Z E T R O N

MODEL 35A MICROCONNECT
OPERATOR'S MANUAL

#025-9044S

This manual is for the Model 35A with hardware revision B.

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WARRANTY STATEMENT

Zetron warrants that all equipment sold pursuant to any resultant agreement shall be free from defects in material or workmanship at the time of delivery. Such warranty shall extend from the time of delivery for a period of one year. Buyer must provide written notice to Zetron within this prescribed warranty period of any defect; if the defect is not the result of improper usage, service, maintenance, or installation and equipment has not been otherwise damaged or modified after delivery, Zetron shall either replace or repair the defective part or parts of equipment or replace the equipment or refund the purchase price at Zetron's option after return of such equipment by buyer to Zetron. Shipment to Zetron's facility shall be borne on account of buyer.

1. Consequential Damages: Zetron shall not be liable for any incidental or consequential damages incurred as a result of any defect in any equipment sold hereunder and Zetron's liability is specifically limited to its obligation described herein to repair or replace a defective part or parts covered by this warranty.

2. Exclusive Warranty: The warranty set forth herein is the only warranty, oral or written, made by Zetron and is in lieu of and replaces all other warranties, expressed or implied, including the warranty of merchantability and the warranty of fitness for particular purpose.

FEDERAL COMMUNICATIONS COMMISSION (FCC) REGULATIONS

To comply with FCC regulations, the following must be met:

1. If requested by the telephone company, the FCC Registration Number (EYB5Q5-72478-OT-E), Ringer Equivalence Number (1.3B), and Interface Jack (RJ11C) should be reported.

2. The total of all ringer equivalence numbers on any one line should not exceed 5.0 for best performance.

3. This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

   a. This device may not cause harmful interference.

   b. This device must accept any interference received, including interference that may cause undesired operation.

4. This device must not be installed on coin-operated or multi-party telephone lines.

5. Repair work on this device must be performed by Zetron, Inc.

TRADEMARKS

Touch-Tone is a registered trademark of AT&T.

1. INTRODUCTION

INTRODUCTION

Zetron's Model 35A Microconnect is a multi-featured, microprocessor-controlled phone patch that can connect a public or private telephone system to a simplex, half-duplex or full-duplex radio network. The Model 35A gives mobile radio users a reliable and convenient method of placing and receiving telephone calls, and gives system operators complete control over mobile-to-phone connections.

The Model 35A has a high degree of flexibility. Its user-programmable features allow it to be "customized" to any system's needs. The owner/operator handles all programming by standard DTMF (Dual Tone Multiple Frequency, or "Touch-Tone") from any telephone, handheld, or mobile radio that can access the unit.

System operators can completely regulate the calls that go through the Microconnect. Programmed access codes, call lengths, and toll inhibits ensure that mobile radio users only make permissible calls and stay within toll restrictions. "Privileged Users," however, can be allowed to override the toll inhibits with a special access code. To prevent unwanted ring-outs, phone-to-mobile callers can also be required to enter a telco access code, a DTMF code from the caller after the Model 35A answers the phone line.

The Model 35A does not allow mobile-to-phone audio to be repeated out the transmitter in half-duplex conversations giving privacy to the call. Also, for the half-duplex mobile, a privacy mode can selected to transmit a fast busy when the mobile is keyed. The Microconnect is ideal for simplex operation since it uses a unique combination of VOX detection and sampling. Connect and disconnect codes guarantee that only authorized users can answer or terminate a mobile's telephone call.

Other features include automatic transmission of the programmed station Morse ID and an auxiliary control relay.

FEATURES

* For use with simplex, half-duplex or full-duplex radio networks
* Full-duplex or half-duplex programmable for both users
* High or low-speed regenerated DTMF or pulse dialing
* VOX and sampling both used for optimal simplex operation
* Microprocessor-based; non-volatile system parameters
* Programmable mobile and telco access/disconnect codes
* Programmable toll inhibits and call time limit
* "Privileged User" access codes override toll inhibits
* Privacy Mode for half-duplex operation
* Auxiliary control relay with flexible operation
* Automatic Morse code ID transmits FCC call letters
* "Busy" disconnect; last number redial; nine auto-dials
* Programmable number of channel ring-outs
* Phone party courtesy tones
* Manual connect/disconnect
* No DTMF Mobile Answer/Originate/Disconnect Modes
* Optional digital voice delay improves simplex operation
* Optional digital voice delay eliminates half-duplex "squelch tail"
* All programming by DTMF via telephone, handheld, or mobile
* Protected from lightning and static
* Compact design simplifies installation
* One-year parts and labor warranty
* Zetron quality design and factory support
* Programmable Off-Hook Detect
* Programmable Hook-Flash Option

2. SPECIFICATIONS

RECEIVER SPECIFICATIONS

Audio Input	0.3 to 4.0 volts peak-to-peak
COR Modes	Active High/Low; Adjustable Threshold; Internal Squelch; VOR.

TRANSMITTER SPECIFICATIONS

Audio Output	0.1 to 3.0 volts peak-to-peak.

TELEPHONE SPECIFICATIONS

Levels	Standard end-to-end, adjustable.
DTMF	Standard tones; -40 dB referenced, nominal-maximum-input sensitivity.

GENERAL SPECIFICATIONS

Connections	Discriminator; PTT; transmit audio; auxiliary input; auxiliary relay output; power; ground; telephone line.
Connector Type	Detachable screw terminal strip; telephone line connected through standard modular phone jack.
Transmit	DPDT relay.
Adjustments	Five adjustments from rear panel: receiver input level (RX AUDIO); squelch/COR level (SQUELCH); transmitter output level (TX AUDIO); phone hybrid balance (BALANCE R, C). Two internal adjustments: phone input level (R62); phone output level (R61).
Auxiliary Input	TTL levels; active-high or -low.
Auxiliary Output	DPDT relay.
Indicators	Power (POWER); phone activity (PHONE); carrier detect (CARRIER); transmit (TRANSMIT); DTMF decode (DTMF).
Front Panel Switches	DISCONNECT and CONNECT.

Rear Panel Switches	Receiver input level (RX HI/LO); receiver input flat/de-emphasized (RX DE-EMP); COR modes (COR MODE A, B, C); transmit audio output level (TX HI/LO); auxiliary pull-up (AUX PUP); COR pull-up (COR PUP).
Rx Audio Processing	Flat or de-emphasized.
Power	13.5 to 15 V DC; 12 V AC; 0.5 amp
Size	10.5 x 8 x 2 in
Weight	2.5 lb
Temperature Range	0 to +65 degrees C.

3. OPERATION

BASIC OPERATION

Operation of the Model 35A Microconnect is chiefly determined by the system parameters selected by the owner/operator while programming the unit. Programming procedures are discussed in Section 5.

When shipped from the factory, the Microconnect is preprogrammed with a set of factory default values which allow the unit to be immediately operated after installation in most situations, the Model 35A is defaulted to work on a simplex system, if operation is on a duplex system the radio system type parameter will have to be changed. For optimum performance it is usually necessary to adjust several of the programming parameters. The programming parameters are stored in non-volatile memory, so the Model 35A will retain programmed parameters during a power loss.

Basic mobile-to-phone operation follows these general steps:
(See Operational Flowchart.)

- -Mobile keys up and enters valid access code; (*2 & *123 = default)
- -Mobile enters phone number, Microconnect dials out;
- -If the number is not toll restricted, the call will continue;
- -Disconnect occurs by busy signal, mobile disconnect code (#2 & #123 = default), telco disconnect code (# = default), mobile activity time-out (30 seconds = default), or call limit time-out (3 minutes = default).

Basic phone-to-mobile operation follows these general steps:

- -Phone caller dials Microconnect's telephone number;
- -After rings-to-answer (1 = default), the Model 35A enters the Answer Mode selected, the answer mode determines whether the line is answered before channel ring-outs start or when the mobile answers or if a telco access code is needed after the line is answered and before ring-outs occur;
- -Mobile can be setup to answer a call with COR or by entering valid mobile access code;
- -Disconnect occurs with rings-to-disconnect, a mobile disconnect code, the telco disconnect code, the mobile activity timer, or the call limit timer.

PROGRESS TONES

Programming

4 tones repeated twice (Twilight Zone)	Enter programming mode
2 beeps	Select function code
3 beeps	Select programming range
3 beeps	Select programming increment (function codes 50-56 and 58-68 only)
2 beeps confirm action 2 above 6 beeps confirm action 3 above. 5 beeps confirm action 4 above.	These sequences all happen in the process of exiting programming

Mobile Activity

1 beep, repeated at successively more frequently times. (Radio side only)	Mobile is inactive for a period of time determined by function 7.
Same as mobile activity timer, at 12, 9, 6, and 3 seconds before disconnect (herd on both phone and mobile side)	Call limit timer function 8.

Initiating Calls: Phone to Mobile

Model 35 regenerates ringing out to the mobile.	After model 35 is dialed the telco, and after at completion of rings to answer.
High/low "Warble" Repeated 5 times.	After mobile attempts to originate a call to the telco side and telco off hook is detected.

Before or During a Call

Touch Tone is heard when pressed on the telco side after the start of a call.	Tones are passed on to the mobile.

Test Tones

800Hz on and off tone to the transmitter.	Programming function 0 option 2
800Hz on and off tone to the telephone line.	option 3
800Hz on and off tone to telephone line and the mobile.	option 4
Five beeps at twice normal speed.	Memory reset

MOBILE ACCESS CODES

To gain access to the telephone line, a mobile user must first key up and enter the correct mobile access code.

There are two types of mobile access codes: "Normal User" and "Privileged User." A mobile that accesses the Microconnect with a Normal User code is subject to all of the programmed toll and call limit restrictions, while a mobile that accesses the Microconnect with the Privileged User code is not. The codes may be changed at any time by the owner/operator (via the Supervisor programming code), and they can be up to 10 digits in length. The factory default Normal User code is "*2"; the factory default Privileged User code is "*123".

After entering an access code, a half-duplex mobile, or on a simplex system, typically releases the PTT (push-to-talk) button to verify access to the Microconnect while a full-duplex mobile does not. A valid code causes the Microconnect to access the phone line, and the mobile will hear dial tone. If the access code is invalid, it will be ignored. If the phone line is already being used (or if the telephone system is "down"), the mobile will hear a simulated busy signal and the call will be aborted.

Once a mobile enters a valid access code, telephone number dialing may begin.

Dial-Out

As the telephone number is received from the mobile, if the minimum dial tone wait time has not occurred, the Microconnect regenerates the digits in either slow DTMF, fast DTMF, slow pulse dialing, or fast pulse dialing. When a DTMF digit is dialed by the Microconnect, in half-duplex and full-duplex, a beep is transmitted using the beep frequency. The dialing type is selected by programming.

For both slow and fast DTMF dial-out, the Microconnect regenerates the digits for the same duration as they are received from the mobile once the minimum dial-out wait time has occurred, the tone that is transmitted with each DTMF digit will be the same length as the DTMF digit.

The Microconnect determines that the mobile has completed dialing a phone number when one of the following conditions has been met:

1) The DTMF time-out has been exceeded.
2) A DTMF "*" has been detected.
3) The maximum number of dial-in digits has been received and the mobile un-keys.

The Microconnect can look for one, two, or all of these conditions simultaneously, depending on the selection of the dial-in termination mode (Section 4). DTMF time-out and number of dial-in digits are programmable. Since a full-duplex mobile does not unkey the number of digits dialed is not used to terminate DTMF regeneration. Note that if a half-duplex mobile access the system when it is set up for full-duplex, DTMF regeneration will terminate if the mobile unkeys after the dial-in digits have been received.

Once the Microconnect has determined that the mobile has completed dial-in, and the regenerated telephone number has been issued to the phone line, the unit disables regeneration of digits from the mobile and allows the mobile audio to be patched through to the telephone line. Caution: the mobiles audio is not set to the phone line until DTMF regeneration is terminated.

Automatic redial of the last phone number dialed is initiated by entering the access code followed by a "*0".

Use of one of the nine auto-dial numbers is initiated by entering an access code followed by a "*" followed by a single digit from 1 to 9, selecting the desired auto-dial number.

Toll Inhibits

The Model 35A checks for any programmed toll restrictions when a "Normal User" has completed dial-in. If a restricted entry is made, the call is aborted and the mobile hears an error tone and is dropped from the patch.

The Microconnect may be programmed to reject phone numbers with certain first or second digits (second digit restrictions are useful for private branch exchange systems). Up to four digits may be specified as invalid for the first digit, and up to four additional numbers may be specified as invalid for the second digit. If desired, any combination of first and second digit restriction may be programmed. Note that the first digit restriction is independent of the second digit restriction.

The Microconnect can also be programmed to disallow phone numbers according to length. For example, phone numbers with more than seven digits can be disallowed on public systems, and numbers with more than four digits can be disallowed on private branch exchange systems.

The Model 35A can additionally be programmed to disallow "Normal User" overdial (DTMF transmitted by a mobile after normal dial-in has been completed). This ensures that a mobile cannot re-dial after receiving a second dial tone (a second dial tone may appear under certain circumstances; e.g., after the phone party hangs up). The Model 35A will insert a DTMF "3" after every digit generated by the mobile after a call has been placed and transmit a beep with each DTMF "3", thus preventing any usable overdial. Privileged Users are not subject to overdial restriction (overdial digits are not regenerated, however).

TELEPHONE ACCESS

Phone-to-mobile callers may request access to a mobile by first dialing the telephone number of the Microconnect. A caller will hear standard telephone rings until the Microconnect enters the "Telco Answer" Mode. The number of rings before a caller is answered, "rings-to-answer," is user-programmable. Further processing of the call will depend upon which of the three answer modes has been chosen by the site manager.

Telco Answer Modes

Answer/Ring-out Mode

In this mode, the Microconnect will "answer" the phone line after rings-to-answer, and will transmit "ring-outs" to the mobiles if the channel is clear. An "answered" caller is one who has been connected to the Microconnect's phone line; a "ring-out" is a signal to the mobiles that indicates the presence of an incoming call. The caller will hear simulated ringing until the call is answered or until rings-to-disconnect occurs. If the channel is busy, the caller will hear double-rings.

Answer/Access/Ring-out Mode

After rings-to-answer, the Microconnect answers the phone line and generates a 1-second, simulated dial tone. After the dial tone, the caller must enter the correct telco access code. An invalid code will disconnect the the phone line. A valid code will send ring-outs to the mobiles. If a mobile does not answer the call before rings-to-disconnect, the phone line will be dropped, disconnecting the call.

No-Answer/Ring-out Mode

After rings-to-answer, the Microconnect transmits ring-outs (if the channel is clear), but the phone line is not answered, picked up, until a mobile answers. If a mobile does not answer before rings-to-disconnect, the Microconnect momentarily answers the line then immediately hangs it up clearing the line for another call.

Call Connect/Disconnect

A mobile answers a phone call simply by keying up or entering one of the two valid, normal user or privileged user, mobile access codes. A mobile may answer a call after channel ring-outs have stopped, but before rings-to-disconnect has occurred (the maximum number of rings that the telephone party hears, "rings-to-disconnect," is sometimes selected to be greater than the number of "ring-outs" the mobiles hear).

A mobile disconnects a phone call by entering one of the two valid mobile disconnect codes. Similar to the mobile access codes, these codes can be up to 10 digits in length, and there is both a "Normal User" and a "Privileged User" disconnect code.

The "Normal User" disconnect code can only disconnect calls that are initially accessed by "Normal Users"; "Privileged User" disconnect codes, however, can disconnect any phone/mobile conversation.

Since the Microconnect allows any combination of DTMF digits to be selected for the disconnect code, it will not look for a disconnect code until it has determined that the mobile has completed dialing, however, if a DTMF "Pound" is detected before dial-in, the call will be aborted.

The telephone party may also terminate a call at any time by using the telco disconnect code, which is an additional DTMF sequence, up to 10 digits in length.

The Microconnect will inform the mobile that a disconnect has occurred by transmitting five rapid beeps. In simplex and half-duplex setups COR must go away before the transmitter is re-keyed, but in a full-duplex system the transmitter is dropped immediately.

MOBILE ACTIVITY AND CALL LIMIT TIMERS

Two call timers go into effect during a conversation: the Mobile Activity Timer and the Call Limit Timer.

A mobile must key up periodically to prevent the Mobile Activity Timer from disconnecting the call. The timer is user-programmable from 15 to 255 seconds, if set to 255 the timer is disabled. The Mobile Activity Timer will warn the mobile of an impending time-out by issuing a single beep at 12, 9, 6, and 3 seconds before the call is terminated. The warning beeps are not heard by the phone party. To reset the timer, the mobile simply keys up. If the mobile does not key up before the timer expires, the Microconnect will drop its transmitter and wait 10 more seconds for a mobile key up. If the mobile fails to respond, the call will be terminated.

The Call Limit Timer may be set from 1 to 60 minutes. The Call Limit Timer does not affect Privileged Users. An imminent call limit time-out is preceded by double-beeps issued 15, 12, 9, 6, and 3 seconds before disconnect. The warning beeps may be heard by the phone party as well as the mobile user.

If the Microconnect terminates a call due to the expiration of the Mobile Activity Timer or the Call Limit Timer, five "beep-doos" will be issued.

HALF-DUPLEX OPERATION

During half-duplex operation, the Microconnect is controlled by the transmitting state of the mobile: once a mobile has entered a valid access code, the Microconnect will key up the transmitter, and the transmitter will remain keyed up until disconnect occurs. The audio path from the telephone to the mobile is enabled when the mobile is not keyed up, and the audio path from the mobile to the telephone is enabled only when the mobile is keyed up.

Half-Duplex Privacy Mode

A privacy mode may be programmed into the Microconnect for use with half-duplex radio mobiles. In the privacy mode, an "eavesdropping" mobile will hear the privacy tone only. The Model 35A does this by not re-transmitting the mobile's audio portion, and by sending a fast busy signal when ever the mobile is keyed up. This masking also serves to indicate to other users that the channel is busy.

FULL DUPLEX OPERATION

Either or both of the users (normal or privileged) may be programmed for full-duplex operation in a duplex radio system. Full-duplex operation is typically for use with full-duplex mobiles. In full-duplex operation, the telephone audio is always transmitted during a call. The mobile audio is passed to the telephone party only when the mobile is "keyed-up." No privacy tone is issued when conversing with a full-duplex user. When dialing is occurring from a full-duplex mobile the DTMF dialed to the phone line is passed back through the hybrid, at a loss, to the transmitter. As this may cause some mobiles to be unsquelched, on a shared system, the audio is muted during the dialing of a digit and a beep is transmitted.

Full-duplex interconnect may also be used with half-duplex (push-to-talk) mobiles. Example: In some systems a dispatcher may be using the channel from the phone side of the interconnect to talk to a group of mobiles. If the interconnect were half-duplex, each time a mobile speaks the phone audio will be muted, effectively blocking the dispatchers audio. If a mobile had a stuck mic, none of the other mobiles would be able to hear the dispatcher. If the interconnect is full-duplex, the dispatcher will always be heard by all the mobiles, even while another mobile is talking. In some systems the mobile must retain the capability to squelch the phone audio in case of profanity or other FCC violations by the phone party. Full-duplex should not be used for these applications. Note the Microconnect may be set for both full-duplex and half-duplex operation, selected by two different access codes. This allows the user to select the mode at the beginning of a call. If this is desired it should be noted that when the access code for the privileged user is entered the toll restricts are bypassed. See privileged user operation.

SIMPLEX OPERATION

If installed in a simplex system, the Model 35A provides a unique combination of both VOX and sampling operation. Alternately, the unit can be programmed to operate as a pure VOX or sampling patch. VOX is the preferred mode of operation, unless the phone party has a high noise environment such that the VOX is triggered when there is no voice on the phone line, in which case sampling has to be used. When using VOX, the digital delay board option is recommended to prevent clipping of the initial syllable of speech when the phone party talks. The Model 35A uses a sophisticated combination of VOX and sampling in the VOX mode. If the phone party talks too long or background noise locks up the VOX detector (longer than the "into-sampling" time), the Model 35A automatically drops the transmitter and looks for mobile activity. If activity is detected, the conversation direction is switched, otherwise the transmitter is rekeyed and the phone party is still allowed to talk.

In simplex VOX operation, the transmitter is keyed when speech is detected from the phone. If there is no speech, the radio is allowed to revert to receive mode. If speech occurs again, the transmitter will be rekeyed, but if COR is seen, the radio will stay in receive mode until COR goes away. When COR goes away, the transmitter is keyed ("pre-key") and the phone line is examined again to determine if the transmitter should remain keyed. This pre-key is in anticipation of conversation turn-around, which helps eliminate the squelching of the phone party's first syllable. The following diagram demonstrates typical VOX operation.

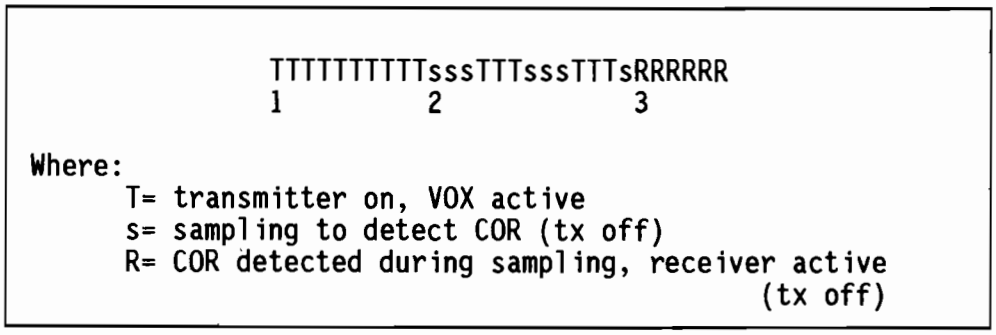
```
    wwwwwwwwwwTTtTTTtTTttxxwwwRRRRRRRRrrtTTTtTTtTTt ...
    1         2         34 5  6        78

Where:
      w= receiver on, watching for VOX and COR (tx off)
      T= transmitter on, VOX is active
      t= transmitter on, VOX inactive (VOX hold time)
      x= Tx-to-Rx transition time for radio (tx off, rx turning on)
      R= receiver on, COR is active (tx off)
      r= receiver on, COR inactive (COR hold time, tx off)
```

Typical VOX Operation

Initially neither party is talking (1). The phone party speaks three words (2). The VOX hold time expires (3). The transmit to receive transition occurs (4). The Model 35A looks for COR and VOX (5). COR is seen when the mobile talks (6). The COR hold time expires (7). The transmitter is re-keyed (8).

If VOX is active for the programmed "into-sampling-time", the transmitter is periodically dropped (at the "sample rate") to check for COR. If COR is not detected, the transmitter is rekeyed, after the "sample width time" plus the "tx-to-rx time", and sampling continues. If COR is detected, the radio party talks and, after COR drops, the VOX mode is re-entered. The VOX mode is also re-entered if VOX activity stops. See the following diagram of automatic sampling after VOX is active for the "into-sampling-time". The "sample rate" is how long the phone audio is transmitted and the "sample width" is how long the transmitter is dropped when testing for COR. Note that the "tx-to-rx" time is always added to the "sample width" time.



Typical auto-sampling after long VOX

The transmitter is keyed when VOX is active (1). After the "into sample time", sampling begins at the "sample rate" (2). Finally, COR is detected and the radio party talks (3). If pure VOX operation is required, the into-sample-time should be set to its maximum value. Alternatively, if pure sampling operation is desired, the into-sample-time should be set equal to the programmed sample rate.

The unit operates with a separate set of programmed sample rates and widths during dial tone activity (before the mobile has completed dialing a phone number), and the into-sample-time does not apply. If dial tone sampling is desired, the sample rate should be set relatively fast (e.g. 1 second) and the sample width set to its minimum value. If VOX operation is desired, the sample rate should be set long (e.g. 4 sec) and the sample width should also be set long (e.g. 10 sec). This will force the unit to transmit 4 seconds of dial tone (after access), and then drop the transmitter to look for mobile activity. If the dial tone sample rate is set to 255 then dial tone will come up, with VOX, for the dial tone sample width. The transmitter will then be dropped and the unit will wait for dial in.

For optimum operation under VOX or sampling, three programmed values must be set: the tx-to-rx time of the station transceiver, the mobile's COR hold-time, and the mobile's tx-to-rx time. The station tx-to-rx time should be set to the minimum time that guarantees that the receivers COR output is valid after unkeying its transmitter. The mobile tx-to-rx time delays the transition from a mobile unkey (and after the COR hold time) until the telephone party's audio is allowed through to the transmitter (the tx is keyed after the COR hold time expires), and the prompt beep is given to the phone party. Normally, the COR hold time needs to be set relatively short (e.g. 0.2 sec), as does the mobile tx-to-rx time (e.g. 0 to 0.1 sec).

FRONT PANEL CONTROLS AND INDICATORS

When the PHONE LED (light emitting diode) on the front panel is continuously lighted, the Microconnect is using the phone line. When the telephone line is ringing, the LED blinks at the ring rate.

The TRANSMIT LED lights up to indicate that the Microconnect's push-to-talk relay is energized, and that the Microconnect is transmitting.

The CARRIER LED turns on whenever mobile activity is detected by the Microconnect. After the mobile un-keys, the LED remains lighted for the duration of the programmed COR Hold time.

The DTMF LED is illuminated whenever the Microconnect is decoding a valid DTMF digit from either the telephone line or from a mobile. It is normal for the DTMF LED to appear to be glowing dimly even when DTMF is not being decoded.

The manual CONNECT and DISCONNECT buttons will connect or disconnect the telephone line regardless of the status of the telephone line or channel. Depression of the CONNECT button is equivalent to Normal User access and dial-out: the Mobile Activity Timer and the Call Limit Timer activate, DTMF regeneration is disabled to prevent overdial, and the connection remains intact until a mobile or telco disconnect code is entered or the DISCONNECT button is depressed, which resets the unit.

AUXILIARY RELAY

In addition to the transmitter control relay, the Microconnect has an auxiliary relay with a set of SPDT (single-pole-double-throw) contacts on the rear panel. Various relay operating modes may be selected by programming, and include:

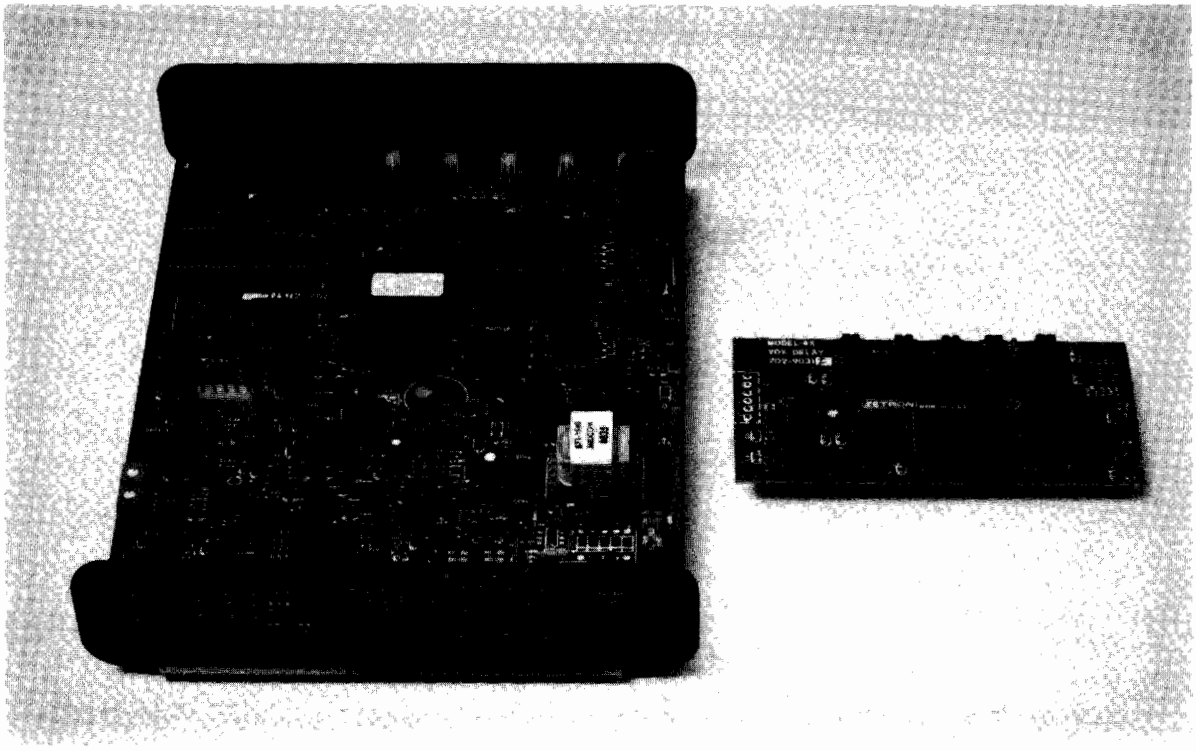
--OFF regardless of Microconnect operation;
--ON regardless of Microconnect operation;
--ON at Normal User access, OFF at disconnect;
--ON at Privileged User access, OFF at disconnect;
--ON at any mobile access, OFF at disconnect;
--ON at telephone access, OFF at disconnect;
--ON at telephone access, OFF at mobile answer or disconnect.

The relay may also be operated in a "pulse" mode, in which the relay will turn on at the specified condition and will turn off after a programmed length of time.

4. INSTALLATION

INSTALLATION WARNING

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause interference to radio communications. Installation of the Model 35A Microconnect should only be attempted by qualified radio service personnel.

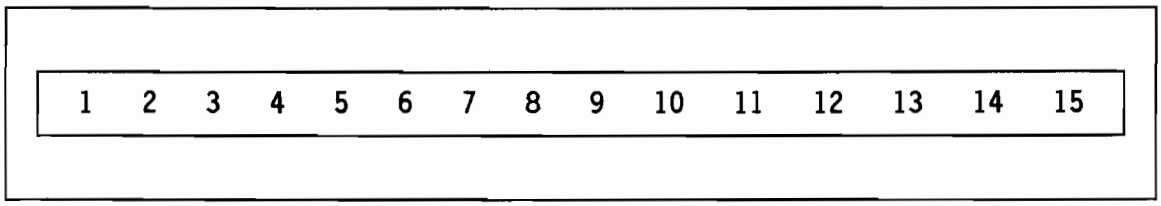


GENERAL

Connections to the transmitter, receiver, and power are grouped on a detachable terminal strip on the rear of the Model 35A for ease of installation. The Microconnect includes test modes to aid in installation. All adjustments, except phone line in and out, are accessible from the rear panel. All switches are also accessible from the rear panel.

EQUIPMENT REQUIRED FOR INSTALLATION

Required equipment includes: (1) a communications service monitor, (2) a VOM (volt-ohmmeter) or oscilloscope, (3) a handheld or mobile radio with a DTMF encoder for system testing, (4) a small flat bladed screwdriver for adjustments, and a small Phillips screwdriver.



1= TX Audio+ 4= RX Audio 7= RLY N.O. 10= PTT N.O. 13= AC/DC+ Input
2= TX Audio- 5= COR Input 8= RLY Com. 11= PTT Com 14= AC Input
3= AUX Input 6= Ground 9= RLY N.C. 12= PTT N.C. 15= Ground

SCREW TERMINAL CONNECTIONS

INSTALLATION PROCEDURE

1. Remove the 15-pin screw-terminal connector from the rear of the Model 35A.

2. POWER SUPPLY: Locate the 12-volt DC supply for the radio. With a VOM, measure the DC voltage. It should be between 13.5 and 15.0 volts. If 12-volt DC is not available, a 12-Volt AC wall transformer may be used. For DC operation, connect the power supply ground lead to pin 15, and the positive supply lead to pin 13. For 12-Volt AC operation, connect between pins 13 and 14. Pin 13 is internally fused. If AC power is used, connect a chassis ground wire from pin 15 to the chassis ground of the radio.

3. TRANSMITTER PTT: For most transmitters, a contact closure to ground will cause the transmitter to key up. For this configuration, connect a wire from pin 10 (relay N.O.) to the PTT input of the transmitter. Jumper from pin 11 (relay COM) to pin 6 (Ground). If the transmitter needs a positive voltage to key up, put the jumper from Pin 11 to A+.

4. TRANSMITTER AUDIO INPUT: Connect pin 1 to the mic or line input of the transmitter. Shielded cable must be used for this connection with the braid connected to pin 2. For some transmitters, a resistor may be needed in parallel with the TX Audio to allow the mic to work with the Model 35A.

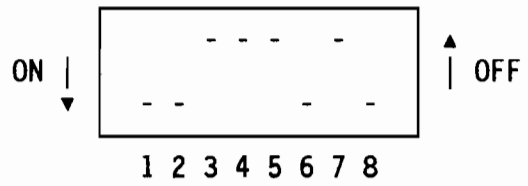
5. RECEIVER AUDIO INPUT: Connect pin 4 to the receiver discriminator output. Speaker audio may be used for this connection, but discriminator audio is recommended. Shielded cable is required for discriminator audio but not for speaker audio. The shield braid should go to pin 6.

6. COR INPUT: Connect pin 5 to the carrier active point in the receiver. The signal must be between 0 and 7 Volts DC, and change at least 1 volt between carrier and no carrier conditions. A built in squelch detector can be used if a carrier indication from the receiver is not readily available, but external COR is recommended.

7. Reconnect the 15 pin screw terminal connector to the Model 35A.

INITIAL REAR PANEL SETTINGS

The Model 35A provides rear panel switches so that internal jumper straps are not required. For new installations the switches should be set to the following positions:



Sw 1= Receiver de-emphasis
Sw 2= Receiver Hi/Low Gain
Sw 3= COR Mode C
Sw 4= COR Mode B
Sw 5= COR Mode A
Sw 6= Transmit Hi/Low Gain
Sw 7= COR Pull-Up
Sw 8= AUX Pull-Up

Tx Audio, Rx Audio and the Squelch adjustments on the back of the Model 35A should be set to mid point. Balance C and R on the back panel and Phone in and out, R61 and R62 inside the unit, should not be adjusted at this time.

TESTS AND ADJUSTMENTS, INITIAL TURN-ON

1. AUDIO INPUT GAIN FROM RECEIVER: Set the service monitor to the receive frequency and generate a signal into the receiver. Deviate the signal with a 1000 Hz tone @ 3 kHz. Adjust Rx Audio on the back panel for 1 Volt P-P at TP8 inside the Model 35A. If the voltage on TP8 does not come up to 1 Volt, change switch 2 on the back panel to ON and readjust the Rx Audio as before. Next generate the DTMF tones 0 to 9, * and # at 3 kHz deviation and make sure the DTMF LED follows each digit. If the DTMF LED does not follow the digits, or is intermittent, please refer to Section 6 of this manual.

2. TRANSMIT AUDIO ADJUSTMENT: Call the Model 35A from another phone line with a DTMF phone or use a DTMF transceiver to access the programming mode. If you are using a phone, the access code (9897) should be entered after the Model 35A connects and before the ringout occurs. You have a 3 second window to enter the access code from the phone before ringout starts. Once in the program mode, enter 0* 2#. This keys up the transmitter and sends a tone over the air. Adjust Tx audio on the back panel for 70% of full channel deviation (typically 3.5 kHz on a 5 kHz channel). If the TX Deviation will not come up to 70%, set switch 6 to the Off position and readjust the TX Audio pot as before. To end the test, wait for the pause in the tone and enter a #. After the beep tones, enter 0* 0# to exit the program mode.

3. COR (SQUELCH) ADJUSTMENTS: Set the COR mode switches using the table below.

COR MODE A:	COR MODE B:	COR MODE C:	OPERATION
OFF	OFF	OFF	External COR (active high)
OFF	OFF	ON	External COR (active low)
ON	OFF	ON	Internal Squelch
ON	ON	OFF	Internal receiver VOR

External COR (active high) is a signal going from a lower to higher voltage when carrier is received. External COR (active low) is just the opposite. Internal squelch uses the internal squelch circuit in the Model 35A to generate a carrier indication and must have discriminator audio to function. Speaker or squelched audio from the radio will not work with internal squelch. Internal receiver VOR is voice operated and can only be used with squelched or speaker audio. It should be used only when one of the other methods of generating a COR indication cannot be used and will cause chopping of the receiver audio to the phone party. After setting the COR switches, adjust the SQUELCH pot on the rear panel to follow carrier activity on the channel. The CARRIER LED should be lit when a signal is being received and be off otherwise. A pull-up is available when using dry relay contacts or open collector transistor signals. This is enabled by switch 7 on the back panel. If an external CTCSS decoder is used to validate the carrier indication (to prevent access by users with invalid CTCSS tones), connect a TTL level signal (0-5 volts) to the AUX In terminal (pin 3). A pull-up is available for use with dry relay contacts or open collector signals using the AUX PUP switch.
See the programming section for COR Auxiliary Input Mode operation.

TESTS AND ADJUSTMENTS, PHONE

1. HYBRID BALANCE ADJUSTMENT: The Hybrid Balance adjustments are on the back panel marked Balance C and Balance R. To adjust the hybrid, dial the phone number of the Model 35A from a second phone line with a DTMF telephone. When the Model 35A answers, access the program mode (9897), then access the hybrid balance test mode (0* 4#). When the test begins, the transmitter will key up and a test tone will be heard on the transmitter frequency. Adjust the Balance C and the Balance R for minimum deviation while monitoring the transmitter frequency. Repeat the adjustments 2 or 3 times for the optimum setting. Make sure the calling phone is quiet during the test. Exit the test mode by pressing the # key on the phone during the portion of the test sequence when no tone is transmitted. Then press 0* 0# to exit the programming mode.

2. PHONE LINE OUT: The phone output adjustment (R61) is adjusted for proper DTMF regeneration and audio level before shipment from Zetron and is cemented into place. If the audio level from the mobile into the phone is not correct, it should be adjusted with the RX audio adjustment on the back panel while a phone call is in progress. After adjusting the RX audio pot, make sure the DTMF LED lights when receiving DTMF from the mobiles.

3. PHONE LINE IN: The phone input adjustment (R62) is also adjusted for proper levels before shipping from Zetron but may need to be fine tuned for your phone line. With a phone call in progress, have the phone party talk loudly. Adjust R62 for 4 kHz deviation from the base station transmitter while the phone party is talking. Next, have the phone party enter the DTMF numbers 0 to 9. The DTMF LED should light for all the numbers. If not, have the phone party hold the DTMF digit down that is not lighting the LED and adjust R62 until the LED comes on. Check all the DTMF digits again after this adjustment.

VOX DELAY BOARD

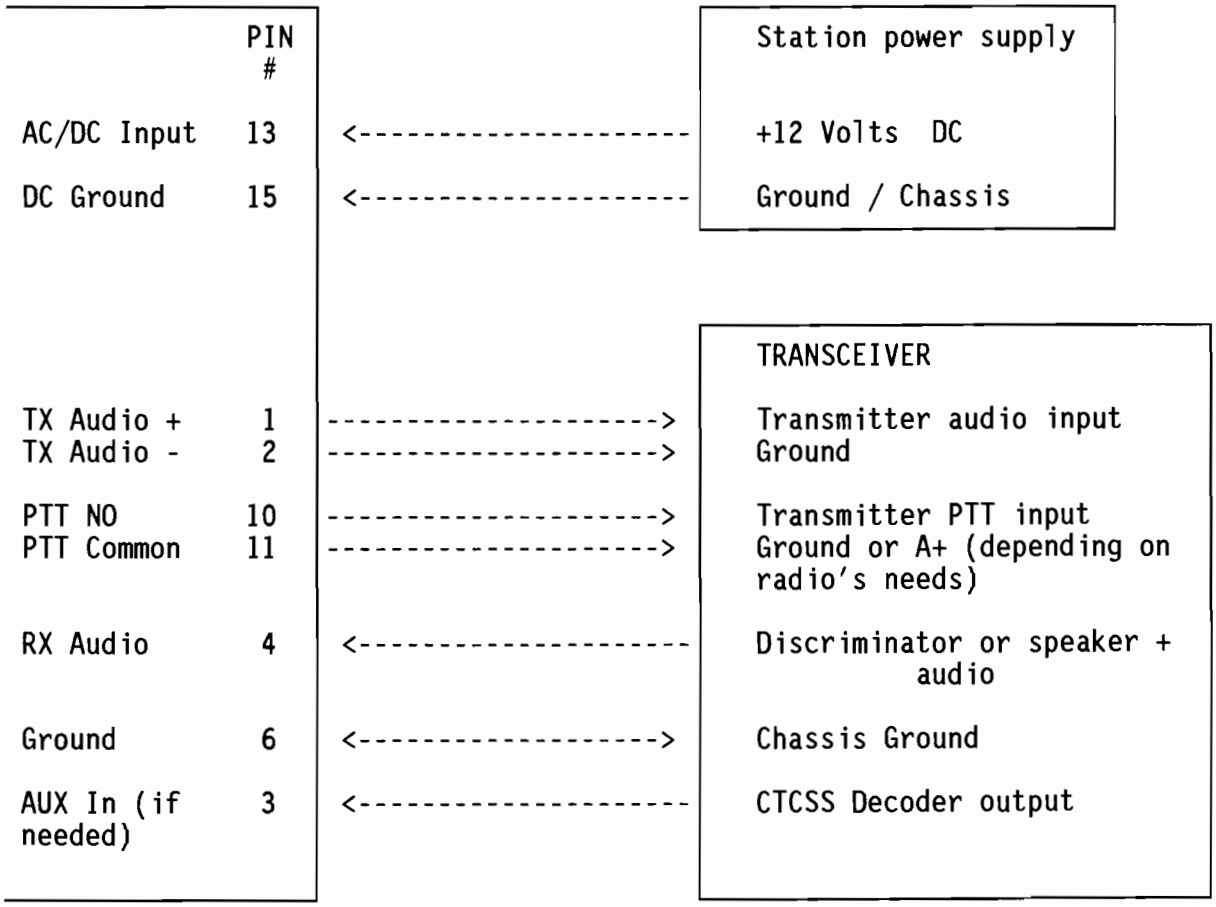
1. The optional VOX Delay Board is factory installed, and set for a nominal voice delay of 0.5 seconds. During installation, the amount of delay should be adjusted to the minimum value needed to guarantee that none of the telephone audio is lost due to transmitter keying delays. The adjustment is made by varying R11, located on the VOX Board. If the VOX Delay option is ordered after the installation of the Model 35A, an installation sheet will be included with the Delay Board.

AUXILIARY RELAY

1. An additional set of relay contacts are also provided: RLY NC, RLY NO, and RLY COM. The relay's operation is determined by programming. The relay can be used to control various site equipment such as an external tone generator board or a phone system interface. See the Programming section for more information.

TYPICAL INSTALLATION DIAGRAM

Model 35A



5. PROGRAMMING

INTRODUCTION

The Microconnect is provided with factory default settings that typically allow it to operate without additional programming. For optimum system operation, however, it is necessary to tailor the settings to fit a system's specific needs.

This section has been further divided into three sections of programming. The first section is for Simplex operations and contains all the programming parameters used for simplex operation. This section will be used if the Microconnect is hooked to a simplex base station or a control station for a repeater. The second section is for Duplex operation and contains all the programming parameters for duplex operation. This section will be used if the Microconnect is hooked to a repeater or full duplex base station. The third section has the all the programming functions and is called the Complete Programming section. These functions can be used to fine tune the Mode 35A parameters, such as COR Hold and Quiet, the autodial numbers, access codes, Morse ID's, etc.

The Microconnect can be reset to its factory default settings at any time. There are three methods of restoring the factory default settings:

FIRST METHOD:
1. Remove power from the Microconnect.
2. Remove the RAM IC (U20) from its battery socket.
3. Replace the IC and apply power to the Model 35.
4. Following power-up, after about 3 seconds, the Model 35 keys the transmitter and sends five beeps. This indicates that the memory has been reset. The first 5 beeps are issued at twice the speed the second 5 beeps are issued. PTT is dropped between the two 5-beep sequences.

SECOND METHOD:
1. Remove power from the Microconnect.
2. Install a jumper between TP 13 and TP 16 (Ground).
3. Apply power to the unit.
4. Wait 5 seconds.
5. Remove the jumper with the power still applied. If you remove power first, the unit will not be reset.

THIRD METHOD:
1. Enter the programming mode by dialing in the program access code (9897).
2. Enter DTMF 0*1#.
3. Enter DTMF 0*0# to exit programming. The unit should be reset.

Use one of these three methods to reset the unit. You do not have to do all three.

* * * * * * * * * * * * * * * * N O T E * * * * * * * * * * * * * * * * * *

The first method works only with software version 2.6 and later. The second and third methods work with all software versions.

* *

General Programming Information

Normal operation of the Microconnect must be suspended during programming. All programming of the Microconnect can be done by any DTMF ("Touch-Tone") handheld or mobile radio, or telephone that can access the unit. If the Model 35A has been set to No Answer/Ringout (Function 12), a telephone cannot be used because the Model 35A will not answer the line to allow overdial of the programming access code. If Answer/Ringout has been selected for Function 12 the phone party will have 2 seconds to dial in the Programming Access Code (9897) before the Microconnect will begin ringing out to the channel. If you hear the Model 35A start ringing after it answers, you have waited too long and will have to call the unit again. If Answer/Access/Ringout has been selected for Function 12, you will have 8 seconds to enter the Programming Access Code. To enter the Access Code, first dial the telephone number to which the Model 35A is connected. When the Model 35A answers the call, enter the Programming Access Code (factory default is 9897). A 4-tone signal, heard twice, indicates access to the Program Mode. To access programming with a handheld or mobile just key and dial the Access Code. The transmitter connected to the Model 35A will key up and send the 4-tone signal to indicate proper access. After the Model 35A has been accessed, programming is achieved through the following steps:

1. Enter the desired function code, followed by the "*" key. Two beeps indicates acceptance of the function code.

2. FUNCTION CODES 1-48: Enter the desired programming range number, followed by "#" key. Three beeps indicate that valid programming has been entered. (See example 2 on the following page.)

   FUNCTION CODES 50-56, 58-68: Enter the desired code length (within the programming range), followed by the "#" key. Three beeps will occur after the "#". Next, enter the desired code string. Three beeps will occur after the correct number of digits have been entered. (See example 3 on the following page.)

   FUNCTION CODE 57 (Morse ID): Enter the desired code length, followed by the "#" key. Three beeps will be heard. Next enter the two-digit codes found in the Morse ID table for the correct Morse ID. (Each two digits entered from the table should be considered as 1 number, i.e. 01 = 1, 15 = F etc.) Example 4.

3. Repeat steps 1 and 2 for all the functions to be programmed.

4. Exit the Program Mode by entering 0*0#.

If the Model 35A is programmed using a handheld or a mobile, it is necessary to unkey after entering a "*" or "#" in order to hear the acceptance tones. Similarly, if the Model 35A is programmed with a telephone, it necessary to wait and listen for the acceptance tones after entering a "*" or "#".It is important to remember to exit the Programming Mode after programming by telephone. The Model 35A is unusable during programming and if a telephone caller hangs up before exiting the Programming Mode the Model 35A will remain in this Mode with the phone line off-hook. A caller attempting to re-access the system over the phone will just get busy signal. The Model 35A will reset itself after 5 minutes of inactivity.

Programming Errors
If a "bee-doo" is heard when a "*" or "#" is entered at the end of a command string, then the command string contained invalid data and no changes will have been made to the function parameter. (It should be noted that a parameter is changed as soon as the final "#" is accepted for function codes 1-48 and as soon as the correct number of digits are entered for function codes 50-68 and the three beeps are heard, not when the Programming Mode is exited.)

If an undesirable function code is entered, pressing the "*" key again will abort the command and allow a new function code to be selected. If an undesired programming range number is accidentally entered, pressing the "*" again instead of the "#" key will similarly abort the data. If undesired, but valid data is entered followed by the "#" key, then the data will be accepted and the function will have to be reprogrammed.

Programming Examples
(These examples occur after successfully accessing the Microconnect.)

1. Accessing the Programming Mode:
   For this example, the Supervisor Access Code will be assumed to be the factory default code of "9897".

   Enter "9897" (Hear 4-tone signal repeated twice).

2. Choosing the "No-Answer/Ring-out" Telco Answer Mode:
   The telco answer mode function is Function Code 12, and the "no-answer/ring-out" mode is number 2 in the programming range.

   Enter "12*" (hear two beeps) (Function Code)
   Enter "2#" (hear three beeps) (Programming Range)

3. Changing the Supervisor Access Code to "8206363":
   The supervisor access code function is Function Code 56, and the desired code is 7 digits long.

   Enter "56*" (hear two beeps) (Function Code)
   Enter "7#" (hear three beeps) (number of digits)
   Enter "8206363" (hear three beeps) (new access code)

4. Setting the Morse Code ID to "WABC123":
   The Morse Code ID function is Function Code 57, and the desired ID is 7 digits long (not 14).

   Enter "57" (hear two beeps) (Function Code)
   Enter "7#" (hear three beeps) (number of digits)
   Enter "32 10 11 12 01 02 03" (hear three beeps)

5. Exit programming:
   Enter "0*" (hear two beeps) (Function Code)
   Enter "0#" (hear two sets of five beeps)

How to Read the Programming Charts

There are 67 programmable functions listed in the complete programming chart; they are numbered from 1 to 48 and 50 to 68. The number of a function is called its "function code." The functions numbered 1 to 48 are various aspects of Microconnect operation; the functions numbered 50 to 68 are the various code strings. Function code 0 is used for tests and exiting programming.

Each function on the programming chart has a "programming range." A programming range is the range of numbers that will be accepted as valid parameters for the function. For instance, if a function's programming range is "1-15," then only those numbers within 1 to 15 will be accepted when changing the setting of the function.

Each number from the programming range corresponds to a certain setting of the function. The value of the setting is determined by multiplying the programming range number by the "programming increment." For instance, if the number "5" is chosen from the programming range of a function whose programming increment is "1.0 sec," the value of the function's setting will be 5.0 seconds. (5 x 1.0 sec = 5.0 sec). When a function's programming increment is "n/a," the settings that correspond to the programming range numbers are listed under the "function description."

The "factory default" values are the settings initially given to the functions by the factory. Each factory default value consists of a programming range number and its corresponding setting value. For example, a factory default value of "20 = 2.0 sec" means that the programming range number of 20 was selected, which, when multiplied by the programming increment (0.1sec), equals a setting of 2.0 seconds.

See the Complete Programming Function Descriptions later in this section for more examples.

SIMPLEX PROGRAMMING SECTION

These are the Function Codes used when programming the Model 35A for Simplex operations (Some codes may be used for both simplex and duplex). Other function codes used to fine tune the overall operation of the Model 35A can be found in the Complete Programming Section.

Simplex Programming Chart

FN. CODE	FUNCTION DESCRIPTION	PROG. RANGE	PROGRAMMING INCREMENT	FACTORY DEFAULT
0	Control Functions 0: exit programming mode 1: reset to factory defaults 2: transmitter test mode 3: telco test mode 4: hybrid balance test	0 - 4	n/a	n/a
12	Telco Answer Mode 0: Answer/Ringout 1: Answer/Access/Ringout 2: No-Answer/Ring-out	0 - 2	n/a	0 = ans./ring-out
16	Radio System Type 0: duplex 1: simplex 2: simplex pulser	0 - 2	n/a	1 = simplex
19	Tx-to-Rx Time	1 - 250	0.01 sec.	30 = 0.3 sec
20	VOX Hold Time	0 - 50	0.1 sec	7 = 0.7 sec
21	Dial Tone Sample Rate	5 - 50	0.1 sec	20 = 2.0 sec
22	Dial Tone Sample Width	1 - 255 (255 = never)	0.01 sec	255 = never
23	Into-Sample Time	5 - 255 (255 = never)	0.1 sec	100 = 10.0 sec
24	Sample Rate	5 - 250	0.1 sec	20 = 2.0 sec
25	Sample Width	1 - 100	0.01 sec	20 = 0.2 sec
43	Simplex Pre-Key 0: disabled 1: enabled	0 - 1	n/a	1 = enabled
46	Simplex Pulser Rate	5 - 50	0.1 sec	15 = 1.5 sec
47	Simplex Pulser Width	1 - 50	0.1 sec	5 = 0.5 sec
50	Normal User Access Code	1 - 10	1 digit	2 = 2 dig ("*2")
51	Normal User Disconnect Code	1 - 10	1 digit	2 = 2 dig ("#2")

The critical functions for simplex operation are 19 - 25. These codes will determine how well the VOX and sampling portion of the Model 35A will work. Factory default on most of these functions should be acceptable for most applications, but you may need to fine tune function 25 (sample width). This function determines how long the transmitter will unkey, allowing the receiver of the base station to give an accurate COR indication to the Model 35A. If this function is set too short, the transmitter will unkey and key back up before the receiver can receive a signal. This defeats the purpose of sampling, as the mobile can never gain control of the system should VOX keep the transmitter keyed.

Simplex programming function descriptions

TX-TO-RX TIME (Function Code 19)

Function Code 19 determines the time the Model 35A will wait between dropping the transmitter and examining its COR input to determine whether a mobile is transmitting. If the Tx-to-Rx Time is too short, the Model 35A may get a false COR indication from the switch over from transmit to receive in the base station. Factory default setting is a good place to start from but you may need to lengthen this setting if your Model 35A is locking on to the receiver without a mobile keyed up. See Function Code 25 for additional information.

VOX HOLD TIME (Function Code 20)

Function Code 20 is the duration a telephone party may stop talking before the Model 35A will unkey the base and listen for a mobile. This timer is used to keep the Model 35A from keying and unkeying the base for every syllable the phone party speaks. The factory default is 0.7 seconds and should be a good place to begin. If the transmitter unkeys and keys back up during normal conversation you may need to extend this timer. This should not be confused with sampling discussed later. Sampling will only occur after the Into Sample Timer has expired.

DIAL TONE SAMPLE RATE (Function Code 21)

Function Code 21 is the length of dial tone that will be transmitted after the mobile has signed onto the system. During simplex operation, the transmitter and the receiver cannot be active at the same time, so as long as the mobile is hearing dial tone, he cannot be dialing. The Model 35A will send dial tone for the duration programmed here and then sample for the Dial tone Sample Width discussed next. Factory default for this is 2 seconds. This function only applies while dial tone is present on the phone line.

DIAL TONE SAMPLE WIDTH (Function Code 22)

This function code is the duration that the transmitter will unkey to allow a mobile to dial the phone number after accessing the system. The factory default for this function is 255. This allows the dial tone to come on for 2 seconds, then unkey the transmitter and listen for the mobile to start dialing without ever keying the transmitter back up to send dial tone. If this is set to a lower level, the Model 35A would wait for that duration, then key the transmitter back up and send more dial tone. If this function is set too short the mobile may never be allowed to dial a number after he signs onto the Model 35A because the receiver will never be able to hear the mobiles. This function only applies while dial tone is present on the phone line.

INTO-SAMPLE TIME (Function Code 23)

This Code is the length of time the Model 35A will remain in VOX operation before it becomes a sampling interconnect (the length of time the phone party will be allowed to speak before the Model 35A will start to "kerchunk" the audio). The factory default setting is 10 seconds. After this timer expires, the Model 35A will become a sampling interconnect until the phone party stops talking or until the mobile keys up and captures the system during the sample width (Code 25). This is useful to allow the mobile to disconnect a call if the phone line is noisy or if he has been put on hold with music playing on the phone system. This timer is reset by carrier activity, i.e. when the mobile unkeys it starts the into-sample delay over again.

SAMPLE RATE (Function Code 24)

The sample rate is how long the phone line audio will be transmitted by the Model 35A before dropping the transmitter and checking for activity from the receiver. This will only happen after the Into-Sample Rate has expired as explained before. The sampling occurs only when the telephone VOX is active. If the telephone audio becomes silent, the Model 35A reverts to VOX operation again and waits for the phone party to begin speaking before it keys up the transmitter again.

SAMPLE WIDTH (Function Code 25)

The sample width is the amount of time that the transmitter is dropped and the Model 35A is looking for mobile (COR) activity. Once the Sample Width time expires the transmitter will re-key if the VOX is still active. Note that the actual amount of time the transmitter drops is equal to the sample width plus the rx-to-tx delay time (Function Code 19) so both timers should be as short as possible.

SIMPLEX PRE-KEY (Function Code 43)

This command enables or disables the Pre-Key feature of the Simplex VOX operation. When a mobile unkeys, the Model 35A can "Pre-Key" the transmitter, expecting the phone party to speak next. This makes sure the mobile hears the first word from the phone party. If no phone VOX activity is detected during the VOX Hold Time, the transmitter will be dropped. If you are using the Model 35A on a control station through a repeater it is recommended that you disable this function.

SIMPLEX PULSER RATE (Function Code 46)

This command is only available if the Radio System Type (Function Code 16) is set to 2 (Simplex Pulser). This is the duration that the transmitter will wait before keying up and unkeying (pulse) to keep a GEMARC or Tone repeater active while no communication is going on during the call. If the phone party puts a mobile on hold and no VOX is indicated, the Model 35A normally would not key the transmitter and the repeater would not see activity and unkey. This would allow another user to capture the repeater, thus locking out the phone conversation already in progress. In the pulser mode, the Model 35A keys the control station every Pulser Rate to remain in control of the channel. The default setting for this function code is 1.5 seconds.

SIMPLEX PULSER WIDTH (Function Code 47)

Function Code 47 is the duration that the transmitter keys to allow the repeater to see activity on the channel. If this is set to short, the repeater will not hear the "pulse". The default setting for this is 0.5 seconds.

DUPLEX PROGRAMMING SECTION

These are the Function Codes used when programming the Model 35A for Full or Half Duplex operation. (Some codes may be used for both duplex and simplex operation.) Other function codes used to fine tune the overall operation of the Model 35A can be found in the Complete Programming Section.

Duplex Programming Chart

FN. CODE	FUNCTION DESCRIPTION	PROG. RANGE	PROGRAMMING INCREMENT	FACTORY DEFAULT
0	Control Functions 0: exit programming mode 1: reset to factory defaults 2: transmitter test mode 3: telco test mode 4: hybrid balance test	0 - 4	n/a	n/a
12	Telco Answer Mode 0: Answer/Ringout 1: Answer/Access/Ringout 2: No-Answer/Ring-out	0 - 2	n/a	0 = ans./ring-out
16	Radio System Type 0: duplex 1: simplex 2: simplex pulser	0 - 2	n/a	1 = simplex
40	Full-Duplex Normal User	0 - 1	n/a	0 = no
41	Full-Duplex Privileged User	0 - 1	n/a	0 = no
50	Normal User Access Code	1 - 10	1 digit	2 = 2 dig ("*2")
51	Normal User Disconnect Code	1 - 10	1 digit	2 = 2 dig ("#2")

Duplex Programming Function Descriptions

FULL DUPLEX USER (Function Codes 40 and 41)

These two functions are used to enable Full-Duplex operation for normal and privileged users in a duplex system. If a user is enabled for Full-Duplex, the telephone caller's audio is continually transmitted during a call. The Privacy Tone (if enabled) is not broadcast in Full-Duplex operation. When the Model 35A dials a DTMF digit during sign-on, a single beep is transmitted for each digit.

COMPLETE PROGRAMMING SECTION

Complete Programming Chart
(For detailed explanation of the available functions, see the subsection "Programmable Function Descriptions.")

FN. CODE	FUNCTION DESCRIPTION	PROG. RANGE	PROGRAMMING INCREMENT	FACTORY DEFAULT
0	Control Functions 0: exit program mode 1: reset to factory default 2: transmitter test mode 3: telco test mode 4: hybrid balance test	0 - 4	n/a	n/a
1	COR Auxiliary Input Mode 0: no auxiliary 1: active low input 2: active high input	0 - 2	n/a	0 = no aux.
2	COR Hold Time	0 - 50	0.1 sec	2 = 0.2 sec
3	COR Quiet Time	0 - 100	0.1 sec	30 = 3.0 sec
4	Minimum Dial Tone Wait Time	5 - 100	0.1 sec	20 = 2.0 sec
5	No. of Dial-In Digits	1 - 15	1 digit	7 = 7 digits
6	DTMF Time-out	20 - 100	0.1 sec	50 = 5.0 sec
7	Mobile Activity Time	15 - 255 (255 = disabled)	1.0 sec	30 = 30 sec
8	Call Time Limit	1 - 60	1.0 min	3 = 3.0 min
9	Rings-to-Answer	1 - 255 (255 = never)	1 ring	1 = 1 ring
10	No. of Channel Ring-outs	1 - 255 (255 = forever)	1 ring-out	5 = 5 ring-outs
11	Rings-to-Disconnect	1 - 255 (255 = never)	1 ring	11 = 11 rings
12	Telco Answer Mode 0: Answer/Ring-out 1: Answer/Access/Ring-out 2: No-Answer/Ring-out	0 - 2	n/a	0 = ans./ring
13	Dial-In Termination Mode 0: digit count, "*", timed 1: "*", timed 2: timed 3: digit count, timed	0 - 3	n/a	0 = digit count, "*", timed
14	Telco Prompt Tones 0: disable 1: enable	0 - 1	n/a	1 = enable
15	Beep Frequency	35 - 100	10 Hz	60 = 600 Hz
16	Radio System Type 0: duplex 1: simplex 2: simplex pulser	0 - 2	n/a	**1 = Simplex**
17	Normal User Overdial 0: allow 1: disallow	0 - 1	n/a	1 = disallow
18	Tone-Out Delay Time	0 - 20	0.1 sec	8 = 0.8 sec
19	Tx-to-Rx Time	1 - 250	0.01 sec	30 = 0.3 sec

Complete Programming Chart (cont'd)

FN. CODE	FUNCTION DESCRIPTION	PROG. RANGE	PROGRAMMING INCREMENT	FACTORY DEFAULT
20	VOX Hold Time	0 - 50	0.1 sec	7 = 0.7 sec
21	Dial Tone Sample Rate	5 - 50	0.1 sec	**20 = 2.0 sec**
22	Dial Tone Sample Width	1 - 255	0.01 sec	**255 = never**
23	Into-Sample Time	2 - 255	0.1 sec	**100 = 10 sec**
24	Sample Rate (0.1 sec)	5 - 250	0.1 sec	20 = 2.0 sec
25	Sample Width	1 - 100	0.01 sec	20 = 0.2 sec
26	Dial-out Mode 0: slow DTMF 1: fast DTMF 2: slow pulse 3: fast pulse	0 - 3	n/a	0 = slow DTMF
27	Auxiliary Relay Mode 0: always off 1: always on 2: on at either mobile access, off at disconnect 3: on at Normal User access, off at disconnect 4: on at Privileged access, off at disconnect 5: on at Telco access, off at disconnect 6: on at Telco access, off at mobile access, or off at disconnect	0 - 6		0 = always off
28	Auxiliary Relay Pulse 0: disable 1: enable	0 - 1		0 = disable
29	Auxiliary Relay Pulse Time	1 - 100	0.1 sec	10 = 1.0 second
30	No DTMF Mobile 0: disabled 1: answer enabled 2: originate (LO) enabled 3: answer/originate (LO) enabled 4: disabled 5: answer enabled 6: originate (HI) enabled 7: answer/originate (HI) enabled	0 - 7	n/a	0 = disabled
31	Direct Telco Access Mode 0: disabled 1: enabled	0 - 1	n/a	0 = disabled
32	Privacy Mode 0: disabled 1: enabled	0 - 1	n/a	0 = disabled
33	Fast ANI Required 0: disabled 1: normal codes only 2: priv. codes only 3: normal and priv. codes	0 - 3	n/a	0 = disabled

Complete Programming Chart (cont'd)

FN. CODE	FUNCTION DESCRIPTION	PROG. RANGE	PROG. INCREMENT	FACTORY DEFAULT
34	Morse ID Revisit Time	1 - 99	1 min	15 = 15 min
35	Morse ID Mode 0: disabled 1: ID at end of call 2: ID periodically 3: ID periodically after reception of COR.	0 - 3	n/a	0 = disable
36	Disc. on 2nd Dial Tone or Busy 0: disabled 1: enabled	0 - 1	n/a	1 = enabled
37	Maximum Phone No. Digits	1 - 15	1 digit	15 = 15 digits
38	Telco Force Timers Reset	0 - 1	n/a	0 = disabled
39	Delay After 1st Auto-Dial Dig.	0 - 50	100 msec	0 = no delay
40	Full-Duplex Normal User	0 - 1	n/a	0 = no
41	Full-Duplex Privileged User	0 - 1	n/a	0 = no
42	Alternate ring tone	0 - 1	n/a	0 = no
43	Simplex Pre-key	0 - 1	n/a	1 = yes
44	Hookflash	0 - 1	n/a	0 = disabled
45	Off-Hook Detect	0 - 1	n/a	1 = enabled
46	Pulser Rate (see 16)	5 - 50	0.1 sec	15 = 1.5 sec
47	Pulser Width (see 16)	1 - 50	0.1 sec	5 = 0.5 sec
48	2nd Dialtone Detect Width	10 - 90	0.1 sec	40 = 4.0 sec
50	Normal User Access Code	1 - 10	1 digit	2 = 2 dig ("*2")
51	Normal User Disconnect Code	1 - 10	1 digit	2 = 2 dig ("#2")
52	Privileged User Access Code	1 - 10	1 digit	4 = 4 dig ("*123")
53	Privileged User Disc. Code	1 - 10	1 digit	4 = 4 dig ("#123")
54	Telco Access Code	1 - 10	1 digit	1 = 1 dig ("*")
55	Telco Disconnect Code	1 - 10	1 digit	1 = 1 dig ("#")
56	Supervisor Access Code	1 - 10	1 digit	4 = 4 dig ("9897")
57*	Morse ID String	1 - 10	1 digit	1 = 1 dig ("0")
58	Toll-Restricted 1st Digits	0 - 4	1 digit	0 = 0 digits
59	Toll-Restricted 2nd Digits	0 - 4	1 digit	0 = 0 digits
60	Auto-Dial 1	0 - 15	1 digit	none
61	Auto-Dial 2	0 - 15	1 digit	none
62	Auto-Dial 3	0 - 15	1 digit	none
63	Auto-Dial 4	0 - 15	1 digit	none
64	Auto-Dial 5	0 - 15	1 digit	none
65	Auto-Dial 6	0 - 15	1 digit	none
66	Auto-Dial 7	0 - 15	1 digit	none
67	Auto-Dial 8	0 - 15	1 digit	none
68	Auto-Dial 9	0 - 15	1 digit	none

* Important: consult the table at the end of this section when programming the Morse ID string.

Complete Programming Function Descriptions

CONTROL FUNCTIONS (Function Code 0)

Function Code 0 is used to perform several control functions, rather than to change a programming constant. Function Code 0 includes five parameters which are listed below the function description.

Parameter 0 will cause the Microconnect to exit the Program Mode and return to normal operation. Parameter 1 will reset all of the programming settings to the factory default values (note: the Microconnect does not exit the Program Mode when this command is executed).

Parameters 2 and 3 put the unit into a test mode. Parameter 2 sends a tone pattern to the transmitter; Parameter 3 sends a tone pattern to the telephone line. The repeating tone pattern consists a constant tone for six seconds, followed by two seconds of silence. (The tone frequency is determined by the setting of Function Code 15.) To halt the test mode, enter any DTMF digit during the two seconds of silence. The unit will respond by emitting three beeps, and will remain in the Program Mode.

Parameter 4 initiates the hybrid balance test mode. The transmitter is keyed, and an 800 Hz tone is sent into the phone line. The hybrid balance pots (R & C) are adjusted to produce minimum deviation on the RF channel (or audio output from the Model 35). Note: The phone line must be connected and silence should be on the line for proper operation of the test.
Example: To select Transmitter Test enter **0* 2#**.

COR AUXILIARY INPUT MODE (Function Code 1)

Function Code 1 selects the operational mode of the auxiliary input. Parameter 0 causes the Microconnect to ignore the auxiliary input and operate with the COR input only. Parameter 1 causes the Microconnect to interpret an active low input as a valid mobile transmission. Parameter 2 causes the Microconnect to interpret an active high input as a valid mobile transmission. Parameters 1 and 2 both cause the auxiliary input to be used as the COR input and the COR input to be used as a channel-busy indication. Caution: this mode may conflict with no-DTMF mobile originate.
Example: To disable COR Aux Input enter **1* 0#**.

COR HOLD TIME (Function Code 2)

The COR hold time is the time between a COR input drop and the Microconnect's decision that a mobile has unkeyed. To eliminate the "picket fence" factor, the COR hold time should be set to a non-zero value.
Example: To set COR Hold to 0.2 seconds enter **2* 2#**.

COR QUIET TIME (Function Code 3)

The COR quiet time is the time the channel must remain quiet (no COR signal) before the Microconnect will issue ring-outs over the channel.
Example: To set Quiet Time to 3 seconds enter **3* 30#**.

MINIMUM DIAL TONE WAIT TIME (Function Code 4)

The minimum dial tone wait time is the minimum time the Microconnect will wait between receiving a valid access code and dialing out over the phone line. Any dialing digits received during the wait time are placed in a buffer memory until they are transmitted after the DTMF time-out. The minimum dial tone wait timer is used when a mobile does not un-key to listen for a dial tone; if a mobile unkeys after entering an access code, the minimum dial tone wait timer is not used.
Example: To set Dial Tone Wait Time to 2 seconds enter **4* 20#**.

NUMBER OF DIAL-IN DIGITS (Function Code 5)

Function Code 5 is the minimum number of digits the Microconnect accepts from a dialing mobile before deciding that dial-in is complete, in conjunction with the mobile unkeying. The maximum number of dial-in digits is not used as a toll restriction, but as an indication to the Microconnect that dial-in is complete and that regeneration should be disabled and the mobile's audio connected to the phone line. (Function Code 13 selects the dial-in termination modes.) Note that the unit will remain in regenerate after the number of digits has been received, if the mobile does not un-key, therefore a full-duplex mobile must use the timed mode or terminate DTMF regenerate with a DTMF "*".
Example: To set Number of Dial-In Digits to 7 enter **5* 7#**.

DTMF TIME-OUT (Function Code 6)

DTMF time-out is the maximum amount of time the Microconnect will wait for a dial-in digit. If no dial-in digit is received by the end of the DTMF time-out, the Microconnect will decide that the mobile has completed dial-in. (Function Code 13 selects the dial-in termination modes.)
Example: To set DTMF Time-Out to 5 seconds enter **6* 50#**.

MOBILE ACTIVITY TIME (Function Code 7)

The mobile activity time is the maximum time during a call that a mobile may remain unkeyed. If a mobile does not key-up by the end of this time, the transmitter will be dropped. Once the transmitter is dropped, the mobile must re-key within 10 seconds or the call will be terminated. If desired, the mobile activity timer may be disabled.
Example: To set Mobile Activity Time to 30 seconds enter **7* 30#**.

CALL TIME LIMIT (Function Code 8)

The call time limit is the maximum length of a conversation initiated by a Normal User access code. It does not affect calls initiated by Privileged User access codes.
Example: To set Call Time Limit to 3 minutes enter **8* 3#**.

RINGS-TO-ANSWER (Function Code 9)

Rings-to-answer is the number of rings that must be received from the telephone line before the Microconnect will send ring-outs over the channel (which must first be quiet) and/or will answer the line. (See Function Code 12.)
Example: To set Rings-to-Answer to 1 ring enter **9* 1#**.

NUMBER OF CHANNEL RING-OUTS (Function Code 10)

Function Code 10 selects the maximum number of ring-outs that the Micro-connect will transmit over the channel for an incoming call. Note: the ring-outs to the caller, rings to disconnect, may continue after the channel ring-outs have stopped. (See Function Code 12.)
Example: To set Number of Channel Ring-Outs to 5 enter **10* 5#**.

RINGS-TO-DISCONNECT (Function Code 11)

Rings-to-disconnect is the maximum number of rings that can occur before the Microconnect disconnects an unanswered incoming call. If this value is less than channel ring-outs then the channel ring-outs will be equal rings-to-disconnect. (See Function Code 12.)
Example: To set Rings-to-Disconnect to 11 rings enter **11* 11#**.

TELCO ANSWER MODES (Function Code 12)

Function Code 12 selects one of the three answer modes.

If the Answer/Ring-out Mode is selected, the Microconnect will answer the phone line after rings-to-answer and will send ring-outs over the channel if the channel is clear. The telephone party will concurrently hear ringing (if the rings are being transmitted over the channel) or broken ringing (if the channel is busy). If a mobile does not answer the call before rings-to-disconnect, the Microconnect will disconnect the line.

If the Answer/Access/Ring-out Mode is selected, the Microconnect will answer the line after rings-to-answers. The telephone party will then hear a one-second dial tone and must enter the proper telco access code after the dial tone stops. After the code has been detected, the Microconnect will proceed as above. If an invalid code is entered, the unit will hang up the phone line.

If the No-Answer/Ring-out Mode is selected, the unit will issue channel ring-outs (as above) after rings-to-answer, but the Microconnect will not answer the phone line until a mobile answers the call or until rings-to-disconnect occurs, at which point the Microconnect will momentarily answer the line in order to disconnect the caller.
Example: To set Telco Answer Mode to Answer/Ring-out enter **12* 0#**.

DIAL-IN TERMINATION MODE (Function Code 13)

The Microconnect can use three different criteria to determine that a mobile has completed dial-in. These are referred to as "digit count," "*," and "timed" in the programming chart. The four modes of Function Code 13 select different combinations of these criteria; for any given mode, the Microconnect will decide that dial-in is complete when any one of the mode's criteria are met.

"Digit count" is the method of counting the number of digits dialed. The Microconnect decides that dial-in is complete when the minimum number of digits is received, and the mobile unkeys. If the user is set up for full-duplex then the mobile does not unkey and this mode is not used. (The no. of dial-in digits is selected via Function Code 5.)

The "*" symbol refers to the fact that the Microconnect will decide that dial-in is complete when a DTMF "*" is received from a mobile.

This is one of modes that should be used for a full-duplex user.

"Timed" refers to the fact that the Microconnect will decide that dial-in is complete when the DTMF time-out timer expires. This is one of the modes that should be used for a full-duplex user. (The length of DTMF time-out is selected via Function Code 6.)
Example: To set Dial-In Termination Mode to digit count/*/timed enter **13* 0#**.

TELCO PROMPT TONES (Function Code 14)

Function Code 14 enables and disables the prompt tone heard by the telephone party. The Microconnect sends a prompt tone to the phone party after the mobile unkeys and after the COR hold time and tone-out delay time have passed. (The prompt tone frequency is determined by Function Code 15; the tone-out delay is selected by Function Code 18.)
Example: To enable Telco Prompt Tones enter **14* 1#**.

BEEP FREQUENCY (Function Code 15)

Function Code 15 selects the frequency of the telephone prompt tones, the Morse code ID tones, and the beep tones sent to the mobiles.
Example: To set Beep Frequency to 600 Hz enter **15* 60#**.

RADIO SYSTEM TYPE (Function code 16)

This code selects between Duplex, Simplex and Simplex Pulser. In the Duplex Mode, the Model 35A will key up and remain keyed during the entire conversation and should be connected to a Full Duplex Base or Repeater. In the Simplex Mode the Model 35A will key up the base station only when phone audio is present (VOX Indication) and unkey the base to allow a simplex base to receive mobile transmissions. In the Simplex Pulser Mode the Model 35A will work the same way as Simplex except that the Model 35A will pulse the transmitter during a call when the system is idle (no one talking). This is used to keep control of a GEMARC repeater when the Model 35A is connected to a control station for that system. This mode will also retain control of a tone repeater in the same way.
Example: To set Radio System Type to simplex enter **16* 1#**.

NORMAL USER OVERDIAL (Function Code 17)

Function Code 17 allows and disallows DTMF overdial to Normal Users. Overdial is DTMF signals received after dial-in termination, these digits are not regenerated. If disallowed a beep will be transmitted when the digit "3" is dialed. Privileged Users are not affected by overdial restriction.
Example: To disallow Normal User Overdial enter **17* 1#**.

TONE-OUT DELAY TIME (Function Code 18)

Function Code 18 determines the time the Microconnect will wait after the end of the COR hold time (after a mobile unkeys) before sending a prompt tone to the telephone party or status signals (e.g., disconnect beeps and programming acceptance prompts) to the mobile. The tone-out delay time should be greater than or equal to the tx-to-rx time of the mobile transceiver, to prevent the clipping of status signals or the initial syllables of a phone party's speech.
Example: To set Tone-Out Delay Time to 0.8 seconds enter **18* 8#**.

TX-TO-RX TIME (Function Code 19)

Only applicable to simplex systems.) Function Code 19 determines the time the Microconnect will wait between dropping the transmitter and examining its COR input. The tx-to-rx time should be equal to or longer than the time for the system's transceiver to change from "transmit" to "receive."

Example: To set Tx-to-Rx Time to 0.3 seconds enter **19* 30#**.

VOX HOLD TIME (Function Code 20)

(Only applicable to simplex systems.) The VOX hold time is the time between a gap in the telephone VOX signal and the Microconnect's decision that the phone party has finished talking. The VOX hold time should be longer than inter-syllable gaps but short enough to allow natural conversation turnovers. If the digital delay board is used this timer must equal to or greater than the delay time of the board.

Example: To set VOX Hold Time to 0.7 seconds enter **20* 7#**.

DIAL TONE SAMPLE RATE (Function Code 21)

(Only applicable to simplex systems.) Function Code 21 selects how long dial tone is transmitted before the Microconnect will sample the receiver for activity (before the mobile has started dialing the phone number). Dial tone must be present before the transmitter will be keyed.

Example: To set Dial Tone Sample Rate to 2 seconds enter **21* 20#**.

DIAL TONE SAMPLE WIDTH (Function Code 22)

(Only applicable to simplex systems.) The dial tone sample width is how long the Microconnect looks for mobile activity after transmitting dial tone. After the Sample Width time the Microconnect will transmit dial tone again if present. (See section 2-12 for a description of sampling.) Note that the actual amount of time that the transmitter is dropped is equal to the sample width plus the tx-to-rx time (Function Code 19). If set to 255, dial tone is only issued once for the dial tone sample rate time (Function Code 21).

Example: To set Dial Tone Sample Width to never enter **22* 255#**.

INTO-SAMPLE TIME (Function Code 23)

(Only applicable to simplex systems.) Into-sampling time is the time the telephone VOX detector must be active before the Microconnect will commence sampling. If set to 255 sampling will not occur, this should only be done in extreme cases because if the phone line goes to a error tone the transmitter will be keyed and then not allow the mobile to regain access.

Example: To set Into-Sample Time to 10 seconds enter **23* 100#**.

SAMPLE RATE (Function Code 24)

(Only applicable to simplex systems.) The sample rate is how long the audio on the phone line will be transmitted by the Microconnect before dropping the transmitter and checking for activity from the receiver after the into-sample time has expired. The sampling occurs only when the telephone VOX is active; if the telephone audio becomes silent, the Microconnect reverts to VOX operation. If the sample rate is greater than or equal to the into-sample time, the into-sample time is used for the sample rate.

Example: To set Sample Rate to 2 seconds enter **24* 20#**.

SAMPLE WIDTH (Function Code 25)

(Only applicable to simplex systems.) The sample width is the amount of time that the transmitter is dropped and the Microconnect is looking for mobile (COR) activity. Once the Sample Width time expires the transmitter will be re-keyed if the VOX is still active. Note that the actual amount of time that the transmitter is dropped is equal to the sample width plus the tx-to-rx delay time (Function Code 19).
Example: To set Sample Width to 0.2 seconds enter **25* 20#**.

DIAL-OUT MODE (Function Code 26)

Function Code 26 selects the type and rate of regenerated dialing of a telephone number received from a mobile. Dial-out can be slow DTMF (5 digits/sec), fast DTMF (10 digits/sec), slow pulse (10 pulses/sec), or fast pulse (14 pulses/sec). The difference between fast and slow dialing is the rate at which digits are transmitted; the lengths of the regenerated DTMF digits are always the same as they are received from the mobile if the minimum dial tone wait time has passed. This time also affects the speed of dialing of the auto-dial numbers.
Example: To set Dial-Out Model to slow DTMF enter **26* 0#**.

AUXILIARY RELAY MODE (Function Code 27)

Function Code 27 selects various methods of tripping and resetting the Microconnect's auxiliary relay.
Example: To set Auxiliary Relay Mode to always off enter **27* 0#**.

AUXILIARY RELAY PULSE (Function Code 28)

Function Code 28 allows the auxiliary relay to operate in pulse rather than continuous operation. The Microconnect will energize the relay for the auxiliary relay pulse time (Function Code 29) and then will de-energize the relay. If a specific mode's OFF condition occurs before the end of the pulse, the relay will de-energize regardless of whether the pulse expired.
Example: To set Auxiliary Relay Pulse to disable enter **28* 0#**.

AUXILIARY RELAY PULSE TIME (Function Code 29)

Function Code 29 selects the length of the auxiliary relay pulse (Function Code 28).
Example: To set Auxiliary Relay Pulse Time to 1 second enter **29* 10#**.

NO DTMF MOBILE MODE (Function Code 30)

Function Code 30 controls the ability of no-DTMF mobiles to answer and originate calls. If the answer mode is enabled, a no-DTMF mobile may answer an incoming call by simply keying up after at least one channel ring-out occurs. If the originate mode is enabled, a no-DTMF mobile may originate a call, using auto-dial number 9, by generating a tone that applies a signal (HI or LO) to the auxiliary input for two seconds along with COR. The call then proceeds as does a privileged user call. The no-DTMF mobile disconnects the call by another two-second presence of tone. NOTE: an external, user-provided tone decoder must be used to detect the tone and to apply an active high or low TTL level on the Model 35 auxiliary input (TB1 pin 3). Caution: If no-DTMF mobile originate is enabled and the Aux. input is set up, you may have a conflict in operation.
Example: To set No DTMF Mobile Mode to disable enter **30* 0#**.

DIRECT TELCO ACCESS MODE (Function Code 31)

Function Code 31, when enabled, allows a telephone caller to access the channel without intervention by a mobile. Operation is dependent upon the selection of the telco answer mode (Function Code 12).

If the Answer/Ring-out Mode is selected, the telephone party will hear a prompt tone and will gain access to the channel after the Microconnect has answered the channel (after rings-to-answer) and has determined that the channel is quiet (as defined by the COR quiet time). If the channel is busy, the telephone party will hear broken ringing until the channel goes quiet or rings-to-disconnect is exceeded, at which point the call is terminated.

If the Answer/Access/Ring-out mode is selected, operation occurs as for the Answer/Ring-out Mode above after the access code has been entered.

If the No-Answer/Ring-out Mode is selected, the Microconnect will answer a caller as soon as the channel is quiet (as defined by the COR quiet time), and will issue a prompt tone and give access to the telephone party.
Example: To set Direct Telco Access Mode to disable enter **31* 0#**.

PRIVACY MODE (Function Code 32)

(Only applicable to half-duplex mobiles.) Function Code 32 causes the Microconnect to transmit a fast busy signal over the channel when a mobile has completed dial-in and is keyed-up. If the user is setup as full-duplex this mode will have no effect on operation.
Example: To set Privacy Mode to disable enter **32* 0#**.

FAST ANI REQUIRED (Function Code 33)

Function Code 33 requires that neither, either, or both of the Normal and Privileged User access/disconnect codes be received from the mobiles at a minimum of five digits per second. The first digit of the ANI (automatic number identification) may be as long as desired.
Example: To set Fast ANI Required to disable enter **33* 0#**.

MORSE ID REVISIT TIME (Function Code 34)

Function Code 34 determines how often the Microconnect will automatically send its Morse code ID. (Function Code 35 selects the Morse ID Mode; Function Code 57 selects the Morse ID string.)
Example: To set Morse ID Revisit Time to 15 minutes enter **34* 15#**.

MORSE ID MODE (Function Code 35)

Function Code 35 will cause the Microconnect to transmit its Morse code ID either at the completion of a call or periodically when the channel is clear. The ID is sent only after the Morse ID revisit time (Function Code 34) has expired. The ID is also sent whenever the Microconnect is turned on and whenever the Program Mode is exited. (Function Code 57 selects the Morse code ID digits.)
Example: To set Morse ID Mode to disable enter **35* 0#**.

DISCONNECT ON 2ND DIAL TONE OR BUSY (Function Code 36)

Function Code 36 causes the Microconnect to disconnect a call upon detection of 6 sec of a 2nd dial tone or 5 cycles of a busy signal. Example: To set Disconnect on 2nd Dial Tone or Busy to enable enter **36* 1#**.

TOLL RESTRICTS (Function Codes 37, 58-59)

Three methods of toll restriction are available: restrictions on the first phone number digit, restrictions on the second, and restrictions on the number of digits in the phone number. Any one or all three of these restrictions may be enabled. Up to four DTMF digits may be selected as the restricted digits for the first or second digits; the maximum number of digits in a phone number may be from 1 to 15. The toll restrictions only apply to calls originated by the Normal User; the Microconnect examines the phone number at the completion of dial-in, and will send a Normal User an error tone and will disconnect the mobile if the number is invalid.
Example: To set Number of Digits to 15 enter **37* 15#**. To select 0 and 1 as the first digit to restrict enter **58* 2# 01**. To select 0, 1, 8, or 9 as the second digit to restrict enter **59* 4# 0189**.

TELCO FORCE TIMERS RESET (Function Code 38)

Function Code 38 allows the telco party to reset the mobile activity and call limit timers by pressing DTMF "0". The default disabled.
Example: To set Telco Force Timers Reset to disable enter **38* 0#**.

DELAY AFTER FIRST AUTO-DIAL DIGIT (Function Code 39)

This delay is inserted after the first auto-dial digit is dialed. This delay is very useful when dialing through PBX systems.
Example: To set Delay After First Auto-Dial Digit to no delay enter **39* 0#**.

FULL-DUPLEX USER (Function Code 40, 41)

These two functions are used to enable full-duplex operation for normal and privileged users in a duplex system. If a user is enabled for full-duplex, the telephone caller's audio continuously transmits during a call. The privacy tone (if enabled) is not broadcast in full-duplex operation. When the Model 35 dials a digit a beep transmits.
Example: To set Full-Duplex User to no full-duplex - normal user enter **40* 0#**. To set to no full-duplex - privileged user enter **41* 0#**.

ALTERNATE RING TONE (Function code 42)

This command allows selection between two different ring-out tones to be used to signal mobiles on the radio channel. The standard ring is sometimes hard to distinguish between a mobile originate, or phone to mobile call. By programming this function to a "one" a different ring tone is used to alert the mobile that a call requires answering. The default is the normal telco style ring-out.
Example: To set Alternate Ring Tone to no enter **42* 0#**.

SIMPLEX PRE-KEY (function code 43)

This command enables or disables the Pre-Key feature of simplex VOX operation. When a mobile unkeys, the Microconnect can "Pre-Key" the transmitter, expecting the phone party to speak next. This makes sure the mobile hears the first word from the phone party. If no phone VOX activity is detected during the VOX hold time, the transmitter will be dropped. The Pre-Key function may be enabled or disabled.
Example: To set Simplex Pre-Key to yes enter **43* 1#**.

HOOKFLASH (Function code 44)

This command enables or disables the Hookflash feature of the Model 35A. With the hookflash enabled, the Model 35A will place the phone line back on hook for 1/2 second and then come back off-hook to allow an overdial or answering of call waiting. The hookflash is accomplished by entering a DTMF "1" or "2". With a "1", the Model 35A will do the hookflash, then go back to regeneration mode to allow overdialing of an extension number or another phone number. With a DTMF "2", the Model 35A will do the hookflash, then go back to normal operation allowing the mobile to answer a call waiting call. The DTMF digit must be held for at least 1/2 seconds to accomplish the hookflash.
Example: To set Hookflash to disable enter **44* 0#**.

OFF-HOOK DETECT (Function code 45)

This command turns the off-hook detect circuit off and on. With the circuit on, the Model 35A will transmit a busy signal if the mobile tries to access the system with a parallel phone off-hook on the system. This keeps a mobile from barging in on a conversation. This command is also used when patch is used on a PBX that only has 24 volt battery across tip and ring. The Microconnect considers anything less than 27 volts to be off-hook.
Example: To set Off-Hook Detect to disable enter **45* 0#**.

SIMPLEX PULSER RATE (Function code 46)

(Only applicable to simplex systems.) This command selects how often the Model 35A will key up the transmitter if Function Code 16 is set to 2.
Example: To set Simplex Pulser Rate to 1.5 seconds enter **46* 15#**.

SIMPLEX PULSER WIDTH (Function code 47)

(Only applicable to simplex systems.) This command determines how long the transmitter will key up for every pulse rate.
Example: To set Simplex Pulser Width to 0.5 seconds enter **47* 5#**.

DIAL TONE DETECT TIMER (Function code 48)

This command determines how long a 2nd dial tone must be present before the Model 35A will hang up the call. This function is enabled with Function Code 36.
Example: To set Dial Tone Detect Timer to 4 seconds enter **48* 40#**.

ACCESS AND DISCONNECT CODES (Function Codes 50 - 56)

All of the access and disconnect codes are programmed as described in "Programming the Microconnect."

If too few digits are entered when a code string is entered, the Microconnect will wait until more digits are received before leaving the function code; if too many digits are entered, the unit will accept the specified number of digits as soon as the number of required digits are entered and ignore any extra digits entered.

It should be noted that conflicts can arise when selecting certain combinations of access codes. If the Normal User code is contained within the Privileged User code, for instance, the Privileged User code will never be detected by the Microconnect. For example, if the Normal User code is "*1" and the Privileged User code is "*12", the Microconnect will always interpret the Privileged User code as the Normal User code "*1" followed by the first digit ("2") of a telephone number.

Do not set the normal and privileged user access codes to be the same string of digits. The Model 35 will not stop you from doing this, but it causes problems in normal operation because the patch uses the access code received to determine which restrictions or privileges to use during the call. If you only intend to use one class of users, then change the access code for just that user class and leave the other at default.

If a code consists of a single digit (e.g., "*"), the Model 35 must receive the digit's DTMF signal for a minimum of 0.5 sec to recognize the code. Similarly, if a code consists of two identical digits (e.g., "**"), the first digit's DTMF signal must be received for 0.5 seconds. Example: To set Normal User Access Code to *227 enter **50*** (hear two beeps); enter **4#** (hear three beeps); enter ***227** (hear three beeps). (i.e. The Normal User Access Code function code is 50, the desired access code is 4 digits long, and the code is *227.)

MORSE CODE ID (Function Code 57)

The Morse code ID string will be transmitted either at the end of a call or periodically when the channel is clear (Function Code 35 selects the Morse ID Mode; Function Code 34 selects the Morse ID revisit time).

Do not enter the desired code string itself when programming the Morse code ID: instead, it is necessary to enter the pairs of numbers from that correspond to the desired Morse code characters.
EXAMPLE--Setting the Morse code ID to "W7ABC":

The Morse ID function is Function Code 57, and the desired ID is 5 characters long, and the string "W7ABC" corresponds to the pairs "32 07 10 11 12", therefore:

enter **57*** (hear two beeps);
enter **5#** (hear three beeps);
enter **32 07 10 11 12** (hear three beeps).

AUTO-DIAL NUMBERS (Function Codes 60-68)

Nine auto-dial numbers may be stored using Codes 60-68. Once programmed, the numbers are dialed by entering the access code plus "*1" for auto-dial one, "*2" for auto-dial two, and so forth. If no number is stored, no number is dialed and dial tone is re-issued.
EXAMPLE--Setting auto-dial one to 644-1300:

enter **60*** (hear two beeps);
enter **7#** (hear three beeps);
enter **6441300** (hear three beeps).

Programming Morse ID Characters

DESIRED CHARACTER	PROGRAMMING VALUE	DESIRED CHARACTER	PROGRAMMING VALUE
0	00	I	18
1	01	J	19
2	02	K	20
3	03	L	21
4	04	M	22
5	05	N	23
6	06	O	24
7	07	P	25
8	08	Q	26
9	09	R	27
A	10	S	28
B	11	T	29
C	12	U	30
D	13	V	31
E	14	W	32
F	15	X	33
G	16	Y	34
H	17	Z	35

6. REPAIR

COMMON PROBLEMS

COR and Squelch Problems:

For the internal squelch circuit to operate properly, the receiver audio must be unsquelched, and contain a high percentage of high frequency noise when no carrier is present. For example, if the audio level for a full deviation tone at 1 KHz is 0.2 volts peak-to-peak, the unsquelched noise level with no carrier present should be at least 1.0 volts peak-to-peak.

When setting level of the squelch pot, it is often helpful to set the units COR Hold Time to 0.0 sec.

If an external subaudible detector is to be used, it must provide rapid detection of the tone (ie 100ms or less), and it must not provide an indication of tone present when the transmitter that the Model 35A is connected to keys up.

If the Model 35A is being used on a control station operating through a repeater, an external tone decoder board is required, and the sub-audible hold time of the repeater must be short (ie less than 100ms) for convenient operation of the Microconnect.

DTMF Decoding Problems:

For reliable DTMF decoding, the audio from the receiver must either be flat from 300Hz to 3KHz (set the rear panel de-emphasis switch to "off"), or must be high-frequency emphasized with the standard 6 dB per octave slope (set the rear panel de-emphasis switch to "on").

The unit requires that COR be present before it will validate a DTMF digit. If high speed auto-dial microphones are being used with the unit, or if an excessively long first digit of an ANI string is required to access the unit, make sure that the COR signal being used from the receiver responds rapidly when a mobile keys up (ie less than 100ms of delay).

Sluggish Operation:

Remember that the half- duplex turnover time of the unit is determined by two programmable values: the COR Hold Time, and the Tone Out Delay Time. Set both times to the minimum necessary for comfortable operation.

With simplex operation, the pertinent programmable values are the above mentioned ones, and the VOX Hold Time, the Sample Width, and the Tx-To-Rx Time.

Mobile can't originate a call; they always get a busy tone back:

Check to see if the phone line tip and ring voltage is less than 27 volts (many PBX switches use 24 volts). If the voltage is less than 27 volts, use function code 45 to turn off the off-hook detector.

IN CASE OF DIFFICULTY...

In case of installation difficulty, call Zetron at (206) 820-6363 and ask for assistance with the Model 35A Microconnect. Engineers are available for assistance. Please have the serial number of the unit and/or the Zetron Order Number. If the call is made from the installation site by the installer or radio technician, the problem can probably be solved over the phone.

If a problem develops after the unit has been in service for some time, call Zetron at (206) 820-6363. If the call is made from the installation site by a radio technician, the problem can probably be solved over the telephone. If requested, units returned to Zetron can be serviced and returned the same day (if received before 11:00 am).

MODEL 35A MICROCONNECT SPARE PARTS KIT (951-9035C)

ITEM	QTY	ZETRON P/N	DESCRIPTION	MFR. PART #
1.	1	103-2015	150 OHM 2W	
2.	2	105-0001	VARISTOR	V250A15A
3.	1	107-0003	2K POT IT R/A	
4.	1	107-0010	10K POT 1T R/A	
5.	1	107-0015	50K POT 1T R/A	
6.	1	152-0021	.47/250V POLY	
7.	1	154-0025	1/35V TANT	
8.	1	154-0100	10/16V TANT	
9.	1	155-0010	1/50V ALUM	
10.	1	155-0014	4.7/50V ALUM	
11.	1	155-0015	2/50V ALUM	
12.	1	155-0050	10/25V ALUM	
13.	1	155-0056	22/50V ALUM	
14.	1	155-0080	100/25V ALUM	
15.	1	155-0141	3300/16V TUB	
16.	1	305-0003	AUDIO 600 OHM	TM-016
17.	1	305-0018	AUDIO PHONE XFMR	671-0676
18.	1	311-0008	OPTO ISOLATOR	4N26
19.	1	311-0011	LED RED FLUSH	
20.	1	311-0012	LED GRN FLUSH	
21.	1	314-4373	OCTAL LATCH TS	74LS373
22.	1	316-0004	TONE FILTER	MF4CN-50
23.	1	316-0005	REG 5V LOW POWER	LM78L05
24.	1	316-0353	OP-AMP, DUAL BIFET	LF353P
25.	1	316-0358	OP-AMP, DUAL	LM358P
26.	1	316-0570	DUAL AGC	NE570
27.	1	316-7805	REG +5V 1.5A	LM340T-5
28.	1	316-7808	REG +8V	LM78L08CZ
29.	1	321-2090	DTMF XCVR	20C90
30.	1	321-6116	RAM 2Kx8 (450NS)	HM6116
31.	1	321-6522	VIA/TIMER	R6522
32.	1	321-6803	MICROPROCESSOR	MC6803P
33.	1	323-1520	RING DET	TCM1520
34.	1	323-4040	8-BIT LD SHIFT REG	MC14040B
35.	1	323-4053	3PDT SWITCH	MC14053
36.	1	323-4066	QUAD ANALOG SWITCH	MC14066B
37.	1	323-4906	HEX LEVEL SHIFT	74C906
38.	1	324-4132	QUAD NAND SCHMIDT	74HC132
39.	1	324-4139	DUAL 2:4 MUX	74HC139
40.	1	324-4365	HEX BUS DRIVER	74HC365
41.	1	340-0014	NPN DARLINGTON	MPSA14
42.	1	340-2003	DRIVER ARRAY	ULN2003
43.	1	340-3904	NPN GEN	2N3904
44.	1	340-3906	PNP	2N3906
45.	1	342-0001	SILICON 1A 100V	1N4002
46.	1	342-3009	SILICON	1N4148
47.	1	342-3011	SILICON 1A 1000V	1N4007
48.	1	343-3029	1W 5.1VZ	1N4733A
49.	1	343-3100	1W 8.2VZ	1N4738A
50.	1	343-3112	1W 27VZ	1N4750A

MODEL 35A MICROCONNECT SPARE PARTS KIT (951-9035C) cont'd

ITEM	QTY	ZETRON P/N	DESCRIPTION	MFR. PART #
51.	1	343-3115	1W 56VZ	IN4758A
52.	1	343-3030	1W 6.2VZ	IN4735A
53.	1	376-0358	3.58 MHZ	
54.	1	380-0030	DPDT 12V	
55.	1	416-1213	BATTERY/SOCKET	
56.	1	416-1576	1A FUSE AGC	

MODEL 35A MICROCONNECT PARTS LIST (702-9131H.2)

ITEM	QTY	ZETRON P/N	DESCRIPTION	COMPONENT REFERENCE	MFR. PART #
1.	3	101-0025	10 OHM	R34 76 77	
2.	2	101-0033	22 OHM	R78 84	
3.	3	101-0047	47 OHM	R1 2 67	
4.	1	101-0048	75 OHM	R31	
5.	2	101-0049	100 OHM	R27 108	
5.5	1	101-0061	330 OHM	R105	
6.	2	101-0065	470 OHM	R30 106	
7.	3	101-0066	510 OHM	R14 38 58	
8.	3	101-0068	620 OHM	R46 71 104	
9.	4	101-0071	820 OHM	R99-102	
10.	7	101-0073	1K	R10 41-43 54 75 95	
11.	4	101-0075	1.5K	R47 R111-113	
12.	3	101-0081	2.2K	R64 68 72	
13.	2	101-0083	2.7K	R85 86	
14.	1	101-0086	3.6K	R55	
15.	1	101-0087	3.9K	R50	
16.	2	101-0092	6.2K	R28 48	
17.	2	101-0095	8.2K	R92 110	
18.	20	101-0097	10K	R9 12 25 26 35 36 40 52 53 56 59 81 82 88 89 93 94 96 97 103	
19.	1	101-0099	12K	R87	
20.	1	101-0101	15K	R49	
21.	2	101-0105	22K	R90 109	
22.	3	101-0106	24K	R57 66 69	
23.	1	101-0107	27K	R15	
24.	2	101-0111	39K	R51 60	
25.	6	101-0113	47K	R7 8 18 19 45 83	
26.	2	101-0118	75K	R17 29	
27.	8	101-0121	100K	R3 13 16 32 33 39 44 91	
28.	2	101-0145	1M	R70 73	
29.	1	101-0155	5.1M	R65	
30.	1	101-0160	10M	R37	
31.	1	103-2015	150 OHM 2W	R74	
32.	2	105-0001	VARISTOR	RV1 2	V250A15A
33.	1	107-0003	2K POT 1T R/A	R20	
34.	1	107-0005	5K POT 1T R/A	R24	
35.	1	107-0010	10K POT 1T R/A	R22	
36.	2	107-0015	50K POT 1T R/A	R21 23	
37.	2	107-0502	50K POT 1T	R61 62	
38.	2	119-0008	10Kx7 R-PAK	RP1 2	
39.	2	150-0024	24 PF/1KV DISC	C61 62	
40.	2	150-0096	1000 PF/1KV DISC	C2 3	
41.	3	150-0110	.01 DISC	C42 43 72	
42.	8	151-0020	.001/50V TS	C4 8 10 16 25 37 40 45	
42.5	1	151-0027	270 PF/50V TS	C9	
43.	1	151-0047	470 PF/50V TS	C56	
44.	4	151-0120	.01/50V TS	C6 20 21 26	
45.	3	151-0130	.047/50V TS	C32 46 69	
46.	6	151-0180	.1/50V TS	C5 12 34 36 39 47	

MODEL 35A MICROCONNECT PARTS LIST (702-9131H.2) cont'd

ITEM	QTY	ZETRON P/N	DESCRIPTION	COMPONENT REFERENCE	MFR. PART #
47.	1	152-0010	.1/250V POLY	C28	
48.	18	152-0012	.1/50V POLY	C13 14 17 18 23 24 27 30 33 41 44 49 52 53 58 60 67 71	
49.	1	152-0021	.47/250V POLY	C29	
50.	1	152-0040	4.7/50V POLY	C7	
51.	1	152-0089	.001/50V POLY	C11	
52.	4	154-0025	1/35V TANT	C22 54 55 59	
53.	1	154-0100	10/16V TANT	C70	
54.	4	155-0052	10/35V ALUM	C19 38 48 68	
55.	1	155-0056	22/50V ALUM	C31	
56.	1	155-0077	100/25V ALUM	C15	
57.	1	155-0141	3300/16V TUB	C57	
58.	4	305-0001	BEADS FERRITE	E1-4	
59.	1	305-1540	PHONE HYBRID XFMR	T2	671-1540
60.	3	311-0008	OPTO ISOLATOR	U11-13	4N26
61.	4	311-0011	LED RED FLUSH	DS1-4	
62.	1	311-0012	LED GRN FLUSH	DS5	
63.	1	314-4373	OCTAL LATCH TS	U23	74LS373
64.	2	316-0004	TONE FILTER	U17 18	MF4CN-50
65.	4	316-0353	OP-AMP, DUAL BIFET	U3 4 6 8	LF353P
66.	2	316-0358	OP-AMP, DUAL	U2 19	LM358P
67.	1	316-7805	REG +5V	VR1	LM340T-5
68.	1	321-2090	DTMF XCVR	U15	20C90
69.	1	321-6116	RAM 2Kx8 (450NS)	U20	HM6116
70.	1	321-6522	VIA/TIMER	U25	R6522
71.	1	321-6803	MICROPROCESSOR	U21	MC6803P
72.	1	323-1520	RING DET	U10	TCM1520
73.	2	323-4040	12-BIT BINARY CNTR	U27 32	MC14040B
74.	1	323-4053	3PDT SWITCH	U7	MC14053
75.	1	323-4066	QUAD ANALOG SWITCH	U9	MC14066B
76.	1	323-4906	HEX LEVEL SHIFT	U24	74C906
77.	2	324-4132	QUAD NAND SCHMIDT	U30 31	74HC132
78.	1	324-4139	DUAL 2:4 MUX	U29	74HC139
79.	1	324-4365	HEX BUS DRIVER	U14	74HC365
80.	1	340-2003	DRIVER ARRAY	U16	ULN2003
81.	4	340-3904	NPN GEN	Q2 4 6 7	2N3904
82.	1	340-3906	PNP	Q3	2N3906
83.	2	342-3009	SILICON	CR8 24	1N4148
84.	8	342-3011	SILICON 1A 1000V	CR14-17 20-23	1N4007
85.	2	343-3030	1W 6.2VZ	CR25 6	IN4735A
86.	2	343-3100	1W 8.2VZ	CR11 12	1N4738A
87.	1	343-3112	1W 27VZ	CR18	1N4750A
88.	1	343-3115	1W 56VZ	CR19	IN4758A
89.	2	371-0005	SINGLE KEY R/A	SW2 3	
90.	1	371-0008	DIP 8-POS R/A	SW1	
91.	1	376-0358	3.58 MHZ	Y1	
92.	3	380-0030	DPDT 12V	K1-3	
93.	14	401-0052	STAKE PINS .2 HT	TP7,8,10,11,13-16 (1 EA) XJP8 (6 EA)	

MODEL 35A MICROCONNECT PARTS LIST (702-9131H.2) cont'd

ITEM	QTY	ZETRON P/N	DESCRIPTION	COMPONENT REFERENCE	MFR. PART #
94.	1	401-0059	15-PIN R/A PINS	TB1	
95.	1	401-6006	6-POS MALE	P1	
96.	1	401-7000	6-POS TELCO JACK	J1	
97.	2	402-3040	MINI JUMPER	JP8 (POS A & E)	
98.	3	407-0006	SKT 6 PIN DIP	XU11-13	
99.	9	407-0008	SKT 8 PIN DIP	XU2-4 6 8 10 17-19	
100.	4	407-0014	SKT 14 PIN DIP	XU9 24 30 31	
101.	6	407-0016	SKT 16 PIN DIP	XU7 14 16 27 29 32	
102.	1	407-0020	SKT 20 PIN DIP	XU23	
103.	1	407-0022	SKT 22 PIN DIP	XU15	
104.	2	407-0028	SKT 28 PIN DIP	XU20 22	
105.	2	407-0040	SKT 40 PIN DIP	XU21 25	
106.	1	408-0001	WIRE JUMPER	JP7 POS B	
107.	1	408-----	WIRE	R3 NOTE 1	
108.	1	410-9101C.2	PCB BARE	ZETRON	
109.	1	416-1213	BATTERY/SOCKET	XU20	
110.	1	416-1576	1A FUSE AGC	F1	
111.	2	416-3040	FUSE CLIP	XF1	
112.	5	417-0010	LED MOUNT	XDS1-5	
113.	1.5"	525-0003	INSUL TUBE CLEAR	XRX1,XRX2,XQX1	
114.	A/R	561-0001	SILICON GREASE	XVR1	

DO NOT INSTALL:

C1 35 63-66
CR1-5,13
JP1-6,9
P2,3
R4,63
U1,26,28
TP1-6,9,12

NOTES:

INSTALLED ON 901-LEVEL:
U26

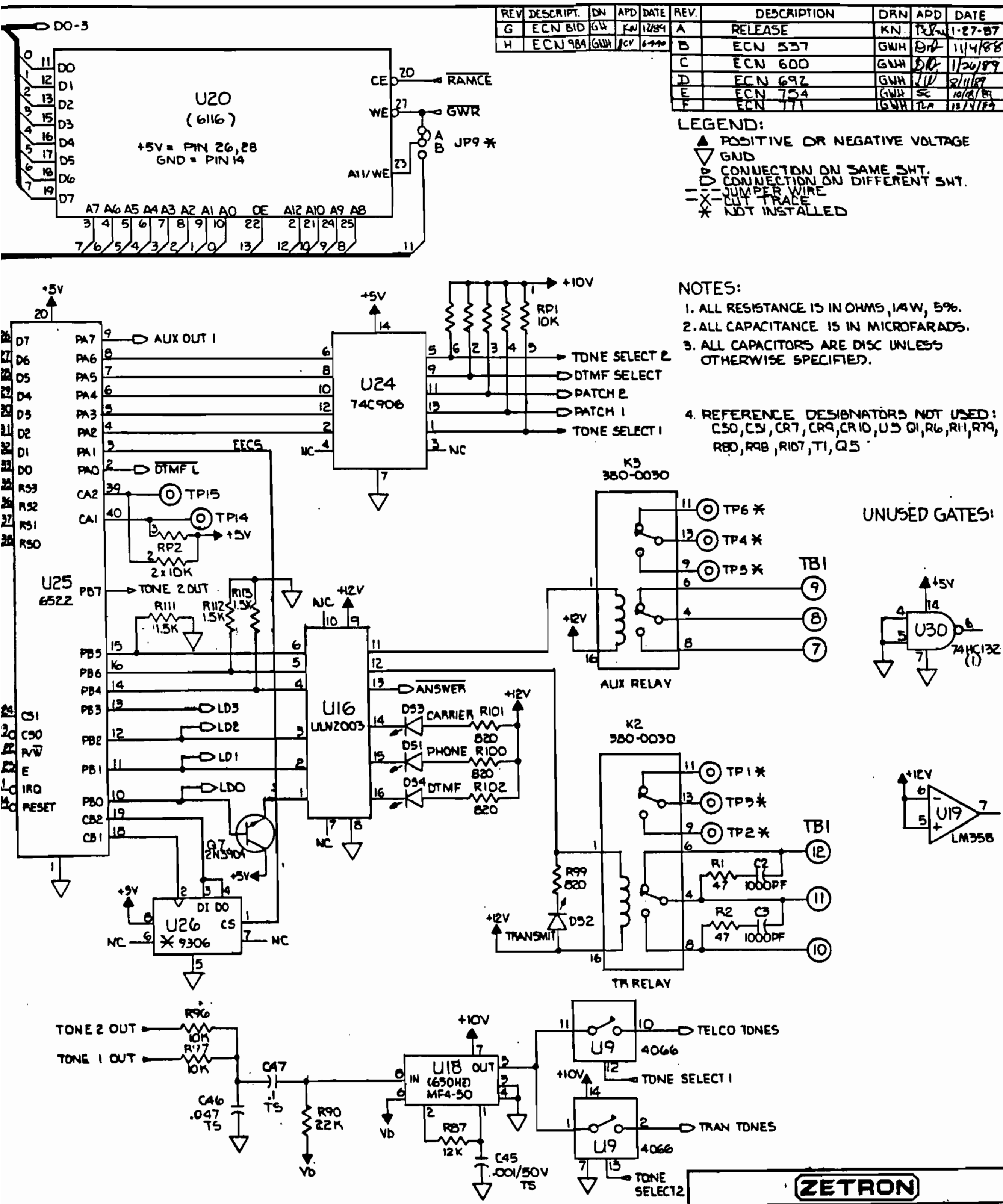
REV	DESCRIPT.	DN	APD	DATE
G	ECN 810	GW	KN	12/89
H	ECN 984	GWH	JCV	6-4-90

REV.	DESCRIPTION	DRN	APD	DATE
A	RELEASE	KN	[illegible]	1-27-87
B	ECN 537	GWH	[illegible]	11/4/88
C	ECN 600	GWH	[illegible]	1/26/89
D	ECN 692	GWH	[illegible]	8/11/89
E	ECN 754	GWH	SC	10/18/89
F	ECN 771	GWH	TLA	11/7/89

LEGEND:
- ▲ POSITIVE OR NEGATIVE VOLTAGE
- ▽ GND
- ▷ CONNECTION ON SAME SHT.
- ▷ CONNECTION ON DIFFERENT SHT.
- =–= JUMPER WIRE
- =X= CUT TRACE
- ✱ NOT INSTALLED

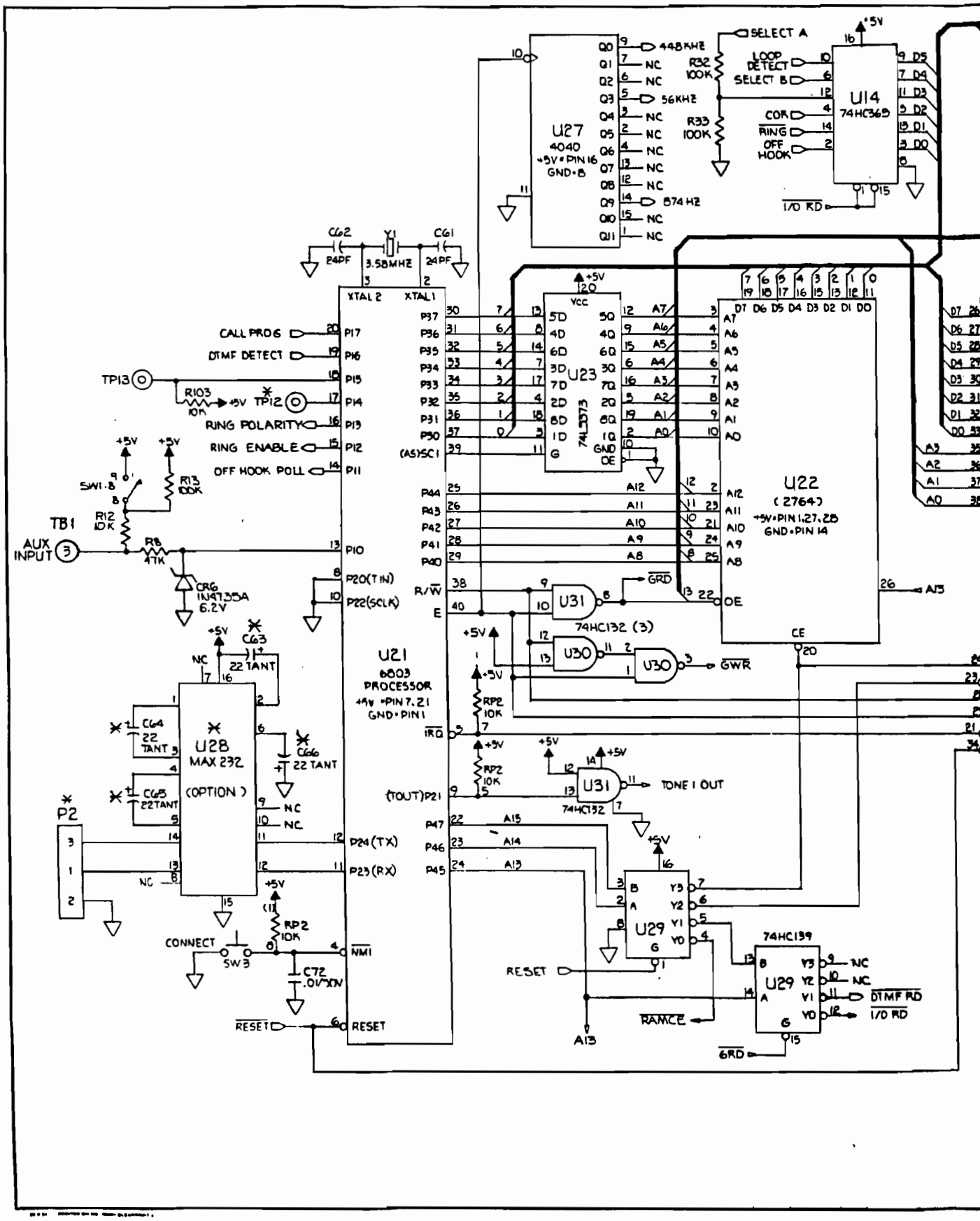
NOTES:
1. ALL RESISTANCE IS IN OHMS, 1/4 W, 5%.
2. ALL CAPACITANCE IS IN MICROFARADS.
3. ALL CAPACITORS ARE DISC UNLESS OTHERWISE SPECIFIED.
4. REFERENCE DESIGNATORS NOT USED: C50, C51, CR7, CR9, CR10, U5 Q1, R6, R11, R79, R80, R98, R107, T1, Q5

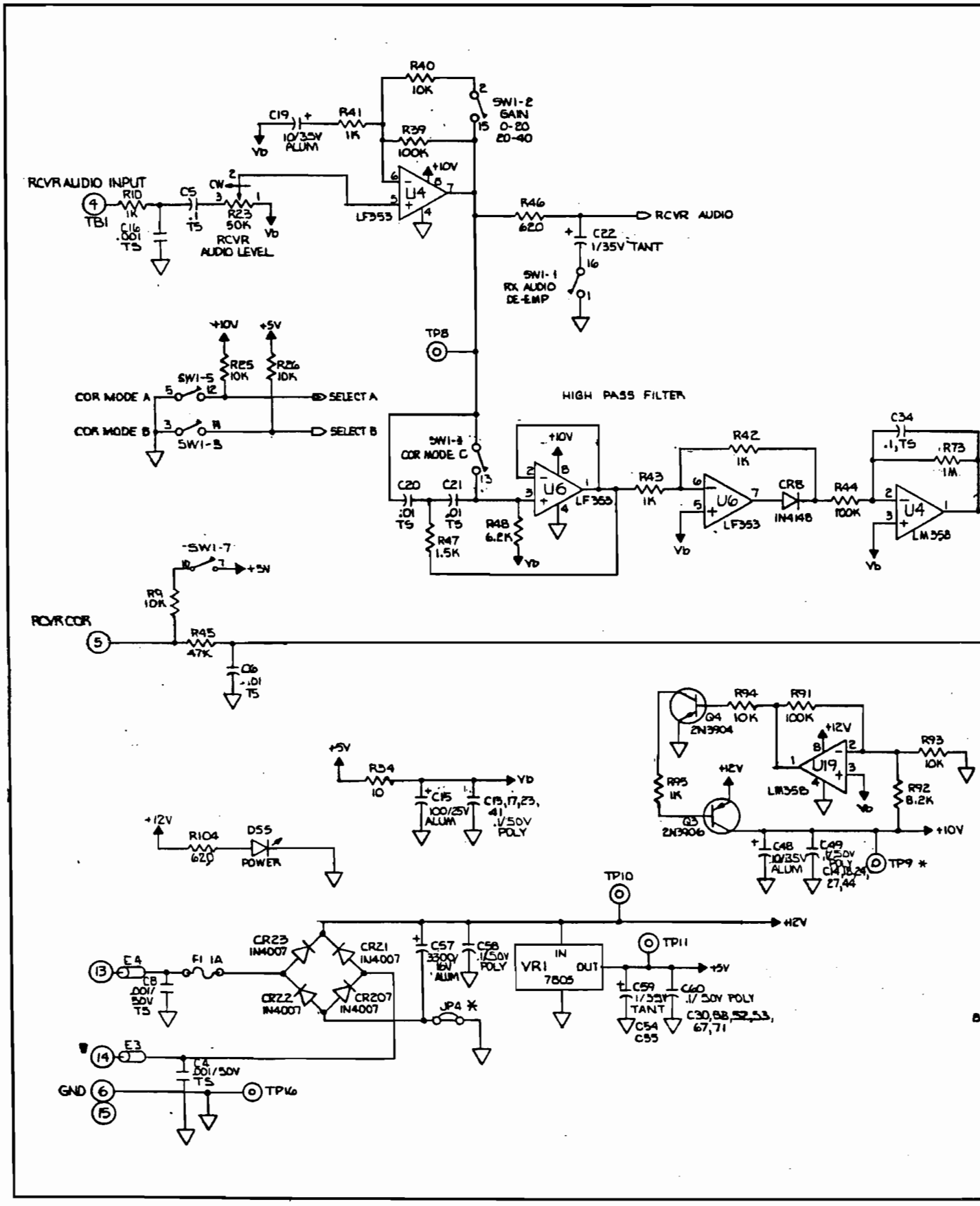
UNUSED GATES:



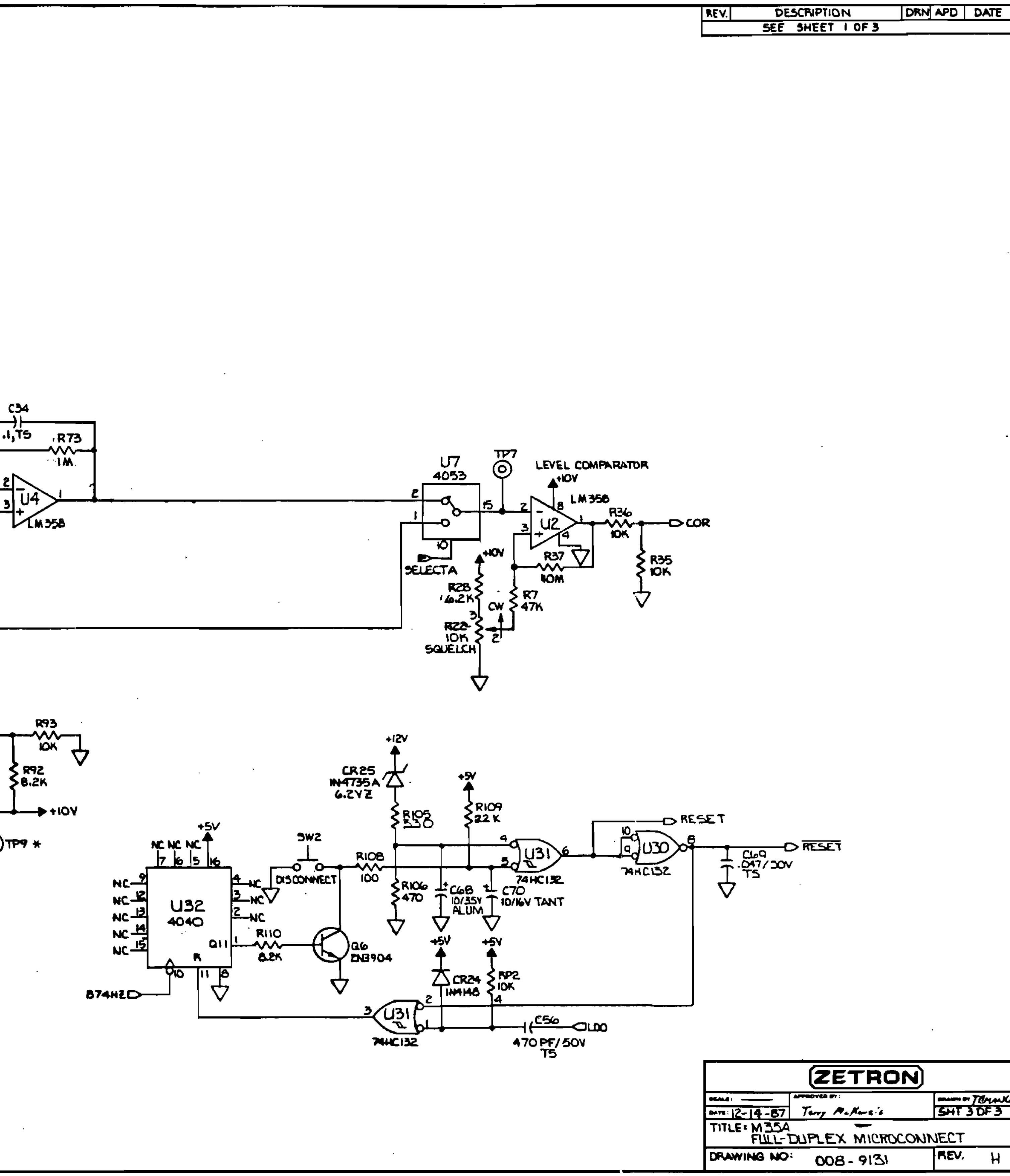
ZETRON			
SCALE: —	APPROVED BY: [signature]		DRAWN BY: [illegible]
DATE: 12-14-87			SHT 1 OF 3
TITLE: M35A FULL-DUPLEX MICROCONNECT			
DRAWING NO: 008-9131			REV. H

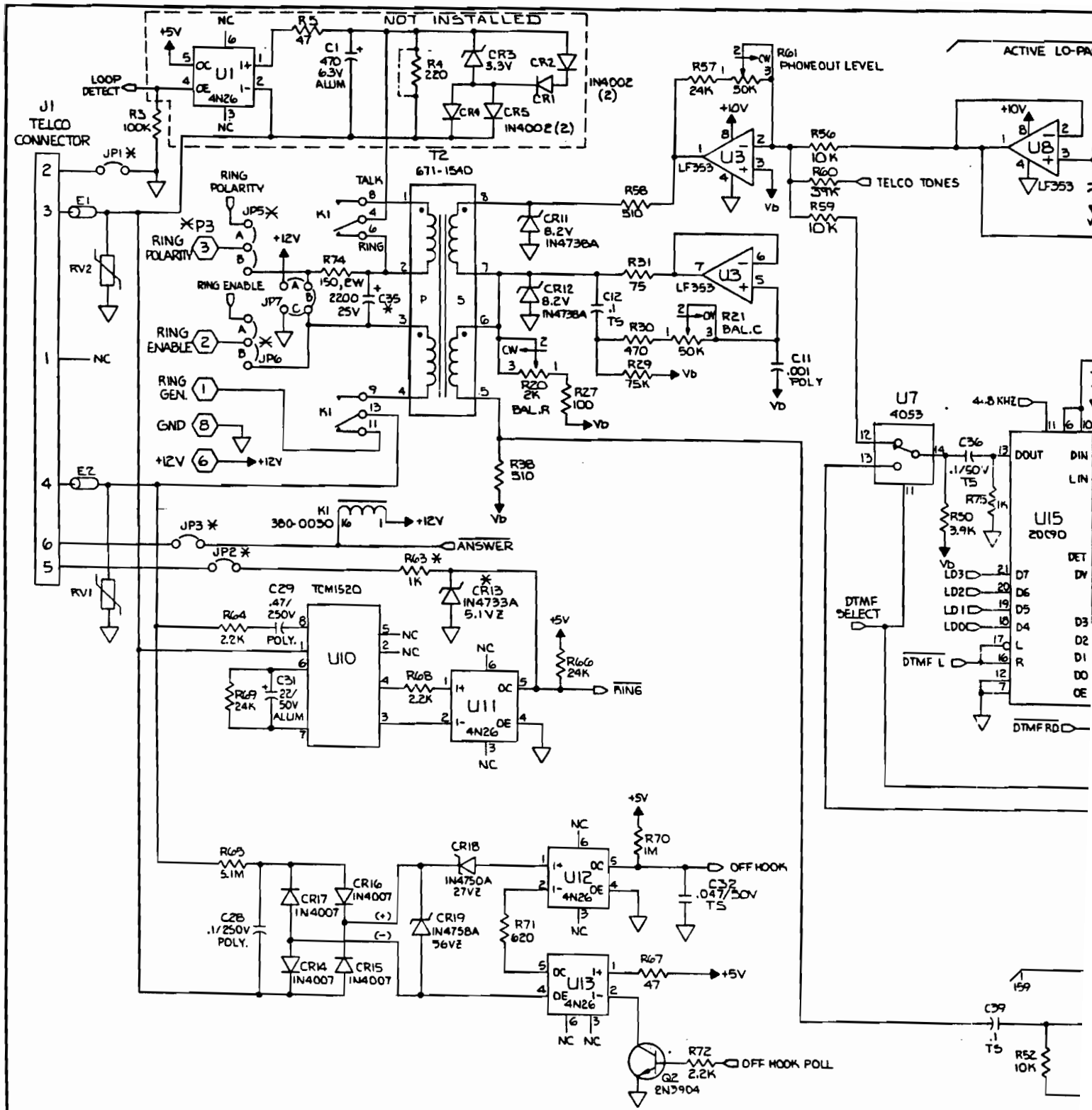
MODEL 35A FULL-DUPLEX MICROCONNECT SCHEMATIC (008-9131H) SHT 1 OF 3



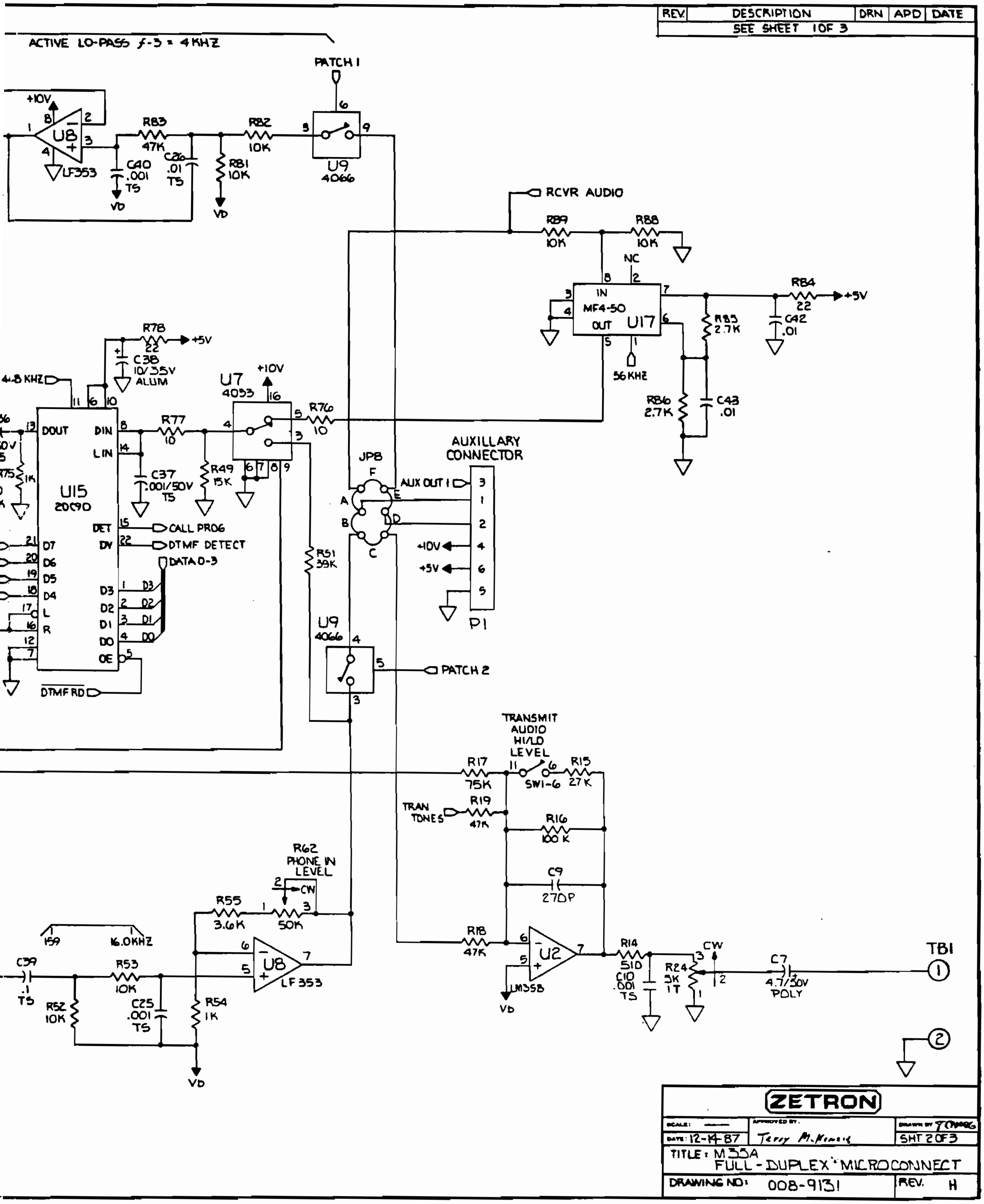

R40
10K
SW1-2
GAIN
0-20
20-40
C19
10/35V
ALUM
R41
1K
R39
100K
+10V
RCVR AUDIO INPUT
R10
1K
C5
.1
TS
R23
50K
RCVR
AUDIO LEVEL
C16
.001
TS
TB1
LF353
U4
R46
620
RCVR AUDIO
C22
1/35V TANT
SW1-1
RX AUDIO
DE-EMP
TP8
+10V
+5V
R25
10K
R26
10K
SW1-5
COR MODE A
SELECT A
COR MODE B
SW1-6
SELECT B
HIGH PASS FILTER
SW1-8
COR MODE C
C20
.01
TS
C21
.01
TS
R47
1.5K
R48
6.2K
U6
LF353
R43
1K
R42
1K
CR8
IN4148
R44
100K
C34
.1, TS
R73
1M
LM358
SW1-7
+5V
R9
10K
RCVR COR
R45
47K
C6
.01
TS
R94
10K
R91
100K
Q4
2N3904
+12V
U19
LM358
R93
10K
R95
1K
R92
8.2K
Q3
2N3906
+10V
C48
10/35V
ALUM
C49
.1/50V
POLY
TP9 *
R34
10
C15
100/25V
ALUM
C18,17,23,
41
.1/50V
POLY
R104
620
D55
POWER
TP10
+12V
CR23
IN4007
CR21
IN4007
CR22
IN4007
CR207
IN4007
C57
3300/
16V
ALUM
C58
.1/50V
POLY
VR1
7805
IN
OUT
TP11
+5V
C59
1/35V
TANT
C60
.1/50V POLY
C54
C55
C30,68,52,53,
67,71
JP4 *
E4
F1 1A
C8
.001/
50V
TS
E3
C4
.001/50V
TS
GND
TP16

MODEL 35A FULL-DUPLEX MICROCONNECT SCHEMATIC (008-9131H) SHT 2 OF 3

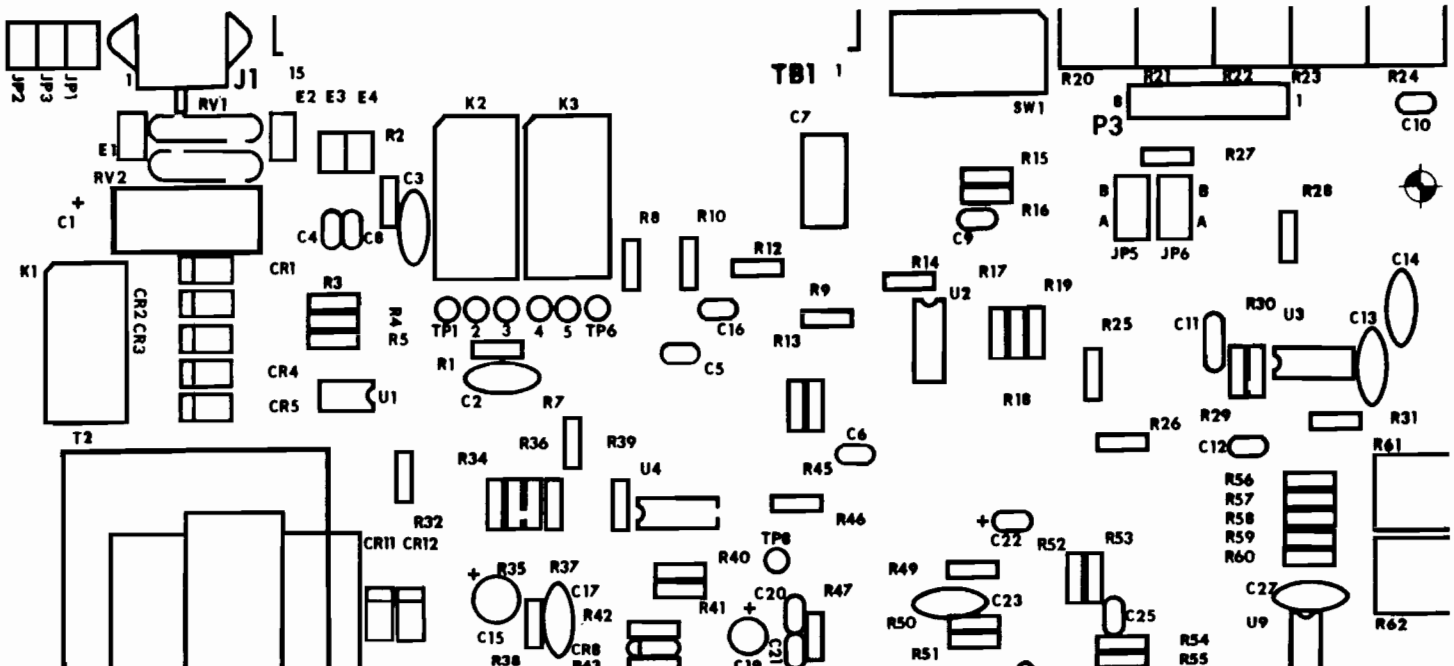



NOT INSTALLED
ACTIVE LO-PA
J1
TELCO
CONNECTOR
LOOP
DETECT
U1
4N26
R3
100K
R5
47
C1
470
6.3V
ALUM
R4
220
CR3
3.3V
CR2
CR1
CR4
CR5
IN4002 (2)
IN4002
(2)
JP1
E1
E2
RV1
RV2
T2
671-1540
TALK
RING
K1
RING
POLARITY
JP5
P3
RING ENABLE
JP7
JP6
RING
GEN.
GND
+12V
NC
R74
150, 2W
2200
25V
C35
R58
510
CR11
8.2V
IN4738A
CR12
8.2V
IN4738A
C12
.1
TS
R30
470
R29
75K
R20
2K
BAL.R
R27
100
R38
510
Vb
VD
R61
PHONEOUT LEVEL
R57
24K
50K
+10V
U3
LF353
R56
10K
R60
39K
R59
10K
TELCO TONES
U8
LF353
R31
75
R21
BAL.C
C11
.001
POLY
U7
4053
4.8 KHZ
C36
.1/50V
TS
R75
1K
R50
3.9K
U15
2090
DOUT
DIN
LIN
DET
DV
D7
D6
D5
D4
D3
D2
D1
D0
OE
LD3
LD2
LD1
LD0
L
R
DTMF
SELECT
DTMF L
DTMF RD
K1
380-0030
ANSWER
JP3
JP2
R63
1K
CR13
IN4733A
5.1VZ
C29
.47/
250V
POLY.
TCM1520
U10
R64
2.2K
C31
22/
50V
ALUM
R69
24K
R66
24K
RING
U11
4N26
R68
2.2K
R65
5.1M
CR16
IN4007
CR17
IN4007
CR14
IN4007
CR15
IN4007
C28
.1/250V
POLY.
CR18
IN4750A
27VZ
CR19
IN4758A
56VZ
U12
4N26
R70
1M
OFF HOOK
C32
.047/50V
TS
R71
620
U13
4N26
R67
47
+5V
R72
2.2K
OFF HOOK POLL
Q2
2N3904
C39
.1
TS
R52
10K
159

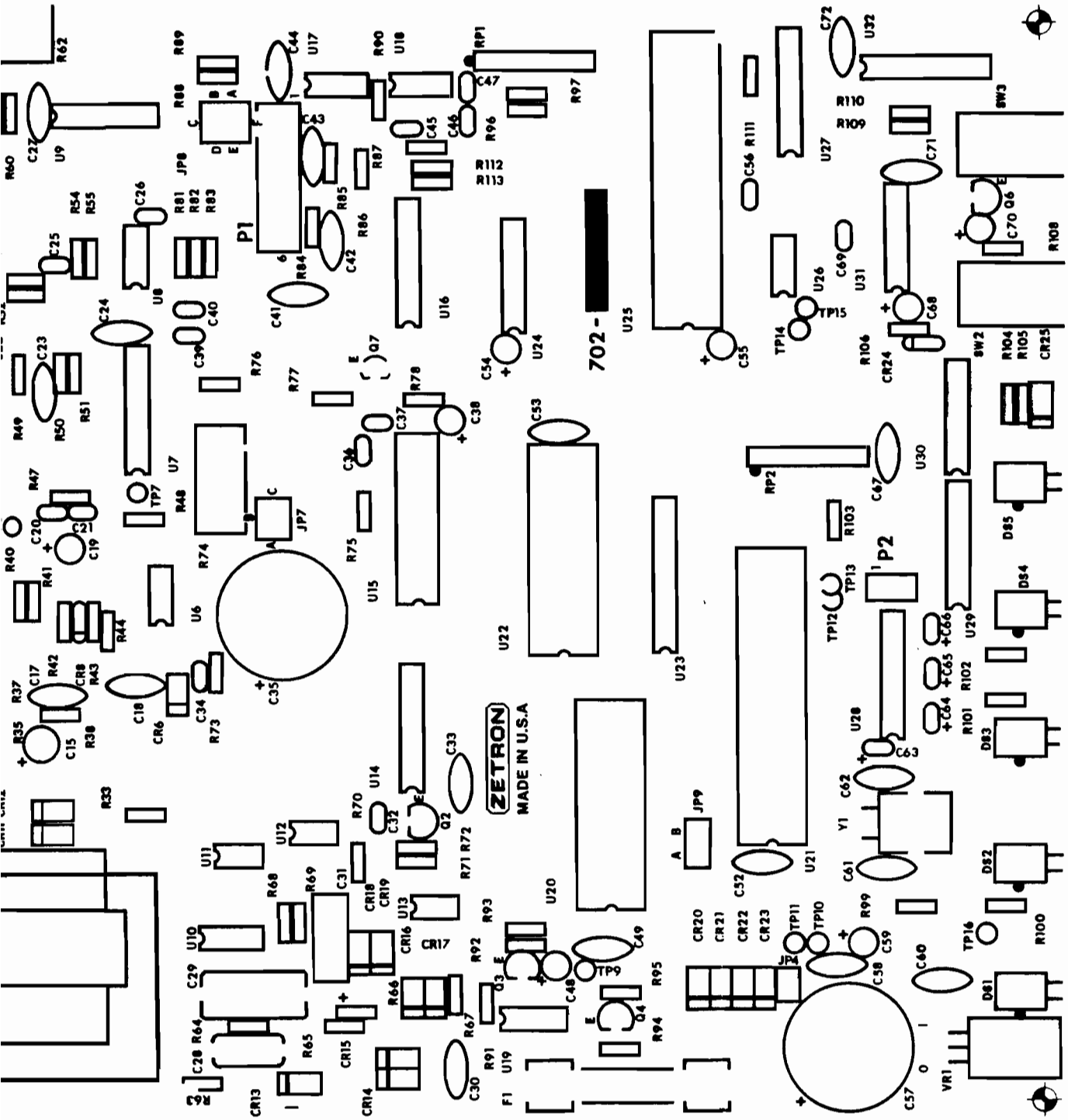
MODEL 35A FULL-DUPLEX MICROCONNECT SCHEMATIC (008-9131H) SHT 3 OF 3



COMP. I.D.


J1
RV1
RV2
K1
K2
K3
T2
TB1
SW1
P3
JP5
JP6
U1
U2
U3
U4
U9
TP1
TP6
TP8
CR1
CR2
CR3
CR4
CR5
CR11
CR12
C1
C2
C3
C4
C5
C6
C7
C9
C10
C11
C12
C13
C14
C15
C16
C17
C20
C22
C23
C25
C27
R1
R2
R3
R4
R5
R7
R8
R9
R10
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R34
R35
R36
R37
R38
R39
R40
R41
R42
R45
R46
R47
R49
R50
R51
R52
R53
R54
R55
R56
R57
R58
R59
R60
R61
R62

MODEL 35A FULL-DUPLEX MICROCONNECT SILKSCREEN (702-9131H.2)



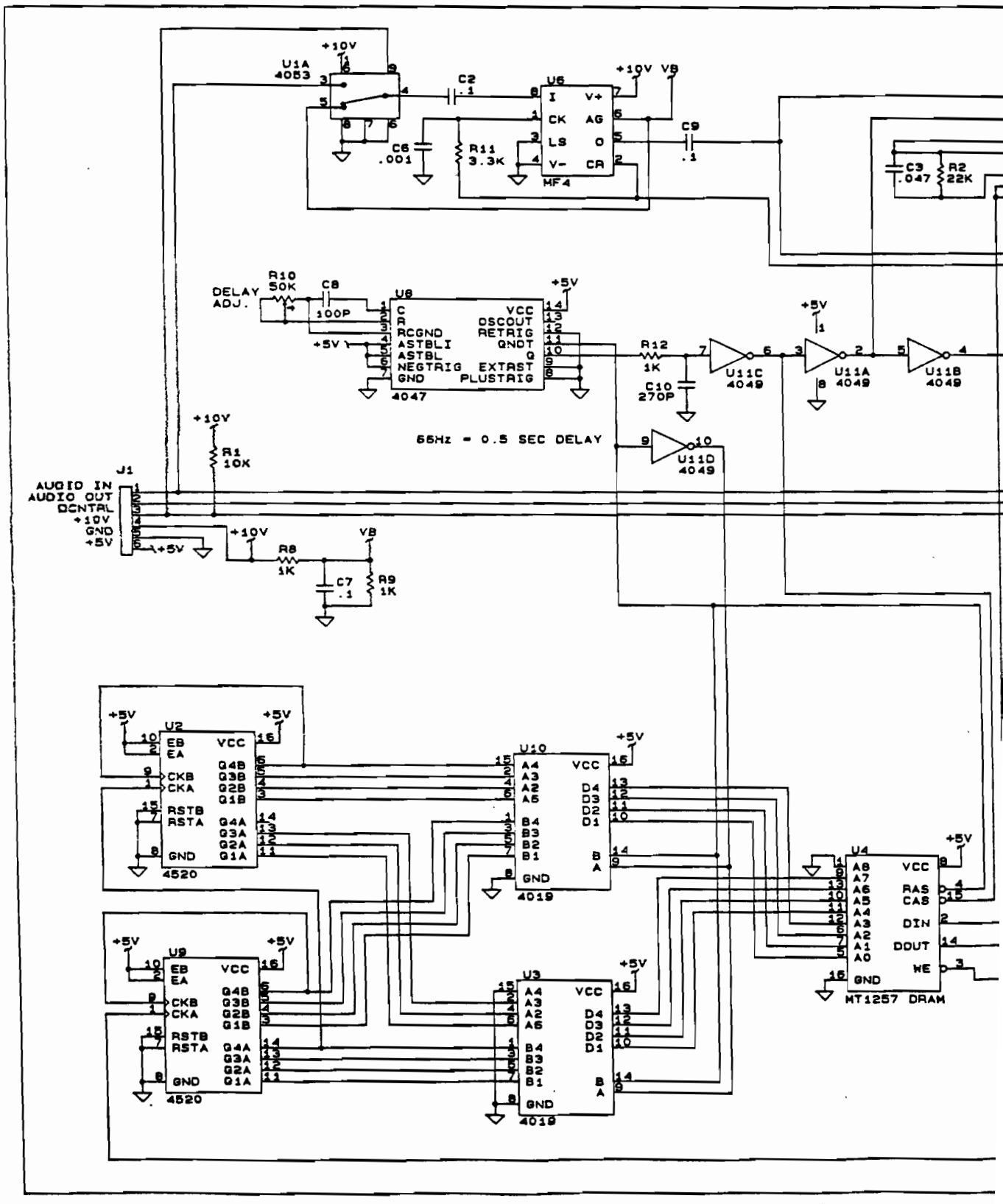
MODEL 4X VOX DELAY PARTS LIST (702-9031H)

LEGEND:
+ = OPTION
/ = NOT INSTALLED
^ = INSTALLED ON HIGHER ASSY

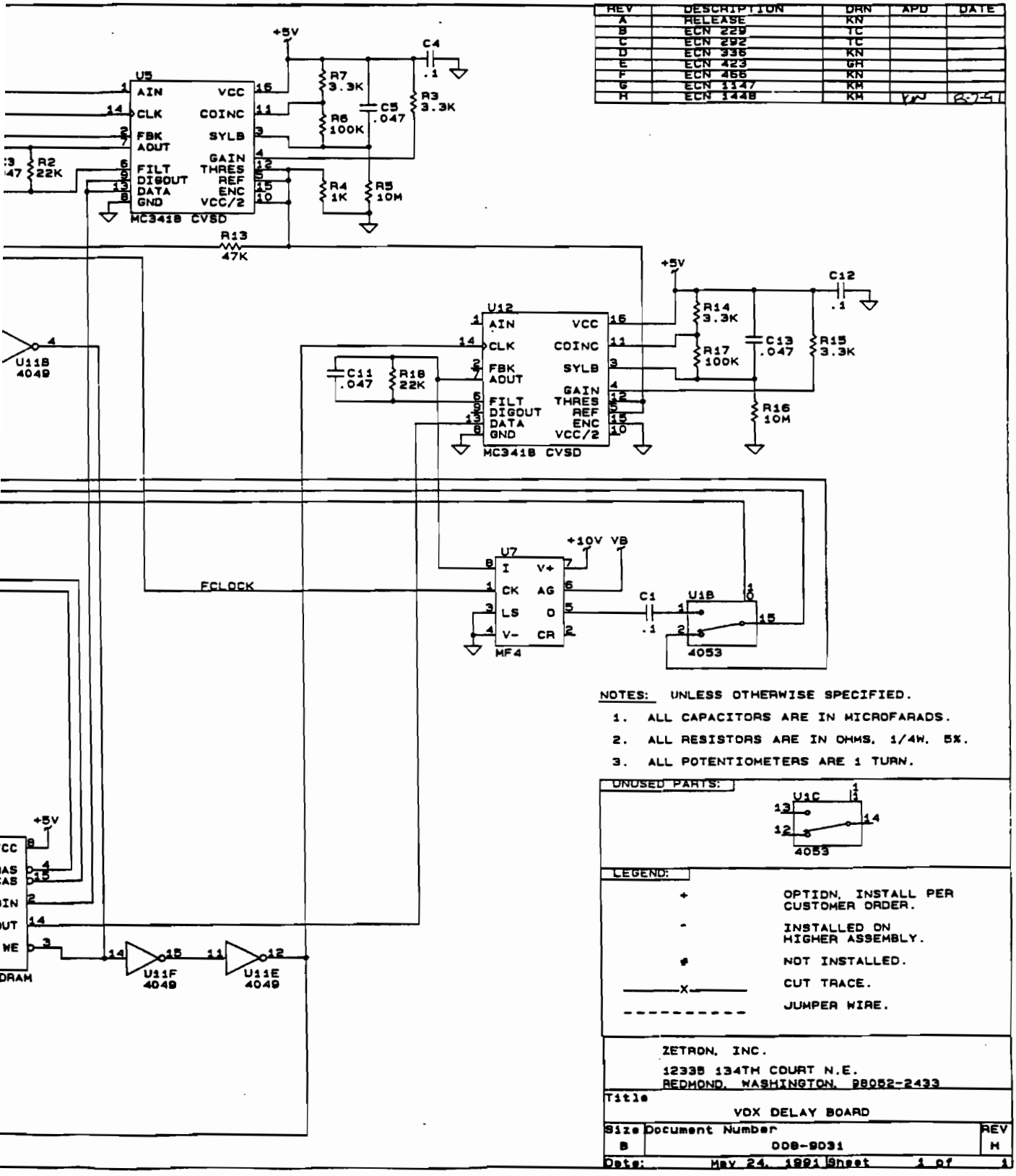
Item	Quantity	Reference	Part	Description	Mfg.Part No.
1	4	R4,R8,R9,R12	101-0073	1K 1/4W 5% CARBON FILM	
2	5	R3,R7,R11,R14,R15	101-0085	3.3K 1/4W 5% CARBON FILM	
3	1	R1	101-0097	10K 1/4W 5% CARBON FILM	
4	2	R2,R18	101-0105	22K 1/4W 5% CARBON FILM	
5	1	R13	101-0113	47K 1/4W 5% CARBON FILM	
6	2	R6,R17	101-0121	100K 1/4W 5% CARBON FILM	
7	2	R5,R16	101-0160	10M 1/4W 5% CARBON FILM	
8	1	R10	107-0502	50K POT 1 TURN	3386P-1-503
9	1	C8	151-0010	100 PF 50V +-10% CERAMIC, TEMPERATURE STABLE	CW15C101K
10	1	C6	151-0020	.001 UF 50V +-10% CERAMIC, TEMPERATURE STABLE	CW15C102K
11	1	C10	151-0027	270 PF 50V +-10% CERAMIC, TEMPERATURE STABLE	CW15C271K
12	4	C3,C5,C11,C13	151-0130	.047 UF 50V +-10% CERAMIC, TEMPERATURE STABLE	CW20C473M
13	6	C1,C2,C4,C7,C9,C12	151-0180	.1 UF 50V +-10% CERAMIC, UNSTABLE	AVXSR205E104MAA
14	2	U6,U7	316-0004	TONE FILTER	MF4CN-50
15	1	U4	321-0256	256K DRAM	P21256-100
16	2	U5,U12	323-3418	CVSD VOICE DIG	MC3418CP
17	2	U3,U10	323-4019	MUX	MC14019
18	1	U8	323-4047	MONOSTABLE MULTIVIBRATOR	CD4047BE
19	1	U11	323-4049	HEX BUFFER INV	MC14049B
20	1	U1	323-4053	3PDT SWITCH	MC144053
21	2	U2,U9	323-4520	COUNTER	MC14520
22	1	J1 (NOTE 1)	401-6005	6-POS FEMALE	09-52-3063
23	2	XU6 7	407-0008	8-PIN DIP SOCKET	
24	1	XU8	407-0014	14-PIN DIP SOCKET	
25	9	XU1-5 9-12	407-0016	16-PIN DIP SOCKET	
26	1	PCB	410-9031D	VOX DELAY BOARD	

NOTES:

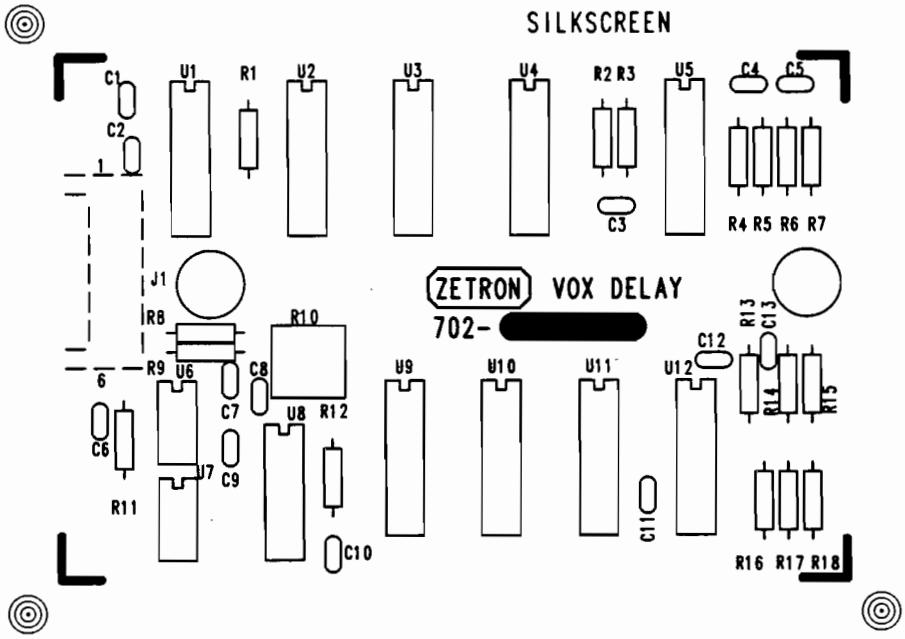
1. CUT OFF TAB NEAR PIN 1 OF J1.

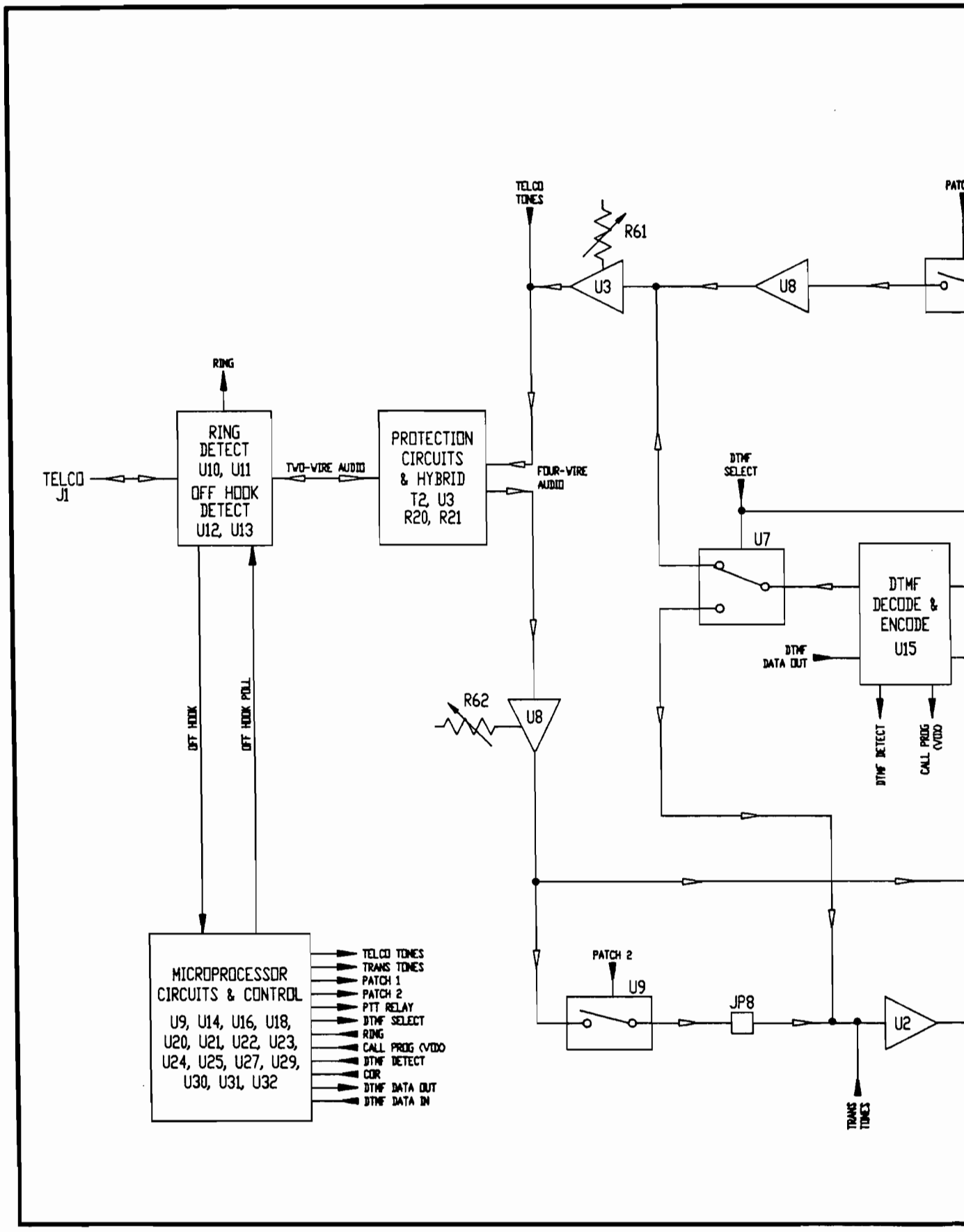

U1A
4053
+10V
C2
.1
U6
MF4
+10V
VB
C6
.001
R11
3.3K
C9
.1
C3
.047
R2
22K
R10
50K
DELAY
ADJ.
C8
100P
U8
4047
+5V
R12
1K
C10
270P
U11C
4049
U11A
4049
U11B
4049
U11D
4049
55Hz = 0.5 SEC DELAY
R1
10K
J1
AUDIO IN
AUDIO OUT
CONTRL
+10V
GND
+5V
R8
1K
C7
.1
R9
1K
U2
4520
U10
4019
U4
MT1257 DRAM
U9
4520
U3
4019

VOX DELAY BOARD SCHEMATIC (008-9031H)



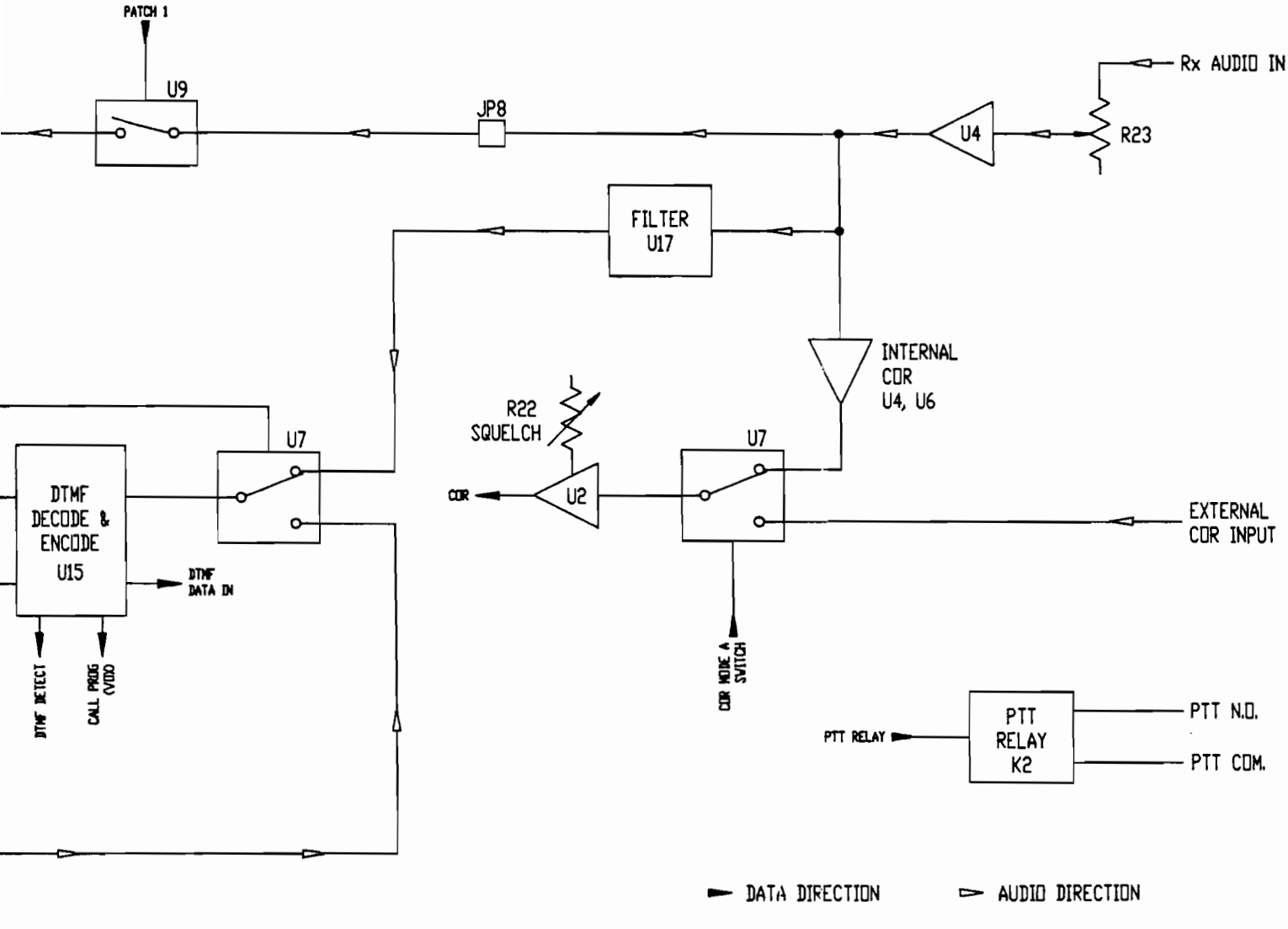
VOX DELAY BOARD SILKSCREEN (702-9031H)

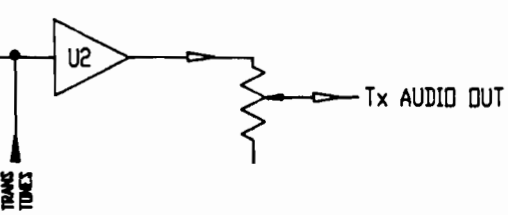



TELCO TONES
R61
U3
U8
RING
RING DETECT U10, U11 OFF HOOK DETECT U12, U13
TELCO J1
TWO-WIRE AUDIO
PROTECTION CIRCUITS & HYBRID T2, U3 R20, R21
FOUR-WIRE AUDIO
DTMF SELECT
U7
DTMF DECODE & ENCODE U15
DTMF DATA OUT
DTMF DETECT
CALL PROG (VIDO
R62
U8
OFF HOOK
OFF HOOK PULL
MICROPROCESSOR CIRCUITS & CONTROL U9, U14, U16, U18, U20, U21, U22, U23, U24, U25, U27, U29, U30, U31, U32
TELCO TONES
TRANS TONES
PATCH 1
PATCH 2
PTT RELAY
DTMF SELECT
RING
CALL PROG (VIDO
DTMF DETECT
COR
DTMF DATA OUT
DTMF DATA IN
PATCH 2
U9
JP8
U2
TRANS TONES

MODEL 35A BLOCK DIAGRAM (006-0054A)

REVISIONS				
REV	DESCRIPTION	DRAWN	APPRVD	DATE
A	RELEASE	PW		09-26-89





DRN			ZETRON
CHK			
APV			ZETRON, INC. 12335 134TH COURT N.E. REDMOND, WA 98052
TOLERANCES (EXCEPT AS NOTED)			TITLE: MODEL 35 BLOCK DIAGRAM
DECIMAL	±.XX	±.01	
	±.XXX	±.005	
ANGULAR	∠	± 1°	DRAWING NUMBER: 006-0054 / REV: A / SIZE: B
SCALE: NONE			
SHEET: 1 OF 1			DO NOT SCALE DRAWING

7. PROGRAMMING LOG

PROGRAMMING LOG

This section is provided for the site manager to record the current programming settings of the Model 35A.

FN. CODE	FUNCTION DESCRIPTION	PROG. RANGE	PROGRAMMING INCREMENT	CURRENT SETTING
0	Control Functions 0: exit program mode 1: reset to factory default 2: transmitter test mode 3: telco test mode 4: hybrid balance test	0 - 4	n/a	_____
1	COR Auxiliary Input Mode 0: no auxiliary 1: active low input 2: active high input	0 - 2	n/a	_____
2	COR Hold Time	0 - 50	0.1 sec	_____
3	COR Quiet Time	0 - 100	0.1 sec	_____
4	Minimum Dial Tone Wait Time	5 - 100	0.1 sec	_____
5	No. of Dial-In Digits	1 - 15	1 digit	_____
6	DTMF Timeout	20 - 100	0.1 sec	_____
7	Mobile Activity Time	15 - 255 (255 = disabled)	1.0 sec	_____
8	Call Time Limit	1 - 60	1.0 min	_____
9	Rings-to-Answer	1 - 255 (255 = never)	1 ring	_____
10	No. of Channel Ringouts	1 - 255 (255 = forever)	1 ringout	_____
11	Rings-to-Disconnect	1 - 255 (255 = never)	1 ring	_____
12	Telco Answer Mode 0: Answer/Ringout 1: Answer/Access/Ringout 2: No-Answer/Ringout	0 - 2	n/a	_____
13	Dial-In Termination Mode 0: digit count, "*", timed 1: "*", timed 2: timed 3: digit count, timed	0 - 3	n/a	_____
14	Telco Prompt Tones 0: disable 1: enable	0 - 1	n/a	_____
15	Beep Frequency	35 - 100	10 Hz	_____
16	Radio System Type 0: duplex 1: simplex 2: simplex pulser	0 - 2	n/a	_____
17	Normal User Overdial 0: allow 1: disallow	0 - 1	n/a	_____

PROGRAMMING LOG (continued)

FN. CODE	FUNCTION DESCRIPTION	PROG. RANGE	PROGRAMMING INCREMENT	CURRENT SETTING
18	Tone-Out Delay Time	0 - 20	0.1 sec	
19	Tx-to-Rx Time	1 - 100	0.01 sec	
20	VOX Hold Time	0 - 50	0.1 sec	
21	Dial Tone Sample Rate	5 - 50	0.1 sec	
22	Dial Tone Sample Width	1 - 255	0.01 sec	
23	Into-Sample Time (0.1 sec)	2 - 255 (255 = never)	0.1 sec	
24	Sample Rate (0.1 sec)	5 - 250	0.1 sec	
25	Sample Width	1 - 100	0.01 sec	
26	Dialout Mode 0: slow DTMF 1: fast DTMF 2: slow pulse 3: fast pulse	0 - 3	n/a	
27	Auxiliary Relay Mode 0: always off 1: always on 2: on at either mobile access, off at disconnect 3: on at Normal User access, off at disconnect 4: on at Privileged access, off at disconnect 5: on at Telco access, off at disconnect 6: on at Telco access, off at mobile access, or off at disconnect	0 - 6		
28	Auxiliary Relay Pulse 0: disable 1: enable	0 - 1		
29	Auxiliary Relay Pulse Time	1 - 100	0.1 sec	
30	No DTMF Mobile Answer 0: disabled 1: answer enabled 2: originate (LO) enabled 3: answer/origiate (LO) enabled 4: disabled 5: answer enabled 6: originate (HI) enabled 7: answer/originate (HI) enabled	0 - 7	n/a	
31	Direct Telco Access Mode 0: disabled 1: enabled	0 - 1	n/a	
32	Privacy Mode 0: disabled 1: enabled	0 - 1	n/a	

PROGRAMMING LOG (continued)

FN. CODE	FUNCTION DESCRIPTION	PROG. RANGE	PROG. INCREMENT	CURRENT SETTING
33	Fast ANI Required 0: disabled 1: normal codes only 2: priv. codes only 3: normal and priv. codes	0 - 3	n/a	
34	Morse ID Revisit Time	1 - 99	1 min	
35	Morse ID Mode 0: disabled 1: ID at end of call 2: ID periodically 3: ID periodically after reception of COR	0 - 3	n/a	
36	Disc. on 2nd DialTone/Busy 0: disabled 1: enabled	0 - 1	n/a	
37	Maximum Phone No. Digits	1 - 15	1 digit	
38	Telco Force Timers Reset	0 - 1	n/a	
39	Delay After 1st Auto-Dial Dig.	0 - 50	100 msec	
40	Full-Duplex Normal User	0 - 1	n/a	
41	Full-Duplex Privileged User	0 - 1	n/a	
42	Alternate Ring Tone	0 - 1	n/a	
43	Simplex Pre-key	0 - 1	n/a	
44	Hookflash	0 - 1	n/a	
45	Off-Hook Detect	0 - 1	n/a	
46	Pulser Rate (see 16)	5 - 50	0.1 sec	
47	Pulser Width (see 16)	1 - 50	0.1 sec	
48	2nd Dial tone Detect Width	10 - 90	0.1 sec	
50	Normal User Access Code	1 - 10	1 digit	
51	Normal User Disconnect Code	1 - 10	1 digit	
52	Privileged User Access Code	1 - 10	1 digit	
53	Privileged User Disc. Code	1 - 10	1 digit	
54	Telco Access Code	1 - 10	1 digit	
55	Telco Disconnect Code	1 - 10	1 digit	
56	Supervisor Access Code	1 - 10	1 digit	
57	Morse ID String	1 - 10	1 digit	
58	Toll-Restricted 1st Digits	0 - 4	1 digit	
59	Toll-Restricted 2nd Digits	0 - 4	1 digit	
60	Auto-Dial 1	0 - 15	1 digit	
61	Auto-Dial 2	0 - 15	1 digit	
62	Auto-Dial 3	0 - 15	1 digit	
63	Auto-Dial 4	0 - 15	1 digit	
64	Auto-Dial 5	0 - 15	1 digit	
65	Auto-Dial 6	0 - 15	1 digit	
66	Auto-Dial 7	0 - 15	1 digit	
67	Auto-Dial 8	0 - 15	1 digit	
68	Auto-Dial 9	0 - 15	1 digit	

8. APPENDICES

APPENDIX A - SOFTWARE REVISIONS

Required Rework:

Note that the following rework must be done to revision A boards to allow them to run Version 1.05 or greater software:

Solder a wire jumper on the reverse side of the board between IC U21 pin 26 and IC U23 pin 24.

Installing New Software:

-Remove the old PROM from IC socket U21. Save for a spare or discard.

-Insert the new PROM in the socket, making sure that the orientation is correct.

-Update the units non-volatile memory by either resetting the unit to factory defaults, or by setting each of the new program function codes to the desired setting.

Software revision 1.04 or higher:

-Increased the allowable range of programming values for:
  -The Into Sample Time (Function Code 23), and
  -The Sample Rate (Function Code 24).

-Added the capability for:
  -No DTMF Mobiles (Function Code 30), and
  -Direct Telco Access (Function Code 31).

Software revision 1.05 or higher:

-Added the capability for:
  -Half-duplex Privacy Mode (Function Code 32),
  -Fast ANI Required Selection (Function Code 33),
  -Morse ID (Function Codes 34,35,57),
  -Disconnect on Second Dial tone or Busy (Function Code 36), and
  -Toll Restricts (Function Codes 37,58,59).

Software Revision 1.08 or higher:

-Increased the allowable range of programming values for:
  -The Dial tone Sampling Rate (Function Code 21),
  -The Into Sample Time (Function Code 23), and
  -The Sample Rate (Function Code 24).

-Changed the programming increment values for:
  -The Tx-To-Rx Time (Function Code 19),
  -The Dial tone Sample Width (Function Code 22), and
  -The Sample Width (Function Code 25).

Software Revision 1.09 or higher:

-Allows a DTMF "Pound" Disconnect during mobile dial-in.

APPENDIX B - HARDWARE REVISIONS

Hardware revision 410-9078B:

-Allows use of 1.05 or higher software,
-Allows a lower gain setting for the Telco Input Audio.

APPENDIX C - HARDWARE CHANGE HISTORY

410 REV	702 REV	901 REV	S/W VER	DATE	DESCRIPTION
A					First Release
			2.2		
B			2.4	7/88	Delete parts from Aux input line to reduce susceptibility to R.F. Remove output trans -former. Rev. A cannot be updated to Rev. B because of changes in the board layout.
	C			1/89	Change the value of R60 from 120k to 39k
			2.5		101-1000 to compensate for telco tones too
			2.6		low. Rev. C can be updated to higher revs. Preform Revs D & E.
	D			7/89	Add Q7 (330-3904) on back of board to improve reset activation.
	E			10/89	Change R105 from 100 ohm to 330 ohm to change
	E+				the low voltage reset point to 9.6V Rev E can be updated to higher revs.
	F			10/89	Incorporate layout changes to allow the use of new smaller hybrid trans- former. Delete from PCB assembly R63, CR13, JP1, JP2, JP3, TP1, TP2, TP3, TP4, TP5, TP6, TP9, TP12, P2
	G				Change parts list to allow for new hybrid transformer T2 305-1540 no change to fit or function.
	H				Tx audio roll off at 1500Hz when sw1-6 is in the off position resulting in occasional muffled audio: change C9 from .001 microfarad to 270 picofarad.

APPENDIX D - VOX DIGITAL DELAY BOARD INSTALLATION INSTRUCTIONS

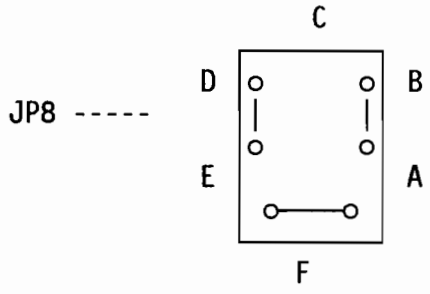
Required tools/assemblies:

1. Zetron Model 35A Microconnect.
2. VOX assembly, 702-9031.
3. Small Phillips screwdriver.
4. One extra two-pin jumper.

1. Remove the four outside screws on the bottom of the Model 35A.

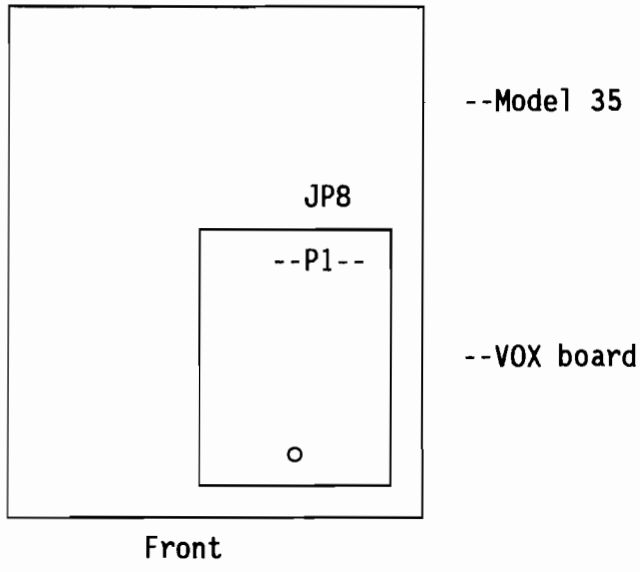
2. Locate the jumpers labeled JP8, and remove the two existing jumpers.

3. Place the JP8 mini jumpers in the positions indicated in the diagram below. You will need a total of three jumpers.



4. Remove the screw in the top of the stud.

5. Connect the VOX digital board to P1 on the Model 35A.



6. Screw the board down to the supporting stud.

7. If necessary adjust R11 on the delay board for the desired delay.

8. Reinstall the cover.

Operational Flowchart for
Default Settings in

START	M35 ANSWER	RINGS TO ANSWER	RINGING STYLE (TO MOBILE)	RINGS TO MOBILE	RINGS TO DISCONNECT
PHONE PARTY DIALS NUMBER. TELEPHONE COMPANY ISSUES RINGING.	ANSWER/RINGOUT	DEFAULT = 1 RING	TX KEYED & TELCO STYLE RINGING SENT TO MOBILE	DEFAULT = 5 RINGS	DEFAULT = 11 RINGS
	ANSWER/ACCESS/RINGOUT	OPTION = 2 - 254 RINGS	OPTION = ALTERNATE RINGING	OPTION = 1 - 254 RINGS	OPTION = 1 - 254 RIN
FRONT PANEL CONNECT BUTTON.*	NO ANSWER/RINGOUT CAUTION: NO DTMF PROGRAMMING FROM TELCO IF THIS MODE IS ENABLED.	255 RINGS = NO ANSWER		255 = RING FOREVER	255 = NEVER

*DROPS IMMEDIATELY INTO CONVERSATION MODE (GO DIRECTLY TO CONVERSATION MODE)

Operational Flowchart fo
Default Settings in

START	MOBILE ACCESS	OFF-HOOK DETECTION	DIAL-IN
MOBILE CHECKS FOR CLEAR CHANNEL.	MOBILE PTT + "*2" (NORMAL) MOBILE PTT + "*123" (PRIVILEGED)	M35 CHECKS FOR TELCO OFF-HOOK.	M35 KEYS TELCO OF TELCO DI ISSUED T
	MOBILE PTT + "*" + 1-10 DIGITS.	TELCO OFF-HOOK DETECTION IS DISABLED.	
	NO DTMF MOBILE USER MOBILE PTT + AUX INPUT (2 SECONDS) AUTODIAL NUMBER 9.		MOBILE PHONE N AUTODIA
	FAST ANI REQUIRED.		

IONAL FLOWCHARTS

t for Telco Access
s in Boldface

SCONNECT	MOBILE ANSWER	CONVERSATION MODE	MOBILE DISCONNECT	TIMED DISCONNECT	TELCO DISCONNECT
I RINGS	MOBILE PTT + "*2"(NORMAL)	PRIVACY DISABLED	MOBILE PTT + "#2"(NORMAL)	CALL LIMIT TIMER = 3 MINUTES TIMER RANGE = 1 - 60 MINUTES	DISCONNECT ON 2ND DIAL TONE
- 254 RINGS	MOBILE PTT + "*123"(PRIVILEGED)	PRIVACY ENABLED	MOBILE PTT + "#123" (PRIVILEGED)		DTMF 1-10 DIGITS - TELCO DISCONNECT CODE
	MOBILE PTT + "*" + 1-10 DIGITS	FULL-DUPLEX USER	MOBILE PTT + "#" + 1-10 DIGITS	MOBILE ACTIVITY TIMER = 30 SECONDS TIMER RANGE = 1 - 254 SECONDS 255 = NEVER (IGNORE MOBILE ACTIVITY)	DTMF "#" - TELCO DISCONNEDT CODE
	MOBILE PTT (COR TO ANSWER) (NO DTMF MOBILE)		MOBILE PTT (COR) + AUX INPUT (NO DTMF MOBILE) (2 SECONDS)		FRONT PANEL DISCONNECT BUTTON
	MOBILE PTT + AUX INPUT				
	FAST ANI REQUIRED				

rt for Mobile Access
gs in Boldface

DIAL-IN PROCEDURE	NUMBER REGENERATION	DIAL-IN TERMINATION MODE	CONVERSATION MODE	DISCONNECT PROCEDURE
M35 KEYS TX, TELCO OFF-HOOK, TELCO DIAL TONE ISSUED TO MOBILE.	DTMF PHONE NUMBER OR AUTODIAL NUMBER IS REGENERATED TO TELCO VIA SLOW DTMF.	7 DTMF DIGITS (DIGIT COUNT), "#", OR TIMED (5 SECONDS)	PRIVACY DISABLED	SAME AS TELCO ORIGINATE
MOBILE PTT + PHONE NUMBER OR AUTODIAL NUMBER	FAST DTMF	M35 CHECKS FOR "#", OR 2-10 SECOND PAUSE.	PRIVACY ENABLED	
	SLOW PULSE	M35 CHECKS FOR 2-10 SECOND PAUSE.	FULL-DUPLEX USER	
	FAST PULSE	M35 CHECKS FOR 1-15 DIGITS OR 2-10 SECOND PAUSE.	OVERDIAL NOT ALLOWED	
		M35 CHECKS FOR 1-15 DIGITS, "#", OR 2-10 SECOND PAUSE.	OVERDIAL IS ALLOWED	