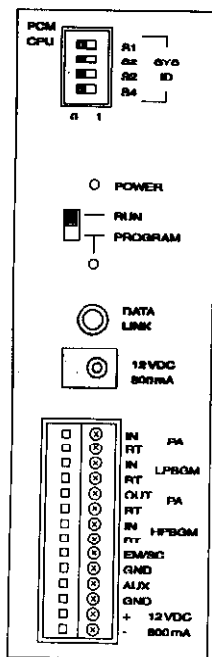# Bogen Model PCM-CPU

Central Processing Module for Bogen's PCM-2000 Zone Paging System

Section 1

Description

The Bogen Model PCM-CPU is the microprocessor module for the Bogen PCM Zone Paging System. One module is required per system (up to three PCM-ZPM zone modules). The PCM-CPU module provides power, data and audio connections for the PCM system.

The PCM-CPU module is connected to other PCM modules electrically through internal cables. Modules are mechanically joined by sliding together interlocking tabs and securing with a screw on the rear panel. The system is designed to be wall-mounted with the modules side by side like books, oriented so that when the blue connector blocks are on the bottom, the PCM-TIM is far left, the PCM-CPU is first from left and the (first) PCM-ZPM module is on the right. (See illustration on page 7.)

The PCM-CPU module includes a set of dip switches that set the SYStem ID, a POWER LED, a PROGRAM/RUN switch, a DATA LINK RCA jack (used to connect to satellite systems), power in jack/terminals, and audio connections for PA, low power BGM, high power BGM, emergency/shift change trigger and auxiliary contacts.

PCM-2000 System

Minimum system configuration consists of three modules: PCM-CPU, PCM-TIM, and PCM-ZPM. To this, you can add up two additional PCM-ZPM modules and/or talk back module (PCM-TBM). If more than 9 zones are required, satellite systems can be added to bring total capacity to 99 zones. The PCM-2000 system provides the following features and functions:

Voice Channel:

- Zone paging & sub zone group paging (up to 32 zone groups, each with up to 99 zones).
- Override paging (using loop start or contact closure).
- Talk back paging (centrally-amplified zones only).
- High powered central paging.
- Low power distributed paging.

- Privacy beep on talk back zones.
- Preannounce tone.

Background Music:

- Low-power distributed (buffered for up to 50 amplified speakers).
- High-power, using dedicated BGM amplifier.
- High-power using a single paging/BGM amplifier.
- BGM disable to individual zones.
- Local BGM input on each individual zone module.

Signalling Channel

- Night ringer (90V or contact closure activation).
- Code calling (2 types - echo & pattern).
- Emergency/shift change tone (tone and duration selectable).

Other Features:

- DTMF setting of all operating parameters
- Run/Program switch
- External C-form contacts
- Relay driver output per zone.
- Nonvolatile memory for setup data (no backup battery required).
- Talk/Talk back selection per zone.
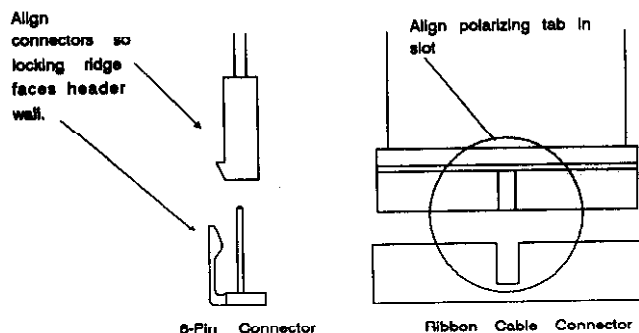- Setup tone to assist in volume setting, etc.

Specialized Features

- Specialized modules provide time-triggered signalling.
- Talk back paging

Section 2

Installation

Assembling Modules

To assemble modules together place them side by side starting with the left most module of the assembly (PCM-TIM). Plug the ribbon cable connector into its header, see drawing for orientation. Then plug the 6 pin connector onto its header. Very important — check for proper orientation of this connector (see illustration).

Align connectors so locking ridge faces header wall.

Align polarizing tab in slot

6-Pin Connector

Ribbon Cable Connector

NOTE:

If the 6-pin connector is installed backwards, the power light on this module, and possibly the entire assembly will not light when powered up. Correct this by separating the modules and locating the reversed 6 pin connector.

Place the modules close together and dress the connector cables away from the sheet metal so that they will not get pinched. Push the two units together while aligning the locking tabs on the top and bottom sides of the left unit with the locking slots on the right unit. At this point the left unit will be positioned sightly ahead of the right unit. Now slide the left unit back against the right unit until the faces of both units are even. Secure the two units together by tightening a screw into the screw clamp tab in the back of the unit.

Note:

It usually easier to run the screw in and out of the screw clamp tab, to cut a thread, before assembling the units together.

Repeat the procedure for the rest of the modules to be included in the assembly.
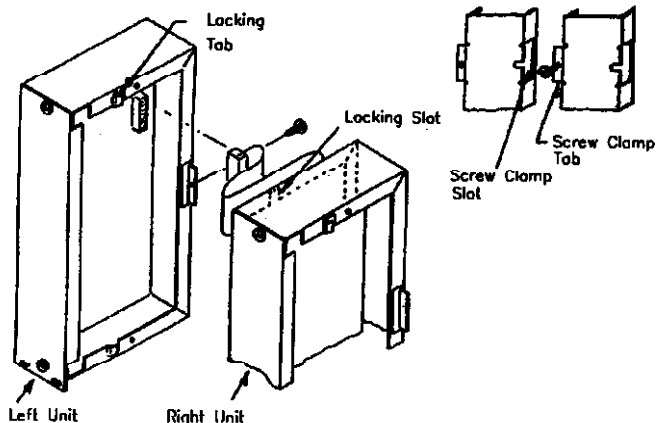
The figure below shows the correct sequence of modules for a maximum assembly. If certain modules are not used, remove them and maintain the order shown for the rest of the modules.
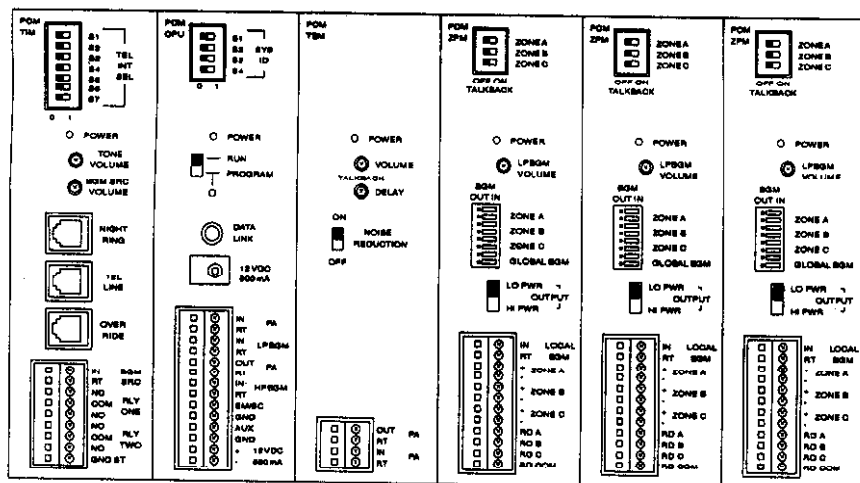
Power

The PCM system requires 12V DC @ 800mA. Use the PCM-PS power supply. Plug the output jack of the power supply into the POWER jack on the PCM-CPU module. Power can also be connected to the 12V DC terminals on the connector block.

Important Power Supply Information

1. The PCM system is sold without a power supply. Bogen sells a power supply, model PCM-PS, which is recommended for use with the PCM. This power supply is capable of supplying enough power for one PCM-CPU module, and all possible modules that can be physically connected to the PCM-CPU module.

2. Any power supply used with the PCM system **must** be a Class 2 power supply, and be either UL listed (for use in the U.S.) or CSA Certified (for use in Canada).

3. When powering multiple PCM assemblies from a single power supply (such as a master assembly and satellite assemblies), care must be taken to determine the proper capacity of the power supply.

    Use the following formula to determine the **minimum** rated capacity required for the power supply. The value is based on the number of PCM assemblies to be powered from that supply:

    Power Supply Rating = or > 0.8 X [PCM Assemblies]

    Use the following formula to determine the maximum number of PCM assemblies that could be powered from a supply whose rating is known.

    $$\frac{[\text{Power Supply Current Rating in Amps}]}{0.8} = \begin{array}{c}\textbf{Number of PCM}\\ \textbf{Assemblies*}\end{array}$$

    *(drop any fractions & DO NOT ROUND UP)

4. Use Class 2 wiring when connecting PCM assemblies to the power supply.

System ID

For a system with no satellites, set SYS ID dip switches to the position shown. See section on System Expansion in this manual for additional information on setting system IDs in expanded systems.

	Zone #s	Dip Setting For SYS ID			
		S1	S2	S3	S4
Master	1 - 9	O	O	O	O

Program/Run Switch

The Program/Run switch must be set to the PROGRAM position during system programming and the RUN position during normal operation. Refer to the instructions included with the PCM-TIM module for programming instructions.

Audio Connections

Centralized amplifier connections are made to the screw terminals marked PA IN & OUT on the PCM-CPU module. Connect PA IN & RT (return) to the audio input on the paging amplifier. Connect the high power (70V) output of the amp to the PA OUT & RT terminals.

Low Power BGM

Connect BGM source to the LPBGM IN & RT terminals (Connect signal ground or shield to RT terminals and the hot to IN). This provides low-level BGM signals to the PCM-ZPM modules with LO PWR OUTPUT selected. This input is unbalanced.

High Power BGM

Connect BGM source to the input of an amplifier. Connect the high power (70V) output of the amplifier to the HPBGM IN & RT terminals (amplifier common should connect to RT). This provides high-power background music signal to the PCM-ZPM modules with HI PWR OUTPUT selected.

Emergency/Shift Change Trigger

External input control is available to trigger a tone signal from the PCM-2000 over the paging system. Shorting EM/SC to the GND terminal will produce a user programmed tone into a preselected group of zones. See Programming section of the PCM-TIM manual for information on programming the EM/SC feature.

Aux/Gnd Contacts

These contacts are used to synchronize with a master clock. Shorting these terminals resets the real time clock in the PCM-TBM module to a preset time. See the PCM-TIM manual Programming section for further information on this function.

Section 3

System Expansion

Concept

In situations where it is necessary to extend beyond 9 zones of paging, a master and satellites must be used. Each satellite system is responsible for the specific group of zones as determined by the setting of its SYS ID dip switches. The master system transmits its commands on the Data Link bus to all satellites at the same time, but only the specifically addressed satellite responds.
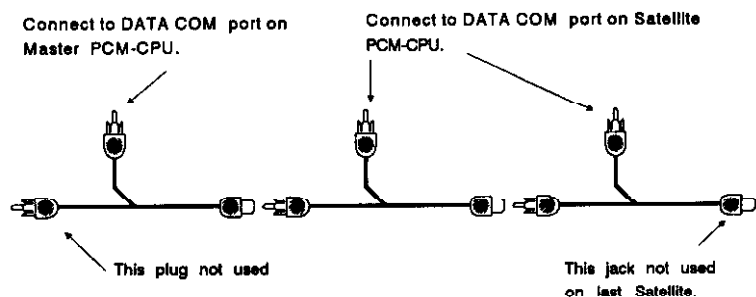
Note:

A satellite system consists of 1 PCM-CPU module and 1 to 3 PCM-ZPM modules. PCM-TIM and PCM-TBM modules are not necessary and will not work in a satellite system.

Audio Wiring

Audio wiring is daisy-chained from one assembly to another. The illustration on page 15 shows the daisy chain audio wiring between system assemblies (wiring to the BGM sources is only done on the master system). The same wiring scheme is used between adjacent assemblies.

Data Link Wiring

The DATA LINK ports of the system's PCM-CPU modules are connected using RCA cables. For a one satellite system, a standard male to male RCA cable can be used. For systems with more than one satellite, the recommended interconnecting cable consists of a single female RCA connector with two male RCA connectors (see illustration on next page). It is also recommended that the distance between adjacent satellite systems does not exceed 3 feet, and that all DATA LINK connections are securely made and well seated. Bad connections will result in operational failures and/or inconsistent operation.

Connect to DATA COM port on
Master PCM-CPU.

Connect to DATA COM port on Satellite
PCM-CPU.

This plug not used

This jack not used
on last Satellite.

System ID

Once the satellite systems have been wired together, the satellite ID numbers can be assigned. The ID for the master system (the one which has the PCM-TIM module) must be set to zero (all SYS ID switches set to "O"). Although satellite systems can be numbered in any order, it is best to number them sequentially, starting with "1" and following the way in which they are daisy chined together. The table on the next page shows the SYS ID switch settings for the available satellite numbers and the zones that each satellite is responsible for. After satellites have been numbered, you may want to mark the actual zone numbers for each zone in the white area to the left of the zone terminal screws. Use an indelible felt-tip marker. The lowest numbered zone in the satellite system should be the top zone in the PCM-ZPM module adjacent to the PCM-CPU module. The highest zone in the satellite is the bottom zone in the last PCM-ZPM module.

After satellite systems have been wired and ID numbers assigned, the system can be powered up. If it is necessary to change the ID number of a satellite after the system has been powered, you must remove and then reapply power to that satellite after changing switch settings.

Satellite Zones & SYS ID Switch Positions

	Zone #'s	Dip Setting For SYS ID			
		S1	S2	S3	S4
Master	1 - 9	O	O	O	O
Satellite					
1	10 - 18	I	O	O	O
2	19 - 27	O	I	O	O
3	28 - 36	I	I	O	O
4	37 - 45	O	O	I	O
5	46 - 54	I	O	I	O
6	55 - 63	O	I	I	O
7	64 - 72	I	I	I	O
8	73 - 81	O	O	O	I
9	82 - 90	I	O	O	I
10	91 - 99	O	I	O	I

I = On
O = Off

One-Way Paging System with Satellites

The following examples and illustrations show typical paging system configurations. For improved clarity, these illustrations show modules separated from each other. In actual systems, all modules are physically connected. Information relative to connecting the system to the telephone system can be found in the instructions supplied with the PCM-TIM module.

The illustration on the next page shows the wiring between different assemblies in a system with satellites for one way paging. Four pairs of audio wires are daisy chained between adjacent assemblies. These pairs are for the high power paging and background music (PA OUT & RT and HPBGM IN & RT), and the low power paging and background music (PA IN & RT and LPBGM IN & RT).

If a system is only using one type of paging, either all high power or all low power, only two pairs of wires are needed to connect assemblies together. An all low power system would need only PA IN & RT and LPBGM IN & RT. Likewise, in an all high power system, the only inter-assembly wiring needed would be PA OUT & RT and HPBGM IN & RT. The centralize high power amplifier would still connect to PA IN & RT and PA OUT & RT.

The DATA LINK RCA cable is also daisy chained between assemblies. See the section on Data Link wiring for suggested RCA cable types and wiring techniques for multiple assembly systems. Although this diagram shows wiring between the master and a satellite, the same wiring connections would exist between adjacent satellite assemblies up to the maximum system of 10 satellites. Two wires can be clamped in each of the terminals to simplify wiring and eliminate wiring splices.

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Two-Way Talk Back Paging System with Satellites

For improved clarity, these illustrations show modules separated from each other. In actual systems, all modules are physically connected.

The illustration on the next page shows the wiring for a PCM-2000 system with satellites using talk back. This configuration is essentially the same as the one way system described previously, 4 pairs of wires connect between all adjacent PCM-2000 assemblies. The main difference between the one-way configuration (previous example) and this configuration, is that the centralized high power amplifier is connected to the PCM-TBM module instead of the PCM-CPU. All other wiring is the same for these two configurations.

The PCM-ZPM dip switches for TALKBACK must be set to ON to enable talk back. **Talk back is only available in high power zones with passive speakers.**

Note:

The PCM-TBM module uses high gain amplifiers to provide the talk back for speaker to amplifier. When using high power BGM to provide uninterrupted BGM in zones not being paged, some of this signal will leak into the talk back path and be heard in the telephone receiver. One method to reduce this effect is to use the 25V output of the paging amp and high power BGM source instead of the typical 70V output. Also reducing the amount of treble from the BGM source helps reduce leakage.

Section 4

Applications

The following examples and illustrations show typical paging system configurations. For improved clarity, these illustrations show modules separated from each other. In actual systems, all modules are physically connected. Information relative to connecting the system to the telephone system can be found in the instructions supplied with the PCM-TIM module.

3-Zone System with One-Way Paging & Single amp BGM

The application illustrated on the next page shows the simplest PCM-2000 system configuration. Here a single amplifier supplies both paging and BGM to passive speakers. As a result, BGM is lost in all zones when a page is made (this feature must be enabled. See "1 Amp BGM" in the Programming section of the PCM-TIM manual).

Connect the low level BGM source to the PCM-TIM terminals marked BGM SRC IN & RT. Connect the paging amplifier's input to the terminals marked PA IN & RT. Connect the paging amplifier's output to the terminals marked PA OUT & RT. The OUTPUT switch on the PCM-ZPM must be in the HI PWR position for this application.

Connect the passive speakers to the PCM-ZPM zone terminals. The GLOBL BGM jumpers should be in the IN position. The jumpers for any zone that is to have BGM should also be in the IN position. Set the paging level using the amplifier's volume control and the BGM level using the BGM SRC VOLUME control on the PCM-TIM.

6-Zone System with One-Way Paging With Mixed High Power & Low Power Zones and Local BGM

In the application illustrated on the next page, both high power passive speakers and low power amplified speakers are in use in the same system. Two separate sources are used to supply BGM. In this configuration, background music will be interrupted in all zones not being paged.

The right-most PCM-ZPM module is set for high-powered paging, and its OUTPUT switch is in the HI PWR position. Only passive speakers may be connected to this module. This module is also being supplied by a local background music source. Note that the BGM source is amplified; the same type of signal that the paging amplifier produces. The high power BGM source is wired to the module's LOCAL IN & RT terminals, and the GLOBL BGM jumpers have been moved to the OUT column.

The other PCM-ZPM module is set for low power paging. Its OUTPUT switch is in the LO PWR position. Background music is being supplied to the low power amplified speakers by another low level BGM source. The BGM source is connected to the LPBGM terminal, which supplies BGM to all low power PCM-ZPM modules having their GLOBL BGM jumpers in the IN column. The centralized paging amplifier's input is connected to the PA IN & RT terminals. The amplifier's output is connected to the PA OUT & RT terminals

9-Zone System With Talk Back, Single-Amp BGM And Mixed High & Low Power Zones

In the application illustrated on the next page, low power paging is supplied to amplified speakers, and talk back or regular paging is supplied for high power zones equipped with passive speakers. A single amplifier is used to supply both paging and BGM to the passive speakers (this feature must be enabled. See "1 Amp BGM" in the Programming section of the PCM-TIM manual). Because of this, the BGM to all high power zones will be lost when a page is made. In zones using amplified speakers, BGM will not be lost when a page in another zone is made.

The centralized paging amplifier is connected to the PCM-TBM module when using talk back paging, instead of the PCM-CPU, as is regular paging situations. Connect the amplifier's input to the PCM-TBM terminals marked PA IN & RT. Connect the amplifier's output to the PCM-TBM terminals marked PA OUT & RT. The BGM source in this case is a low level source with its output going to two sets of terminals. Wire the BGM source to the PCM-TIM terminals marked BGM SRC IN & RT and also to the PCM-CPU terminals marked LPBGM IN & RT.

Set the paging level in the high power zones using the volume control of the central amplifier. Use the volume control on each amplified speakers to set the page level in the low power zones. The LPBGM VOLUME control on the PCM-ZPM module will adjust the BGM level in low power zones. Use the BGM SRC VOLUME control on the PCM-TIM module to adjust the BGM level in the high power zones. The GLOBL BGM jumpers must be in the IN column in order for the PCM-ZPM module to receive background music. To enable talk back in a high power zone, set the PCM-ZPM module's TALK BACK dip switch for the desired zone to ON. Follow the recommendations in the PCM-TBM manual to adjust talk back quality.