RADIO COMMUNICATIONS
FOR PROFESSIONALS

RITRON, INC.

MODEL RP-200

INSTALLATION & MAINTENANCE MANUAL

MULTIFUNCTION TELEPHONE INTERCONNECT AND PAGING TERMINAL

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IMPORTANT: THE RP-200 IS DESIGNED TO PROVIDE RADIO- TO- TELEPHONE INTERCONNECTION WHEN USED WITH RITRON RADIO COMMUNICATIONS EQUIPMENT. YOUR RITRON DEALER OR REPRESENTATIVE CAN HELP YOU PROPERLY INSTALL AND OPERATE YOUR SYSTEM.

TELEPHONE INTERFACE INFORMATION

SPECIFICATIONS

Ringer Equivalence: 0.7B
Universal Service Order Code: RJ11C
DOC Number: 1084 3399 A

PROHIBITED CONNECTIONS

The RP-200 may not be connected to a party line. The RP-200 may not be connected to any line providing coin service.

IMPORTANT CUSTOMER INFORMATION

All subscriber connections to the telephone system are to be made with standard plugs and telephone company supplied jacks (or their equivalent) to facilitate quick disconnection in case of a malfunction that could cause harm to the telephone network.

THE CUSTOMER'S RESPONSIBILITIES

Customers who connect this equipment directly to the public switched telephone network (PSTN) are required to provide an approved telephone equipment coupler between the RP-200 and the PSTN.

RIGHTS OF THE TELEPHONE COMPANY

When properly connected to the PSTN, the telephone company has the right to temporarily disconnect service to any device causing harm to the system; however, prior notice will be given if practicable. If prior notice is not given, the company shall:

1) Promptly notify the customer after service is disconnected.

2) Give the customer the opportunity to correct the situation that caused the discontinuance.

3) Inform the customer that he has the right to file a complaint with the Federal Communications Commission (FCC) according to the procedures set forth in Part 68 of the FCC Rules and Regulations.

The telephone company also has the right to make changes in the facilities, equipment, operations and procedures. If it can be foreseen that the changes will cause the customer's equipment to be incompatible, adaquate prior notice will be given to allow the customer to make such changes as are necessary to insure uninterrupted service.

Further information can be obtained by reading: Part 68, Subpart B - Conditions on use of terminal equipment; Part 90, Subpart O - Private Radio; Paragraph 90.476 -Interconnection of fixed stations and certain mobile stations; Paragraph 90.477 - Restrictions on interconnected systems.

WHAT TO DO IF PROBLEMS OCCUR

If a problem should occur that causes interference or difficulty within the telephone network, the first action should be to disconnect the RP-200 from the telephone network by removing the modular plug from the telephone jack.

No repair of the RP-200 should be attempted by the customer or the dealer. Any unauthorized repair of the RP-200 may seriously affect compliance with the rules under which the unit is registered. Remove the unit from service and return freight pre-paid to: RITRON, INC. Att: Customer Service Dept. -- 505 West Carmel Drive -- Carmel, IN 46032

RP-200 INSTALLATION

NOTE: Prior to installing the RP-200, the associated RITRON Repeater should be properly set-up.

CTCSS ENCODE DISABLE

In order to obtain the best performance with pagers and paging decoders, the RP-200 sends a signal to the associated RITRON Repeater that disables the Repeater's CTCSS sub-audible tone encoder whenever a page is transmitted. Most new repeaters (RR-155, RR-454 and RR-455) and all older repeater models shipped with a RP-200 receive this modification at the factory. If you are installing the RP-200 with an older model RITRON Repeater, you may have to make the following modifications: RITRON Desktop Repeaters require a jumper from J302 pin 15 to IC311 pin 13. RITRON Wall-Mount Repeaters need a connection from J302 pin 7 to IC403 pin 2.

DESKTOP REPEATER SET-UP

The RP-200 is connected externally to RITRON Repeater Plus Desktop Repeaters. The configuration jumpers inside the Repeater should be set for "Telenexus" operation (see the appropriate Repeater manual) to allow the RP-200 to take full control of the Repeater.

OPERATION WITH/WITHOUT CTCSS SUB-AUDIBLE TONE

When installing a RP-200 in conjunction with a RITRON Desktop Repeater equipped with CTCSS (Continuous Tone Coded Squelch System), be sure that the White wire in the interconnecting cable is positioned in pin 7 of the 20 pin connector. If the Desktop Repeater is NOT equipped with CTCSS, the White wire should be positioned in pin 10 of the 20 pin connector.

To remove the wire and terminal from its connector shell, place the connector on a flat surface with the guide pins DOWN. To release the terminal for removal, press down gently at the wire end of the slot with a pick and pull the wire and terminal from the shell.

Check the retaining barb on the terminal to ensure that it will lock the terminal in place, and push the terminal into the appropriate pin location.

WALL-MOUNT REPEATER SET-UP

The RP-200 is installed inside of RITRON Repeater Plus Wall-Mount models. A model RP-PIK connector and cable kit brings the connectors to the front panel of the Repeater. The RP-200 automatically takes control of the Repeater upon installation.

CONNECTION TO THE TELEPHONE LINE

This connection is made by inserting a modular plug cord from the jack labeled "Telephone" on the RP-200 and the telephone line from either the registered protective coupler or your telephone system.

The RP-200 will function properly when connected to a conventional telephone line. It may not be compatible with certain special "key" telephone systems. Generally, if a typical home telephone set will function on the telephone line in question, the RP-200 will too.

RP-200 ADJUSTMENTS

Due to the maximum level of -9 dBm specified by the FCC Rules and Regulations, the level of audio placed onto the telephone line will be slightly less than that available using a telephone to telephone connection. There is no provision to adjust this level. However, the following adjustments in the RP-200 have been factory preset to operate with a RITRON Repeater. It is not normally neccessary to adjust them at the time of installation.

TRANSMITTED TELEPHONE AUDIO

If the incoming telephone audio is consistantly low, the adjustment of control R125 can be made using a live telephone conversation. Do not use a telephone instrument connected in parallel with the RP-200 for this adjustment since the level will not be representative of the audio level normally appearing on the line.

PAGING TONES

R128 should be adjusted to provide deviation of +/- 3.5 to 4.0 KHz in the attached RITRON Repeater when transmitting the second tone of the Pager address "124."

REPEAT AUDIO

R130 is to be adjusted to provide +/- 3.0 KHz deviation of transmitter audio when the Repeater is receiving a 1.0 KHz tone with +/- 3.0 KHz deviation.

TOUCH TONE DEVIATION SETTINGS

For the Autopatch System to function properly, the Touch Tone level in EACH TRANSCEIVER must be adjusted for +/- 3.5 KHz deviation (4 KHz, maximum). If the level is set incorrectly, the RP-200 and the telephone network may not decode digits properly.

SPECIAL EXTERNAL CONNECTIONS

For connection to special external devices, a modular telephone jack (J101), a connecting cable and terminal block are provided with the RP-200. The pin numbers are shown below as viewed from left to right, looking into the jack.

PIN	FUNCTION	WIRE COLOR
1	Ground	Blue
2	Alarm Activate	Yellow
3	Relay Contact A	Green
4	Relay Contact B	Red
5	Night Service Enable	Black
6	Ground	White

Night Service Paging Mode Control: A contact closure on these terminals enables the Night Service Option on RP-200 Paging Systems. When in Night Service, incoming calls are not answered automatically. However, the RP-200 will turn on the transmitter and send either the : All-Call page (if no PROM installed) or the Night Service Page address programmed in the PROM. This page is followed by the telephone ringing sound so that the portable operator knows that the page was originated from the telephone on Night Service.

Alarm Input: An Alarm terminal pair is provided for connection to an external contact closure. When the external circuit closes, the alarm function is activated, keying the radio transmitter and sending the alarm tone. If, however, the RP-200 was in the Paging Mode, the All-Call Page or designated Alarm Paging Address in the PROM is sent, followed by the alarm tone. After the alarm is initially activated and the tones sent out, the alarm will beep at the end of each Morse Code Station ID until the alarm is reset or disabled via touch tone commands. Once the alarm has been activated, the RP-200 will not recognize another alarm until a touch tone command has been received to reset the alarm.

Remote Control Relay Output: The status (open or closed) of an isolated relay contact may be controlled by Touch Tone signaling the RP-200 from either a radio or the telephone. This relay is capable of handling 1 Ampere of non-inductive current at up to 120 VAC. These contacts are available on J101 for connection to any customer-selected external devices.

It is highly recommended that you use this relay contact closure to control another relay, one that actually carries the load. Then, in the event of a problem with your external circuit, you do not risk harming the relay internal to the RP-200.

TELENEXUS HYBRID ADJUSTMENT

If you wish to make a full duplex interconnect with the telephone line using the RP-200 and a RITRON Repeater as the Base Station, and a RITRON Telenexus Subscriber Unit as the Mobile, the telephone hybrid transformers and balancing network must be properly adjusted for each specific telephone line. With this configuration, the Telenexus connect command from a RTSU/RR unit will disable the repeat audio path (to prevent loop feedback and "howling").

At the time of installation and connection to the telephone line, R157 and SW102 must be adjusted as follows:

1) Set the PJ101 jumper according to the following table to best match the RP-200's DC Loop Resistance to your telephone system:

PJ101 POSITION	DC LOOP RESISTANCE	SUGGESTED SETTING
A	1710 Ω	Not used in U.S.
B	300 Ω	For most 24 volt telephone systems (factory setting).
C	770 Ω	For most 48 volt telephone systems.
D	1240 Ω	Not used in U.S.

2) Connect an AC voltmeter or oscilloscope across R158.

3) Terminate the attached RITRON Repeater to the transceiver port of a radio communications test set or dummy load. With the test set signal generator or a compatible Telenexus Subcriber Unit and Repeater, send the Touch Tone sequence required to connect to the telephone line.

4) Send a continuous single tone from the communications test set, or, simultaneously push the "5" and "8" keys on the Touch Tone telephone connected to the RTSU end.

5) Adjust R157 for the minimum signal reflected from the telephone line (present across R158).

6) Adjust SW102 as above.

7) Repeat steps 5 &6 for minimum reflected signal.

When using the Telenexus with the RP-200, the same operating procedures as required for a portable or mobile radio must be used. However, Rotary or Dial Pulse Telephones may not be used with the Telenexus RTSU-1 Subscriber Unit when a RP-200 is used for connection to the telephone network instead of the Telenexus RTLT-1 Telephone Line Terminator.

USING YOUR RP-200 SYSTEM

The RP-200 has a very large number of features. Most users are only interested in knowing how to send and receive telephone calls and, if your RP-200 and radios are properly equipped, pages. In each system, some user is often designated the "super-user". This person may need to know about the supervisory and control features of the RP-200. These instructions may be separated as required to meet those specific needs.

Some portable and mobile radios automatically activate their transmitter whenever a key is pressed on their Touch Tone keypads. Others require that the Push To Talk (PTT) switch be manually depressed and held while dialing. Consult your portable radio Owner's Manual or RITRON dealer to find out which type you have.

Throughout this text, [ ] means to PRESS the enclosed key on the Touch Tone keyboard (and the PTT switch on some models).

In order to ensure the best reception by the RP-200 when dialing, hold the portable radio vertically and try not to move it around. If your radio is of the type that automatically transmits whenever a Touch Tone key is depressed, hold the first key a little longer than the rest. This gives the transmitter time to initially activate.

PLACING AND RECEIVING TELEPHONE CALLS

Making A Telephone Call From A Portable: Enter [*] and wait to receive a dial tone. Then press the [DIGITS] to dial the number.

Ending A Telephone Call: Press [##].

Answering An Incoming Telephone Call: Push [*] to answer an incoming call.

SENDING A "SWITCH-HOOK FLASH"

Pressing a single [*] when a telephone call is in progress will momentarily hang-up and then reconnect the RP-200.

SWITCHING FROM ROTARY TO TOUCH TONE DIALING

If the RP-200 is in rotary mode, enter a single brief [#].

PAGING ANOTHER PORTABLE OR SENDING A RP-200 COMMAND

Enter [abc*], where "abc" is the three digits of the pager or command code.

RP-200 MODES OF OPERATION

The RP-200 may be set to provide a mode of operation most suited to your application. These modes may be selected by the internal Configuration Switch settings, programming the Configuration PROM or by sending the appropriate Command Code to the RP-200. These modes and their functions are as follows:

Basic Autopatch Mode: In this mode, the RP-200 will respond to incoming telephone rings by transmitting a single ringing signal to all radios that are monitoring the channel. The Multiple Ring Out Feature may be activated so that as the RP-200 detects additional rings, they cause more ringing signals to be transmitted.

Paging Quiet-Call Mode: If your portable radios are equipped with RITRON's Paging Quiet-Call and are set to receive a Page, they can be selected out of an entire group of users for a specific call. When paged, your radio will emit an audible alerting beep. Incoming calls that originate from the telephone line or another portable may be followed by a voice message from the calling party.

To page a portable or pager from a telephone, you must dial the telephone number of the line to which the RP-200 is connected. Under normal operation, the RP-200 will answer after the programmed Ring Delay. Then it will send the caller a short beep to let them know the RP-200 has answered. The caller then has about 6 seconds to enter the 3 digit number of the Pager or Portable he is calling followed by **[*]**. To let the caller know that the RP-200 is working properly, the RP-200 will send the caller sidetones of the same frequency it is using to activate the proper Pager. When the tones end, the caller has about 16 more seconds to speak a message that will be transmitted to the Pager. At the end of that time, the RP-200 will hang up the line. For example, to Page unit 123 you should enter [123*]. All Incoming Pages must be made with a **Touch Tone** telephone.

The Portable user may answer a page and initiate 2-way conversation if his radio is equipped with DTMF, by pressing [*]. In this case, the handheld user must disconnect following the conversation, by entering [##].

Night Service Paging Mode: This is like Paging Quiet-Call Mode, except that the RP-200 does not answer an incoming telephone call, but transmits an All-Call (or the Night Service Paging Address programmed in the PROM), followed by the ringing tone (instead of a voice message) to announce an incoming telephone call. The caller hears multiple rings until the radio user answers.

In order for the radio user to answer, his portable must be equipped with DTMF. The radio user must press [*] to connect, and [##] to disconnect. If he wishes to receive another page, he must reset his radio to paging mode.

Dial-Up Remote Mode: Dial-Up Remote Mode will cause the RP-200 to answer and connect the calling party directly to the Repeater on the first incoming ring. The handheld user does not have to enter [*] to answer, ie. DTMF is not required.

The connection will be broken when either the calling party or a DTMF-equipped portable sends **[##]**, or, if no signal is received from a portable for 20 seconds. This option can provide dial-up remote access on a PABX.

NOTE: If the portable(s) has no DTMF capability, Dial-Up Remote mode must be enabled in CPROM, and configuration switch 1 (enable night service) must be on.

SPECIAL FEATURES

Alarm Signaling: When an external switch connected to the Alarm Input of the RP-200 is closed, the Alarm signal is immediately transmitted. If the RP-200 is in Paging Mode, then the Alarm signal will be preceeded by the Night Service Paging Address. This Alarm will be sent once when the switch first closes and thereafter appended to each Station Identifier. Refer to the Command Code list for the method of controlling the Alarm.

Remote Control Relay Operation: See the installation instructions to make sure the contacts are not used to switch a load beyond their rated capacity. The first two digits of the Remote Control sequence may be changed; normally, they are **95**. The Remote Control Relay may be operated with the following sequences:

[___ ___ 1*] will De-Activate the Relay Output.

[___ ___ 2*] will Activate the Relay Output.

The Remote Control Relay must be enabled before the above commands will work. If it is disabled, then it is termed to be "locked" and can not be controlled until the RP-200 receives another Remote Control Relay Enable command.

Telephone Time Out Timer: The RP-200 may be set to limit the length of telephone calls by automatically disconnecting the line after a certain time. When a call is within 30 seconds of being automatically disconnected, the user of the portable radio will hear 3 beeps each time he releases his Push To Talk switch.

RP-200 USER CONFIGURATION CHECKLIST

YOUR SYSTEM IS NORMALLY SET TO OPERATE AS A:

[ ] **Basic Autopatch.**

[ ] **Paging Autopatch.** When placed in Night Service Mode, incoming telephone calls will cause the RP-200 to transmit a Page to unit ____ ____ ____.

[ ] **Dial-Up Remote.**

Your RP-200 will be activated on the _____ incoming telephone ring.

Your RP-200 will automatically disconnect any telephone call that runs over _____ minutes.

Outgoing telephone calls from portable radios are normally dialed by [Touch Tone] / [Pulse].

THE TOUCH TONE COMMANDS:

[___ ___ **1***] will Open the Relay Output.

[___ ___ **2***] will Close the Relay Output.

Your **Command Code Prefix** is the digit _____.

The sequence [___ ___ ___ *] is the Access Code that unlocks the RP-200 and allows it to **recognize Commands.**

The numbers ____ ____, ____ ____ and ____ ____, are prohibited as the first digits after connection to the telephone network. If entered they will result in disconnection from the telephone line.

Your FCC Call-Sign is _____. It [is] / [is not] programmed into the RP-200's Automatic Station Identifier.

Your Automatic Station Identifier is normally [enabled] / [disabled].

RP-200 [PXX*] COMMAND CODES

These Touch Tone Command Codes are entered in the form **[PXX*]**; **P** is the Prefix, and **XX** the command. The * terminates the sequence. If no PROM is installed, the Prefix defaults to **6**. The RP-200 will acknowledge most commands with four short beeps.

[P00*] Disable Repeater and Autopatch: Signals from portable units will be ignored and not repeated. Incoming telephone calls will be ignored.

[P01*] Enable Ring-In Only: The repeater is disabled, but incoming telephone calls will send a ring tone to the portables, which may not be answered until the Autopatch is enabled.

[P02*] Enable Repeater and Ring-In Only: Same as above, but the repeater is enabled.

[P03*] Enable Repeater and Basic Autopatch

[P04*] Enable Paging Mode: Sets the RP-200 so that it will automatically answer incoming telephone calls and accept digits in order to send a page.

[P05*] Enable Night Service: Incoming telephone calls will not be answered but will cause the Night Service Paging Address (All-Call or as programmed in the PROM) to be transmitted followed by the ring tone. This command overides the status of the internal Night Service DIP switch and the external remote control Night Service switch.

[P06*] Enable Dial-Up Remote: Incoming telephone calls are immediately answered and connected to the repeater transmitter. The call will be disconnected if no portables reply within 20 seconds, or if **[##]** is received.

[P07*] Disable Telephone Ring Detector: The RP-200 will not respond to incoming rings.

[P11*] Disable Multiple Ring Outs: When in Basic Autopatch mode, the RP-200 will transmit a Ring Out to portable units only once in reponse to an incoming call.

[P12*] Enable Multiple Ring Outs: The RP-200 will continue to transmit Ring Outs as long as the calling party lets the line ring.

[P15*] Disable Digit Restrictions: The patch is open and all digits dialed will be passed through to the telephone network.

[P16*] Enable Digit Restrictions: The patch disconnects from the telephone network if the first digits dialed after connection to the telephone line are Restricted Digits as programmed in the PROM.

[P17*] Disable Rotary Dialing: Outgoing telephone calls will be made using Touch Tone signaling.

[P18*] Enable Rotary Dialing: When connected to the telephone line, incoming Touch Tone digits will be converted to Rotary Dial pulses to be sent to the telephone network.

[P21*] Disable Alarm: Alarm inputs will be ignored.

[P22*] Enable and Reset Alarm: Reset the Alarm status and respond to an Alarm input.

[P25*] Disable Relay Control: Prohibits the Relay Command from changing the status of the Remote Control Relay.

[P26*] Enable Relay Control: Allows the Relay Command to change the status of the Remote Control Relay.

[P27*] Disable Telephone Control: The RP-200 will Ignore commands originating from the telephone line, except for Pages.

[P28*] Enable Telephone Control: The RP-200 will respond to commands and Pages originating from the telephone line.

[P31*] Disable Morse Code Identifier

[P32*] Enable Morse Code Identifier and transmit your ID.

[P37*] Disable Command Functions: The RP-200 will ignore all commands originating from both the telephone line and a radio (exept the Access Code). For information about the Access Code, see page 13, the section titled, "Prom Contents-- Description and Function."

[P39*] Telenexus Connect: Connects to the telephone line with repeat audio disabled for use with a full duplex mobile unit. The telephone hybrid must be properly adjusted for best quality audio.

[P49*] Reset System: Returns the RP-200 to "power-on" status as if the unit had just been turned on.

[P41*] Enable "Cutover" Beep: During a telephone conversation, a "cutover" beep sounds when the portable radio user releases the Push-To-Talk button. This allows the user to tell the party on the telephone, "Wait for the beep before you talk or I won't be able to hear you."

[P42*] Disable "Cutover" Beep: The cutover beep is also disabled when the RP-200 is reset or turned off and then back on. The cutover beep may be enabled automatically when power is applied to the repeater and autopatch by programming and installing a configuration PROM (CPROM) with an even (i.e., ending in 0, 2, 4, 6, or 8) relay control command prefix.

[P99*] Test Tone: Causes the RP-200 to begin alternately transmitting a 1000 Hz tone followed by no tone. This will continue until the RP-200 receives any Touch Tone digit.

RP-200 THEORY OF OPERATION

CONVENTIONS

The terms Touch Tone and DTMF (Dual Tone Multi-Frequency) refer to those signals commonly used by the domestic telephone network for signaling and control.

In the description of digital circuits in the manual, a "1" or "high" level represents a voltage greater than 3.5 Volts. Conversely, a "0" or "low" corresponds to a voltage less than 0.5 Volts.

The RP-200 contains CMOS integrated circuits which must be protected from static discharge. To insure the safety of these IC's, you should discharge any accumulated static buildup by momentarily touching a grounded object before making contact with the internal circuitry.

THE MICROCOMPUTER CONTROLLER

The RP-200 is controlled by a custom programmed microcomputer (IC112). This microcomputer: generates Audio Beeps in response to user commands; is connected to the output of the Touch Tone Decoder; controls the routing of audio signals within the RP-200, to and from the telephone line and the Repeater; controls the Telephone Line Relay; responds to Touch Tone commands and Switch Status Changes to configure the RP-200 to operate in various modes and; reads data from the PROM as required.

CONFIGURATION PROM

Data is read from the PROM (IC113) into the microcomputer. This process involves setting the Chip Enable line (pin 15) low and placing the proper 5 bit address on pins 10 through 14. The 8 data bits are then read from pins 1 through 9 (pin 8 is ground).

TOUCH TONE DECODER

A two chip decoder is used to provide both the filtering and decoding of Touch Tone signals. The Digital Decoder IC105 clock input is connected to pin 2, low band tones to pin 13 and high band tones to pin 4. By using digital-counting techniques within IC105, the two tone frequencies are tested and verified to be proper in frequency and duration before an output is initiated. The output code representing a Touch Tone digit is presented in binary form at pins 5, 6, 7 and 8, with pin 5 being the least significant bit, and pin 8 being the most significant bit. These four output lines are all high impedance (tri-state) unless the tri-state enable (TOE) line (pin 9) is "high." The output of the strobe line (pin 15) goes high to indicate that a valid Touch Tone is currently being detected. The outputs from the decoder are applied to the microcomputer for processing.

TELEPHONE LINE RING DETECTOR

IC101 rectifies the alternating current ringing voltage from the telephone line and converts it to +5 Volts D.C. for application to the Light Emitting Diode portion of opto-isolator IC102. The transistor output of the opto-isolator is connected to an input port of microcomputer IC112. This signal goes "low" when an incoming ring signal is present.

TELEPHONE LINE RELAY

Connects the line coupling transformer to the telephone network.
The line relay is activated by the microcomputer through switching transistor Q102.

TELEPHONE LINE COUPLING TRANSFORMERS

T102 and T103 isolate the unbalanced audio signals from the balanced telephone network. The loop current is determined by the DC resistance of the transformers and a resistor network composed of R153, R154, R155 and R156, set by PJ101. Hybrid balancing is accomplished by the potentiometer, R157, and a capacitor network controlled by a 6-position DIP switch, SW102.

TELEPHONE LINE LIMITER AND SUMMING AMPLIFIER

Output signals to the telephone line include: radio receiver audio, user beeps from the microcomputer and, the high and low tone group audio outputs from the Touch Tone filter. The resulting signal applied to the telephone line is limited to a -9dBm maximum. This is accomplished by limiting the input signal from the radio receiver in operational amplifier IC108A. The gain in the following amplifier stage, IC109A, is set by fixed resistors. Signals from the microcomputer and the output of the Touch Tone filter are of fixed amplitude and likewise limited.

TRANSMITTER MODULATION SUMMING AMPLIFIER

All audio signals applied to the external radio transmitter are adjusted in level by potentiometers and summed in IC109B. These signals include telephone audio (R125), signaling tones and beeps (R128) and repeat audio (R130).

AUDIO ROUTING TRANSMISSION GATES

The routing of audio signals within the RP-200 is accomplished by transmission gates that are controlled by the microcomputer. These gates allow the bi-directional flow of signals when their control port (shown schematically by an arrow) is set high. When the control port is set low, the gate is open and no signal can pass.

Audio sources to the radio Transmitter Summing Amplifier are controlled by the following ICs:

IC103C - Audio from the Telephone Line.
IC107A - Signaling Tones from the Microcomputer.
IC107C - Repeat Audio from the Radio Receiver.

Audio sources to the Telephone Line Summing Amplifier are controlled as follows:

IC106A - High Tone Group Touch Tone Filter Output.
IC106B - Low Tone Group Touch Tone Filter Output.
IC107B - Signaling Tones from the Microcomputer.
IC107D - Limited Radio Receiver Audio.

REMOTE CONTROL RELAY

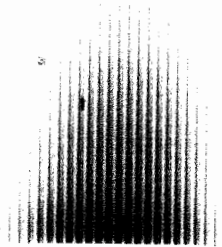
Relay K102 is activated through Q104, which is controlled by the microcomputer. The relay's contact closure output is connected to both P102 and J101.

REPEATER TRANSMITTER ACTIVATE

The microcomputer activates the Repeater transmitter by turning on Q101, whose output is connected to the Repeater's transmitter activate control line.

REPEATER CTCSS ENCODE DISABLE

When Q103 is turned on, its collector pulls to ground. This ground is routed to a point in the external Repeater that is used to disable CTCSS encode during the transmission of pages.



INPUT/OUTPUT CONNECTIONS

The RP-200 is designed to be installed either internal or external to several models of RITRON Repeaters. When the RP-200 is ordered for use with RITRON Desktop Repeaters such as models RR-455 or 155, it is packaged in a separate ABS plastic enclosure. A cable is provided for connection from P101 to the 20 pin accessory connector on the rear panel of the Repeater. A modular telephone jack (J102) should be connected to the telephone line. A second modular telephone jack (J101) carries the remote control signals such as the Alarm Input, Remote Control Relay Output and Night Service Enable Input.

For internal connections in Repeaters such as the RR-454, P101 is a vertical connector from the bottom of the RP-200 to the Repeater main board. A connector and cable establishes the path for the telephone and remote control lines from P102 to the RP-PIK modular jack interface board mounted in the Repeater chassis. Here again, two modular jacks are provided for external connections.

RP-200 INTERNAL CONFIGURATION SWITCH

The Configuration Switch (SW101) is used to enable the options listed below when the RP-200 is first turned on or reset. The function will be Enabled if the switch is in the ON position.

SWITCH	FUNCTION
1	Night Service Enable
2	Morse Code Station Identifier Enable
3	Pulse Dialing Enable
4	Not Used
5	Paging System Enable
6	Repeater Disable (normally set ON)

CONFIGURATION PROM PROGRAMMING

PROM CONTENTS: DESCRIPTION AND FUNCTION

The PROM (Programmable Read Only Memory) is a 32 address by 8 bits type that's widely used in cellular and trunked radios to hold operational information. The PROM may be programmed only once. Any changes must be made in a new PROM.

The RP-200 will operate without a PROM installed. However, some features will not work and others will work in only one particular (default) manner. For example, the Telephone Time Out Timer defaults to 3 minutes and cannot be changed without installing a properly programmed PROM.

RITRON will program your PROM as requested. Order RITRON model RCPROM and submit a completed PROM Programming Request form at the time of order.

The following information is contained in locations $00 to $1F of the RP-200's PROM and is available to the microcomputer's operating program:

$00 PROM Present Flag: The first location in the PROM must be set to hexadecimal $AA, and is read to signal the RP-200 that the PROM is present.

$01 Repeater Time Out Timer Time: May be set in increments of 6.4 seconds with a value of 1 to 255 (6.4 seconds to 27 minutes).

$03 Telephone Time Out Time: May be set in increments of 6.4 seconds with a value of 1 to 255 (6.4 seconds to 27 minutes).

$02 Morse Code Identifier Timer: May be set in increments of 6.4 seconds with a value of 1 to 255 (6.4 seconds to 27 minutes).

$04 Flash Time Constant: This constant determines the length of the flash-switch-hook in increments of 25 milli-seconds. Most telephone systems will respond properly with a 350 milli-second (program a $0E) flash-switch-hook. Refer to your telephone system's specifications for more information.

$05 Night Service Paging Address: This is the paging code that is sent when an attempt to ring the RP-200 is made while it is in the Paging Mode AND Night Service is enabled. See the Paging : Quiet-Call table for the proper hex code.

$06 Alarm Paging Address: If the RP-200 is in Paging Mode, the Alarm will transmit this paging address followed by the Alarm tone. See the Paging Quiet-Call table for the proper hex code.

$07-$08 Access Code: The RP-200 will not respond to Touch Tone **Commands** unless it is Unlocked. The RP-200 may be unlocked by entering the **Access Code**. The RP-200 remains unlocked until it is Locked. If no PROM is present, the **Access Code** defaults to **[987*]**. If another Access Code is programmed in the PROM, it may not be either a valid paging address or a command. For example, to program 505 as the Access Code program $05 and $A5 into locations $07 and $08.

$09 Function Prefix Digit: This is the first digit of most command codes. With no PROM installed the Prefix Digit defaults to 6. To set 8 as the Prefix Digit, program $08 into location $09.

$0A Relay Control Prefix: These two digits precede the Relay On and Off commands. With no PROM installed, the Relay Control Prefix is 65. To change the Relay Control Prefix to 57, program $57 into location $0A

$0B - 0D Restricted First and Second Telephone Dialing Digits: First Digit dialing Restrictions of up to 3, 2- digit sequences may be programmed. Each sequence requires 1 byte of PROM. To program the RP-200 to restrict any first digit (n), the PROM contents take the form $n0. The Unused digit restrict locations must be programmed with $FF!

For example, if the RP-200 is connected directly to a line from the telephone company, the first digits-- 0 and 1-- may be restricted by programming $0A, $01and $FF into locations $0B thru $0D of the PROM. However, if the RP-200 is connected to an extension of a PABX that requires dialing the digit 9 for access to an outside line, this may be restricted by programming $90 into location $0B of the PROM. To allow dialing 9 for making outside calls, yet restrict the second digits of 1 and 0, program $91, $9A and $FF into locations $0B thru $0D of the PROM.

$0E Ring Delay: The number of incoming rings from the telephone line before the RP-200 Rings Out (if in Patch Mode or Night Service), or before the RP-200 Answers the incoming call to accept Touch Tone commands (Pages or Functions). To set the Ring Delay to 4 rings, program $04 into location $0E.

$0F PROM Flags: These Flags are read by the program when the RP-200 is first turned on or RESET. These presets may be overridden by the appropriate Touch Tone Command. Many of these flags may be used to ensure that access to the Repeater, the Telephone Interconnect or Touch Tone Commands are not gained by momentarily removing power from the RP-200 and Repeater. The flag bit numbers and functions are:

BIT FUNCTION (selected if bit is set high)

0 - Disable REPEATER

1 - Disable AUTOPATCH

2 - Enable DIAL-UP: The Dial-Up Remote mode will be activated.

3 - Enable MULTIPLE RING OUTS: The Multiple Ring Out option causes the RP-200 to transmit ring signals out to the portable and mobile units as long as the calling party allows the telephone to ring. This process starts after the RP-200 has received the number of Rings it is set to count before activating. The Multiple Ring Out Option may be activated via PROM programming or by Touch Tone Remote Control.

4 - DIALING RESTRICTIONS Enabled: Dialing Restrictions are put in effect.

5 - Not used.

6 - Not used.

7 - Not used.

To set the RP-200 to function when first turned on or reset so that the Repeater is Enabled, the Autopatch is Disabled, Dial-Up Remote is Disabled, Multiple Rings are Enabled and dialing Restrictions are Enabled: program the binary number % 0001 1010 as $1A (from Conversion Table on page 17) into location $0F.

$10 - $17 Non-Paging to Paging Code Conversion Table: The RP-200 may be programmed to convert up to 4 Touch Tone sequences that are not valid Paging Quiet-Call codes into Paging Quiet-Call codes 341, 342, 343 and 344. For example, the Touch Tone sequence "103" may be mapped to produce the valid Paging Quiet-Call code "343," by programming locations $10 and $11 with $01 and $A3, respectively. Unused locations must be filled with $FF. Care must be taken that these codes do not match any valid Touch Tone Command.

If required, RITRON can program up to 15 additional conversions (to codes 411 through 443) into the microcomputer (IC112). Ask for OPT.RP2CC and specify those codes at the time of order.

$18 - $1F Morse Code Identifier Sequence: A Morse Code Station Identifier (ID), of up to 8 characters, may be sent once every 15 minutes (or at the PROM programmed interval) whenever the Repeater or RP-200 is in use. The station identifier characters are stored in the PROM in ASCII format (ASCII Table on page 17). A table in the uC ROM produces the actual Morse sequence. Up to 8 characters including letters, numbers and the "/" character, may be stored as the ID sequence (ie. KNE9811A).

RP-200 PROM PROGRAMMING WORKSHEET

LOC. DEC.	LOC. HEX.	VALUE HEX.	VALUE DEC.	RESULT	DESCRIPTION
00	00	$AA	170		Must contain this value!
01	01	_____	_____	_____	Repeater Time Out Time, (x 6.4 sec.).
02	02	_____	_____	_____	ID Timer, (x 6.4 sec.).
03	03	_____	_____	_____	Telephone Time Out Timer (x 6.4 sec.).
04	04	_____	_____	_____	Flash -Switch- Hook Time (x 25 ms.).
05	05	_____	_____	_____	Night Service Paging Address (ie.124).
06	06	_____	_____	_____	Alarm Paging Address (ie.124).
07	07	_____	_____	_____	Access Code Digits 2 & 3.
08	08	_____	_____	_____	Access Code Digit 1.
09	09	_____	_____	_____	Function Prefix Digit.
10	0A	_____	_____	_____	Relay Activate Code Prefix (ie.95).
11	0B	_____	_____	_____	Restricted Digits Pattern 1.
12	0C	_____	_____	_____	" " " 2.
13	0D	_____	_____	_____	" " " 3.
14	0E	_____	_____	_____	Answer After Ring Number.
15	0F	_____	_____	_____	Flags and Presets (see text).
16	10	_____	_____	_____	Mapped Paging Code 1, (Digit 1).
17	11	_____	_____	_____	(Digits 2 & 3.)
18	12	_____	_____	_____	Mapped Paging Code 2, (Digit 1).
19	13	_____	_____	_____	(Digits 2 & 3.)
20	14	_____	_____	_____	Mapped Paging Code 3, (Digit 1).
21	15	_____	_____	_____	(Digits 2 & 3.)
22	16	_____	_____	_____	Mapped Paging Code 4, (Digit 1).
23	17	_____	_____	_____	(Digits 2 & 3.)
24	18	_____	_____	_____	Morse Code ID Character 1 (**see table**).
25	19	_____	_____	_____	2
26	1A	_____	_____	_____	3
27	1B	_____	_____	_____	4
28	1C	_____	_____	_____	5
29	1D	_____	_____	_____	6
30	1E	_____	_____	_____	7
31	1F	_____	_____	_____	8

CUSTOMER: _____

PROM SERIAL NUMBER: _____

PAGING QUIET-CALL CODES AND TONES

The chart below shows all 64 RITRON Paging Quiet-Call codes, including ALL-CALL (444). This list shows the switch setting to be used in corresponding RITRON Quiet-Call equipped Pagers and Portables, the Code Number, the frequencies of the first and second tones used and the Hexadecimal (HEX) representations used in the RP-200 PROM for these codes.

SWITCH SETTING	PAGER CODE	1ST TONE	2ND TONE	HEX CODE	SWITCH SETTING	PAGER CODE	1ST TONE	2ND TONE	HEX CODE
111111	111	330.5	569.1	$00	111110	311	410.8	569.1	$20
011111	112	330.5	600.9	$01	011110	312	410.8	600.9	$21
101111	113	330.5	634.5	$02	101110	313	410.8	634.5	$22
001111	114	330.5	669.9	$03	001110	314	410.8	669.9	$23
110111	121	330.5	707.3	$04	110110	321	410.8	707.3	$24
010111	122	330.5	746.8	$05	010110	322	410.8	746.8	$25
100111	123	330.5	788.5	$06	100110	323	410.8	788.5	$26
000111	124	330.5	832.5	$07	000110	324	410.8	832.5	$27
111011	131	349.0	569.1	$08	111010	331	433.7	569.1	$28
011011	132	349.0	600.9	$09	011010	332	433.7	600.9	$29
101011	133	349.0	634.5	$0A	101010	333	433.7	634.5	$2A
001011	134	349.0	669.9	$0B	001010	334	433.7	669.9	$2B
110011	141	349.0	707.3	$0C	110010	341	433.7	707.3	$2C
010011	142	349.0	746.8	$0D	010010	342	433.7	746.8	$2D
100011	143	349.0	788.5	$0E	100010	343	433.7	788.5	$2E
000011	144	349.0	832.5	$0F	000010	344	433.7	832.5	$2F
111101	211	368.5	569.1	$10	111100	411	457.9	569.1	$30
011101	212	368.5	600.9	$11	011100	412	457.9	600.9	$31
101101	213	368.5	634.5	$12	101100	413	457.9	634.5	$32
001101	214	368.5	669.9	$13	001100	414	457.9	669.9	$33
110101	221	368.5	707.3	$14	110100	421	457.9	707.3	$34
010101	222	368.5	746.8	$15	010100	422	457.9	746.8	$35
100101	223	368.5	788.5	$16	100100	423	457.9	788.5	$36
000101	224	368.5	832.5	$17	000100	424	457.9	832.5	$37
111001	231	389.0	569.1	$18	111000	431	483.5	569.1	$38
011001	232	389.0	600.9	$19	011000	432	483.5	600.9	$39
101001	233	389.0	634.5	$1A	101000	433	483.5	634.5	$3A
001001	234	389.0	669.9	$1B	001000	434	483.5	669.9	$3B
110001	241	389.0	707.3	$1C	110000	441	483.5	707.3	$3C
010001	242	389.0	746.8	$1D	010000	442	483.5	746.8	$3D
100001	243	389.0	788.5	$1E	100000	443	483.5	788.5	$3E
000001	244	389.0	832.5	$1F	000000	444	483.5	832.5	$3F

DECIMAL TO HEXADECIMAL TO BINARY CONVERSION TABLE

DEC	HEX	BIN	DEC	HEX	BIN
0	0	0000	8	8	1000
1	1	0001	9	9	1001
2	2	0010	10	A	1010
3	3	0011	11	B	1011
4	4	0100	12	C	1100
5	5	0101	13	D	1101
6	6	0110	14	E	1110
7	7	0111	15	F	1111

ASCII CHARACTER TABLE

These are the only characters that may be sent in Morse Code by the RP-200.

CHR	DEC	HEX	*CHR*	*DEC*	*HEX*	CHR	DEC	HEX
/	47	2F						
0	48	30	*C*	*67*	*43*	O	79	4F
1	49	31	*D*	*68*	*44*	P	80	50
2	50	32	*E*	*69*	*45*	Q	81	51
3	51	33	*F*	*70*	*46*	R	82	52
4	52	34	*G*	*71*	*47*	S	83	53
5	53	35	*H*	*72*	*48*	T	84	54
6	54	36	*I*	*73*	*49*	U	85	55
7	55	37	*J*	*74*	*4A*	V	86	56
8	56	38	*K*	*75*	*4B*	W	87	57
9	57	39	*L*	*76*	*4C*	X	88	58
A	65	41	*M*	*77*	*4D*	Y	89	59
B	66	42	*N*	*78*	*4E*	Z	90	5A

GENERAL INFORMATION

CARE IN PROGRAMMING TOUCH TONE CONTROL CODES

When the [*] is received, the previous 3 Touch Tone digits that were entered are checked to see if they form either a valid paging code, a converted pager address, or a command code. If none of these match then a connect to the telephone line is initiated.

Many of the control, access and paging codes used with the RP-200 may programmed by the user. Care must be taken to see that duplication of codes does not occur. For example, you should not program the Access Code so that it is also a valid Paging Code. Also, the Remote Control Relay code should not be the same as a mapped Paging Code. In general, make sure that all of these codes and addresses are unique when you program the RP-200's PROM.

GUARANTEED TELEPHONE CONTROL ACCESS

So that you can control the RP-200 via a telephone regardless of its current mode of operation, the RP-200 will always answer the 30th incoming telephone ring and wait 7 seconds for a command.

PAGING AND SPECIAL COMMANDS

Pages and Special Functions consist of 3 digits followed by the "*" character, which are entered from the Touch Tone keyboard of either a radio transceiver or, if the RP-200 is set to allow it, a telephone.

A valid paging code may only consist of the digits 1 thru 4 and must be compatible with the RITRON Paging Quiet-Call coding scheme. RITRON Paging Quiet-Call Decoders interpret the paging address 444 as ALL-CALL.

RADIO INTERFACING AND OPTIONS

The RP-200 is compatible with the RWR-10 Wired DC Remote Control for the RITRON RR-452 and RR-454 Repeaters. The remote control phone is treated as if it was just another portable in the system.

In order to enable the telephone connected to the RWR-10 Local DC Remote to send pages and place telephone calls for portables that are not equipped with Touch Tone encoder pads, please make sure that: 1) The microprocessor installed in the RP-200 (IC112) is the "BROWN dot" software revision or higher. Do not use plain, red, blue, green or orange dot processors. 2) R302, found on the RR-454 printed circuit board, is cut. This is required so that the RP-200 can control the RWR-10 microphone audio. 3) R308, also located on the RR-454 printed circuit board, is a 15K Ohm resistor (not 270K) to provide sufficient audio level from the RWR-10 to the RP-200. The 15K Ohm value appears in all RITRON RR-454's manufactured after June 1, 1988. For more information, contact RITRON RP-200 Engineering.

The RP-200 is specifically designed for easy connection to RITRON Repeaters. RITRON Engineering and Customer Service are not able to support the use of the RP-200 with any other manufacturer's radio equipment. For more information, refer to the RITRON RR-454 Wall-Mount and RR-455 Desktop Repeater Plus manuals.

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FEEDBACK

We welcome your comments and suggestions concerning the RP-200. Please address them to:

RITRON, INC. RP-200 Engineering
P.O. Box 1998, Carmel, IN 46082-1998 USA
Phone: 317-846-1201 Fax: 317-846-4978

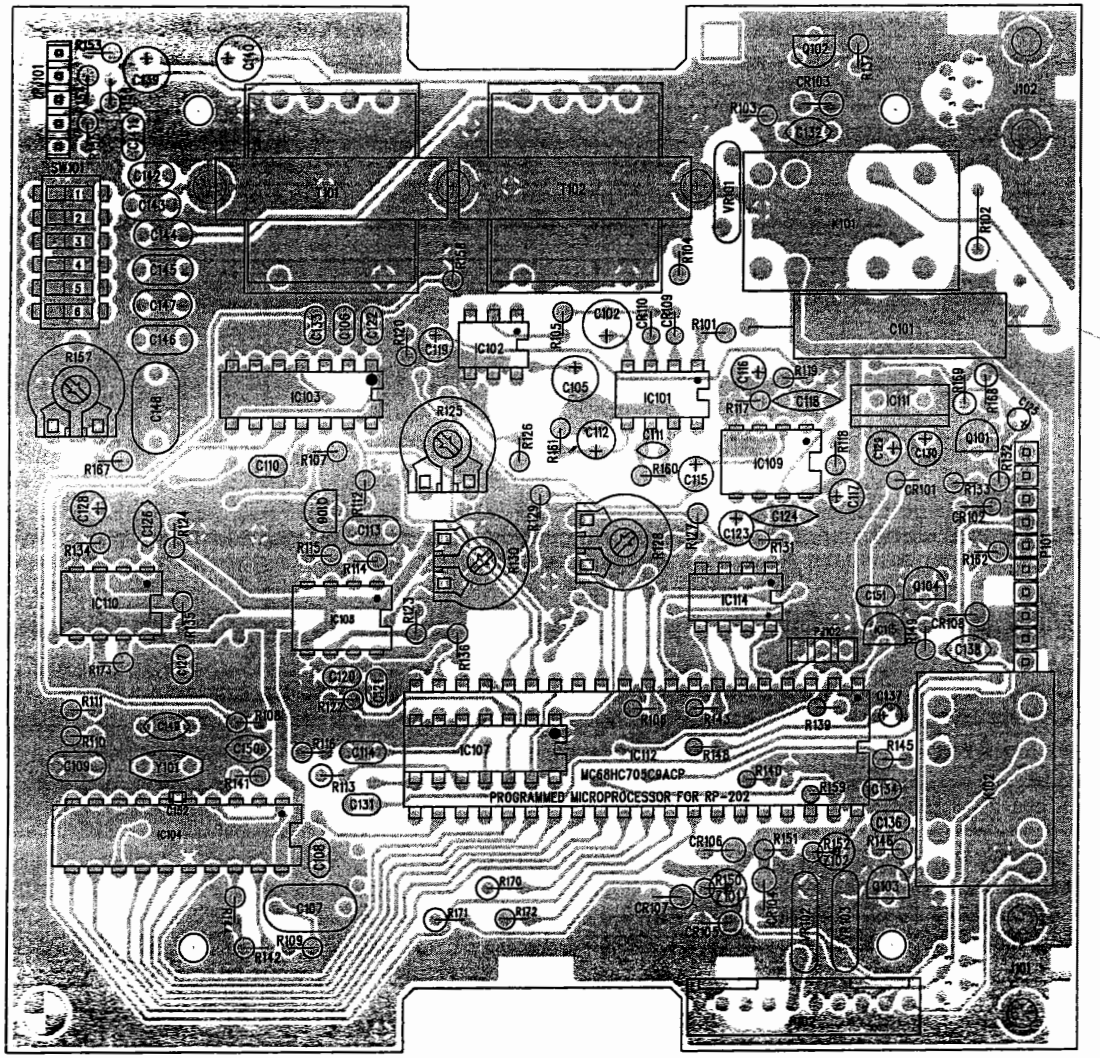
RP-200 SCHEMATIC REFERENCE PARTS LIST

NOTE: This parts list reflects component values current with ECN 2405. If a value in this parts list differs from the value shown in the schematic on page 23, the parts list is to be considered more current.

REF#	RITRON#	DESCRIPTION
CAPACITOR		
C 101	01517004	.47µF MYLARROLL 1000V .8x1.3 a
C 102	01503021	10µF ELT 50V .1" .2"x.46" r
C 105	01515463	.1µF X7R MLCER 50V .100 r K
C 106	01501050	.01µF MYLAR 100V .200" r 10%
C 107	01515463	.1µF X7R MLCER 50V .100 r K
C 108	01515463	.1µF X7R MLCER 50V .100 r K
C 109	01515037	680pF COG MLCER 50V .100 r K
C 110	01515463	.1µF X7R MLCER 50V .100 r K
C 111	01515463	.1µF X7R MLCER 50V .100 r K
C 112	01515037	680pF COG MLCER 50V .100 r K
C 113	01501050	.01µF MYLAR 100V .200" r 10%
C 114	01501040	.001µF MYLAR 100V .125" r 10%
C 115	01502013	10µF TANT 16V(C) .1" r 20%
C 116	01502013	10µF TANT 16V(C) .1" r 20%
C 117	01502013	10µF TANT 16V(C) .1" r 20%
C 118	01510127	100pF N150 CERDIS 50V .32x.2 r
C 119	01502013	10µF TANT 16V(C) .1" r 20%
C 120	01515463	.1µF X7R MLCER 50V .100 r K
C 121	01515463	.1µF X7R MLCER 50V .100 r K
C 122	01515463	.1µF X7R MLCER 50V .100 r K
C 123	01502013	10µF TANT 16V(C) .1" r 20%
C 124	01510127	100pF N150 CERDIS 50V .32x.2 r
C 125	01502007	1µF TANT 35v(v) .1" 20%
C 126	01516451	.01µF Y5V CERDIS 25V .200 r Z
C 127	01515463	.1µF X7R MLCER 50V .100 r K
C 128	01502013	10µF TANT 16V(C) .1" r 20%
C 129	01502013	10µF TANT 16V(C) .1" r 20%
C 130	01502013	10µF TANT 16V(C) .1" r 20%
C 131	01515463	.1µF X7R MLCER 50V .100 r K
C 132	01516451	.01µF Y5V CERDIS 25V .200 r Z
C 133	01502007	1µF TANT 35v(v) .1" 20%
C 134	01515463	.1µF X7R MLCER 50V .100 r K
C 136	01515463	.1µF X7R MLCER 50V .100 r K
C 137	01502007	1µF TANT 35v(v) .1" 20%
C 138	01516451	.01µF Y5V CERDIS 25V .200 r Z
C 139	01503021	10µF ELT 50V .1" .2"x.46" r
C 140	01503021	10µF ELT 50V .1" .2"x.46" r
C 141	01501041	.0022µF MYLAR 100V .200" r 10%
C 142	01501045	.0047µF MYLAR 100V .125" r 10%
C 143	01501050	.01µF MYLAR 100V .200" r 10%
C 144	01501051	.022µF MYLAR 100V .200 r 10%
C 145	01501053	.033µF MYLAR 100V .250" r 10%
C 146	01501053	.033µF MYLAR 100V .250" r 10%
C 147	01501051	.022µF MYLAR 100V .200 r 10%
C 148	01515463	.1µF X7R MLCER 50V .100 r K
C 149	01516451	.01µF Y5V CERDIS 25V .200 r Z
DIODES		
CR102	04810001	1N4148; GENERAL PURPOSE
CR103	04810003	1N4001 50 VOLT/1AMP
CR104	04810003	1N4001 50 VOLT/1AMP
CR105	04810003	1N4001 50 VOLT/1AMP
CR106	04810003	1N4001 50 VOLT/1AMP
CR107	04810003	1N4001 50 VOLT/1AMP
CR108	04810003	1N4001 50 VOLT/1AMP
CR109	4810001L	1N4148 LONG LEADED GEN PURPOSE
INTEGRATED CIRCUIT		
IC101	03131024	RING DETECTOR; TI #TCM1520A
IC102	03131020	DARLINGTON OPTO COUPLER H11B1
IC103	03134066	CD4066BCP; QUAD ANALOG GATE

REF#	RITRON#	DESCRIPTION
IC104	03132004	DTMF FILTER; MITEL MT8865
IC105	03132005	DTMF DECODER; MITEL MT8860
IC106	03134066	CD4066BCP; QUAD ANALOG GATE
IC107	03134066	CD4066BCP; QUAD ANALOG GATE
IC108	03131017	CA3260AE DUAL BI-MOS OP AMP
IC109	03131017	CA3260AE DUAL BI-MOS OP AMP
IC110	03131017	CA3260AE DUAL BI-MOS OP AMP
IC111	03131016	MC78MO5CY 5 VOLT REG. (TO-220)
IC112	03132068	µPROCESSOR, PROG. FOR RP-200
IC114	03132067	EEPROM 128 X 8 X24C01
JACK		
J 101	02100310	6-PIN MODULAR PHONE JACK
J 102	02100083	RJ11 4 WIRE PC MOUNT JACK
RELAY		
K 101	04500006	RELAY; DPDT 12VDC 3A SMALL
K 102	04500006	RELAY; DPDT 12VDC 3A SMALL
SHORTING PLUG		
PJ101	02100075	2 PIN SHORTING PLUG
PJ101	02100027	5 PIN METHODE HEADER .1"C
PLUG		
P 101	02100084	10 PIN 0.1"CENTER HEADER
P 102	02100313	10 PIN POLARIZED PC MNT CONN
TRANSISTOR		
Q 101	04800048	NPN 1W MPSW01A
Q 102	04800006	MPS-4124 NPN LOW NOISE AUD.
Q 103	04800007	MPS-A13 NPN DARLINGTON
Q 104	04800007	MPS-A13 NPN DARLINGTON
RESISTOR, CHIP, FIXED, UNLESS STATED OTHERWISE		
R 101	04700137	2.2KΩ 5% 1/4W
R 102	4700130L	560Ω 5% 1/4W
R 103	04720009	0Ω 5% 1/4W
R 104	04720009	0Ω 5% 1/4W
R 105	04700133	1KΩ 5% 1/4W
R 106	04700845	10KΩ 5% 1/8W
R 107	04700153	47KΩ 5% 1/4W
R 108	04700173	2.2MΩ 5% 1/4W
R 109	04700141	4.7KΩ 5% 1/4W
R 110	04700163	330KΩ 5% 1/4W
R 111	04700157	100KΩ 5% 1/4W
R 112	04700157	100KΩ 5% 1/4W
R 113	04700161	220KΩ 5% 1/4W
R 114	04700157	100KΩ 5% 1/4W
R 115	04700149	22KΩ 5% 1/4W
R 117	04700145	10KΩ 5% 1/4W
R 118	04700145	10KΩ 5% 1/4W
R 119	04700163	330KΩ 5% 1/4W
R 120	04700130	560Ω 5% 1/4W
R 122	04700147	15KΩ 5% 1/4W
R 123	04700145	10KΩ 5% 1/4W
R 124	04700157	100KΩ 5% 1/4W
R 125	04750008	10KΩ TRIM POT/HORZ MOUNT
R 126	04700150	27KΩ 5% 1/4W
R 127	04700152	39KΩ 5% 1/4W
R 128	04750008	10KΩ TRIM POT/HORZ MOUNT
R 129	04700160	180KΩ 5% 1/4W
R 130	04750008	10KΩ TRIM POT/HORZ MOUNT

REF#	RITRON#	DESCRIPTION
R 131	04700163	330KΩ 5% 1/4W
R 132	04700121	100Ω 5% 1/4W
R 133	04700141	4.7KΩ 5% 1/4W
R 134	04700145	10KΩ 5% 1/4W
R 135	04700145	10KΩ 5% 1/4W
R 136	04700157	100KΩ 5% 1/4W
R 137	04700141	4.7KΩ 5% 1/4W
R 138	04720009	0Ω 5% 1/4W
R 139	04700845	10KΩ 5% 1/8W
R 140	04700845	10KΩ 5% 1/8W
R 143	04700845	10KΩ 5% 1/8W
R 144	04700845	10KΩ 5% 1/8W
R 145	04700157	100KΩ 5% 1/4W
R 146	04700157	100KΩ 5% 1/4W
R 148	04700157	100KΩ 5% 1/4W
R 149	04700157	100KΩ 5% 1/4W
R 150	04700121	100Ω 5% 1/4W
R 151	04700133	1KΩ 5% 1/4W
R 152	04700121	100Ω 5% 1/4W
R 153	04700121	100Ω 5% 1/4W
R 154	04700129	470Ω 5% 1/4W
R 155	04700129	470Ω 5% 1/4W
R 156	04700129	470Ω 5% 1/4W
R 157	04750005	2KΩ TRIM POT; LINEAR
R 158	04700130	560Ω 5% 1/4W
R 159	4700857L	100KΩ 5% 1/8W
R 160	04720009	0Ω 5% 1/4W
R 161	04720009	0Ω 5% 1/4W
R 162	04720009	0Ω 5% 1/4W
R 163	04720009	0Ω 5% 1/4W
SWITCH		
SW102	05100023	6 POSITION DIP
TRANSFORMER		
T 103	05600023	600Ω SPLIT PRIMARY HYBRID
VARISTOR		
VR101	05111001	82 VOLT 8 JOULE@ 2 ms
CRYSTAL		
Y 101	02300025	3.579545 MHZ COLOR BURST
FERRITE BEAD		
Z 101	01801003	FAIR-RITE 2643000301
Z 102	01801003	FAIR-RITE 2643000301
HARDWARE		
HW 01	02800114	CRYSTAL SUPPORT
HW 02	02100229	PLCC SOCKET 44 PIN SURFACE MNT
HW 03	02800020	STANDOFF 4-40 X 3/16"
HW 04	02800020	STANDOFF 4-40 X 3/16"
HW 05	02800020	STANDOFF 4-40 X 3/16"
HW 06	02800020	STANDOFF 4-40 X 3/16"
HW 07	02800020	STANDOFF 4-40 X 3/16"
HW105	02100118	HI/LO POWER SOCKET



PARENT ITEM 9/RP-202

TOP SIDE PARTS PLACEMENT W/ REF.DES.

RITRON,INC. CARMEL,IN. 46032

LAST ECN: 3045 12/31/01

SCHEMATIC 1720201A_C

RP-202 1720200A_C

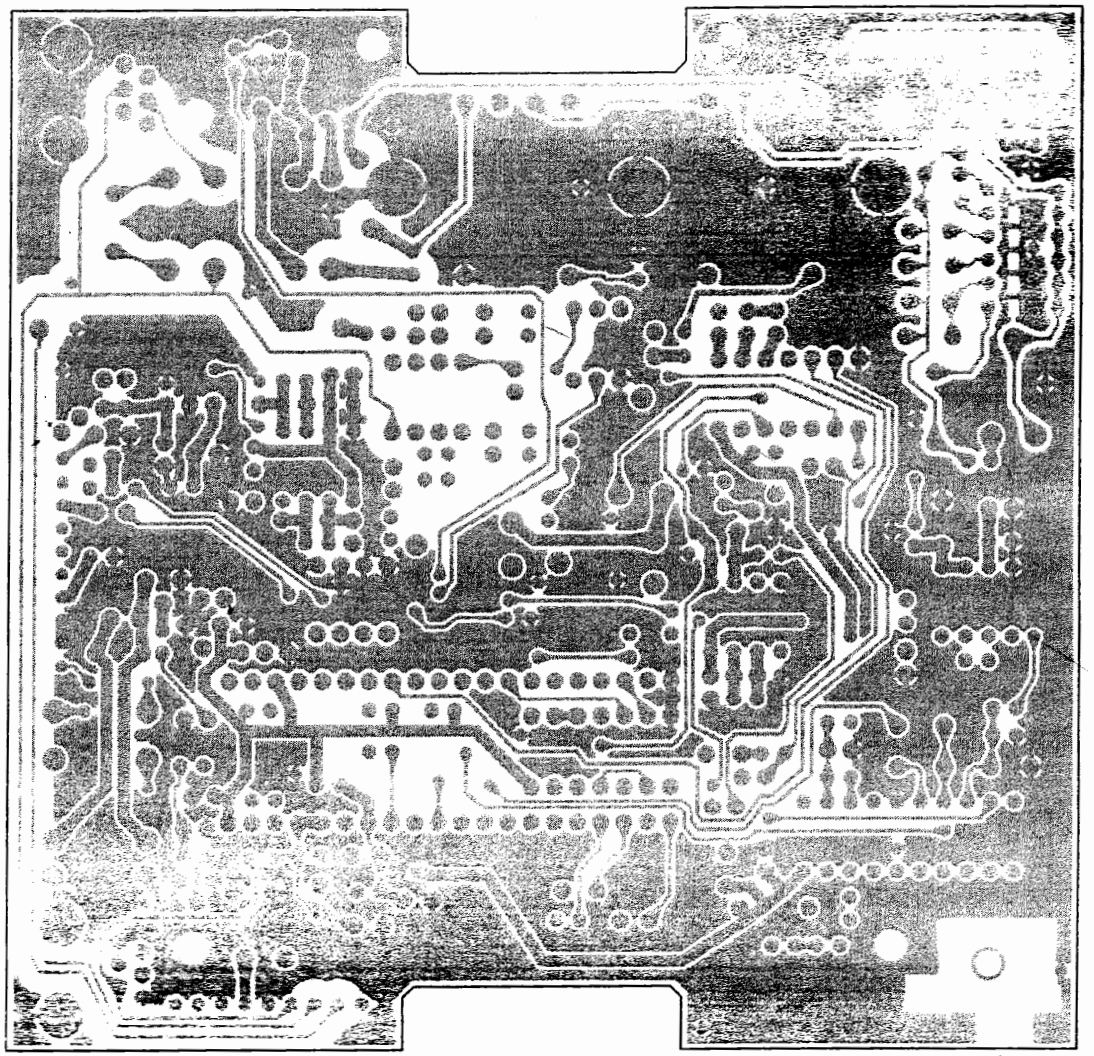
PARENT ITEM 9/RP-202

BOTTOM SIDE CIRCUIT

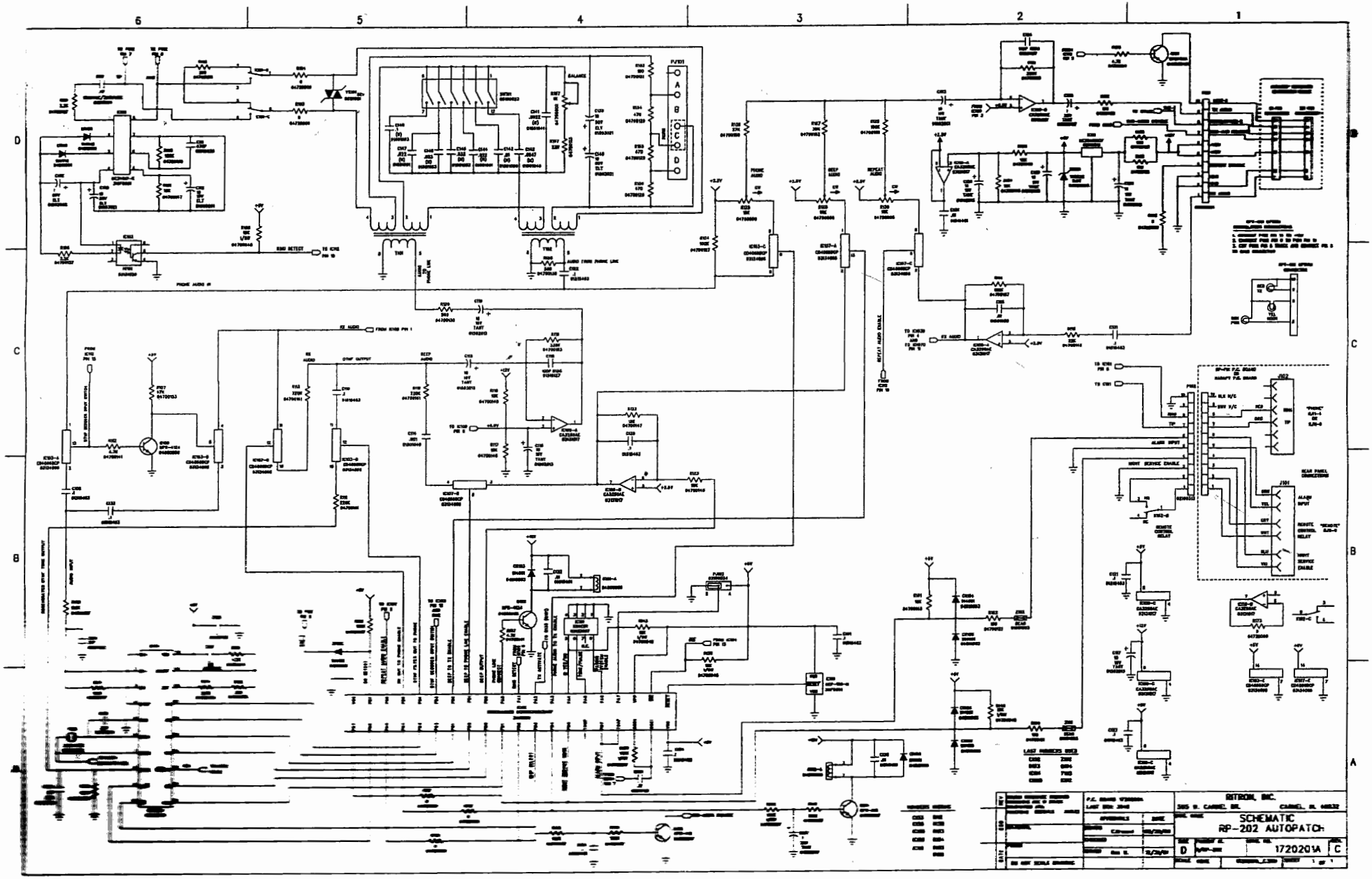
RITRON,INC. CARMEL,IN. 46032

12/31/01 LAST ECN: 3045

SCHEMATIC 1720201A_C



RP-202 1720200A_C


SCHEMATIC
RP-202 AUTOPATCH
1720201A
C
D

RITRON ADDENDUM

RP-200 Multifunction Paging Interconnect Module

Because the original RP-200 microcontroller (MCU) is no longer available from the manufacturer, the Interconnect Module board has been improved to incorporate a new MCU. The upgrade results in a unit that has valuable additional features, and can also function identically to the older RP-200.

As well as changing out IC112 to incorporate the new MCU, circuitry changes include removal of the IC113 PROM and SW101 DIP switch, and their replacement with a nonvolatile memory chip. The resulting RP-200 features and operating modes may be configured by Touch Tone commands from a telephone or radio, then stored in the memory chip. These Touch Tone settings are retained in the chip if power is removed from the unit.

These are the new Touch Tone commands:

P95 Store current mode and configuration in permanent memory

P91 Reset permanent memory to RITRON factory default settings

P92 Reset permanent memory to engineering test settings

P93 Reset permanent memory to Rainbird Golf default settings

P94 Reset permanent memory to Rainbird Commercial settings

NOTE: "P" is the programmed prefix digit:

The following features may be factory-programmed. Programming software and a serial interface cable to program these features with a PC are available from RITRON.

⇒ Number of rings before activation

⇒ Ringing tone duration

⇒ Custom paging tones

⇒ Variable paging tone durations

⇒ Dial-up remote mode inactivity time-out time

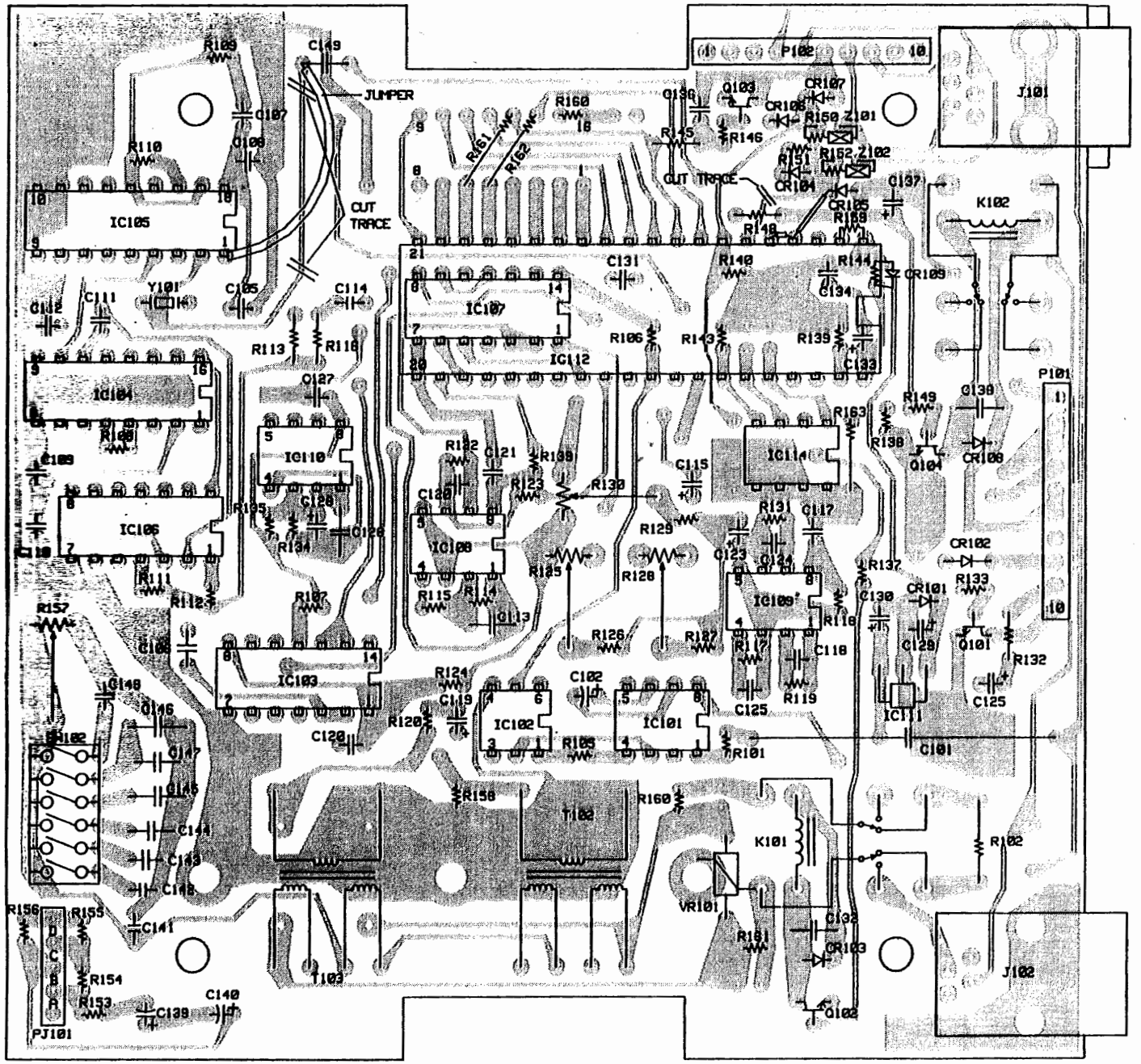
⇒ Telephone interconnect time-out time

⇒ Morse code identification with or without CTCSS

PROGRAMMING, TEST & ALIGNMENT FUNCTIONS

To load factory defaults into the nonvolatile memory, turn the unit OFF, apply a ground to EEPROM pin 5, then turn the unit ON. Wait a second or two, then release the ground applied to pin 5.

To generate test tone cycles, enter command P99. The cycle is 1000Hz with CTCSS, 1000Hz only, CTCSS only, then no modulation; the cycle then repeats. Send any Touch Tone digit to end the cycle.



RITRON, INC.
CARMEL, IN.

SCHEMATIC	1770155 REV N
TOP SIDE PARTS PLACEMENT W/REF.DES.	1750155 REV N
TOP SIDE PARTS PLACEMENT W/VALUES	1750155 REV N
P.C. BOARD	1700155 REV D

LAST ECN #2405
DATE: 11/01/96

RP-200

BOTTOMSIDE PARTS PLACEMENT

1760155

REV N