

THE
KE2AM

VOICE IDer / REPEATER CONTROLLER

DOCUMENTATION
FOR
VERSION B rev C

Please Read This Manual Before Hookup

GET-TECH

201 Riley Rd.
New Windsor, NY
12553
914-564-5347

Documentation Rev F May 7, 1992

GET-TECH's VOICE ID'er / REPEATER CONTROLLER VER B REV C DOCUMENTATION REV F

INSTALLATION:

The ID'er contains CMOS circuitry. **DO NOT MAKE CONNECTIONS WITH POWER ON.** Connections should be made to grounds first, then other signals. Use Figures 4 and 5 for help in locating connection points. The ID'er circuit contains hi-gain amplifiers. Care should be taken in locating the ID'er in an enclosure that will provide adequate shielding from RF.

POWER:

AVOID DAMAGE TO DELICATE CMOS CIRCUITS. Make sure the power is off before making connections. Connect the ground terminal to the return (negative side) of the supply. Connect the positive terminal to +8 to +15VDC.

BATTERY BACKUP:

Battery backup is supplied to the RAM through the use of a lithium powered socket (plugged into location U2). The socket contains two lithium cells and all shut-down circuits necessary to retain memory. The shelf life of the backup socket is approximately five years, with no external power applied. Actual life will far exceed this shelf life. The batteries are integral parts of the socket (not removable). In the unlikely event it becomes necessary to replace them, the entire socket is removed.

AOUT (audio output):

Audio output may be connected to audio or mic input on your rig or repeater. Output audio level is adjustable up to 2VP-P, with an impedance ranging from 2K to 20K, and 1VP-P at 600 ohm. Impedance lower than 600 ohm will result in excessive distortion and should be avoided.

AIN (audio input):

Audio input should not exceed 2V P-P; ideally, a level of 1V P-P should be more than adequate. The source may come from an audio stage or the discriminator output of your receiver. When using discriminator output as the audio input source, the audio during the TX hang time will be muted by Q3. This will eliminate the unwanted noise when no signal is present during the TX hang time. Keep the audio level as low as possible. This will help minimize distortion and overload of the mixer circuit.

NOTE:

When using discriminator output for the audio input source, additional deemphasis may be necessary. C4 may be increased. Increasing the deemphasis will also affect the ID'er audio; however, the ID'er audio may be conditioned independently of the receiver audio output by changing the value of C27. The procedure will vary depending on your installation. C4 values have been as high as .47uf.

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MIC (mic input):

This input is for recording your message. Good results can be obtained with a inexpensive dynamic tape recorder mic; however, this will result in little low frequency response, mostly high frequency making the audio sound tiny. Excellent results can be obtained by using a Electret mic element such as a Radio Shack P#270-092B (must be tied to 5VDC, VCC point on the board see FIGURE 5) or the entire assembled mic P#33-1060. Regardless of what mic you choose, DO NOT OVERDRIVE. This will significantly reduce the quality of the audio in the playback mode.

SQIN (trigger input):

Squelch input is the activating signal from your receiver or COR. This signal initiates the timers and transmit enable (TXEN) only if JP3 is in place. A positive pulse between 3.5 to 12V will start the sequence. The time-out timer (TOT) resets when the SQIN is removed (carrier dropped). If it's time to ID, the controller will do so on the falling edge of this signal. This is the polite mode of operation (no ID until carrier is dropped).

TXEN (transmit enable):

This signal enables or keys the transmitter by sinking TXEN line to ground. This is accomplished by Q1 2N4401 NPN transistor, which will drive up to 400MA @ 30VDC. Q1 is protected by D1 from inductive kickback. If driving a relay a diode must be installed accross the coil (see fig 6).

JP1 (sample rate):

If jumper is installed, the slow rate is selected. This rate will give you more record time with roll-off at a lower frequency. JP1 removed will give you the higher rate with less record time, however, better high frequency response (see chart below).

JP1	INSTALLED	REMOVED
SAMPLE RATE	5.8Khz	11.7Khz
MAX RECORD TIME	11.7sec	5.8sec

FIGURE 1

JP2 (filter select):

This jumper selects the filter cut-off frequency. Its setting depends on the characteristics of the recorded voice and the equipment used (MIC, RECEIVER, TRANSMITTER). I recommend experimenting with this setting for best results. This setting works in conjunction with JP1 (see FIGURE 2).

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JP2	INSTALLED	REMOVED
CUTOFF FREQUENCY AT LO SAMPLE RATE JP1	2.7Khz	3.4Khz
CUTOFF FREQUENCY AT HI SAMPLE RATE JP1	5.4Khz	6.9Khz

FIGURE 2

JP3 (transmit inhibit):

This jumper will disable the transmitter in all modes. It can be tied to your control link for remote disable, or used manually, depending on your installation.

JP3	INSTALLED	REMOVED
TRANSMITTER	ENABLED	DISABLED

FIGURE 3

ADJUSTMENTS:

Audio level adjustments are critical for good reproduction quality.

- 1) Place play/rec (SW1) into the play position.
- 2) Apply power and wait 6 seconds. Have some method of listening to the output (monitor speaker or receiver).
- 3) Press momentarily the start switch. This will force the ID'er to announce a prerecorded message contained in RAM "Thank you for purchasing the GET-TECH digital voice ID'er and repeater controller." The announcement was recorded during testing. This recording is commercial in nature and should not be transmitted on the air. Use a dummy load for testing.
- 4) Set the ID'er audio level (RV1) to a desired volume. A lower setting will result in better signal, noise, and distortion proportion.
- 5) With a signal present at the input (have someone key up the repeater and speak), adjust the output level (RV2) for good quality and volume. RV2 actually adjusts the input to the mixer, not the output; however, this has the same effect. The ID'er may be adjusted for talk through operation (depending on the output level setting).

HINT 1: It is important to keep all levels as low as possible. This will result in minimum distortion and best reproduction. There may be some interaction between adjustments if levels are set to high.

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RECORDING:

Assuming all connections have been made according to the previous pages...

- 1) Select the sample rate (JP1) and cutoff filter frequency (JP2) you wish to use (see Figures 1,2).
- 2) Place the record play switch (SW1) in the record position.
- 3) Press the start button (SW2) and begin speaking into the mic. Hold the start for the duration of the message; release as soon as you have completed your announcement.
- 4) Place the record/play switch (SW1) back into the play position.
- 5) Press the start button (SW2). This will key the transmitter and force the message to be played over the air. If the message needs to be recorded over, return to step 2. You may do this as many times as necessary.

NOTE: Most likely your first recording will not be your best. Experiment with all the variables to achieve the best audio for your application.

HINT 2: If power is lost, your message will be retained in memory; however, the record length will be set to the maximum time. Let's say your maximum available record time is 6 seconds. Your message only used 3 seconds. If power is lost, your message will play for 3 seconds, followed by 3 seconds of anything left in RAM beyond the first 3 seconds. For this reason we recommend filling the RAM with silence before starting your message. Record no sound for the total duration of the message (6 or 12 seconds). This action will clear the RAM.

HINT 3: When recording, speak loudly without overdriving. This will help the signal-to-noise ratio. You can change the input filter setting (JP2). Try recording with the filter on, then playback with the filter off or the other way around. The signal-to-noise ratio and audio response may be improved with either technique.

PLAYBACK:

- 1) Place the play/record switch (SW1) in the play position.
- 2) Momentarily press the start button (SW2). This will force the message to play back even if the ID timer (U7) hasn't timed out. This action will also key the transmitter for the duration of the message. To disable the transmitter, remove JP3.

ID'er OPERATION:

When there is a signal present on the SQIN line, Q2 will trigger the time-out timer (TOT). This in turn triggers Q1 to enable the transmitter. If this signal remains for the duration of the TOT (approximately 2 minutes), the TXEN output will disengage, causing the repeater to time out. Reset is accomplished automatically when the input signal (SQEN) is removed. If it's time to ID, the ID'er will wait until after the signal at SQIN is removed before ID'ing. This type of operation is considered a polite mode. Once the announcement has been heard, you must wait until the ID timer (IDT) times out before it can be heard again (approximately 9 minutes). The ID'er will not initiate a message playback on its own. It may only be triggered by the SQIN signal or pressing the start switch (SW2).

CONTROLLER OPERATION:

The control circuit is made up of three timers and a GAL (Gate Array Logic). Use of the GAL reduced the chip count by five. U6 LM556 is a dual timer; one half is used for the time-out timer (TOT) and the other half for the transmitter hang timer (THT). U7 LM555 is used for the ID timer (IDT). All control logic is contained in the GAL. Changes to timing can be made by changing the R/C time constant for the particular timer.

CHANGING TIME CONSTANT:

When changes are necessary, try to make changes to the resistors rather than the caps (TOT R15, THT R14, IDT R19). This will have the least effect on thermal stability. Use percentages for value selection, i.e., to reduce IDT by 50%, decrease the value of R19 by 50%. To extend THT time by 25%, increase R14 by 25% and so on. Resistor values in excess of 6M should be avoided. Cases where values will exceed 6M the appropriate capacitor value should be changed (TOT C18, THT C17, IDT C16). Use the same system for capacitor value selection as explained for resistors. Only use low leakage tantalum capacitors.

WARRANTY:

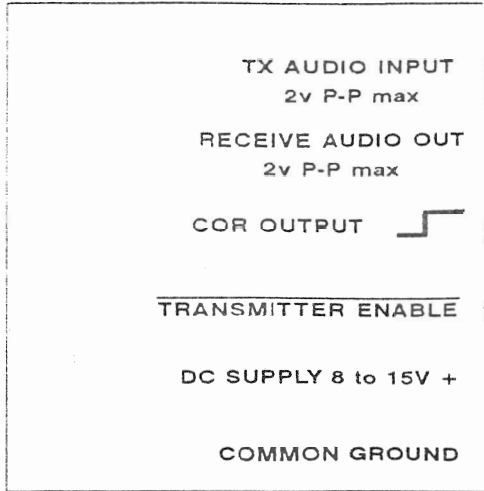
Each ID'er/controller is fully tested before shipment. Precautions have been taken to safeguard the PCB from static and shipping damage. The ID'er/controller has a 90-day from date-of-purchase warranty. Misuse or physical damage by user are not covered. If a problem should arise, please feel free to contact GET-TECH at (914-564-5347).

GET-TECH

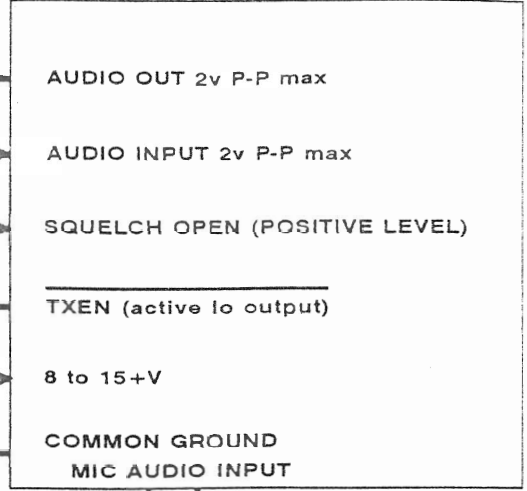
DIGITAL VOICE ID'er / REPEATER CONTROLLER

Repeater controller application

TYPICAL REPEATER



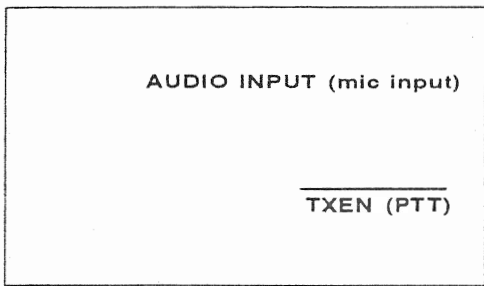
ID'er / CONTROLLER



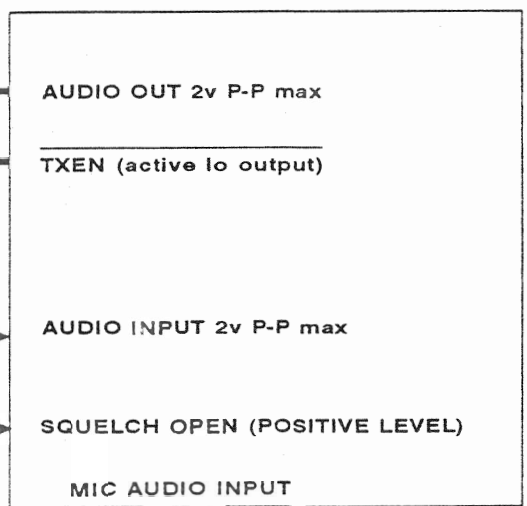
EXAMPLE OF A TYPICAL REPEATER / ID'er CONNECTION

Figure 4

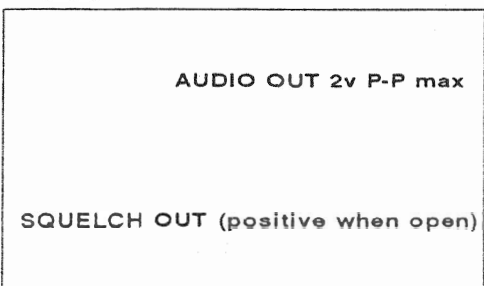
TYPICAL TRANSMITTER



ID'er / CONTROLLER



TYPICAL RECEIVER



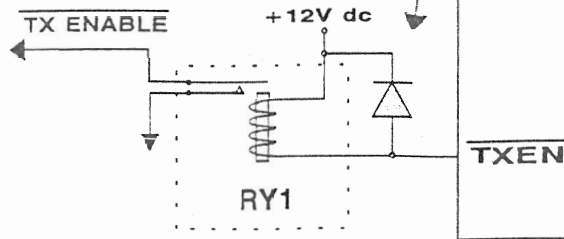
EXAMPLE OF A TYPICAL CONNECTION USING TWO RADIOS

Figure 5

GET-TECH DIGITAL VOICE ID'er / REPEATER CONTROLLER

When driving a relay it is necessary to add a diode to suppress the counter EMF.
Diode D1 on the board will only protect Q1 not eliminate the EMF.

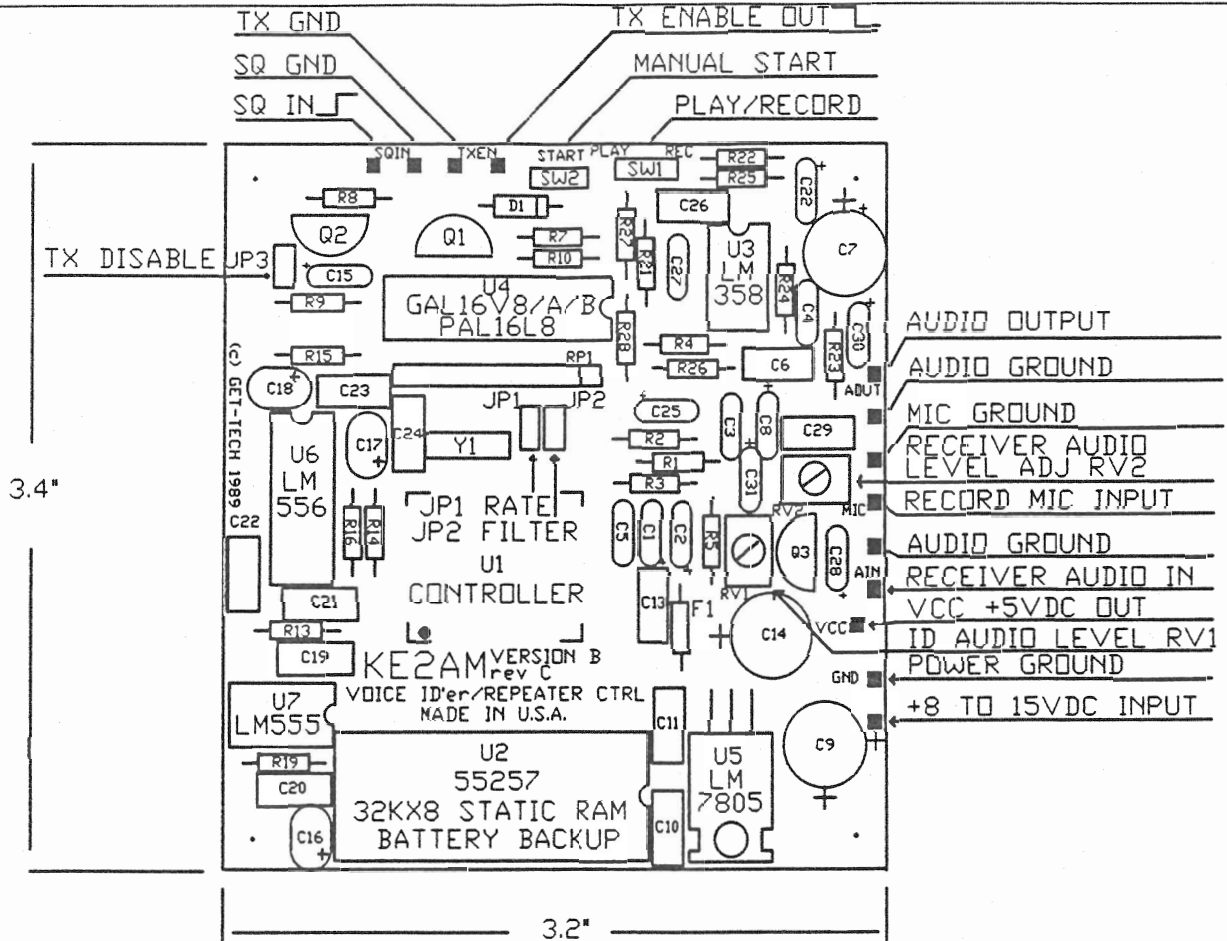
PLACE DIODE HERE



similar to RADIO SHACK 275-248

External relay connection

Figure 6.



DRAWING NOT TO SCALE

Figure 7

KE2AM's

DIGITAL VOICE ID'er / REPEATER CONTROLLER

SYSTEM BLOCK DIAGRAM

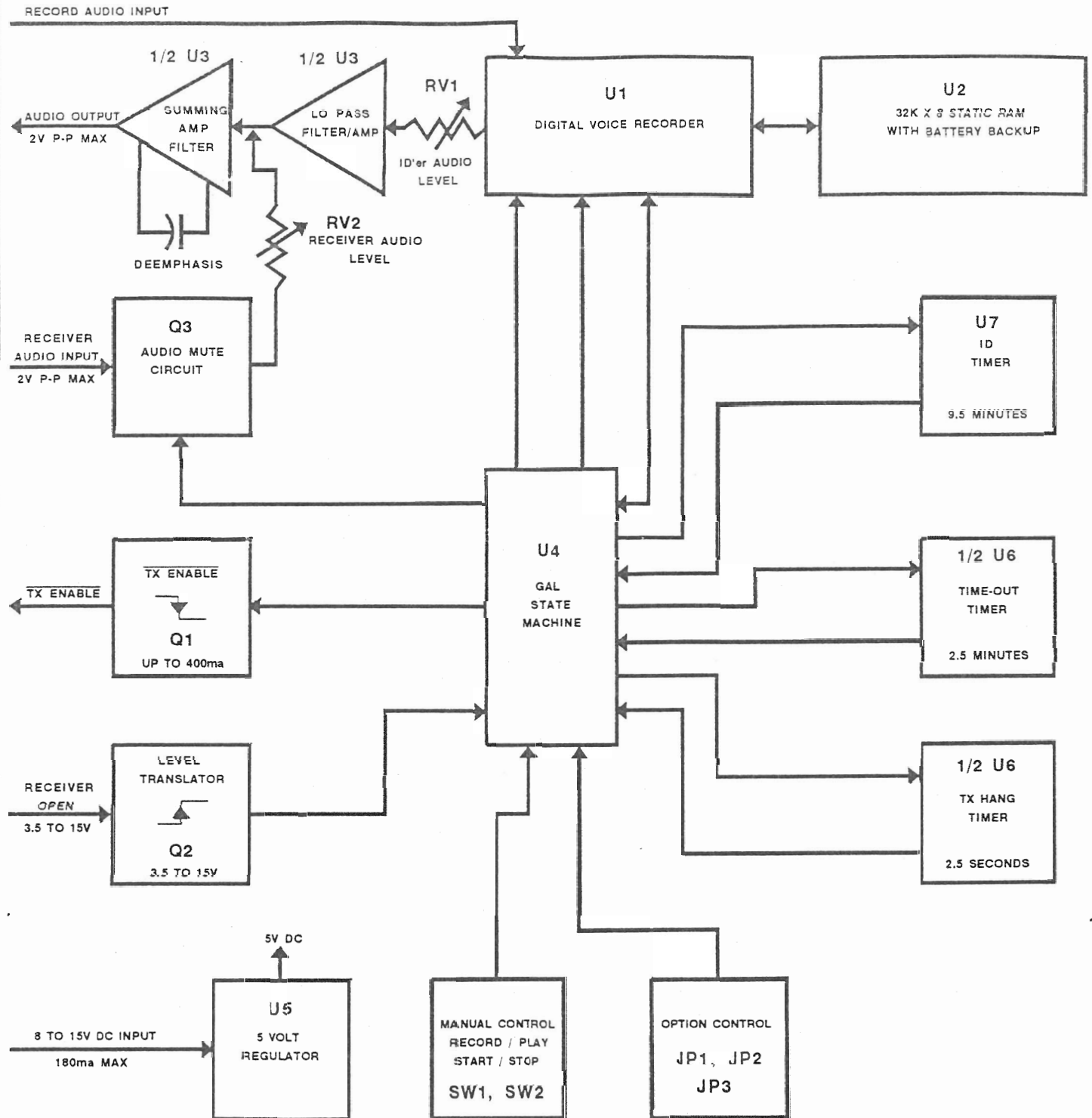
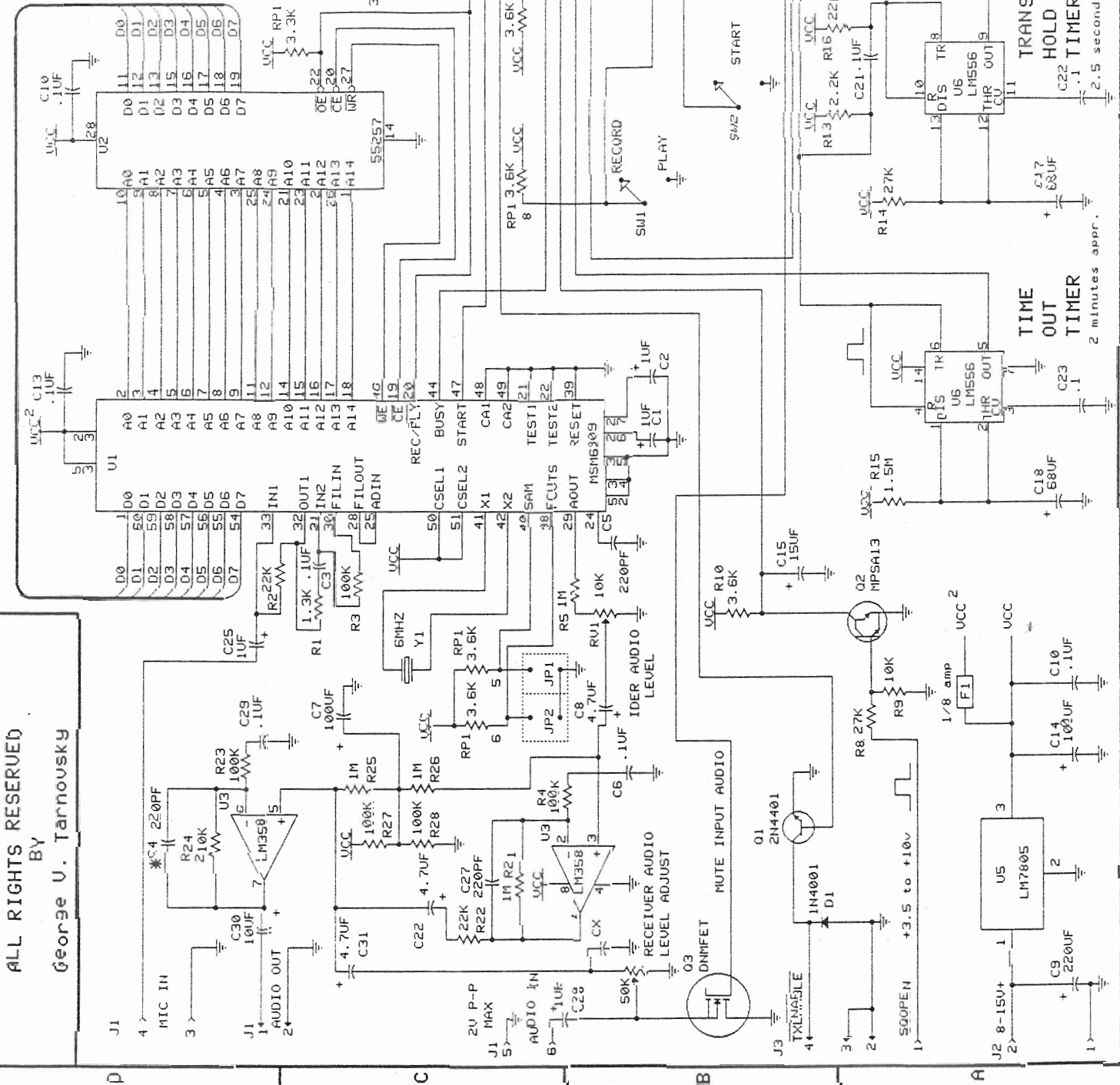


Figure 8

ALL RIGHTS RESERVED
By
George U. Tarnovsky



OPTION / JUMPER DESCRIPTION		INSTALLED	FLOWED
JP1	SAMPLE RATE	SLOW	FAS1
JP2	CUTOFF FILTER FREQ	LOW	HIGH
JP3	TRANSMIT DISABLE	ENABLED	DISABLED

ADJUSTMENTS	
RV1	IDER AUDIO OUTPUT LEVEL ADJUST
RV2	RECEIVER AUDIO OUTPUT LEVEL ADJUST

* WHEN USING DESCRIPTOR AUDIO C4 MAY BE RAISED FOR DEEMPHASIS. IF C4 VALUE IS .47UF AND MORE DEEMPHASIS IS REQUIRED ADD CAP C4 TO RV2.

NOTE
IN ORDER TO PROVIDE OUR CUSTOMERS WITH THE MOST CURRENT PRODUCTION UNITS, THERE MAY BE MINOR DISCREPANCIES BETWEEN THE UNIT AND SCHEMATIC.

6ET-TECH

KE2AM IC-ER/CONTROLLER. VER 5

DATE: JUNE 5, 1991 DRW: R8159

REV: 6 JUNE 22, 1992 BY: GEORGE U. TARNOWSKY

1 2 3 4 5 6 7 8

KE2AM Ver B DIGITAL VOICE ID'er / REPEATER CONTROLLER

- Repeater controller
- Contest ID'er
- Message system
- Alarm system
- Customizing available

- RECORD HIGH QUALITY SPEECH, MODULATED CW, OR TONES
- 8 TO 15 VOLT DC OPERATION
- HIGH QUALITY COMPONENTS
FR4 GLASS EPOXY, TRU-HOLE
SOLDER MASK, SILK SCREEN
METAL FILM RESISTORS
TANTALUM CAPS FOR TIMING
- ON-BOARD AUDIO MIXING
- AUDIO LEVEL ADJUSTMENTS
- MADE IN U.S.A.
- SMALL SIZE 3.4" X 3.2"
- BATTERY BACKUP INCLUDED

VOICE IDER:

- HIGH QUALITY DIGITIZED VOICE (any voice stored in battery backup RAM)
- 11 OR 5 Khz SAMPLING RATE
- UP TO 12 SECONDS OF RECORD TIME
- 2V P-P AUDIO OUTPUT (adjustable) 2K TO 20K IMPEDANCE, 1V@ 600 ohm
- ON BOARD RECEIVER AND IDer AUDIO MIXING (muting during TX hang time)

REPEATER CONTROLLER:

- TIME-OUT TIMER 2 MINUTES (user changeable)
- SQUELCH TAIL 2.5 SECONDS (user changeable)
- ID TIMER 9.5 MINUTES (user changeable)
- OPEN COLLECTOR TRANSMIT ENABLE (up to 400Ma)
- SQUELCH OR COR TRIGGERED OPERATION 3.5 TO 12V POSITIVE PULSE
- LITHIUM BATTERY BACKUP HAS 5-YEAR SHELF LIFE (no power applied)
- DISCRIMINATOR OR SQUELCH AUDIO INPUT, PREVISIONS FOR ON BOARD DEEMPHASIS

ASSEMBLED AND TESTED NOT A KIT
PRICE INCLUDES BATTERY BACKUP RAM

In U.S.A. add \$5 for shipping and handling.
COD charges are additional.
Order by phone or mail, CHECK or COD.

SPECIFICATIONS AND PRICE SUBJECT TO CHANGE.

\$119.00

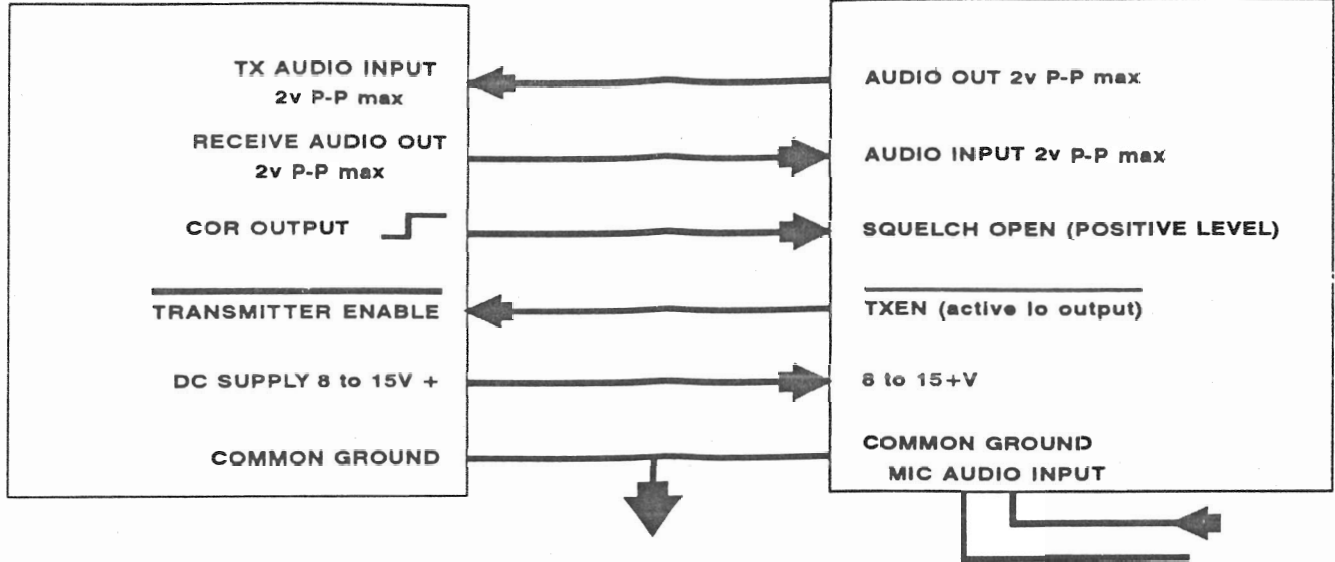
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KE2AM's
DIGITAL VOICE ID'er / REPEATER CONTROLLER
 Repeater controller application
VERSION B

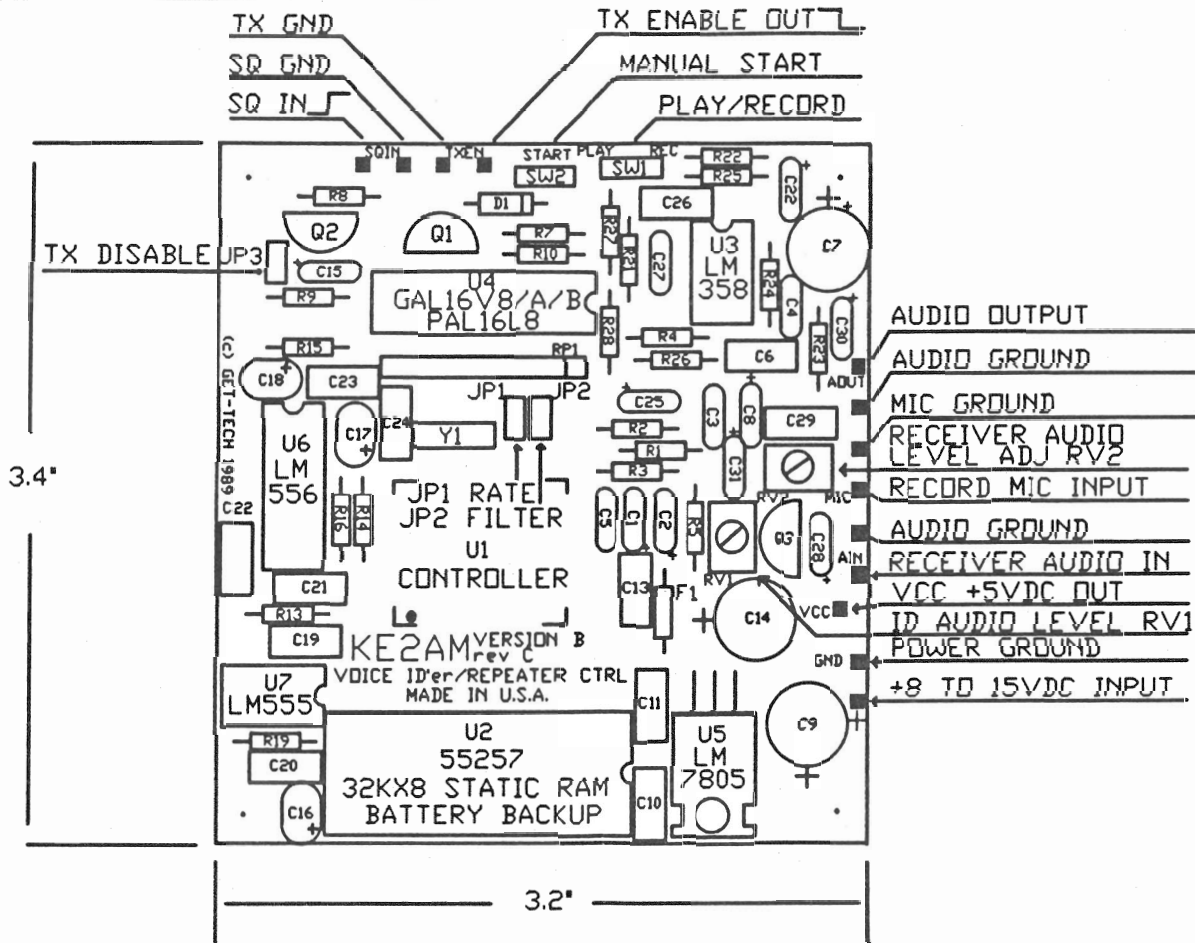
TYPICAL REPEATER

ID'er / CONTROLLER



EXAMPLE OF A TYPICAL REPEATER / ID'er CONNECTION

Figure 4



DRAWING NOT TO SCALE

Figure 5

73 Review

by Bill Brown WB8ELK

The KE2AM Voice ID and Repeater Controller

Control your repeater economically!

Get-Tech
George Tarnovsky KE2AM
201 RD2 Riley Rd.
New Windsor NY 12550
(914) 564-5347
Price Class: \$69, \$85 with
battery-backed socket

How would you like a repeater controller/ID that actually identifies in your own voice? George Tarnovsky KE2AM of Get-Tech has designed just such an animal. His controller provides you with the basic timing signals to put together a very economical repeater system. It even provides you with the capability of identifying in your own voice with the onboard digital voice recorder.

The Voice Recorder/IDER

The KE2AM controller is offered completely assembled for the amazingly low price of \$69. All parts are mounted on a high quality 3.75" x 3.375" circuit board.

The voice record section consists mainly of a surface-mounted control chip, along with a 256K memory IC. A jumper chooses between 6 or 12 seconds of recorded message.

The unit is designed to take low-level audio from a microphone. I just hooked up my remote HT mike to the audio input terminals. To record your message, just flip the record/playback switch and press the momentary contact start button. When using other audio sources, you may want go through a potentiometer to drop the audio down to acceptable levels. The audio will sound clipped if you overdrive the recorder.

Now, just flip back to play, then hit the start button for an instant replay. You can choose two sampling rates via a jumper wire. In the 5 kHz rate, you get 12 seconds of message time, but you will notice some sampling distortion. For higher fidelity, use the 11 kHz rate, but you only get 6 seconds for your message. Even at the higher sampling rate, you'll notice something of a background hiss. Another jumper allows you to select a low-pass filter which eliminates most of this. Although low-level audio is all that is necessary for your repeater transmitter, the controller has an LM-386 audio amplifier which can drive a small speaker loud enough to hear in even the noisiest environments.

With the filter in place and at the higher sampling rate, I found the reproduction to be

of excellent quality. Six seconds may not seem like a lot but it is more than sufficient for a repeater ID.

Repeater Controller

This board is not only a high quality voice recorder, it also supplies all of the timing signals necessary for repeater control. A connection to your receiver's squelch line is all that's needed to activate the transmit controller and timer logic. Your receiver's squelch circuit must be able to supply 3 to 12 volts when activated. In most rigs, it's possible to tap this off of the receive LED. When an open squelch signal is detected, the controller turns on an open collector transistor to key your repeater's transmitter. The transmitter enable signal is also controlled by the status of on-board timers.

Three separate timers, along with associated logic circuitry, comprise the controller section.

The **ID timer** makes sure that your repeater is identified every 7.5 minutes. It won't ID with each transmission. It will reset when first activated and identify with the next transmission after 7.5 minutes has elapsed.

The **time-out timer** keeps conversations from getting too long-winded. After two minutes of continuous transmission, it will drop out the transmitter until reset by the squelch line.

The **squelch tail timer** gives you 2.5 seconds of hang time when the repeater is dropped.

Impressions

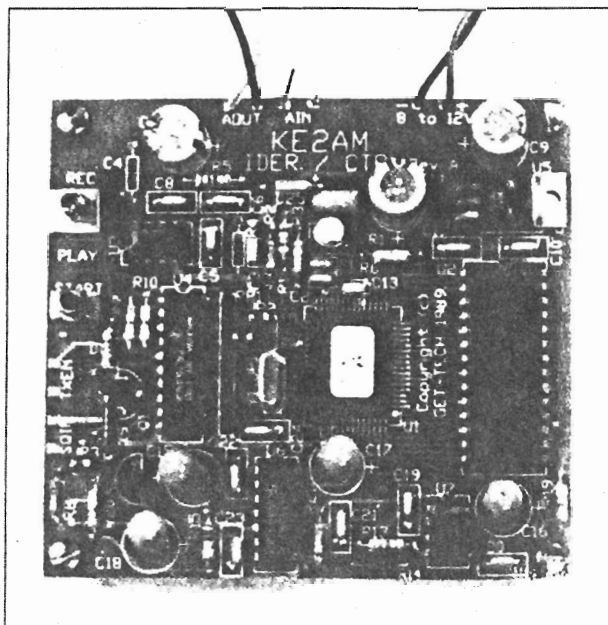
I found the KE2AM controller to be a very convenient way to put together a basic re-

peater quickly and inexpensively. Using two HTs and this controller, I was able to put together a portable crossband repeater with relatively little fuss and bother. It's been great taking this to hamfests or up to mountaintops.

The controller requires 8-15 volts at 118 mA. The current drain may be a little on the high side, but most of it is due to the PAL logic array. The plus side is that the PAL circuit reduces the IC count considerably.

Since the RAM memory is erased when the power drops out, your voice message disappears. This could prove to be a major problem if your repeater site has a power glitch or outage. Fortunately, Get-Tech offers a battery-backed socket option that retains RAM memory when power to the controller is removed.

I highly recommend the KE2AM controller. It's a high quality unit that will leave enough money in your pocket to build the rest of your repeater. **73**

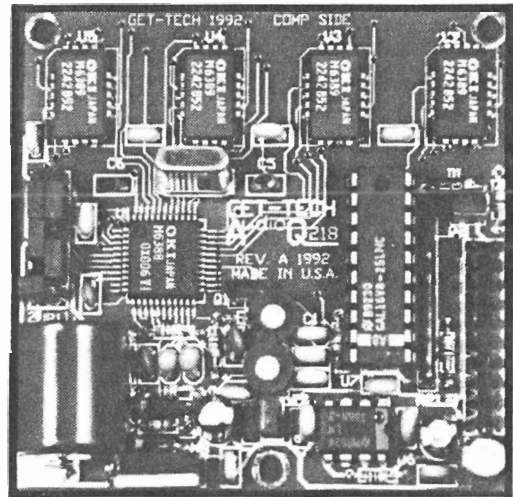


The KE2AM voice recorder and repeater controller.

AudioQ218 DIGITAL VOICE RECORDER/PLAYER

- UP TO 218 SECONDS RECORD TIME**
218 seconds of high-quality speech that you record.
- 1 TO 8 MESSAGES**
As many as 8 different messages may be selected using 8 low-going inputs.
- 4 SAMPLE RATES**
Select from 4 standard sample rates--4.8Khz, 8.5Khz, 9.6Khz, 11Khz. Optional rates to 22Khz available.
- BATTERY BACKUP**
Data is battery backed-up, providing 600 hours of retention using rechargeable NiCad technology.
- 4 MEG OF RAM**
Allow maximum message storage, extended record time, and high sample rates.
- DIRECT SPEAKER OUTPUT**
Speaker output will drive up to 400Mw into 8 Ohm using on-board amplifier.
- LO-LEVEL OUTPUT**
Separately adjustable lo-level output for external amplifier, PA system, or transmitter.
- LOW POWER**
Requires only 50MA during standby; 135MA max depending on output volume.
- TX ENABLE 400MA**
Enable a transmitter or relay during playback.
- WIDE OPERATING RANGE**
8-15 VDC operation.

← 2.6" →



2.6"

- CUSTOMIZING**
For your unique requirements customizing is available.
- HIGH QUALITY**
MADE IN U.S.A. using high-quality components.
- 12-BIT A/D, D/A**
Full 12-bit A/D, D/A conversion for excellent dynamic range and signal-to-noise ratio.
- \$149.00 + S/H**

"Our products *speak*... for themselves"

UNITS ARE FULLY ASSEMBLED AND TESTED. FULL DOCUMENTATION IS INCLUDED. FOR MORE INFORMATION, PRICING, AND AVAILABILITY CALL, WRITE, OR FAX.

GET-TECH

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