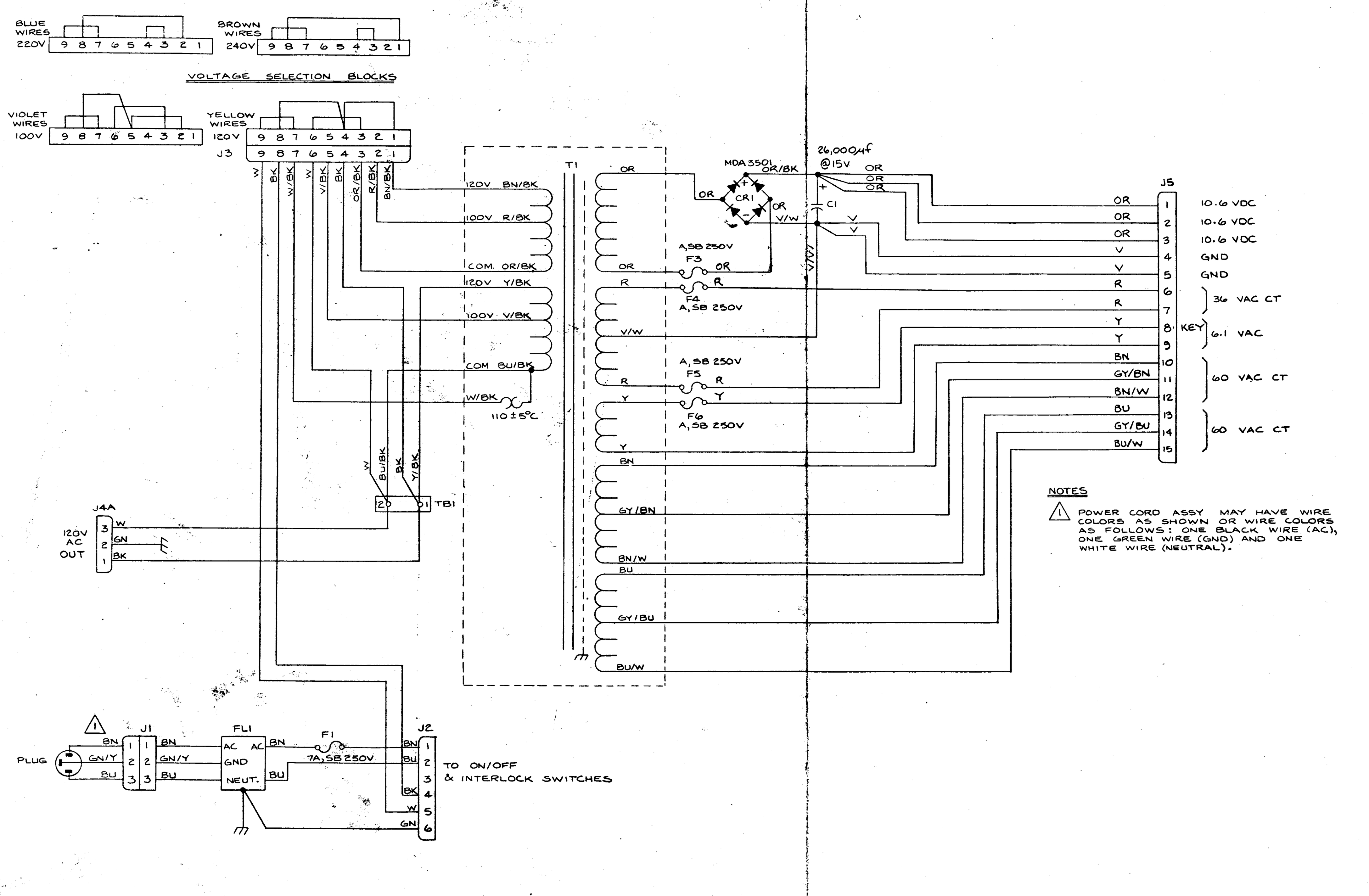
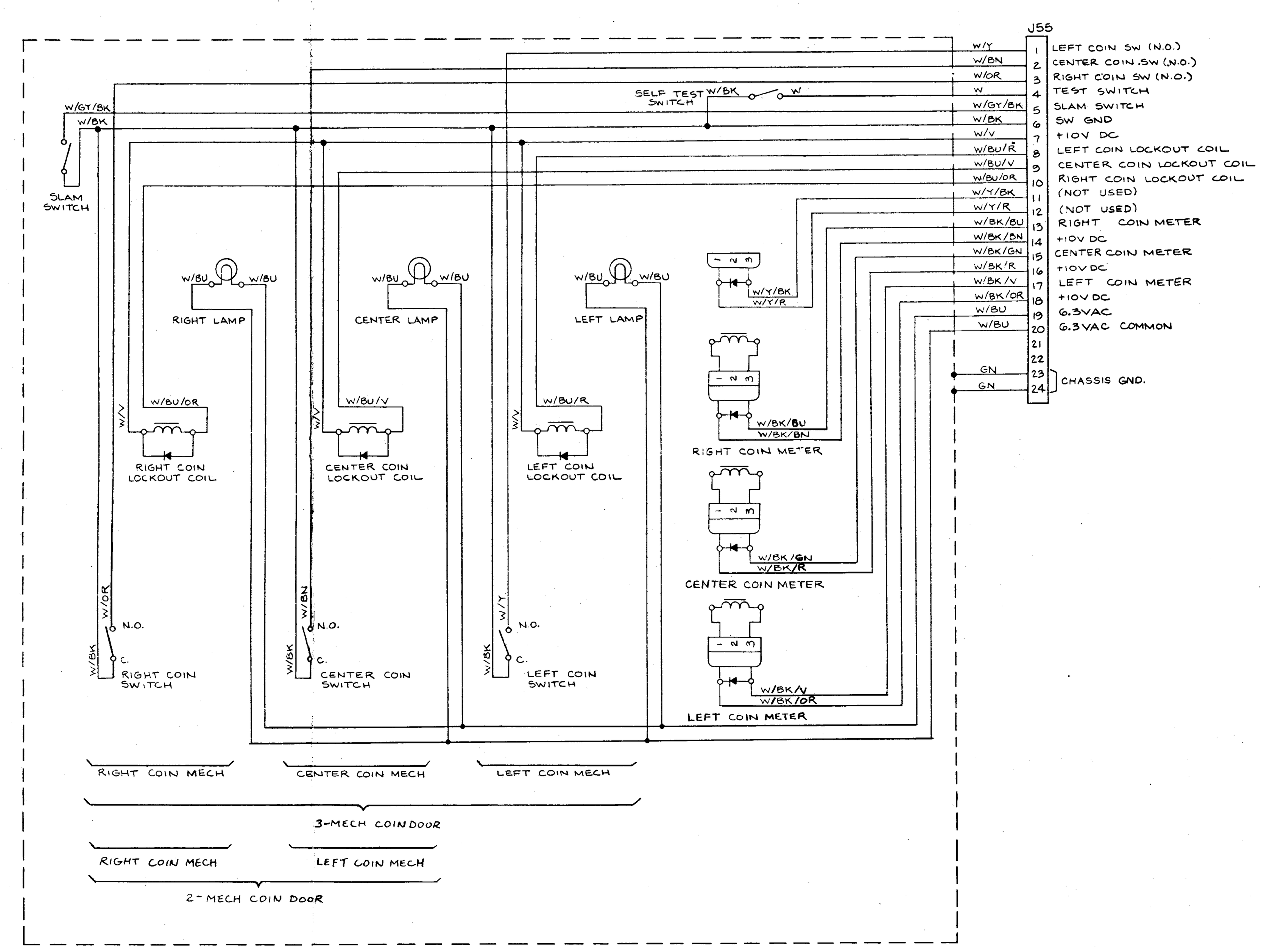
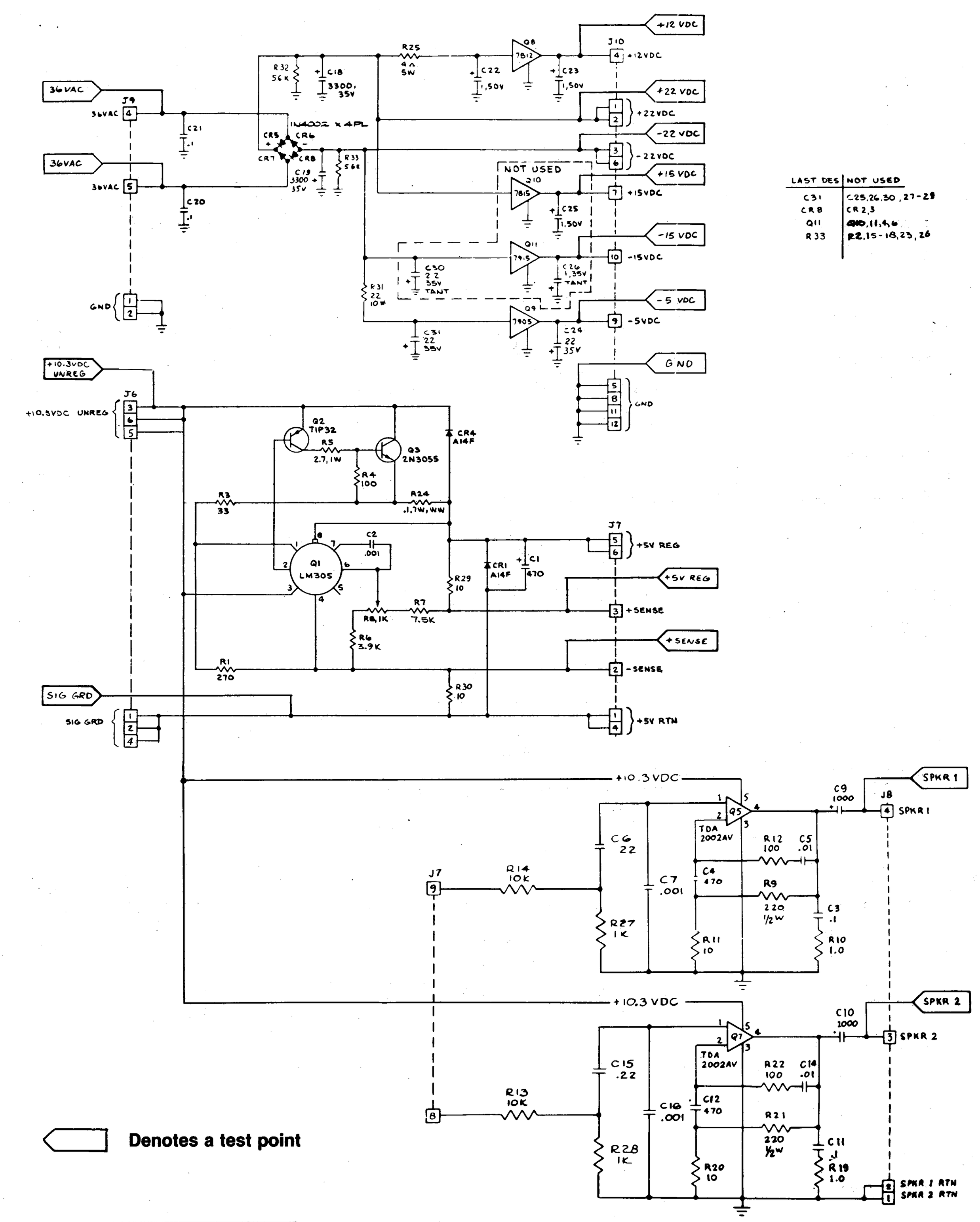
International Power Supply Schematic (035887-01 A)



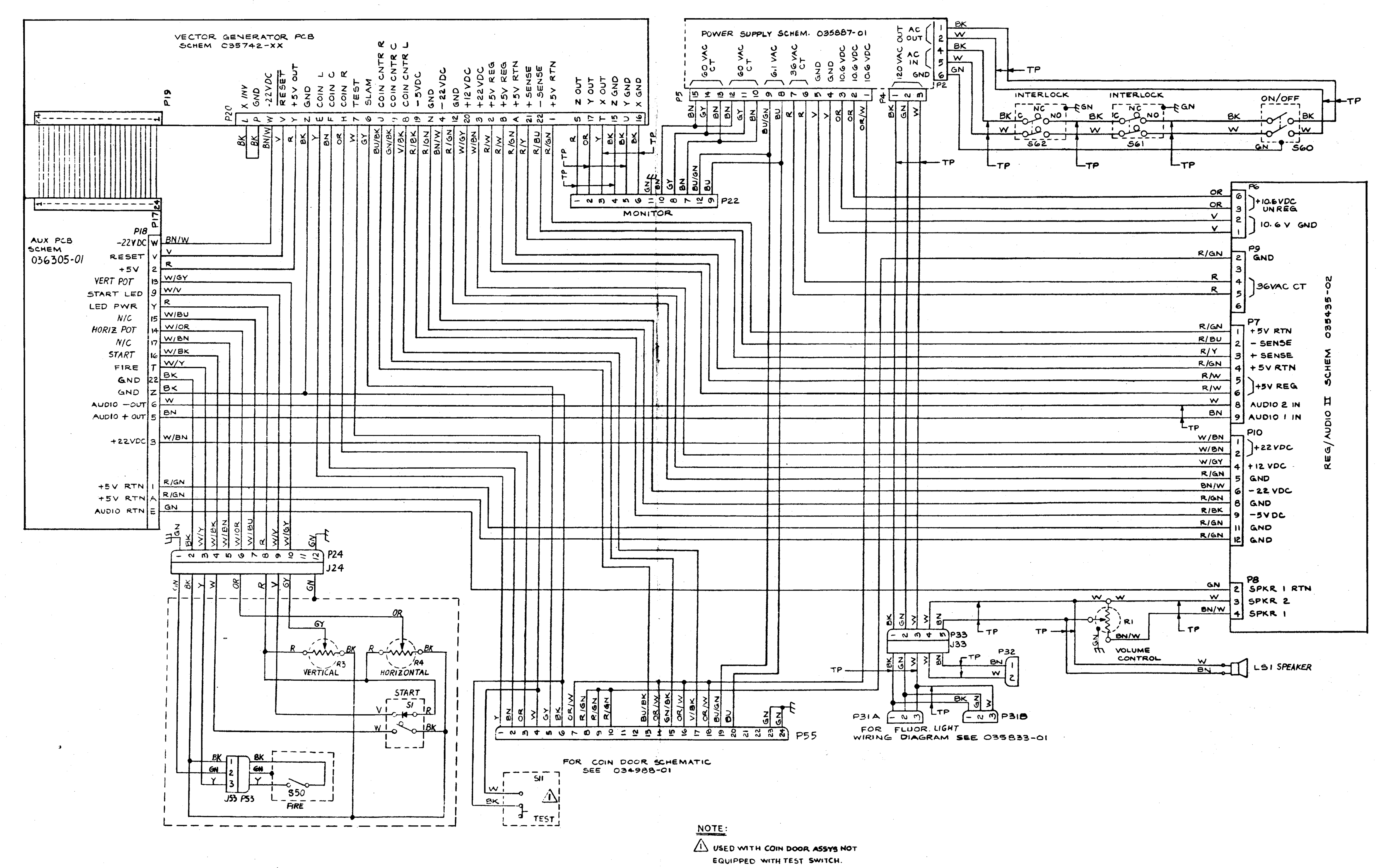
Coin Door Wiring Diagram (034988-01 A)



Regulator Audio II PCB Schematic (035435-02 C)



Red Baron™ Wiring Diagram (036991-01 A)



ATARI®

Drawing Package Supplement
to
RED BARON™
Operation, Maintenance and Service Manual

Contents of this Drawing Package

A Warner Communications Company

Sheet 1, Side A
DP-169-01 1st printing
Red Baron

Regulator/Audio II PCB

The Regulator/Audio II PCB has the dual functions of regulating the +5 VDC logic power to the game PCB and amplifying the audio from the game PCB.

Regulator Circuit

The regulator consists of voltage regulator Q1, power pass transistor Q3 and Q3's driver transistor Q2. The regulator accurately regulates the logic power input to the game PCB by monitoring the voltage through high-impedance inputs +SENSE and −SENSE. The inputs are directly from the +5 VDC and ground inputs to the game PCB. Therefore, the regulator regulates the voltage on the game PCB. This eliminates a reduced voltage due to IR loss in the wire harness between the regulator and the game PCB. Variable resistor R8 is adjusted for the +5 VDC on the game PCB. Once adjusted, the voltage at the input of the game PCB will remain constant at this voltage.

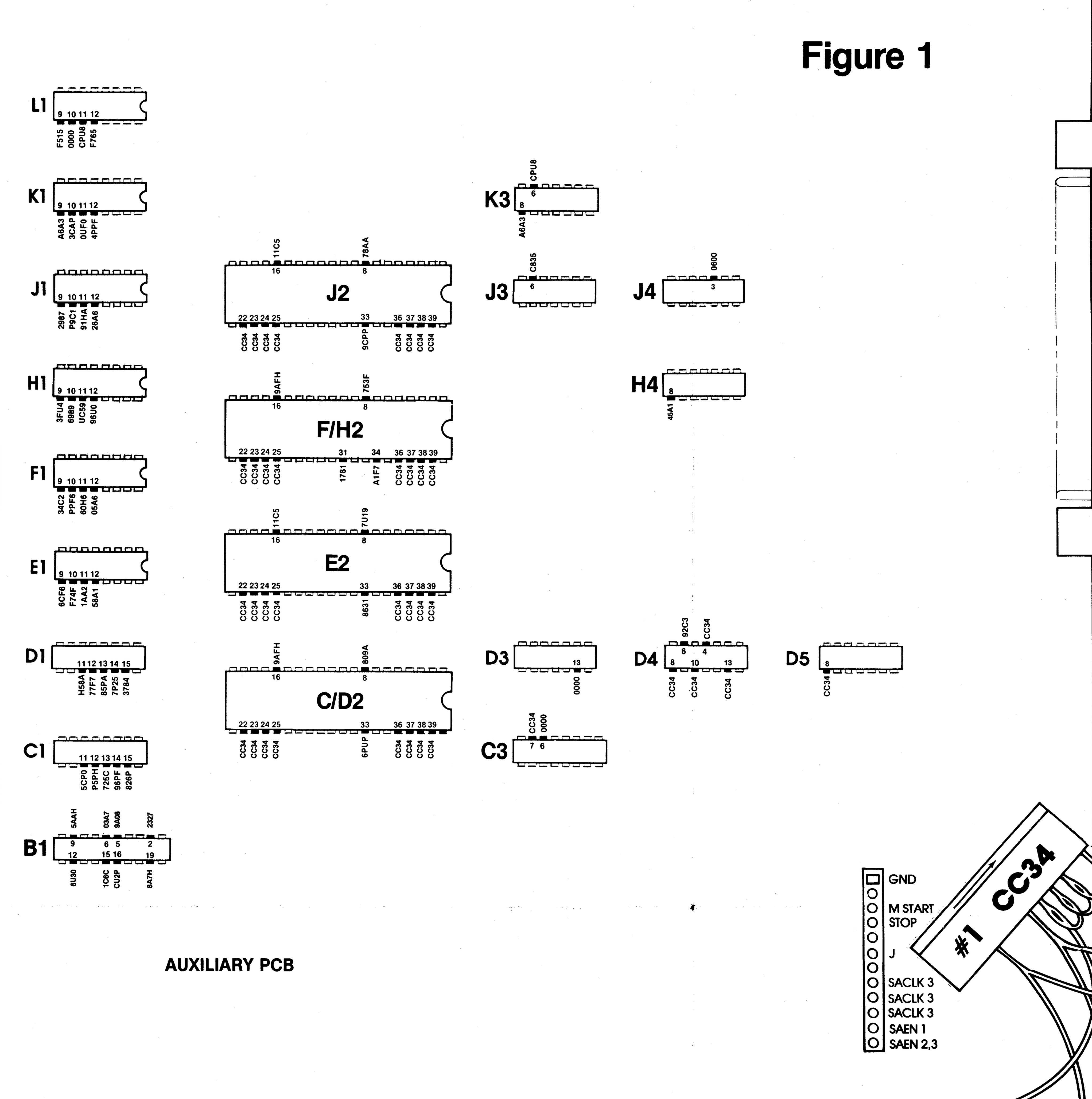
Regulator Adjustment

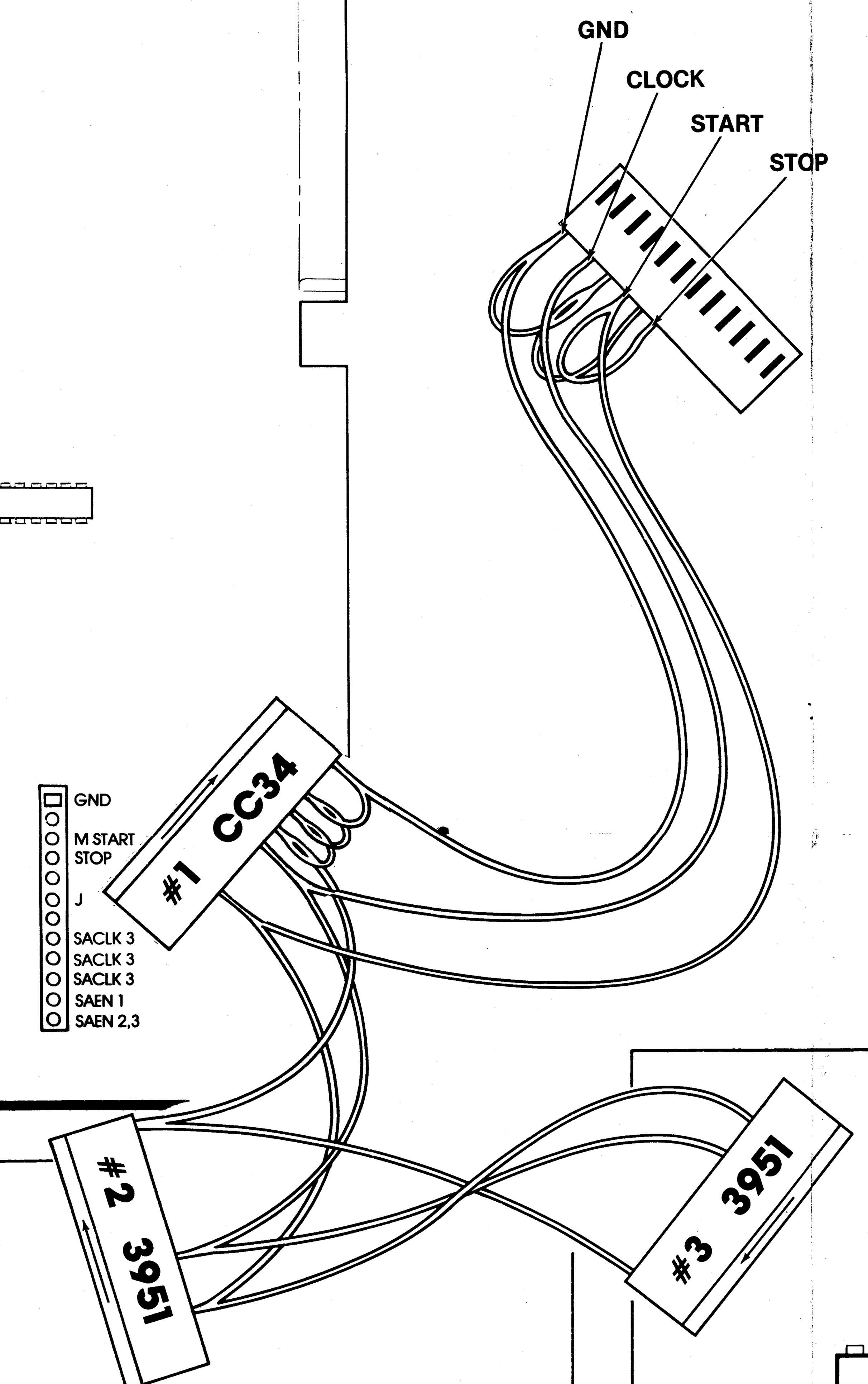
1. Connect a voltmeter between +5 V and GND test points of the game PCB.
2. Adjust variable resistor R8 on the Regulator/Audio II PCB for +5 VDC reading on the voltmeter.
3. Connect a voltmeter between +5 V REG and GND on the Regulator/Audio II PCB. Voltage reading must not be greater than +5.5 VDC. If greater, try cleaning edge connectors on both the game PCB and the Regulator/Audio II PCB.
4. If cleaning PCB edge connectors doesn't decrease voltage difference, connect minus lead of voltmeter to GND test point of Regulator/Audio II PCB and plus lead to GND test point of game PCB. Note the voltage.
   Now connect minus lead of voltmeter to +5 REG test point on Regulator/Audio II PCB and plus lead to +5 V test point on game PCB. From this you can see which harness circuit is dropping the voltage. Troubleshoot the appropriate harness wire or harness connector.

Audio Circuit

The audio circuit contains two independent audio amplifiers. Each amplifier consists of a TDA2002AV amplifier with an effective gain of 2.2.

Figure 1





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

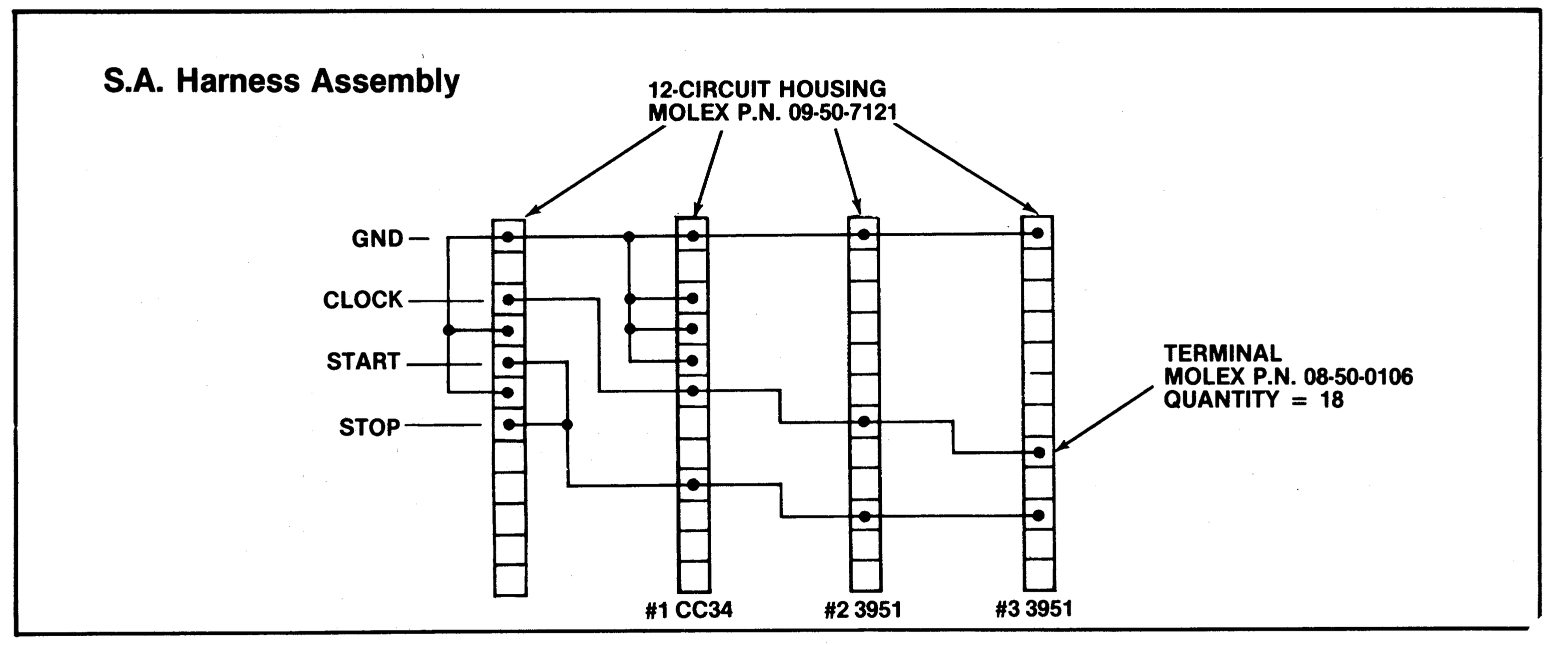
   Kurz-Kasch Signature II signature analyzer. For more information contact Kurz-Kasch, 711 Hunter Drive, Wilmington, Ohio 45117.

   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."

S.A. Harness Assembly



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 incorrect, 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 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.

Figure 2A

PORTION OF AUXILIARY PCB

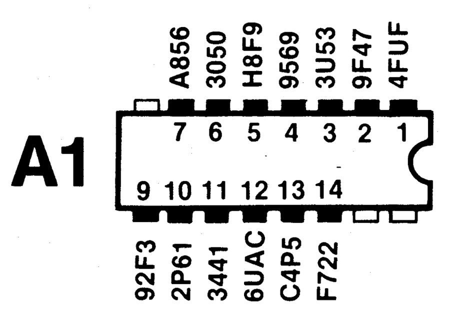


Figure 2B

PORTION OF AUXILIARY PCB

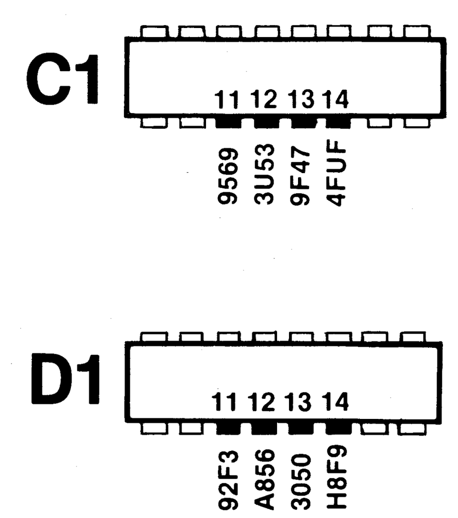
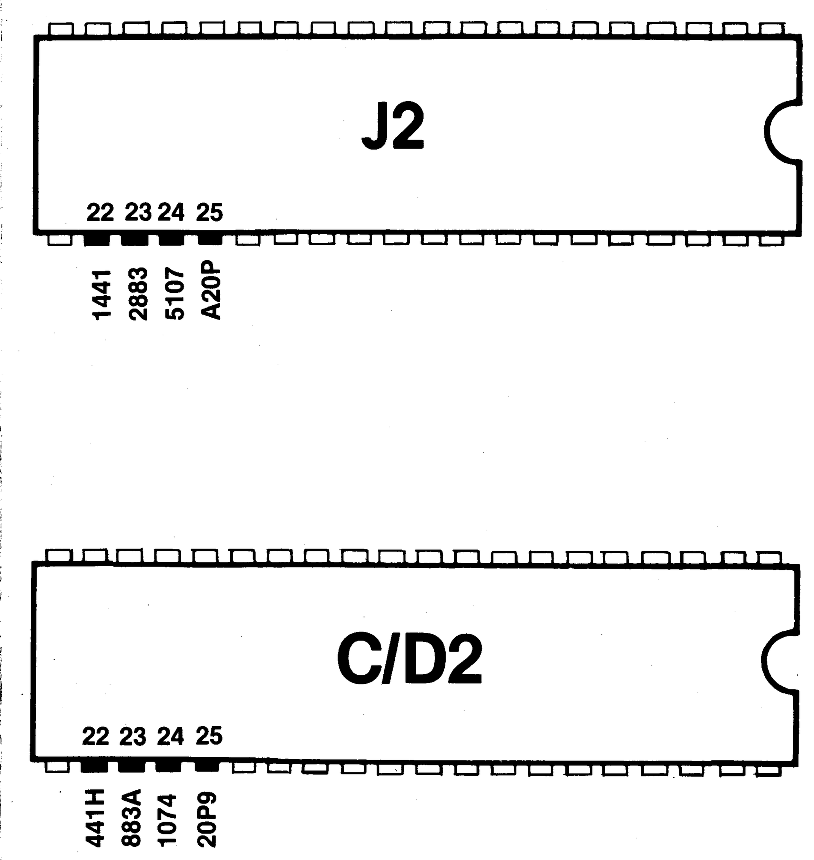


Figure 3

PORTION OF AUXILIARY PCB



ATARI®

Sheet 1, Side B

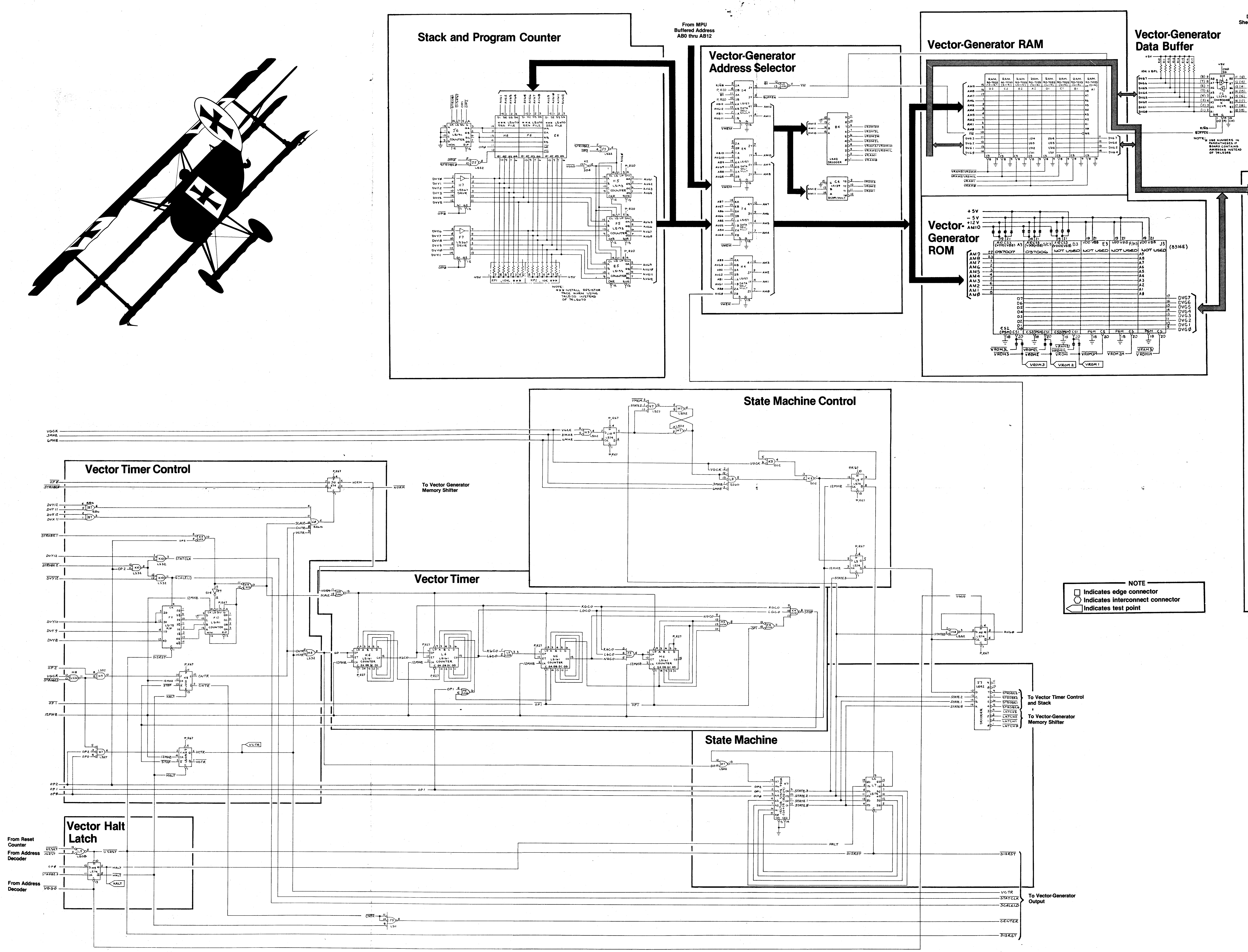
RED BARON™

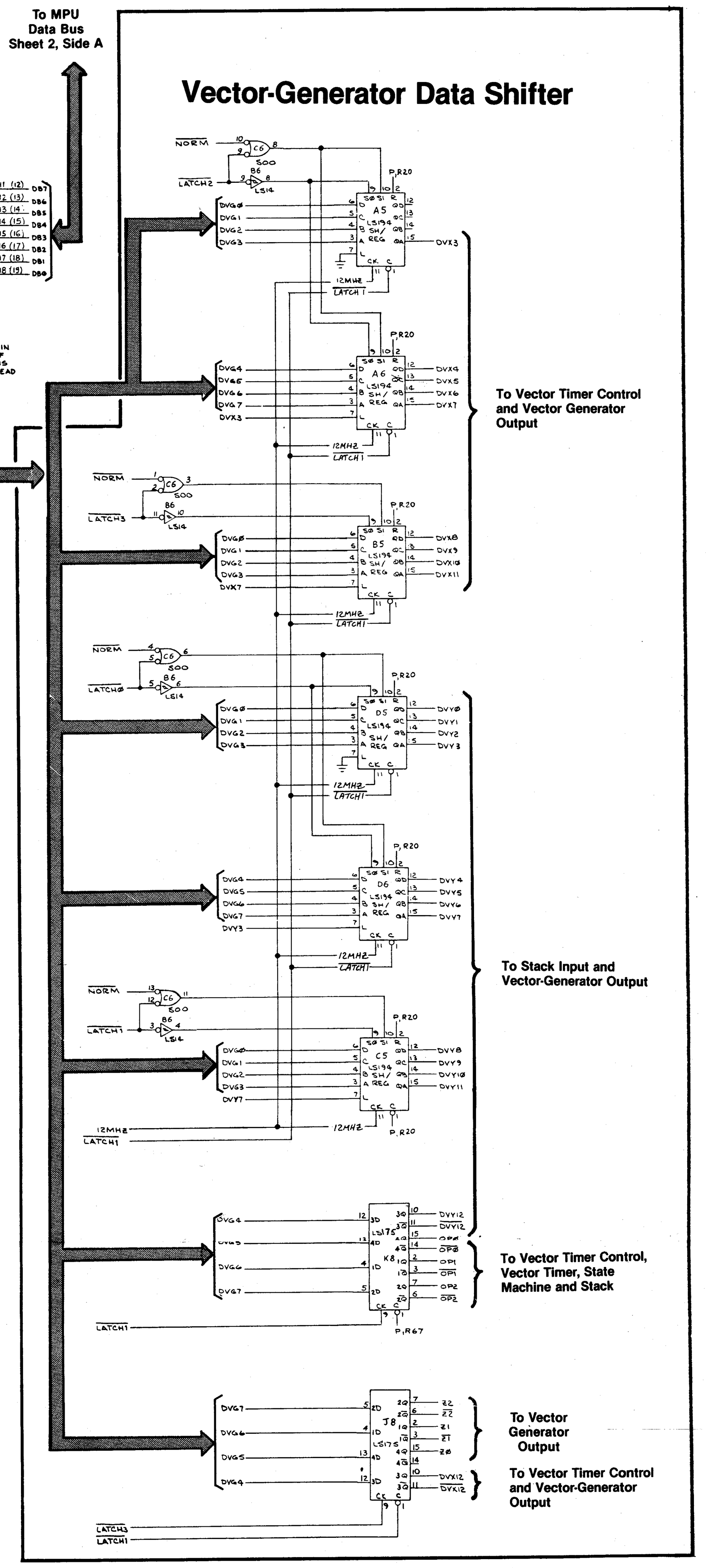
Auxiliary PCB Signature Analysis Procedure

Section of 036305-01 A

A Warner Communications Company

Sheet 1, Side B
DP-169-01 1st printing
Red Baron





ATARI®

Sheet 3, Side A

RED BARON™

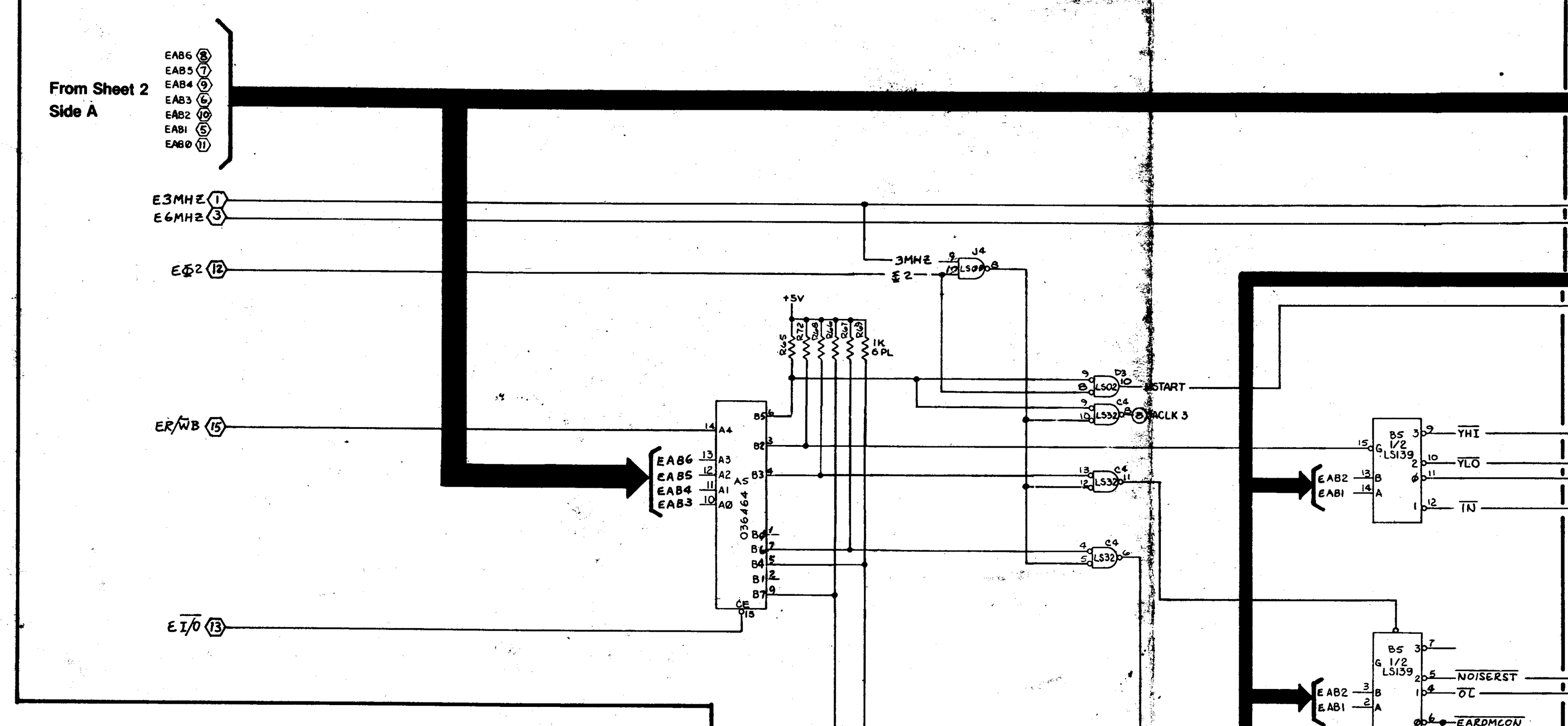
Vector-Generator Program Counter
Vector-Generator RAM
Vector-Generator ROM
Vector-Generator Data Shifter
Vector-Generator Data Buffer
Vector-Generator Data Latches
Vector-Generator Vector Timer
Vector-Generator State Machine
Section of 035742-01 & -02 B

A Warner Communications Company

Sheet 3, Side A
DP-169-03 1st printing
Red Baron

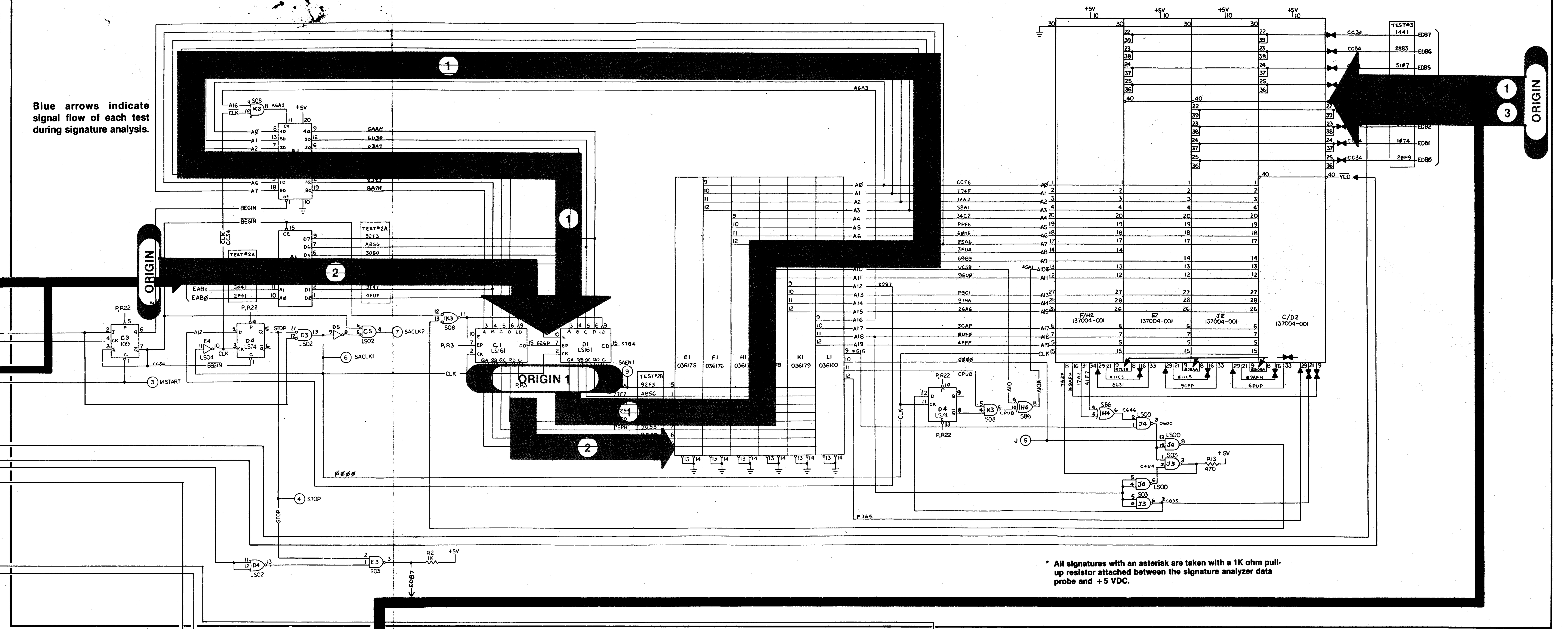
Auxiliary Board Address Decoder

PROM A5 is the address decoder for the Red Baron™ Auxiliary PCB. When I/O on pin 13 is low, the address decoder PROM A5 is enabled and receives EAB3-EAB6 from the game address decoder. When ER/WB is low, A5 enables the appropriate circuitry on the auxiliary board, via decoders B5, and gates C4 and D3.



Math Box

Blue arrows indicate signal flow of each test during signature analysis.



* All signatures with an asterisk are taken with a 1K ohm pull-up resistor attached between the signature analyzer data probe and +5 VDC.

Potsel Circuitry

Horizontal (H POT) and Vertical (V POT) inputs from the joystick are applied to analog switches J5. When POTSEL from data latch E3 goes high, H POT passes to K5 pin 12 and compares with the output from K5 pin 1. The result is applied to counters A3 and B3. Depending on the polarity of the signal, A3 and B3 count up or down. This count is applied to DAC B4 as P0-P7 and the custom audio and control chip B2. The output of DAC B4 is an analog current equal to the digital input from A3 and B3.

This current is converted to a voltage at K5 pin 1 and is sent to comparator K5 pin 13. When POTSEL goes low, V POT passes, and the circuit works as explained for H POT.

High Score Memory

The High Score Memory circuit stores the three best scores and other pertinent information. These scores are saved even if power is removed from the game. The High Score Memory circuit consists of an erasable reprogrammable ROM C0, latches A0, H0, F0, buffer E0 and timer J0.

J0 produces a 12 KHz 0-15V square wave. This signal when +15V forward biases diode CR7 and allows capacitor C54 to charge to −29V. When the signal is 0V, CR7 is cutoff and CR6 is forward-biased which causes C53 to develop a charge. C53 charges to approximately −28V. This is the potential required for EAROM C0 to operate.

The MPU addresses the EAROM (AB0-AB5) via latch A0, when EAROMWR is high. Data is latched into the EAROM on EDB0-EDB7 through latch F0.

The function of the EAROM (read, write or erase) is determined by the MPU on data lines EDB0-EDB3. Latch H0 receives a high EAROMCON signal from the MPU address decoder and function data is passed to the EAROM.

Data in the EAROM is read by the MPU when the EAROMRD signal to buffer E0 goes low. The EAROM is addressed by the MPU after a reset pulse or during Self-Test.

Audio Output

Shift registers E4, F4, and gate H4 function as a random noise generator. The output on F4 pin 13 is gated with CRSH4-CRSH7 to produce BANG, and with SHOT to produce SHOT SND.

CRSH4-CRSH7 and RNOISE are gated at F3 and the output is a digital crash signal. This signal is summed by resistor network R14-R17 and applied to comparator K4 pin 6.

When OL goes high, E3 latches the MPU data (EDB0-EDB7) for CRSH0-CRSH7, SHOT and SQUEAL sound inputs, and the start LED and POTSEL signals. When RESET on pin 1 goes high, the output of E3 is cleared.

The custom audio and control chip B2 generates most of the audio for the Red Baron™ game. It also serves as the data buffer for the POTSEL input to the MPU.

When low, ACHPEN enables the custom audio chip B2. The clock frequency of ER/WB determines whether data is written into the chip or read from the chip. P0-P7, from the POTSEL circuit, represents steering information from the game joystick. This is buffered and latched to the MPU when addressed by address lines EAB0-EAB3. The audio output from B2 is also selected by addressing EAB0-EAB3 from the address decoder.

SHOT SND, BAND, SQUEAL SND, and the custom audio output are summed at resistor network R8-R11 and applied to push-pull amplifier K4. The output is AUDIO I and AUDIO II.

ATARI®

Sheet 3, Side B

RED BARON™

Auxiliary PCB Audio Output
Control Panel Input
Math Box

Section of 036305-01 A

A Warner Communications Company

Sheet 3, Side B
DP-169-03 1st printing
Red Baron