

The **LynTec**
CROWDCOMP™
always knows when to **SPEAK UP**



The LynTec C3 — a TRUE AMBIENT SENSING, CrowdCompensating Computer.
Proven automatic level compensation based on the measurement of true ambient noise.

BENEFITS

- Automatically rides sound system gain
- Follows fastest sports crowd dynamics
- Eases sound operator's work load
- Maintains maximum speech intelligibility
- Effective in large or small, indoor or outdoor facilities
- Provides higher intelligibility for advertising audio
- Improves neighborhood relations for outdoor stadiums,
The sound system is loud only when the crowd is loud
- Proven in sports venues and industrial applications

WHAT IT DOES

The CROWDCOMP™ automatically increases sound system level in direct relation to the ambient noise level changes.

By closely tracking the crowd, a more constant signal to noise ratio is achieved. The sound system is loud only when the crowd is loud.

HOW IT DOES IT

First a simple, automatic, one minute, one-time calibration is run to determine the unique time/frequency profile of the sound system and the acoustics of the room, stadium or arena.

This calibration cycle feeds two sets of 9 different frequency click pulses through the sound system (9 clicks for each microphone). The built-in calibration click pulses are very short (8 msec.) and vary in frequency from 150 Hz to 3600 Hz...from a kick-drum thump to a bird-cheep.



The CROWDCOMP's continuous FFT analysis of the signals fed to the sound system, versus the continuous FFT analysis of the audio sensed in the room, provides a superior method of ignoring the sound system's contribution to the room.

The remaining audio that is **not source related**, delayed direct sound, reflections and reverberation, is **true ambient noise**.

Accurate measurement of the **true ambient noise** is the basis for the CROWDCOMP's unerring **gain control tracking** of the crowd.

The real-time FFT capability of the CROWDCOMP provides the computing speed and accuracy necessary to track sports crowd dynamics.

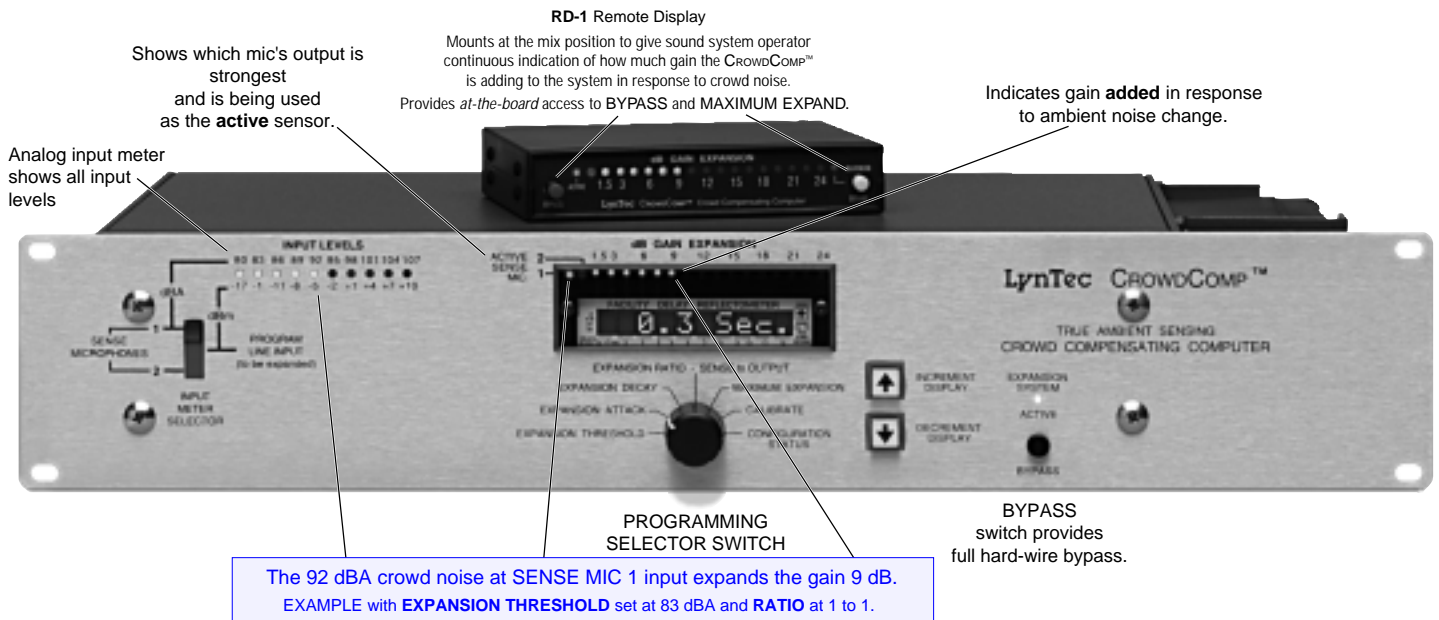
The CROWDCOMP makes level correcting decisions 40 times a second, accurately correcting for every impulse of the crowd.

As the job list shows...The CROWDCOMP is the choice of professionals worldwide.

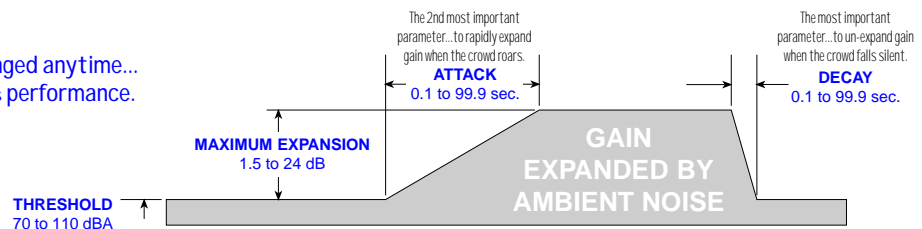
One or two sense microphones pick up all of the returns of these click pulses. The returns are comprised of delayed direct sound from the loudspeakers and reflections at various other delay times depending on room surfaces and reverberation.

A real-time FFT (Fast Fourier Transform) spectrum analysis is performed on all of the returns to make up a room time/frequency profile. This time/frequency profile, stored in nonvolatile memory, is the reference that the CROWDCOMP uses to ignore any sound that is introduced into the room by the sound system.

CONTROLS AND INDICATORS

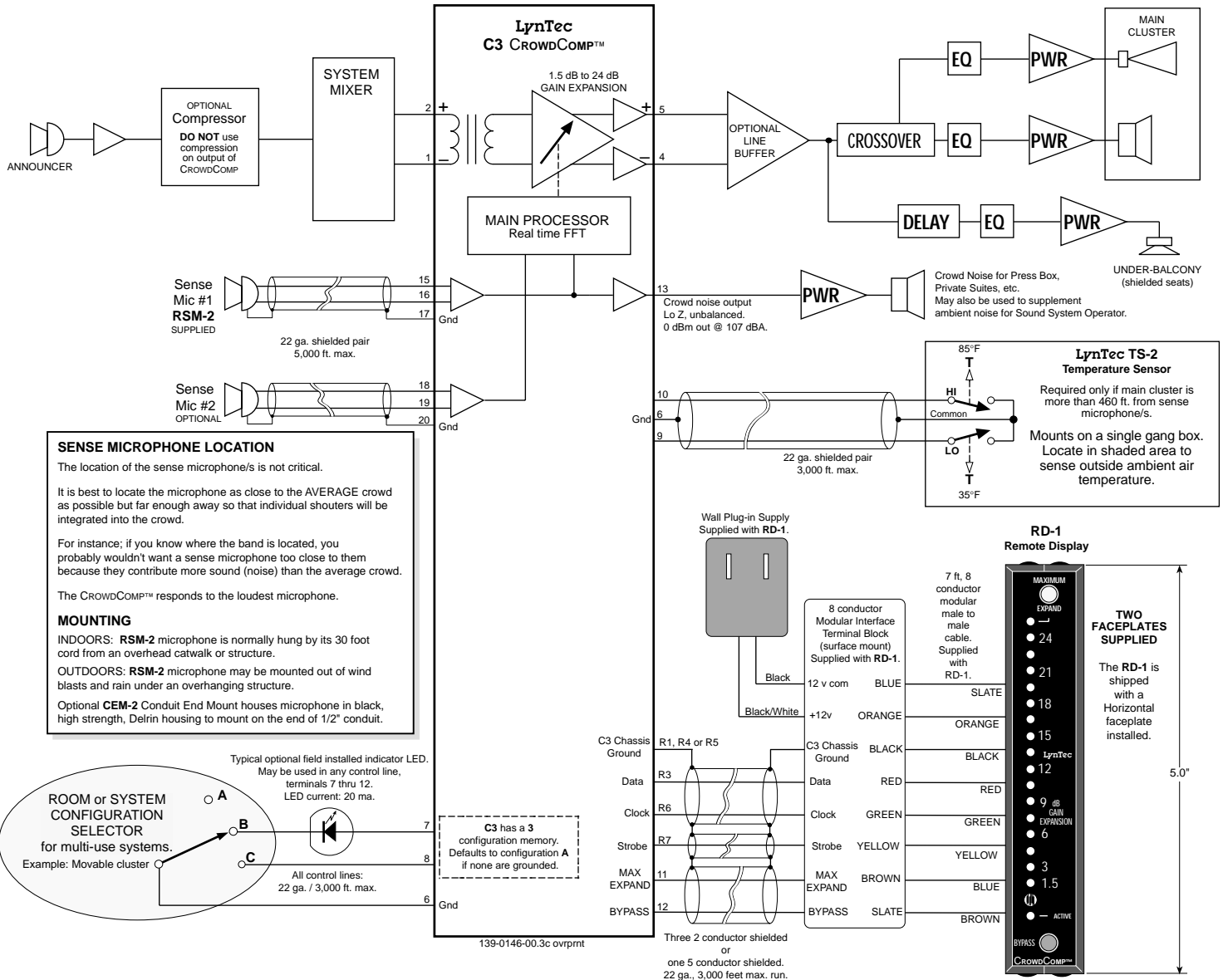


Operating parameters may be easily changed anytime... even on the fly, to tailor the CROWDCOMP's performance.



UL/CSA listed power supply. Attached and out of the way to reduce rack clutter.

Simplified Stadium Sound System Block Diagram using the CROWDCOMP™



Architect's and Engineer's Specifications

The Ambient Noise Compensating Computer shall control the gain expansion level of a sound system in response to ambient noise.

The device shall have an gain expansion range of 0-24 dB in digitally controlled 1.5 dB steps. The device shall be field programmable to begin expansion from a threshold sound pressure level of 70 dBA to 110 dBA in 1 dB steps.

The device shall be programmable to provide attack and decay times of 0.1 second to 99.9 seconds.

Calibration shall be semiautomatic consisting of click pulses from 150 Hz to 3600 Hz and shall be accomplished without any requirement for program audio.

Calibration results shall be stored in nonvolatile memory. To prevent tampering, changes from all front panel controls except BYPASS shall be automatically locked out after 2 minutes of programming inactivity.

The device shall be housed in an 3.5" (2U) high all aluminum, rack mountable housing, utilizing all stainless steel hardware, and shall fit a standard 19" rack.

The Ambient Noise Compensating Computer shall be the LynTec model C3.

A dynamic sense microphone shall be provided with a sensitivity of -61 dB (0 dB = 1 mW/10 dynes/cm²).

The sense microphone shall be the LynTec RSM-2 mounted in a LynTec CEM-2 Conduit End Mount housing to mount on 1/2" conduit.

ORDERING INFORMATION

Model Number	Description
C3	LynTec CROWDCOMPensating Computer. Includes one RSM-2 Remote Sensing Microphone.
OPTIONS	
RSM-2	Remote Sensing Microphone A dynamic lavalier omnidirectional microphone. EV 649B. One supplied with CROWDCOMP™ to guarantee dBA scale accuracy. Two may be used for wide variations in crowd concentration.
CEM-2	Conduit End Mount for RSM-2 microphone. Black Delrin® plastic housing to mount microphone on the end of 1/2" conduit.
RD-1	Remote Display Indicates GAIN EXPANSION and provides remote control of MAXIMUM EXPAND and BYPASS. Supplied with horizontal faceplate installed. Easily changed vertical faceplate inside case. Powered by supplied, UL & CSA listed, plug-in power supply. 7 ft. flat cable and surface mounted modular interface block supplied.
TS-2	Temperature Sensor To automatically temperature compensate for speed of sound changes prevalent in long-throw outdoor installations where delay between the main loudspeaker cluster and the sense microphone is more than 500 milliseconds. (>460 ft.) Consists of two thermostats mounted on single-gang blank switch plate.
www.LynTec.com ♦ 8401 Melrose Drive ♦ Lenexa, KS 66214, U.S.A. Voice 800-724-4047 or 913-529-2233 ♦ Fax 888-722-4157 or 913-529-4157	

DETAILED SPECIFICATIONS

Controlled Channel

One per CROWDCOMP unit.

GAIN EXPANSION characteristics:

Expansion range: 0 to 24 dB in 1.5 dB steps.

PROGRAM LINE INPUT (to be expanded) characteristics:

Maximum input level: 0 dBm (to guarantee full 24 dB expansion range).

Input Impedance, in ACTIVE mode: 600Ω, transformer balanced.

Input Impedance, in BYPASS mode: 600Ω, hard-wired by an internal relay to the output.

PROGRAM LINE OUTPUT (to be expanded) characteristics:

Output Impedance: ≤30Ω, Electronically balanced. **DO NOT** ground.

Desired output load impedance: The output should be terminated with 600Ω to guarantee BYPASS level consistency.

Maximum output level: +24 dBm. (12.25v RMS)

CONTROLLED CHANNEL FREQUENCY RESPONSE

40 Hz to 20 kHz, ±1 dB.

TOTAL NOISE & DISTORTION

≤0.3% , 20 Hz to 30 kHz, at 24 dB expansion, 1 kHz, 0 dBm input.

FRONT PANEL CONTROLS

INPUT METER SELECTOR slide switch:

This 3 position slide switch selects the input to the **INPUT LEVELS** analog bar graph meter. The top and bottom positions show the activity of the **SENSE MICROPHONES**. The center position displays the **PROGRAM LINE INPUT** level. The **INPUT LEVELS** meter is a monitor indicator only and is independent of the CROWDCOMP digital gain expansion system.

PROGRAMMING SELECTOR SWITCH

This rotary switch selects the field programmable parameters of the CROWDCOMP. The display reads the programmed value of each position.

The parameters are locked to prevent tampering but may be changed with the **INCREMENT** or **DECREMENT DISPLAY** buttons *after* the **UNLOCK** button on the rear is pressed.

Any of the programmable parameters may be changed *on the fly* while the system is operating, updating within 50 milliseconds. Programming is locked-out after two minutes of switch inactivity.

PROGRAMMING SELECTOR SWITCH functions:

EXPANSION THRESHOLD

Crowd noise level where gain expansion begins.

Field programmable from 70 to 110 dBA (peak responding).

EXPANSION ATTACK

Total time required for gain to expand to the programmed MAXIMUM EXPANSION limit. (linear)

Programmable range: 0.1 sec. to 99.9 sec.

EXPANSION DECAY

Total time required for gain to un-expand from the programmed MAXIMUM EXPANSION limit to zero. (linear)

Programmable range: 0.1 sec. to 99.9 sec.

EXPANSION RATIO - SENSE to OUTPUT

The ratio of sensed crowd noise to gain expansion.

Programmable range: 0.5 to 1.5 dB gain expansion per dB of sensed change.

EXPANSION RATIO examples:

Example 1

A 1 dB = 0.8dB setting will produce an *under-expanded* gain change of only 0.8 dB for a sensed ambient noise change of 1.0 dB. Under-expansion is useful when the headroom of the sound system is limited and *some* control is desired over a wider range, or when a 1 to 1 level change is *perceived* by the sound system operator as *overcompensation*. (Usually because he isn't hearing full crowd noise due to his isolated location [use sense microphone #1 output for ambient fill]).

Example 2

A 1 dB = 1.0 dB setting will accurately expand the gain in direct proportion to the sensed crowd noise. A 6 dB change in sensed ambient noise will produce a 6 dB gain expansion.

Example 3

A 1 dB = 1.2 dB setting will produce an *overexpanded* gain change of 12 dB for a sensed ambient noise change of 10 dB. Overexpansion is useful when the ambient noise has an especially high *masking* capability and an increase in the signal to noise ratio is desired. (rarely used)

MAXIMUM EXPANSION

Front panel programmable from 1.5 to 24 dB in 1.5 dB steps.

Useful to keep the gain expansion just below system clip point.

A **MAX EXPAND** terminal allows the sound system operator to fully expand the CROWDCOMP system gain by remote control to establish field microphone levels. While talking the system, and the CROWDCOMP set at **MAX EXPAND**, the field microphone level is set just below feedback.

MAX EXPAND is implemented with the LynTec **RD-1 Remote Display** or a momentary action switch convenient to the sound system operator.

CALIBRATE

To determine the time/frequency response of the complete sound system, including the room or environment that follows the CROWDCOMP, an automatic click-pulse calibration is performed.

Assuming the system is **UNLOCK**ed, switching to the **CALIBRATE** position initiates the automatic click-pulse calibration cycle after a 5 second countdown.

Switching out of the **CALIBRATE** position during calibration stops the click pulses and aborts the calibration.

CALIBRATION PULSE characteristics:

Click pulses 8 milliseconds wide, having a peak amplitude of +6 dBm are generated internally and fed to the output during calibration. The nine different click-pulses range in frequency from 150 Hz to 3600 Hz, sounding like a kick-drum thump to a bird cheep.

Because the click pulses are so short, their relatively high amplitude is not objectionable. Calibration is normally performed with the facility unoccupied which is usually a worst-case situation from a reflection/reverberation standpoint. The click pulses are so inoffensive that calibration may be accomplished even with the facility fully occupied.

With no program line audio input present, a set of calibration pulses is sent through the system for each sense microphone.

The delayed and reflected calibration pulses received by the sense microphones provide the CROWDCOMP with a total system time/frequency profile.

The time/frequency profile received by each microphone and the field programmed performance parameters are stored in nonvolatile memory. A "single configuration" 18 pulse calibration cycle lasts 59 seconds.

CONFIGURATION STATUS

This switch position reads the present **CONFIGURATION** of the system; **A**, **B** or **C**. Three different sets of room parameters may be stored in the CROWDCOMP and called up with external switch contacts when the sound system configuration changes.

Example: An arena loudspeaker cluster is moved to three different positions or configurations. Each of these positions have a different time/frequency profile.

A calibration series is run for both sense microphones in each of the three positions.

Grounding the appropriate configuration terminal on the rear of the unit tells the CROWDCOMP which configuration the sound system is in and which set of calibration parameters to use. If none or more than one are grounded the CROWDCOMP defaults to configuration **A**.

For troubleshooting, green indicator LEDs located behind each barrier strip terminal, light when the line is grounded. An additional series LED may also be located at the configuration switch for visual confirmation of switch action.

BYPASS switch

The panel mounted BYPASS switch provides a complete *hard-wire* bypass of the CROWDCOMP. When the bypass switch is depressed, it latches mechanically, and the internal bypass relay falls into an un-energized state, connecting the line input to the output.

The green EXPANSION SYSTEM ACTIVE front panel LED extinguishes in BYPASS.

AC power removal automatically bypasses the CROWDCOMP by this mechanism. Bypass may be accomplished remotely with a switch closure to ground. A red LED located behind the BYPASS barrier strip terminal indicates when the line is grounded.

DISPLAYS

INPUT LEVELS horizontal bar graph:

The **INPUT LEVELS** LED bar graph display indicates the output of either sense microphone or the program line level input as selected by the **INPUT METER SELECTOR** switch.

Range of **SENSE MICROPHONES 1 & 2** display: 80 dBA to 107 dBA, peak responding, using the LynTec sense microphone.

Range of **PROGRAM LINE INPUT** display: -17 dBm to +10 dBm.

The yellow LEDs advise caution on the **PROGRAM LINE INPUT**.

Exceeding a 0 dBm input limits the maximum expansion range.

Example: The maximum expansion of the CROWDCOMP is 24 dB. The maximum output level is +24 dBm. A +6 dBm input expanded 24 dB would clip the output badly, but if **MAXIMUM EXPANSION** were set at +18 dB, the output would be OK

The red LED indicates where the line *input* will clip.

CENTER WINDOW DISPLAY

ACTIVE SENSE MIC.

The two yellow LEDs indicate *which* sense microphone is being used to provide ambient sensing information. The CROWDCOMP uses the microphone having the highest ambient level. When there is little ambient noise present, the LEDs flash alternately at a random rate.

When no calibration data is available, neither sense mic. indicator will light.

dB GAIN EXPANSION

The green LEDs above the alphanumeric display show the gain added by the CROWDCOMP in response to the change in ambient noise level.

FACILITY DELAY REFLECTOMETER

The 10 character alphanumeric vacuum fluorescent display is used as a program parameter display and as a vertical bar-graph for the Facility Delay Reflectometer. (FDR)

The vacuum fluorescent display automatically dims during programming inactivity to extend life, returning to full brightness as soon as a control is changed.

FDR functions:

The FDR display shows the return results of a calibration click pulse.

A click pulse is sent through the system. All of the responses at the *click frequency*; direct returns, reverberation, and reflections received by the sense mic. are displayed for an instant before the next click pulse.

Holding the FDR display for examination:

The display may be held for inspection by pressing the **▲** button.

While still holding down the **▲** button, pressing the **▼** button displays the click frequency that generated the display.

As soon as the **▲** button is released, calibration continues with the next higher frequency click pulse. Each frequency click pulse usually will produce a different FDR display, reflecting the time/frequency profile of the sound system in the facility.

Time displayed [horizontally]: 0 to 1.25 sec. in 25 msec. increments.

Amplitude displayed [vertically]: 72 to 108 dBA in 6 dB increments.

The FDR is a valuable analytical tool for reading sense microphone performance, room parameters, and delays.

REMOTE DISPLAY

The **RD-1 Remote Display** shows the sound system operator the dynamics of the CROWDCOMP's **GAIN EXPANSION** and provides remote control access to the **MAXIMUM EXPAND** and **BYPASS** functions.

The LED's in the RD-1 are automatically dimmed by an ambient light sensor.

The RD-1's flat-pack design is field convertible to vertical or horizontal mounting. Intended to mount on or near the sound system console, the RD-1 is fed data and power via a 7 ft., 8 conductor modular telephone cable.

The modular cable is terminated by an modular interface, connecting to the remote cabling and a supplied small plug-in local power supply.

REAR PANEL CONTROL

UNLOCK

The **UNLOCK** button unlocks the system so that programming may be changed via the front panel rotary switch and the **INCREMENT** and **DECREMENT DISPLAY** buttons. The system automatically locks after two minutes of programming inactivity.

REAR PANEL CONNECTIONS

Input/Output terminations: 3-48 slotted head screw activated wire clamping terminal blocks at rear of unit.

AUDIO PROGRAM TO BE EXPANDED

600Ω BALANCED TRANSFORMER INPUT

The line input audio, typically from a mixer or line amplifier.

Input Impedance: 600Ω. Max. level: 0 dBm for full 24 dB expansion.

BALANCED OUTPUT

The expanded line output is typically connected to equalizer feeds.

This output should be terminated in 600Ω and should NOT be grounded.

To feed an unbalanced load: Connect from either output terminal to chassis ground. Leave the other output terminal **UNGROUNDED**.

The sensitivity of the system following the CROWDCOMP is important. The system should be set to clip with an input of +10 dBm. (2.45v RMS)

Any *change* in gain settings following the CROWDCOMP must be accompanied by a new calibration run.

The calibration pulses have a peak level of +6 dBm.

CONFIGURATION B & C control lines

Three nonvolatile memory locations are used to store calibration data. Reflections and return delays are generated by a click pulse calibration run. Useful when cluster is moved. The default memory is **A**.

Grounding either **B** or **C** CONFIGURATION terminal selects another memory location.

TEMPERATURE COMPENSATION

Temperature sensing and automatic compensation is required when the CROWDCOMP is operated in *long-throw* outdoor applications having more than 500 milliseconds of delay between the sense microphones and the main loudspeaker cluster. (>460 ft.)

TS-2 temperature sensor contains a LO TEMP [35°F] and HI TEMP [85°F] thermostat mounted on a single position aluminum blank switch cover. Mount in a shaded location to sense outside ambient temperature. Wiring connections are crimped push-on terminals.

Once the system is calibrated, preferably between 50°F and 70°F, thermostat action will command a calculated calibration change which is transparent to the user.

Wiring requirements: One 22 ga. shielded pair, 5,000 ft. maximum run.

LO TEMP

Connected to 35° thermostat. (Part of TS-2 temperature sensor).

A Green indicator LED located behind the barrier strip terminal, lights when the remote thermostat closes **below** 35°F.

HI TEMP

Connected to 85° thermostat. (Part of TS-2 temperature sensor).

A Green indicator LED located behind the barrier strip terminal, lights when the remote thermostat closes **above** 85°F.

SENSE MICROPHONE INPUTS #1 and #2

Electronically balanced microphone inputs for LynTec RSM-2 microphones. (E-V 649B)

Input impedance: 150Ω. Sensitivity: 240 microvolts = 94 dBA.

SENSE MICROPHONE #1 OUTPUT

An auxiliary output from sense microphone #1 to supply sensed crowd noise for sound operator's room and elsewhere.

This output is single ended, low impedance, at line level.

Output: 0 dBm at 107 dBA. Clip: 125 dBA. Output impedance: ≤50Ω.

REMOTE DISPLAY OUTPUTS

Seven screw terminals for driving the **RD-1 Remote Display**.

Wiring requirements: 5 active lines plus ground; 22 ga., 1,500 ft. maximum run.

CABLE ROUTING CAUTION: A 500 Hz, 5v peak triangular wave is impressed on 3 of the 5 lines. DO NOT route with microphone level cables.

MICROPROCESSORS

The C3 uses two microprocessors: 10 MHz, 68000 & 11 MHz, 8749.

MECHANICAL

19.00" wide, 3.5" high, 10.0" max behind mounting surface.

1.0" maximum frontal projection from mounting surface.

Weight: 8 pounds.

ENVIRONMENTAL

Temperature: Operating 0°-140°F.

Humidity: 0-90% Non-condensing.

POWER REQUIREMENTS

Standard Model 85-135VAC, 50/60Hz, 25 watts maximum.

Overseas model 225VAC ±10%, 50/60Hz, 25 watts maximum.

6 ft, 3 wire line cord attached. NO power switch.

SAFETY APPROVALS

The standard 100/120 volt 50/60Hz power supply attached to the side of the C3 is UL & CSA listed.

The plug-in power supply supplied with the RD-1 is UL listed.

FCC DATA

The C3 meets the class A EMI/RFI requirements of FCC part 15.

Due to product improvement specifications are subject to change without notice