KB-212

SPEAKER STATION

USER MANUAL

Clear-Com®

Intercom Systems

Introduction

Congratulations and thank you for choosing this Clear-Com product.

The KB-212 Speaker Station is a powerful, yet user-friendly unit that can serve as a versatile intercom station.

Please read this manual completely to better understand the functions of these products. For questions not addressed in this manual, contact the dealer or Clear-Com directly. Clear-Com applications support and service people are ready to help.

Description

The Clear-Com PL-Pro™ KB-212 speaker station is designed for use in theatres, live performances, industrial environments, and small television facilities. It features speech intelligibility, even in high noise levels, and can be customized through its programmable options.

Local or remotely controlled talking or listening is selectable and allows either hands-on or hands-free operation. The talk button operates in momentary mode. The integral microphone and speaker offer half-duplex communication. The KB-212 offers both visual and audible call signaling to attract the attention of operators.

A balanced program input allows the monitoring of external audio through the speaker. This program input can also be used as a paging function.

The integral speaker's volume level can be adjusted using a front-panel knob. An internal control allows setting a minimum speaker level. An automatic speaker switching circuit will quiet the speaker when the talk button is activated.

The KB-212 receives 30-VDC power from the Clear-Com intercom line. The unit mounts either in a standard four-gang electrical outlet box or in an optional Clear-Com V-Box. The extra-thick front panel and compact, surface-mount circuitry results in a reduced size and lighter weight package that maintains Clear-Com ruggedness. The intercom channel connects to a plug-on screw terminal strip. Male and female three-pin XLR connectors are provided on the optional V-Box to offer a through connection to the intercom channel.

Although the optional EB-4W daughter board module allows this unit to function on a TW line, the unit's operation will remain single channel. Also, the EB-4W 4-Wire daughter board module is available to allow long-distance connections using separate pairs of wires for send audio and receive audio.

The KB-212 is compatible with all Clear-Com Party-Line intercoms.

Quick Start

1. Unpack the unit and inspect it for any damage that may have occurred during shipping.

2. Set the Option switches to the default (toward the front panel) position.

3. Connect the intercom lines.

4. Install the KB-212 into the four-gang outlet box or V-Box. (For additional information, refer to the Clear-Com PL-Pro™ System Installation Manual.)

5. Set Listen Levels. (Refer to "6—Intercom Level Control" on page 4.)

6. The speaker station should now be operating properly.

7. Read the rest of this manual for further information.

Operation

Normal operation of the KB-212 Speaker Station only requires access to the front-panel controls. The controls located elsewhere on the unit are intended to be set-and-forget in nature For intercom operation, set the Listen level control to the desired level and press the Talk button when talking.

Front Panel

The controls, indicators, and connectors on the KB-212 front panel are shown in Figure 1 on page 3 and are described by the following text.
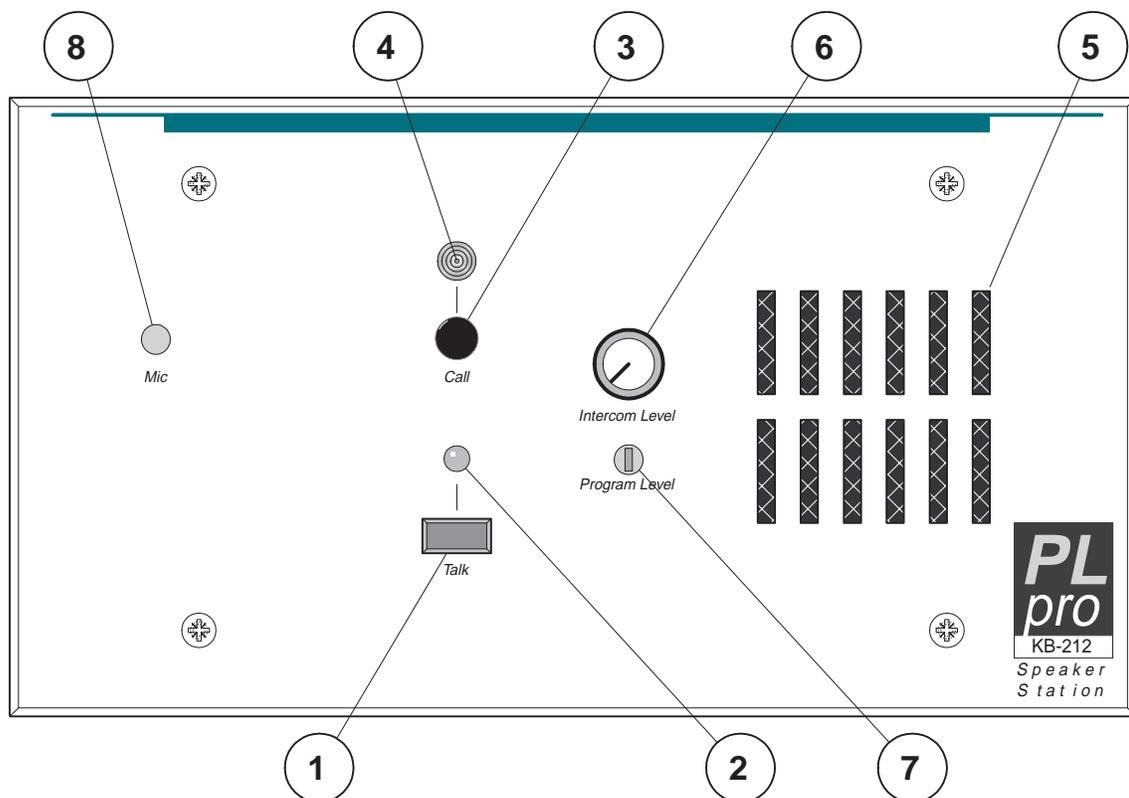

FIGURE 1: Front Panel

1—Talk Button

The Talk button activates the microphone feed to the intercom channel. The Talk button has a momentary action.

2—Talk Lamp

The Talk lamp lights when the microphone feed to the intercom channel is on, whether this is activated locally by the Talk button or remotely from another station using the call signal.

3—Call Button

Pressing the Call button will send a call signal and cause all the call lights on other stations on the intercom channel to light.

4—Call Lamp

The Call lamp will light while the Call button is pressed, or when a call signal is on the intercom channel.

5—Tone Alert

An audible tone alert can sound when a call signal is received on the intercom channel. This can be useful when the operator's attention has been drawn away from the KB-212 indicator panel. The audible tone alert level can be adjusted or turned off by an internal control. The Tone Alert will not sound if a call signal is originated at the KB-212 station.

Note: This feature is automatically turned off if the operating mode of the KB-212 is set to any setting other than Normal.

6—Intercom Level Control

Turn this control to set the speaker's required listen level. This control does not affect the Tone Alert level or the Program Input level.

7—Program Level Control

Adjust the Program Level control to set the program audio level heard in the panel speaker.

Note: Forcing the trimpots past their stop points will damage them.

8—Integral Microphone

The microphone for the KB-212 is built into the front panel.

Internal Adjustments and Connections

The controls and connectors inside the KB-212 are shown in the following figure and described by the following text. The controls can be accessed without completely removing the panel from its wall box or V-Box enclosure by removing the top two screws and loosening the bottom two screws a few turns. The panel can then be leaned out from the wall to make the controls accessible as shown in the lower view of Figure 2 on page 5.
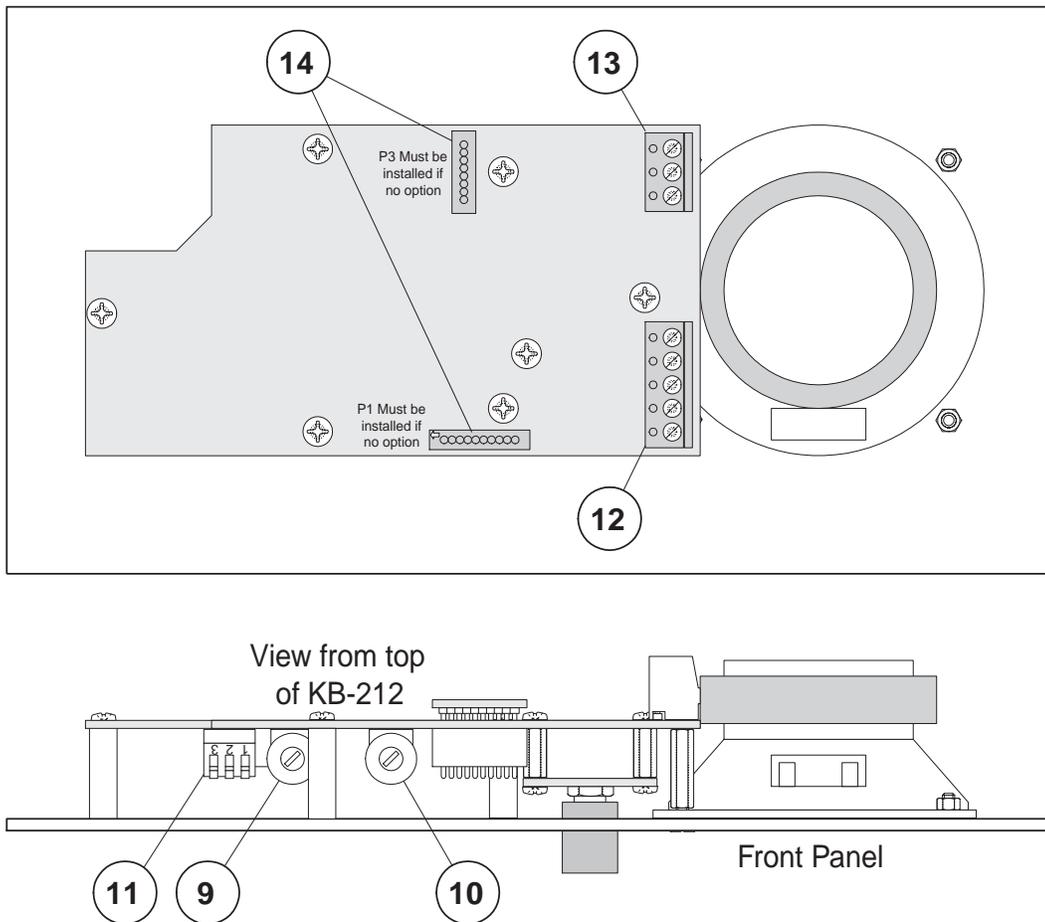
FIGURE 2: Internal Controls

9—Call Alert Tone Level Control

This control adjusts the volume of the Call Alert Tone sound. This is normally adjusted when the system is set up and shouldn't need to be adjusted during normal operation. This feature can be disabled by turning the control fully counterclockwise.

10—Minimum Volume Control

This control adjusts the minimum setting of the Intercom Level control on the front panel. Setting this control can prevent people from inadvertently turning the intercom level all the way down. This is normally adjusted when the system is set up and shouldn't need to be adjusted during normal operation. This feature can be disabled by turning the control fully counterclockwise.

11—Option Switches

Three Option switches are provided. They should be configured when the system is set up, but are not changed in normal operation.

Note: The ON position of each switch is toward the circuit board and the OFF position is toward the front panel. The function of these switches is as follows:

• Internal Microphone Gain (S1-1)— This switch determines the microphone's sensitivity. When the switch is in the ON position, talking should be done within 2 ft. of the front panel. If it is necessary to talk from a greater distance, the switch should be turned OFF. The default position of this switch is in the ON position.

• Operating Mode (S1-2 and S1-3)—These switches work together to define the operating mode of the KB-212. In modes other than Normal, the call signal from other stations on the same channel activates the KB-212. Refer to the following table:

Mode	S1-2	S1-3	Description
Normal	OFF	OFF	Speaker is on Mic is activated by the Talk button
Remote Page	OFF	ON	Speaker turns on by remote call signal control Mic is activated by the Talk button
Remote Listen	ON	OFF	Speaker is on Mic is activated by remote call signal control or by the Talk button
Remote Listen-Page	ON	ON	Speaker turns on by remote call signal control or by the Talk button Mic is normally on

Table 1: KB-212 Operating Mode Options

• The default position of these switches is in the OFF position for Normal mode, which is the only mode in which the Call Alert Tone functions operate. In other modes, the Call Alert Tone is automatically disabled to avoid interference with operation.

Note: Only Normal mode may be used when the EB-4W 4-Wire Option Module is installed.

12—Intercom Line Connection

The KB-212 contains a five-terminal, plug-on connector for intercom line connection. This connector is intended to be unplugged from the circuit board when connecting the intercom line, and then plugged back on when the wiring is completed. The connections for each pin are visible on the circuit board when the connector is unplugged. The pinout of this connector is as follows:

- Pin 1—(NC)

- Pin 2—(NC)

- Pin 3—Channel A Audio

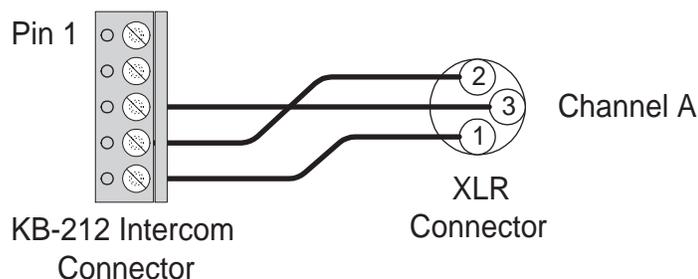- Pin 4—Power (30 VDC)

- Pin 5—Ground (Shield).

FIGURE 3: Intercom Line Connector Wiring

13—Program Input

A three-terminal, plug-on connector provides the program input to the station. Program is fed to the speaker. This level is controlled by the Program Level control. The Program Input accepts a balanced or unbalanced line-level audio signal from -20 dBv to +10 dBv. If this input is connected to the stage announce (SA) output of a Main Station it can be used as a paging input. Since the level of this input is independently adjustable from the intercom audio volume, it can be used to override the intercom audio in all modes except Remote Listen-Page. The program input is also independent of the Mode setting. The pinout of the Program Input connector is as follows:

- Pin 1—Ground (Shield)

- Pin 2— + Signal

- Pin 3— - Signal.
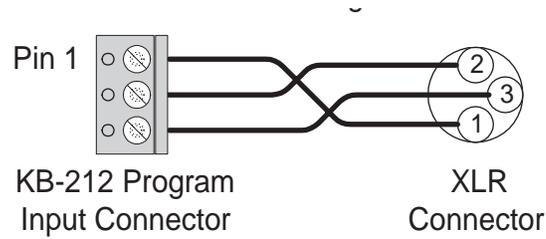
FIGURE 4: Program Input Connector Wiring

14—Option Board Jumpers

The two jumper plugs P1 and P3 must be installed when optional modules are not used. When the optional EB-4W or EB-TW Modules are used, both P1 and P3 must be removed. Save these jumper plugs for possible future use.

Note: The KB-212 will not operate without either the jumper plugs or the optional modules installed.
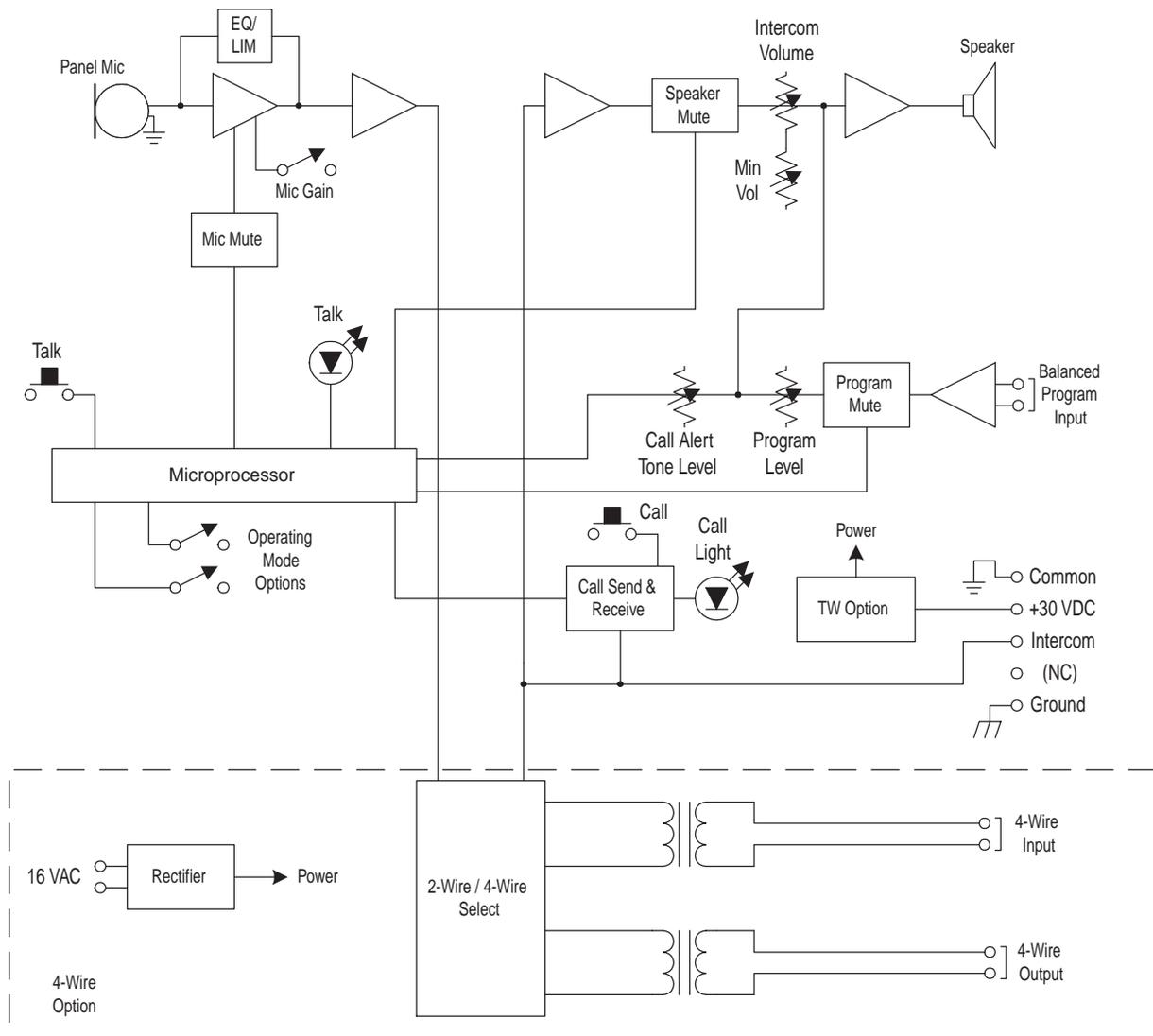
FIGURE 5: KB-212 Block Diagram

Troubleshooting

- **System does not operate. The Talk Light does not come on when Talk button is pressed**.

Scenario 1

No intercom connection to the KB-212. If the EB-4W 4-Wire Option Module is connected, no AC power to the KB-212.

Solution: Check connections and cable.

Scenario 2

The KB-212 has an internal failure.

Solution: Unit requires servicing.

- **System operates incorrectly. The Talk Light does not come on when Talk button is pressed or stays on until Talk button is pressed and the Speaker is off when it should be on.**

Scenario 1

Operating Mode switches are set incorrectly.

Solution: Refer to the option switch setting section of this manual.

- **Speaker does not operate. The Talk Light comes on when Talk button is pressed**.

Scenario 1

Intercom Level knob turned all the way down.

Solution: Adjust control appropriately.

Scenario 2

Speaker plug or wiring has come loose.

Solution: Make sure speaker is connected internally.

Scenario 3

Plug P3 missing on circuit board.

Solution: Plug P3 must be installed in jack J3 if the EB-4W or EB-TW option is not used.

- **Hum or buzz in system**

Scenario 1

Inductive pickup caused by close proximity of this speaker station or connected stations to power lines or transformers.

Solution: Relocate the offending unit or wiring. If the cable run is exceptionally long, consider adding and using the EB-4W 4-Wire Option Module. (Requires an additional 4-wire interface at the opposite end of a "long run.")

- **System feedback (Acoustical)**

Scenario 1

Intercom Level control at this station or another station is set too high.

Solution: Adjust.

Scenario 2

Channel unterminated.

Solution: Set the Main Station or Power Supply termination switch for the appropriate channel to the ON position.

Scenario 3

The KB-212's microphone is too close to an open speaker on the same channel.

Solution: Change the units' location.

- **Excessive crosstalk**

Scenario 1

High DC resistance in ground return.

Solution: Use heavier cable; add additional conductor(s) to ground return. If the cable run is exceptionally long, consider adding and using the EB-4W 4-Wire Option Module.

Scenario 2

Multi-channel cable pairs are not individually shielded.

Solution: Replace cable with individually shielded pairs.

- **Program signal sounds distorted.**

Scenario 1

Program Level control set too high.

Solution: Turn the Program Level control counter-clockwise.

Scenario 2

Overload of Program Input circuit.

Solution: Reduce the gain of the program signal at the source, such as an audio mixer.

- **The call signal does not function.**

Scenario 1

Excessive DC loading of intercom line.

Solution: Remove any audio transformers or other equipment that may be connected across the intercom line. If equipment other than Clear-Com intercom equipment must be connected to the intercom line, please contact Clear-Com application or service personnel for information or recommendations.

Scenario 2

Far too many terminations on the intercom line.

Solution: Check all main stations and power supplies to make sure each intercom channel is terminated at only one point.

Scenario 3

Plug P1 missing on circuit board.

Solution: Plug P1 must be installed in the J1 jack if the EB-4W or EB-TW options are not used.

Parts Lists

Parts List for the KB-212 Main PCB

Capacitors

Value		Type	Volts	Tol.	Part #	Designator
220	uF	Aluminum	35V		150021	C5 C18
22	uF	Tantalum	16V		150032	C21 C24
4.7	uF	Aluminum NP	50V		150087	C13
100	uF	Aluminum	35V		150136	C25 C45
22	pF	Ceramic Disc SMD	50V	5%	151116	C14
47	pF	Ceramic Disc SMD	50V	5%	151120	C7 C19 C30 C36
220	pF	Ceramic Disc SMD	50V	5%	151128	C26
390	pF	Ceramic Disc SMD	50V	5%	151131	C10
470	pF	Ceramic Disc SMD	50V	5%	151132	C17
.0015	uF	Ceramic Disc SMD	50V	5%	151138	C11
.0047	uF	Ceramic Disc SMD	50V	10%	151156	C27
.01	uF	Ceramic Disc SMD	50V	10%	151160	C32 C33 C35 C38 C44
.047	uF	Ceramic Disc SMD	50V	10%	151168	C23 C37
.1	uF	Ceramic Disc SMD	50V	10%	151172	C3 C4 C12 C15 C29 C39C40 C41 C46 C47
.22	uF	Ceramic Disc SMD	50V	10%	151176	C16 C22 C28
.47	uF	Tantalum SMD	35V	10%	151184	C31 C34
1	uF	Tantalum SMD	16V	10%	151185	C6 C20 C43
4.7	uF	Tantalum SMD	16V	10%	151189	C8
10	uF	Tantalum SMD	25V	10%	151192	C42

Resistors

Value		Power	Type	Tol.	Part #	Designator
10	OHM	1/4	Carbon Film	5%	410002	R19 R45
390	OHM	1/4	Carbon Film	5%	410005	R39
1.3K	OHM	1/2	Carbon Film	5%	410075	R28
2.2	OHM	1/10	SMD	5%	411181	R27
100	OHM	1/10	SMD	1%	411293	R40
301	OHM	1/10	SMD	1%	411339	R41
432	OHM	1/10	SMD	1%	411354	R15
475	OHM	1/10	SMD	1%	411358	R10
1.00K	OHM	1/10	SMD	1%	411389	R29
1.21K	OHM	1/10	SMD	1%	411397	R17
1.50K	OHM	1/10	SMD	1%	411406	R31
2.00K	OHM	1/10	SMD	1%	411418	R14 R38

3.24K	OHM	1/10	SMD	1%	411438	R26
4.75K	OHM	1/10	SMD	1%	411454	R20
5.62K	OHM	1/1O	SMD	1%	411461	R18
6.19K	OHM	1/10	SMD	1%	411465	R23
8.25K	OHM	1/10	SMD	1%	411477	R42
10.0K	OHM	1/10	SMD	1%	411485	R8 R44
12.1K	OHM	1/10	SMD	1%	411502	R13 R33
20.0K	OHM	1/10	SMD	1%	411514	R12 R24 R32
33.2K	OHM	1/10	SMD	1%	411535	R43
47.5K	OHM	1/10	SMD	1%	411550	R2 R4
68.1K	OHM	1/10	SMD	1%	411565	R35 R36
100K	OHM	1/10	SMD	1%	411581	R5 R21
121K	OHM	1/10	SMD	1%	411589	R22
221K	OHM	1/10	SMD	1%	411614	R48
475K	OHM	1/10	SMD	1%	411646	R46 R47
1.0M	OHM	1/10	SMD	5%	411677	R49
10K	OHM		X4 SMD DIP Isolated	1%	416016	R1 R7 R9
47K	OHM		X4 SMD DIP Isolated	1%	416018	R3
100K	OHM		X4 SMD DIP Isolated	1%	416019	R6
Pot	10K		TRIMPOT		470058	R34 R30
Pot	5K		TRIMPOT		470063	R37
Pot	5K		POT		470081	R25

Diodes and Transistors

Device	Description	Part #	Designator
LED	LOW CURRENT GREEN T1 3/4 LED	390021	D8
LED	LED, YELLOW, ULTRA BRIGHT T1 3/4	390057	D3
IC	LM384 POWER 4W OP AMP 14 PIN	480012	IC5
IC	7805L POS 5V REGULATOR TO-92 PKG	480088	IC10
Diode	BAV70 DUAL DIODE COM CATH... SMD	481019	D1 D7
IC	833 DUAL OPAMP... SMD	481023	IC1 IC2 IC8
Transistor	2907A PNP 60V 600MA... SMD	481027	Q2
Diode	BAV99 DUAL DIODE... SMD	481033	D2 D5 D6
Transistor	MPSA14 DNPN 30V 300MA... SMD	481038	Q4
IC	DG444 QUAD CMOS ANALOG SW SMD	481050	IC4
Transistor	J175 P-CHANNEL JFET... SMD	481056	Q1
Diode	5.1V 5% ZENER 1/4W... SMD	481061	D4
Transistor	MPSA64 DPNP 30V 500MA SMD	481075	Q3
IC	MICROPROCESSOR, KB/MR SERIES	710508	IC9

Miscellaneous

Device	Description	Part #	Designator
Connector	5 POS, SCREW TERM. PLUG-IN 5MM	210085	P4
Connector	3 POS, SCREW TERM. PLUG-IN 5MM	210370	P2
Pot	SHAFT FOR PIHER POT FIG 3 GREY PT10	240043	R30 R34
Pot	PIHER TRIMPOT SHAFT, GREY	240057	R37
Pot	KNOB GREY INSERT	240077	R25
Button	ROUND MINIATURE BUTTON, BLACK	240081	S2

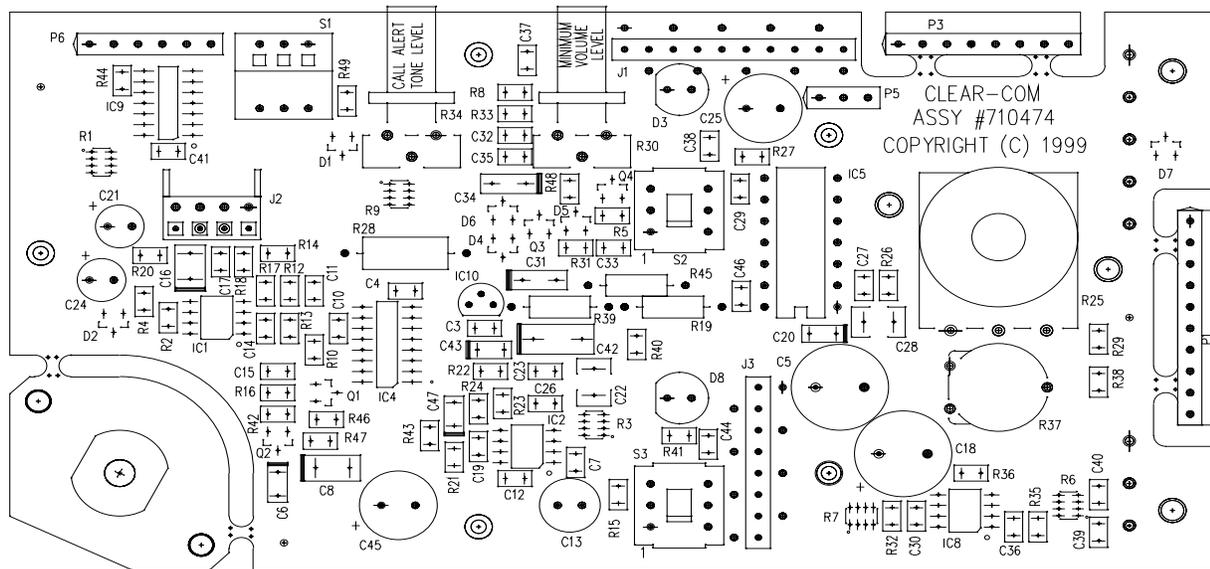| Button | RECT. MINIATURE BUTTON, BLACK | 240082 | S3 |
Lens	LENS, YELLOW, ROUND FOR T1 3/4	240099	D3
Speaker	2 1/2 IN. SPKR 8 OHM 3.5W	500103	
Panel Mic	ELECTRET MIC ELEMENT W/PINS	500132	
Switch	DPDT P.B. MINIATURE W/LONG PLUNGER	510107	S2 S3
Switch	DIP SWITCH PIANO 3 POS	510114	S1
	RUBBER MIC MOUNT	640027	

FIGURE 6: Main PCB Component Layout
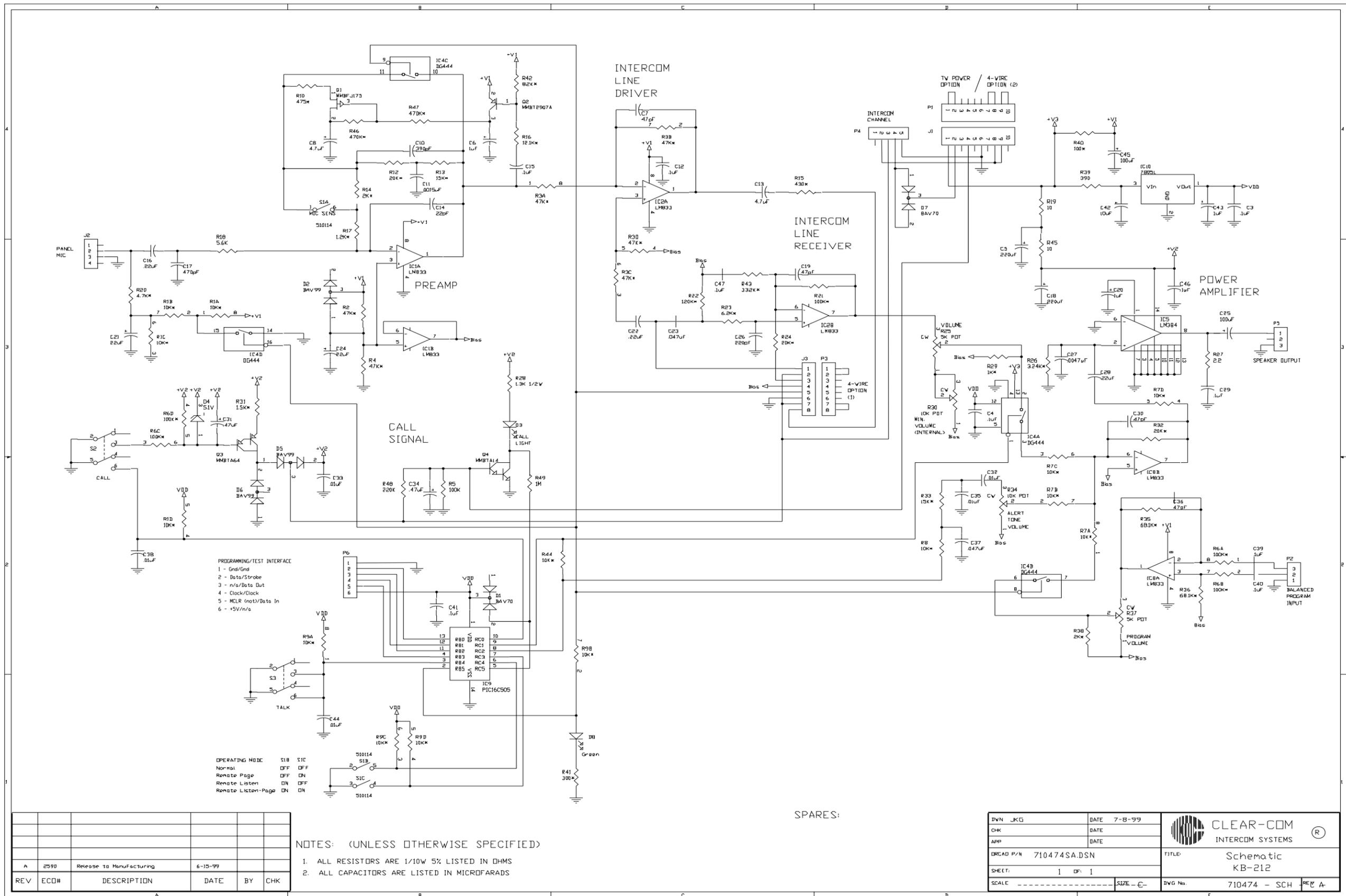
FIGURE 7: KB-212 Schematic

Rev. B

This page is a place holder.

Technical Specifications

Panel Microphone Pre-Amp

Input Type:	Electret
Gain from panel mic to intercom line:	+25 dB, low sensitivity; +31.5 dB high sensitivity

Pre-Amp Response Curve

Frequency Response:	250 Hz to 12 kHz, contoured for intelligibility
Limiter Range:	20 dB

Speaker Amplifier

Speaker Type:	2.5 in. round, 16 ohm
Power Output:	2 W into 16 ohms
Frequency Response:	200 Hz to 15 kHz, ±3 dB
Signal-to-Noise:	75 dB
Gain from intercom line:	+37 dB
Distortion:	< 0.5% THD at 1 kHz
Speaker Level:	98 dB SPL at 3 ft.

Program Amplifier

(Transformerless, balanced differential input)

Input Level:	-20 dBV
Input Impedance:	> 100k ohm
Frequency Response:	150 Hz to 15 kHz, ± 3 dB

Power Requirements

Voltage:	30-VDC standard unit; 16 to 18 VAC with 4-Wire Option Module
Current:	100 mA average

Internal Connectors

Intercom:	five-position, plug-on screw terminals
Program:	three-position, plug-on screw terminals
AC Power (4-Wire Option Module):	two-position, plug-on screw terminals

Internal Controls

(3) Option switches; (1) Tone Alert Volume control; (1) Minimum Volume Level control

Front Panel Controls & Indicators

(1) Program Level control; (1) Intercom volume control; (1) Talk button; (1) Call button; (1) Talk LED; (1) Call LED

Environmental

32 to 122 F (0 to 50 C)

Dimensions

8.25 in. W x 4.5 in. H x 1.75 in. D (210 mm x 114 mm x 44 mm)

Weight

1.04 lbs. (0.47 kg)

Notice About Specifications

While Clear-Com makes every attempt to maintain the accuracy of the information contained in its product manuals, that information is subject to change without notice. Performance specifications included in this manual are design-center specifications and are included for customer guidance and to facilitate system installation. Actual operating performance may vary.

KB-212 Manual P/N 810254

© 2000 Clear-Com Systems

All Rights Reserved

Clear-Com Limited Warranty

The Clear-Com warranty does not cover any defect, malfunction, or failure caused beyond the control of Clear-Com, including unreasonable or negligent operation, abuse, accident, failure to follow instructions in the manual, defective or improper associated equipment, attempts at modification and repair not authorized by Clear-Com, and shipping damage. Products with their serial numbers removed or defaced are not covered by this warranty.

This warranty is the sole and exclusive express warranty given with respect to Clear-Com products. It is the responsibility of the user to determine before purchase that this product is suitable for the user's intended purpose.

Any and all implied warranties, including the implied warranty of merchantability are limited to the duration of this express limited warranty. Neither Clear-Com nor the dealer who sells Clear-Com products is liable for incidental or consequential damages of any kind.

For your own records fill in the information below:

Model No _____ Serial No. _____

Date Purchased _____

Purchased from (dealer) _____

Address _____

City _____ State _____ ZIP _____

Factory Service

All equipment returned for repair must be accompanied by documentation stating the return address, telephone number, date of purchase, and a description of the problem.

Note: Do not return any equipment to the factory without first obtaining a Return Authorization Number.

Send equipment to be repaired to:

> **Customer Service Department**
> **Clear-Com Intercom Systems**
> **4065 Hollis Street**
> **Emeryville, CA 94608-3505**
> **Telephone: (510) 496-6666**
> **Fax: (510) 496-6601**

Warranty Repairs

If in warranty, no charge will be made for the repairs. Equipment being returned for warranty repair must be sent prepaid and will be returned prepaid.

Non-Warranty Repair

Equipment that is not under warranty must be sent prepaid to Clear-Com. If requested, an estimate of repair costs will be issued prior to service. Once repair is approved and repair of equipment is completed, the equipment will be shipped freight collect from the factory.

Clear-Com®
Intercom Systems

4065 Hollis Street, Emeryville, CA 94608
(510) 496-6666 Fax (510) 496-6601
Manual Part Number 810254 Rev. B