DIGITAL SERVICE MULTIPLEXOR

SHELF SERVICE NODE LOCATION

A18-05721-XX

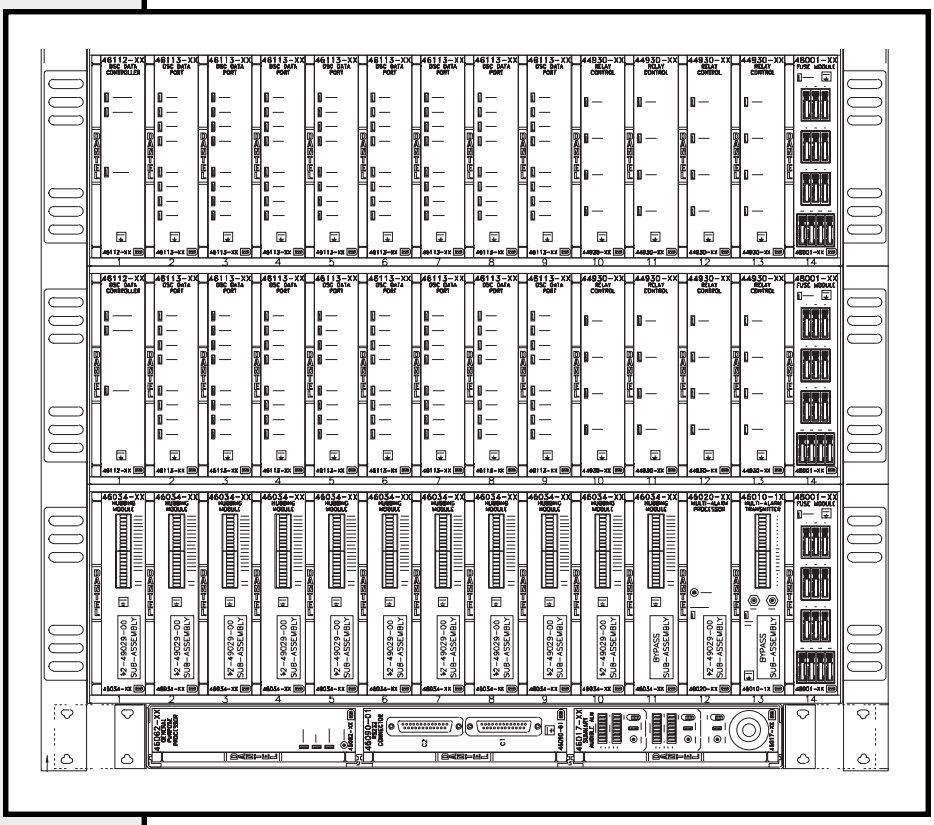


Table of Contents

About this Practice:

This practice has been reissued to:

- Update Service Node Description in ***General Description*** section.
- Update the table in Step 4A, in ***Installation*** section.
- Update margin note in step 5A.

Reissued Practices: Updated and new content can be identified by a banner in the right margin.

UPDATED

issue date: October 1998

CAUTION

- Install or remove modules from the shelf only when the power is off. If you install a module in the shelf with the power on, the internal circuitry may suffer damage and the product warranty will be void.
- Remove and install circuit boards only in a static-safe environment (use antistatic wrist straps, smocks, footwear, etc.).
- Keep circuit boards in their antistatic bags when they are not in use.
- Do not ship or store circuit boards near strong electrostatic, electromagnetic, magnetic, or radioactive fields.
- For more complete information on electrostatic discharge safety precautions, refer to Bellcore™ Technical Reference # TR-NWT-000870.

ORDERING INFORMATION

NOTE: This section lists the different options available for this product. To order any of the available options, contact Dantel Inside Sales through our toll-free number, **1-800-432-6835.**

OPTION NUMBER	FEATURES
A18-05721-00	Service Node Assembly; Wired; Not equipped
A18-05721-01	Service Node Assembly; Wired; Equipped for up to 2 LSO Locations
A18-05721-02	Service Node Assembly; Wired; Equipped for up to 4 LSO Locations
A18-05721-03	Service Node Assembly; Wired; Equipped for up to 6 LSO Locations
A18-05721-04	Service Node Assembly; Wired; Equipped for up to 8 LSO Locations
A18-05721-05	Service Node Assembly; Wired; Equipped for up to 10 LSO Locations
A18-05721-06	Service Node Assembly; Wired; Equipped for up to 12 LSO Locations
A18-05721-07	Service Node Assembly; Wired; Equipped for up to 15 LSO Locations

GENERAL DESCRIPTION

NOTE:

Practices for the various modules are located in the Appendix of this manual. Block and level drawings for this assembly are located in the back of this manual.

The Service Node Digital Service Multiplexor (DSM) Shelf described in this manual is offered in a number of different configurations. Refer to ***Ordering Information*** above.

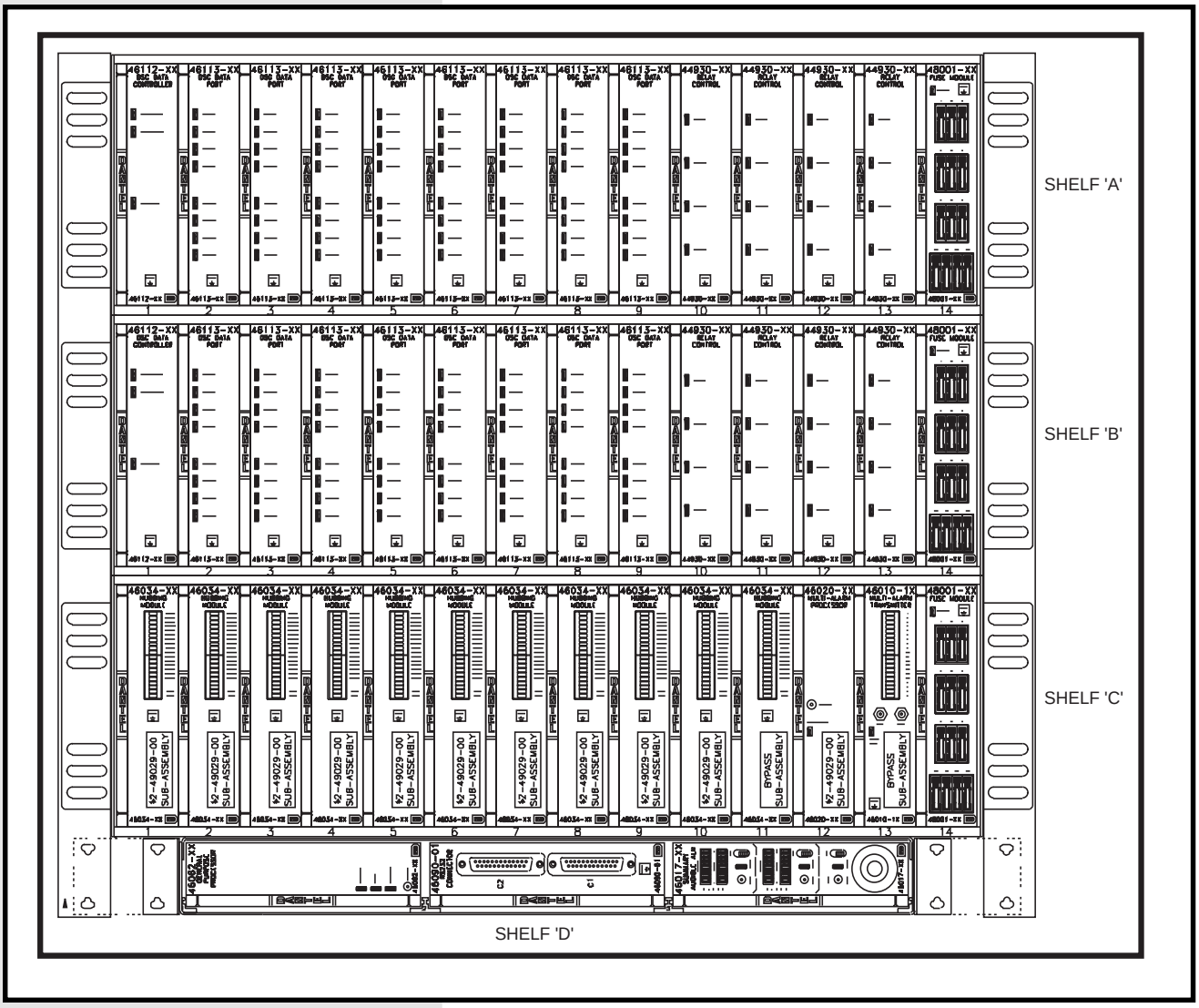
The DSM is composed of two basic modules. Refer to Figs. 1, 2, and 3 for front, rear, and side views of the 05721 system. The B11-46112-00 Controller Module and the B11-46113-00 Data Port Module. The Controller Module is used to interface the 64Kb channel using a RS-422 interface and to interface the Data Port Modules. Each Controller can accommodate up to 8 Data Port Modules. Each Multi Port Module can provide for up to four RS-232 or RS-422 ports. In this application only the RS-232 ports will be wired to DB-25 connectors. The total number of ports that can be provided from a Controller and Port Modules is 32. The DSM can be optioned so that the channels can terminate at a location or they can be repeated to the next locations. At the Service Node, all channels are set for terminal application.

The purpose of this system is to provide RS-232 ports from the Service Node to every Local Serving Office (LSO) site. This will allow for transmission of ASCII information on the 64Kb OW channel of fiber systems such as FT 2000 terminals. This could be ASCII data such as TL1 messages from Telecom Solutions DCD-23 BITS clock or TL1 messages from other Network Elements (NEs). This application will also provide for an additional RS-232, 1200 baud port at every LSO. This system will provide for a self healing ring on the 64 kb channel and it will provide for alarm information for maintenance and fault location of the ring.

Specific Application

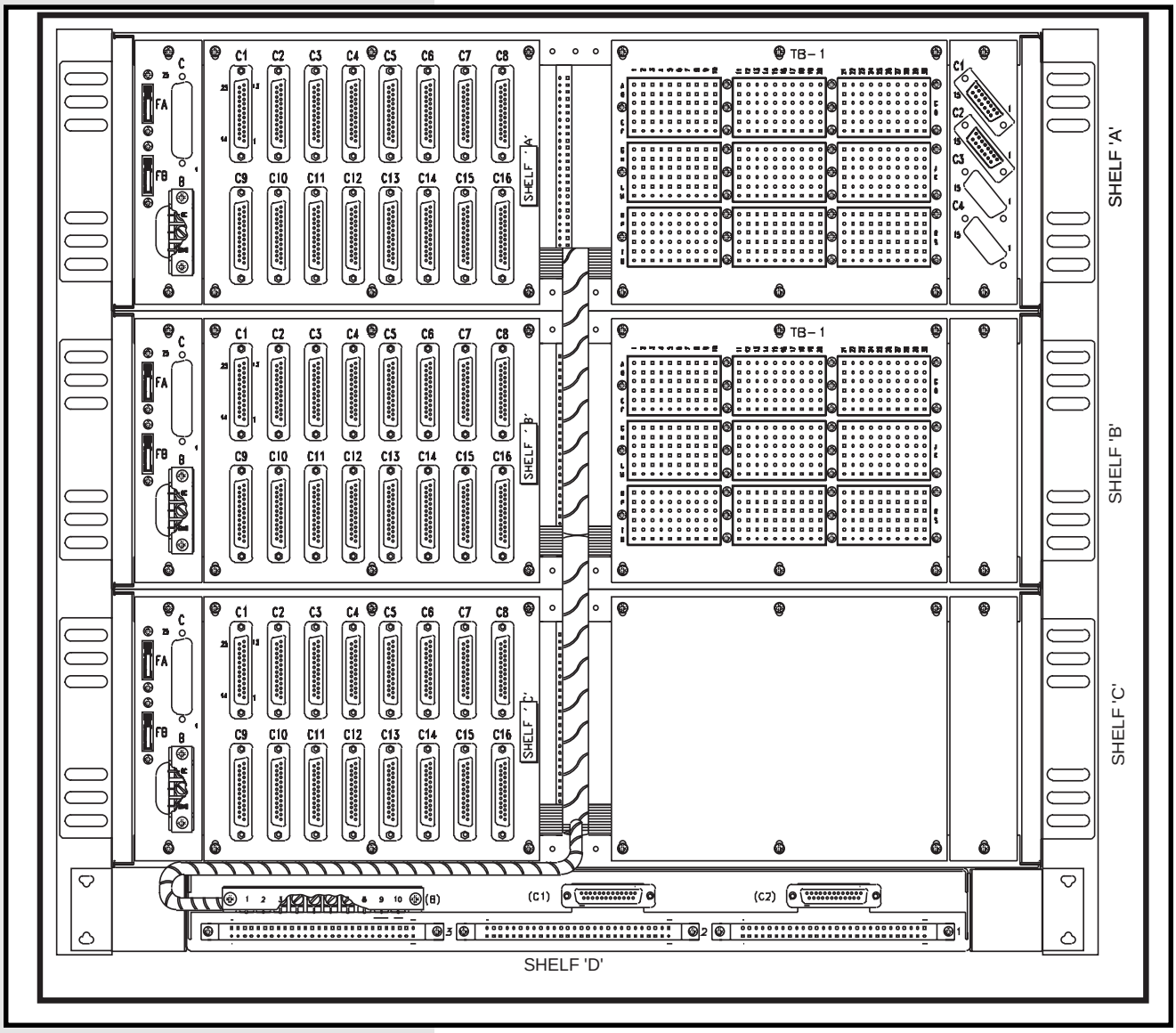
This application consists of two basic assemblies. A18-05720-XX for the Local Serving Office (LSO) and the A18-05721-XX Service Node assemblies. These assemblies will work together to make a self healing system with two RS-232 ASCII ports at every LSO and one Alarm channel that is common to all LSO locations. Each Channel will terminate at the Service Node on DB25 connectors configured as DTE, RS-232 interfaces.

FIG. 1 - FRONT VIEW, 05721 SYSTEM



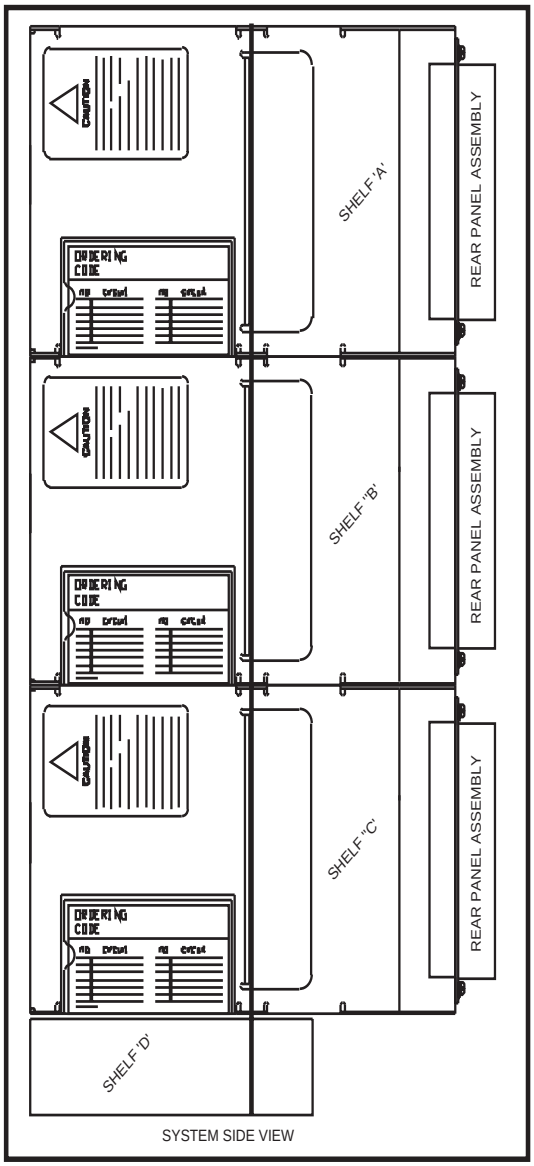
NOTE: *For a larger, more detailed drawing of the above, please refer to Sheet # 8 of the A18-05721-XX Block Diagram.*

FIG. 2 - REAR VIEW, 05721 SYSTEM



NOTE: *For a larger, more detailed drawing of the above, please refer to Sheet # 9 of the A18-05721-XX Block Diagram.*

FIG. 3 - SIDE VIEW, 05721 SYSTEM



NOTE: *For a larger, more detailed drawing of the above, please refer to Sheet # 9 of the A18-05721-XX Block Diagram.*

SERVICE NODE ASSEMBLY

The Service Node provides for 30 self-healing channels on a fiber ring application, one self-healing alarm channel, and one pilot channel. The assembly will consist of two Controllers, 16 Data Port Modules, and Hubbing Modules to allow for the transmission and reception of data from the East and West directions of the ring. A Multi-Alarm Transmitter (MAT) is used to monitor the synch on the local terminals, to monitor the ring continuity of the system, and to monitor the local power supplies for the Controller cards. A Multi-Alarm Processor (MAP) is used to interrogate all of the MATs at the LSOs for faults. A General Purpose Processor (GPP) then polls the MAP and converts the detected faults to TL1 alarm messages that are sent to the OS over a Datakit channel.

In this application, the DSMs are set up to act as a self-healing ring. At the Service Node, data will normally be transmitted in a West to East direction (clockwise). Data is received in an East to West direction (counter-clockwise). When the system is intact, the East DSM is opened and no data is transmitted or received by it. When the MAT at the Service Node detects a fault on the ring in either direction, the system will self-heal by transmitting or receiving in the opposite direction in order to avoid the fault.

SERVICE NODE DESCRIPTION

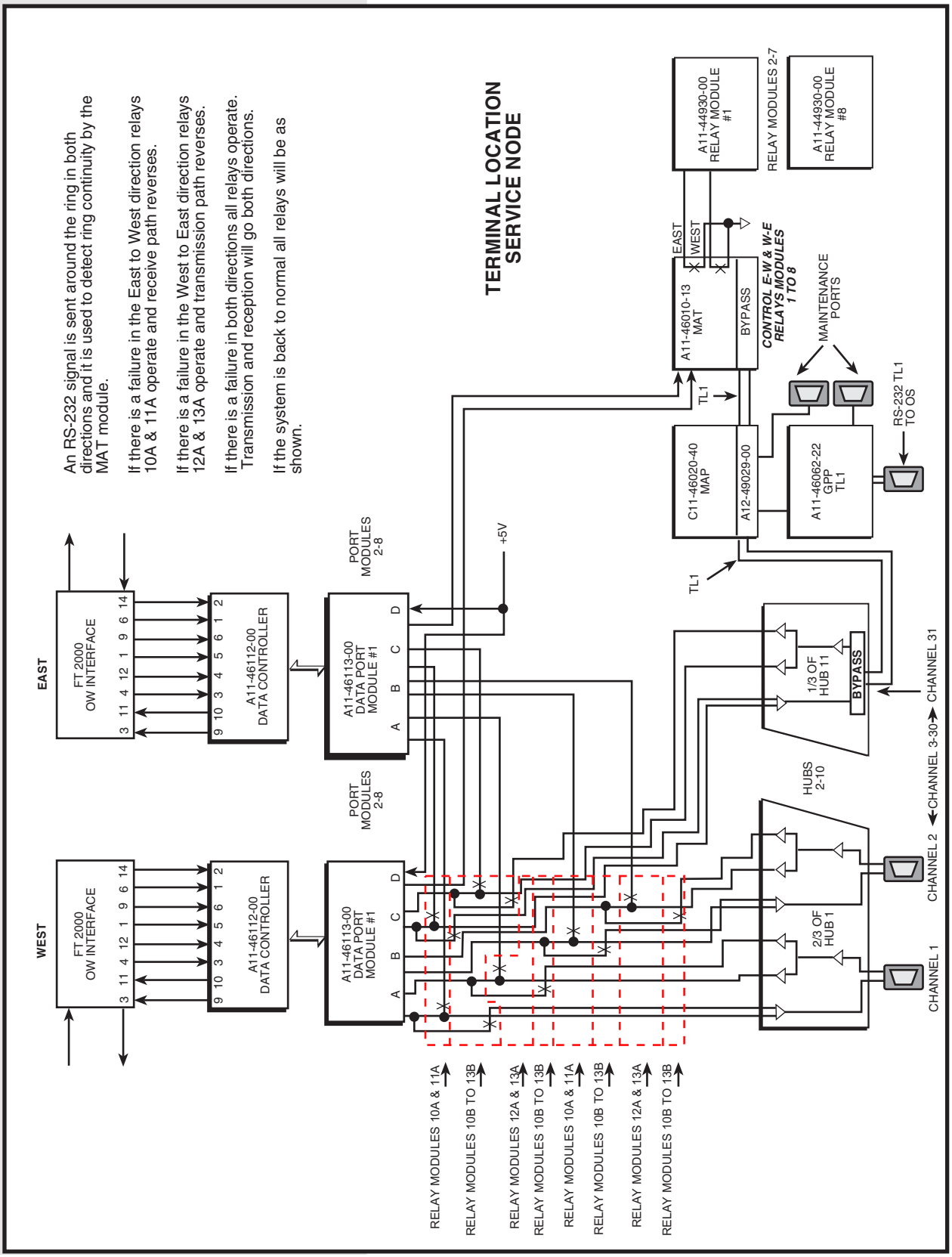
The Service Node location can send or receive data from either direction. Refer to Fig. 4. The data to and from the East Port modules is opened if there is no faults on the system. An RS-232 signal is sent around the ring in both directions, East to West and West to East. The opposite ends of the ring have detectors on them so that there is continuous monitoring of the continuity of the system in both directions.

If there is no fault on the system, data is transmitted from the West to the East, and data is received from the East to West direction. An RS-232 signal, used for continuity checking, is sent out on channel 31 with a known pattern and in a known time slot on the data string. This data string will also contain framing information. This will assure that noise cannot cause a false indication. There is a 300 millisecond delay upon the loss of signal before the detect takes place.

The detected RS-232 signals are sent to the MAT at the Service Node. If there is a failure on the ring, the MAT will energize one of two relays, depending on the failure direction, and this relay will trigger additional relays that will cause the data path to reverse direction. (This can be either the transmission path or the receive path, depending on the failure direction.)

If there is a failure from the West to East direction, the MAT alarm point associated with the continuity check for the West to East loop cannot detect the RS-232 signal at the Service Node, and the logic will energize relays 12A and 13A. All transmit and

FIG. 4 - TERMINAL LOCATION SERVICE NODE



receive data is shifted to the East to West direction. The transmission is now around the ring in the East to West, counter-clockwise direction, while the receive is still in the same direction. The East to West pair is intact with no fault detected on it.

If there was a failure on the system from the East to the West, Relays 10A and 11A would energize. The transmit path would remain West to East, but the receive path direction reverses so that it, too, is West to East.

UPDATED

If there is a cut causing failures in both directions, this will cause ring fault detect alarms in both directions and all of the transfer relays 10A to 13B would operate. Data transmission and reception would then go both directions from the Service Node. Data would be transmitted from the West to the East up to the break location and data would be received from the break in the East to West direction. Every LSO on the West side of the break would report in this manner. Every LSO to the East of the break would now transmit data from the West to the East direction and the LSOs would receive from the East to West direction. There would be no conflict of data because of the complete opening of the system at the break location.

ALARM CONDITION ASSIGNMENTS

The MAT at the Service node will monitor the alarm conditions, assigned as follows:

- Point 1 = East Sync alarm
- Point 2 = East DSM Power Supply alarm
- Point 3 = Continuity East Loss of Signal alarm
- Point 4 = West Sync alarm
- Point 5 = West DSM Power Supply alarm
- Point 6, 9 = Continuity West Loss of Signal alarm
- Point 7 = Blown fuse alarm
- Point 8 = Customer use (logic for points 1 to 8 reversed)
- Points 10 to 16 for customer use

The MAP, being polled by the GPP, will pass the detected alarms to the GPP. The GPP will then create TL1 messages based on the alarm inputs from the MAP. The database created for the GPP can be generic in nature so that all systems could be databased the same with only the SIDs being different. The user would only have to change one entry in the data base for each MAP database entered into the GPP. The GPP can support up to 50,000 TL1 messages.

GENERAL DESCRIPTION

The database can be created so that the AID for each point could be descriptive of the location and the type of alarm. The GPP can support up to 4,096 different AIDs. If the GPP is centrally located, one GPP can be used to poll a number of different Service Nodes. It would only require that there be a data link between the sites to allow the different MAPs from the Service Nodes to communicate with the GPP at the central location. A Hubbing Module has been provided to accommodate additional remote MAP ports. It can also be used for other purposes.

The GPP will create autonomous TL1 alarm messages and it will accept TL1 commands from the operations center such as RTRV-HDR, INH-MSG, date/time setting routines, etc.

INSTALLATION

TURN-UP PROCEDURE

The following is a step-by-step procedure for turning-up the shelf after it has been mounted in an equipment rack and all wiring has been completed.

STEP 1 - MODULE INFORMATION

If the modules are installed in the shelf, remove the Fuse Module first, then remove all the other modules.

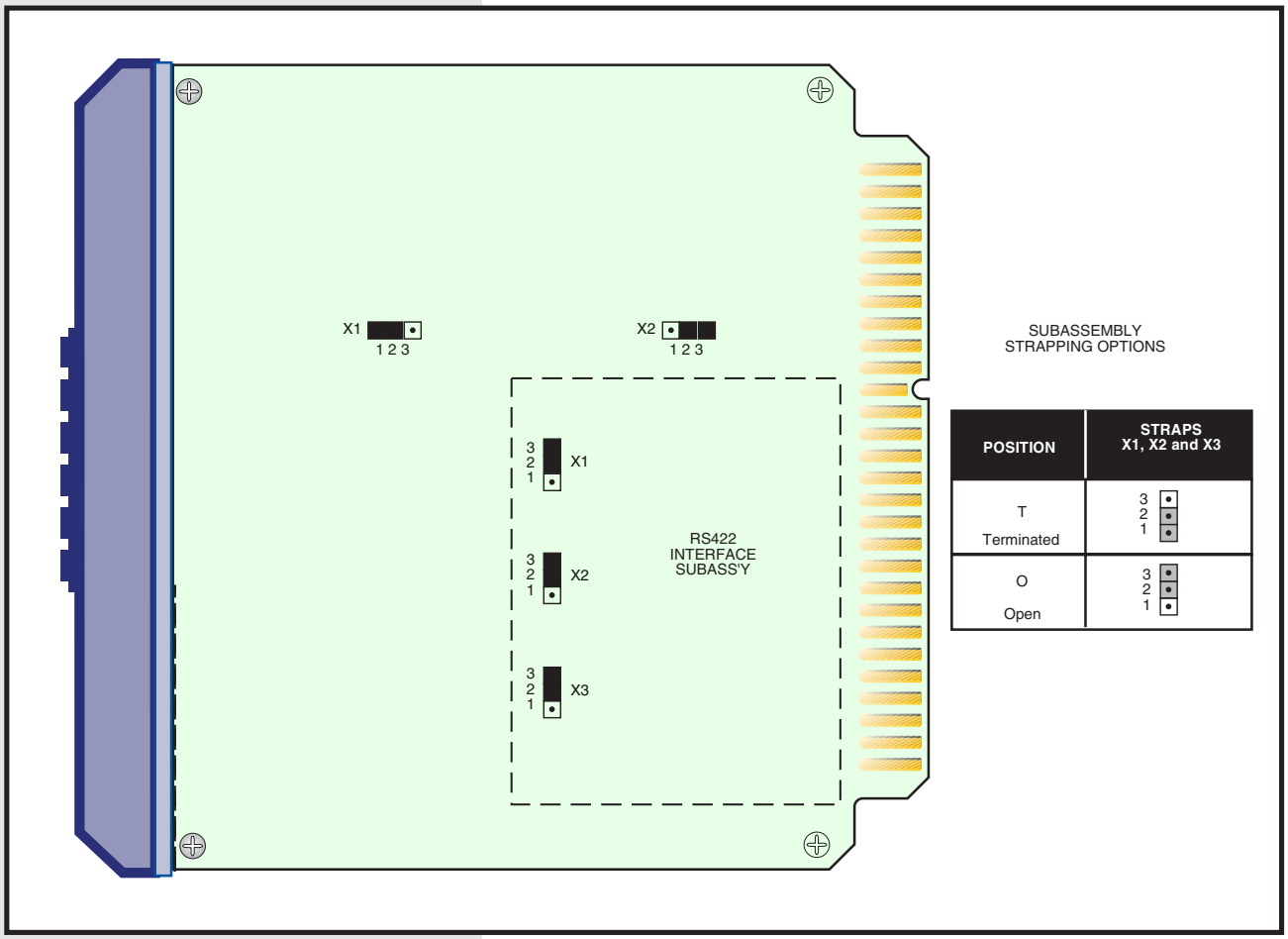
CAUTION: *Modules should only be installed or removed from the shelf after power has been shut off (by removing the Fuse Module). Installing modules in the shelf with power applied may damage internal circuitry and void the product warranty. Observe electrostatic precautions when handling modules. Refer to Bellcore Technical Advisory #TA-TSY-00878, Section 7, for electrostatic discharge information.*

STEP 2 - 46112 STRAPPING INFORMATION

Refer to Figure 5 for strap locations. Set 46112 switches and straps per following table:

B11-46112 STRAPPING INFORMATION FOR ALL CONTROLLERS				
SHELF A & B, SLOT 1		SUBASSEMBLY		
X1	X2	X1	X2	X3
1 to 2	2 to 3	2 to 3	2 to 3	2 to 3

FIG. 5 - 46112 DSM DATA CONTROLLER MODULE STRAP LOCATION

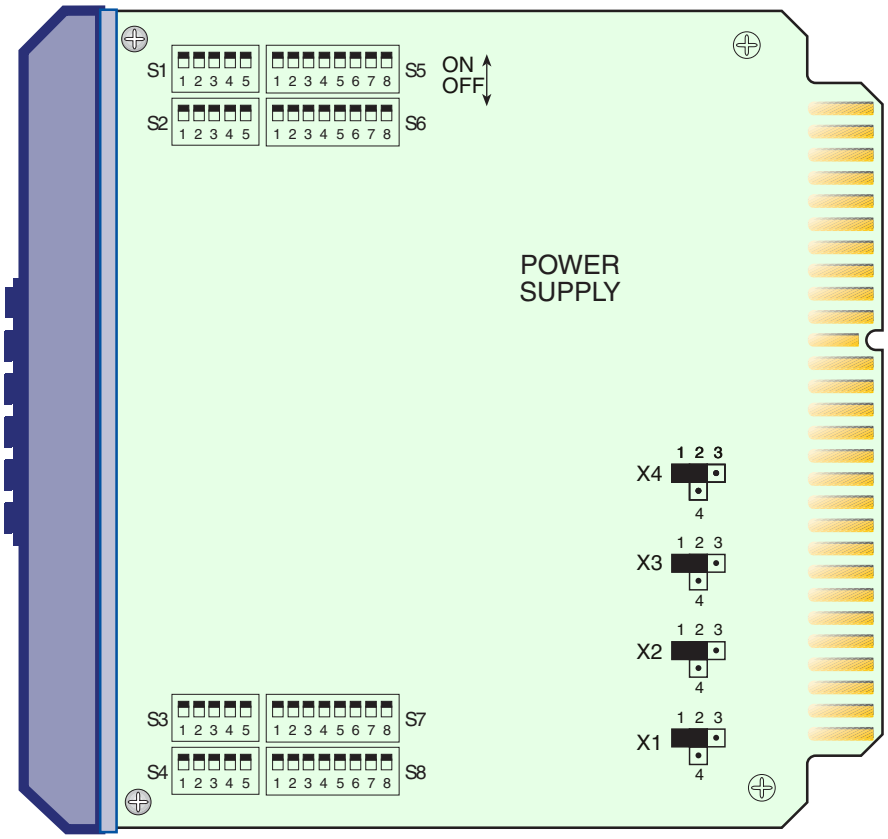


STEP 3 - 46113-00 SWITCH SETTINGS

Refer to Figure 6 for switch and strap locations. Set the 46113 switches and straps per following table:

B11-46113-00 SWITCH SETTINGS FOR SERVICE NODE (SWITCHES SHOWN ARE ON; ALL OTHERS OFF)								
	Port A		Port B		Port C		Port D	
	S1	S5	S2	S6	S3	S7	S4	S8
SHELF A								
Slot 2	All OFF	1,2,5,8	5	1,2,5,8	4	1,2,5,8	4,5	1,2,5,8
Slot 3	3	1,2,5,8	3,5	1,2,5,8	3,4	1,2,5,8	3,4,5	1,2,5,8
Slot 4	2	1,2,5,8	2,5	1,2,5,8	2,4	1,2,5,8	2,4,5	1,2,5,8
Slot 5	2,3	1,2,5,8	2,3,5	1,2,5,8	2,3,4	1,2,5,8	2,3,4,5	1,2,5,8
Slot 6	1	1,2,5,8	1,5	1,2,5,8	1,4	1,2,5,8	1,4,5	1,2,5,8
Slot 7	1,3	1,2,5,8	1,3,5	1,2,5,8	1,3,4	1,2,5,8	1,3,4,5	1,2,5,8
Slot 8	1,2	1,2,5,8	1,2,5	1,2,5,8	1,2,4	1,2,5,8	1,2,4,5	1,2,5,8
Slot 9	1,2,3	1,2,5,8	1,2,4,5	1,2,5,8	1,2,3,4	1,2,4,8	1,2,3,4,5	1,2,5,8
SHELF B								
Slot 2	All OFF	1,2,5,8	5	1,2,5,8	4	1,2,5,8	4,5	1,2,5,8
Slot 3	3	1,2,5,8	3,5	1,2,5,8	3,4	1,2,5,8	3,4,5	1,2,5,8
Slot 4	2	1,2,5,8	2,5	1,2,5,8	2,4	1,2,5,8	2,4,5	1,2,5,8
Slot 5	2,3	1,2,5,8	2,3,5	1,2,5,8	2,3,4	1,2,5,8	2,3,4,5	1,2,5,8
Slot 6	1	1,2,5,8	1,5	1,2,5,8	1,4	1,2,5,8	1,4,5	1,2,5,8
Slot 7	1,3	1,2,5,8	1,3,5	1,2,5,8	1,3,4	1,2,5,8	1,3,4,5	1,2,5,8
Slot 8	1,2	1,2,5,8	1,2,5	1,2,5,8	1,2,4	1,2,5,8	1,2,4,5	1,2,5,8
Slot 9	1,2,3	1,2,5,8	1,2,4,5	1,2,5,8	1,2,3,4	1,2,4,8	1,2,3,4,5	1,2,5,8
NOTE: AT SERVICE NODE, SET STRAPS X1, X2, X3, AND X4 ON ALL 46113 CARDS TO “G” (1 TO 2)								

FIG. 6 - 46113 DSM DATA PORT MODULE STRAP AND SWITCH LOCATIONS



SUBASSEMBLY
STRAPPING
OPTIONS

POSITION	STRAPS X1, X2, X3 and X4
"G" RS232	= RS-232 (default)
"T" RS422	= RS-422 TERMINATED
"O" RS422	= RS-422 NON-TERMINATED

NOTE:

1 - 2 = RS- 232
2 - 3 = TERMINATED
2 - 4 = RS-422 UNTERMINATED
X1 = Port A
X2 = Port B
X3 = Port C
X4 = Port D

STEP 4A - 46034 HUBBING MODULES

Refer to Figure 7 for switch and strap locations. Set the 46034 switches and straps per following table:

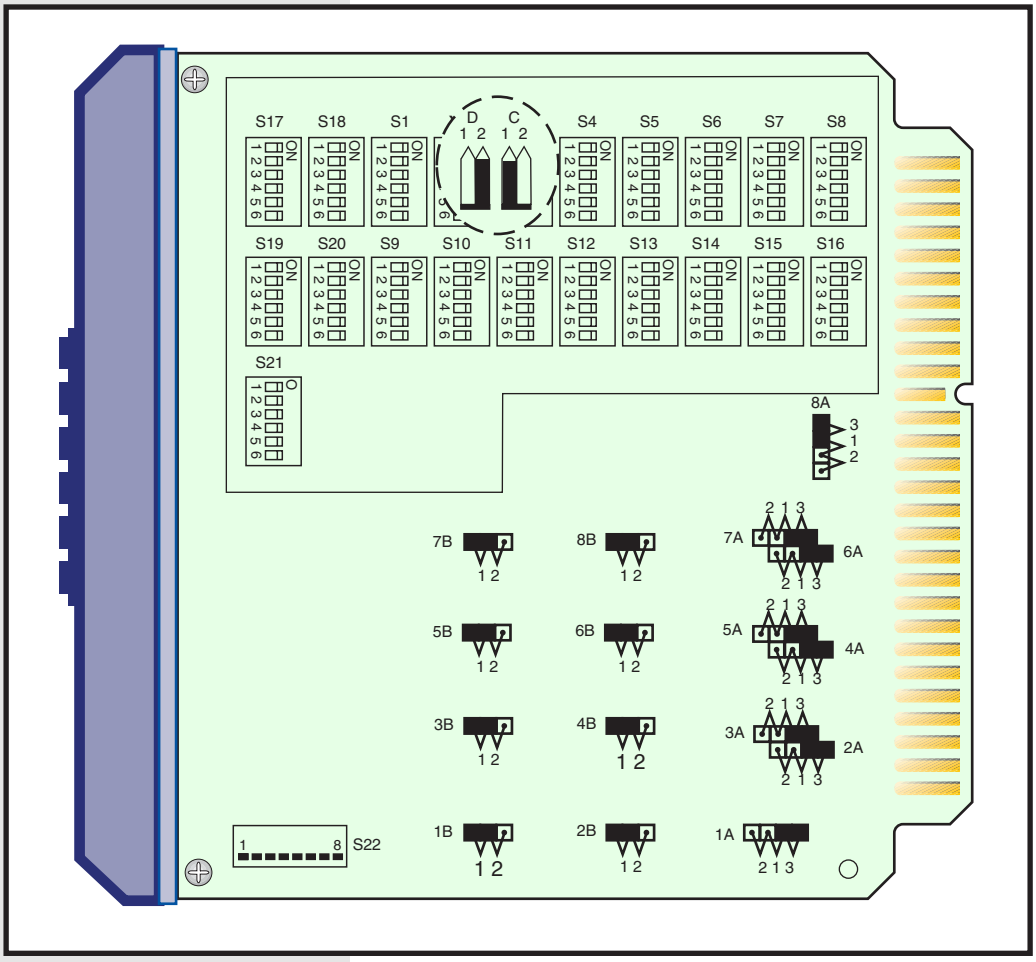
	SLOTS 1 - 10	SLOT 11
SWITCH	POSITION	POSITION
1	1 ON	5 ON
2	1 ON	5 ON
3	2 ON	As needed
4	3 ON	As needed
5	3 ON	As needed
6	4 ON	As needed
7	5 ON	As needed
8	5 ON	As needed
9	2 ON	6 ON
10	2 ON	6 ON
11	1 ON	As needed
12	4 ON	As needed
13	4 ON	As needed
14	3 ON	As needed
15	6 ON	As needed
16	6 ON	As needed
17	6 ON	6 ON
18	All OFF	All OFF
19	5 ON	5 ON
20	All OFF	All OFF
21	All OFF	All OFF
22	All OFF	All OFF
STRAPS		
1A to 8A	3	3
1B to 8B	1	1
C	2	2
D	1	1

UPDATED

STEP 4B - 46034 HUBBING MODULES

Refer to Step 9 and strap the 49029 communication subassemblies in slots 1 through 10.

FIG. 7 - SWITCH AND STRAP LOCATIONS, 46034 HUBBING MODULE



NOTE: *Refer to step 9 for strap and switch information on the 49029 subassembly mounted on the Hubbing Modules*

STEP 5A - B11-46020-00 MAP

Refer to Figures 8 and 9 for MAP switch locations. Set switch settings of 46020-40 per following table:

B11-46020-40 MAP SWITCH SETTINGS AT SERVICE NODE SWITCHES SHOWN ARE ON (DOWN)							
Shelf C	S1	S2	S3	S4	S5	S6	S7
Slot 12	All ON	All ON	1,2,3,5,6,7	1,2,3,5,6,7	All OFF	3,4,5,7,8	All OFF
Master Port = 1200 baud, DCP/F protocol. Printer Port = 1200 baud, Printer protocol. Both ports = 1 stop bit, 8 word length, no parity.							

NOTE:
Level of alarms for MAT 16, point 3 must be "A", point 6 must be "B", and point 9 must be "C". All other points must be "D".

After switches are set, the MAP will require configuration. Connect a computer to C1 of the 46090 in slot 2 of shelf D, or to C7 of shelf C. Use the A22-46508 T/Shell practice for instructions. Master port is set for 1200 baud. Printer port is set for 1200 baud.

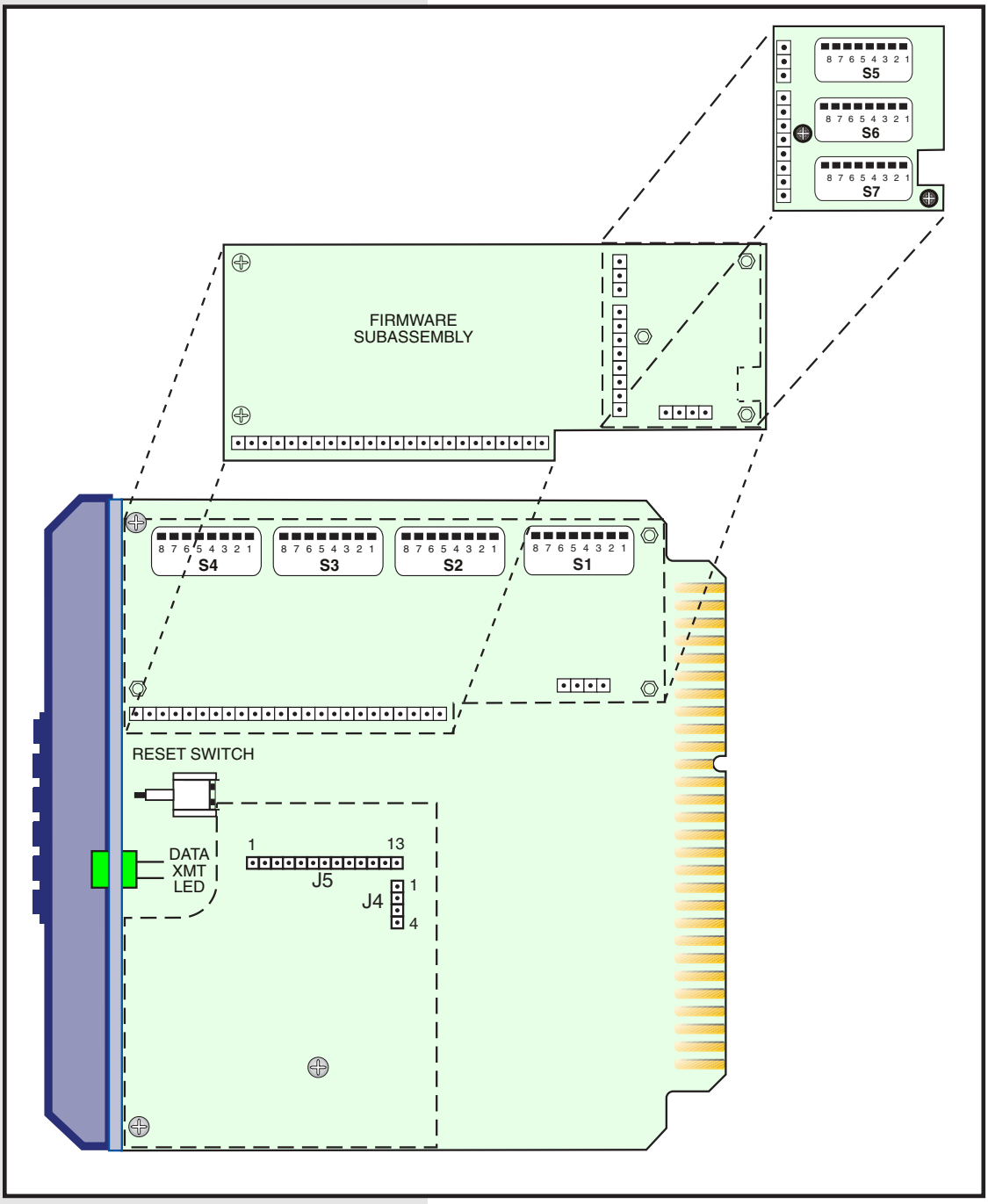
NOTE UPDATED

STEP 5B - B11-46020-00 MAP

Interpoll Delay is a feature of the 46020-40 Multiple Alarm Processor (MAP). Refer to the 46020-40 Installation and Operation Manual, *Printer Syntax* section. This command is used to configure the MAP to interrogate the Multi- Alarm Transmitters (MATs) through a large number of LSOs.

Using the MAP's printer port, set the IPD value to 128 (500ms). The command is **IPD 128**. This allows enough time for the MAP to poll a MAT and to receive that MATs response before polling the next MAT. Refer to the 46020-40 Manual, *Printer Syntax* section for more details on the use of this command.

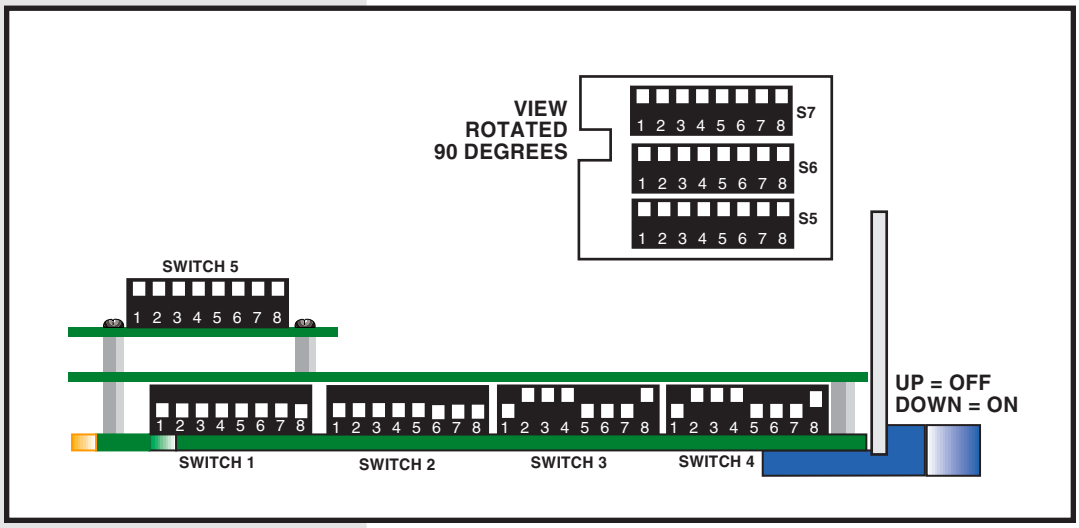
FIG. 8 - MAP SUBASSEMBLY LOCATIONS



STEP 5C - B11-46020-00 MAP

Refer to Step 9 and set the straps on the 49029 communication subassembly.

FIG. 9 - 46020 MAP VIEWED FROM THE TOP



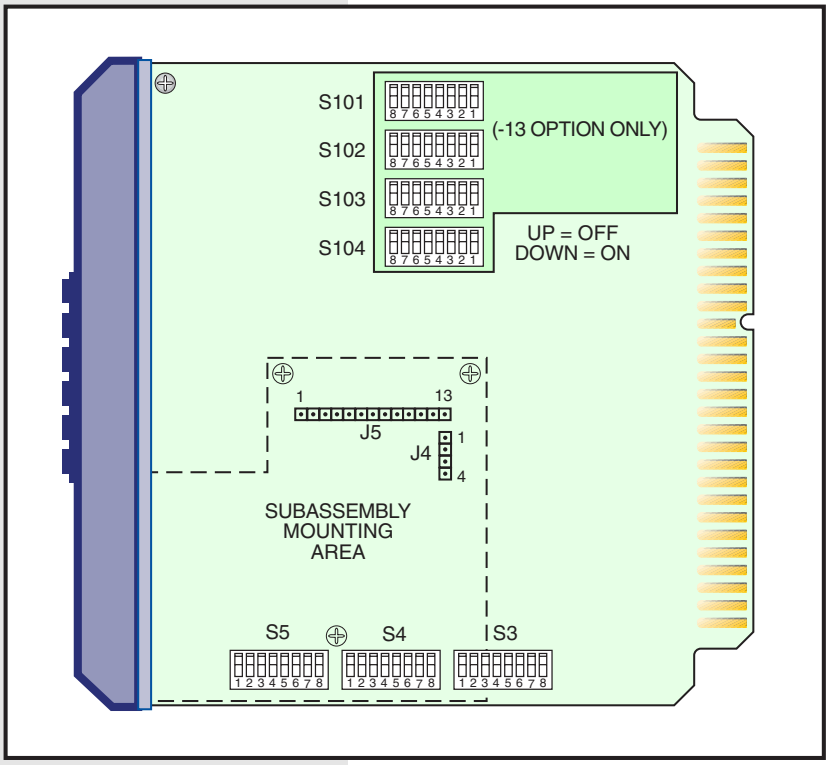
STEP 6 - 46010-13 MAT SWITCH SETTING

Refer to Figure 10 for switch locations. Set 46010 switches per the following table:

A11-46010-13 MAT SWITCH SETTGINS AT SERVICE NODE (LISTED SWITCHES ARE IN THE ON (DOWN) POSITION)							
Shelf 3	S3	S4	S5	S101	S102	S103	S104
Slot 13	1,3	1,3,5	1,5,6,7,8	3,6	All OFF	3	1

MAT will be set for address 16, 1200 baud, normal mode, input reversal for points 1-8. Alarm point 3 to operate A level relay, alarm point 6 to operate B level relay, and alarm point 9 to operate C level relay. All other alarms to operate level D relay.

FIG. 10 - MAT SWITCH LOCATIONS



STEP 7 - 46062 GPP SETTINGS

Master Port: RS-232, 1200 baud, TL1, TL1 mode by computer, memory hold on power-up or reset, no parity

Data Port: DCPF, 1200 baud, no parity, 1 stop bit,

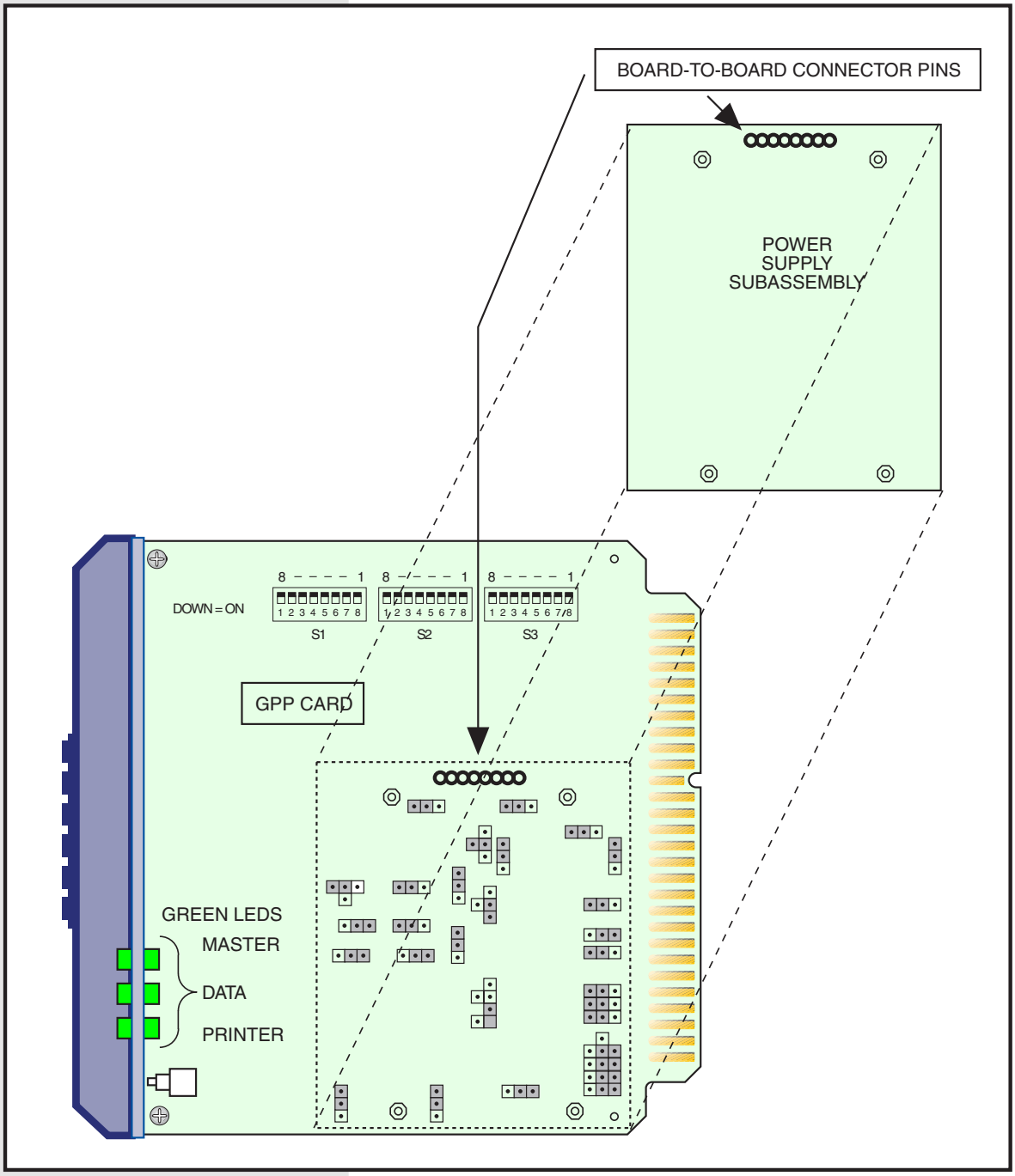
Printer Port: Printer syntax, 1200 baud, 1 stop bit, no parity

The GPP will require a download of the Operating software and the Database for the GPP. See 46504 T/Shell editor practice for instructions. Connect a computer that contains the T/Shell editor to C2 of the 46090 in slot 2, shelf D, or to C2D of the D shelf.

Refer to Fig. 11 for switch and strap locations. Set 46062 strap settings per following table:

A11-46062-22 GPP SETTINGS AT SERVICE NODE SWITCHES LISTED ARE IN THE ON (DOWN) POSITION			
Shelf D Slot 1	**S1** all on	**S2** all on	**S3** 1,2,3,4,5,6,7
Master Port jumpers = K3, CC2, DD1, L2, EE1, N1, M2 Data Port jumpers = C1, A1 GPP will be factory-set for RS-232 on all ports. Operating software and database is required to operate GPP.			

FIG. 11 - GPP SWITCH AND STRAP LOCATIONS



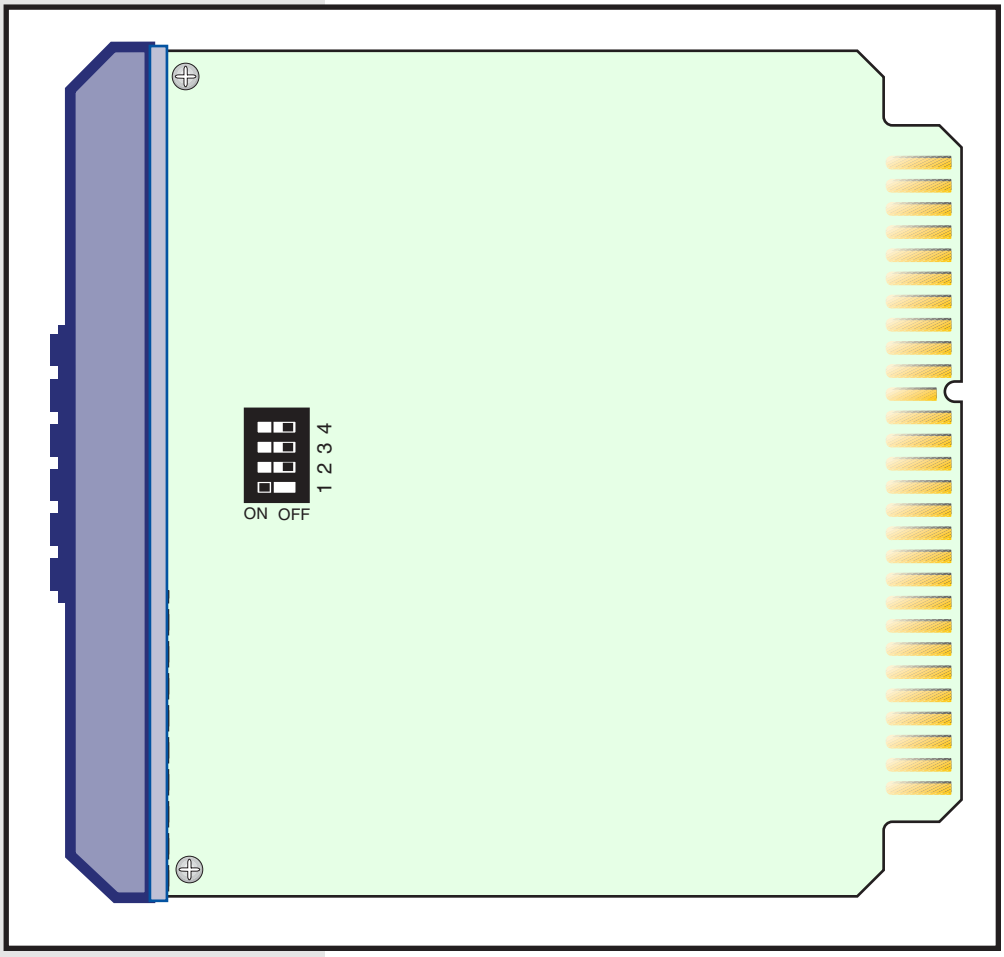
Step 8 - 46017 Switch Information

Refer to Figure 12 for switch locations. Set the 46017 switches per requirements. Times are not additive. Only one switch may be on at a time. Refer to the following table:

A11-46017-01 SWITCH OPTIONS SHELF D, SLOT 3				
TIME-OUT IN...	S1-1	S1-2	S1-3	S1-4
1 minute *	ON	OFF	OFF	OFF
4 minutes	OFF	ON	OFF	OFF
8 minutes	OFF	OFF	ON	OFF
16 minutes	OFF	OFF	OFF	ON
No time-out	OFF	OFF	OFF	OFF

*** Default setting**

Fig. 12 - 46017 Summary Alarm Module Switch Location

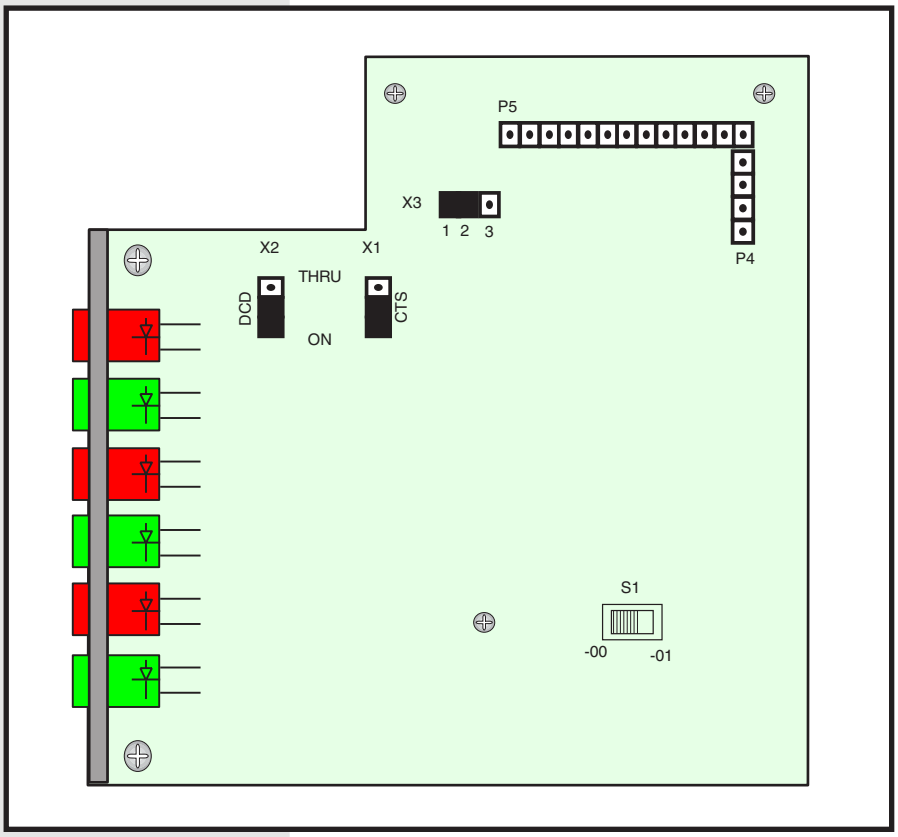


STEP 9 - 49029

Refer to Figure 13 for switch and strap locations. Set the 49029-00 switch settings per the table:

A11-49029-00 SWITCH OPTIONS	
OPTION	SWITCH OR STRAP SETTING
TXD, RXD, RTS, and DCD normal	S1 = 00 Mode
CTS not used for handshaking	X1 = ON
DCD not used for handshaking	X2 = ON
Parallel option not used	X3 = 1 & 2

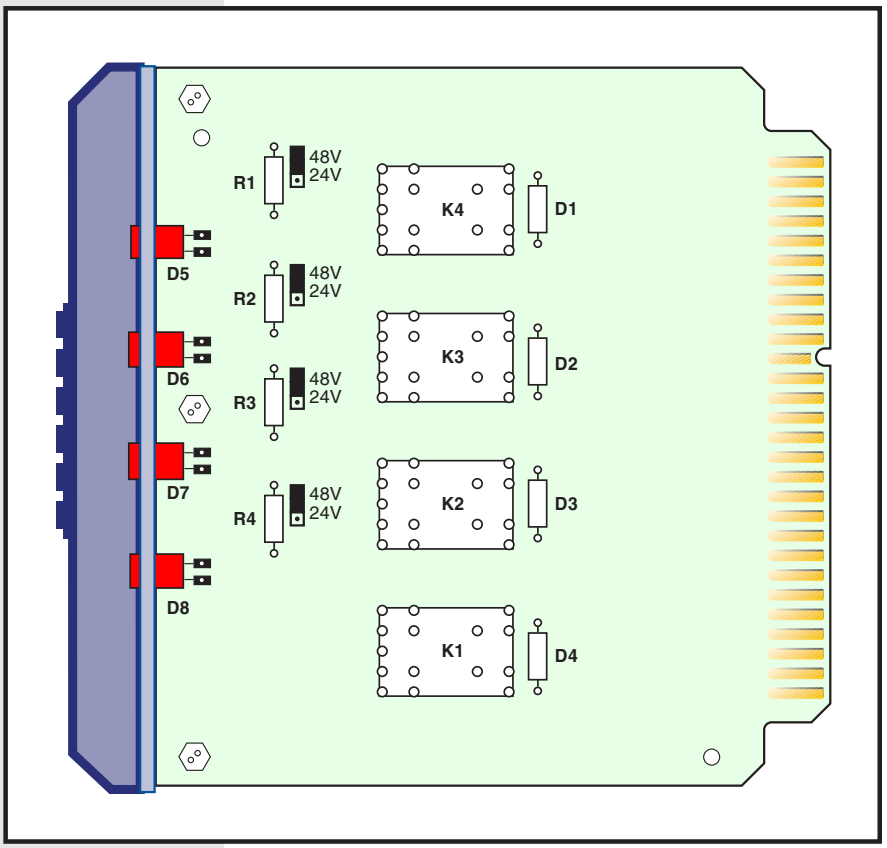
FIG. 13 - 49029 SWITCH AND STRAP OPTION LOCATIONS



STEP 10 - FUSE MODULE, CONNECTOR MODULE, RELAY MODULES

- The A11-48001-01 Fuse module requires no switch or strap settings.
- The A11-46090-01 requires no setting.
- The 44930 relay modules are set -48 VDC operation from the factory and no additional strapping is required. Refer to Figure 14.

FIG. 14 - STRAP OPTION LOCATIONS 44930-01 (SET FOR -48 VDC)



STEP 11 POWERING UP AND TESTING

A. On shelves A, B, and C connect the redundant battery supplies to barrier strip terminals 1 and 2, and connect ground to terminal 3.

B. Use the DB15 connector C1, of shelf A, to connect the assembly to the East port of the fiber optic equipment. Use connector C2 of shelf A to connect to the West port of the fiber equipment.

C. Insert all of the modules in the shelf, starting at slot 1 of shelf A. When a Fuse Module is installed in slot 14 of shelf A, B or C, power will be applied to that shelf. Inserting the fuse module in shelf C will also place power on shelf D. Shelf D fuse protection is controlled by fuse FA of shelf C.

D. When the units first power up the 46112 TX REPEAT LED will blink on and off at a one second rate. If the 46112 continues to flash, it is an indication that there is a wrong switch setting on a 46113 module.

E. Remove the fuse from the fuse module for Shelf A, slot 2 (Shelf A slot 14 fuse #2). MAT alarm point #2 should come on. After observing the failure on the MAT replace the fuse. This is the East DSM power supply monitor alarm.

NOTE:
For a detailed drawing of the 05720 system, refer to the Block and Level Drawing, located at the back of this manual.

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F. Remove the fuse from the fuse module for Shelf B, slot 2 (Shelf B slot 14 fuse #2). MAT alarm point #5 should come on. After observing the failure on the MAT replace the fuse. This is the West DSM power supply monitor alarm.

G. Remove a fuse from the fuse module and replace it with a blown fuse. Point 7 on the MAT should come on. This is the blown fuse alarm. The fuse module alarm LED should also come on. After observing the alarm condition, replace the fuse.

H. If any of the other alarm points are used for local alarms, they can be tested and the associated LED from the alarmed point can be observed at this time.

NOTE:

In the event of a failure, as well as during installation, the RX SYNC LED is an important indication of the soundness of the 64KB side of the DSM system. This LED appears as either on or off if there is no synchro-nization signal detected.

When the 46112 DSM receives a good synchronization signal the RX SYNC LED appears to turn on solid. A closer exami-nation however, reveals that the LED is actually alternating on and off at a very high rate. The LED appears to "flicker" slightly.

I. The synch light on the associated 46112 DSM will come on when the assembly is connected to the 64Kb channel and it is receiving framed data from the other end of the 64Kb channel.

J. If the synch lights do not come on after connection to known good 64Kb fiber optics channels, the associated synch alarms on the MAT will be on indicating a synch failure. Point 1 is for an East synch failure and point 4 is for a West synch failure. Recheck the connections to the fiber terminals to make sure that the connection between the DSMs and the fiber terminals are correct. Verify that the connecting DB-15 cable is straight with no nulls in it. Verify that the associated DSM at the other end of the link is attached to its fiber terminal. Alarm point 3 will also be on if there is no complete continuity around the system from the West to the East and point 6 will be on if there is no continuity from East to West.

K. After the synch lights come on, use a null modem and connect an ASCII device such as a notebook computer to the desired port for the chosen LSO to be tested. Use a terminal mode, such as the one in the T/Shell editor. When the user operates the key board, one RX LED and two TX LEDs, on the appropriate 46034, should turn on. These LEDs should turn on and off following the keyed information. The TX LED on the associated active 46113 modules should also follow the keyed inputs. See table 1 of A18-05721-XX drawing for port assignments. Set the terminal mode for 1200 baud, a word length of 8, no parity, and 1 stop bit. Key in TL1 commands for the attached TL1 device. A "COMPLD" message indicates successful communication. Check all active ports. After verifying that all ports are good, the ports can be connected to the inputs for the Datakit.

L. Using a null modem, connect the notebook computer to C1 on the D shelf. The baud rate is 1200 baud from the factory. Create local alarms on the MAT and observe the TL1 messages on the GPP.

M. Step M and N require that the ring be up in both directions to all sites. If the ring is not up in both directions, MAT points 3, 6 and 9 will be on and all of the transfer relays will be energized. (If point 3 is on, there is a failure in the West to the East direction.) Disconnect the East receive fiber from the fiber optics terminal. MAT point 3, level A on the MAT, and relay modules 12A and 13A will energize. (Observe LEDs on relay modules.) Connect the notebook

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computer to one of the LSO ports. Do a command for the LSO location and receive the COMPLD message. This is the check for the self-healing of the system for a East to West failure.

N. Reconnect the East Receive fiber and disconnect the West receive fiber. MAT alarm Point 3 clears. Points 6 and 9 on the MAT module (Shelf C Slot 13), relay B on the MAT, and relay modules 10A and 11A will all come on or energize. Do a command for a LSO and receive the COMPLD message. This is the check for the self-healing of the system for a West to East failure.

O. Restore the fiber equipment. All alarms on the local MAT turn off. At a LSO location, completely shut down the East or West terminal by removing the receive and transmit fibers in one direction or one of the connections from he fiber terminal to the DSM assembly. At the Service Node, MAT alarm points 3, 6 and 9 will operate as well as relay modules 10A through 13A, and 10B through 13B. (Points 1 or 4 will also turn on if the LSO is the first one from the Service Node). Check the communications to each LSO on either side of the LSO that you put in failure, by sending a TL1 command to every LSO. After checking that the system is working, restore the LSO that had been placed in the failure mode. This is a check for self-healing on a complete failure in both directions at a given location.

P. The 46017 will put out an audible alarm signal whenever there is a MAT alarm at any location. Disable the audible device with the lower ACO switch on the module.

Q. After all ports have been checked out and the connectons are made to the transport channels, (such as Datakit or Dantel's 46095 X.25 module), have the Alarm Center issue commands to every LSO.

R. This completes the testing procedure.

SUPPORT DOCUMENTATION

The A18-05721-XX Digital Service Multiplexor Shelf - Service Node Location is made up of individual Dantel modules. Each of these modules has a unique Installation & Operation Manual (practice) detailing the operation of that module. This is a list of those individual practices.

Support Documents

1. 46112 DSM Controller Module
2. 46113 DSM Port Module
3. 46034 Hubbing Module
4. 44930-00 Relay Module
5. 46010 Multiple Alarm Transmitter
6. 48001 Fuse Module
7. 46062-22 General Purpose Processor
8. 46020-40 Multi Alarm Processor
9. 46017-01 Summary Audible Alarm Module
10. 46090-01 Connector Module
11. 46504 GPP T/Shell Editor
12. 46508 MAP -40 T/Shell Editor
13. 49029 RS232 Current Loop Interface Subassemby
14. A18-05721-XX Block and Level Drawing

WARRANTY

LIMITED WARRANTY

The Seller warrants that the standard hardware products sold will be free from defects in material and workmanship and perform to the Seller's applicable published specifications for a period of 18 months for hardware, and 3 months for software, from the date of the original invoice. The liability of the Seller hereunder shall be limited to replacing or repairing, at its option, any defective products which are returned F.O.B. to the Seller's plant, (or, at the Seller's option, refunding the purchase price of such products). In no case are products to be returned without first obtaining permission and a customer return authorization number from the Seller. In no event shall the Seller be liable for any consequential or incidental damages.

Equipment or parts which have been subject to abuse, misuse, accident, alteration, neglect, unauthorized repair or installation are not covered by warranty. The Seller shall make the final determination as to the existence and cause of any alleged defect. No warranty is made with respect to custom equipment or products produced to the Buyer's specifications except as specifically stated in writing by the Seller in the contract for such custom equipment.

This warranty is the only warranty made by the Seller with respect to the goods delivered hereunder, and may be modified or amended only by a written instrument signed by a duly authorized officer of the Seller and accepted by the Buyer.

Warranty and remedies on products not manufactured by the Seller are in accordance with warranty of the respective manufacturer. THE SELLER MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED; AND ALL IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEEDS THE AFORESAID OBLIGATIONS IS HEREBY DISCLAIMED BY THE SELLER.

IN CASE OF DIFFICULTY

If you experience difficulty with this equipment, check the following, as appropriate:

1. **Switch settings**
2. **Signal levels**
3. **Software configuration**
4. **Connections between Dantel's equipment and your equipment.**

If there is still a problem, substitute equipment that is known to be good. For additional assistance, call Dantel's Technical Field Service Department weekdays, 6 A.M. to 5 P.M. pacific time:

1-800-4DANTEL (1-800-432-6835).

If a thorough checkout shows a piece of equipment has malfunctioned, you may return it to the factory. For repairs and emergency replacements, obtain a Return Material Authorization (RMA) number from the Customer Service Representative at **1-800-4DANTEL** (1-800-432-6835).

To ensure expedient processing of your order, provide a purchase order number and shipping and billing information when requesting an RMA number. Also, when the units are returned to Dantel, include a description of the failure symptoms for each unit returned. Send defective equipment to:

Dantel, Inc. • 2991 North Argyle Avenue • Fresno, California 93727-1388