INSTALLATION INSTRUCTIONS

MicroComm DXI

ACB-100 Audio Control Board

1. Intent & Scope

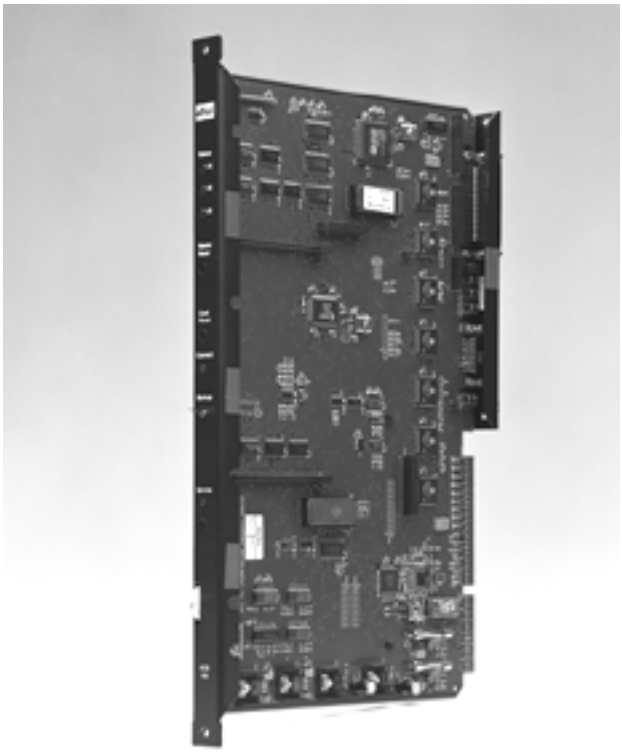
This document describes the installation procedure for the ACB-100 Audio Control Board.

2. Description

The ACB-100 Audio Control Board controls all the I/O cards in a MicroComm DXI card cage. It controls the system's audio switching and includes the system's digital signal processors. Audio trunking between card cages, which may be linked to form larger exchanges, is also made through the ACB.

Each audio control board may include up to two Digital Signal Processors (DSP) expansion modules. Each expansion module provides two more DSPs. These DSPs are used to support additional I/O cards and special functions such as Audio Level Alarms and conference calls. Digital audio trunk (CEPT) interfaces are available for fiber optic and copper conductor networks

An Audio Control Board (ACB-100) must be located in the first card slot of each card cage.

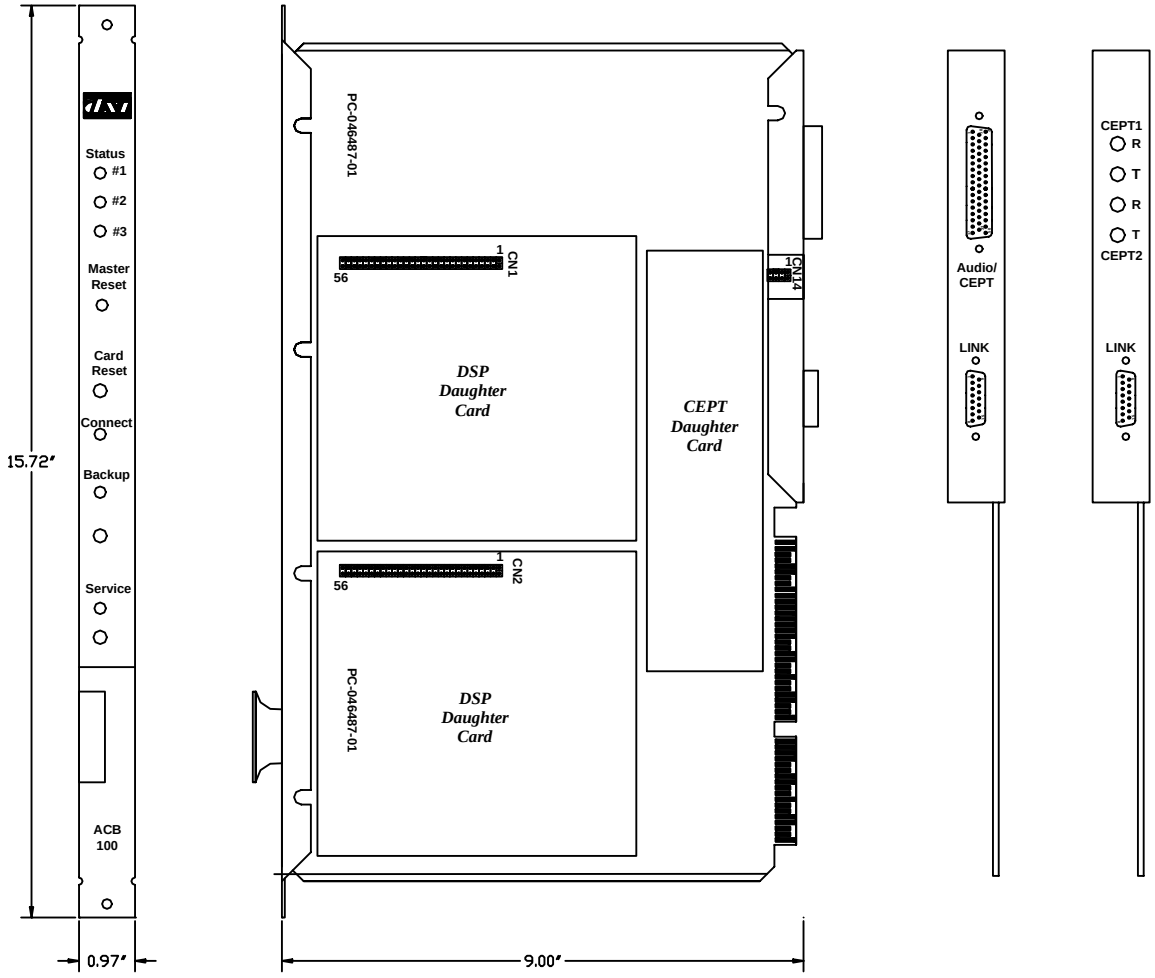


ACB-100

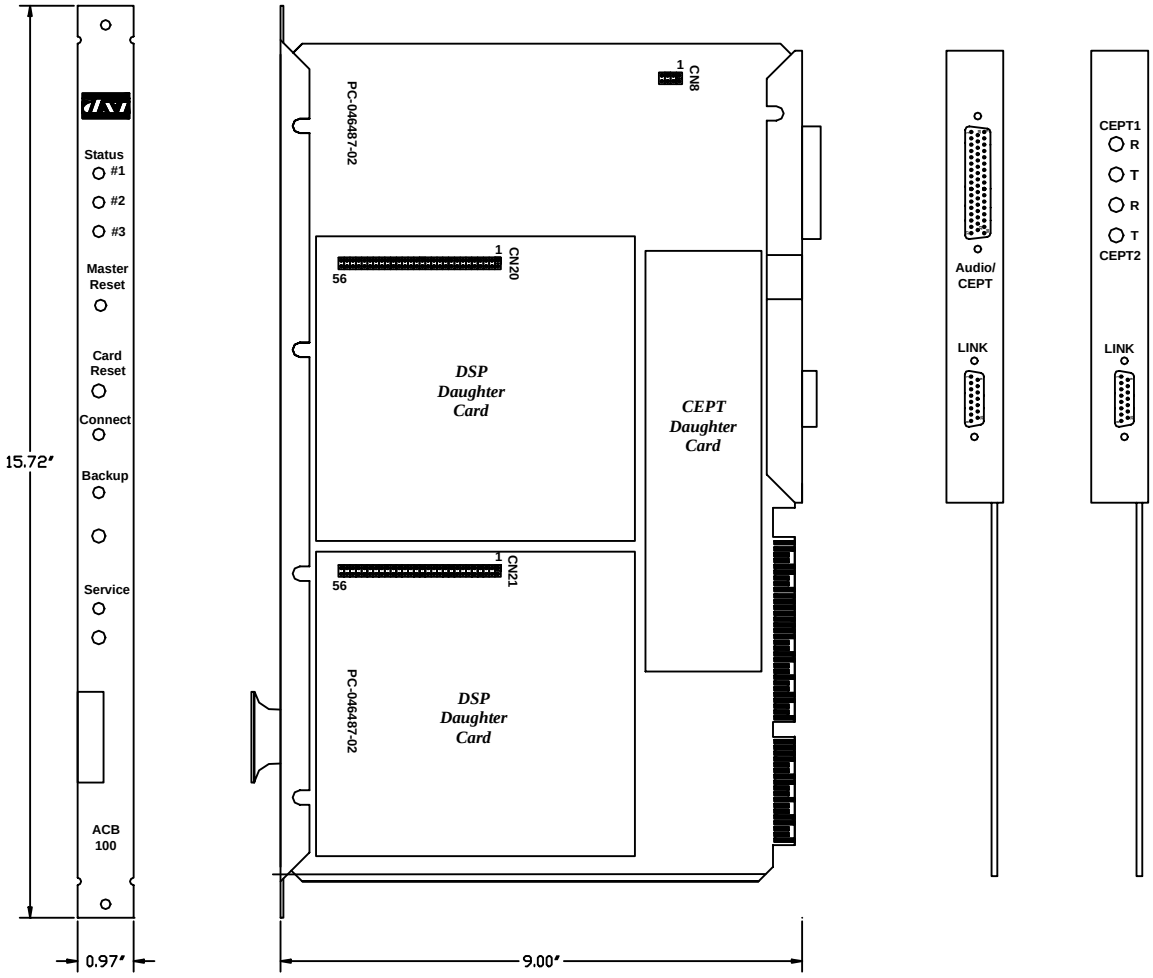
DSP Daughter Cards

Two versions of the printed circuit board used in the ACB-100 have been produced. The latest printed circuit board is designated as PC06487-02, while the earlier version was designated as PC06487-01 or PC06487. The main difference between the two boards is the location of the headers on the printed circuit board and the label names assigned to the headers. In the following description the labels associated with the -01 version of the printed circuit board are given in brackets.

The ACB-100 has one factory installed DSP, and headers for inserting two DSP daughter cards. Each daughter card contains two DSPs. The factory installed DSP is labeled DSP #1. The daughter card inserted in header CN20 (CN1) contains DSPs labeled DSP #2 and DSP #3, while the daughter card inserted in header CN21 (CN2) contains DSPs labeled DSP #4 and DSP #5. The following diagrams show the location and #1 pin of the headers CN20 (CN1) and CN21 (CN2). If a daughter card is not installed in CN20 (CN1) and/or CN21 (CN2) headers four shorting jumpers must be installed in positions 1-2, 3-4, 5-6 and 7-8 at the right hand end of the DSP daughter card header.

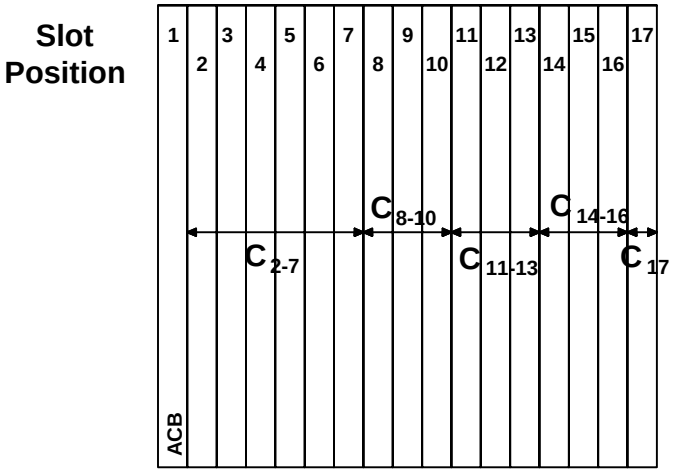


Header Location for DSP Daughter Cards on PC06487-01



Header Location for DSP Daughter Cards on PC06487-02

The card cage has 17 card slots. The ACB card is always installed in position 1, while the remaining 16 slots can be used for any other type of DXI card. Determining card positions should be partially based on the intensity of the workload placed on the DSP's. The card cage slots are divided into five groups, as shown in the following diagram:



Card Cage Slot Positions

The groups are labeled as follows $C_{2\text{-}7}$, $C_{8\text{-}10}$, $C_{11\text{-}13}$, $C_{14\text{-}16}$, and C_{17}. The notation $C_{2\text{-}7}$, for example, represents the group of cards in slot positions 2 to 7. The various DSP workloads are distributed according to the following table:

Configuration	$C_{2\text{-}7}$	$C_{8\text{-}10}$	$C_{11\text{-}13}$	$C_{14\text{-}16}$	C_{17}
No daughter card	DSP #1	DSP #1	DSP #1	DSP #1	DSP #1
Daughter card DSPs #2 & #3	DSP #1	DSP #2	DSP #2	DSP #3	DSP #3
Daughter card DSPs #4 & #5	DSP #1	DSP #1	DSP #4	DSP #1	DSP #5
Both Daughter Cards	DSP #1	DSP #2	DSP #4	DSP #3	DSP #5

Note: If a system is set up for conference calls, then DSP #5 will be running the conference functions and cannot perform normal operations. Therefore you should not install an audio card with switch inputs (SAB or AIO cards for example) in card cage slot 17. Cards such as a PAB, TSB, or DIO cards can be inserted in card slot 17 since these cards do not depend on the DSP for support.

Each DSP is capable of supporting 4 master stations. The slot position of the SAB cards in the card cage and the assignment of SAB channels to master stations must be made so as to satisfy this constraint.

4. Card Cage Linking

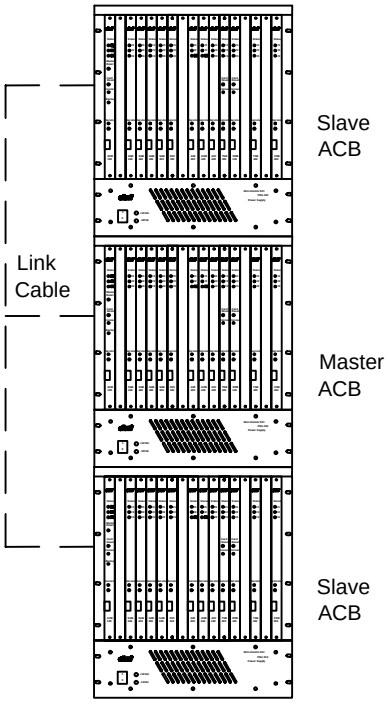
The MicroComm DXI I/O card cages can be linked together to form a larger exchange. When card cages are mounted in the same equipment rack, the link connection is via the DB-15 "Link" connector on the rear of the ACB. CEPT trunks are available in fiber optic and cable versions.

4.1 Link Cable Interface

If there are two to three card cages in one equipment room, and they are mounted adjacent to each other in the equipment racks (3 ft total from ACB to ACB), then the ACBs can be connected through a "back plane link" cable for an inexpensive audio trunk link. One of these ACBs must act as the controlling ACB (the "master" ACB),

while the others will act as "slave" ACBs. With the ACB-100 this is achieved by removing jumpers on the printed circuit board (PCB) of the ACB for each of the "slave" ACBs [i.e. remove the jumpers on connector CN8 (CN14).].

The link between the ACB cards is made through a special DB-15 connector located on the back of the ACB. A ribbon link cable connects to each of the ACBs using this connector. The ribbon link cable is supplied in two configurations; CBL-220 is used to connect two Card Cages together, while the CBL-230 is used to connect three Card Cages together (these part numbers are for ACB-100 cards). The figure on the right shows the link connection between three Card Cages in the same rack.



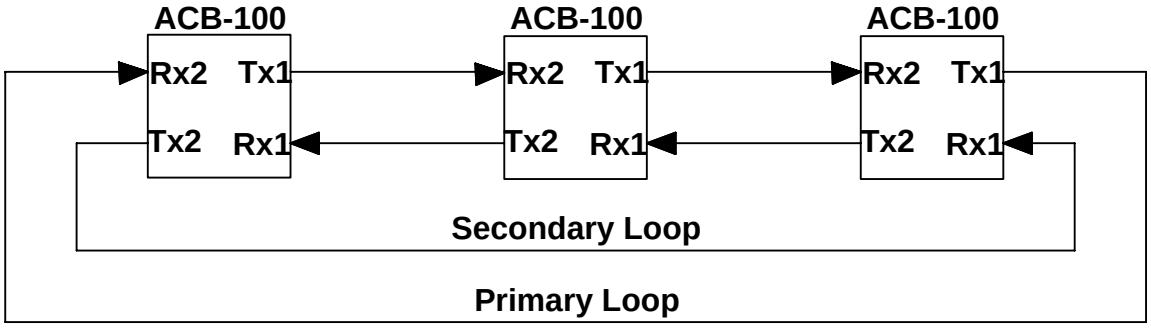
One limitation of a back plane link is that only up to three card cages can be linked in this fashion, and they must be adjacent to each other to comply with the length requirements.

A back plane link has another limitation – if the "master" ACB in the link fails, the "slave" ACBs will be unable to function. If the system specifications require fail-safe operation, then a CEPT loop or redundant ACB cards (with a redundant back plane link) should be used.

The MicroComm DXI I/O card cages can be linked together to form a larger exchange. When card cages are mounted in the same equipment rack, the link connection is via the DB-15 'Link' connector on the rear of the ACB card. To interconnect multiple card cages at remote locations to form an exchange, CEPT ports on the ACB are used. CEPT trunks are available in fiber optic and copper cable versions.

4.2 CEPT Trunk Configuration

The network configuration of the CEPT trunk is that of a bi-directional loop, as indicated in the diagram below. Each transmit and receive port of a CEPT pair is connected to the opposite ports of the next ACB in the loop i.e. Tx1 of the first ACB is connected to Rx2 of the next ACB, while Tx2 of the second ACB is connected to Rx1 of the first ACB. In the CEPT network show the ACB's are connected so that the Primary loop is in the clockwise direction, while the Secondary loop is in a counterclockwise direction. With this configuration if one link is broken then data can still be transmitted from one ACB to any other ACB by switching to the Secondary loop.



CEPT Network

4.3 Copper CEPT Network Interface

For the copper conductor interface version of the CEPT trunk a CBL-110-A cable connects to the female DB-50 connector on the rear of the ACB card. The CBL-110 cable has three individual multi-conductor cables; (i) four (4) shielded twisted pair, (ii) six (6) unshielded twisted pairs, and (iii) four (4) unshielded twisted pairs with a cable shield. Only one of the cables (four unshielded twisted pair with cable shield) is used with the ACB card. The pin outs for a mating male connector on a CBL-110 cable is shown in the following wiring table. Only the Tx and Rx CEPT connections are used for this application. Signals indicated are from the board's perspective.

The maximum distance between ACB cards for a 22 gauge (unshielded) twisted pair is 8,200 ft (2.5 km).

4.4 Fiber Optic CEPT Network Interface

The fiber optic CEPT interface version of the audio control board is provided with four ST type fiber optic connectors. These are marked for each of CEPT 1 and CEPT 2 as Tx (Transmit) and Rx (Receive) from the board's perspective.

The maximum signal strength power loss in a fiber optics CEPT link must not exceed 12 db. The length of cable, number of connectors, and number of patch panels determines the loss of signal strength in fiber optic cables. With only one pair of connectors between ACB cards for a 62.5/125 multimode fiber optic cable the maximum distance between ACBs is 8,500 ft (2.6 km).

Typically, every connector reduces the signal by 0.3 db, and every 3,300 ft (1 km) of cable reduces the signal by 3.2 db, assuming a perfect connection. You should allow for some extra margin for field-grade connections.

Wiring Table

DB-50 Pin Number	Signal Name	Wire Color Cable 1	Wire Color Cable 2	Wire Color Cable 3	Terminal Block Pin Number
1	Audio 1 +	Black			1
18	Audio 1 -	Red			2
34	Audio 1 Shield	BR Shield			3
2	Input 1		White-Blue		4
19	Common 1		Blue-White		5
35	Output 1		White-Orange		6
3	Audio 2 +	Black			7
20	Audio 2 -	White			8
36	Audio 2 Shield	BW Shield			9
4	Input 2		Orange-White		10
21	Common 2		White-Green		11
37	Output 2		Green-White		12
5	Audio 3 +	Black			13
22	Audio 3 -	Green			14
38	Audio 3 Shield	BG Shield			15
6	Input 3		White-Brown		16
23	Common 3		Brown-White		17
39	Output 3		White-Grey		18
7	Audio 4 +	Black			19
24	Audio 4 -	Blue			20
40	Audio 4 Shield	BBl Shield			21
8	Input 4		Grey-White		22
25	Common 4		Red-Blue		23
41	Output 4		Blue-Red		24
9	N/C				25
26	N/C				26
42	N/C				27
10	N/C				28
27	N/C				29
43	N/C				30
11	N/C				31
28	N/C				32
44	N/C				33
12	N/C				34
29	N/C				35
45	N/C				36
13	N/C				37
30	N/C				38
46	N/C				39
14	N/C				40
31	N/C				41
47	Rx 2 +			White-Blue	42
15	Rx 2 -			Blue	43
32	Tx 2 -			White-Orange	44
48	Tx 2 +			Orange	45
16	Gnd			Cable Shield	46
33	Rx 1 +			White-Green	47
49	Rx 1 -			Green	48
17	Tx 1 -			Brown	49
50	Tx 1+			White-Brown	50

5. System Planning Worksheet

The table on the following page may be copied and used as a worksheet for planning system wiring. It shows the audio control board's pin numbers, pin signal name, associated CBL-110 cable wire colors, and terminal block terminal numbers. The blank column is to be used to identify the field wiring interface connection.

ACB-100 Audio Control Board

Card Cage: _____ Card Slot: _____

DB-50 Pin Number	Signal Name	Wire Color Cable 1	Wire Color Cable 2	Wire Color Cable 3	Terminal Block Pin Number	Connect To
1	Audio 1 +	Black			1	
18	Audio 1 -	Red			2	
34	Audio 1 Shield	BR Shield			3	
2	Input 1		White-Blue		4	
19	Common 1		Blue-White		5	
35	Output 1		White-Orange		6	
3	Audio 2 +	Black			7	
20	Audio 2 -	White			8	
36	Audio 2 Shield	BW Shield			9	
4	Input 2		Orange-White		10	
21	Common 2		White-Green		11	
37	Output 2		Green-White		12	
5	Audio 3 +	Black			13	
22	Audio 3 -	Green			14	
38	Audio 3 Shield	BG Shield			15	
6	Input 3		White-Brown		16	
23	Common 3		Brown-White		17	
39	Output 3		White-Grey		18	
7	Audio 4 +	Black			19	
24	Audio 4 -	Blue			20	
40	Audio 4 Shield	BBl Shield			21	
8	Input 4		Grey-White		22	
25	Common 4		Red-Blue		23	
41	Output 4		Blue-Red		24	
9	N/C				25	
26	N/C				26	
42	N/C				27	
10	N/C				28	
27	N/C				29	
43	N/C				30	
11	N/C				31	
28	N/C				32	
44	N/C				33	
12	N/C				34	
29	N/C				35	
45	N/C				36	
13	N/C				37	
30	N/C				38	
46	N/C				39	
14	N/C				40	
31	N/C				41	
47	Rx 2 +			White-Blue	42	
15	Rx 2 -			Blue	43	
32	Tx 2 -			White-Orange	44	
48	Tx 2 +			Orange	45	
16	Gnd			Cable Shield	46	
33	Rx 1 +			White-Green	47	
49	Rx 1 -			Green	48	
17	Tx 1 -			Brown	49	
50	Tx 1+			White-Brown	50	