

**KB-112**  
**Speaker Station**

INSTRUCTION  
and  
SERVICE MANUAL



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**KB-112 REMOTE STATION  
OPERATION & SERVICE MANUAL**

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## I. INTRODUCTION TO THE KB-112 REMOTE SPEAKER STATION

The KB-112 is a versatile, single-channel Remote Station that provides two-way (talk/listen) communicating ability. Compatible with all Clear-Com intercoms, the KB-112 is ideal in places where wearing a headset is not feasible: dressing rooms, security entrances, etc. The KB-112 has a push-to-talk electret mic and a built-in speaker with a wide frequency response.

### OPERATING MODES

The KB-112 features "control logic" CMOS circuitry for programming the operation of the station. This allows remote or local control (or both) of the speaker and the mic. The station operator pre-sets a bank of dip switches that are located on the electronics module. If pre-set for remote control, the KB-112 speaker and/or mic can be activated by all other Clear-Com stations (on the same channel, using the visual signal circuitry).

The KB-112's operating modes are:  
**NORMAL:** Speaker is on. Mic is locally activated by pushbutton on front panel.

**REMOTE PAGE:** Speaker is off except when turned on by remote control, used to page anyone at that KB-112's location. Mic is activated locally.

**REMOTE LISTEN:** Speaker is on. Mic is turned on locally OR by remote control, which allows that KB-112 operator to talk "hands-free."

**REMOTE LISTEN-PAGE:** Speaker is normally off. Mic remains on for hands-free talking. Another station can turn off the mic and turn on the speaker for paging that KB-

112's operator.

The KB-112 front panel contains a red LED that lights whenever the mic is active. This is especially helpful when your KB-112 is remotely controlled; the LED shows that another station operator has turned on your mic.

Other KB-112 features are intercom volume control, Visual Call Signal button, and amber Call lamp.

### PROGRAM INPUT

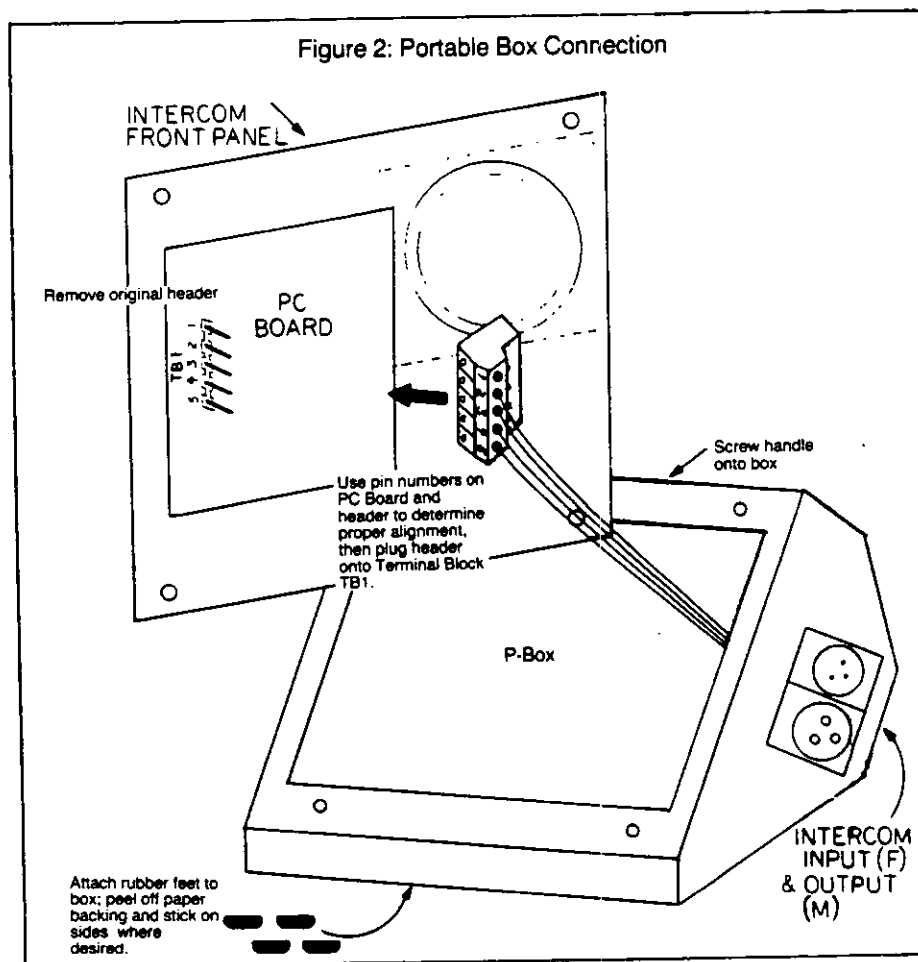
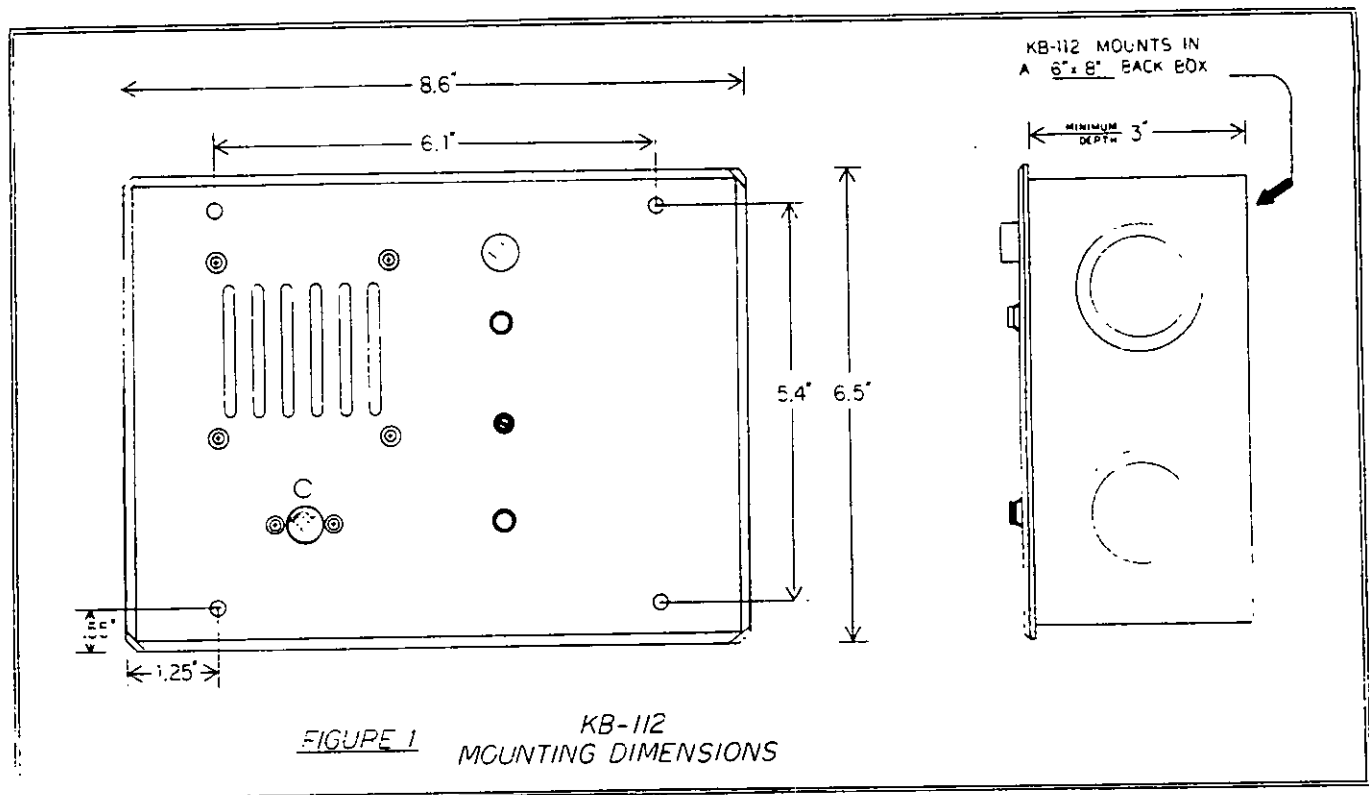
If desired, you can monitor external program via the KB-112; its wiring terminal strip includes an access point for input from the auxiliary audio source. The station accepts an unbalanced, line-level signal from audio gear such as mic mixers or portable amps, and mixes it with the intercom output from the speaker.

### INSTALLATION

The KB-112 is a custom-mounting station; its non-glare, charcoal-brown, aluminum front panel installs in a cut-out in the wall or a console, or inside a standard 6" x 8" Nema Type 1 box.

For portable use, you can install the KB-112 in Clear-Com's "P-Box," a rugged, lightweight aluminum enclosure with a sloped front, walnut side panels, and a carrying strap. It provides 3-pin XLR connectors for input and extension.

The KB-112 connects to the intercom system with standard, two-conductor (individually-shielded) mic cable.



## II. INSTALLATION OF THE KB-112

The KB-112 can be mounted in a cut-out in any surface, or it can mount inside a 6" by 8" Black (electrical) Box (minimum depth, 3"). See figure 1 for dimensions.

The KB-112 connects to the intercom system through its five-screw terminal strip (designated as "TB-1" on the PC Board Lay-Out; see Figure 3). Route two-conductor, shielded cable (i.e. Belden 8762) from the Main Station or Power Supply output connector to the KB-112's location. Unshielded cable may be used where AC interference is not a problem.

After preparing a surface for installation (refer to Fig. 1), bring wiring into the header on TB1 (the terminal block), and connect leads according to the following TB-1 pin assignments:

Pin 1--Chassis Ground  
Pin 2--Program Input  
(or no connection)  
Pin 3--Intercom Audio  
Pin 4-- +30 volts DC  
Pin 5--Common

The KB-112 may be mounted inside the Clear-Com Model "P" Box, thereby becoming a portable Remote Station. The "P" Box is a sloped-front, sturdy steel enclosure supplied with a handle, rubber feet, and screws for attaching the handle and the intercom to the chassis.

When the KB-112 is mounted in the portable enclosure, it connects to the intercom system with the 3-pin, XLR-type connectors located on the side of the chassis. There is one female connector for the input and one male connector for extending the intercom line to other stations. Inside the box, the connectors are wired to a 5-pin header, which you plug onto the terminal block on the KB-112 PC Board.

To install the KB-112 in the P Box:

- 1) Remove the plastic header from the terminal block (TB1) on the KB-112 PC Board; pull straight up to lift header off.
- 2) A similar header is wired to the P-Box's 3-pin connectors; plug that header onto terminal block TB-1. The header, terminal block and PC Board are clearly labelled with the pin numbers to ensure proper connections. See Figure 2, Portable Unit Connection.
- 3) Attach the KB-112 to the enclosure using the supplied screws. If desired, attach the handle and the protective rubber feet on the suitable sides. The enclosure also has cut-outs on each side for hanging it, in any position, from the wall, a console, or where desired.

Use standard two-conductor mic cable to interconnect the portable station within the intercom system. The pin-out assignment for each XLR connector is:

Pin 1-- common  
Pin 2-- +30 volts DC  
Pin 3-- intercom audio

Route cable from the Main Station/Power Supply (or other Remote Station) to the portable KB-112 and input to the female connector. Use the male output connector to "daisy-chain" the intercom line between the KB-112 and another portable Remote Station.

Before operating either the KB-112 or installing it in the portable enclosure, be sure that the unit's dip switches are set to the desired positions.

### III. OPERATING CONTROLS

The KB-112 controls are straight-forward and simple to use.

The **Volume** control adjusts the listen-level of the speaker.

The red **Call** push-button activates the intercom system's Visual Signalling circuit. The signal remains active as long as you press the Call button. It allows you to attract the attention of operators who have removed their headsets, by illuminating the Call lights at all stations that are communicating on

your channel.

The other important feature of the **Call** button is its ability to activate the mic and/or speaker of any KB-112 (on the same channel) that is pre-set for remote control.

The **Call Light** on the KB-112 lights up when another station's operator (on the same channel) presses the Call button.

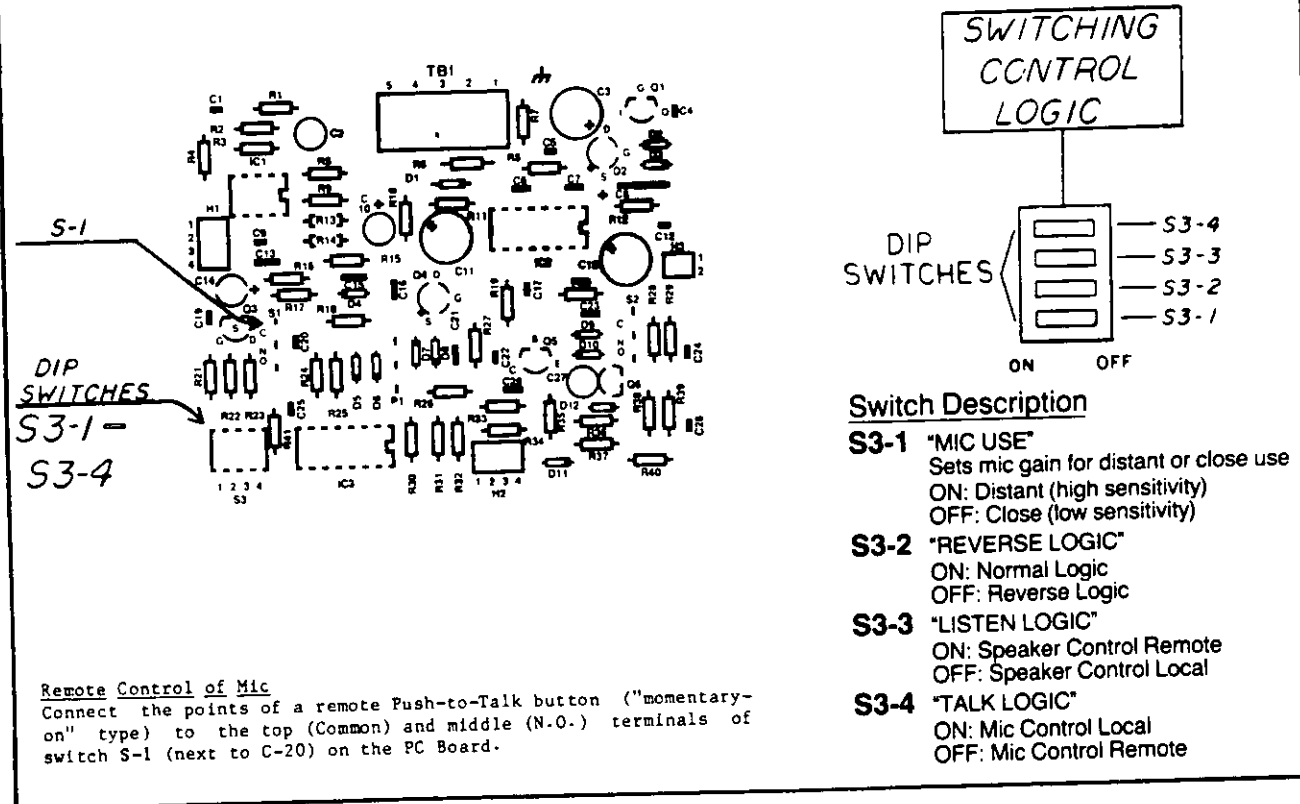
#### ALTERNATE OPERATING MODES

At the factory, Clear-Com sets the KB-112 for the **NORMAL** operating mode.

To pre-set the KB-112 for Remote Page, Remote Listen, or Remote Listen-Page, change the position of one or more dip switches (designated as S3-1, S3-2, S3-3, and S3-4). See Figure 3, PC Board Lay-Out, for the location of these switches. The chart below describes the functions that occur during each set-up, and which switch positions enable these functions.

OPERATING MODE	Switch Setting		
	S3-2	S3-3	S3-4
<b>"Normal"</b> – speaker is on – mic activated by front panel push-button	ON	OFF	ON
<b>"Remote Page"</b> – speaker turns on by remote control – mic activated by front panel push-button	ON	ON	ON
<b>"Remote Listen"</b> – speaker is on – mic activated by remote control	ON	OFF	OFF
<b>"Remote Listen-Page"</b> – speaker turns on by remote control OR by front panel push button – mic is normally on	OFF	OFF	OFF

**Figure 3**  
**KB-112 PC BOARD LAY-OUT**



**USING THE MIC**

When set up for the Normal, Remote Page, or the Remote Listen mode of operation, the black push-button on the KB-112 front panel determines the mic's activity. To talk on the intercom channel, press this button. As long as you press it, the mic is "on" and the red LED above it lights up, indicating that other operators can hear you.

When set up for Remote Listen, the mic will also turn on when another Station (which must be on the same channel) activates the Call circuit. This allows the KB-112 operator to talk "hands-free." The mic-on LED and the Call Light both illuminate when a remote operator turns on the mic.

When set up for Remote Listen-Page the mic remains on, so the KB-112 operator can talk "hands-free." The mic and the mic-on LED are on until another Station (on the same chan-

nel) wants to page the KB-112 operator. The remote operator then presses his Call button, which turns off the KB-112 mic and LED and turns on the KB-112 Call Light and speaker.

**Distance from Mouth to Mic:**

A fourth internal dip switch (designated as "S3-1") determines how close you should be to the mic when talking. This switch is normally set to "off," which means you should be within two feet of the front panel when talking into the mic (i.e., during the Normal and Remote Page modes).

However, you should change the dip switch to "on" when talking into the mic will occur from a greater distance, i.e. during Remote Listen or Remote Listen-Page (when the operator can talk hands-free).

### USING THE SPEAKER

When the KB-112 is set up for the Normal mode or the Remote Listen mode, its speaker stays "on" so the operator can monitor activity on the intercom channel. When the operator turns on the mic (or if the mic is turned on from a remote location), the speaker automatically shuts off.

When the KB-112 is set up for the Remote Page mode, the speaker can turn on only when another Station

activates the Call circuit. That Station must be connected to the same channel used by the KB-112.

When the KB-112 is set up for the Remote Listen-Page mode, the speaker stays off EXCEPT when another Station activates the "Call" circuit. Due to the nature of the reverse logic, when in this mode the KB-112 operator can also turn on the speaker by pressing the black "push-to-talk" button.

### USING THE EXTERNAL PROGRAM INPUT

If your intercom is used in theatrical or musical production, the KB-112's "Program Input" might be useful. It enables you to listen to an external audio source in addition to the intercom audio. Simply feed an unbalanced, line-level signal to the KB-112 terminal strip.

This application works when the KB-112 is set up for "Normal," "Remote Page," or "Remote Listen" mode of operation. The program audio is completely isolated from the intercom audio, and is cut off when the KB-112's mic is activated.

#### Connecting The Input

The program access point is high-impedance, about 500k ohms. Therefore it can be driven by an audio device of virtually any impedance; it could be the monitor buss off a

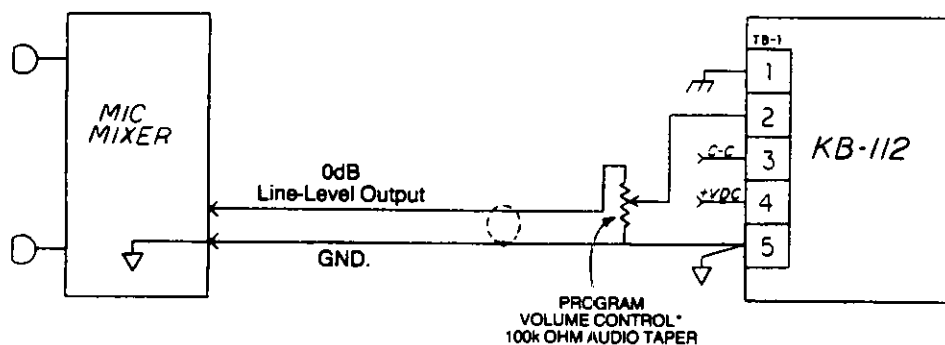
mixing console, the output of a mini mic-mixer, the pre-amp output of an amp, etc.

Use single-conductor, shielded cable to input "program" to the KB-112. Connect the hot lead from your source to **terminal 2** on the KB-112 terminal strip, and connect the ground lead from your source to **terminal 5**.

If a balanced input is desired, insert a balancing transformer between the KB-112's access point and the program source.

The program volume is adjustable from the source end; use the audio source's VU meter reading as a volume control reference. Or for local control of the program volume, refer to the set-up shown in Figure 4, Typical Program Feed.

Figure 4: TYPICAL PROGRAM FEED



\* Volume Control is optional. If desired, it may be installed at either the KB-112 end or the program source end.



#### IV. PARTS LISTING

Part #	Description	Qty.	Schematic Reference Desig.
710133	KB-112 PC Module Assembly	1	---
250156	Front Panel	1	---
500089	Speaker, 3" round, 16 ohm	1	SP1
250054	Speaker screen, 3"		
470037	Trimpot (volume)	1	P1
500056	Mic, electret	1	M1
640005	Mic bushing		
640027	Rubber mount for mic		
390000	Lamp, amber	1	I1
390007	Red LED	1	I2
510028	Switch, momentary push	2	S1, S2
240020	Switch cover, red	(1)	
240021	Switch cover, black	(1)	
280067	Dress cone nut	(2)	
210085	Terminal Strip, 5-screw	1	TB1
210086	Header	(5)	
250178	Terminal Strip label	1	
250193	Dip Switch label	1	
210002	Intercom Input, D3M	1	J1 (P Box)
210003	Intercom Output, D3F	1	J2 (P Box)
240003	Handle	1	P Box
240010	Rubber foot, 1/2" square	8	P Box
810027	Instruction Manual	1	

#### V. THEORY OF REMOTE STATION OPERATION

Refer to the KB-112 Schematic (last page) when reading this section for a clearer understanding of what occurs during KB-112 operation.

The KB-112 incorporates Clear-Com's high-impedance bridging method, so it connects to the intercom line without taking appreciable power from the line. This enables up to 20 Stations to be connected on one line extending from the Main Station or Power Supply, with only a 6

dB loss in audio level.

The KB-112 is a "half-duplex" device, which means that its operator cannot simultaneously talk and listen; only one action may occur at a time.

During "normal" operation, the speaker remains on and the mic off. The Push-To-Talk button (S1 in the Schematic) shuts off the speaker and turns on the mic; this button

works with the Control Logic circuitry in order to operate the analog switches. For this to happen, the dip switches S3-2 and S3-4 should be closed. This means the output of IC3-2 is low.

When the P-T-T switch is activated, the output of IC3-2 goes high. This causes the output of IC3-3 to go high, turning on the "mic-on" LED. The high voltage goes to the input of R8, which turns on FET Q2, shutting off amplifier IC2. The same high level also turns on FET Q3 and supplies power to the electret mic, completing the feedback loop of IC1-1, thus turning on the mic pre-amp.

By changing the settings of the Control Logic dip switches (S3-2 to S3-4), we change the control voltages going to the digital amplifiers, making different operating modes possible.

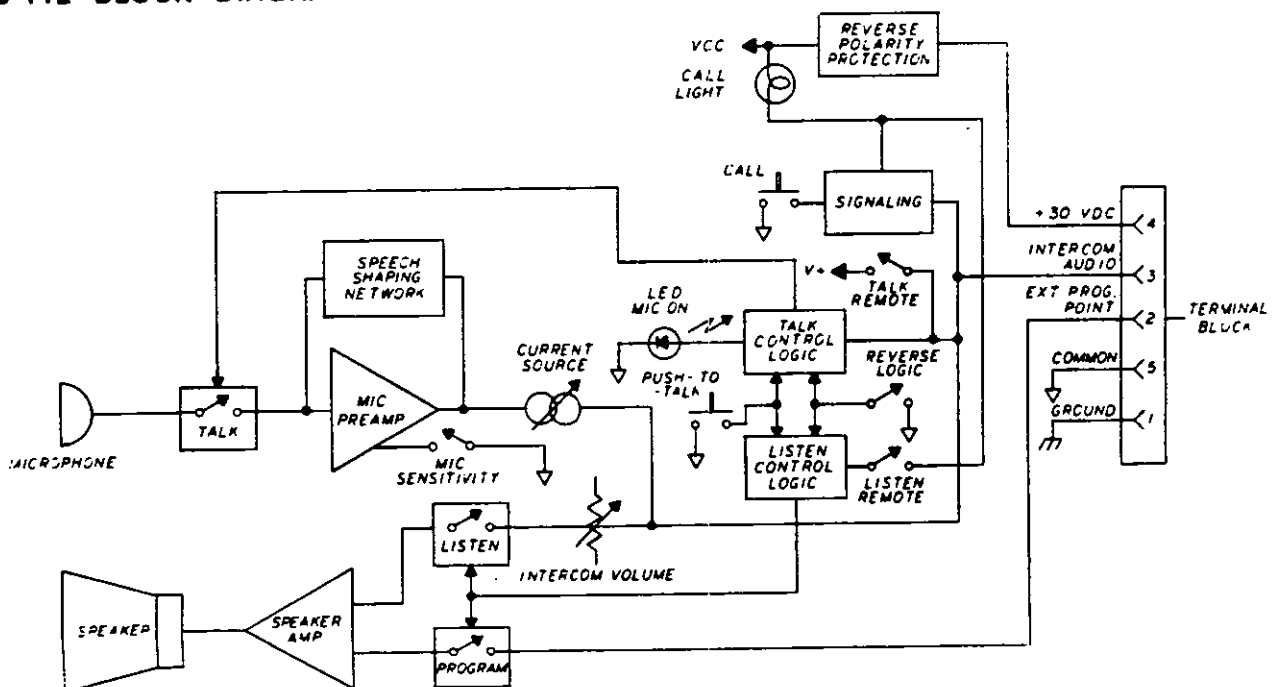
#### Communication Circuitry

In the "Talk" circuit, signals from the mic are amplified 44 dB by a low-level preamp (IC1-1). Preamplified signals are sent to the audio line (where they are attenuated by

17 dB) and to the line buffer amp (IC1-2). The line buffer feeds part of the signal back to the bridging circuit, raising the line impedance to 15k ohms. When the mic is off, the mic preamp gain is reduced to unity, reducing any noise in the input circuitry by 30 dB. When dip switch S3-1 goes from open to closed, the gain adjustment of the mic input is increased by 7 dB.

The VISUAL CALL SIGNAL is accomplished by impressing DC voltage on the audio line. Pressing the Call button (S2) turns on transistor Q6, applying about 11 volts to the intercom line. A receive-call signal entering a KB-112 is detected by transistor Q5, which in turn is detected by a darlington amp which turns on the Call light (I1; during alternate operating modes when dip switch S3-3 is closed, the same control voltage is also used to activate the mic and speaker amp on/off functions). The call-receive circuit requires only 4 volts (at 100 ma) to turn on the light. The 7-volt difference between the send and receive voltages assures positive signalling, even on very long lines.

#### KB-112 BLOCK DIAGRAM



## VI. KB-112 SPECIFICATIONS

### AMPLIFIER DESIGN

Solid-state, integrated circuit amps including a mic preamp, speaker power amp, signalling circuit, logic control circuit. Current-limited with short-circuit and reverse polarity protection.

### MIC PREAMPLIFIER

**Freq. Response:** 200-12k Hz, contour to enhance intelligibility

**Mic Preamp Gain:**  
25 dB, low sensitivity  
31.5 dB, high sensitivity

**Mic Type:** electret

### SPEAKER AMPLIFIER

**Speaker Type:** 3" round, 16 ohm

**Power Output:** 2 watts into 16 ohms

**Freq. Response:** 100-15k Hz,  $\pm 3$  dB

**Signal-to-Noise:** 75 dB

**Equivalent**

**Input Noise:** 121 dB

**Line-to-Speaker Gain:** 30.5 dB

**Distortion:** 0.5% THD at 1k Hz

**Speaker Level:** 98 dB @ 3 feet

### GENERAL SPECS

#### Station Bridging

**Impedance:** 18k ohms (200-10k Hz)

#### Power Requirements:

17 ma quiescent, 60 ma average talk  
60 ma signalling, 60 ma remote control, 200 ma short circuit

**Voltage Range:** 12-32v, 28v nominal

**Line Level:** 1 dB max

**Signal Voltage:** 11VDC on audio line

**Call Light Sensitivity:** 4 volts

**Aux. Input Impedance:** 500k ohms

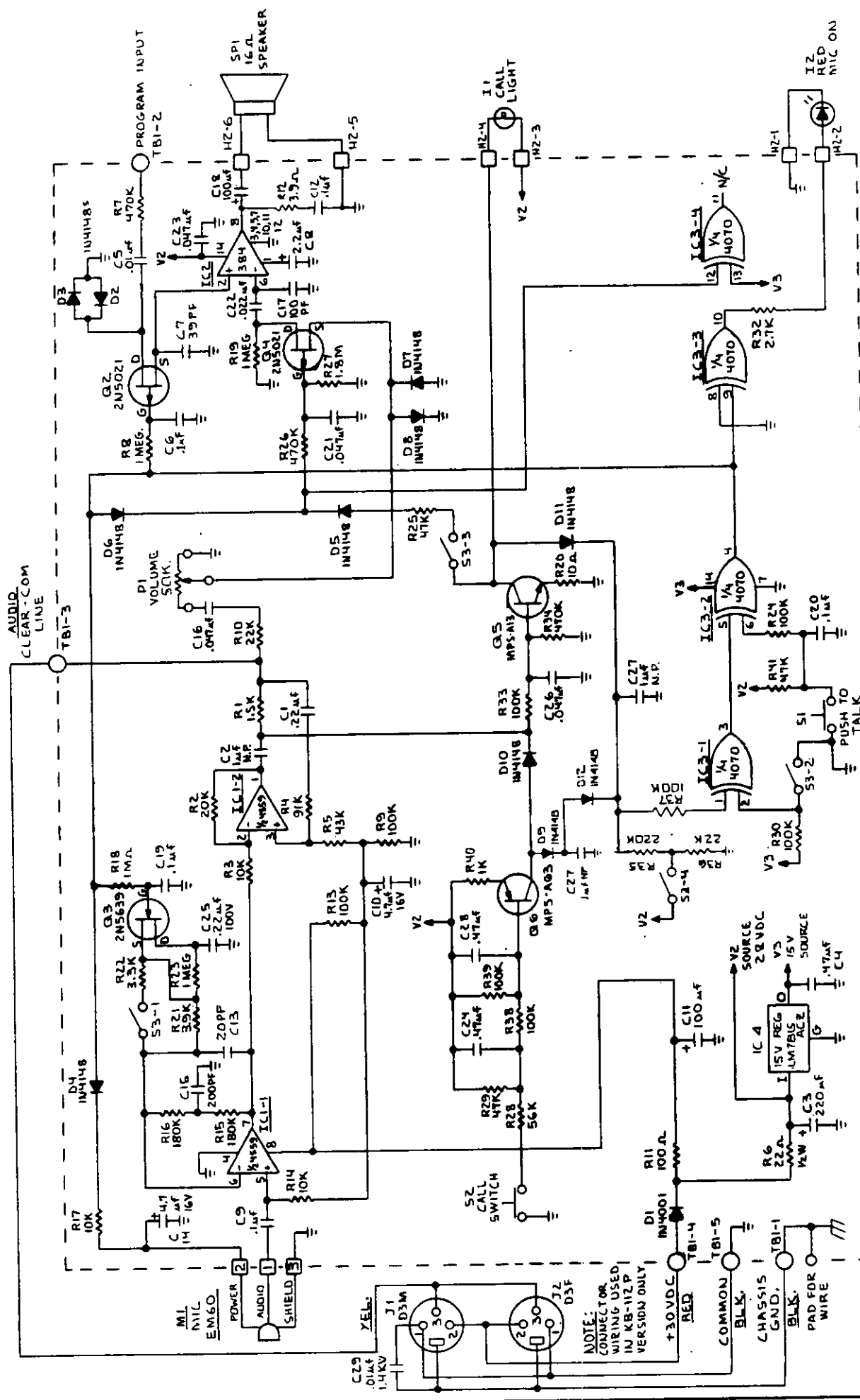
**Aux. Input Level:** .7v for max output

#### DIMENSIONS (front panel):

8.6" wide x 6.5" high x 1.4" deep

#### NOTE:

"WHILE CLEAR-COM MAKES EVERY ATTEMPT TO MAINTAIN THE ACCURACY OF THE INFORMATION CONTAINED IN ITS PRODUCT MANUALS, THE INFORMATION IS SUBJECT TO CHANGE WITHOUT NOTICE."



**Clear-Com**  
intercom systems

**SCHEMATIC**  
KB-112

SCALE: 1" = 100' 0"

DRAWING NO: KB-112-SSD-C-F

DATE: 11/11/71

DO NOT SCALE

LAST REF. DESIGNATOR'S USED

C30	I3
R42	I2
D12	SPI
G6	P1
S3	IC3
IC3	H3
T1	T1

S3 (DIP SWITCH) POSITIONS

1. \* INDICATES NORMAL OPERATION
2. S3-1 LOW GAIN (OPEN) \*  
S3-1 HIGH GAIN (CLOSED)
3. S3-2 PUSH TO LISTEN (OPEN) \*  
S3-2 PUSH TO TALK (CLOSED) \*  
S3-3 REMOTE PAGE OFF (OPEN) \*  
S3-3 REMOTE PAGE ON (CLOSED)
4. S3-4 LOCAL CONTROL OF S3-2 FUNCTIONS (OPEN) \*  
S3-4 LOCAL CONTROL OF S3-2 FUNCTIONS (CLOSED) \*
5. NOTE S3-3 MUST BE (OPEN) FOR REMOTE CONTROL FUNCTIONS
6. NOTE S3-3 MUST BE (OPEN) FOR REMOTE CONTROL FUNCTIONS

NOTE:  
CONNECTOR  
WIRING USED  
IN KB-112 P  
VERSION ONLY

