

***MCN Monitoring and Control Network
Comparator Display System***

***TSAM Interface Module
TIB
Hardware Reference Manual***

S2-60469-100

E/I Products Inc. 

FCC Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

DOC Statement

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Computer Software Copyrights

This manual describes products which include copyrighted CTI Products, Inc. computer programs in semiconductor memory. CTI Products, Inc. reserves all rights for these programs, including the exclusive right to copy or reproduce the copyrighted computer programs in any form. No copyrighted computer program contained in products described in this manual may be copied, reproduced, decompiled, disassembled, or reversed engineered in any manner without express written permission of CTI Products, Inc. The purchase of products from CTI Products, Inc. shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license under the copyrights, patents, or patent applications of CTI Products, Inc., except for the normal non-exclusive, royalty fee license to use that arises by operation of law in the sale of the product.

Information contained in this document is subject to change without notice and does not represent a commitment on the part of CTI Products, Inc.

No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, for any purpose without the written permission of CTI Products, Inc.

Copyright 1995, CTI Products, Inc. All rights reserved.

MCN is a trademark of CTI Products, Inc. Other trademarks referenced are properties of their respective owners.



TIB Hardware Reference CTI Products, Inc.

Standard Limited Hardware Warranty

LIMITED WARRANTY. Equipment manufactured by CTI Products, Inc. is warranted to be free from defects in material and workmanship for a period of ONE (1) YEAR from date of shipment to original purchaser. Under this warranty, our obligation is limited to repairing or replacing any equipment proved to be defective by our inspection within one year of sale to the original purchaser. This warranty shall not apply to equipment which has been repaired outside our plant in any way, so as to, in the judgment of CTI Products, Inc. affect its stability or reliability, nor which has been operated in a manner exceeding its specifications, nor which has been altered, defaced, or damaged by lightning.

CUSTOMER REMEDIES. In the event of a defect, malfunction, or failure to conform to specifications established by the seller during the period shown, the customer shall call CTI Products, Inc. to obtain a Return Authorization Number and return the product or module, shipping and insurance prepaid. CTI Products, Inc., will then at its option, either repair or replace the product or module and return it, shipping prepaid, or refund the purchase price thereof. On-site labor at the purchaser's location is not included in this warranty.

EQUIPMENT NOT MANUFACTURED BY CTI Products, Inc. Equipment not manufactured by CTI Products, Inc. is excluded from this warranty, but is subject to the warranty provided by its manufacturer, a copy of which will be supplied to you upon specific written request.

NO OTHER WARRANTIES. The foregoing constitutes the sole and exclusive remedy of the buyer and exclusive liability of CTI Products, Inc., AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESSED OR IMPLIED OR STATUTORY AS TO MERCHANTABILITY, FITNESS FOR PURPOSE SOLD, DESCRIPTION, QUALITY, PRODUCTIVENESS OR ANY OTHER MATTER.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES. WITHOUT LIMITING THE FOREGOING, IN NO EVENT SHALL CTI PRODUCTS, INC. OR ITS SUPPLIERS BE LIABLE FOR ANY DAMAGES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, OR OTHER PECUNIARY LOSS) ARISING OUT OF THE USE OF OR INABILITY TO USE CTI PRODUCTS, INC. EQUIPMENT BY PURCHASER OR OTHER THIRD PARTY, WHETHER UNDER THEORY OF CONTRACT, TORT (INCLUDING NEGLIGENCE), INDEMNITY, PRODUCT LIABILITY OR OTHERWISE, EVEN IF CTI PRODUCTS, INC. HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR LOSSES. IN NO EVENT SHALL CTI PRODUCTS, INC.'S, LIABILITY EXCEED THE TOTAL AMOUNT PAID BY PURCHASER FOR THE EQUIPMENT GIVING RISE TO SUCH LIABILITY

CTI Products, Inc.
1211 W. Sharon Rd.
Cincinnati, OH 45240

If you have questions about the MCN comparator display system, call us at:
(513) 595-5900. (8:30 to 5:00 Eastern)

1. INTRODUCTION.....	1
1.1 REFERENCE DOCUMENTS	1
2. SPECIFICATIONS.....	2
3. THEORY OF OPERATION.....	4
3.1 ASSOCIATING A TIB WITH A COMPARATOR I/O MODULE	4
3.2 TRANSMITTER STATUS	4
3.3 CONTROLLING THE TRANSMITTER.....	4
3.4 RECEIVER BANKS	5
4. OPTION SWITCHES.....	6
5. CONNECTORS.....	9
6. MOUNTING.....	12
7. SPECIAL INSTALLATION INSTRUCTIONS	13
7.1 UNIT ADDRESS SETTING.....	13
8. WIRING A TIB TO A TSAM.....	15
8.1 FORCE SELECT OUT CONNECTIONS	15
9. SYSTEM EXAMPLES	16
9.1 BASIC SYSTEM OPERATION	16
9.2 MULTIPLE TIB/TSAM SYSTEM EXAMPLE	17
10. TROUBLESHOOTING	19

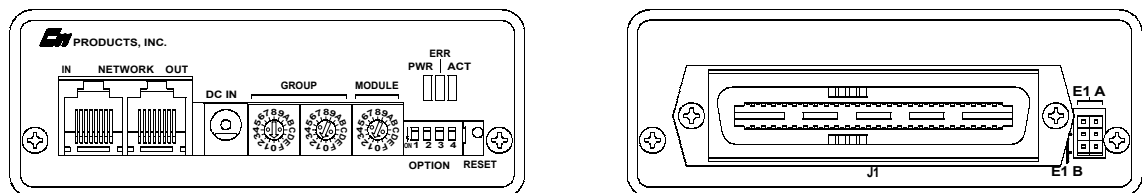
1. Introduction

The TSAM Interface Module (TIB) is a member of the Monitoring and Control Network (MCN™) family of auxiliary modules. Hardware specifications, special installation, and configuration information are described in this manual.

The TIB module is a control module that interfaces between a CIB module and CTI Product's Transmitter Steering Audio Matrix (TSAM). This interface provides monitor and control of transmitter sites from a PC with a HIB as the Operator Interface Module. The CIB is the only Comparator I/O Module that operates with the TIB and the HIB is the only User Interface Module that operates with a TIB.

The TIB is used in systems that have multiple transmitters, with each transmitter associated with one or more receivers and that use the TSAM to provide steering for the transmitter sites. The TIB will translate a FORCE VOTE command for a particular receiver into a FORCE TX command that commands the TSAM to steer to the transmitter associated with the receiver being FORCE VOTED. The TIB can also monitor the TSAM for the active transmitter site for display on a PC.

NOTE: See reference 3 for a description of TSAM operation.



CA-80023-100

Figure 1 - TIB Front and Rear View

1.1 Reference Documents

1. Monitoring and Control Network System Manual
Part Number S2-60425
2. Comparator I/O Module (CIB) Hardware Reference Manual
Part Number S2-60426
3. Transmitter Steering Audio Matrix Installation & Maintenance Manual
Part Number S2-60447

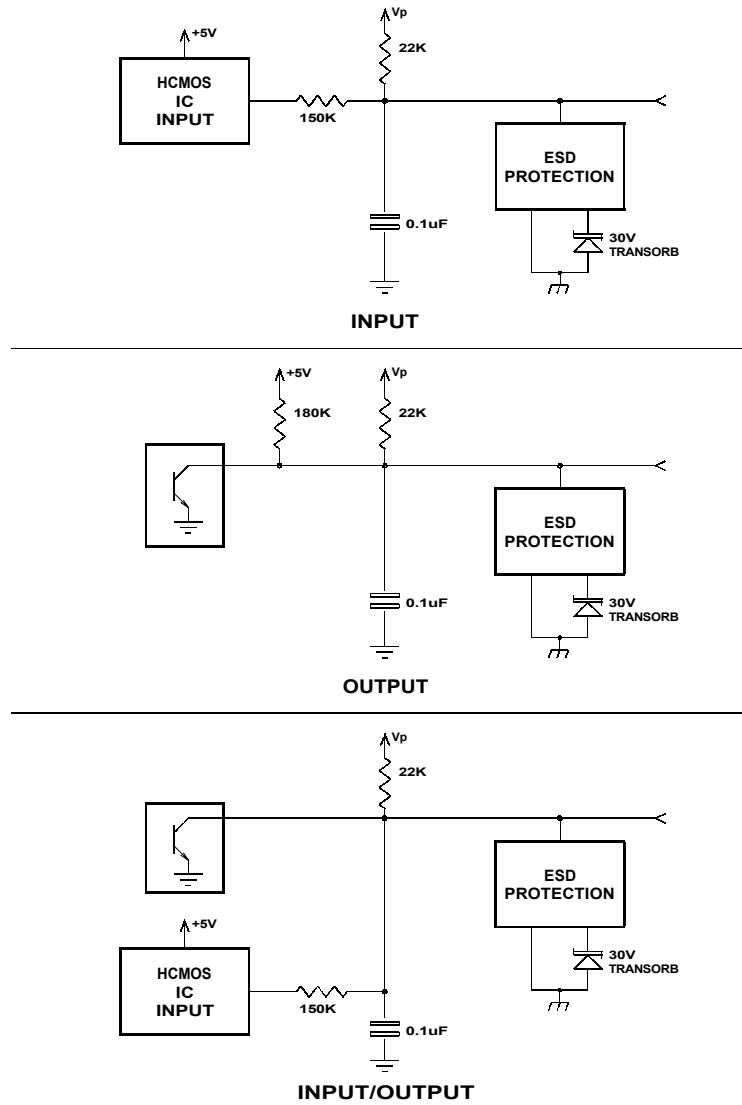
2. Specifications

Size	5.5" x 4.2" x 1.5" (140 x 107 x 38 mm)
Weight	16 oz (455 gm)
Temperature	0 - 50 °C
Humidity	10 - 95% non-condensing
Module Power	10 - 32 Vdc / 2 Watts max.
Number of Transmitters Supported	8
Open Circuit Voltage (all I/O pins) jumper E1B removed jumper E1B installed	+13.8 Vdc nominal +5 Vdc nominal
Inputs per Transmitter active low, pull-up to +5 or +13.8 Vdc	Tx Select In
Input Voltage (Input and In/Out pins)	-0.6 to 30 Vdc max
Input Current (Input and In/Out pins): jumper E1B removed (Vin = 0 Vdc) jumper E1B installed (Vin = 0 Vdc)	-720 µA max (source) -270 µA max (source)
Outputs per Transmitter (active low)	Tx Select Out
Control Outputs (active low)	Force Select
Output Saturation Voltage (Outputs and In/Out pins) with Iout = 100 mA	550 mV max.
Output Pin Current (Outputs and In/Out pins)	150 mA max per pin (sink) 100 mA max per pin if all output are ON
Maximum Power Dissipation	2 Watts
Input/Output Connection	50 pin Telco style
Network Connector	(2) RJ-45 (1 in, 1 out)
Safety Approvals	UL 1950 CSA 1950 EN 60950-1992
Emissions Compliance	FCC Part 15, Class A DOC Class A EN55022
Susceptibility Compliance	IEC 801-2 IEC 801-3 IEC 801-4 EN50082-1

Table 1 - Module Specifications

Figure 2 shows the equivalent circuits of the TIB I/O pins. The pull-up voltage V_p by jumper E1B, located on the rear of the module.

- $V_p = 13.8 \text{ Vdc}$ with jumper E1B out
- $V_p = 5.0 \text{ Vdc}$ with jumper E1B in

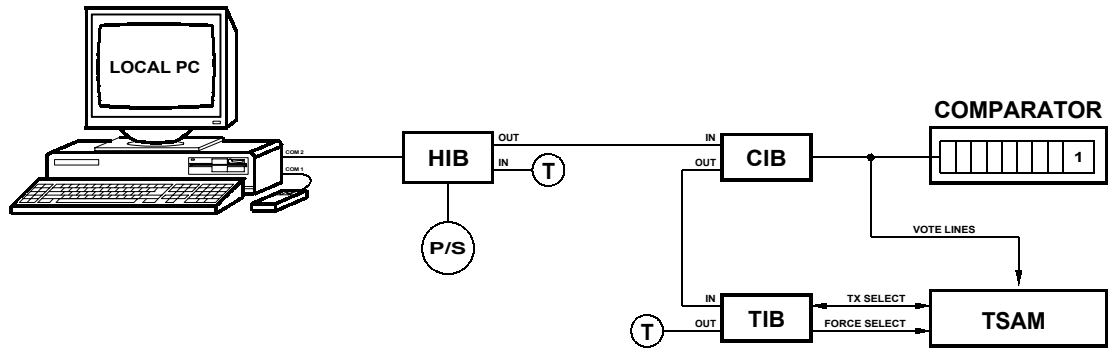


CA-80043-100

Figure 2 - I/O Equivalent Circuit

3. Theory of Operation

This section describes the operation of the TIB module in an MCN comparator display system.



CA-80119-100

Figure 3 - Basic System Configuration

3.1 Associating a TIB with a Comparator I/O Module

When installing a system, you need to configure the TIB with the address of the CIB it will be operating with. Section 7.1 describes how to enter this extra address. By having the address of the CIB, the TIB knows which receivers are associated with its transmitters.

3.2 Transmitter Status

The TIB monitors the TSAM's 8 Tx Select lines to determine which transmitter is currently active. Whenever the TSAM steers to a transmitter, the TSAM updates the Tx Select lines to indicate the currently active transmitter. The TIB sends the status information to a HIB over the MCN network so that the transmitter status can be displayed on the PC.

3.3 Controlling the Transmitter

When a receiver is FORCE VOTED from the PC, the HIB sends a FORCE VOTE command to the CIB, the TIB that is associated with that CIB also receives the command and activates the Tx Select line for the specified receiver/transmitter. The TIB then activates the Force Select output line for approximately 100 milliseconds. After this 100 milliseconds, the Tx Select lines and the Force Select line are deactivated so that the TIB can resume monitoring the transmitter status.

3.4 Receiver Banks

If the Comparator I/O Module that is associated with a TIB supports more than 8 receivers (it divides its receivers into multiple banks, as specified in the *Receiver Banks* section of reference 1), then the TIB must be configured so that its transmitters are associated with the proper receiver bank of the Comparator I/O Module. This is done by setting the receiver bank selector switches (see section 4 for switch settings) on the TIB. Setting these switches configures the TIB's 8 transmitters to correspond to the 8 receivers of the selected bank.

Because the CIB is the only Comparator I/O module the TIB operates with, the TIB's receiver bank selector switches must be set to bank 0.

4. Option Switches

Three sets of option switches are provided for module configuration. The module must be power cycled or reset after these switches are set so that the options will take effect. Table 2 describes the option switches and shows the factory defaults.

SWITCH	DESCRIPTION	DEFAULT
GROUP	unit address setting (00-FE) refer to the MCN System Manual	00
MODULE	unit address setting (0-F) refer to the MCN System Manual	0
OPTION position 1	receiver bank selector 1 (see Table 3)	DOWN
position 2	receiver bank selector 2 (see Table 3)	DOWN
position 3	receiver bank selector 3 (see Table 3)	DOWN
position 4	unit address selector	DOWN

Table 2 - TIB Option Switches

The Group and Module selector switches are used to set the node address during module installation. Refer to the Monitor and Control Network System Manual for details about setting these switches.

The unit address selector switch (OPTION switch position 4) is only used at installation time. Refer to section 7, *Special Installation Instructions*, for a description of this switch. For normal operation, this switch must be in the DOWN position.

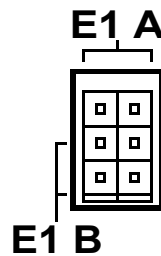
A TIB can monitor 8 receivers (one receiver bank) for FORCE VOTE information. Option switches 1 through 3 allow the TIB to associate its 8 transmitters with any receiver bank supported by the Comparator I/O Module. The settings for these switches is shown in Table 3.

Bank	Option Switch Position			Receiver Numbers
	1	2	3	
0 *	DOWN	DOWN	DOWN	1 through 8
1	UP	DOWN	DOWN	9 through 16
2	DOWN	UP	DOWN	17 through 24
3	UP	UP	DOWN	25 through 32
4	DOWN	DOWN	UP	33 through 40
5	UP	DOWN	UP	41 through 48
6	DOWN	UP	UP	49 through 56
7	UP	UP	UP	57 through 64

Table 3 - Receiver Bank Selectors

* This is the required setting when operating with a CIB.

Figure 4 shows the configuration of the two jumper options available on the rear of the TIB. These jumpers should be installed at system installation time with power removed from the TIB.



CA-80024-100

Figure 4 - Jumper Options

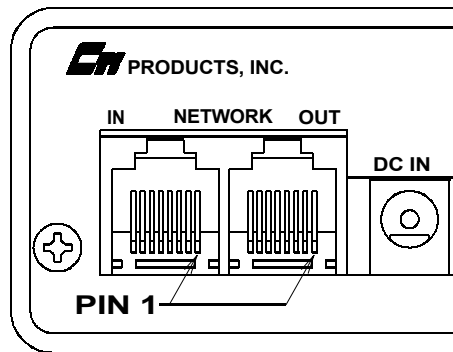
Jumper E1A is located across the top 2 terminals of the 6 pin terminal block.
Jumper E1B is located across the left side middle and bottom terminals of the 6 pin terminal block. The remaining 2 terminals of the block are unused.

Jumper	Function	Default
E1A	Reserved	IN
E1B	In for inputs pulled up to +5 Vdc. Out for inputs pulled up to +13.8 Vdc.	OUT

Figure 5 - Jumper Options Description

5. Connectors

The **NETWORK IN/OUT** ports on the front of the TIB are used to connect the TIB with other MCN modules. These ports carry both the network data signals as well as DC power for power distribution with other modules. Table 4 gives the pinout for these connectors. Figure 6 shows the location of pin 1 for each port.



CA-80068-100

Figure 6 - Network IN/OUT Ports

Pin	Function
1	DATA +
2	DATA -
3	+ POWER
4	No Connect
5	No Connect
6	- POWER
7	- POWER
8	+ POWER

Table 4 - Network Connector Pinout

The **DC IN** port provides the primary power connection to the module. Power is distributed through the **NETWORK OUT** connector to provide power to the **NETWORK IN** connector of the MCN unit it is connected to. Each power supply can power up to four units total. See reference 1 for complete details of connections to the network and DC IN connectors.

Connector J1 provides the discrete I/O for the TSAM interface. Table 6 gives the pinout for this connector. Table 5 describes the functions of the I/O signals.

Signal	Direction	Description
TX Select Out	Input/Output	Activated to select the transmitter to steer to. This signal is used as an Output only.
Tx Select In	Input	Ground input to indicate the active transmitter(s).
Force Select	Output	Activated to force TSAM to steer to the selected transmitter.

Table 5 - I/O Signal Descriptions

TIB J1	Function	Direction
26	unused	No Connect
1	Ground	
27	unused	No Connect
2	unused	No Connect
28	Tx Select 8 Out	Input/Output
3	Tx Select 7 Out	Input/Output
29	Tx Select 8 In	Input
4	Tx Select 7 In	Input
30	unused	No Connect
5	unused	No Connect
31	unused	No Connect
6	unused	No Connect
32	unused	No Connect
7	unused	No Connect
33	unused	No Connect
8	unused	No Connect
34	Tx Select 6 Out	Input/Output
9	Tx Select 5 Out	Input/Output
35	Tx Select 6 In	Input
10	Tx Select 5 In	Input
36	unused	No Connect
11	unused	No Connect
37	unused	No Connect
12	unused	No Connect
38	unused	No Connect
13	unused	No Connect
39	unused	No Connect
14	unused	No Connect
40	Tx Select 4 Out	Input/Output
15	Tx Select 3 Out	Input/Output
41	Tx Select 4 In	Input
16	Tx Select 3 In	Input
42	unused	No Connect
17	unused	No Connect
43	unused	No Connect
18	unused	No Connect
44	unused	No Connect
19	Force Select	Output
45	unused	No Connect
20	unused	No Connect
46	Tx Select 2 Out	Input/Output
21	Tx Select 1 Out	Input/Output
47	Tx Select 2 In	Input
22	Tx Select 1 In	Input
48	unused	No Connect
23	unused	No Connect
49	unused	No Connect
24	unused	No Connect
50	unused	No Connect
25	unused	No Connect

Table 6 - TIB Connector J1 Pinout

6. Mounting

Refer the reference 1, section *Mounting Options*, for details about mounting the TIB module.

CAUTION

Make sure that any mounting screws used to secure unit to a bracket do not protrude into the unit's enclosure more than 1/8 inches from the bottom surface of the unit.

Using a larger screw that touches the PC board inside the unit may damage the unit when it is powered. Doing so will void the unit's warranty.

7. Special Installation Instructions

7.1 Unit Address Setting

A TIB must be programmed with two unit addresses:

1. the address of the CIB it will operate with
2. the TIB's own address

You only need to perform this programming once, at installation time. These addresses are stored in non-volatile memory so the only reason that you would have to repeat this step is if you changed the unit address of the CIB or if you replaced the TIB module.

Before programming the address information into the TIB, determine the unit addresses of all the MCN modules in the system, following the guidelines in the *Address Planning* section of the Monitoring and Control Network System Manual (reference 1).

Valid ranges for the Group and Module switches are:

- Group number = 00 through FE
- Module number = 0 through F

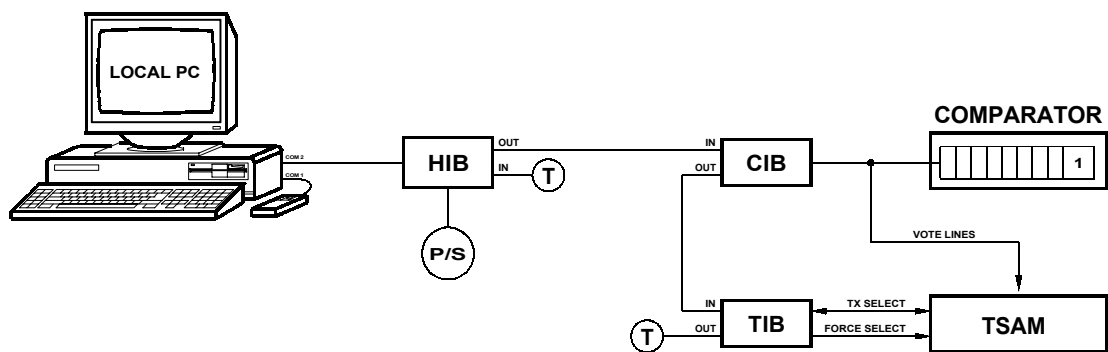
The steps for programming the unit address of the CIB are:

Step	Action
1	Determine the unit addresses of all the MCN modules in the system.
2	Apply power to the TIB.
3	Place OPTION switch 4 in the UP position.
4	Set the Group and Module switches to the unit address of the CIB (from step 1) that this TIB will operate with.
5	Press the RESET button on the TIB.
6	The ERR LED will turn on and remain on.
7	Place OPTION switch 4 in the DOWN position.
8	Set the Group and Module switches to the unit address of this TIB (its own address from step 1).
9	Press the RESET button on the TIB.
10	The ERR LED will turn on momentarily and then turn off.

For example, Figure 7 shows a system with a single TIB and CIB. The following steps show how the system might be setup, using the following address assignments:

- CIB address is Group 00, Module 0
- TIB address is Group 01, Module 0
- HIB address is Group 80, Module 0 (this is set using the MCNCFG program running on the Local PC)

Step	Action
1	Connect the module's NETWORK IN and OUT ports as shown in the diagram.
2	Power on the modules.
3	On the CIB, set the Group switch to 00 and the Module switch to 0.
4	Reset the CIB.
5	On the TIB, place OPTION switch 4 in the UP position.
6	On the TIB, set the Group switch to 00 and the Module switch to 0. This is the address of the CIB it will work with.
7	On the TIB, set the transmitter bank selector switches to bank 0.
7	Press the RESET button on the TIB.
8	The TIB's ERR LED will turn on and remain on.
9	On the TIB, place OPTION switch 4 in the DOWN position.
10	On the TIB, set the Group switch to 01 and the Module switch to 0. This is the TIB's own address.
11	Press the RESET button on the TIB.
12	The ERR LED will turn on momentarily and then turn off.



CA-80119-100

Figure 7 - Unit Address Programming Example

8. Wiring a TIB to a TSAM

Table 7 provides the wiring list to connect a TIB module to a TSAM.

TIB Pin #	Description	TSAM Pin #
21	tx select 1 out >	11
46	tx select 2 out >	37
15	tx select 3 out >	12
40	tx select 4 out >	38
9	tx select 5 out >	13
34	tx select 6 out >	39
3	tx select 7 out >	14
28	tx select 8 out >	40
22	tx select 1 in <	11
47	tx select 2 in <	37
16	tx select 3 in <	12
41	tx select 4 in <	38
10	tx select 5 in <	13
35	tx select 6 in <	39
4	tx select 7 in <	14
29	tx select 8 in <	40
19	force select out >	28
1	ground	36

Table 7 - TIB <--> TSAM Connections

8.1 Force Select Out Connections

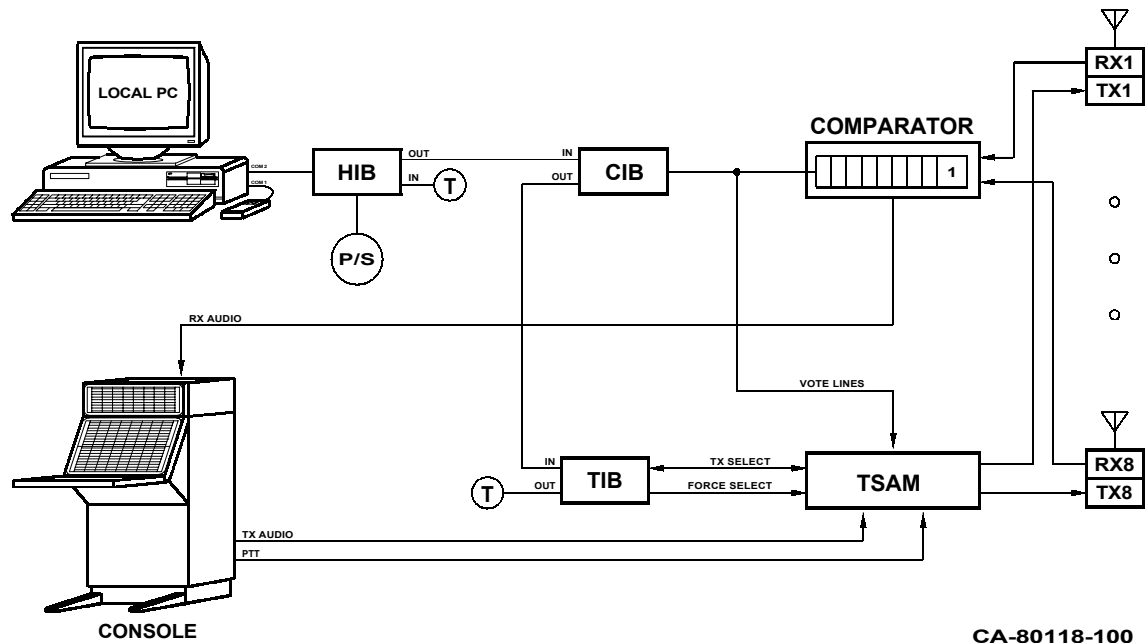
The Force Select Out pin of the TIB (pin 19) must be connected to the Force Select In of the TSAM (pin 28) in a system with one TSAM per communication channel.

If a system has multiple TSAMs on a communication channel (the TSAMs, are connected together through the P103 expansion bus), the Force Select Out pins (pin 19) of all the TIBs on that channel must be wired together and connected to the Force Select pin (pin 28) of the MASTER TSAM.

9. System Examples

9.1 Basic System Operation

Figure 8 shows an example system using the TIB module and a TSAM.



CA-80118-100

Figure 8 - TIB System Example

For the system shown in the figure, note the following:

- The system receivers are connected to the comparator
- The system transmitters are connected to the TSAM
- The comparator's vote lines are connected to the CIB and to the TSAM (this allows the TSAM to steer based on receiver activity and comparator voting)

Assume initially that all receivers are inactive and the TSAM is programmed for Instant Update mode (the TSAM will steer as soon as a vote occurs). When receiver 8 becomes active, the comparator will vote receiver 8, activating the receiver 8 vote output. The TSAM sees this vote change, since it is monitoring the comparator's vote outputs, and steers to transmitter 8 (since it is programmed for Instant Update mode). The TSAM updates the Tx Select lines to indicate that transmitter 8 is active. The TIB detects the change on these lines and sends a message to the MCN modules indicating that transmitter 8 is the currently active transmitter. The HIB receives this steered transmitter information and updates the PC's receiver 8 display information to show that it is the active transmitter. The CIB will also detect the receiver 8 vote status and generate a VOTE message to the HIB. Thus, the HIB will receive status messages indicating that receiver 8 is

voted and that transmitter 8 is active. Both of these states will be shown on the operator's PC.

To force the TSAM to steer to transmitter 1, the operator will generate a FORCE VOTE for receiver 1. The TIB will receive this FORCE VOTE for receiver 1 and setup the Tx Select lines for transmitter 1 and the Force Select line. When the TIB activates the Force Select line to the TSAM, the TSAM will immediately steer to transmitter 1. The FORCE VOTE for receiver 1 will also cause the CIB to generate a FORCE VOTE command to the comparator.

9.2 Multiple TIB/TSAM System Example

Figure 9 shows an example system that has 16 receivers and transmitters on the same communication channel. Therefore, 2 TIBs and 2 TSAMs are required because each only supports 8 transmitters. In Figure 9, the console audio connections were omitted to keep the diagram simple. Normally the console audio paths would be connected the same as shown in Figure 8.

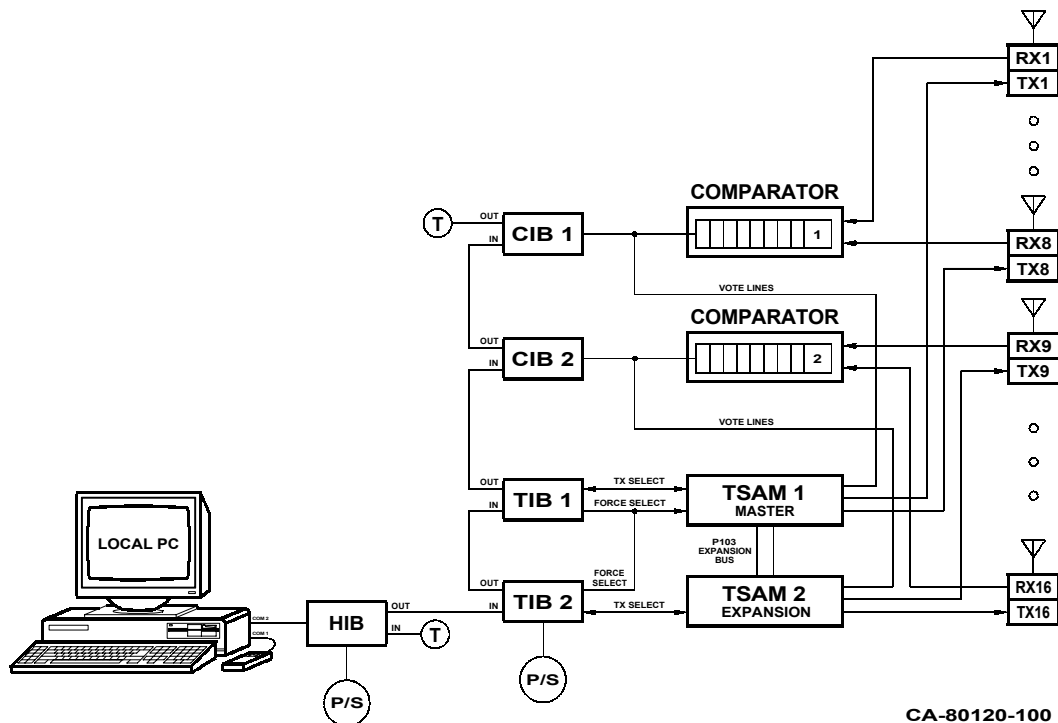


Figure 9 - Multiple TIB/TSAM Example

For the system shown in the figure, note the following:

- Comparator 1 and TSAM 1 control receivers 1 through 8 and transmitters 1 through 8 respectively.
- Comparator 2 and TSAM 2 control receivers 9 through 16 and transmitters 9 through 16 respectively.

- Because all of the receivers and transmitters are on the same communication channel, TSAM 1 and TSAM 2 are connected together through their P103 expansion ports.
- The system transmitters are connected to the TSAMs. Transmitters 1 through 8 are connected to TSAM 1 and transmitters 9 through 16 are connected to TSAM 2.
- TIB 2's Force Select line is connected to TIB 1's Force Select line, not to TSAM 2's Force Select line.
- The comparator's vote lines are connected to the Comparator I/O Modules and to the TSAMs (this allows the TSAM to steer based on receiver activity and comparator voting).
- Assume the TSAMs are programmed for Instant Update mode (the TSAM will steer as soon as a vote occurs).

During system installation, the following setups must be performed:

- TSAM 1 is setup as a MASTER (from the front panel switches).
- TSAM 1 is programmed for 1 expansion TSAM (from its RS-232 programming port).
- TSAM 2 is setup as an EXPANSION (from the front panel switches).
- TIB 1 is programmed with CIB 1's unit address and TIB 2 is programmed with CIB 2's unit address (using the steps given in section 7.1).
- For both CIB 1 and CIB 2, option switch 3 must be set to the UP position to enable operation with the TIBs.
- For both TIB 1 and TIB 2, the transmitter bank select switches must be set for bank 0 since the CIB only supports receiver bank 0.

The system operates the same as the system in the previous example. When a receiver becomes active and is voted by the comparator, the TSAM will steer to the corresponding transmitter. The TIB monitoring that transmitter will detect the steering change and update the HIB with new active transmitter status.

When a receiver is FORCE VOTED from the PC, the CIB controlling that receiver will send the FORCE VOTE command to the comparator. The TIB associated with that CIB will also receive the FORCE VOTE command and will command the TSAM to steer to the transmitter that corresponds to the FORCE VOTED receiver.

10. Troubleshooting

This table is a list of troubleshooting tips specific to the TIB module. For additional troubleshooting tips, refer to the troubleshooting section found in the *Monitoring and Control Network System Manual*, reference 1.

Due to the high percentage of surface-mount components the TIB is treated as a field replaceable unit. If any system problems are the result of a malfunctioning TIB unit, the entire unit must be replaced and returned for repair.

PROBLEM	CAUSE
ERR LED is ON	<p>Verify that the module's Group and Module numbers are valid.</p> <p>Reprogram the unit address of the CIB that the TIB is connected to. Also, verify that this is a valid unit address. Refer to section 7.1 for a description of this procedure.</p> <p>Verify that option switch 4 is in the DOWN position.</p>
TSAM steers between transmitters but the operator station does not show the active transmitter	<p>Verify that the User Interface Module being used to display the transmitter steering information is a HIB connected to a PC.</p> <p>Verify that the TIB is properly wired to the TSAM.</p> <p>Verify that the TIB is programmed with the unit address of the proper CIB.</p> <p>Verify that the CIB's option switch 3 is in the UP position. If not, change the switch and reset the CIB.</p> <p>Verify that the TIB's option switches 1, 2, and 3 are set to bank 0.</p>
TSAM does not steer when a receiver is FORCE VOTED from the operator station	<p>Verify that the TIB is properly wired to the TSAM.</p> <p>Verify that the TIB is programmed with the unit address of the proper CIB.</p> <p>Verify that the TIB's option switches 1, 2, and 3 are set to bank 0.</p>