MR-202/MR-204

TWO- AND FOUR-CHANNEL HEADSET STATIONS

USER MANUAL

Clear-Com®
Intercom Systems

Introduction

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

The MR-202 Two-Channel and MR-204 Four-Channel Headset Stations are powerful, yet user-friendly units that can serve as versatile intercom stations.

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™ MR-202 and MR-204 are headset stations ideal for use in theatres, live performances, industrial environments, and small television facilities. They feature speech intelligibility in all noise levels and can be customized through their programmable options.

Selectable, multi-channel talking and/or listening allows the operator to communicate on one of two (MR-202) or four (MR-204) intercom channels. The dual-action talk button operates in electronic momentary or latching mode. The MR-202 and MR-204 offer visual call signaling to attract the attention of operators. The Remote Mic Kill (RMK) feature on main stations will turn off any open microphones on these headset stations.

The MR-202 and MR-204 stations accept dynamic headsets, such as the Clear-Com PL-Pro™ or the HS-6 Telephone Headset Series. A sidetone control allows the operator to vary the level of his voice heard in the headset.

The MR-202 and MR-204 receive 30-V DC power from the Clear-Com intercom line. They mount in a standard two-gang electrical outlet box. The extra-thick front panel and compact, surface-mount circuitry results in a small size and lighter weight package that maintains Clear-Com ruggedness. The intercom channels connect to a plug-on screw terminal strip.

The optional EB-TW daughter board module can be installed to provide an interface to two intercom channels on a single microphone cable. Also, the EB-TW 4-Wire daughter board module is available to allow long-distance connections using separate pairs of wire for send audio and receive audio. The EB-4W 4-Wire option supports two-channel operation and may only be used on the MR-202.

The MR-202 and MR-204 are compatible with all Clear-Com Party-Line intercoms.

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Quick Start

1. Unpack the unit and inspect for any damage that may have occurred during shipping.
2. Connect the intercom lines. If less than the maximum number of intercom lines are to be connected, link unused intercom inputs to a connected input with jumper wires.
3. Install the MR-202 or MR-204 into the two-gang outlet box. (For additional information, refer to the Clear-Com PL-Pro™ System Installation Manual.)
4. Connect the appropriate headset or handset.
5. Set Listen Levels and Sidetones. (Refer to “3—Intercom Level Control” on page 4 and “4—Sidetone Control” on page 4.)
6. The headset station should now be operating properly.
7. Read the rest of this manual for further information.

Operation

Normal operation of the MR-202 or MR-204 Headset Station only requires 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. Set the Sidetone control for the desired amount of sidetone in the earphone.

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Front Panel

The controls, indicators, and connectors found on the MR-204 front panel are shown in Figure 1 on page 3 and are described by the following text. The MR-202 front panel is identical except the channel switch has two positions.

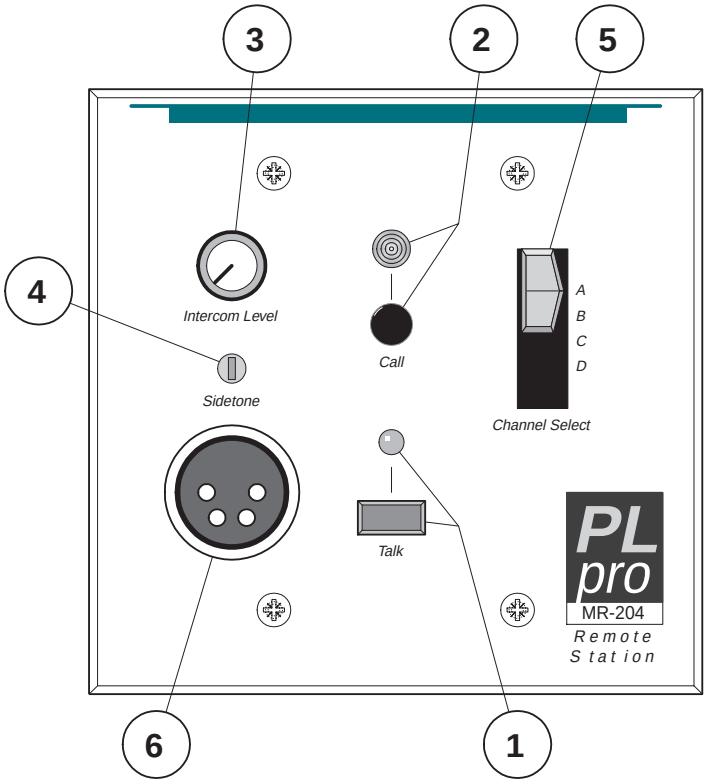

FIGURE 1: Front Panel

1—Talk Button and Lamp

The Talk button activates the microphone feed to the selected intercom channel. The Talk button has a dual action (momentary or latching) depending upon how the button is pressed. If desired, the latching function can be defeated using an internal switch. The following describes the various functions of this button.

- Momentary—Press and hold the Talk button while speaking. Release it when finished.
- Latching—Press and release the button quickly to latch the Talk function. Press and release the button again to turn off the Talk function.

- Talk Indication—The associated Talk lamp will illuminate green when the Talk function is activated.

2—Call Button and Lamp

Pressing the Call button will send a call signal on the selected channel. All the call lights on that channel will then flash. Call signals can also be sent while talking if required. The Call lamp will light while the Call button is pressed, or whenever a call signal is present on the selected channel.

3—Intercom Level Control

Turn this control to set the listen level required on the headset.

4—Sidetone Control

Sidetone is the level of the operator's voice that heard while talking on the intercom. Setting a comfortable level of sidetone will ensure that the intercom line sounds alive and also helps modulate the operator's voice relative to other voices on the line.

Use the following procedure to correctly set the Sidetone level control.

1. Set the Intercom Level control to a comfortable level by having someone talk to the operator from another station.
2. Press the Talk button and speak into the microphone while turning the Sidetone control slowly back and forth until you hear your voice at a comfortable level in the headset.

Note: Do not force the trimpot past its stop points. This will damage it.

5—Channel Switch

This switch selects the intercom channel (A, B, C, or D) on which the headset station is active.

6—Headset Connector

The headset connector is located on the front panel. All Clear-Com headsets are recommended for use with the MR-202 or MR-204. The Clear-Com PT-4 Push-to-Talk Microphone or the HS-6 Telephone Handset will also plug into the headset connector. The following is a description of the characteristics of a suitable headset:

- Mic Type—Dynamic; 150 to 400 ohms impedance; -55 dB output level
- Headphone—Dynamic; 50 to 2000 ohms impedance.

The wiring of the headset is to be as follows:

- Pin 1—microphone ground (shield)
- Pin 2—microphone hot
- Pin 3—headphone ground
- Pin 4—headphone hot.

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The microphone and headphone wiring in the headset cord must be individually shielded.

Note: Do not connect Pins 1 and 3 together. Headset extension cords or headset “Y” cables are not recommended because they may increase crosstalk between channels.

Internal Adjustments and Connections

The controls and connectors found inside the MR-202 and MR-204 are shown in the following figure and described by the following text. The jumpers can be accessed without completely removing the panel from its wall box 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. The jumpers will be accessible as shown in the lower view of Figure 2 on page 5.

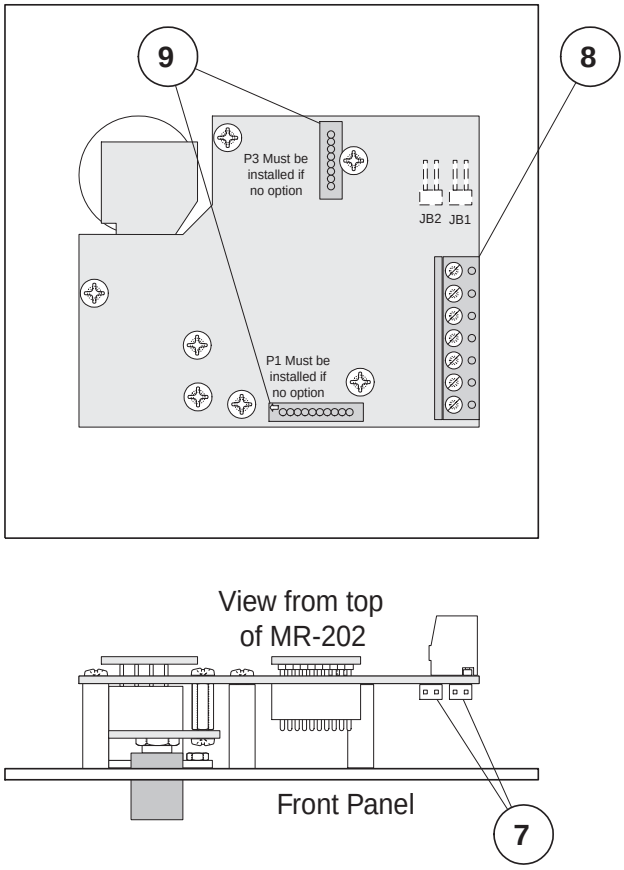

FIGURE 2: Internal Adjustments and Connections

7—Option Jumpers

Two option jumpers, JB1 and JB2, are provided. They should be configured when the system is set up, but shouldn't need to be changed during normal operation.

Note: The default position of the jumpers is in the OPEN (only one pin connected) position. The function of each jumper is as follows:

JB1—Long Line

If a long cable run is unavoidable and approaches 1,000 ft. or more, set the Long Line option jumper to the CLOSED (both pins connected) position. The ability to set a sidetone null depends upon properly setting this jumper.

JB2—Latch Disable

Setting the Latch Disable jumper to the CLOSED (both pins connected) position will disable the latching function of the Talk button. In this mode, the Talk button must be held in continuously while the operator is talking.

8—Intercom Line Connection

The MR-202 contains a five-terminal, plug-on connector for intercom line connection. The MR-204 contains a seven-terminal, plug-on connector for intercom line connection. This connector is intended to be unplugged from the circuit board when connecting the intercom line(s), and then plugged back on when the wiring is completed. If less than the maximum number of intercom lines are to be connected to the intercom connector, link unused intercom inputs to a connected input with jumper wires. 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—Channel A Audio
- Pin 3—Channel B Audio
- Pin 4—Power (+30 VDC)
- Pin 5—Ground (Shield)
- Pin 6—Channel C Audio (MR-204 only)
- Pin 7—Channel D Audio (MR-204 only).

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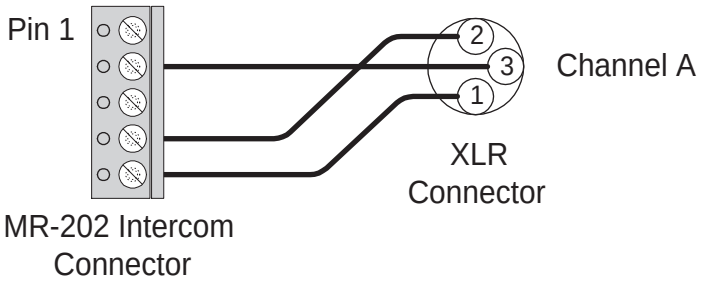

FIGURE 3: MR-202 Intercom Wiring

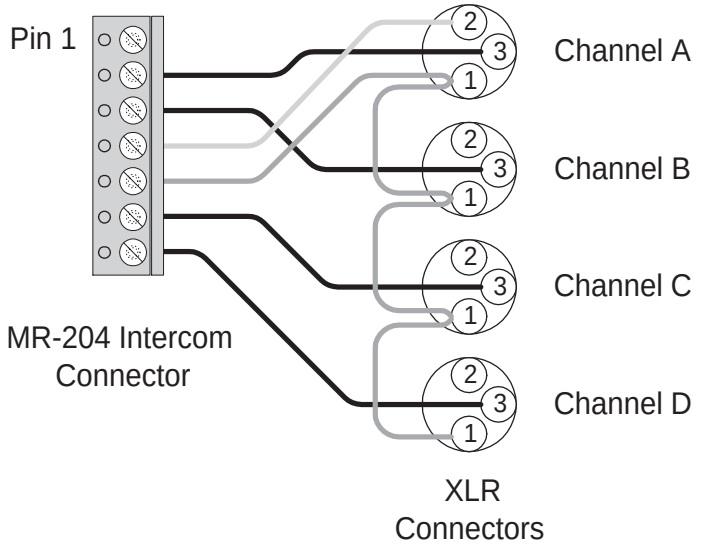

FIGURE 4: MR-204 Intercom Wiring

9—Option Board Jumpers

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

Note: The MR-202 and MR-204 will not operate without either these jumper plugs or the optional modules installed.

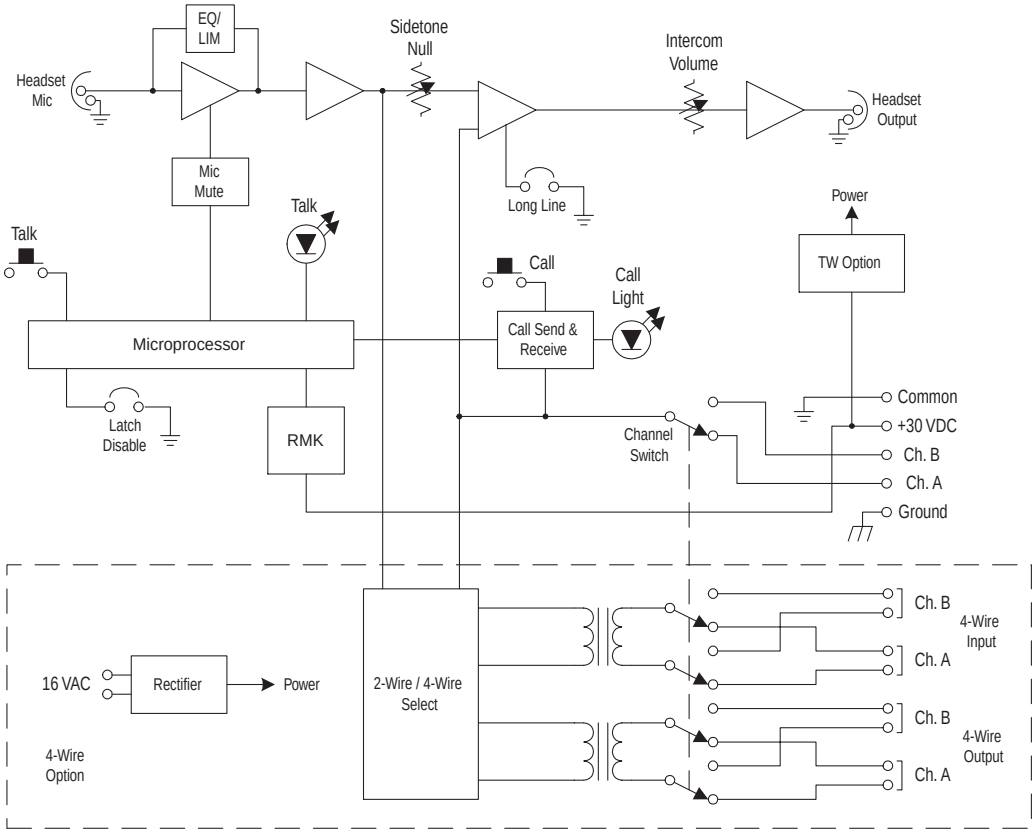

FIGURE 5: MR-202 Block Diagram

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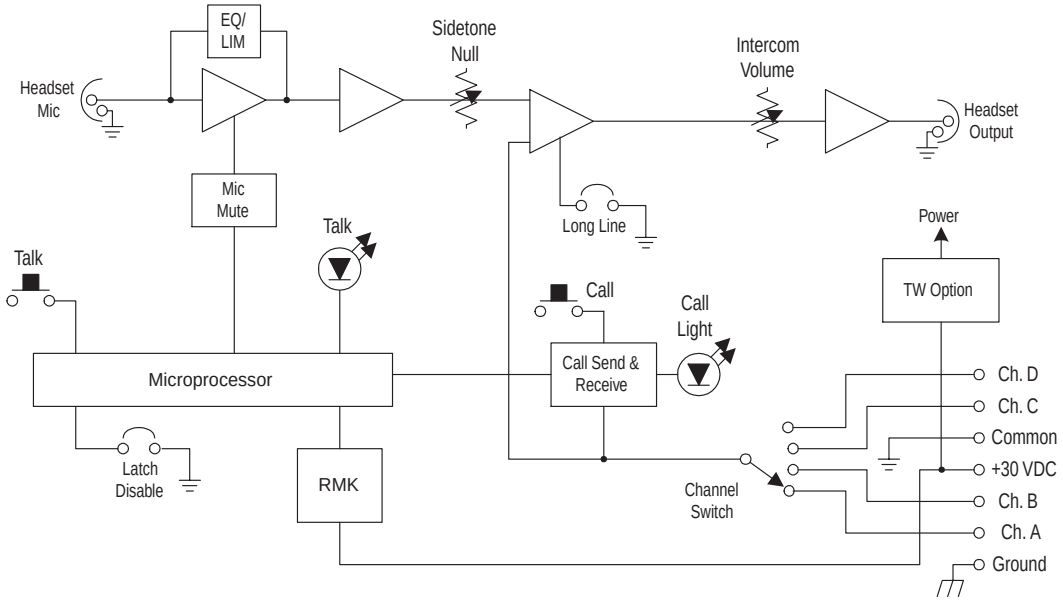

FIGURE 6: MR-204 Block Diagram

Troubleshooting

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

Scenario 1

The MR-202 or MR-204 doesn't have an intercom connection. If the EB-4W 4-Wire Option Module is connected, the MR-202 may not be receiving AC power.

Solution: Check connections and cable.

Scenario 2

The MR-202 or MR-204 has an internal failure.

Solution: Unit requires servicing.

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

Scenario 1

The headset unplugged, the Intercom Level knob is turned all the way down, or the Channel switch set to unused channel.

Solution: Adjust controls appropriately.

Scenario 2

Defective headset.

Solution: Test with another headset.

Scenario 3

Plug P3 is missing on circuit board.

Solution: Plug P3 must be installed in the J3 jack 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 headset 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 the “long run.”)

- **System feedback (Acoustical)**

Scenario 1

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

Solution: Adjust.

Scenario 2

Sidetone Null control at this station or another station is not adjusted correctly.

Solution: Adjust. Refer to “Front Panel” on page 3.

Scenario 3

Channel not terminated.

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

Scenario 4

The Channel switch is set to an unconnected channel.

Solution: If less than the maximum number of intercom lines are to be connected, link unused intercom inputs to a connected input with jumper wires.

Scenario 5

A headset extension cord was used.

Solution: Headset extension cords are not recommended because they increase crosstalk.

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- **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.

Scenario 3

Headset cables are not wired properly or shielded properly.

Solution: Correct wiring. Use headsets with properly shielded wiring.

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

Scenario 1

Excessive DC loading of intercom line.

Solution: Remove any audio transformers or other equipment which 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 advice.

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.

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PARTS LISTS

Parts List for the MR-202/MR-204 Main PCB and Chassis

Capacitors

Value		Type	Volts	Tol.	Part #	Designator
.01	uF	Ceramic Disc	1.4KV	20%	150029	C6
4.7	uF	Aluminum NP	50V		150087	C10
.047	uF	Metal Film	100V	2%	150123	C19
100	uF	Aluminum	35V		150136	C27
22	uF	Aluminum	35V	20%	150152	C23
22	uF	Tantalum	16V		150032	C24
22	pF	Ceramic Disc SMD	50V	5%	151116	C11 C20
47	pF	Ceramic Disc SMD	50V	5%	151120	C2 C16
220	pF	Ceramic Disc SMD	50V	5%	151128	C22
470	pF	Ceramic Disc SMD	50V	5%	151132	C4 C7
.0022	uF	Ceramic Disc SMD	50V	10%	151152	C14
.0047	uF	Ceramic Disc SMD	50V	10%	151156	C5 C17
.01	uF	Ceramic Disc SMD	50V	10%	151160	C28 C32 C33
.047	uF	Ceramic Disc SMD	50V	10%	151168	C15
.1	uF	Ceramic Disc SMD	50V	10%	151172	C9 C21 C26
.22	uF	Ceramic Disc SMD	50V	10%	151176	C12 C18
.47	uF	Tantalum SMD	35V	10%	151184	C31 C34
1	uF	Tantalum SMD	16V	10%	151185	C3 C13 C30
4.7	uF	Tantalum SMD	16V	10%	151189	C8
10	uF	Tantalum SMD	25V	10%	151192	C29

Resistors

Value		Power	Type	Tol.	Part #	Designator
390	OHM	1/4	Carbon Film	5%	410005	R34
1.3K	OHM	1/2	Carbon Film	5%	410075	R9
22.1	OHM	1/10	SMD	1%	411230	R5
39.2	OHM	1/10	SMD	1%	411254	R21
100	OHM	1/10	SMD	1%	411293	R22 R29
221	OHM	1/10	SMD	1%	411326	R11
301	OHM	1/10	SMD	1%	411339	R35
432	OHM	1/10	SMD	1%	411354	R15
825	OHM	1/10	SMD	1%	411381	R31
1.00K	OHM	1/10	SMD	1%	411389	R18
1.50K	OHM	1/10	SMD	1%	411406	R8
2.00K	OHM	1/10	SMD	1%	411418	R17
2.74K	OHM	1/10	SMD	1%	411431	R14
6.19K	OHM	1/10	SMD	1%	411465	R26
6.81K	OHM	1/10	SMD	1%	411469	R13
8.25K	OHM	1/10	SMD	1%	411477	R36
10.0K	OHM	1/10	SMD	1%	411485	R33
12.1K	OHM	1/10	SMD	1%	411493	R16

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15.0K	OHM	1/10	SMD	1%	411502	R12
20.0K	OHM	1/10	SMD	1%	411514	R20 R25 R28
100K	OHM	1/10	SMD	1%	411581	R23
121K	OHM	1/10	SMD	1%	411589	R27
221K	OHM	1/10	SMD	1%	411614	R6
475K	OHM	1/10	SMD	1%	411646	R24
1.0M	OHM	1/10	SMD	5%	411677	R37
10K	OHM		X4 SMD DIP Isolated	1%	416016	R7
47K	OHM		X4 SMD DIP Isolated	1%	416018	R2 R3
100K	OHM		X4 SMD DIP Isolated	1%	416019	R1
470K	OHM		X4 SMD DIP Isolated	1%	416021	R4
Pot	5K		TRIMPOT		470063	R19
Pot	5K		POT		470081	R30

Diodes and Transistors

Device	Description	Part #	Designator
LED	LOW CURRENT GREEN T1 3/4 LED	390021	D6
LED	LED, YELLOW, ULTRA BRIGHT T1 3/4	390057	D12
LED	LED SMD 0805 RED SMD	391001	D10 D11
IC	7805L POS 5V REGULATOR TO-92 PKG	480088	IC5
Diode	BAV70 DUAL DIODE COM CATH... SMD	481019	D4 D13
IC	833 DUAL OPAMP... SMD	481023	IC1 IC2 IC3
Transistor	2222A NPN 40V 600MA... SMD	481026	Q4
Transistor	2907A PNP 60V 600MA... SMD	481027	Q3
Diode	BAV99 DUAL DIODE... SMD	481033	D1 D3 D8 D9
Transistor	MPSA14 DNPN 30V 300MA... SMD	481038	Q6
Transistor	J175 P-CHANNEL JFET... SMD	481056	Q1 Q2
Diode	5.1V 5% ZENER 1/4W... SMD	481061	D5 D7
Transistor	MPSA64 DPNP 30V 500MA SMD	481075	Q5
IC	MICROPROCESSOR, KB/MR SERIES	710508	IC4

Miscellaneous

Device	Description	Part #	Designator
Connector	5 POS, SCREW TERM. PLUG-IN 5MM	210085	P4
Connector	7 POS, SCREW TERM. PLUG-IN 5MM	210144	P4
XLR	4 PIN M FLUSH MOUNT W/SOLDER CUPS	210286	
Switch	SB-412 SWITCH KNOB GREY WITH 510030	240024	S1
Pot	TRIMPOT SHAFT GREY	240057	R19
Pot	KNOB GREY INSERT	240077	R30
Switch	ROUND MINIATURE BUTTON BLACK	240081	S3
Switch	RECT. MINIATURE BUTTON BLACK	240082	S2
Lens	LENS, YELLOW, ROUND FOR T1 3/4	240099	D12
Switch	SB-412 SCH#CLA-PV-1X6-MBB-AG-C	510030	S1
Switch	DPDT P.B. MINIATURE W/LONG PLUNGER	510107	S3 S2
Wire	4 CONNDUCTOR FLAT CABLE	770017	W1

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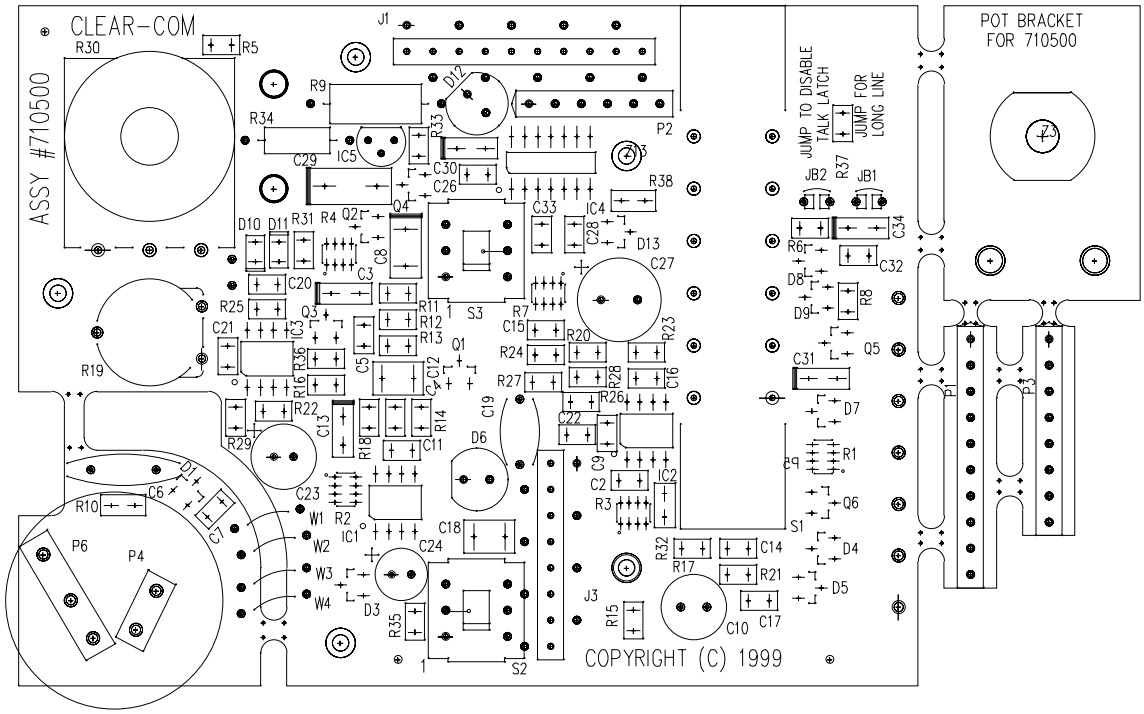

FIGURE 7: Main PCB Component Layout

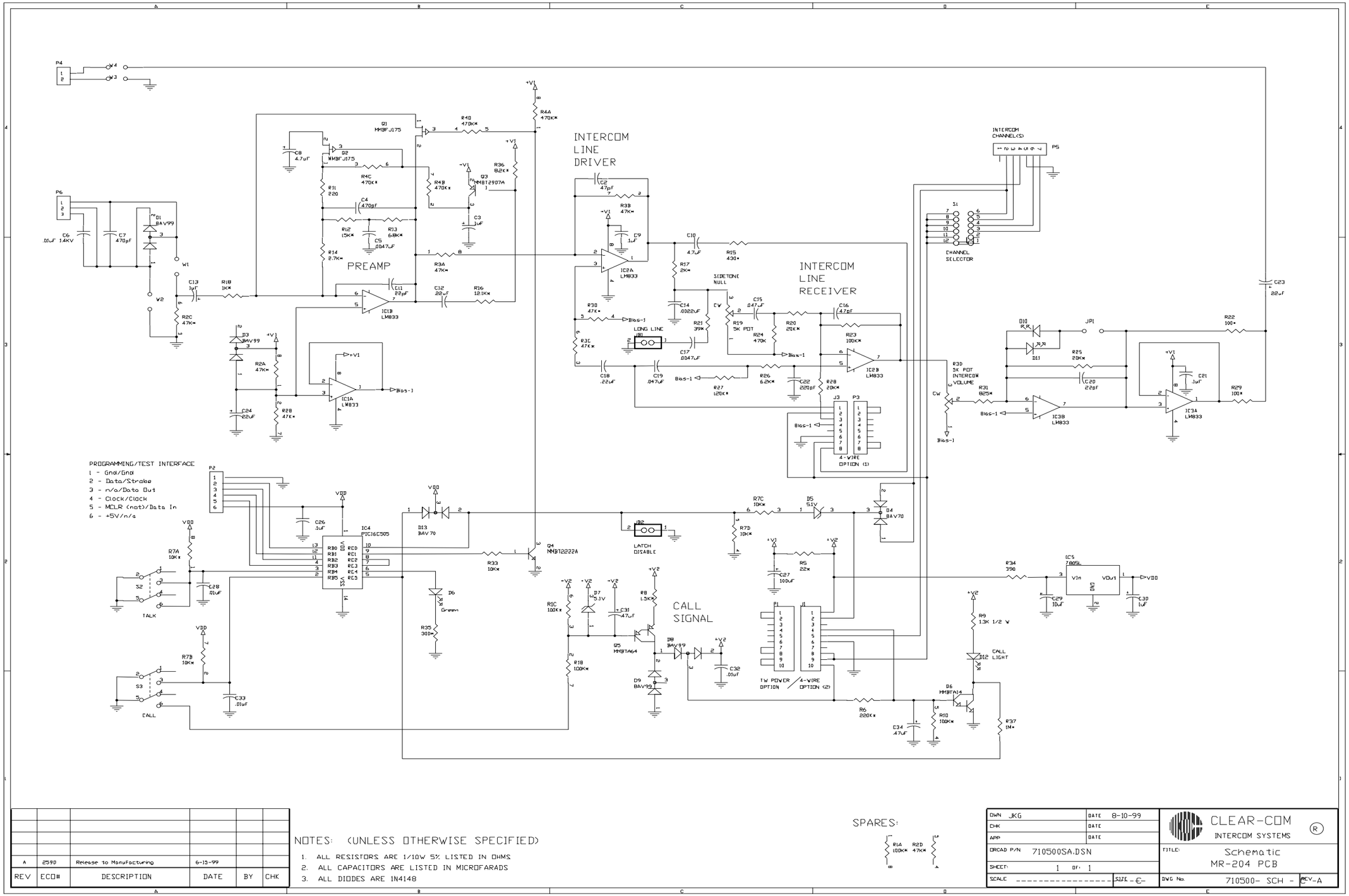

FIGURE 8: MR-204 Main PCB

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Technical Specifications

Headset Microphone Pre-Amp

Input Type:	Dynamic
Impedance:	1k ohms
Input Level:	-55 dBV nominal; -10 dBV max.
Gain from headset mic to intercom line:	+41 dB

Pre-Amp Response Curve

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

Headphone Amplifier

Load Impedance Range:	50 ohm to 2k ohm
Output Level:	at least +20 dBV across 600 ohm
Distortion:	< 0.2% THD at 1 kHz
Frequency Response:	200 Hz to 15 kHz, ±3 dB
Gain from intercom line:	+37 dB
Power Output:	110 dB SPL (typical)

Power Requirements

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

Internal Connectors

Intercom:	Five-position, plug-on screw terminals
AC Power (4-Wire Option Module):	Two-position, plug-on screw terminals

Internal Controls

(2) Option jumpers

Front Panel Connectors

Headset: (1) XLR-4M

Front Panel Controls and Indicators

(1) Intercom volume control; (1) Sidetone control; (1) Talk button; (1) Call button; (1) Channel selector; (1) Talk LED; (1) Call LED

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Environmental

32 to 122 F (0 to 50 C)

Dimensions

4.625 in. W x 4.5 in. H x 1.75 in. D (117 mm x 114 mm x 44 mm)

Weight

0.52 lbs. (0.23 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.

MR-202/MR-204 Manual P/N 810256
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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.

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4065 Hollis Street, Emeryville, CA 94608
(510) 496-6666 Fax (510) 496-6601
Manual Part Number 810256 Rev. B