Rauland

DIRECTOR SERIES COMMUNICATIONS CONTROL PANELS MODELS MCCl00, MCCl00A AND MCClOOB FOR SCHOOL SOUND/COMMUNICATIONS SYSTEMS

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M O D E L V A R I A T I O N S

Model MCClOOA uses the same circuit board as the earlier MCClOO Model, but includes an improved TALK/LISTEN switch. Model MCClOOB includes resistor'R119 in the talk enable circuitry to accommodate operation with the optional VC-6380 Beep Adder. Except for these changes, all information provided in this instruction manual for the MCCl00 Model is fully applicable to the MCClOOA and MCClOOB Models.

S P E C I F I C A T I O N S

Rated Output:	10 watts rms
Frequency Response:	Shaped for maximum intelligibility; Approximately 800 Hz to 10 kHz
Distortion:	Less than 5%
Talk Noise Level:	-50 dB
Type of Output:	Balanced 25-volt line
Compression Amplifier:	RANGE: 20 dB ATTACK TIME: 10 msec RELEASE TIME: 1.5 sec
Supervisory Tone (Listen Mode Only):	DURATION: lOO ± 20msec REPETITION RATE Every 15-20 sec FREQUENCY: Approximately 1.5 kHz
Source Required:	28 Vdc
Unit Size:	**19" panel x** 3½" high x 7⅝" deep

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

1. DESCRIPTION

1.1 General

The Model MCClOO Communications Control Panel provides the communications (intercom) channel for the Rauland "DIRECTOR" Series School Sound/Communications System. Instant monitoring and two-way communications can be obtained with any classroom. The room is selected at the associated room selector switch panel(s). The communications control channel is designated the ORANGE "C" channel. Simplified equipment operation is assured by using the orange color on all communications related equipment panels, and having step-by-step operating instructions screened on the communications control panel.

1.2 Features

The communications control panel provides the following features:

-- State-of-the-art circuitry using integrated circuits for logic switching and some audio amplification stages. This minimizes power consumption, increases reliability, and reduces maintenance costs.

-- Fast acting compression amplifier with 20 dB dynamic range assures optimum operation under widely varying listen and talk input levels. This allows input levels to be preset during the equipment installation eliminating the need for volume controls and their constant readjustment.

-- Amplifier output power rated at 10 watts rms into a balanced 25-volt line provides ample power for talking to 20 rooms simultaneously.

-- Isolated listen and talk inputs to the compression amplifier using computer-grade reed relays. This prevents cross-talk and gives system operational priority to the communication control panel (console) operator.

-- Simple equipment operation using PUSH-TO-TALK/RELEASE-TO-LISTEN switch and front-panel mounted speaker/microphone obtains two-way communications with classroom. No level adjustments are required by the equipment operator.

-- Classroom personnel are alerted to the listening condition by a brief tone signal which is sent every 15 to 20 sec to the monitored classroom.

-- Compatible with selective privacy operation. Classrooms equipped with a PRIVACY or PVCY switch may prevent classroom monitoring. Calls from the console are always heard in the selected classroom(s) regardless of the privacy switch position.

-- Compatible with voice call operation. A separate voice call circuit may be used allowing direct calls to the console operator from the classroom, bypassing selections made at the room selector switch panel.

-- Provisions for ready field addition of the Rauland Model CCPlOO Administrative Expander Kit. This kit allows administrative communications system operation with up to three Rauland Model MDClOO Administrative Centers.

-- Operating power obtained from the common +28 Vdc power source used for the "DIRECTOR" Series equipment.

1.3 Optional Call Origination Switches

There are several different call origination switches available as optional items for the "DIRECTOR" Series School Sound/ Communications Systems. Select the switch that best suits the specific classroom requirements for your system from the following list:

RAULAND MODEL	ANNUNCIATOR METHOD	SWITCH TYPE	SWITCH POSITIONS AND ACTION		
			PRIVACY	NORMAL	CALL
OS10	Voice or Visual	3-position lever	Locking	Spring return from call	Momentary
OS11	Voice or Visual	2-position lever	-------	Spring return from call	Momentary
2304F-A	Visual	Pushbutton	-------	----------	Momentary
2307	Visual	3-position rocker	Locking	Spring return from call	Momentary
2302S	-----	Rotary	-------	L locking	T locking

2.. INSTALLATION

2.1 Introduction

The Communications control panel is available either as a factory installed item, completely prewired and tested as an integral part of a "DIRECTOR" Series School Sound/Communications System, or separately for field installation into an existing sound system. Sufficient information is provided to do a typical field installation. Not every application or interface problem is described. The intraunit connections between the communications control panel and the items that comprise a "DIRECTOR" Series System are shown on the wiring diagram in the instruction manual provided with either the Model MCAlOO or MCBlOO Master Control Panel.

2.2 Equipment Damaged in Transit

This equipment has been carefully inspected and tested at the factory prior to shipment. If the equipment was damaged in transit, notify the transportation company immediately to place your claim.

2.3 Mounting Communication Control Panel (Field Installation Only)

The communications control panel may be mounted in any standard 19-inch rack. The minimum space requirements are: 3½" high by 7¼" deep. Remember that sufficient open space must be kept behind the chassis for making equipment connections and to allow accessibility for equipment maintenance. Mount panel as follows:

Step 1. Secure chassis to the rack with screws through the four mounting holes provided. It is recommended that l0-32 or larger hexagon head screws be used. Rauland supplied racks require l0-32 x 3/8" self-locking screws, and turrets require 10 x 3/8" sheet metal screws and 10-2 Tinnerman-type nuts. The mounting hardware is supplied with the equipment.

Step 2. Install front panel on chassis using the two 6-32 x 3/8" binder head screws supplied.

2.4 Intraunit Wiring Check List (Communications Control Panel)

Use the following check list to verify that factory installed wiring is intact, and as a guide for making connections in the field.

MCCl0OB Terminal	Function	Connect To	Present (✔)
B	None	Not Used	
Cl	Audio In/Out	MCRl0OA; Term 17	
CZ	TP Cable Shield	MCRl0OA; Term 13	
c2	Audio In/Out	MCRl0OA; Term 16	
P	+28 Vdc Input	PSX29A or SAX60/l0O	
4	None	Not Used	
z	Common	PSX29A or SAX60/100	
M	+12 Vdc Output	Optional Applications	
T	Disable Supervisory Tone	Optional Applications	
Y	Beep Enable For VC-6380	SWL25; Term L.	

2.5 Connecting Voice Call Origination Lines

In intercom systems using voice call origination from the classroom, one twisted-pair shielded cable is "looped" between all classrooms equipped with voice call origination switches and is connected to the following terminals:

MCC1OO Termina1	Function
Cl	Voice Call In
cz	Cable Shield
c2	Voice Call In

2.6 Equipment Grounding

In any sound system, the audio common must be connected to the equipment chassis at some point in the system. To minimize the possibility of ground loops and resultant hum pick-up, it is recommended that only one such connection be made in the entire sound system. For the "DIRECTOR" Series System, this connection should be made between the switch bank ground buss and terminal 23 on the Model MCA1OO Master Control Panel.

3. INITIAL ADJUSTMENTS AND LEVEL SETTINGS

3.1 Introduction

Setting levels requires two men: the first man at the communications control panel to make the required adjustment; and the second man at strategically located classrooms to hear the sound, follow voice instructions, and reply as required. One 1.2 k ± 5%, ½ watt resistor is required when adjusting the INPUT BALANCE - to cancel hum or noise introduced by the speaker lines.

3.2 Input Balance Adjustment

Step 1. In a distant classroom have assistant disconnect the speaker and connectone 1.2 k ± 5%, ½ watt resistor across the audio line.

Step 2. Place appropriate classroom selector switch on the room selector switch panel in C position.

Step 3. Adjust INPUT BALANCE control (R105), accessible from the rear chassis, for minimum hum or noise.

Step 4. Disconnect the 1.2 k load resistor and reconnect the speaker.

Step 5. Place classroom selector switch on the room selector switch panel in OFF position.

3.3 LISTEN LEVEL ADJUSTMENT

Step 1. In a distant classroom, have assistant place call origination switch in NORMAL position, if room is so equipped.

Step 2. Place appropriate classroom selector switch on the room selector switch panel in C position.

Step 3. Have assistant talk into the classroom speaker using a normal voice level.

Step 4. Adjust LISTEN LEVEL oontrol (R45), accessible from the rear chassis, for the desired monitor speaker volume level.

Step 5. Place classroom selector switch on room selector switch panel in OFF position.

3.4 TALK LEVEL Adjustment

Step 1. In a distant classroom, have assistant place call origination switch in NORMAL position, if room is so equipped.

Step 2. Place appropriate classroom selector switch on the room selector switch panel in C position.

Step 3. Depress and hold the PRESS-TO-TALK/RELEASE TO LISTEN switch. Talk into monitor speaker grille using a normal voice level,

Step 4. Adjust TALK LEVEL control (R44), accessible from the rear chassis, for'the desired classroom volume level.

Step 5. Place classroom selector switch on the room selector switch panel in OFF position.

4. OPERATING INSTRUCTIONS

4.1 Introduction

Two-Way communications (intercom) and/or monitoring can be obtained with any classroom selected at the room selector switch panel(s). Immediately upon making the room selection, a brief supervisory tone signal is automatically sent to the selected classroom alerting classroom personnel of the listening condition. The supervisory tone signal is sent every 15 to 20 sec thereafter during classroom monitoring. The PRESS-TO-TALK/RELEASE TO LISTEN switch is used with the panel-mounted speaker/microphone to communicate with the selected classroom. No talk or listen level adjustments are made by the console operator, as these are preset during the equipment installation.

Instructions for operating with the administration communications system are provided separately with the respective equipment.

4.2 To Monitor Or Call Classroom

The classroom may be equipped for selective privacy operation. If bsed, the console operator can not monitor the classroom even though the classroom has been selected. However, the console operator is always able to talk to the classroom personnel. Proceed as follows:

Step 1. Place the desired classroom selector switch on the room selector switch panel in the C position. The alerting tone is automatically sent immediately upon making the room selection and every 15 to 20 sec thereafter while operating in the listening mode. No classroom sound is heard during these brief transmissions.

Step 2. Classroom sound should be heard from the panel-mounted speaker/microphone. If the classroom sound is not heard and monitoring is required, go to Step 3 and advise classroom personnel to place the call origination switch in its normal position. Upon completion of monitoring, place the classroom selector switch on the room selector panel in the OFF position.

Step 3. To talk to classroom personnel, depress and hold the PUSH-TO-TALK/RELEASE TO LISTEN switch while speaking into the speaker/microphone using a normal voice level.

Step 4. To hear the reply, release the PUSH-TO-TALK/RELEASE TO LISTEN switch. Proceed using this PUSH/RELEASE method until the, conversation is completed. Remember that conversation occurs only in one direction at a time and the console operator can "talk-over" (override) the classroom, exercising operational priority.

Step 5. Upon completion of the conversation, place classroom selector switch in the OFF position.

4.3 To Answer A Call From Classroom

Classrooms may call the console operator using voice or audible/visual means depending upon the method provided in the intercom system. Voice calls originated in the classroom are heard by the console operator regardless of the room selector switch position. Audible/visual calls originated in the classroom sound a chime and light an annunciator lamp above the respective room selector switch. Then, the console operator selects the respective room and proceeds with the PUSH-TO-talk/RELEASE TO LISTEN method of communications, described in the preceeding paragraph.

5. THEORY OF OPERATION

5.1 Introduction

The circuitry used in the communications control panel is mainly analog for amplifying the incoming and outgoing intercom audio. Digital circuits are used for listen/talk operational mode selection and for relay control. The analog circuits are described using functional signal flow. The digital circuits are described using active and inactive terms. This permits the circuit description to be used for troubleshooting purposes. Transistor and integrated circuit biasing is not described. This type of information is provided in technical textbooks found in most libraries. Refer to the schematic diagram provided at the rear of this instruction manual for circuit details.

5.2 Communications Channel Audio Amplification

5.2.1 Introduction

Communications (intercom) audio amplification is provided by: (1) preamplifier Q5 and compression amplifier IC5 and IC4; and (2) power amplifier Q6, Q7, Qll, Q12, Q9 and Q13. Incoming (listen) audio or outgoing (talk) audio is switched into these amplification stages by the digital gating circuits and the listen/talk relays.

In the listen mode, listen relays RY2 and RY3 are energized, and listen analog switch IC6-C is closed. Relay RY2 connects the line transformer listen winding to preamplifier Q5. Relay RY3 connects the power amplifier output to the speaker/microphone. Switch IC6-C routes the compression amplifier output to the power amplifier input. In the talk mode, talk relays RYl and RY4 are energized, and talk analog switch IC6-B is closed. The amplification stages and speaker/microphone are switched accordingly.

5.2.2 Preamplifier Q5 and Compression Amplifier IC5 and IC4

Listen audio from the line transformer or talk audio from the speaker is applied to preamplifier Q5. A voltage gain of about 30 is provided by Q5, sufficient for operating compressor IC5 within its optimum range. Compressor IC5 and peak detector IC4-C form a compression amplifier keeping the audio output level relatively constant for widely varying inputs exceeding the "knee-of-compression".

The compression output is monitored by the peak detector. Whenever the peak voltage exceeds the threshold level, the output of IC4-C goes positive. The positive pulses obtained are rectified by D6 and the resultant dc level is added to the dc control voltage on pin 6 of IC5. An increase of dc level at pin 6 decreases the gain of IC5. A second gain control input is provided to IC5 at pin 4. This input is used to momentarily cut-off the compressor when clicks are sensed during operation of the TALK/LISTEN switch.

SERVICING NOTE

To disable the compressor for trouble-shooting purposes, temporarily ground the anode of D6.

5.2.3 Power Amplifier Q6 Q7 Qll Q12 Q9 and Q13

The compression amplifier output is routed through either talk level control R44 and talk analog switch IC6-B, or listen level control R45 and listen analog switch IC6-C; and is applied to the power amplifier. Preamplifier Q6 and predriver Q7 are directly coupled providing sufficient voltage amplification and current for driving complementary-symmetry connected drivers Qll (NPN) and Ql2(PNP). These transistors have fixed bias and operate as emitter-followers conducting on opposite excursions of the input signal from Q7. The outputs of Qll and Q12 are directly coupled to power amplifiers Q9 and Q13 providing current boost. Effectively, a push-pull output is obtained from Q9 and Q13. The total voltage gain through the power amplifier is about 100 times.

Transistor Q8 operates as a temperature sensor preventing thermal run-away of power amplifiers Q9 and Q13. The three transistors are mounted on the same heat sink. When more heat is generated by Q9 and Q13 than can be safely dissipated in the heat sink, the outer case temperature of Q8 increases. This forces Q8 into a heavy conduction rate placing a high positive voltage on the base of Q12. Both Q12 and Q13 turn off removing the dc emitter source to Qll and Q9 which turn off. Normal circuit operation resumes when the heat sink temperature decreases to a safe level.

SERVICING NOTE

All transistors in the power amplifier circuit are directly coupled. A failure in one stage will change the dc levels on the subsequent stages. Use a high impedance voltmeter when measuring the dc voltages. Compare readings obtained with those shown on the schematic diagram.

5.3 "C" Buss Sensing Circuit

The "C" buss sensing circuit switches the communication control panel circuitry to the idle (standby) or listening modes by placing a dc level on Cl and sensing the dc level returned on C2. The "C" buss is connected to the classroom speaker via the normally closed contacts on the associated MCRlOO Master Control Relay and the respective classroom switch'on the room selector switch panel.

If a classroom is not selected for monitoring, the "C" buss is an open circuit. Terminal C2 and pin 2 of "C" buss sensor ICl are clamped low through R109. The operational amplifier output at pin 6 goes high switching all circuits to the idle mode. Refer to Paragraph 5.4 for idle mode circuit details.

When a classroom is selected for monitoring, the classroom speaker transformer coil completes the "C" buss circuit. Terminal C2 goes positive which is applied to pin 2 of "C" buss sensor ICl. The operational amplifier output at pin 6 goes low switching all circuits to the listening mode. Refer to Paragraph 5.5. for listening mode circuit details.

A classroom equipped with a PRIVACY or PVCY switch may prevent classroom monitoring. Selecting this mode grounds the classroom speaker transformer center-tap. The C2 line is clamped low placing a low on pin 2 of ICl. All circuits switch to the idle mode. Note that calls from the console are always heard in the classroom regardless of the privacy switch position.

5.4 Idle (Standby) Mode

With no classrooms selected, the "C" buss is an open circuit. Pin 2 of "C" buss sensor ICl is clamped low, causing its output to go high. This switches the audio processing and gating circuits to the idle mode. The following circuit conditions are obtained:

(1) relays RYl through RY4 de-energize, disabling the speaker/ microphone and opening the line transformer:

(2) supervisory tone timer IC4-B is disabled;

(3) tone analog switch IC6-D opens;

(4) listen analog switch IC6-C closes; and

(5) talk analog switch IC6-B opens.

The high from the "C" buss sensor is applied to relay disable switches Q3 and Q16, and to pin 5 of timer enable gate IC2. Switches Q3 and Q16 turn on, turning off relay driver Q2 and Q15, respectively. Listen relays RY3 and RY2 de-energize, opening the listening circuit to the line transformer and to the speaker/microphone. Transistors Q4 and Q17 provide the current source for the four listen/talk relays? These transistors permit remote on-off control of the relays during operation with the optional administrative communications

system. In this application, Q4 and Q17 are always on because of the fixed bias obtained with R16 and R83 grounded.

The high on pin 5 of timer enable gate IC2 causes its output to go low. Inverter IC7 places a high through D10 on pin 6 of supervisory tone timer IC4-B. This keeps the output of IC4 low inhibiting the timer. The low from the timer is applied to:(a) the control line to tone analog switch IC6-D; (b) pin 6 of talk relay enable gate IC3; and (c) pin 1 of click eliminator gate IC2.

(a) Tone analog switch IC6-D opens, preventing supervisory tones from being routed to the power amplifier for possible transmission over the communications channel.

(b) The low on pin 6 of talk relay enable gate IC3, along with the low on pin 5 from the talk enable gating circuit (see next paragraph) causes the output of IC3 at pin 4 to go high. Pin 6 of inverter IC7 places a low on relay drivers Q14 and Ql, and on pin 8 of listen switch gate IC3. Transistors Q14 and Ql turn off, de-energizing talk relays RY4 and RYl, respectively.

The talk enable gating circuit places a low on pin 5 of talk relay enable gate IC3 as follows. Since the TALK/LISTEN switch is not engaged, pin 1 of talk enable gate IC3 is high through Dl and Rl. The gate output goes low which is inverted twice; once by IC2, as all inputs to IC2 are low, and once by IC7.

(c) The low on pin 1 of click eliminator IC2 and the lows on pins 2 and 8 from the pull-down resistors cause its output at pin 9 to go high. Inverter IC7 places a low on pin 9 of listen switch gate IC3. Both inputs to IC3 at pins 9 and 8 are now low, and its output goes high. This places a high on the control line to listen analog switch IC6-C closing the switch. The compression amplifier output is routed to the power amplifier, ready for instant processing of a voice call from the classroom. The high on pin 12 of talk switch gate IC3 causes its output to go low. This places a low on the control line to talk analog switch IC6-B opening the switch.

All circuits are now in the idle mode waiting for either a room selection to be made for classroom monitoring, or for a voice call to be received from the classroom.

5.5 Listening to Classroom

When a classroom is selected for monitoring, terminal C2 goes positive which is applied to pin 2 of "C" buss sensor ICl. Its output goes low switching the audio processing and gating circuits to the listening mode. The following circuit conditions are obtained:

(1) listen relays RY2 and RY3 energize, enabling the listen circuits to the speaker/microphone and to the line transformer:

(2) talk relays RYl and RY4 remain de-energized, disabling the talk

circuit: and

(3) supervisory tone timer IC4-B is enabled.

SERVICING **NOTE**

A classroom selection can be easily simulated in the service shop by jumpering C1 to C2 through a 1.2 k ± 5%, ½ watt resistor.

The low from the "C" buss sensor is applied to relay disable switches Q3 and Q16, and to pin 5 of timer enable gate IC2. Switches Q3 and Q16 turn off, enabling relay drivers Q2 and Q15 and energizing listen relays RY3 and RY2, respectively. Relay RY2 connects the line transformer listen winding to preamplifier Q5. Relay RY3 connects the power amplifier output to the speaker/microphone.

The low on pin 5 of timer enable gate IC2, and the lows on pins 4 and 3, cause the output of IC2 to go high enabling supervisory tone timer IC4-B. See Paragraph 5.6 for timer circuit details. The timer output is low for 15 to 20 sec and then goes high for 100 + 20 msec. When the timer output is low, it causes the same sequence of events to occur as previously described in Paragraphs 5.4 (a), (b) and (c).

5.6 Supervisory Tone Transmissions to Classroom

Supervisory tone generator IC4-A runs continuously producing an audio tone frequency at about 1.5 kHz. Supervisory tone timer IC4-B controls the gating circuits that switch the tone generator output into the power amplifier. Selecting a classroom for monitoring or receiving a voice call from the classroom activates the tone timer. The supervisory tone is immediately sent to the classroom and is sent every 15 to 20 sec thereafter while operating in the listen mode. The supervisory tone duration is about 100 msec. No classroom sound is heard during these brief tone transmissions.

Supervisory tone generator IC4-A is an operational amplifier that functions as a sinewave oscillator. Positive feedback is applied to the non-inverting input at pin 2 through C39 and R99. Diodes D12 and D13 are transient suppressors. The oscillator frequency is determined by the values of R97 and C35.

Supervisory tone timer IC4-B is an operational amplifier that functions as a positive pulse generator with a very long 15 to 20 sec off period and a short 100 ± 20 msec on period. The long off time constant is determined by the values of R86 and C33. On time is determined by the values of R90 and C33.

During the idle and talk modes of operation, the timer is reset and its output is low. Timing capacitor C33 is kept charged to 2/3 of supply voltage through D10, R89 and IC7. The low timer output opens tone analog switch IC6-D, preventing tone distribution.

When a room is selected for monitoring or an incoming voice, call is received, line C2 goes positive. The positive going transition is coupled through Rl17 and C46 to the base of first beep switch Q18, which turns on. This rapidly discharges C33 enabling the timer, which immediately produces its first positive output pulse. The positive pulse is applied to: (1) tone analog switch ICG-D; (2) pin 6 of talk relay enable gate IC3; and (3) pin 1 of click eliminator gate IC2.

(1) Tone analog switch ICG-D closes routing the output of tone generator IC4-A to the power amplifier.

(2) The high on pin 6 of talk relay enable gate IC3 causes its output to go low. Inverter IC7 places a high on pin 8 of listen switch gate IC3 and on talk relay drivers Q14 and Ql. The output of listen gate IC2 at pin 10 goes low which open listen analog switch IC6-C. Transistors Q14 and Ql turn on energizing talk relays RY4 and RYl. Listen relay drivers Q15 and Q2 turn off de-energizing listen relays RY2 and RY3. Relay RYl switches the speaker/microphone into the audio circuits at preamplifier Q5. Relay RY4 switches the power amplifier output to the line transformer talk winding.

(3) The high on pin 1 of click eliminator gate IC2 causes its output to go low. Inverter IC7 places a high on pin 9 of listen switch gate IC3 which goes low opening talk analog switch IC6-B.

When the increasing positive voltage on line C2 stabilizes, positive bias is no longer coupled to first beep switch Q18. The switch turns off and has no effect on subsequent listen mode circuit operation. The length of the first beep is determined by the time required to charge C33 through R90 to 2/3 of supply voltage. This time is longer (about 500 msec) than subsequent beeps because C33 is initially discharged to a lower voltage by switch Q18. When C33 has charged up, the timer output goes low and all circuits revert to the listening mode, as previously described in Paragraph 5.5. After 15 to 20 sec, C33 is discharged to l/3 of supply voltage through R86. The timer output goes high and the timing cycle repeats for as long as the equipment is continuously operated in the listen mode.

SERVICING NOTE

The tone timer may be disabled for troubleshooting purposes by jumping terminal T to terminal Z. This keeps the circuits in the idle or listen modes if the talk mode is not selected.

5.7 Talking to Classroom

When the TALK/LISTEN switch is depressed, both inputs to talk enable gate IC3 at pins 1 and 2 are low. The output of IC3 goes high and is inverted twice, once by IC2 and once by IC7. A high is placed on pin 5 of talk relay enable gate IC3 and on pin 3 of timer enable gate IC2. The talk relay enable gate goes low at pin 4. Inverter IC7 places a high on pin 8 of listen gate switch IC3 and on talk relay drivers Q14 and Ql. The listen gate switch goes low opening listen analog switch IC6-C. Talk relays RY4 and RYl energize turning off listen relay drivers Q15 and Q2, which de-energize listen relays RY2 and RY3.

The high on pin 3 of timer enable gate IC2 causes its output to go low. This resets supervisory timer IC4-B through DlO, R89 and IC7. The low timer output opens tone analog switch IC6-D. A low is also applied to pin 1 of click eliminator gate IC2. Since all inputs to this gate are low, its output goes high. Inverter IC7 places a low on pin 13 of talk switch gate IC3. This low with the low on pin 12 from IC3 pin 10, cause the output'at pin 11 to go high, closing talk analog switch IC6-B.

5.8 Click Elimination

When the PUSH TO TALK/RELEASE TO LISTEN switch is depressed there is a slight delay before the talk mode is enabled. This delay provides enough time to prevent the switch closure "click" from being acoustically coupled into the audio amplification stages. The time delay is provided by the relatively slow discharge of Cl through R2 which keeps pin 1 of talk enable gate IC3 from immediately going low. The listen mode is immediately enabled when the PUSH TO TALK/RELEASE TO LISTEN switch is released, as Dl is forward biased and places a high on pin 1 of IC3.

Switching transients are sensed by click eliminator IC2 which produces a dc level that temporarily turns off compressor IC5, preventing clicks from being heard. When the output of talk relay enable gate IC3 at pin 4 changes states, either C32 or C31 starts to charge up. This places a temporary high on either pin 8 or 2 of click eliminator IC2. The output of IC2 at pin 9 goes low and is inverted by IC7, forward biasing D5. A positive voltage is applied to pin 4 of compressor IC5 turning off the compressor. The compressor remains off for as long as it takes for D5 to become reversed biased, when C32 or C31 is fully charged, and Cl2 has discharged through R32. When operated with the optional administrative center, the charge time of Cl2 is decreased for compatibility with VOX operation. A high placed on terminal 9 switches R6 and D2 in parallel with R32.

6. MAINTENANCE

6.1 Pushbutton Switch Replacement

Step 1. Remove front panel by unscrewing two screws.

Step 2. Remove cap from switch by pulling outward on cap.

Step 3. Remove nut securing switch to front chassis. (MCCl00 **only)**

Step 4. Pull switch out of its front-chassis mounting.

Step 5. Replace switch and re-install front panel.

6.2 Defeating Periodic Supervisory Tone Transmissions

The periodic supervisory tone transmissions that normally occur during the listening mode may be objectionable. These transmissions can be defeated by jumpering terminal T(stop repeating supervisory tone) to terminal Z (circuit common). The first tone will be transmitted even though this jumper modification is made.

6.2 Adding Model CCPlOO Administrative Center Expander

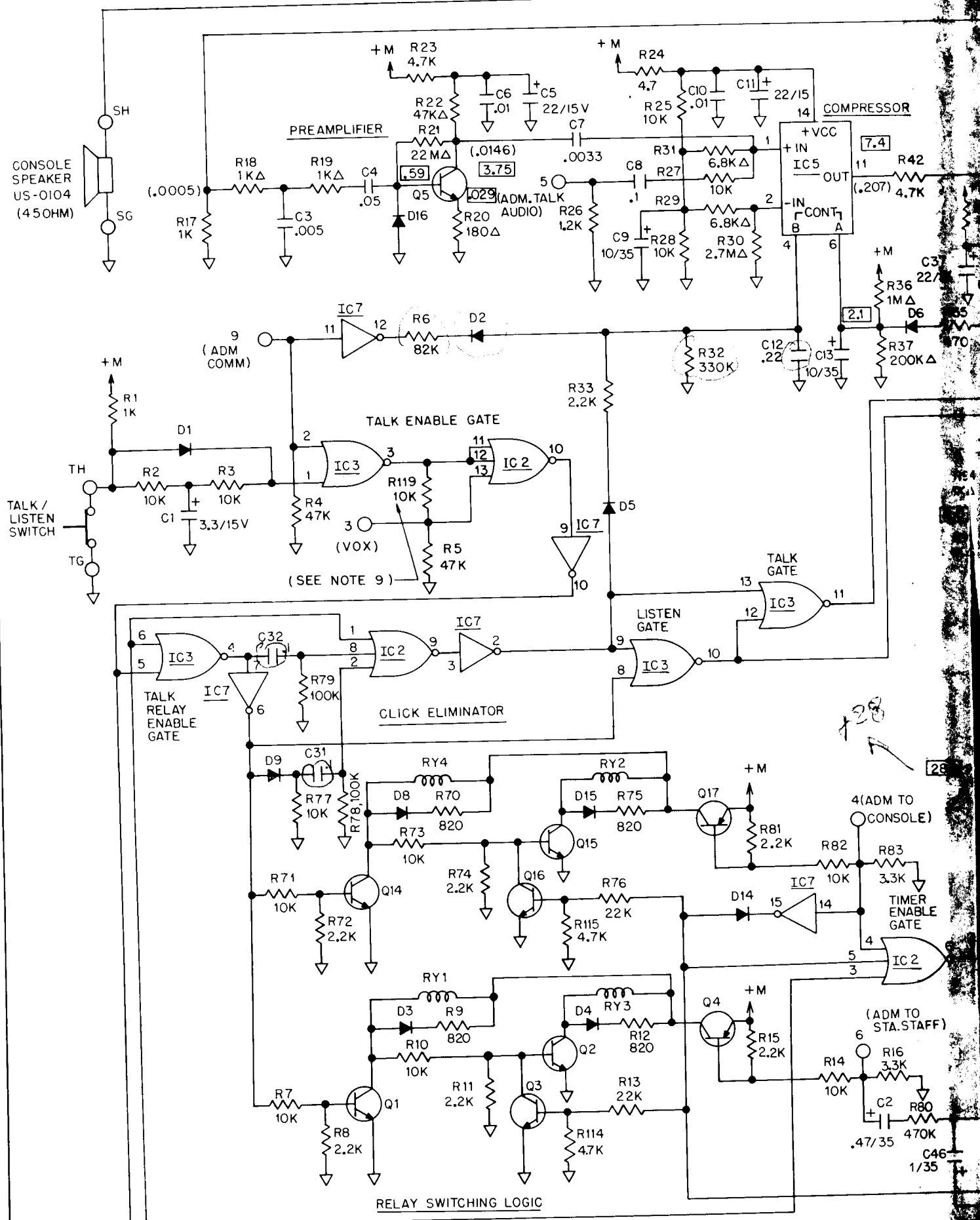
Field installation instructions for adding the Model CCPlOO Administrative Center Expander are supplied with the equipment.

7. UNIQUE ITEMS PARTS REPLACEMENT LIST.

The majority of electrical parts used in the communications control panel are readily obtainable from local parts suppliers. Only those items which are difficult to obtain or are factory selected are listed. Components mounted on the circuit board can be easily located as the reference designator is screened on the circuit board. Use routine circuit tracing procedures to locate' chassis-mounted components.

Rauland Part Number	Description	Quantity Used
	DIODES:	
IN457A	Silicon: signal	14
IN4002	Silicon: rectifer	1
	INTEGRATED CIRCUITS:	
EC-0013	Operational Amplifier: type 741	1
EC-0024	Quad Operational Amplifier; type 4136	1
EC-0030	Quad Two-Input NOR Gate; type 4001	1
EC-0035	Triple Three-Input NOR Gate: type 4025	1
EC-0042	Hex Inverter Buffer: type 4049	1
EC-0052	Quad Bilateral Analog Switch; type 4016	1
EC-0053	Squelch Amplifier: type 370	1
EC-0062	Regulator; 12V; type MC7812CK	1
	POTENTIOMETERS:	
RP-152A	1.5 k-ohms	1
RP-503AE	50 k-ohms	2
X-0616	**SWITCH:** Pushbutton; momentary action Model: MCC1OO — MCC1OOA and MCC1OOB Switch: X-0616 — X-0621 Cap: QP-0745 — QP-0754	
	TRANSFORMER:	
LO'0276	Audio	1
	TRANSISTORS:	
ET-MJE-371	NPN	1
ET-MJE-521	NPN	1
ET-MJE-3055	NPN; power amplifier	2
ET-MPS-A05	NPN	1
ET-MPS-A18	NPN	1
ET-MPS-A55	PNP	3
*ETS-014A	NPN	8

* This item must be ordered from Rauland as it is selected for a specific operating characteristic.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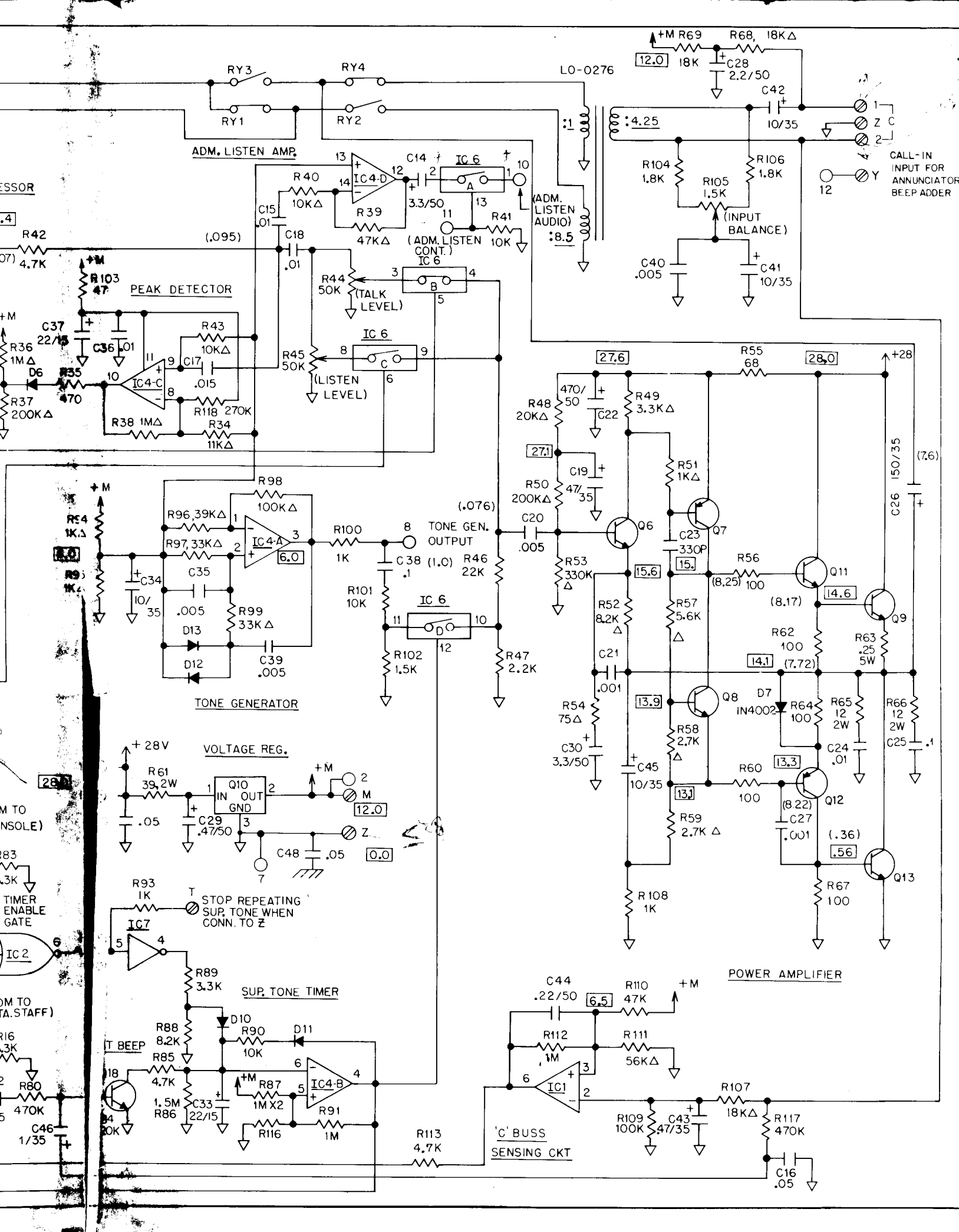
SH
SG
PREAMPLIFIER
COMPRESSOR
+M
R23 4.7K
R22 47KΔ
R21 22MΔ
C6 .01
C5 22/15V
C7 .0033
R24 4.7
R25 10K
C10 .01
C11 22/15
R18 1KΔ
R19 1KΔ
C4 .05
C3 .005
R17 1K
(.0005)
(.0146)
.59
3.75
.029
Q5
D16
R20 180Δ
(ADM. TALK AUDIO)
R26 1.2K
C8 .1
R27 10K
R31 6.8KΔ
R29 6.8KΔ
R28 10K
C9 10/35
R30 2.7MΔ
IC5
+VCC
+IN
-IN
OUT
CONT
7.4
(.207)
R42 4.7K
R36 1MΔ
D6
2.1
R37 200KΔ
C37 22/
IC7
R6 82K
D2
9 (ADM COMM)
R32 330K
C12 .22
C13 10/35
R33 2.2K
R1 1K
D1
TH
R2 10K
R3 10K
C1 3.3/15V
R4 47K
TALK / LISTEN SWITCH
TG
IC3
IC2
TALK ENABLE GATE
R119 10K
R5 47K
(VOX)
(SEE NOTE 9)
D5
TALK GATE
LISTEN GATE
C32
R79 100K
TALK RELAY ENABLE GATE
CLICK ELIMINATOR
D9
C31
R77 10K
R78, 100K
RY4
RY2
D8
R70 820
D15
R75 820
Q17
R81 2.2K
4(ADM TO CONSOLE)
R73 10K
Q15
R74 2.2K
Q16
R76 22K
R82 10K
R83 3.3K
TIMER ENABLE GATE
D14
R71 10K
Q14
R72 2.2K
R115 4.7K
RY1
RY3
D3
R9 820
D4
R12 820
Q4
R15 2.2K
(ADM TO STA. STAFF)
R10 10K
Q2
R11 2.2K
Q3
R13 22K
R14 10K
R16 3.3K
C2 .47/35
R80 470K
C46 1/35
R7 10K
Q1
R8 2.2K
R114 4.7K
RELAY SWITCHING LOGIC


RY3
RY4
RY1
RY2
LO-0276
:1
:4.25
ADM. LISTEN AMP.
IC4-D
IC 6
R40
10K△
R39
47K△
C14
3.3/50
C15
.01
C18
.01
(.095)
R41
10K
(ADM. LISTEN CONT.)
(ADM. LISTEN AUDIO)
:8.5
R42
4.7K
+M
R103
47
PEAK DETECTOR
C37
22/15
C36
.01
R36
1M△
D6
R35
470
R37
200K△
IC4-C
R43
10K△
C17
.015
R118 270K
R38 1MΔ
R34
11K△
R44
50K
(TALK LEVEL)
R45
50K
(LISTEN LEVEL)
+M R69
12.0
18K
R68, 18KΔ
C28
2.2/50
C42
10/35
R104
1.8K
R105
1.5K
R106
1.8K
(INPUT BALANCE)
C40
.005
C41
10/35
1
Z C
2
Y
12
CALL-IN INPUT FOR ANNUNCIATOR BEEP ADDER
27.6
R55
68
28.0
+28
R48
20KΔ
470/
50
C22
R49
3.3KΔ
27.1
C19
R50
200KΔ
47/
35
R51
1KΔ
C26 150/35
(7.6)
R53
330K
15.6
C23
330P
15.
Q6
Q7
R56
(8.25)
100
Q11
14.6
(8.17)
Q9
R52
8.2K
R57
5.6K
R62
100
R63
.25
5W
14.1
(7.72)
C21
.001
R54
75Δ
C30
3.3/50
13.9
Q8
D7
IN4002
R64
100
R65
12
2W
R66
12
2W
C25
.1
R58
2.7K
C24
.01
C45
10/35
13.1
R60
100
13.3
Q12
(8.22)
C27
.001
(.36)
.56
Q13
R59
2.7K Δ
R67
100
R108
1K
POWER AMPLIFIER
R98
100K△
R96, 39K△
R97, 33K△
IC4-A
6.0
R100
1K
8
TONE GEN. OUTPUT
(.076)
C20
.005
C38 (1.0)
.1
R46
22K
R101
10K
IC 6
R102
1.5K
R47
2.2K
C34
10/35
C35
.005
R99
33K△
D13
D12
C39
.005
TONE GENERATOR
+ 28V
VOLTAGE REG.
R61
39, 2W
.05
Q10
IN OUT
GND
C29
.47/50
C48
.05
0.0
12.0
R93
1K
STOP REPEATING SUP. TONE WHEN CONN. TO Z
IC7
R89
3.3K
SUP. TONE TIMER
D10
R90
10K
D11
R88
8.2K
R85
4.7K
1.5M
R86
C33
22/15
R87
1M X2
R91
1M
R116
R113
4.7K
C44
.22/50
6.5
R110
47K
+M
R112
.1M
R111
56KΔ
IC1
R107
18KΔ
R109
100K
C43
.47/35
R117
470K
C16
.05
'C' BUSS SENSING CKT
IC 2
TIMER ENABLE GATE
R80
470K
C46
1/35

DRG No KC-1303
DATE 10-19-77

NOTES:

1. UNLESS OTHERWISE SPECIFIED COMPONENT VALUES SHOWN ARE AS FOLLOWS RESISTANCE IN OHMS ± 10% K= 1,000 M= 1,000,000 RESISTORS ARE I/4 WATT CAPACITANCE IN MICROFARADS P= PICOFARAD
2. A INDICATES COMPONENT TOLERANCE OF ±5%
3. ⏚ DENOTES CONNECTION TO CHASSIS.
   ▽ DENOTES CONNECTION TO CIRCUIT COMMON.
4. ▭ DC VOLTAGES SHOWN ARE NOMINAL VALUES MEASURED TO CIRCUIT COMMON WITH NO SIGNAL INPUT AND 20,000 OHM PER VOLT METER.
5. ( ) A.C VOLTAGES SHOWN ARE NOMINAL VALUES AT 3KHt MEASURED TO CIRCUIT COMMON WITH 1 . 0 M INPUT IMPEDANCE A.C. VOLTMETER.
6. OPERATING MODE AND CIRCUIT STATUS. DIAGRAM SHOWN IN CONSOLE TALK MODE B(ii).

OPERATION		T/L	TERMINAL NO.				ANALOG		SWITCH		CONTACTS ON RY			
TALKING	LISTENING	SW	3	4	6	9	A	B	C	D	1	2	3	4
(A) IDLE		OP	LO	LO	LO	LO	OP	OP	CL	OP	OP	OP	OP	OP
(B) i) ROOM STA.	CONSOLE	OP	LO	LO	LO	LO	OP	OP	CL	OP	OP	CL	CL	OP
ii) CONSOLE	ROOM STA	CL	LO	LO	LO	LO	OP	CL	OP	OP	CL	OP	OP	CL
iii) SUPERVISORY TONE		OP	LO	LO	LO	LO	OP	OP	OP	CL	CL	OP	OP	CL
(C) i) CONSOLE	ADM CENTER	OP	HI	HI	LO	HI	CL	CL	OP	OP	CL	OP	OP	OP
ii) ADM CNTR	CONSOLE	OP	LO	HI	LO	HI	OP	OP	CL	OP	OP	OP	CL	OP
(D) i) ROOM STA	ADM CENTER	OP	LO	LO	HI	HI	CL	OP	CL	OP	OP	CL	OP	OP
ii) ADM CNTR	ROOM STA	OF	HI	LO	HI	HI	OP	CL	OP	OP	OP	OP	OP	CL
iii) SUPERVISORY TONE		OF	LO	LO	HI	HI	OP	OP	OP	CL	OP	OP	OP	CL

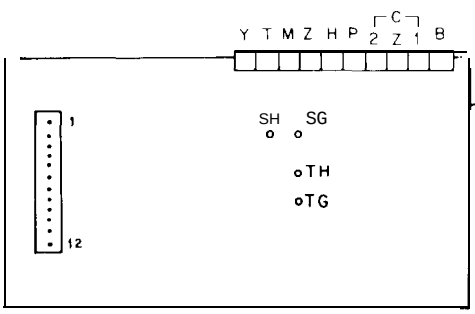
OP -OPEN CL- CLOSED HI > 10VDC LO < 2VDC

7

COMPONENT CHART I	
Q1, Q2, Q3, Q8, Q14, Q15, Q16, Q18	ETS-014A
Q4, Q7, Q17	MPS-A55
Q5	MPS-A18
Q6	MPS-A05
Q9, Q13	MJE-3055
Q10 (EC-0062)	MC7812 CT
Q11	MJE-521
Q12	MJE-371
D1-D6, D8-D14	1N457A
RY1, RY2, RY3, RY4	D-0189

COMPONENT CHART II

IC NO.	RAULAND P/N	DESCRIPTION	+ SUPPLY		TYPE
1	EC-0013	OP AMP	7	4	741
2	EC-0035	TRIPLE 3 INPUT NOR	14	7	4025
3	EC-0030	QUAD 2 INPUT NOR	14	7	4001
4	EC-0024	QUAD OP AMP	11	7	4136
5	EC-0053	AGC AMPLIFIER	14	7	370
6	EC-0052	QUAD ANALOG SW.	14	7	4016
7	EC-0042	HEX INV. BUFFER	1,16	8	4049



8. TERMINALS ARE LOCATED ON BOARD AS SHOWN.

9. R119 AND CONNECTION FROM TERMINAL 'Y' TO TERMINAL '12' ARE NOT INCLUDED ON MCC100 & MCC100A.

N

MODEL MCC 100B
COMMUNICATION CONTROL PANEL
RAULAND BORG.
CHICAGO, ILL
MADE IN U.S.A.
KC-1303