Figure 1

L1 · K1 · J1 · H1 · F1 · E1 · D1 · C1 · B1

J2 · K3 · J3 · J4 · H4 · F/H2 · E2 · C/D2 · D3 · D4 · D5 · C3

AUXILIARY PCB

GND
CLOCK
START
STOP

#1 CC34

○ GND
○ M START
○ STOP
○
○ J
○
○ SACLK 3
○ SACLK 3
○ SACLK 3
○ SAEN 1
○ SAEN 2,3

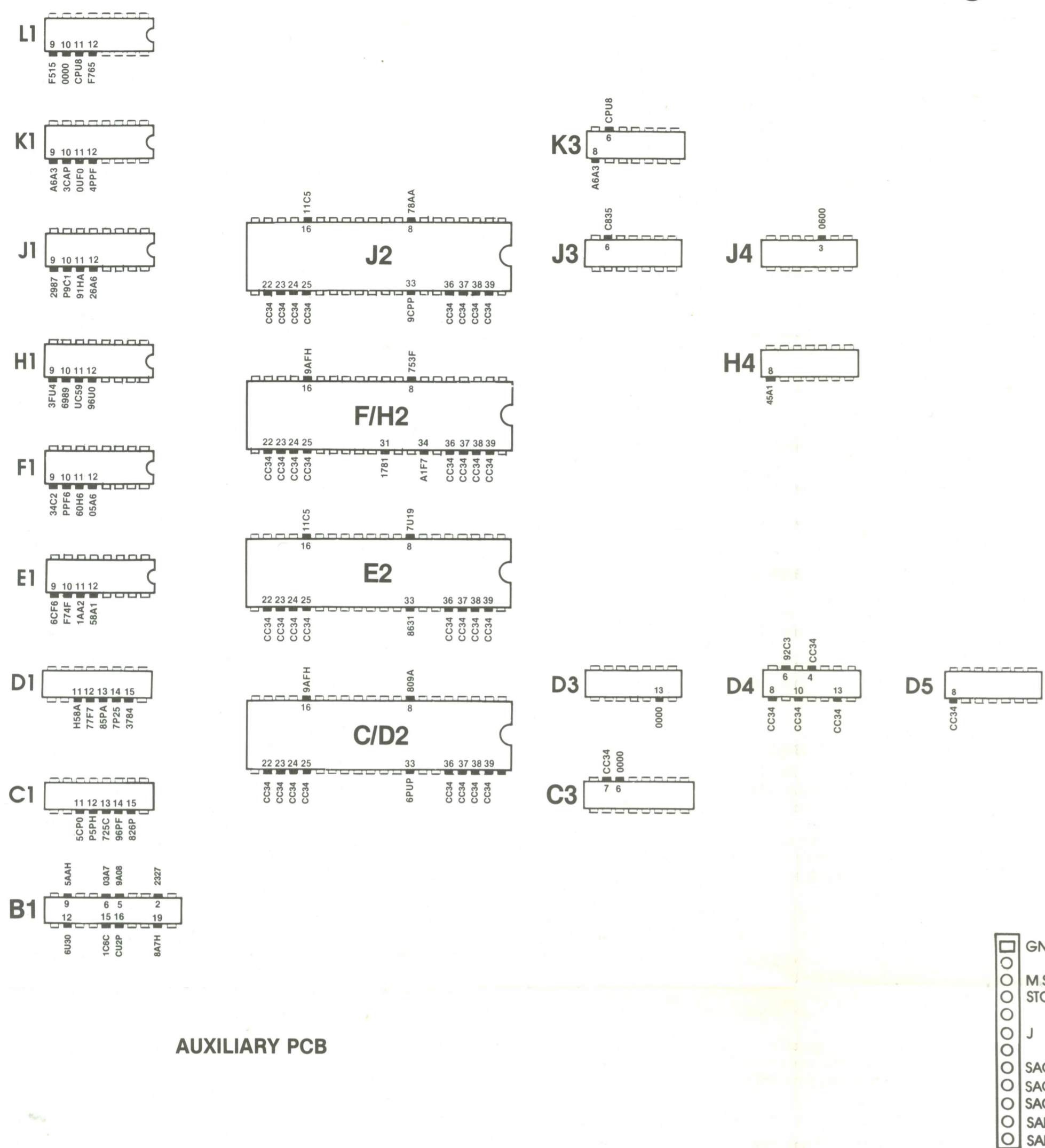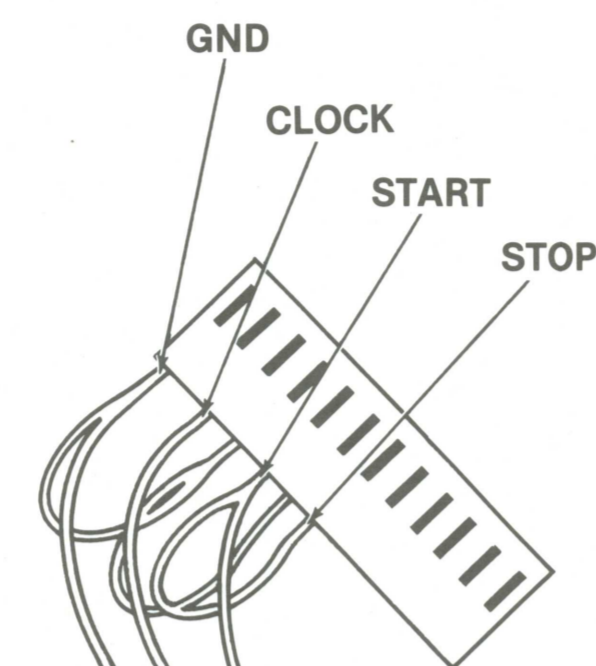## The Auxiliary PCB Math Box Circuitry

The Math Box Circuitry of the Red Baron™ Auxiliary PCB is connected to the Analog Vector-Generator PCB via the PCB harness interconnector. The Math Box Circuitry receives addresses EAB0 thru EAB4 (external address bus 0 thru 4), processes and sends the data back to the Analog Vector-Generator PCB for the three-dimensional video of the Red Baron™ game.

A second connector on the Auxiliary PCB connects the control signals of the signature analyzer (SA). This header accepts a special harness connector that makes signature analysis extremely easy.
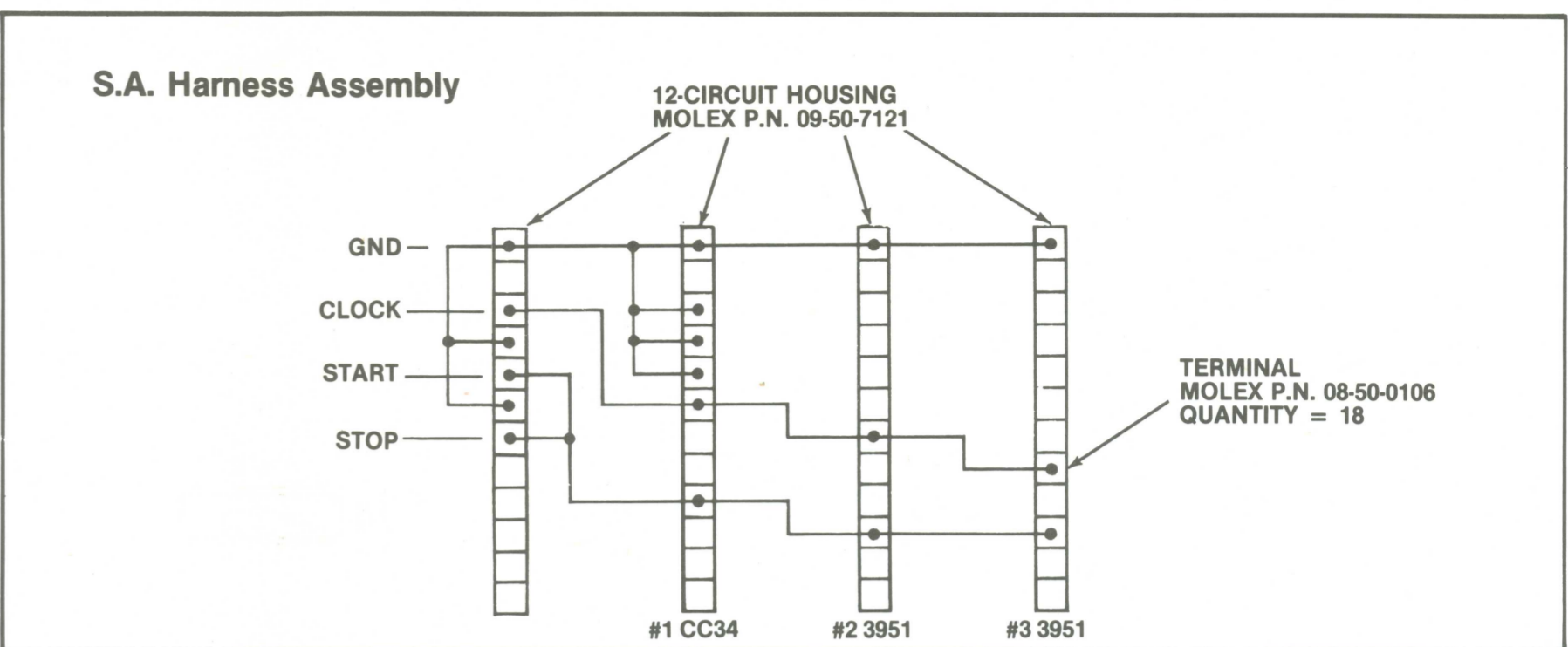
Signature Analysis of the Math Box Circuitry

During the self-test procedure, the Math Box Circuitry is quizzed. **T** displayed in the upper right-hand corner of the self-test video display indicates that the Math Box Circuitry does not answer the question in the amount of time expected. Therefore, a **T** indicates a Math Box Circuitry failure.

Due to the complexity of this circuitry, we offer signature analysis as a simple means of isolating failing circuits. Signatures for this circuitry are presented in two forms:

1) at the actual test points in the Auxiliary PCB Math Box Circuitry schematic diagram (on Sheet 3, Side B), and
2) for your convenience, on the detail drawing of the Auxiliary PCB to the left of this text.

Since the Analog Vector-Generator PCB must be connected to the Auxiliary PCB, you may take signatures while the PCBs are installed in the game.

The following is the procedure for signature analysis of the Math Box Circuitry of the Auxiliary PCB:

—— NOTE ——
Of two Kurz-Kasch Signature IIs we tried, different STOP, START and CLOCK settings were required. If you are using a Kurz-Kasch signature analyzer, make note of your settings of these switches while testing a known good board.

A. Equipment Required:

1. Signature Analyzer (one of the following):

Atari CAT BOX™ Computer-Assisted Troubleshooter. This is a signature analyzer and a ROM/RAM tester combined. For more information contact Atari, Inc., Field Service/Coin-Op Division, P.O. Box 427, Sunnyvale, CA 94086.

OR

Kurz-Kasch Signature II signature analyzer. For more information contact Kurz-Kasch, 711 Hunter Drive, Wilmington, Ohio 45117.

OR

Hewlett-Packard Model 5004A signature analyzer. For more information contact Hewlett-Packard, Scientific Instruments Div., 1501 Page Mill Road, Palo Alto, CA 94304.

For local dealers, check the Yellow Pages under "Electronic Equipment and Supplies."

2. SA Harness Assembly:

Atari part number A036836-01. You can make one of these yourself. The following is an illustration of its construction.

3. Two jumper wires with "hook" connectors on each end.

B. Signature Analysis Setup Procedure

1. Connect Signature Analyzer to the matching pins of SA connector on the SA Harness assembly. In other words, GND should match up with GND, etc.

2. Set Self-Test Switch of Red Baron™ game to ON. After approximately three seconds, the TV monitor should display the self-test pattern.

C. Signature Analysis Test #1 Procedure

1. Plug SA Harness Assembly Test #1 connector onto Signal Analyzer header on Auxiliary PCB (the black wire on the connector should be at the top).

2. Connect a jumper between PWR ON RESET test point and ground. This places a continuous RESET to the microprocessor on the Analog Vector-Generator PCB.

3. Set Signature Analyzer START to _/‾, STOP to _/‾, and CLOCK to _/‾.

4. Connect a jumper wire between the PU test point on the Auxiliary PCB and the tip of the Signature Analyzer probe.
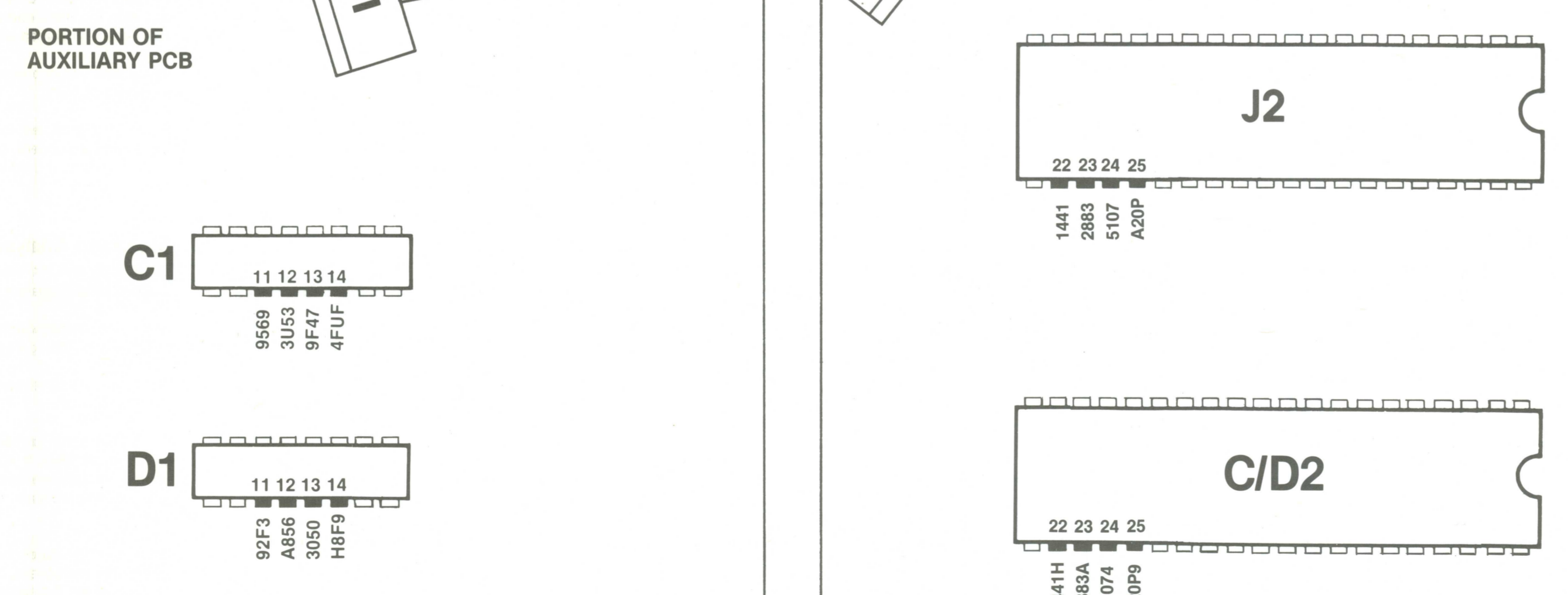
5. The Signature Analyzer should indicate **CC34**.

6. Probe for signatures as shown in Figure 1 to the left. If all signatures are correct, continue with *D. Signature Analysis Test #2A Procedure.* If not **CC34**, refer to *G. Isolating a Failing Circuit.*

D. Signature Analysis Test #2A Procedure

1. Remove the jumper wire from Signature Analyzer probe.

2. Plug SA Harness Assembly Test #2 connector onto Signature Analyzer header on Auxiliary PCB.

3. Remove jumper from PWR ON RESET on the Analog Vector-Generator PCB.

4. Set Signature Analyzer START to _/‾, STOP to ‾_, and CLOCK to _/‾.

5. Connect one end of the jumper wire to the ground test point on the Analog Vector-Generator PCB. Touch the DIAG 'STEP' test pad with the other end of the jumper wire five times. After the fifth time, the screen will be blank.

6. Verify that setup procedure is correct by probing +5V for a signature of **3951**.

7. Probe for signatures as shown in Figure #2A to the left. If all signatures are correct, continue with *E. Signature Analysis Test #2B Procedure.* If a signature is incorrect, refer to *G. Isolating a Failing Circuit.*

E. Signature Analysis Test #2B Procedure

1. Make sure the SA Harness Assembly Test #2 connector is plugged onto Signature Analyzer header on Auxiliary PCB.

2. Make sure jumper wire is removed from the PWR ON RESET test point on the Analog Vector-Generator PCB.

3. Set Signature Analyzer START to _/‾, STOP to ‾_, and CLOCK to ‾_.

4. Verify that setup procedure was correct by probing +5V for a signature of **3951**. If not **3951**, press the reset button the the Analog Vector-Generator PCB, return to *D. Signature Analysis Test 2A Procedure* and once again do step 5. Then return to this step.

5. Probe for signatures as shown in Figure #2B to the left. If all signatures are correct, continue with *F. Signature Analysis Test #3 Procedure.* If a signature is incorrect, refer to *G. Isolating a Failing Circuit.*

F. Signature Analysis Test #3 Procedure

1. Plug SA Harness Assembly Test #3 connector onto Signature Analyzer header on Auxiliary PCB.

2. Make sure jumper wire is removed from the PWR ON RESET on the Analog Vector-Generator PCB.

3. Set Signature Analyzer START to _/‾, STOP to ‾_, and CLOCK to _/‾.

4. Verify that setup procedure was correct by probing +5V for **3951**. If not **3951**, press the reset button on the Analog Vector-Generator PCB, return to *D. Signature Analysis Test 2A Procedure* and once again do step 5. Then return to this step.

5. Probe for signatures as shown in Figure #3 to the left. If all signatures are correct, then Math Box Circuitry of Analog Vector-Generator PCB is OK.
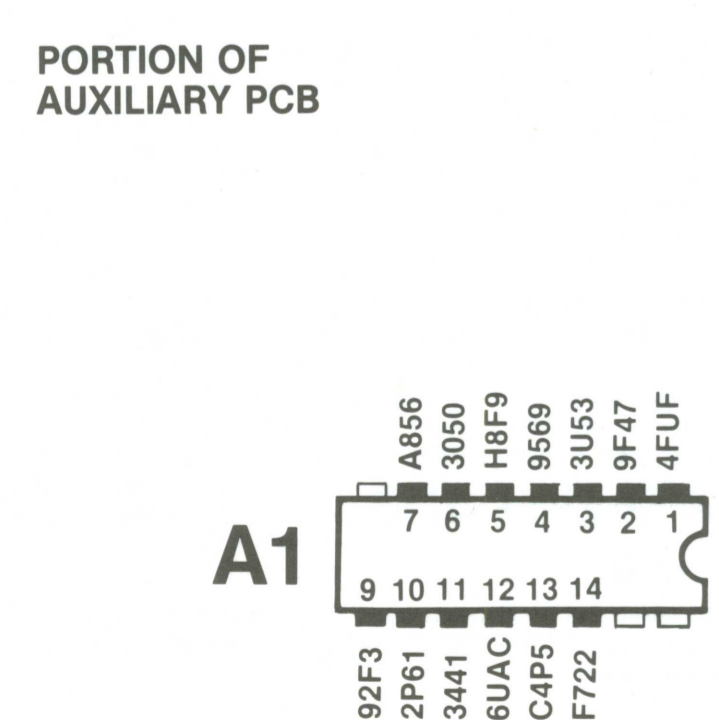
G. Isolating a Failing Circuit

If one of the 137004-001 chips C/D2, E2, F/H2, or J2 has a bad signature, there is a chance it will cause the other 137004-001 chips to have bad signatures also. If this is the case, make sure all input signatures (A0-A19, EDB0-EDB7 and CLK) are correct. If they are correct, replace the 137004-001 chips. If replacing the 137004-001 chips doesn't fix the problem, check for shorted or open traces in the area of the 137004-001 circuitry.

If you find an incorrect signature, find the signature test point of the Math Box Circuitry on Sheet 3, Side B. Locate the IC from which the signature is being output. Check all inputs of that IC.

If all input signatures are correct: Remove the Auxiliary PCB from the circuit. Check the circuit traces common to the failing IC pin on both the top and bottom of the PCB for shorts to another circuit trace. If the circuit traces are not shorted, then replace the failing IC.

If an input signature is incorrect: Locate on the schematic the IC source of the failing signature. Check the input signatures of that IC. If all input signatures are correct, then that is the failing IC. If this IC has a failing input signature, then continue "upstream" in the circuit flow until the failing IC is isolated.

S.A. Harness Assembly

12-CIRCUIT HOUSING
MOLEX P.N. 09-50-7121

GND
CLOCK
START
STOP

TERMINAL
MOLEX P.N. 08-50-0106
QUANTITY = 18

#1 CC34 · #2 3951 · #3 3951

Figure 3

PORTION OF AUXILIARY PCB

#2 3951

#3 3951

J2
22 23 24 25
1441 2883 5107 A20P

C/D2
22 23 24 25
441H 883A 1074 20P9

Figure 2A

PORTION OF AUXILIARY PCB

A1
9 10 11 12 13 14
92F3 2P61 3441 6UAC C4P5 F722
7 6 5 4 3 2 1
A856 3050 H8F9 9569 3U53 9F47 4FUF

Figure 2B

PORTION OF AUXILIARY PCB

C1
11 12 13 14
9569 3U53 9F47 4FUF

D1
11 12 13 14
92F3 A856 3050 6J8H

Ⓐ A Warner Communications Company