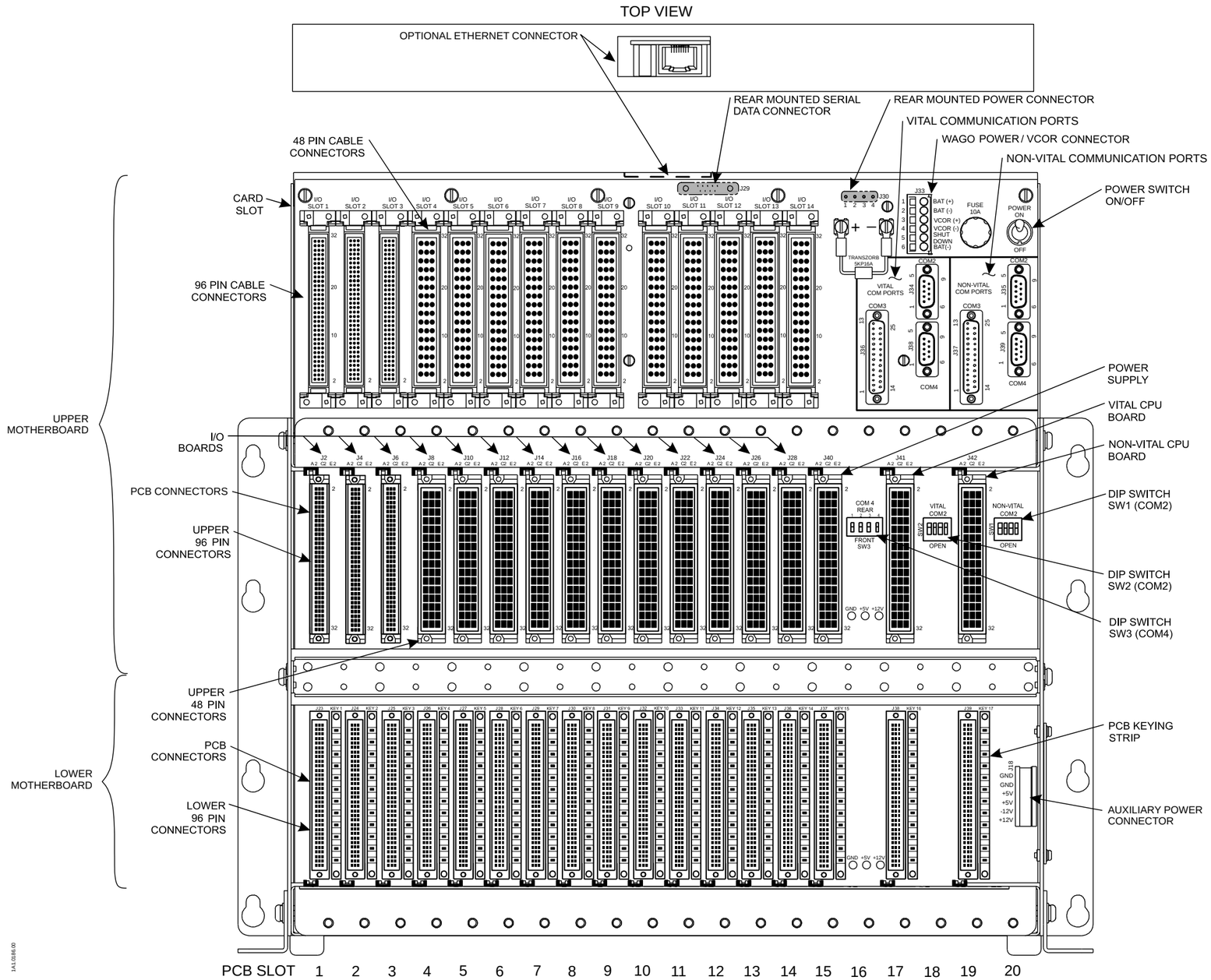

Figure 3-2. N18005301 Cardfile Front View

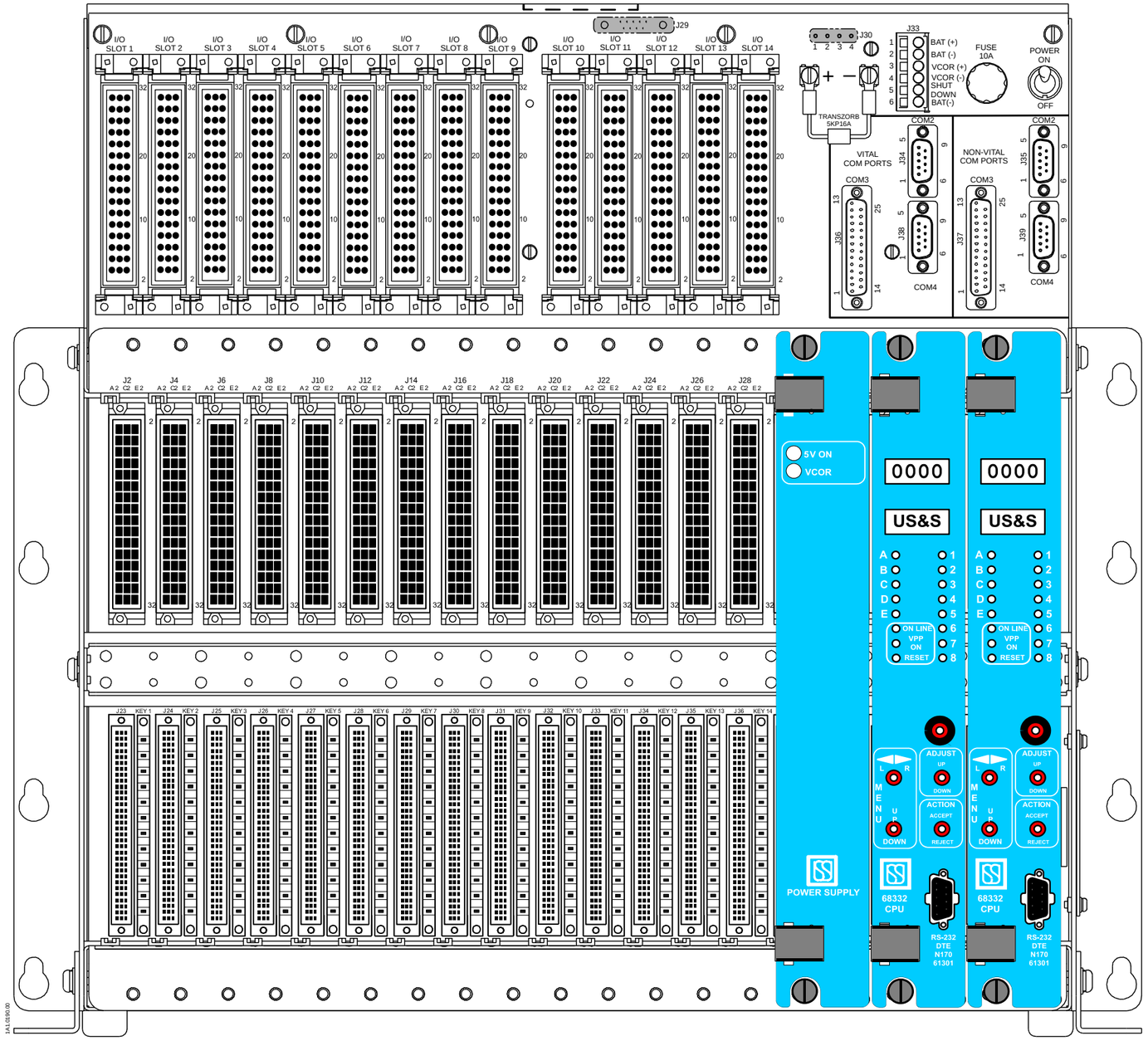

Figure 3-3. N18005201 Cardfile with Power Supply and CPUs Installed

3.1. WAGO Connectors

A six-connection, removable WAGO power connector (J33) is mounted on the front of the upper motherboard (see Figure 3-1). This connector is used for the battery input and VCOR coil wiring. The pinout for the connector is as follows:

- Pin 1 B12 input
- Pin 2 N12 input
- Pin 3 VCOR positive terminal (1A) connection
- Pin 4 VCOR negative terminal (1C) connection
- Pin 5 Shutdown
- Pin 6 N12 input

Pins 2, 3, & 6 of J33 are connected internally to bring N12 to the VCOR relay coil as well as the negative return of the shutdown. Pin 5 of J33 is connected internally to the shutdown function of the Power Supply PCB. The shutdown function allows the user to shut down the system using an external power supply. Figure 3-4 shows the connector wiring.

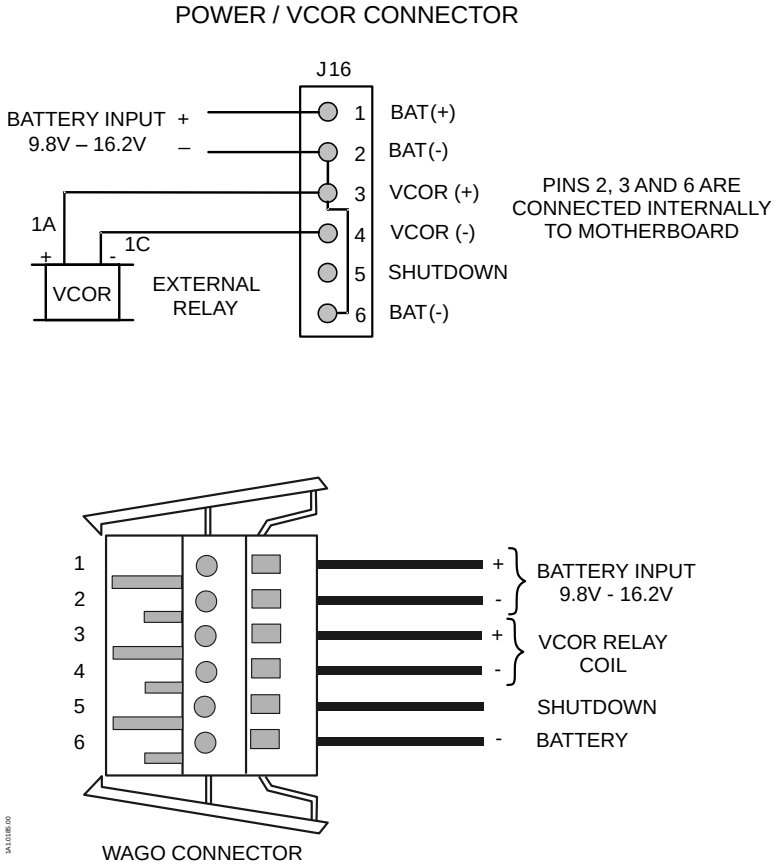

Figure 3-4. Upper Motherboard WAGO Connector Wiring

Input Battery power (12V) from the WAGO connector is routed through the power switch and a 10 amp fuse to the power supply PCB. Surge protection across the battery is provided by a 5 watt, 16 volt, transzorb (Vishay-General Semi part number 5KP16A-E3/4 5KP16A) mounted on screw terminals. The transzorb assembly with ring terminals (Ansaldo STS USA part number N50770002) is field replaceable.

The lower motherboard is equipped with a 6-pin WAGO connector to provide auxiliary (external power supply) power to the MICROLOK II HB2X in lieu of the MICROLOK II Power Supply PCB. Pins 1 and 2 are for common, pins 3 and 4 are for +5 volts, pin 5 is for -12 volts, and pin 6 is for +12 volts. Figure 3-5 shows the connector wiring. The connector is located at the lower right of the motherboard and can be accessed by removing the two screws and panel on the side of the cardfile.

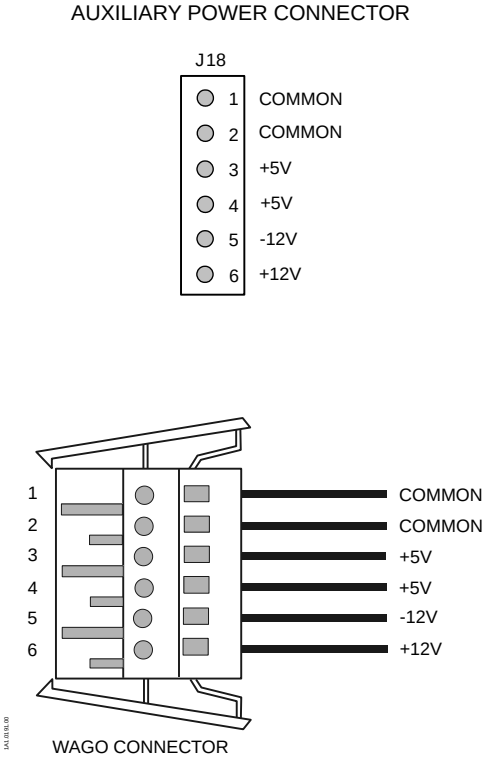

Figure 3-5. Lower Motherboard WAGO Connector Wiring

When using auxiliary power, the Conditional Power Supply PCB (N4519107501) is used in place of the nominal Power Supply PCB (N16660301 or N16661203). The lower motherboard transfers the required voltage (+12V, +5V, & GND) to the upper motherboard Slot 15 connector to satisfy the voltage requirements of the Conditional Power Supply. In this configuration, J33 must be used in conjunction with the auxiliary power so that there is a connection to the VCOR and shutdown function. An external fuse and surge protection are recommended when using auxiliary power. The values of the protection will depend on the auxiliary power source.

3.2. Communications Ports

The MICROLOK II HB2X cardfile contains three vital and/or three non-vital communications ports for external communications. An additional port is used for internal communications between the non-vital and vital CPU PCBs.

3.2.1. Communication Port 1

The upper motherboard contains RS-485 serial ports that are connected internally from com port 1 of the vital CPU board to com port 1 of the non-vital CPU.

3.2.2. Communication Port 2

Communication Port 2 incorporates two RS-485 serial ports that use standard DB-9 male connectors, DIP switches, and terminating resistors (see Figure 3-1). The connectors are labeled "J34, COM 2" and "J35, COM 2" on the motherboard. The ports are connected internally to com port 2 on the vital and non-vital CPU PCBs. The DIP switches switch the terminating resistors in or out. DIP switch SW1 connects terminating resistors to the non-vital com port 2. DIP switch SW2 connects terminating resistors to the vital com port 2. When the DIP switches are in the closed position, the terminating resistors are connected into the circuit. Terminating resistors are used to reduce reflections on a multi-drop line. Terminating resistors should be implemented if the cardfile is at the two furthest ends of the line.

NOTE

The four switches of SW1 or SW2 must be set to the same position, either all open or all closed.

3.2.3. Communication Port 3

The upper motherboard contains two RS-232 serial ports that use standard DB-25 connectors (J36 & J37). J36 is connected to com port 3 of the vital CPU. J37 is connected to com port 3 of the non-vital CPU.

3.2.4. Communication Port 4

The upper motherboard contains two RS-232 serial ports (J38 & J39) using standard DB-9 connectors. These connectors are connected internally to the com Port 4 of the CPU boards (vital and non-vital). The signals associated with the connector J38 are shared with the rear mounted DB-9 connector with sockets (J29) for the Serial to Ethernet Converter (SEC) board. DIP switch SW3 transfers the TXD, RXD, RTS, and DCD signals from the vital CPU board between the two connectors J29 and J38.

Switch SW3 ensures that only one connector of com port 4 is active at a given time. When all four switches of SW3 are set to the "FRONT" position, the signals are routed to connector J38. When all four switches of SW3 are set to the "REAR" position, the signals are routed to connector J29.

NOTE

All four switches of SW3 must be set to the same position, either all FRONT or all REAR.

3.2.5. Optional Ethernet PCB

An Ethernet PCB (ASTS USA part number N17006202) can be plugged onto the rear of the upper motherboard. The Ethernet port is on top of the cardfile when the Ethernet PCB is installed. The 12 volt power for the Ethernet PCB comes through connector J30 (on the rear of the cardfile) and the serial communications signals come through connector J29, "COM 4". See Section 4.3 for installation instructions.

Refer to SM-6800O, for configuration of the Ethernet PCB. Service Manual SM-6800O describes the Serial to Ethernet Converter (SEC). The SEC (ASTS USA part number N16920401) is different in physical appearance from the optional Ethernet PCB. However, the configuration procedures are the same for both units.

When using the optional Ethernet PCB, Switch SW3 must be set to the "REAR" position.

The signals and pin numbers for the com ports are shown in Table 3-1 through Table 3-3.

Table 3-1. Pinout of Serial Link Com Ports 3

PIN NUMBER	SIGNAL COM 3
1	Not Connected
2	TXD (Transmit Data)
3	RXD (Receive Data)
4	RTS (Request to Send)
5	CTS (Clear to Send)
6	Not Connected
7	COMMON (N12)
8	DCD (Data Carrier Detect)
9	Not Connected
10	Not Connected
11	Not Connected
12	Not Connected
13	Not Connected
14	Not Connected
15	TXCLK (Transmit Clock)
16	Not Connected
17	RXCLK (Receive Clock)
18	-12V
19	Not Connected
20	Not Connected
21	+12V
22	Not Connected
23	Not Connected
24	Not Connected
25	Not Connected

Table 3-2. Pinout of Serial Link Com Port 4 (Front of Motherboard)

PIN NUMBER	SIGNAL COM 4 FRONT
1	DCD (Data Carrier Detect)
2	RXD (Receive Data)
3	TXD (Transmit Data)
4	Not Connected
5	COMMON (N12)
6	Not Connected
7	RTS (Request to Send)
8	Not Connected
9	Not Connected

Table 3-3. Pinout of Serial Link Com Port 4 (Rear of Motherboard)

PIN NUMBER	SIGNAL COM 4 REAR
1	COMMON (N12)
2	Not Connected
3	RXD (Receive Data)
4	TXD (Transmit Data)
5	DCD (Data Carrier Detect)
6	Not Connected
7	Not Connected
8	RTS (Request to Send)
9	Not Connected

3.3. Optional Local Control Panel PCB

A Local Control Panel (LCP) PCB can be plugged into the front of the 96-pin cardfile (part number N18005301). The LCP is available with toggle switches or with pushbuttons installed in the uppermost row of controls. Figure 3-6 shows the front panel of the LCP PCB with toggle switches (part number N16926001). Figure 3-7 shows the front panel of the LCP with pushbuttons (part number N16926002). A relay driver PCB (part number N4518104801) is also required when using the LCP PCB. See Section 4.4 for the installation instructions.

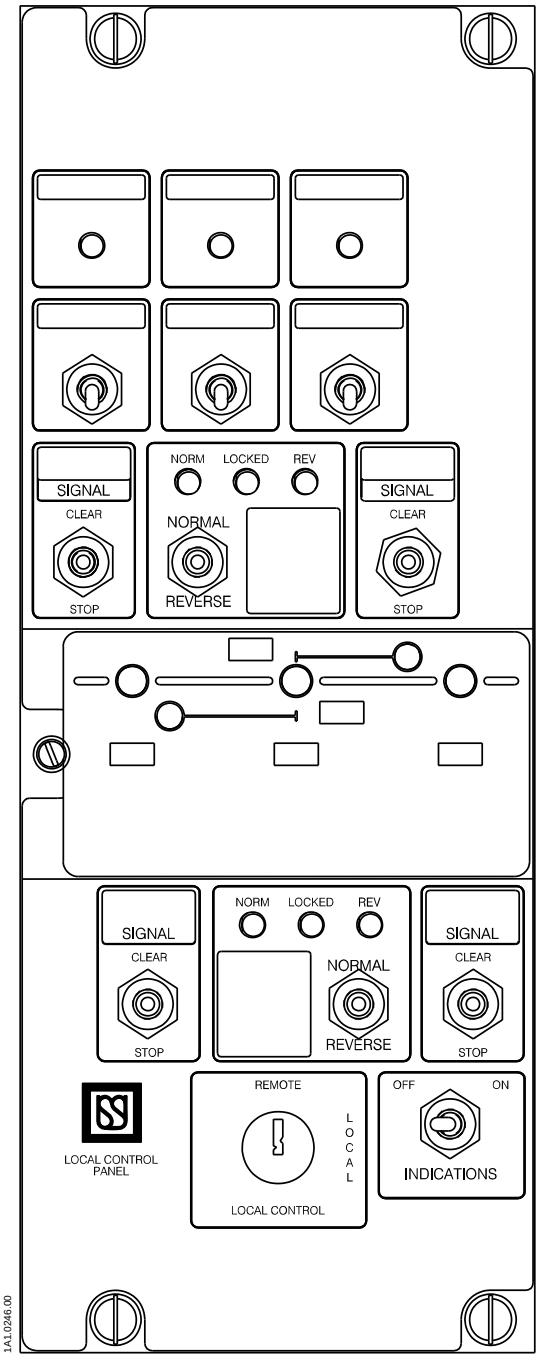

Figure 3-6. LCP PCB with Toggle Switches

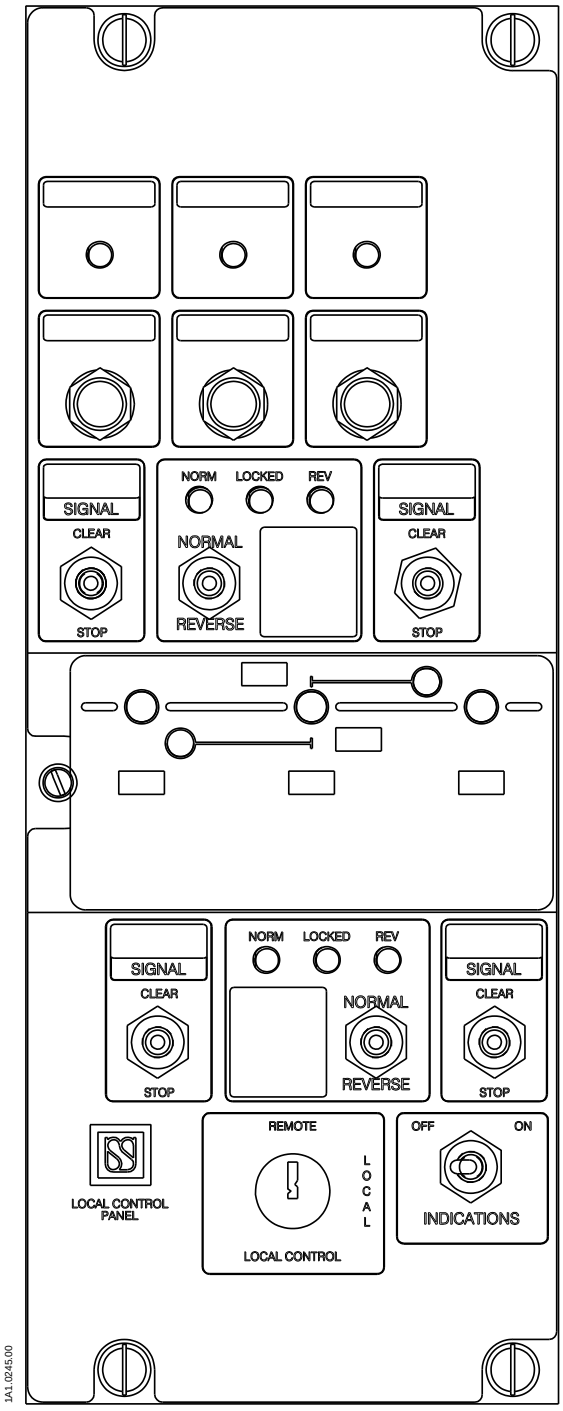

Figure 3-7. LCP PCB with Pushbuttons

4. INSTALLATION AND CONFIGURATION

The cardfile can be either wall or shelf mounted. One inch flanges are located along each side with four slotted mounting holes for wall mounting. One inch flanges are located along the bottom sides with five holes in each side for shelf mounting. Screws or bolts can be used to secure the cardfile to the wall or shelf.

WARNING

When replacing a power supply PCB, make certain of the board type. An old model PCB (N16660301) can be replaced with a new model PCB (N16661203), but not a new with an old (due to current rating).

A power supply PCB cannot be interchanged with a CPS only PCB.

4.1. Keying

The lower motherboard contains keying guides for the lower connectors to prevent accidental insertion of a printed circuit board into the wrong cardfile slot. Keying plugs are inserted by the customer (during installation) into the motherboard connector keying guide (see Figure 4-1). This guide mates with the keying strip mounted alongside the PCB's lower 96-Pin connector. The PCB's keying strip is equipped with twelve male keying tabs from which six tabs are removed at the factory in a specific pattern for the board part number. Each PCB type has a unique six tab arrangement to distinguish it from other boards.

Prior to installing a board, insert keying plugs (Part Number J709146-0473) into the corresponding cardfile motherboard keying guide (next to the connector). Plugs are installed in all cavities not corresponding to a keying tab location.

If it becomes necessary to change the type of board installed in a given slot, the previously installed keying plugs can be removed using a knife or a pair of needle nose pliers.

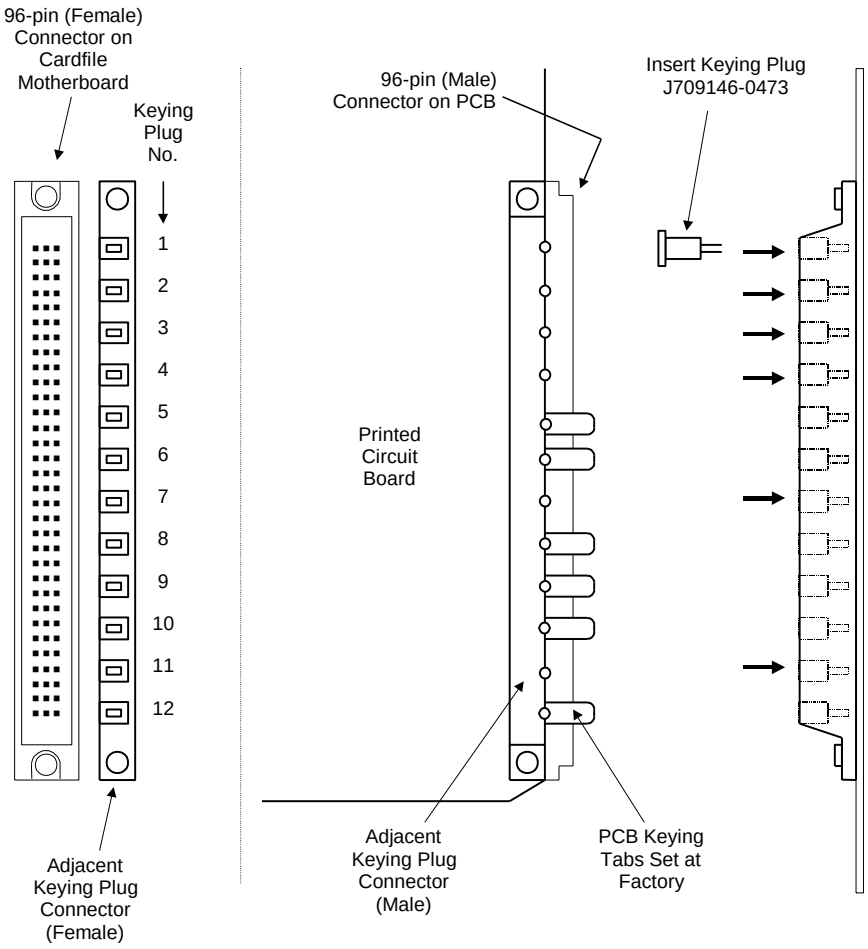

Figure 4-1. Keying Plug Installation

4.2. Cable Connection

When connecting a cable to a Microlok II HB2X, make sure that the notches on the cable connector line up with the tabs on the cardfile connector. The address jumpers may be upside down due to the construction of the cable. See Figure 4-2 for the connector orientation. The connector screws must be tightened to secure the cable connector to the cardfile.

NOTE

The cables must be secured six to twelve inches from the cardfile connector.

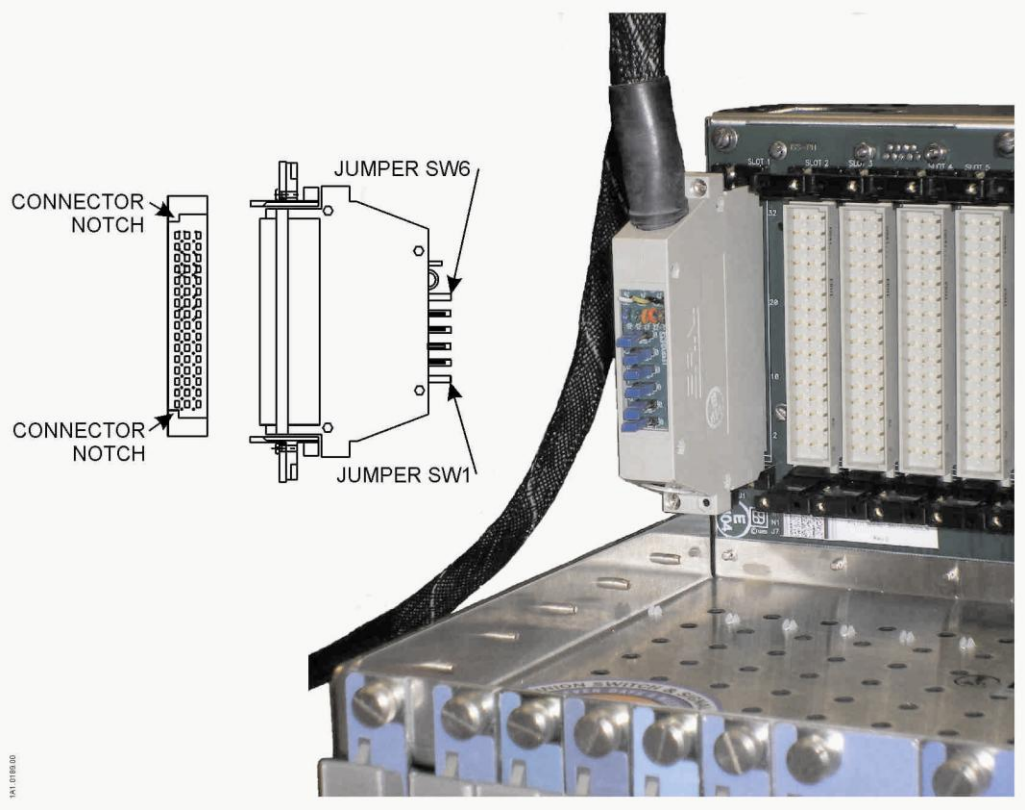

Figure 4-2. Cable Connection

4.3. Installation of optional Ethernet PCB

Proceed as follows to install the Ethernet PCB (Ansaldso STS USA part number N17006202) on the rear of the cardfile motherboard:

1. Remove the HB2X cardfile from the wall or shelf.

2. Remove the three screws that are located on each side of the cardfile toward the back of the cardfile (see Figure 4-3).

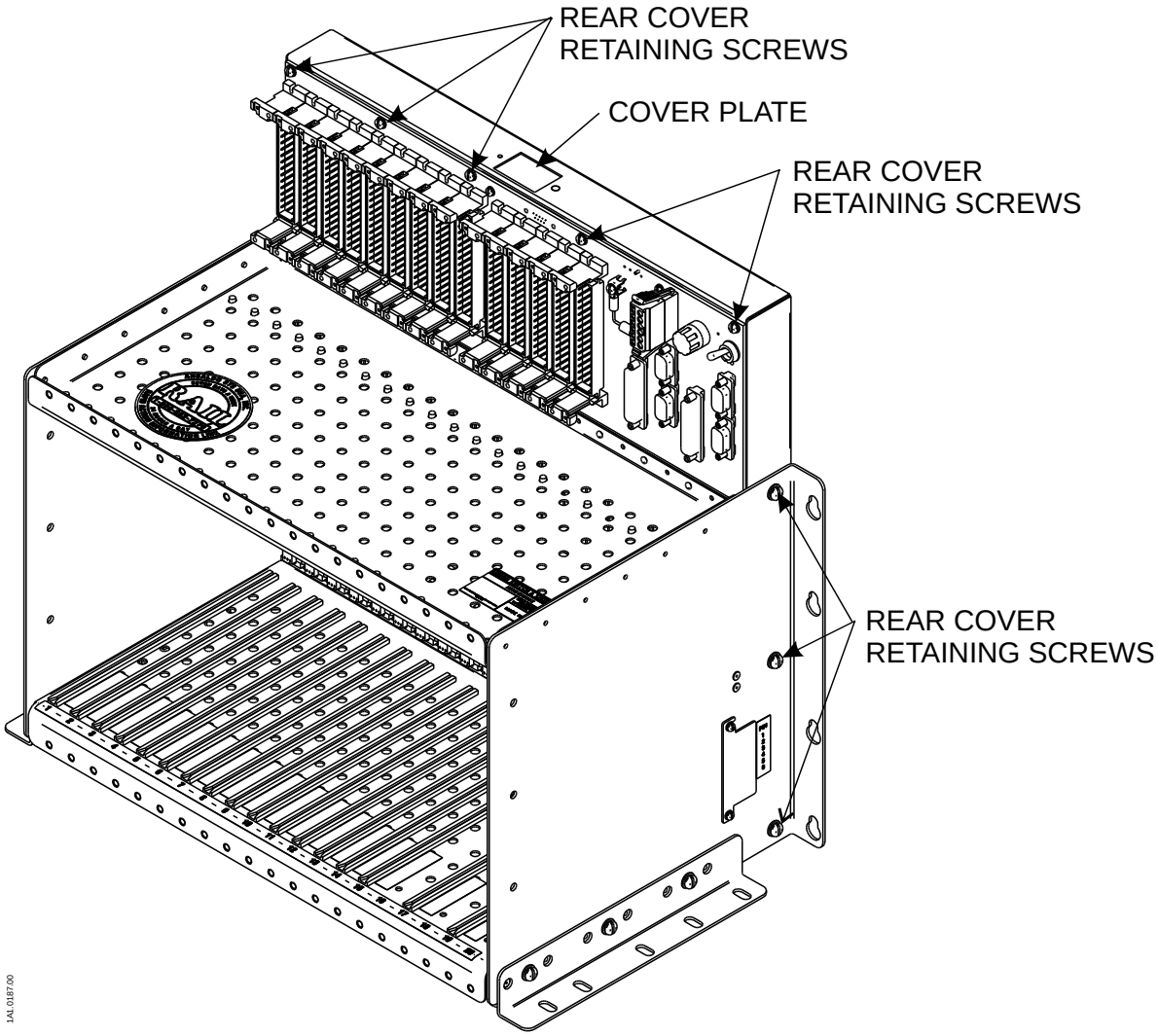

Figure 4-3. Location of Rear Cover Retaining Screws

3. Remove the five screws from the cardfile that are located at the top of the motherboard.

4. Remove the rear cover from the cardfile.

5. Remove the nut that secures the cover plate from the inside of the back cover.

6. Slide the cover plate so that the large portion of the hole in the cover plate is over the head of the mounting screw, and lift the cover plate off of the rear cover.

7. Remove the four screws and washers from the mounting standoffs on the motherboard.

8. Line up the connectors on the Ethernet PCB with the connectors on the back of the motherboard (see Figure 4-4). Make sure the four pins of the power connector engage with the sockets on the motherboard. Make sure the 9-pin D connectors line up. Press the Ethernet PCB down onto the mounting standoffs. Make sure that PCB is positioned completely onto the standoffs and that the connectors are secure.

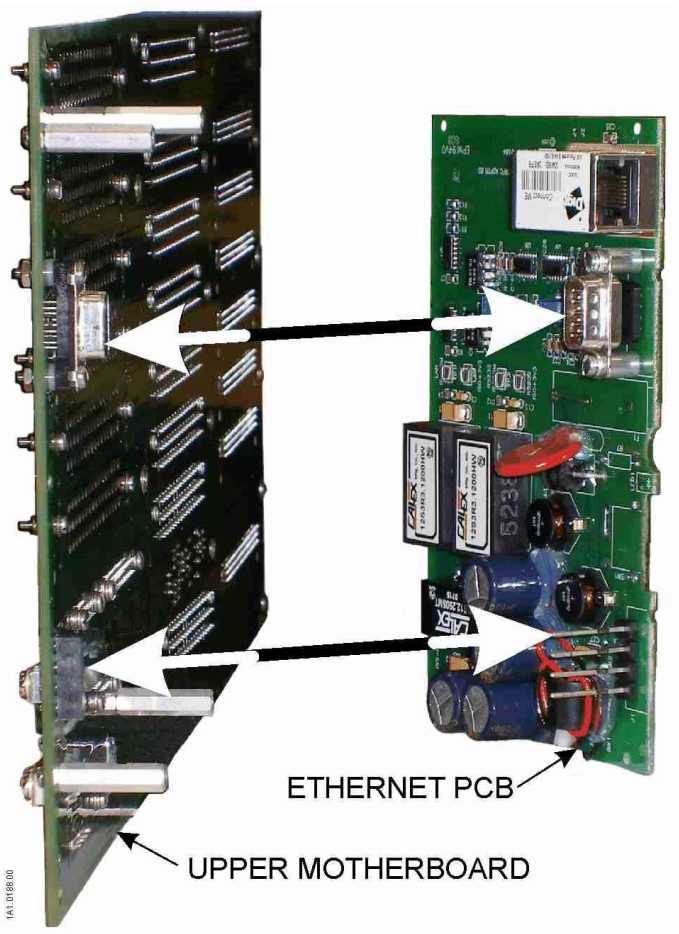

Figure 4-4. Ethernet PCB Location

9. Install the four screws and washers through the Ethernet PCB into the standoffs.
10. Place the back cover on the cardfile. The tabs on the top of the rear cover must be behind the motherboard.
11. Install the six screws into the sides of the cardfile and rear cover that were removed in Step 2.
12. Install the five screws at the top of the motherboard that were removed in Step 3.
13. Set Switch SW3 to the REAR position.
14. Installation of the Ethernet PCB is complete.
15. Proceed to SM6800O to configure the Ethernet PCB.

4.4. Installation of optional Local Control panel PCB

Figure 4-5 shows the LCP PCB with pushbuttons installed in the HB2X cardfile.

Proceed as follows to install the LCP PCB (part number N16926001 or N16926002) on the front of 96-pin cardfile (N18005301):

1. Remove power from the HB2X cardfile.
2. Remove any existing PCBs that are installed in slots 1 through 5.
3. Line up the connectors on the Relay Driver PCB with the connectors on the back of the LCP PCB.
4. Press the Relay Driver PCB into the LCP PCB. Make sure that the PCBs are securely connected.
5. Align the Relay Driver PCB's edges with the cardfile slot's channels.
6. Slide the LCP and Relay Driver PCB assembly into the cardfile channels and into the motherboard connectors. Make sure that the PCB assembly is securely connected to the motherboard.
7. Tighten the four screws on the front of the LCB PCB.
8. Apply power to the HB2X cardfile.
9. Installation of the LCP PCB is complete.

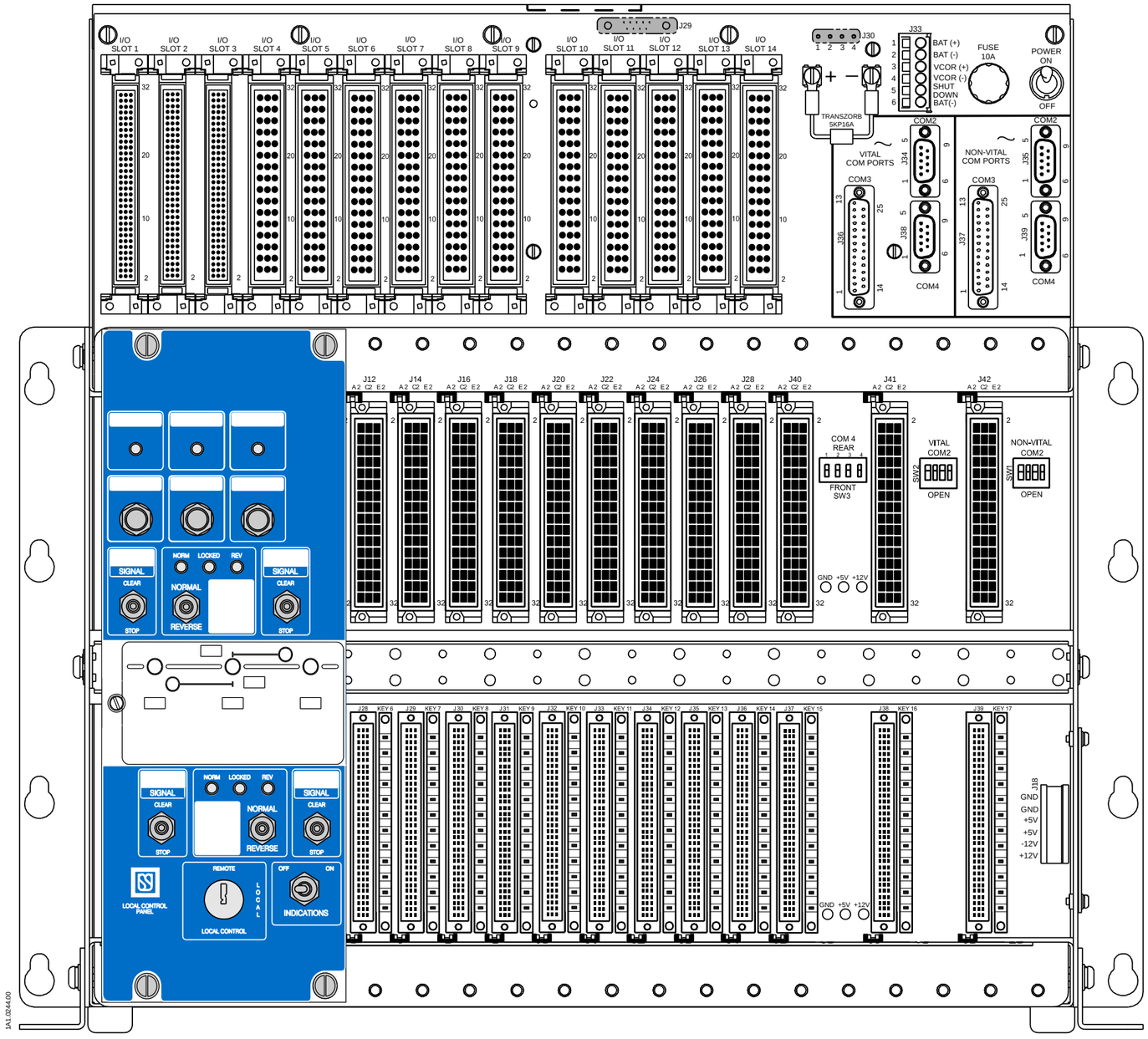

Figure 4-5. N18005301 Cardfile with LCP Installed

5. RAIL TEAM AND TECHNICAL SUPPORT

The Rapid Action Information Link Team (RAIL Team) is a group of experienced product and application engineers ready to assist you to resolve any technical issues concerning this product. Contact the RAIL Team in the United States at 1-800-652-7276 or by e-mail at railteam@ansaldo-sts.us.

End of Manual