1865 WICKHAM ROAD • MELBOURNE, FLORIDA 32935

OPERATIONS & REPAIR MANUAL

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SPECIFICATIONS

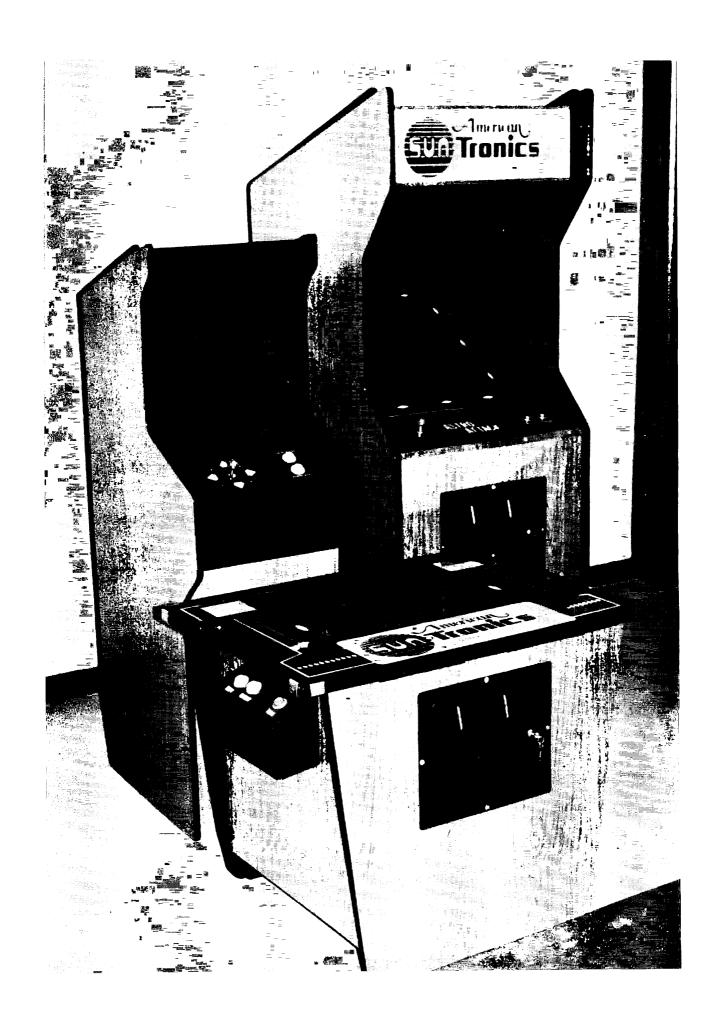
- (1.) Power Supply $120 \text{ V} \pm 5\%$
- (2.) Power Consumption 70W
- (3.) Size:

Arcade - 25" Width X 30" Depth X 72" Height
Mini - 27" Width X 18" Depth X 58" Height
Table - 29%" Width X 24" Depth X 27%" Height

(4.) Weight:

Arcade - 275 pounds, 298 Net Shipping Weight Mini - 165 pounds, 186 Net Shipping Weight Table - 165 pounds, 186 Net Shipping Weight

- (5.) Coinage One (1) or two (2) coins per play, one coin for one player, two coins for two players.
- (6.) Number of Players: One (1) or two (2) players.
- (7.) Accessories: Operations Manual One Copy Keys for Maintenance Door - Two pieces. Keys for Cash Door - Two pieces.



INTRODUCTION

Repair of American Suntronics Universal Video Games is by module adjustments, repair or replacement.

There are five modules with interconnecting cables in these games.

These modules are:

- 1. Game Logic Board
- 2. Monitor
- 3. Power Supply Assembly
- 4. Control Panel Assembly
- 5. Coin Door Assembly

The procedures in this manual will localize the fault to the defective lead, contact or module. Adjustments, fuse replacement and cable repairs can be made at location. Defective modules are returned to the repair station.

No special tools are required by the repair procedure. A digital volt/ohmeter, Radio Shack 22-197 or equivalent, and several test lead jumpers are necessary. The standard tool box compliment of soldering iron, (not a soldering gun) and hand tools will also be needed to make cable and electro-mechanical repairs.

The schematics and diagrams provided in this manual and with the game logic board are all that are required for in-field troubleshooting and repair.

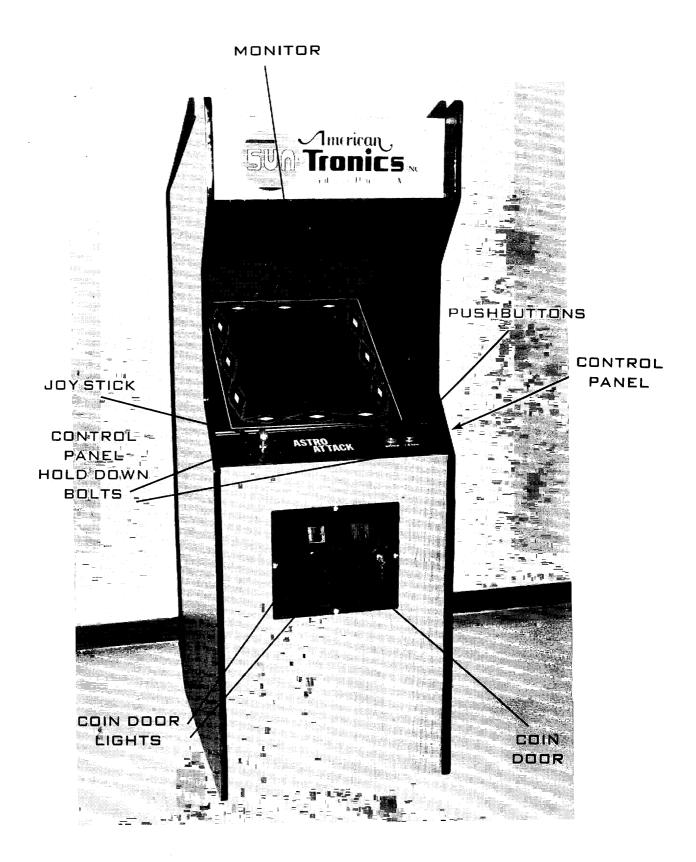
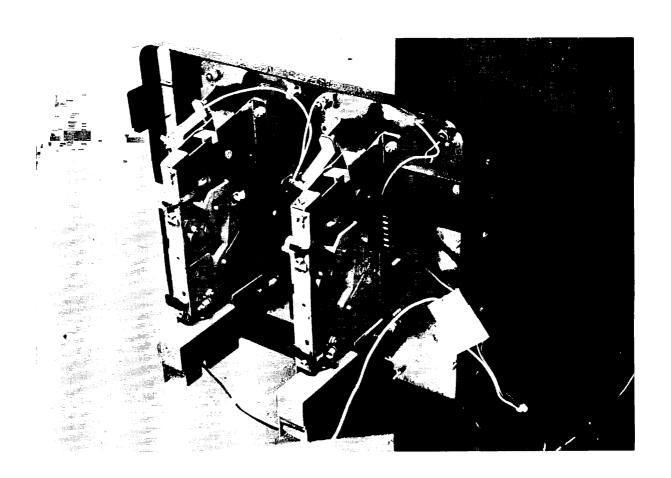


FIGURE 1



COIN DOOR

GENERAL PRACTICES

Game Malfunction Preliminary Inspection

Always inspect the cabinet for damage that might indicate the nature and possible cause of the fault.

For example: No Power - Could be the result of a cut AC line cord.

Not Accepting Coins - Could indicate a foreign object in acceptor slot.

Be certain the AC outlet is active and the AC line switch is on. (Located at rear right of cabinet at bottom). With power applied, the fan will be running. If the fan is not on. remove the panel. Check P7 & P8 (Fig 8) for proper seating to determine if a fuse is defective. The best method is to test with the DVM (Digital Volt/Ohmeter) set to ohms scale. The meter will indicate a short (OOO) for a good fuse.

With AC power applied and the fan running, the coin door lights will be lit. If the lights are out, test the ± 5 VDC fuse.

Module Access

All procedures require that the game be opened to gain access to the modules and cable assemblies to be tested.

Access to the control panel is gained through the coin door. The control panel is easily removed. The panel is held in place by two carriage bolts and wing nuts. Fig 1. The carriage bolts are located one on either end of the control panel. The wing nuts can be removed through the coin door opening. Once the wing nuts have been removed the panel can be lifted out of place and the controls are readily accessable.

Inspect all connectors to insure they are properly seated. Inspect the edge connector for proper alignment with the logic board.

GENERAL PRACTICES (con't)

Without exception, the +5 VDC is the most important and critical factor in the game. The + 5 VDC can be checked at the coin door (Fig. 1). If this voltage is low (4.95 to 4.99 volts) the game will present intermittent faults. Some examples:

- a. Accepts a coin, display reverts to the test pattern, then back to attract mode.
- b. Accepts coin, game starts and suddenly all motion will stop. It will restart only when power is shut off and turned back on.
- c. Accepts coin, the game plays normally, then suddenly ques to test pattern.

These are only three of many such occurances when the +5 VDC is low.

If the +5 VDC is below 4.95 volts, generally the screen will be blank, as if the game were off. The coin door lights will not be lit. All indications are a defective logic board.

It is recommended that the +5 VDC be checked on each service call to insure it is within the range needed for proper operation of the logic board.

Measuring the +5 VDC can be readily accomplished at the coin door. Connect the DVM between pins 1 & 4 of P9. (Fig 4) or read it directly across the coin door lights. The meter should indicate 5.00 volts. This reading assures the proper operating voltage at the logic board.

If adjustment is necessary, refer to power supply section. For all other procedures and adjustments, it will be necessary to remove the rear panel.

POWER SUPPLY

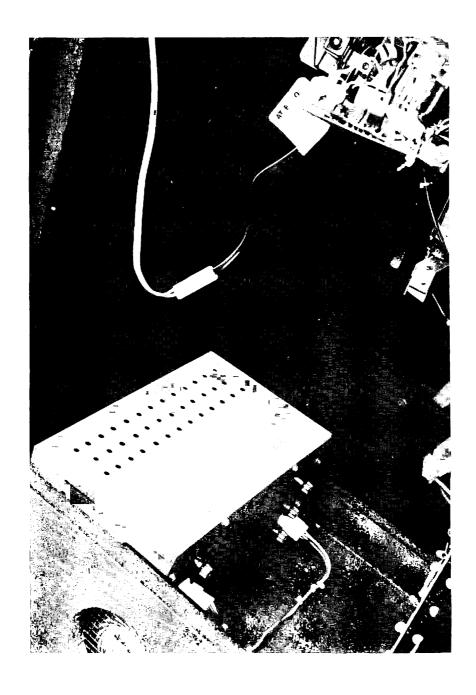
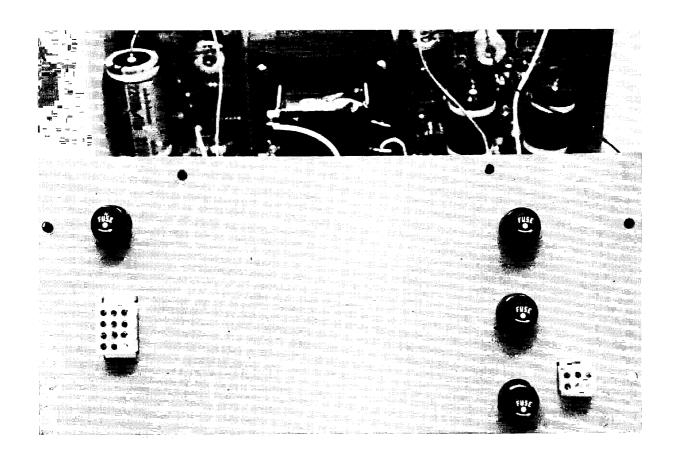


FIGURE 2



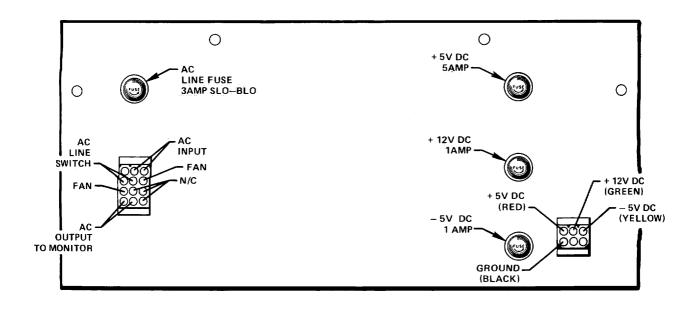


FIGURE 3

POWER SUPPLY

The power supply enclosure is red and located in the bottom of the cabinet (Fig 2).

All AC voltages are delivered to and from P8. The three DC voltages and ground are at P7.

The DC power source is contained within the enclosure. To gain access to the power source, it is necessary to remove the front panel with the four fuses and P7 and P8, (Fig 4).

Remove the AC power input. Remove the six hexagon head screws and lay the panel on the bottom of the cabinet. It is now possible to adjust the voltages. It is recommended that the enclosure be removed also. This is accomplished by removing the four hexagon screws holding the enclosure to the base and lifting it straight up.

AC power can now be restored.

CAUTION

Extreme care must be exercised due to the exposed voltage and connections.

The DC power source supplied with the cabinet may be either a TD 75w or TD 60w as shown in Fig. 5. It is of no importance which DC source is supplied. Both are equally capable of supplying the required voltages and current.

Refer to the diagram for the power source under test for the voltage adjustment.

NOTE: These power sources are designed with an over voltage protect circuit in the +5 VDC power source. If this voltage is adjusted beyond approximately 5.6 volts, the voltage indicated on the DVM suddenly decreases to less than 1 volt. If this occurs, remove the AC power and move the +5 V ADJ one quarter turn counter clockwise. Re-apply AC power.

POWER SUPPLY(con't)

The +5 VDC can be adjusted by connecting the DVM across the terminals of the coin door lights or between pins 1 and 4 of P9. Place the meter inside the cabinet so it can be observed. To increase the voltage, S L O W L Y turn the +5V ADV clockwise. To decrease the voltage, turn the control counter clockwise.

The +12 VDC can be measured between pins 2 & 4 of P7 using the proper control as indicated in Fig 5. Increase the voltage by turning clockwise and decrease by turning counter clockwise.

Negative 5 VDC can be measured between pins 3 & 4 of P7. Adjust the proper control in the same manner as the +12 VDC.

Due to the large selection of game boards, from the simple to the complex, the current requirements vary from board to board. Changes in current demand affect the +5 VDC. When logic boards are changed, the +5 VDC must be measured and adjusted to 5.00 volts if necessary.

POWER SUPPLIES

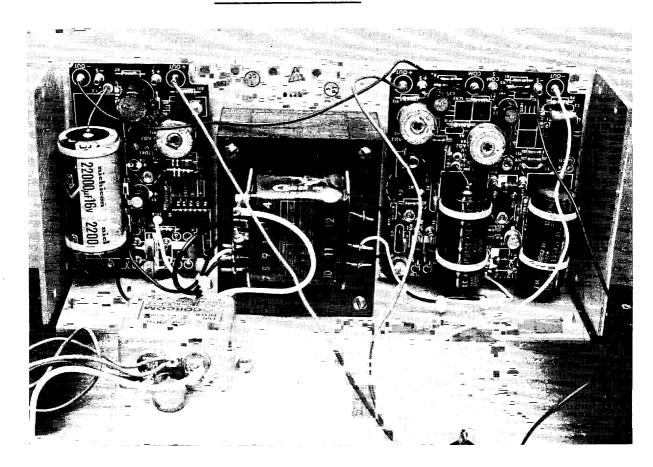


FIGURE 4

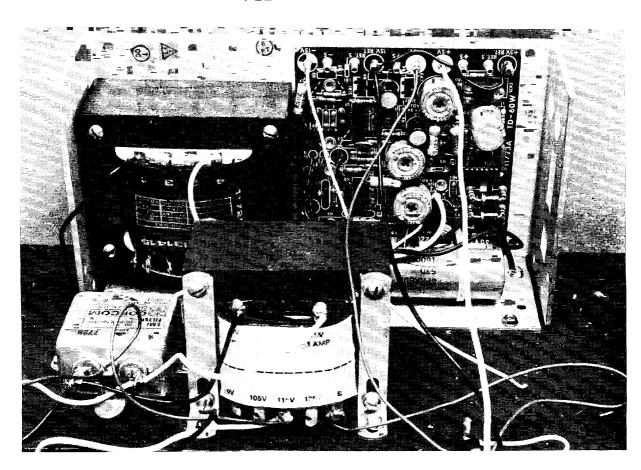
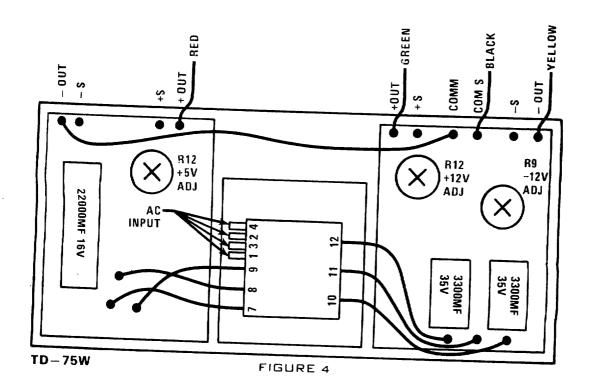
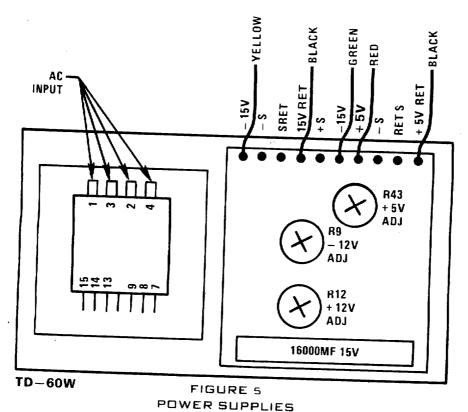


FIGURE 5





GAME LOGIC BOARD

The logic board is an important, fragile piece of electronic equipment to be handled with care, Fig. 6.

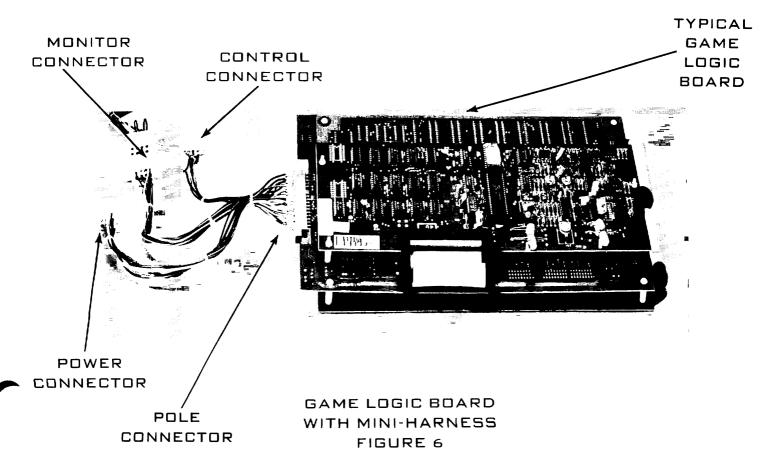
It is recommended that only qualified technicians, familiar with micro-processor circuits attempt any in-depth trouble-shooting with these boards. This is not to imply that someone familiar with logic boards, using caution, cannot adjust the controls for the desired operation of the game.

The main volume control and the DIP switches are the only user controlled functions on the logic board.

The volume control is used to adjust the overall desired sound level.

The DIP switches select the number of characters or rounds per player, coins per play, and bonus level. Some games have more switches for other functions. the switches are explained in the data supplied with the game board.

For the location of the volume control DIP switches and their functions, refer to the game logic data.



CONTROLS

Fig. 7 shows typical controls used in all American SunTronics control panels. The number of pushbuttons and joy sticks, as well as the controls are the same for all control panels.

All wires from all control panels are connected to 15 pin connectors to adapt to the universal harness. In many cases, not all 15 locations are used. The number of wires connected depends upon the number of controls used for a particular game.

The most frequent control panel malfunction is that the character displayed on the screen does not respond to the control. Generally, this is due to the springs not making contact when the pushbutton is depressed, or the control stick is moved. The cause of this problem is the great amount of use these controls receive. They are readily adjusted, (refer to Fig. 7) by grasping point 8 on the pushbutton or 3 on the joy stick assembly with a pair of needle nose pliers and bending the leaf until it nearly touches the actuator when pressure is released. Then grasp the pushbutton at point 7 and the joy stick assembly at point 4 and bend until the clearance between the contact is approximately at 1/8 inch when the pressure is released.

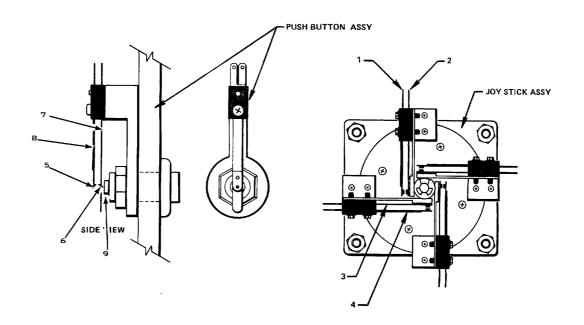
When the contact is closed, there should be some movement of the outerleaf. This movement, or wiping action is a self-cleaning action to help reduce the oxide and dust build-up on the contact surfaces. If intermittent control malfunction is experienced, the contacts can be cleaned by placing a piece of bond paper between the contacts, closing the contacts and withdrawing the paper.

In the event the control is still not functioning, connect the DVM at points 1 & 2 of the joy stick assembly, or the pushbutton. The DVM will indicate approximately 4.5 volts. Closing the contacts will decrease this reading to 0 volts. If no voltage is present, inspect cable for faulty wire or

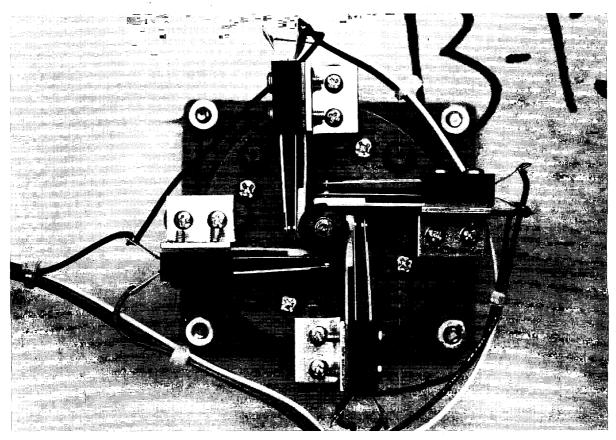
CONTROLS (con't)

connection. If the voltage is present and decreases to O volts when the contacts are closed, suspect a faulty logic board.

CONTROLS







MONITOR

All controls have been set at the factory for optimum display of each game. When game logic boards are changed, it may be necessary to make some minor adjustment to the controls illustrated in Fig. 9.

Occasionally, when a new game board is installed, the picture will appear upside down. This is a result of methods of programming the logic board. It is <u>not</u> a malfunction of the game. It is easily corrected by changing lead positions on the deflection yake of the picture tube. Refer to Fig. 8, items 1,2,3,8 4. The lead colors are RED, BLUE, YELLOW, and GREEN. The position for the leads depends upon the logic board for the particular game.

NOTE: The RED and BLUE leads are always on the outer terminals. The GREEN and YELLOW are always on the inner terminals.

These leads are connected to the yoke terminals with fast on connectors. They are removed by grasping the end and pulling upwards gently.

To invert the display:

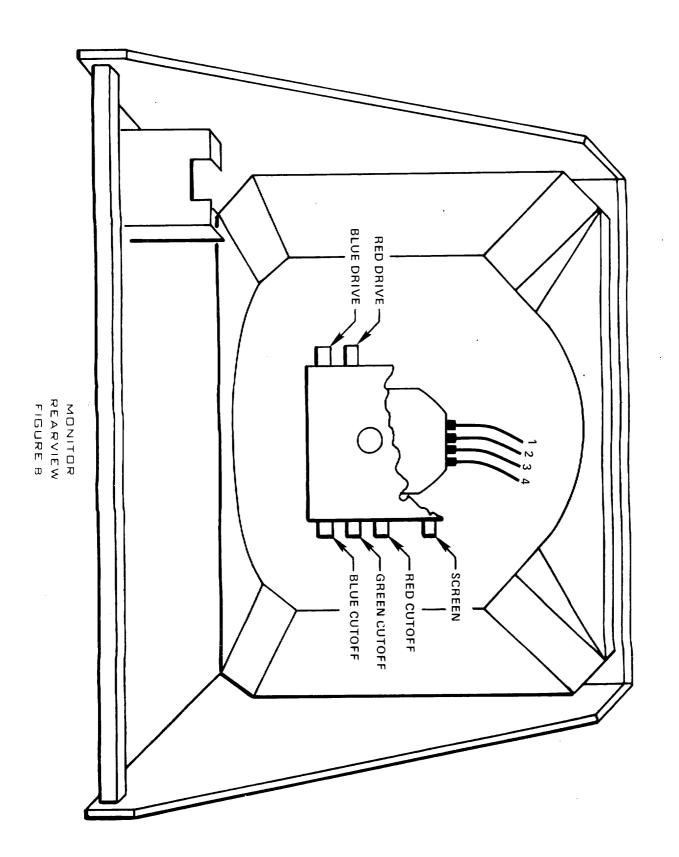
Remove power to cabinet.

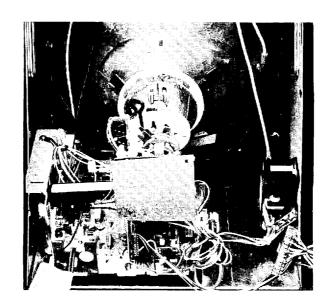
Remove leads from pins 1 & 4 and reverse their location.

Remove leads from pins 2 & 3 and reverse their location.

This completes the display inversion.

Restore power to the game and make any adjustments necessary refering to Fig. 9 for control and location.





1. HORIZONTAL FREQUENCY

With the monitor being driven from the game signal, set the horizontal hold control to its mechanical center and short TP 32 to ground. Adjust the horizontal oscillator coil (screwdriver adjustment) until picture stops sliding horizontally. Do not use the horizontal hold control for horizontal centering (See #3). NOTE: When the game sync is composite, use horizontal sync input.

2. PICTURE SIZE

Adjust the vertical size control, and the horizontal width coil for desired picture size.

3. PICTURE CENTERING

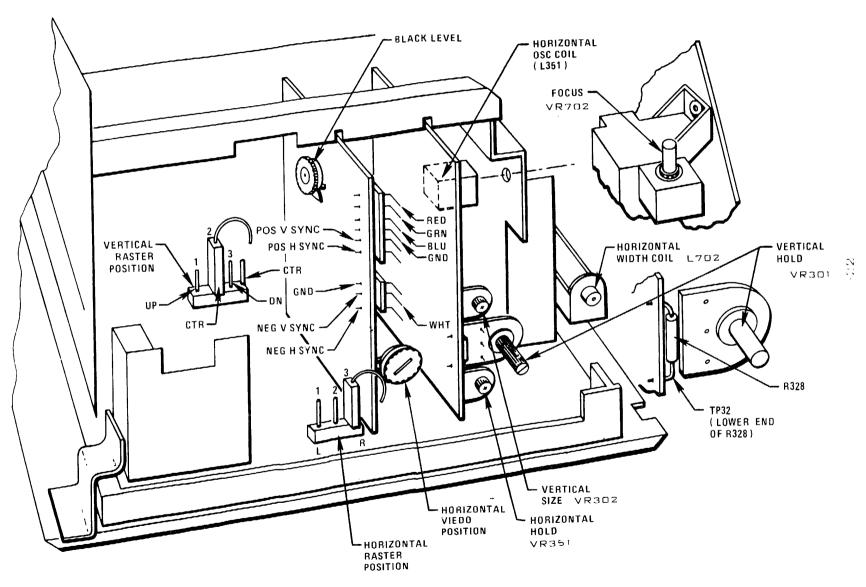
If the video is off center vertically, move the vert raster position adjustment(yellow wire) to the up or down position. If the video is off center horizontally, adjust the horizontal video position control to center the picture. If any additional horizontal positioning is required, move horizontal raster position adjustment (red wire) to the left or right position.

4. BLACK LEVEL

Adjust the black level control to obtain the proper black level (the black portion of the picture just extinguished). Do not use the screen control (on neck PCB) to set the black level.

5. FOCUS

Adjust focus control for best overall definition and fine picture detail.



MONITOR CONTROLS FIGURE 9

COIN DOOR

There are four possible malfunctions that may occur in the coin door. Refer to Fig. 4 and Fig. 10.

1. Lamp Out:

If the lamps are out, replace lamps.

In case the lamps are out and there is no display on the monitor, refer to the section on power supply.

2. Will not accept coins.

This problem is usually caused by oils and dirt from the coins. Remove the acceptor, wash in hot soapy water and shake excess water from acceptor and dry with warm air, such as a hair dryer.

3. Accepts coins, will not register credits.

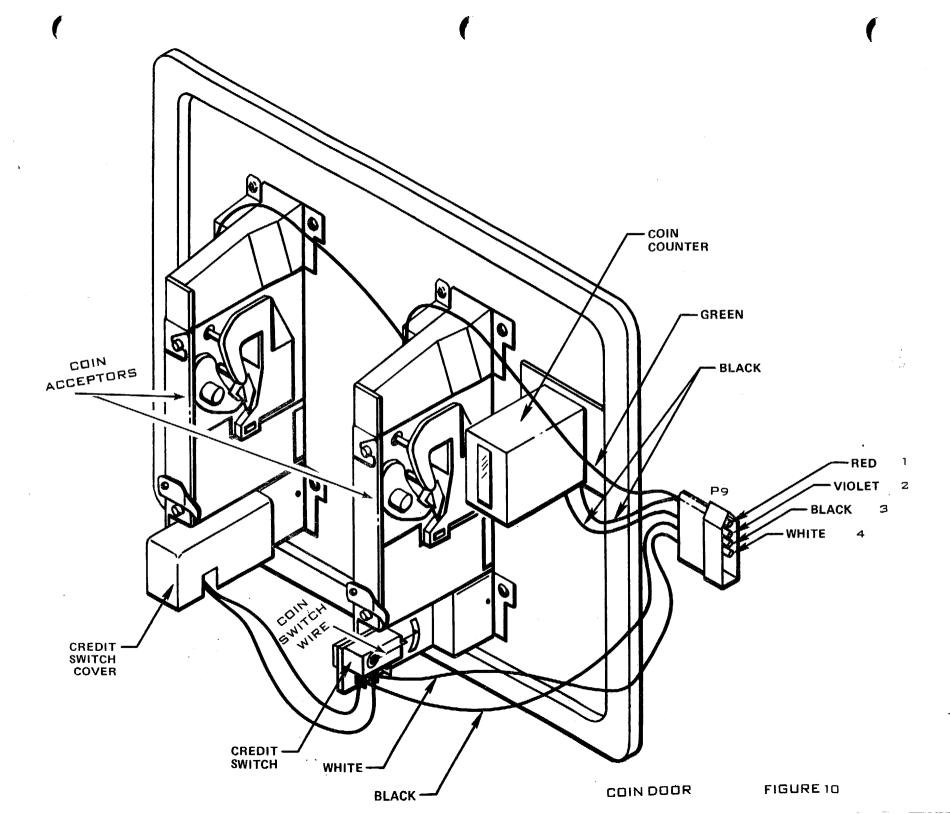
Usually caused by a jammed credit switch wire, or faulty credit switch.

Remove the credit switch covers and inspect coin chutes for foreign objects. The credit switch wires should be horizontal to the credit switch and move freely when depressed.

Separate P9 and J9. Using the DVM set to the ohms scale, measure the resistance across the black and white in J9 pin 3 & 4. The DVM should indicate open. Depressing either of the credit switches will indicate a resistance on the DVM indicating a properly functioning switch. If the meter indicates a shorted switch, unsolder the black and white wires from one of the switches and determine which is defective using the DVM.

4. Coin counter not registering.

The coin counter operates from the +5 VDC line. If the coin door lights are lit, 5 volts is J9 pin 1. Measure the resistance of coil on the coin counter across pins 1 & 2 of J9. The DVM will indicate approximately 35 ohms.

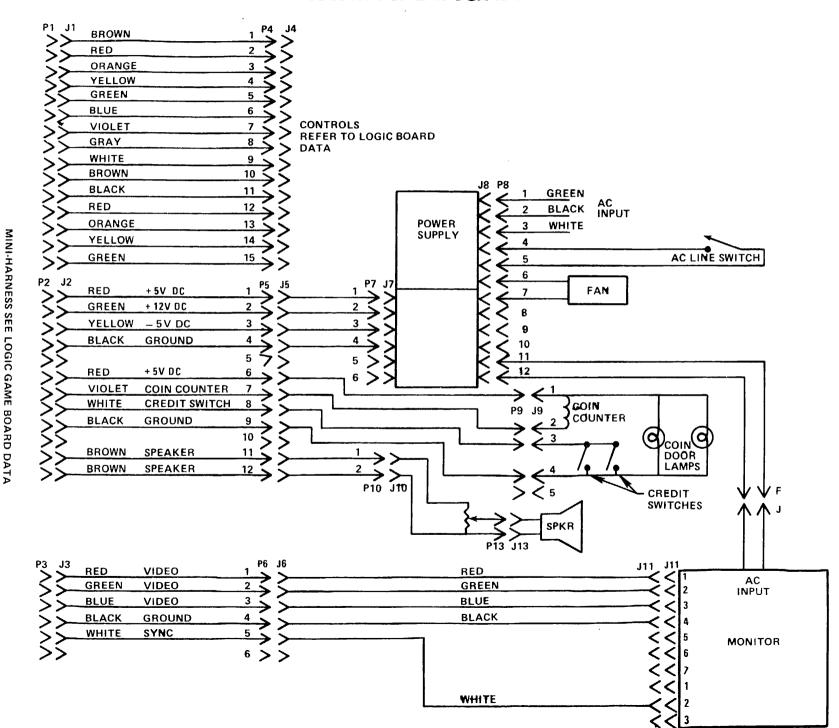


NOTES

DIAGRAMS & SCHEMATICS

1.	UNIVERSAL WIRING HARNESS	PAGE 27
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4.	COIN DOOR	277

WIRING DIAGRAM

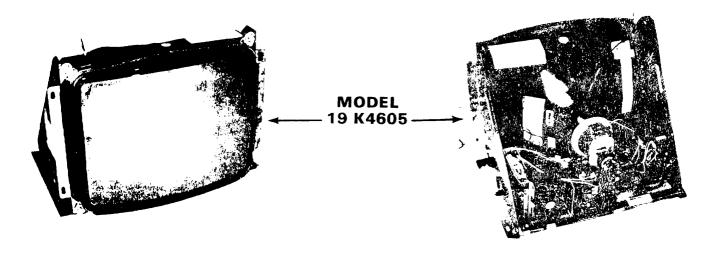


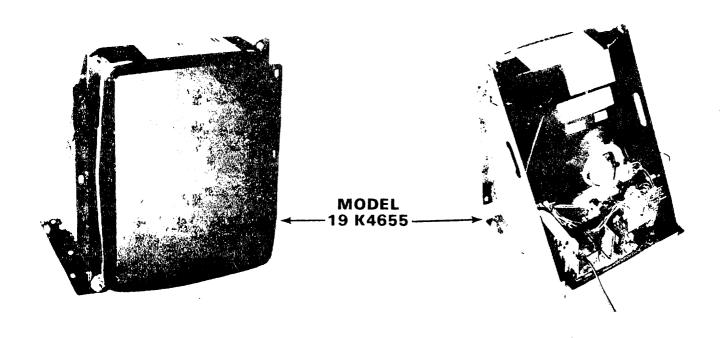


wells-gardner electronics corporation

REVISION #1

19" IN-LINE COLOR MONITORS





wells-gardner electronics corporation

2701 NORTH KILDARE AVENUE CHICAGO, ILLINOIS 60639



4880 ADOHR LANE CAMARILLO, CALIF. 93010

(805) 484-2851

information contained;

Schematic Parts List

Specifications Outline and Mounting General User Information MODEL

AC CONNECTION

FUSE INPUT AT 2.0 AMPS

FOR USE AT

JUMPER

APPLY AC AT

MODEL

CBB - 75W

115 VAC

183,284

184

CBB-75W

APPLICATION DAT

DATE

1 C

6-11-9

FOR PRODUCTION

0,ddV

 $6.2 \pm .4 \text{V}.$ ±12V. AT 1.7A. OR

TABLE

230 VAC

283

184

I.O AMPS

AT -5V.

±15V. AT 1.5A

OUTPUT RATING

5V. AT 6.0A. W/OVF

OVP SET AT

-12/-15V. USEABLE JUMPERING EI TO E2. 0.7A. BY

VOLTAGE/CURRENT RATING CHART

SPECIFICATIONS

AC Input:

115/230vac±10% 47-440Hz.

DC Output:

(Derate output current 10% for 50Hz Operation.)

Refer to Voltage/Current Rating Chart. Voltage

adjustable ±5% minimum.

Input Fusing: Line Regulation: Refer to AC Connection Table. ±0.05% for 10% input change. ±0.05% for 50% load change.

Load Regulation: Output Ripple: Transient Reponse:

3.0mv Pk-Pk maximum, 0.4mv RMS. 30µ seconds for 50% load change.

Short Circuit and

Overload Protection:

Automatic current limit/foldback.

Reverse Voltage

Protection:

Provided on Dual and Triple output units.

Remote Sensing:

Provided on outputs above 15watts, open sense

lead protection built-in.

Stability:

±0.05% for 24hours after warm-up.

Temperature Rating:

0°C to 50°C full rated, derated linearly to 40%

at 70°C.

Cooling:

Temperature Coefficient: ±0.02%/°C maximum, 0.002%/°C typical. Units are full rated 50°C in free air, must be

derated or fan cooled when mounted in

confined area.

Efficiency:

5V units-45%, 12 and 15V units - 55%, 20 and 24V units - 60% at nominal input, full load on

Vibration:

Per Mil-Std-8IOB, Method 514, Procedure I,

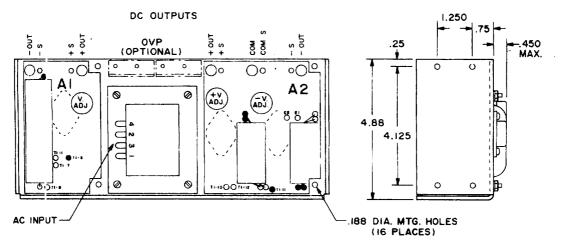
curve AB (to 50Hz).

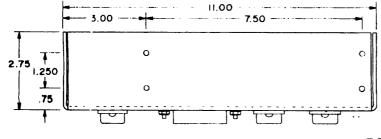
Shock:

Per Mil-Std-8IOB, Method 516, Procedure V.

2 YEAR GUARANTEE

CONDOR will repair or replace any power supply of its manufacture that does not perform to published specifications as a result of defective materials or workmanship for a period of 2 years from date of original purchase. No other obligations or liabilities are implied or expressed. Returns must be freight prepaid.



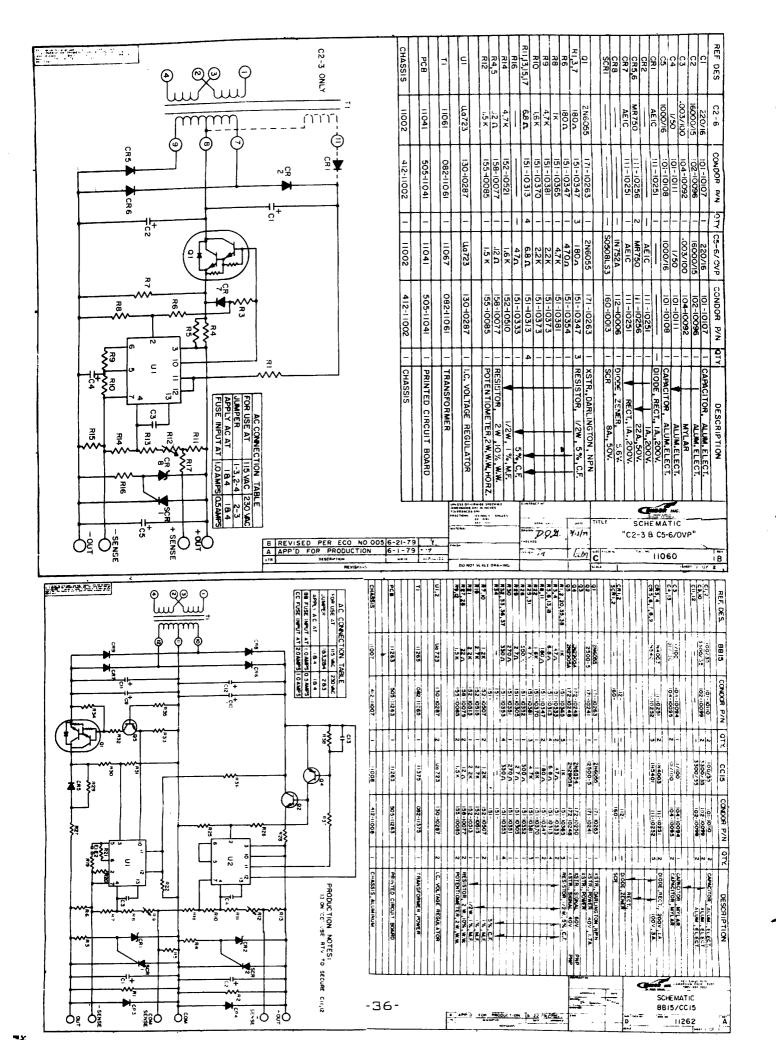


CBB CASE

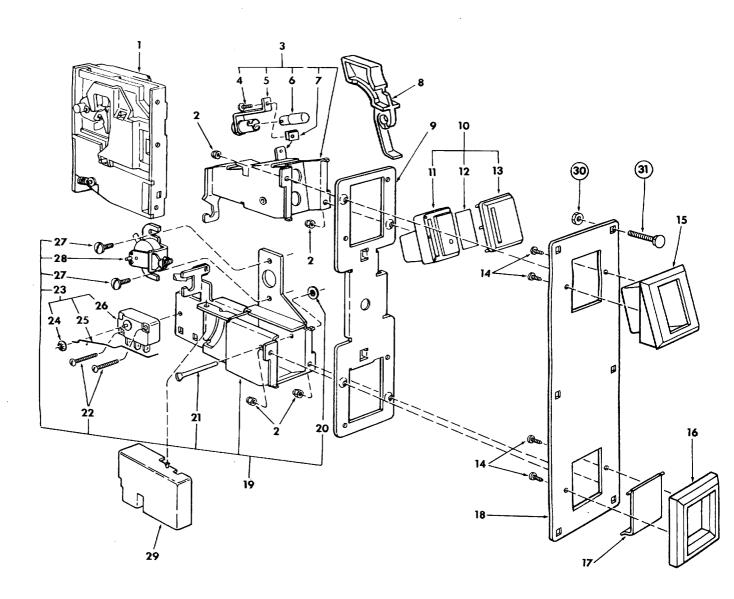
UNIT WEIGHT: 8 lbs



-35-



2800-0 FRONT PLATE EXPLODED VIEW 25¢ U.S. COIN



Index No.	Part No.	Description	index No.	Part No.	Description
1	5301-10	25¢ Coin Acceptor	17	904599	Coin Return Door
2	400-4	#4-40 Self Locking Nut	18	404463	Frontplate Assembly, 3-1/8" x 9-1/4"
3	404351	Coin Inlet Chute Assembly	19	404350	Coin Return Chute Assembly
4	110-4-6	4 x 3/8 Screw	20	904936	Keeper
5	904717	Lamp Socket	21	905115	Bar
, 6	904716	#47 Lamp (6.3 Volt)	22	100-4-12	4-40 x 3/4 Screw
7	904712	Fastener	23	404353	Switch & Wire Assembly
8	904583-1	Coin Return Lever	24	900651	Retainer
9	404464	Inner Panel/Lever Assembly	25	904710-1	Switch Wire-Silver
10	404348	Coin Return Button Assembly	26	904845	Switch
11	904591	Coin Return Button	27	100-6-4	6-32 x 3/16 Screw
12	904703	25¢ Price Decal	28	404354	12 Volt Crem Assembly
13	904589-2	Reject Cover Button (25¢)	29	904762	Switch Cover
14	345-4-5	#4 x 5/16 Pan Head Screw			DWARE NOT INCLUDED IN KIT
15	904588	Coin Inlet Housing	30	406-10	#10-24 Hex Nut
16	904590	Coin Return Cover	31	905022	#10-24 x 1-1/8 Carriage Bolt