The AD-2 Audio Delay Board Kit for the RC-85 and RC-96 Repeater Controllers

Description

The AD-2 audio delay board delays the repeater receiver audio by 75 ms before reaching the repeater (and remote base) transmitter. The delay gives the '85 and '96 audio circuitry an opportunity to *fully mute Touch-Tone* (instead of passing "blips") and to *fully mute squelch tails* less than 75 ms in duration.

The benefit of squelch tail muting is pleasant listening – no crash, chunk, or click is heard at the end of users' transmissions – just the courtesy tone. Touch-Tone blip muting has a variety of benefits, including pleasant listening, improved security, and elimination of sending tone blips through the remote base transmitter which could affect the linked repeater's control system.

The 75 ms delay is long enough to mute squelch tails in most receivers. Those receivers designed for a longer squelch tail may be modified in many cases by reducing a capacitor in the squelch circuit to reduce the tail duration.

Installation of the AD-2 board preserves the outstanding audio characteristics of the '85 and the '96. Although low pass filtering is required on the board because of the sampled data nature of the delay line, flat frequency response is maintained to nearly 6 kHz.

The AD-2 board mounts in an existing IC socket on the '85 or '96 board. For the '85, three additional signals are picked up by soldering wires to points on the bottom of the '85 board. For the '96, these signals are picked up by the J-9 connector. These three wires are connectorized on the AD-2 board for easy removal if necessary.

Installation – '85

The board is supplied with mounting hardware for "board-only" and "rack-mount" '85s. In addition, a Molex connector and wire is supplied for connections to the bottom of the '85 board.

The AD-2 Audio Delay Board Kit

1. Cut the supplied wires to the following lengths. Strip about 1/8" insulation from one end, and about 1/4" insulation from the other end of each wire and tin each end.

   orange – 8.75"   green – 5.5"   red – 9.5"

2. Crimp a Molex pin on one end (the 1/4" stripped end) of each wire.

3. Install the Molex pins in the white connector housing. Be sure that when the Molex connector plugs into the mating connector on the AD-2 board, the wires go to the pin labeled on the board as follows:

   orange – pin 1   green – pin 2   red – pin 3

4. Power down the RC-85 repeater controller, and remove the board from the cabinet. Solder the other end of the wires to points on the bottom of the '85 board as follows:

   orange – U31 pin 5

   green – U14 pin 18

   red – anode of CR1 and CR2 (farthest from the heat sink)

Mount the board back into the cabinet.

5. Remove IC U4 (4053B) from the RC-85 board, and plug it into U5 of the AD-2 board. Be sure to plug it in so that pin 1 is oriented properly.

6. If your repeater receiver's COS signal is *low true*, remove the jumper at JU1.

7. If yours is a "rack mount" '85, plug the 16 pin DIP plug on the bottom of the AD-2 board into a single 16 pin socket as a spacer. (Three 16 pin sockets will be left over.) Unscrew the 4-40 screw at the corner of the board next to the J4 audio connector. Screw in the short standoff extender (see the assembly drawing on the following page). Mount the two short plastic spacers in the holes on the two diagonal corners of the AD-2 board using 4-40 screws. These will serve as supporting feet. Be sure that the socket spacer pins are straight, then carefully plug the AD-2 board into socket U4 on the RC-85 board. Screw a 4-40 screw into the standoff extender.
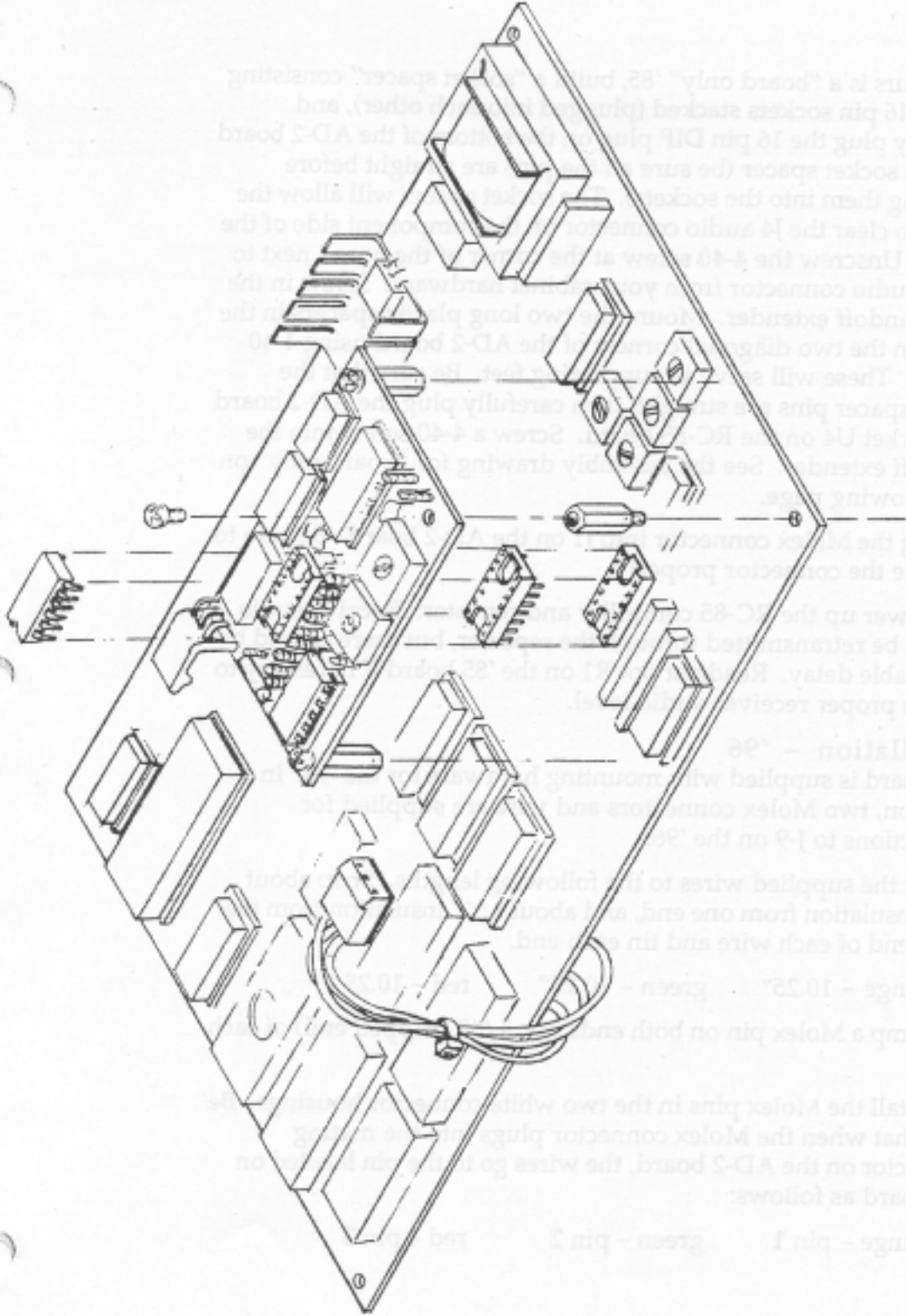
RC-85 Rack Mount

8. If yours is a "board only" '85, build a "socket spacer" consisting of four 16 pin sockets stacked (plugged into each other), and carefully plug the 16 pin DIP plug on the bottom of the AD-2 board into the socket spacer (be sure all the pins are straight before plugging them into the sockets). The socket spacer will allow the board to clear the J4 audio connector on the component side of the board. Unscrew the 4-40 screw at the corner of the board next to the J4 audio connector from your cabinet hardware. Screw in the long standoff extender. Mount the two long plastic spacers in the holes on the two diagonal corners of the AD-2 board using 4-40 screws. These will serve as supporting feet. Be sure that the socket spacer pins are straight, then carefully plug the AD-2 board into socket U4 on the RC-85 board. Screw a 4-40 screw into the standoff extender. See the assembly drawing for "board only" on the following page.

9. Plug the Molex connector into J1 on the AD-2 board. Be sure to polarize the connector properly.

10. Power up the RC-85 controller and repeater. Receive audio should be retransmitted through the repeater, but there should be a noticable delay. Readjust pot R1 on the '85 board if necessary to restore proper receiver audio level.

Installation – '96
The board is supplied with mounting hardware for the '96. In addition, two Molex connectors and wire are supplied for connections to J-9 on the '96.

1. Cut the supplied wires to the following lengths. Strip about 1/8" insulation from one end, and about 1/4" insulation from the other end of each wire and tin each end.

   orange – 10.25"   green – 10.25"   red – 10.25 "

2. Crimp a Molex pin on both ends (the 1/4" stripped end) of each wire.

3. Install the Molex pins in the two white connector housings. Be sure that when the Molex connector plugs into the mating connector on the AD-2 board, the wires go to the pin labeled on the board as follows:

   orange – pin 1   green – pin 2   red – pin 3
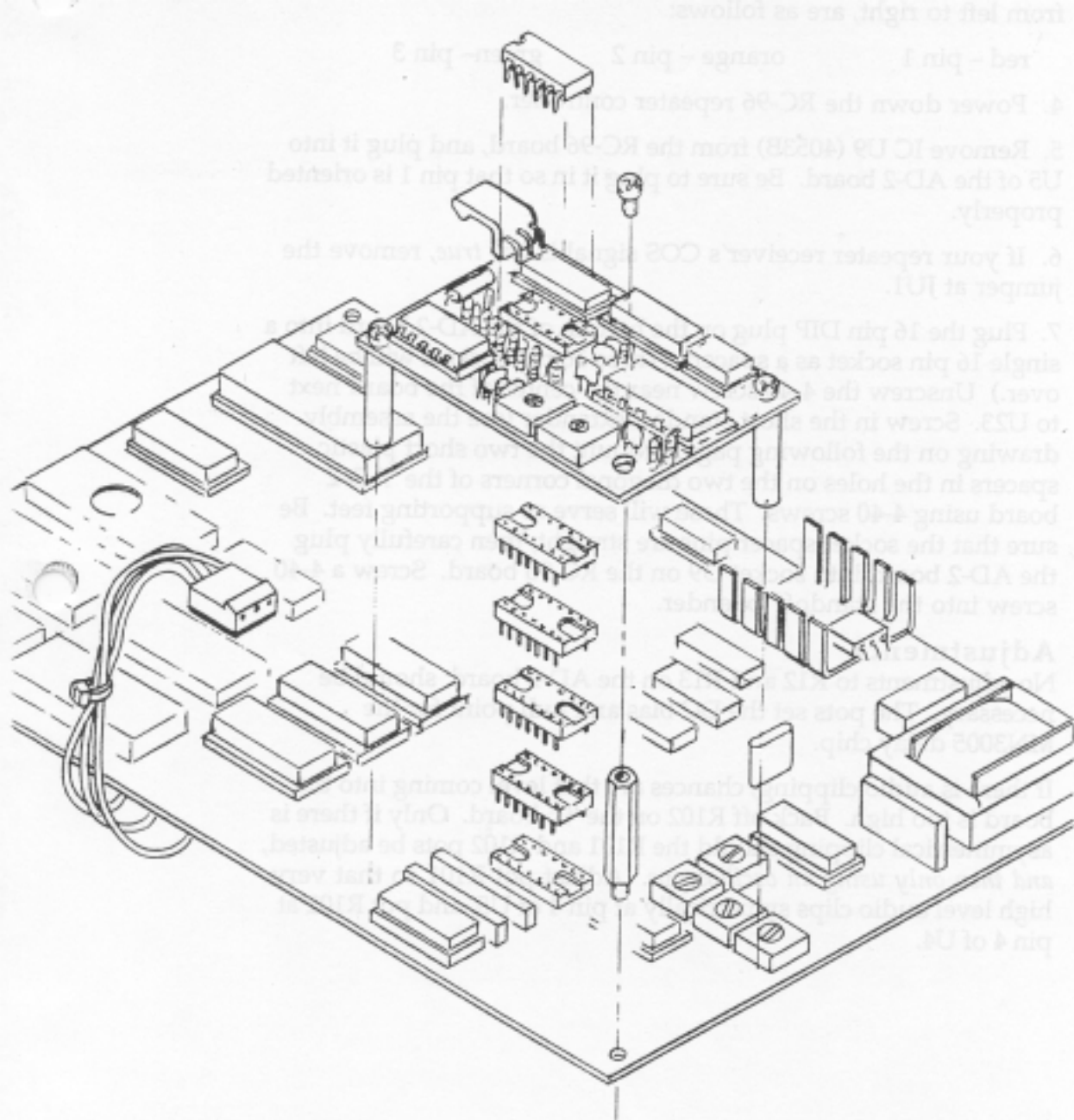
RC-85 Board Only

Be sure that when the Molex connector plugs into J-9, the wires, from left to right, are as follows:
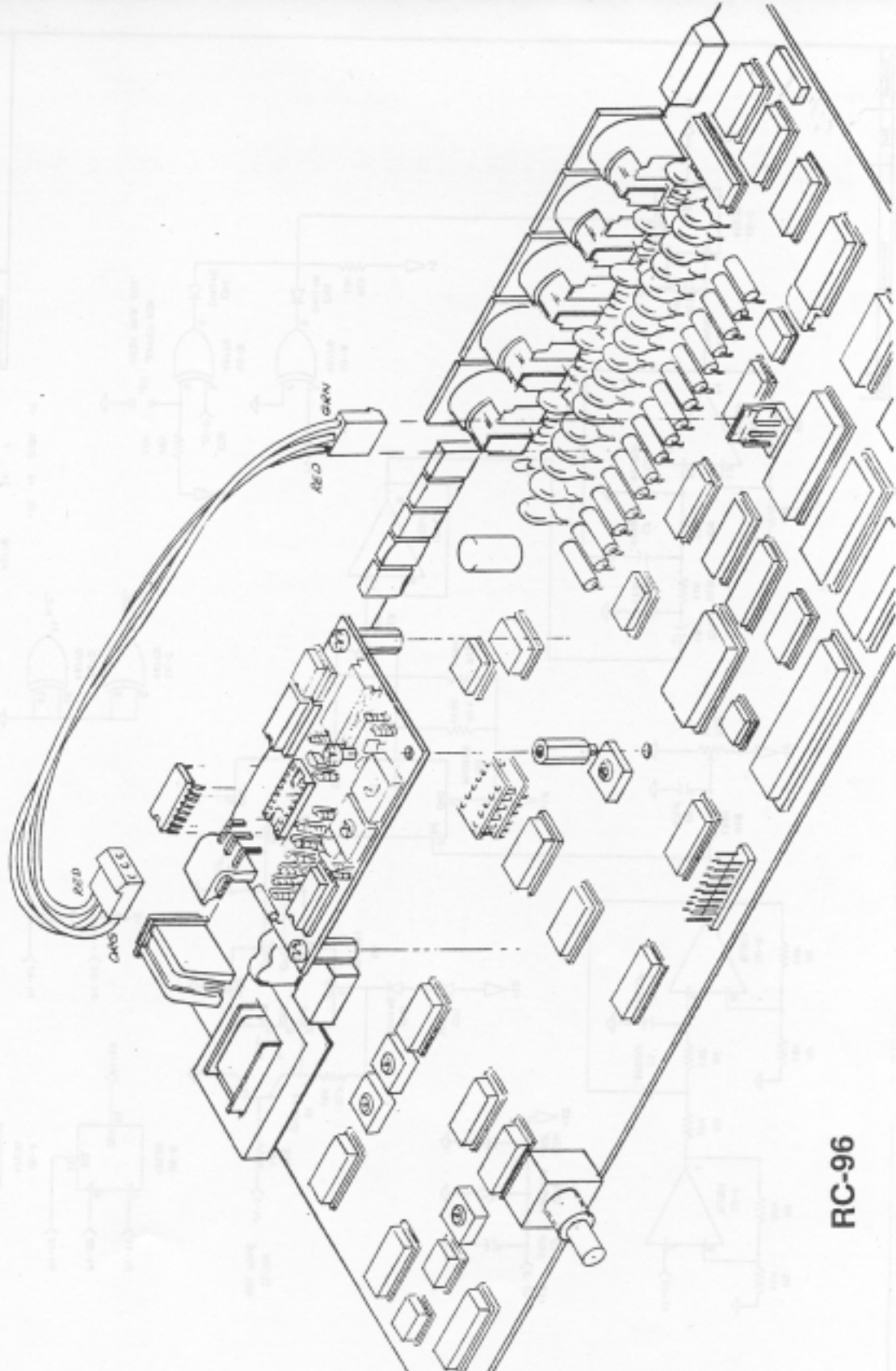
red – pin 1   orange – pin 2   green– pin 3

4. Power down the RC-96 repeater controller.

5. Remove IC U9 (4053B) from the RC-96 board, and plug it into U5 of the AD-2 board. Be sure to plug it in so that pin 1 is oriented properly.

6. If your repeater receiver's COS signal is *low true*, remove the jumper at JU1.

7. Plug the 16 pin DIP plug on the bottom of the AD-2 board into a single 16 pin socket as a spacer. (Three 16 pin sockets will be left over.) Unscrew the 4-40 screw near the center of the board next to U23. Screw in the short standoff extender (see the assembly drawing on the following page). Mount the two short plastic spacers in the holes on the two diagonal corners of the AD-2 board using 4-40 screws. These will serve as supporting feet. Be sure that the socket spacer pins are straight, then carefully plug the AD-2 board into socket U9 on the RC-96 board. Screw a 4-40 screw into the standoff extender.

Adjustments

No adjustments to R12 and R13 on the AD-2 board should be necessary. The pots set the DC bias and null point for the MN3005 delay chip.

If there is audio clipping, chances are that level coming into the board is too high. Back off R102 on the '96 board. Only if there is asymmetrical clipping should the R101 and R102 pots be adjusted, *and then only using an oscilloscope*. Adjust pot R101 so that very high level audio clips symetrically at pin 4 of U5, and pot R102 at pin 4 of U4.

RC-96
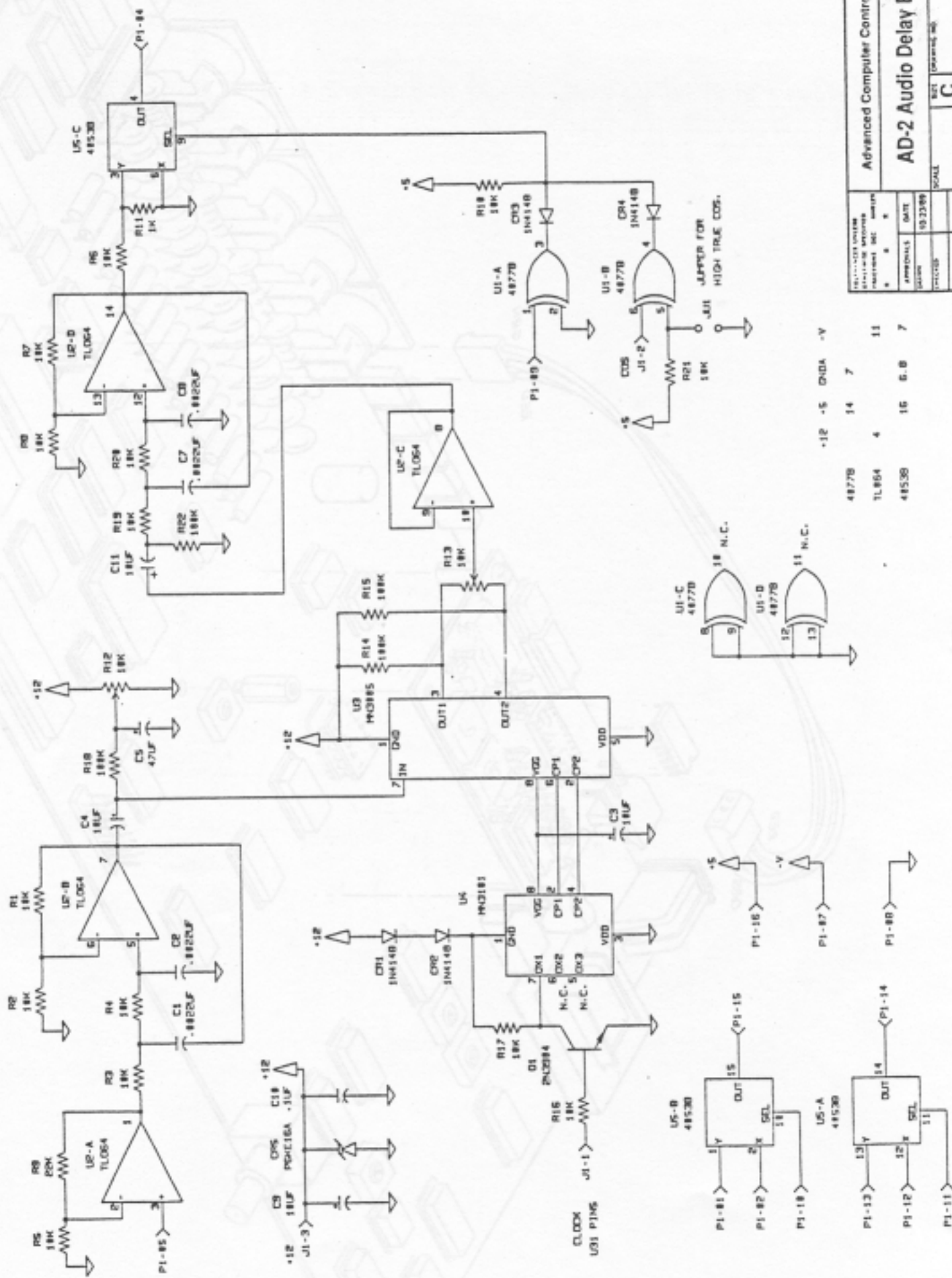
Advanced Computer Controls, Inc.

AD-2 Audio Delay Board

SIZE C | DRAWING NO.

SCALE | DO NOT SCALE | SHEET 1 of 1

DATE 10-23-89

U5-C 4053B
OUT 4
SEL 9
Y 3
X 6

R11 1K
R6 10K

U2-D TL064
14, 13, 12

R7 10K
R8 10K
R20 10K
C8 .0022uF
C7 .0022uF
R19 10K
R22 100K
C11 1uF

U2-C TL064
8, 9, 10

R13 10K
R15 10K
R14 100K

U3 MC3385

U1-A 4077B
1, 2, 3
P1-09

U1-B 4077B
6, 5, 4
CR3 1N4148
CR4 1N4148
R18 10K
R21 10K
JU1
JUMPER FOR HIGH TRUE COS.
J1-2
CR5

U1-C 4077B
8, 9, 10 N.C.
U1-D 4077B
12, 13, 11 N.C.

	+12	+5	GNDA	-V
4077B	14		7	
TL064	4			11
4053B	16	6,8		7

R12 10K
+12
R10 100K
C5 47uF
C4 10uF

U2-B TL064
7, 6, 5
R1 10K
R2 10K
R4 10K
R3 10K
C2 .0022uF
C1 .0022uF

U2-A TL064
1, 2, 3
R9 20K
R5 10K
P1-05

U4 MC3101
GND 1
VGG 8
CP1 6
CP2 2
VDD 3
OUT1 3, OUT2 4
VDD 5
CX1 7, CX2 6, CX3 5 N.C. N.C.

CR1 1N4148
CR2 1N4148
R17 10K
Q1 2N3904
R16 10K
J1-1
CLOCK U3A PINS

C3 10uF
+5
-V
P1-06
P1-07
P1-08

C10 .1uF +12
CR6 PSHC16A
C9 10uF
+12
J1-3

U5-B 4053B
OUT 1
SEL 10
Y, X
P1-01
P1-02
P1-10
P1-15

U5-A 4053B
OUT 13
SEL 11
Y, X
P1-13
P1-12
P1-11
P1-14