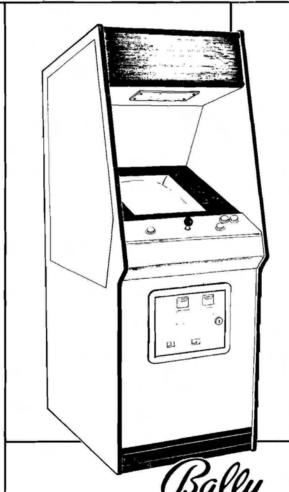


Parts and **Operating** Manual



MIDWAY MFG. CO.

10601 W. Belmont Avenue Franklin Park, Illinois 60131 U.S.A.



Phone: (312) 451-9200

Cable Address: MIDCO

Telex No.: 72-1596

WARNING

THIS GAME MUST BE GROUNDED. FAILURE TO DO SO MAY RESULT IN DESTRUCTION TO ELECTRONIC COMPONENTS.

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a CLASS A computing device pursuant to SUBPART J of PART 15 of FCC RULES, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

ELECTRICAL BULLETIN: FOR ALL APPARATUS COVERED BY THE CANADIAN STANDARDS ASSOCIATION (CSA) STANDARD C22.2 NO. 1, WHICH EMPLOYS A SUPPLY CORD TERMINATED WITH A POLARIZED 2-PRONG ATTACHMENT PLUG.

CAUTION:

TO PREVENT ELECTRIC SHOCK DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD, RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

ATTENTION: POUR PREVENIR CHOCS ELECTRIQUES NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR. UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

(Sally MIDWAY

Invites You To Use

OUR TOLL FREE NUMBERS FOR SERVICE INFORMATION CONCERNING THIS GAME, OR ANY OTHER BALLY MIDWAY GAME YOU NOW HAVE ON LOCATION.

CALL US FOR PROMPT, COURTEOUS ANSWERS TO YOUR PROBLEMS. **VIDEO** —— Continental U.S. 1-800-323-7182

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GAME OPERATING PROCEDURE

UP'N DOWN is a one or a two player game with a color T.V. monitor. The game has five possi ble modes of operation: ATTRACT, READY-TO-PLAY, PLAY, HIGH SCORE/INITIAL, and SELF-TEST.

SELF-TEST MODE

The Self-Test mode is a special mode for checking the game switches and computer functions. It is the easiest and best way to check for proper operation of the entire game.

NOTE: Putting the game into Self-Test will cause it to *erase* any CREDITS it has on it from its memory.

You may begin a Self-Test at any time after the power to the game is on by pushing down on the spring loaded Self-Test switch. The game enters the Self-Test mode immediately.

- First, you will see a RAM TEST display.
- Pushing down on the spring loaded Self-Test switch again will cause the game to step to the next test: an EPROM TEST display.
- Pushing down on the spring loaded Self-Test switch again will cause the game to step to the next test: an INPUT TEST display (switch function tests).
- Pushing down on the spring loaded Self-Test switch again will cause the game to step to the next test: a DIP SWITCH SETTINGS display.
- Pushing down on the spring loaded Self-Test switch again will cause the game to step to the next test: a SOUND TEST display.
- Pushing down on the spring loaded Self-Test switch again will cause the game to step to the next test: a COLOR BAR AND GRID OUTLINE display.
- 7. Pushing down on the spring loaded Self-Test switch ONE MORE TIME will cause the game to step to the TEN BEST PLAYERS display which is part of the attract mode. If you DO NOT press down on the spring loaded Self-Test switch again, normal game functions will return to the monitor screen.
- If you do push down on the spring loaded Self-Test switch ONE MORE TIME it will cause the game to start the Self-Test sequence all over again. You will be back at the RAM TEST display.

ATTRACT MODE

1. The Attract mode starts:

☐ Just after power has been turned on to the game.
☐ After a Self-Test has been completed. (Performing a Self-Test sets the credits in the games memory to zero "0".)
☐ After a play has been finished and there are no more credits left in the games memory.
No matter where the game is in the Attract mode sequence, it will immediately go to the Ready-To-Play mode display as soon as a game has been paid for.

READY-TO-PLAY MODE

- The Ready-To-Play mode starts when enough coins have been accepted for a 1 or a 2 player game.
- The Ready-To-Play mode ends when either the "1 PLAYER" or the "2 PLAYER" push button is pressed.
- 3. If no START button is pressed, the displays will remain on the monitor screen indefi nitely.

PLAY MODE

- The Play mode begins when either the "1 PLAYER" or the "2 PLAYER" start button is pressed.
- The Play mode ends when all of your CARS have been eliminated. When this happens, "GAME OVER" is written across the center of the monitor screen.

HIGH SCORE/INITIAL MODE:

If your score was high enough to become one of the ten best scores, the game will go into the High Score/Initial mode immediately after the "GAME OVER" display. If your score is not high enough to cause the game to go into the High Score/Initial mode, it will either go to the Attract mode (if there are no more credits left in its memory) or into the Ready-To-Play mode (if there are still credits left in its memory).

Follow the ON-SCREEN instructions to enter your initials next to your score in the league of the best ten players to date.

After the High Score/Initial mode, the game will either go to the Attract mode (if there are no more credits left in its memory) or into the Ready-To-Play mode (if there are still cred its left in its memory).

TWO PLAYER OPERATION

In the two player mode, the rules of play are the same as in the single player mode. There are some additional rules, however.

- 1. The players must take turns at the controls.
- Your turn lasts until the pursuers eliminate your CAR. At this point, the game will do one of several things depending on whether or not the caught CAR was your last or if you still have others remaining in reserve.

CAR ELIMINATED - OTHERS REMAINING IN RESERVE

☐ The GAME stops.

Next, the Rack changes to the Rack number
the other player is in, and what's left of the
other players Rack and his CAR appear on
the screen.

☐ Play then begins for the other player.

CAR ELIMINATED - NO OTHERS REMAINING IN RESERVE

- ☐ Game displays "GAME OVER".
- ☐ The Rack changes to the Rack number the other player is in, what's left of the other players maze and his CAR appear on the monitor screen, and game play then begins for the other player (unless your score was high enough to cause it to go into the High Score/Initial Mode, in which case it will go there first and then to the remaining player so he can finish his turn).
- ☐ After the last player has finished his game, the game will either go to the High Score/Initial Mode if his score was high enough, to the Attract mode (if there are no more credits left in its memory), or into the Ready-To-Play mode (if there are still credits left in its memory).

UP 'N DOWN

SCORING

DESCRIPTION	POINTS AWARDED	NOTES			
FLAG CAR	1000 POINTS EACH	WHEN YOU RUN OVER IT			
НАТ	800 POINTS EACH	WHEN YOU RUN OVER IT			
ICE CREAM CONE	800 POINTS EACH	WHEN YOU RUN OVER IT			
BALLOON	800 POINTS EACH	WHEN YOU RUN OVER IT			
ENEMY CARS	400 POINTS EACH	WHEN YOU JUMP ON IT			
FLAG	200 POINTS EACH	WHEN YOU RUN OVER IT			

I. Location and Setup

INSPECTION

- 1. Remove the game from its shipping crate.
- Inspect the entire outside of it for any signs of damage.
 - □ Any scratches?, dents?, cracks?
 - ☐ Any broken controls?
 - ☐ Any broken glass or plastic?
 - ☐ Just look it over closely and make a note of any signs of damage.
- Remove the shipping cleats from the bottom of the cabinet.
 - ☐ UPRIGHT MODELS ONLY: In order to help prevent easy theft of your game, you may wish to remove the Caster Wheel Assemblies from the bottom of your cabinet at this time.
- Install the four levelers, one at each corner of the cabinet.
 - □ Level the cabinet.
- Open the cabinet and inspect the inside of the game for any signs of damage. See Figure 1-2.
 - Also check to make sure all plug-in connectors on the wire harness are firmly seated.

NOTE: ALL connectors or plugs are keyed so they will only go together when all pins are properly lined up.

- Replug any connectors found unplugged. DO NOT FORCE PLUGS ONTO CONNECTORS. DO NOT FORCE PLUGS TOGETHER. If it won't go on easily, assuming the keys are lined up, it either does not belong there or is damaged.
- Make sure all printed circuit boards (P.C.B.'s) are firmly seated in their connectors. See Figure 1-2. These connectors are also keyed. The P.C.B.'s will only go into them one way without being damaged.
- □ Note the location of the game's serial number. See Figure 1-2.
- ☐ Check all major subassemblies to be sure they are mounted securely. These are called out in Figure 1-2.

Power supply.

Control panel.

T.V. monitor.

Other P.C.B.'s and/or P.C.B. rack, etc.

- Make a note of any problems that can't be easily corrected.
- 7. Call your distributor and/or service man about your problem list.

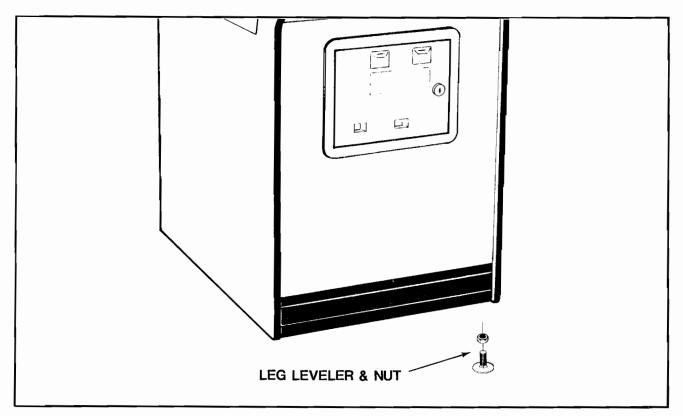


Figure 1-1 Leg Leveler Installation

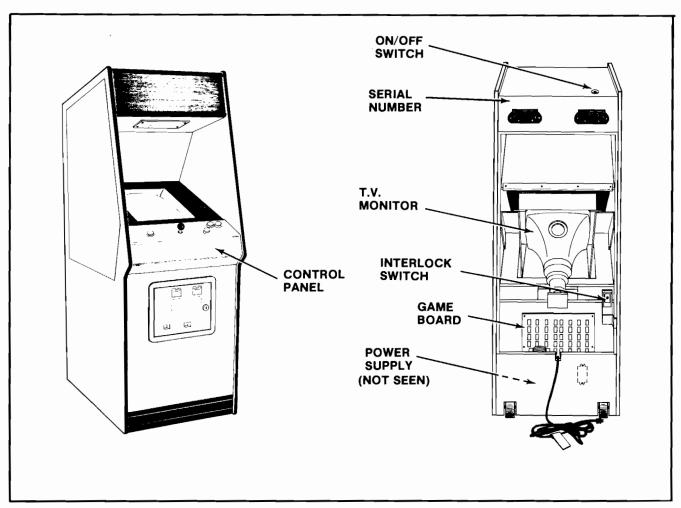


Figure 1-2 Location of Serial No., Interlock Switch, On/Off Switch, and Major Sub-Assemblies

INSTALLATION

1. Location requirements:

☐ Power:

Domestic 110 V @ 60 Hz Foreign 200 V to 240 V @ 50 Hz

☐ Temperature: 32° to 100°F (0° to 38°C)

☐ **Humidity:** Not over 95% relative

□ Space required:

Upright 32" x 25" (81cm x 63cm)

☐ Game height:

Upright 70" (175cm)

2. Voitage Selection:

Your game is designed to work properly on the line voltage where you are located. Check your line voltage with a meter to determine what its value is. Then check the power input wires to the main power supply transformer on your game to be sure they are connected to taps which correspond to your line voltage value.

If the power input wires to the main power supply transformer are not connected to taps which correspond to your local line voltage, move them to the proper taps.

If the line voltage in your area falls outside the upper or lower limits of the range of inputs covered by the main power supply transformer, **DO NOT PLUG YOUR GAME IN** until you have talked with your distributor and/or service man and obtained a solution to this problem. Otherwise you could damage your game.

- Interlock and power ON/OFF switches. See Figure 1-2.
 - ☐ To help prevent the possibility of getting an electric shock while working inside the game cabinet, interlock switches have been installed at each cabinet access door (this **DOES NOT** include the coin door in the Upright and Mini models).
 - ☐ When any access door is opened, the interlock switch installed there turns off all power to the game.
 - ☐ Check each interlock switch for proper operation.

After checking the line voltage in your area and determining that the input wires to the main power supply transformer of your game are connected properly — or — after obtaining a solution to your over or under voltage problem from your distributor and/or your service man, plug the game into your A.C. wall outlet.

The game ON/OFF switches for all models are located as shown in Figure 1-2. Turn the game on and allow it to warm up a few minutes.

Slowly open each access door to the game (this **does not** include the coin door on the Upright and Mini models).

As the door is opened approximately 1" (2.54cm) the power to the game should go off (the T.V. monitor, all the lights, and all sounds will stop).

If this does not happen, check the interlock switch by this door to see if it has broken loose from its mounting or if it is stuck in the "ON" position.

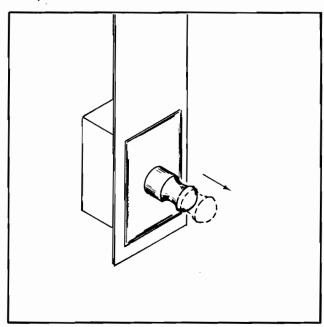


Figure 1-3 Interlock Switch Operation

If the switch is found to be bad, turn the game off, unplug it, and replace the interlock switch. When done, plug the game back into the wall outlet, close the access door, and turn the game back on.

After the game has warmed up, repeat the above interlock switch test.

When the interlock switch is working properly and turns the power to the game off, power may be restored to the game with the access door(s) open. Take hold of the interlock switch plunger and **gently** pull it out to its fully extended position. THIS IS TO BE USED **ONLY** FOR SERVICING THE GAME. See Figure 1-3.

GAME VOLUME ADJUSTMENT CONTROL

The volume control pot is located on a P.C. board inside the game cabinet. It may be reached through the rear access door.

To make the sounds louder, turn the pot clockwise as you face it ().

To make the sounds **less** loud, turn the pot counterclockwise as you face it ().

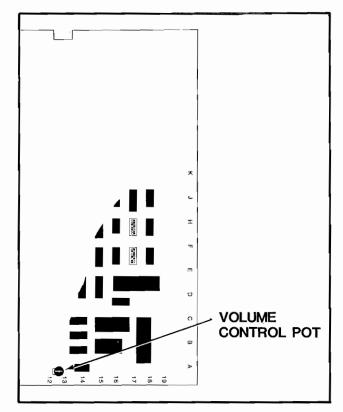


Figure 1-4 Volume Control Location

OPTION SWITCH SETTINGS

To change the option switch settings, you DO NOT have to take the CPU board out of the game. They can be easily reached through the rear access door.

When changing any options, ALWAYS check the results by playing the game to be sure the switches have worked properly and that no switches were accidentally moved that were not meant to be. (These switches are small and this can happen.)

UP 'N DOWN

OPTION SWITCH SETTINGS - DIP SWITCH "A"

VARIOUS CREDIT OPTIONS	COIN SWITCH #1			COIN SWITCH #2				
1 COIN 1 CREDIT 1 COIN 2 CREDITS 1 COIN 3 CREDITS 1 COIN 4 CREDITS 1 COIN 5 CREDITS 1 COIN 6 CREDITS 2 COINS 1 CREDIT 3 COINS 1 CREDIT 4 COINS 1 CREDIT 2 COINS 3 CREDITS	SW#1 OFF ON OFF ON OFF ON OFF ON OFF ON	SW#2 OFF OFF ON ON OFF OFF ON ON OFF	SW#3 OFF OFF OFF ON ON ON ON OFF OFF	SW#4 OFF OFF OFF OFF OFF OFF OFF ON ON	SW#5 OFF ON OFF ON OFF ON OFF ON OFF	SW#6 OFF ON ON OFF ON ON OFF ON ON OFF	SW#7 OFF OFF OFF ON ON ON ON OFF OFF	SW#8 OFF OFF OFF OFF OFF OFF OFF ON
2 COINS 1 CREDIT 4 COINS 2 CREDITS 5 COINS 3 CREDITS 6 COINS 4 CREDITS	OFF	ON	OFF	ON	OFF	ON	OFF	ON
2 COINS 1 CREDIT 4 COINS 3 CREDITS	ON	ON	OFF	ON	ON	ON	OFF	ON
1 COIN 1 CREDIT 2 COINS 2 CREDITS 3 COINS 3 CREDITS 4 COINS 4 CREDITS 5 COINS 6 CREDITS	OFF	OFF	ON	ON	OFF	OFF	ON	ON
1 COIN 1 CREDIT 2 COINS 2 CREDITS 3 COINS 3 CREDITS 4 COINS 5 CREDITS	ON	OFF	ON	ON	ON	OFF	ON	ON
1 COIN 1 CREDIT 2 COINS 3 CREDITS	OFF	ON	ON	ON	OFF	ON	ON	ON
1 COIN 2 CREDITS 2 COINS 4 CREDITS 3 COINS 6 CREDITS 4 COINS 8 CREDITS 5 COINS 11 CREDITS	ON	ON	ON	ON	ON	ON	ON	ON

UP 'N DOWN OPTION SWITCH SETTINGS - DIP SWITCH "B" SW#1 SW#2 SW#3 SW#4 SW#5 SW#6 SW#7 SW#8 **COCKTAIL TABLE MODEL OFF UPRIGHT MODEL** ON 3 CARS **OFF** OFF 4 CARS ON **OFF** 5 CARS ON ON 10,000 OFF OFF OFF 20.000 ON OFF OFF 30,000 **OFF** OFF ON **OFF** 40,000 ON ON 50,000 OFF **OFF** ON 60,000 ON **OFF** ON 70,000 OFF ON ON NO BONUS CAR AWARDED ON ON ON **EASY OFF** OFF **MEDIUM** ON OFF **HARD OFF** ON **HARDEST** ON ON INDICATES FACTORY RECOMMENDED SETTINGS PART NO. M051-00A64-A007

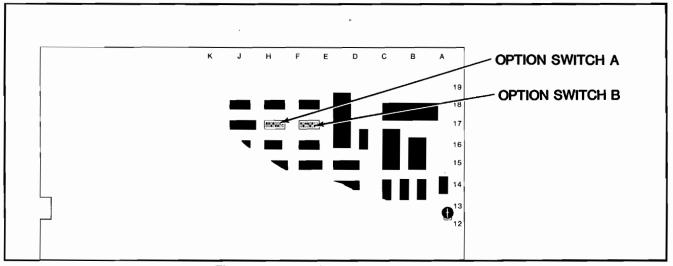


Figure 1-5 Option Switch Locations

II. Maintenance and Repair

INTRODUCTION

Your **NEW** game needs certain types of maintenance to keep it in good working order. **CLEAN**, well **MAINTAINED** games **attract players** and **EARN MORE PROFITS.**

The most important thing for you to remember is to play your game thoroughly EVERY TIME you collect money from the coin box. **JUST LOOKING** at your game **WILL NOT** tell you if all its controls and inside parts are working correctly. **ONLY** being familiar with and playing your game will inform you whether or not it is working the way it should.

The second most important thing you should remember is to clean the outside of the game and coin acceptor mechanisms on a regular basis.

CLEANING

The outside of the game cabinet plus the metal can be cleaned with any non-abrasive household cleaner. However, the front of the T.V. monitor tube and **both sides** of all other glass and plastic on or in the game MUST be cleaned with anti-static cleaner **ONLY**. For cleaning the coin acceptors: hot soapy water may be used on the plastic ones and any household cleanser may be used on the metal ones. If you wish, special coin machine cleaners that leave no residue may be purchased from your distributor.

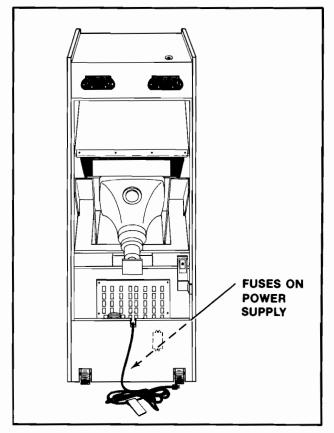
DO NOT dry-wipe any of the plastic panels. This is because any dust that was on them can scratch their surfaces. If this has happened, anyone looking through this type of damaged plastic would feel he was looking at the game through a fog. This fogging damage CANNOT be repaired or reversed. The ONLY solution is to **replace** the damaged piece of plastic.

FUSE REPLACEMENT

This game contains several fuses located as shown,

Replace fuses **ONLY** with the type and size listed in the Illustrated Parts Breakdown Section of your game manual.

See the T.V. Monitor Manual (available on request from your Distributor or the Monitor manufacturer) and/or the T.V. Troubleshooting Section of your game manual for information on these fuses.



Location of Fuses

☐ The control panel is held in place by two or three latches.

They are spring loaded to provide constant positive pressure on their latch plates.

They can be reached through the coin door AFTER turning power to the game off.

To release the latches, lift up and toward the front center of the control panel.

Once they are released, unhook them from their latch plates

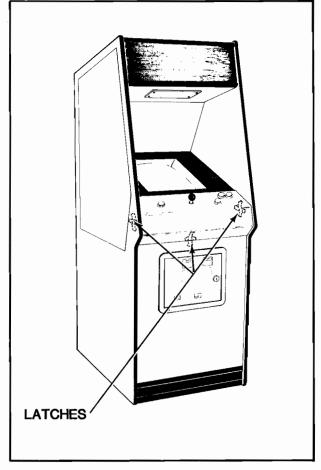
□ To remove the control panel:

Raise it up and tilt it toward you until you can see the cable behind it.

Cradling the control panel between yourself and the cabinet, disconnect it from its cabling and nylon retaining strap.

The control panel is now free and can be removed.

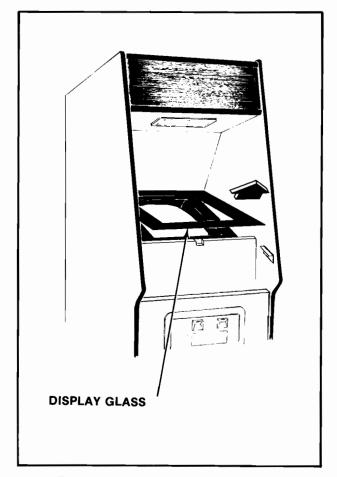
☐ To reinstall the control panel, reverse this procedure.



Opening the Control Panel - Upright

NOTE: In order to do this, the control panel **MUST** be removed first.

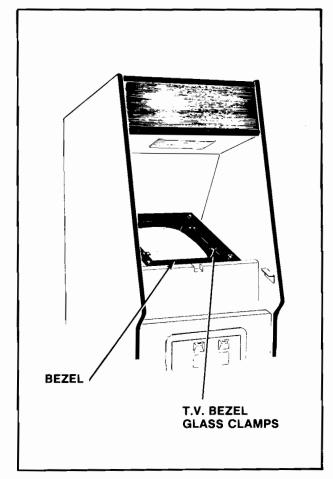
- ☐ Turn the power to the game off and remove the control panel.
- ☐ This frees the main-display-glass so it can be lifted up.
- ☐ By putting your finger in the hole in the middle of the main-display-glass support, you can lift it up and out.
- ☐ To reinstall the main-display-glass, reverse this procedure.



Removing the Main Display Glass - Upright

NOTE: In order to do this, the main-display-glass **MUST** be removed first. See the Upright Model procedure.

- ☐ Loosen the screws which secure the T.V. bezelglass-clamps in place.
 - Move the clamps to the side and the bezel glass may be removed.
 - Remove the above mentioned screws and the bezel with four bezel-glass-clamps may be removed.
- ☐ To reinstall the T.V. bezel assembly, reverse this procedure.



Removing the T.V. Bezel - Upright

WARNING: High voltages may exist in any television unit, even with the power disconnected. Use EXTREME CAUTION and do not touch electrical parts or the T.V. yoke area with your hands or with metal objects held in your hands! In addition, BE SURE TO USE HEAVY GLOVES when handling the monitor. You could cut your hands on the metal T.V. chassis without such protection.

DANGER: The T.V. monitor DOES NOT contain an isolation transformer on its chassis (it is mounted instead on the floor of the cabinet). When servicing the monitor on a test bench, YOU MUST ISOLATE THE MONITOR FROM AC VOLTAGE WITH AN ISOLATION TRANSFORMER.

UPRIGHT MODEL:

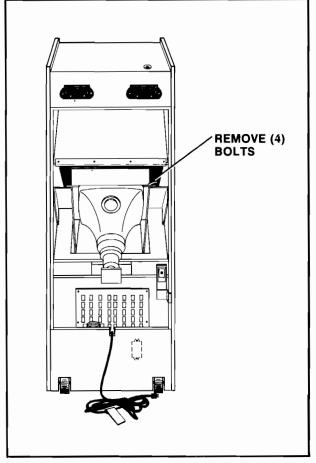
- ☐ Turn power off to the game.
- ☐ Open the rear access door.
- Completely disconnect the T.V. monitor from all its cabling. DON'T FORGET THE CHASSIS GROUND WIRE.

Before removing the T.V. monitor, the maindisplay-glass and bezel **MUST** be removed. See above "Upright Model" procedure.

With the removal of only four bolts, the T.V. monitor and its mounting channels will be loose.

The monitor mounting channels slide on top of and against two metal guides mounted to the cabinet's right and left sides. The monitor is removed by sliding it out the back of the cabinet.

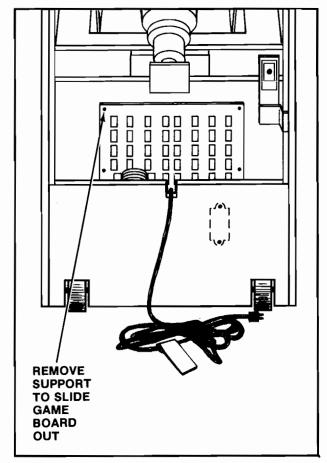
- ☐ To reinstall the T.V. monitor, reverse this procedure.
- After replacing the T.V. monitor, be sure to run the game Self-Test.



Removing the Monitor - Upright

- ☐ Turn the power to the game off.
- ☐ Unlock and open the rear access door
- ☐ Disconnect the game board from all its cabling.
- ☐ Remove the indicated P.C.B. supports and lift the above P.C.B. out of the cabinet.
- ☐ To reinstall the above P.C.B. reverse this procedure.

NOTE: P.C.B.'s are all keyed and will **ONLY** fit into their connectors one way without forcing them. The plugs on the cable harness which connect it to the P.C.B.'s are also keyed and will **ONLY** go onto their connectors one way without forcing them.



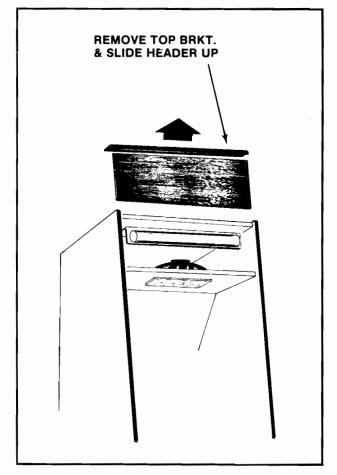
Removing P.C.B.'s - Upright

- ☐ Turn the power to the game off.
- ☐ Opening the attraction panel:

 Remove the screws which secure the top bracket in place. (They are on its top side.)

Remove the top bracket and slide up the attraction panel. This exposes the attraction panel fluorescent light tube and its mounting bracket assembly.

☐ To reinstall the attraction panel, reverse this procedure.



Opening the Attraction Panel - Upright

☐ Turn the power to the game off.

NOTE: In order to do this, the attraction panel **MUST** be removed first. See "Upright Model" procedure.

☐ The fluorescent light tube may be replaced at this time. BE CAREFUL NOT TO DROP IT.

WARNING: If you drop a fluorescent tube and it breaks, IT WILL IMPLODE! Shattered glass can fly six (6) feet or more from the implosion. Use care when replacing any fluorescent tube.

Replacing the fluorescent light tube starter.

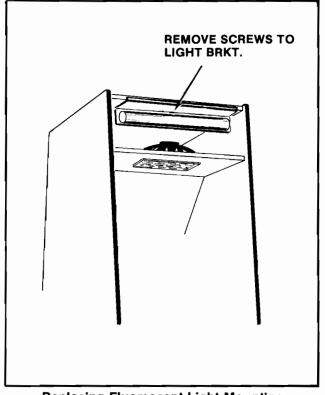
Be sure the power to the game has been turned off.

Grasp the starter (it is on the back of the mounting bracket), give it a quarter turn, and remove it from its socket.

- ☐ To replace the fluorescent light tube starter, reverse this procedure.
- ☐ Replacement of the fluorescent tube mounting bracket assembly.

Be sure the power is off to the game.

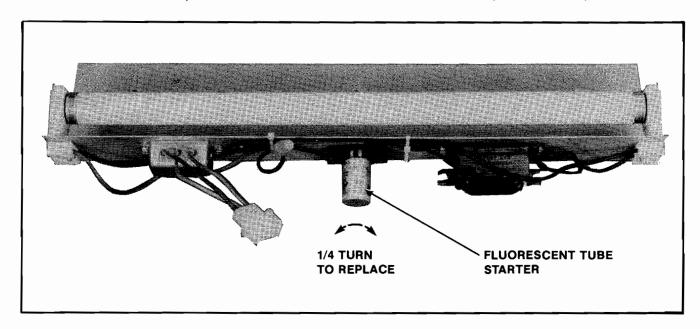
Disconnect it from its power cable.



Replacing Fluorescent Light Mounting Bracket - Upright

Remove the screws which secure it and gently slide it out the front of the cabinet, being careful not to catch its power cable on anything.

☐ To reinstall the fluorescent tube mounting bracket assembly, reverse this procedure.



Replacing Fluorescent Tube Starter

☐ Turn the power to the game off.

NOTE: In order to do this, the attraction panel **MUST** be removed first. See "Upright Model" procedure.

☐ Replacing the speaker.

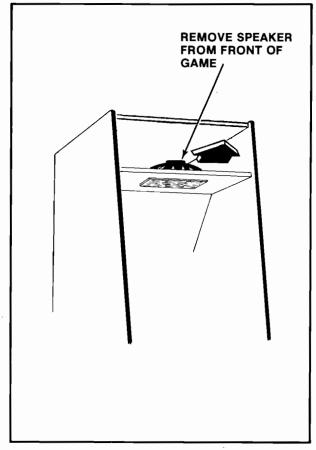
Be sure the power is off to the game.

Remove the attraction panel and disconnect the speaker from its cabling.

Remove the nuts and bolts which secure the speaker and speaker grill in place and set them and the speaker grill aside.

Once the bolts which secure the speaker in place are removed, the speaker may be removed through the opening where the attraction panel was.

☐ Reverse this procedure to reinstall the speaker.



Speaker Replacement

III. Technical Troubleshooting

Introduction

The most common problems occur in harness components such as the coin acceptor, player controls, interconnecting wiring, etc. The TV monitor and PCB computer cause their share of problems too, but not as much as the harness and its component parts. TV monitor troubleshooting will not be covered here because it is covered in that section of this manual.

As you already know, the PCB computer is a complex device with a number of different circuits. Some circuits remain basically the same among games, but overall there are a great many differences between them. PCB troubleshooting procedures, therefore, can be lengthy and will differ greatly among games. However, some basic Z-80 CPU information is involved in this section.

General Suggestions

The first step in any troubleshooting procedure is correctly identifying the malfunction's symptoms. This includes not only the circuits or features malfunctioning, but also those still operational. A carefully trained eye will pick up other clues as well. For instance, a game in which the computer functions fail completely just after money was collected may have a quarter shorting the PCB traces. Often, an experienced troubleshooter will be able to spot the cause of the problem even before opening the cabinet.

After all the clues are carefully considered, the possible malfunctioning areas can be narrowed down to one or two good suspects. Those areas can be examined by a process of elimination until the cause of the malfunction is discovered.

Harness Component Troubleshooting

Typical problems falling in this category are coin and credit problems, power problems and failure of individual features.

NO GAME CREDIT

For example, your prospective player inserts his quarter and is not awarded a game. The first item to check is if the quarter is returned. If the quarter is returned, the malfunction most certainly lies in the coin acceptor itself. First, use a set of test coins (both old and new) to ascertain that the player's coin is not undersize or underweight. If your test coins are also returned, coin acceptor servicing is indicated. Generally, the cause of this particular problem is a maladjusted magnet gate. Normally, this will mean slightly closing the magnet gate a little by turning the adjusting screw out a bit (see section on coin acceptor for more details).

If the quarter is not returned and there is no game credit, the cause of the malfunction may be in one of several areas. First try operating the coin return button; if the coin is returned, the problem is most likely in the magnet gate. Enlarge the gap according to the coin acceptor service procedures. If this does not cure the problem, remove the coin acceptor, clean it and perform the major adjustment procedure.

If the trapped coin is not returned when the wiper lever is actuated, you may have an acceptor jammed by a slug, gummed up with beer, a jammed coin chute, or mechanical failure of the acceptor mechanism. In this case, first check for the slug that will generally be trapped against the magnet. If so, simply remove the slug and test the acceptor. If the chute is blocked, remove the acceptor and remove the jammed coins. If there is actual failure of the acceptor, remove the unit and repair as indicated in the coin acceptor service procedures.

If the coin is making its way through the acceptor (that is, falling into the coin box), yet there is still no game credit, you either have a mechanical failure of the coin switch or electrical failure of the coin and credit circuits. The first place to begin is by checking the coin switch. Most of these switches are the make/break variety of micro switch, which is checked by testing for continuity between the NO, NC, and C terminals. When not actuated, the NC and C terminals should be continuous and the NO terminal open. When operated, the NO and C terminals should close and the NC should be open. If the coin switch checks out, examine the connections to the terminals to make sure there is good contact. If necessary, use the continuity tester and check from the terminal lug on the switch to the associated PCB trace. This will tell you if there is a continuous line all the way to the credit circuit.

If the coin switch wires do not check out, the problem is in the computer — most likely in the coin and credit circuitry.

If you do get game credit when a coin is deposited, but the game will not start when the start switch is pressed, you may have a problem in the start switch, the interconnecting wiring or in the computer. First check the switch. If the switch is OK, proceed to check the wiring. Again, make sure you go from the terminal lug on the switch to the PCB trace. This way, you will check the terminal contact as well as PCB edge connector contact. If the wiring is continuous, proceed to check the PCB credit circuit. If not, check each section of the wiring, until the discontinuity is located. If the wiring is OK, the problem must lie in the computer.

Transformer and Line Voltage Problems

Your machine must have the correct line voltage to operate properly. If the line voltage drops too low, a circuit in the computer will disable game credit. The point at which the computer will fail to work will vary some from game to game, but no game will work on line voltage that drops below 105 VAC.

Low line voltage may have many causes. Line voltage normally fluctuates a certain amount during the day as the total usage varies. Peak usage times occur mainly at dawn or dusk, so if your machine's malfunction seems to be related to the time of day, this may be a factor. A large load connected to the same line as the game (such as a large air conditioner or other device with an exceptionally large motor) may drop the line voltage significantly when starting up. This drop can result in an intermittent credit problem. In addition, poor connections in the location wiring, plug, or line cord may also cause a significant drop in power. Cold solder joints in the game's harness, especially in areas like the transformer connections, interlock switch, or fuse block. may also produce the same results, although probably on a more permanent basis.

Sometimes location owners (especially in bars) replace light switches with dimmer rheostats, and the game is sometimes on the same line. Obviously, the voltage available to the game is going to drop dramatically when the dimmer is turned.

In any case, the way to check for correct line voltage is with your VOM. Set the VOM to 250 VAC and stick the probes in the wall receptacle. If it's OK here, check the transformer primary connections. If you do not get 117 VAC, examine the solder joints on the transformer, fuse block, and interlock switch. If you do get 117 VAC, the problem must be either in the transformer, harness connections, or in the PCB power supply.

If you suspect the transformer, check its secondaries with the VOM set to 50 VAC and correlate the readings with the legend on the side of the transformer. The transformer must also be correctly grounded, so check the ground potential as well, especially if there is a hum bar rolling up or down the TV screen.

HARNESS PROBLEMS

Other harness problems include blowing fuses and malfunctioning controls. The repeating blown-fuse problem can sometimes be quite exasperating to solve, for short circuits have the tendency to occur in areas almost impossible to find. First, try inserting a new fuse, as old fuses age and blow without cause. If the new one also blows, you definitely have a short.

The best way to approach this problem is by turning the power off and disconnecting devices that may be causing the problem, such as the TV, transformer, and PCB. Disconnect the devices by pulling off their connectors, but do not allow them to touch. If necessary, insulate them with small pieces of electrical tape. Then, connect your VOM across the terminals of the fuse block (all electrical power shut off), and set it to one of the resistance scales. This will save blowing a fuse each time you want to check the circuit.

If the VOM reveals that disconnecting the devices removed the short, reconnect the devices one by one until the short returns. The last device connected is the one that is at fault. If the VOM reads a short even after the devices are disconnected, the fault must lie in the harness itself, and only patient exploration will reveal its location. First, carefully examine all the wiring, looking for terminals that may be touching, metal objects such as coins shorting connections or burned insulation. If necessary, use the VOM to check each suspected wire.

MALFUNCTIONING CONTROLS

One of the most common problems here is a bad potentiometer. Typically, a bad pot will cause the image to jump as it reaches a certain point. The only cure for this one is to install a new pot.

If a feature that is operated by a switch (for example, joysticks, foot pedals, control panel buttons) does not operate at all, check the switch with a VOM or continuity tester to verify its operation. If the switch does not check out, replace it. If the switch is OK, you should suspect the input to the switch from the PCB. In this case, get out the harness and logic schematics and check to see what kind of input it is. In many cases, the input will be +5 VDC. If so, use the VOM to check its presence. Normally, the switch is used to pull a +5 VDC line LOW to GND or to pull a LOW line HIGH. If the PCB output is missing, check the wire length from the PCB. If you find the signal at the PCB trace, the wire length or connection is at fault. If not, begin exploring the PCB using the logic schematics.

A Glossary of Microprocessor Terms

MICROPROCESSOR — one or several microcircuits that perform the function of a computer's CPU. Sections of the circuit have arithmetic and comparative functions that perform computations and executive instructions.

CPU — central-processing unit. A computing system's "brain", whose arithmetic, control and logic elements direct functions and perform computations. The microprocessor section of a microcomputer is on one chip or several chips.

PROM — programmable read-only memory. User permanently sets binary on-off bits in each cell by selectively fusing or not fusing electrical links. Non-erasable. Used for low-volume applications.

EPROM — erasable, programmable, read-only memory. Can be erased by ultraviolet light bath, then reprogrammed. Frequently used during design and

development to get programs debugged, then replaced by ROM for mass production.

ROM — read-only memory. The program, or binary on-off bit pattern, is set into ROM during manufacture, usually as part of the last metal layer put onto the chip. Nonerasable. Typical ROM's contain up to 16,000 bits of data to serve as the microprocessor's basic instructions.

RAM — random-access memory. Stores binary bits as electrical charges in transistor memory cells. Can be read or modified through the CPU. Stores input instructions and results. Erased when power is turned off.

LSI — large scale integration. Formation of hundreds or thousands of so-called gate circuits on semiconductor chips. Very large scale integration (VLS) involves microcircuits with the greatest component density.

MOS — metal-oxide semiconductor. A layered construction technique for integrated circuits that achieves high component densities. Variations in MOS chip structures create circuits with speed and low-power requirements, or other advantages (static will damage a MOS chip).

IV. Coin Door Maintenance

SPECIAL NOTE: If you have any questions about the coin acceptors in your game(s), please feel free to contact their manufacturers. Each manufacturer's name is **PROMINENTLY** imprinted on every acceptor mechanism.

Metal mechanisms only: COIN MECHANISMS, INC. 817 Industrial Drive Elmhurst, IL 60126 Phone (312) 279-9150 Metal and Plastic mechanisms: COINCO COIN ACCEPTORS, INC. 860 Eagle Drive Bensenville, IL 60106 Phone (312) 766-6781

COIN DOOR MAINTENANCE

METAL COIN ACCEPTOR MECHANISMS

Periodically, the metal coin acceptor mechanism(s) must be removed from the coin door and cleaned.

- 1. Make sure the power to the game is off.
- 2. Unlock and open the coin door.

- 3. Remove the coin acceptor mechanism as shown in Figure 4-1.
 - ☐ Push down on the two spring loaded latches.
 - ☐ While holding the latches down, pull the top of the coin acceptor mechanism toward you.
 - ☐ Release the latches and lift out the coin acceptor mechanism.

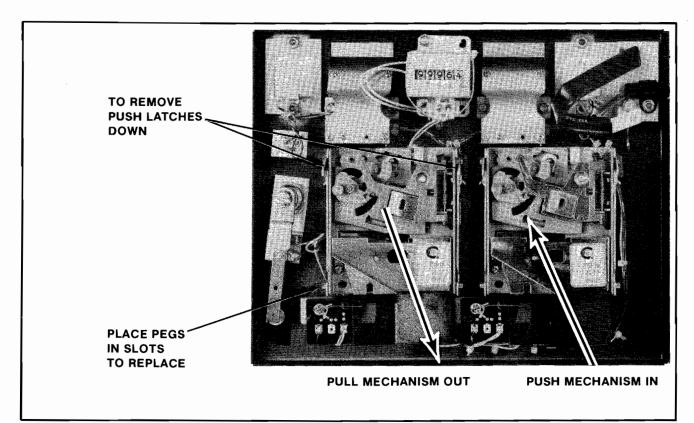


Figure 4-1 Removing & Replacing the Coin Acceptor

- 4. Clean the magnet of all foreign particles. See Figure 4-2.
 - ☐ This may be accomplished by swinging the gate open as shown in the **below** figure.
- Remove the cradles and undersize levers and clean the bushings. (A pipe cleaner makes a good bushing cleaner.)
 - ☐ Also clean the pivot pin.
- 6. Whenever needed, the coin acceptor should be cleaned with hot water and cleanser in the following manner:
 - ☐ Place the coin acceptor in boiling water for about ten minutes.

CAUTION: BE CAREFUL NOT TO BURN YOURSELF.

- □ Next, use a brush and kitchen cleaner to remove all remaining foreign matter from the unit.
- ☐ Rinse the coin acceptor in clean boiling water.
- ☐ Dry the coin acceptor thoroughly by using filtered compressed air to blow it dry.

NOTE: The reason we recommend using boiling water is that it evaporates faster than cold water and speeds drying time.

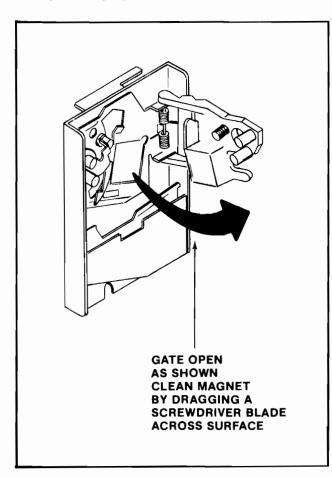


Figure 4-2 Cleaning the Metal Coin Acceptor

- 7. To lubricate the coin acceptor:
 - Use ONLY powdered graphite and put it ONLY on the moving parts of the coin acceptor. These parts are called out in Figure 4-3.
 - ☐ Be extremely careful to keep the powdered graphite away from paths that are traveled by the coins.

— WARNING — DO NOT USE OIL TO LUBRICATE THE COIN ACCEPTOR.

- 8. Check the coin chute for obstructions such as: paper, gum, etc.
- Reinstall the coin acceptor to the coin door. See Figure 4-1.
 - ☐ Place the two pegs at the coin acceptor's base into their retaining slots.
 - □ Now push the top of the coin acceptor toward the coin door until it snaps in place and is held there by the two spring loaded latches.
- 10. Close and lock the coin door.

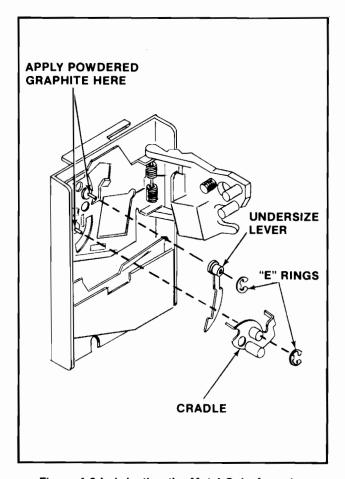


Figure 4-3 Lubricating the Metal Coin Acceptor

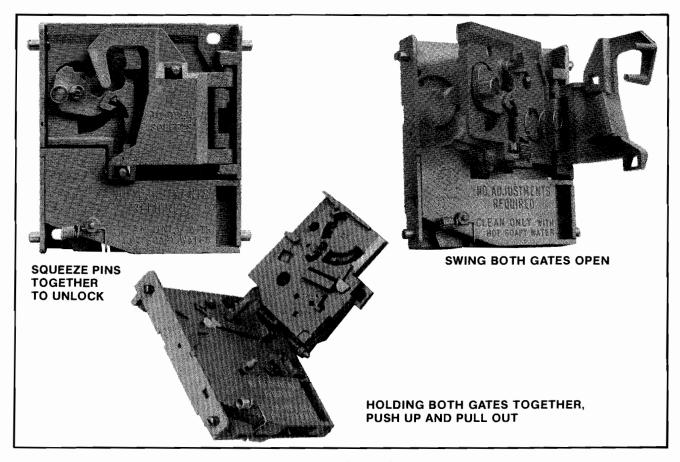


Figure 4-4 Opening the Plastic Coin Acceptor

PLASTIC COIN ACCEPTOR MECHANISMS

The plastic coin acceptor mechanism(s) must be removed periodically from the coin door and cleaned.

- 1. Make sure the power to the game is off.
- 2. Unlock and open the coin door.
- Remove the coin acceptor mechanisms(s) as shown in Figure 4-1.
 - ☐ Push down on the two spring loaded latches.
 - ☐ While holding the latches down, pull the top of the acceptor mechanism toward you.
 - ☐ Release the latches and lift out the mechanism.
- 4. Squeeze the two pins indicated in Figure 4-4 together to open the mechanism and break it down into its three basic parts.
 - ☐ Clean the mechanism in hot soapy water. It never rusts.
 - ☐ Rinse the mechanism in clean hot water and allow it to dry.

- ☐ Reassemble the mechanism (it never needs lubrication).
- 5. Check the coin chute for obstructions such as: paper, gum, etc.
- Reinstall the coin acceptor to the coin door. See Figure 4-1
 - ☐ Place the two pegs at the coin acceptor's base into their retaining slots.
 - □ Now push the top of the coin acceptor toward the coin door until it snaps in place and is held there by the two spring loaded latches.
- 7. Close and lock the coin door.

NOTE: See Figure 4-5 for instructions on how to set the plastic coin acceptor mechanisms to either accept or reject Canadian quarters.

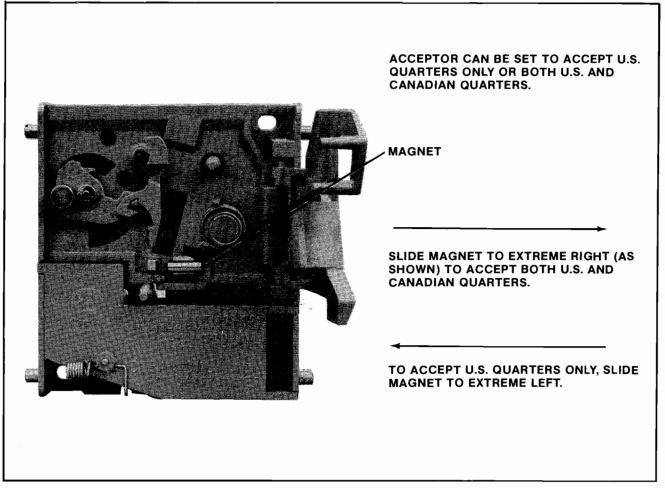


Figure 4-5 Changing the Plastic Coin Acceptor to Accept American or Canadian Quarters

V. T.V. Monitor Manual

PLEASE NOTE:

THE INFORMATION CONTAINED IN THIS SECTION IS TOLD IN AN EASY TO UNDERSTAND MANNER AND IS INTENDED TO AID THOSE WITHOUT AN ELECTRONICS DEGREE IN TROUBLESHOOTING AND REPAIRING THEIR GAMES T.V. MONITOR.

IF YOU READ THROUGH THIS SECTION AND STILL HAVE QUESTIONS, PLEASE CONTACT YOUR DISTRIBUTOR OR MIDWAY MANUFACTURING COMPANY AT THE TOLL FREE NUMBER PROVIDED WITH YOUR GAMES PAPERS.

OUR STAFF AND OUR DISTRIBUTORS STAND READY TO HELP YOU!

THANK YOU

Introduction: (How to use this section of your manual.)

This section has been designed to simply familiarize you with one of the more mystical components in your game - the T.V. monitor. If you are an electronics technician who is quite knowledgeable on the subject, you may decide to just go to the schematics and start troubleshooting the defective monitor. But if you are like most people, a monitor is a T.V. set, and that means a complex doo-dad that means big buck repairs. This isn't necessarily so. This section of the manual will acquaint you with the monitor and could just help you repair it if you feel adventurous enough to give it a try. If you have any knowledge of electronics, especially the use of a voltmeter, the repairs you can make are astonishing. Just keep in mind that ELECTRICITY CAN BE VERY **DANGEROUS, SO BE CAREFUL!!**

If you want to understand how a monitor works, just read the "THEORY OF OPERATION" subsection. If you wish, you can follow along with the schematics. The information is presented in a very basic manner but a more complete treatment of the subject can be found in the technical sections of bookstores.

If you want to attempt to repair your monitor, it would be a good idea to read this whole section beginning to end before starting. Pay attention to all warnings and take them seriously. The more equipment you have the better, but a low cost Volt-Ohm-Milliameter can often do the trick. Here are the steps to take:

- Find the symptom that matches the problems your monitor has in the "SYMPTOM — DIAG-NOSIS" subsection. The diagnosis tells the circuit or area the problem may be in and possibly even the actual component causing it.
- Once you have the circuit that is causing the trouble, read the "TROUBLESHOOTING" subsection to learn the procedure for finding the bad part.
- Next, go to the schematic section and find the schematic that matches your monitor. It may be helpful to read the "DIFFERENCES BETWEEN MONITORS" subsection if you are unsure of which monitor you have. Use the schematic to see what parts are in the offending circuit.

That really is all there is to it. Just remember that there are some bizarre or rare symptoms not covered, or that a monitor may have two or more different problems that only a genius, the experienced, or an experienced genius can figure out. But be patient, follow safety precautions, and remember that there is also literature available from the monitor companies through your distributor or from Bally Midway Manufacturing Company on request. (There is a toll free number on the back side of the front cover of this manual.)

Symptom Diagnosis

1. Insufficient width or heighth:

- A. Horizontal line (due to VERTICAL CIR-CUIT DEFECT).
 - □ Bad yoke.
 - ☐ Bad vertical output section.
 - ☐ Open fusible resistor in vertical section.
 - ☐ Bad height control.
 - ☐ Bad flyback.
- B. Vertical line (due to HORIZONTAL CIR-CUIT DEFECT).
 - □ Bad yoke.
 - □ Open width coil.
 - ☐ Open part in horizontal output section.

2. Picture spread out too far or crushed in certain areas:

- A. Horizontal or vertical output transistor.
- B. Bad Component in output circuitry.
- Vertical linearity or damper control needs adjustment.

3. Line too close with black spacing:

A. Problem in vertical section causing poor linearity.

4. Poor focus and convergence:

- A. Bad high voltage transformer ("flyback") or control.
- B. Focus voltage wire not connected to neck-board terminal.

5. Colors missing; check:

- A. Interface color transistors.
- B. Color output transistors.
- C. Cracked printed circuit board (neck Board).
- D. Color circuits.
- E. Video input jack.
- F. Defective picture tube.

6. Picture not bright enough:

A. Weak emission from picture tube.

7. Silvery effect in white areas; check:

- A. Beam current transistors.
- B. Weak picture tube emission.

8. Too much brightness with retrace lines; check:

- A. Beam limiter transistors.
- B. Brightness and/or color blanking control set too high.

9. Increasing brightness causes an increase in size and poor focus.

- A. Weak high voltage rectifier or regulation (high voltage unit).
- B. Bad component in monitor's power supply.

10. Small picture and/or poor focus:

A. Low B+ voltage (power supply trouble).

11. Vertical rolling:

- Vertical oscillator in the IC, vertical sync. transistor, or circuit.
- B. No sync from logic board.
- C. Three pin sync. jack is loose or plugged in wrong.

12. Horizontal line across center:

- A. Vertical output circuit is dead (see symptom No. 1. A.).
- B. Vertical oscillator is not putting out the right wave form.

13. Picture bends:

- A. Horizontal sync needs adjusting.
- B. Magnetic or electromagnetic interference.

14. Flashing picture, visable retrace lines:

- A. Broken neck board.
- B. Internal short circuit in the picture tube (arcing).

15. Unsymmetrical picture or sides of picture:

A. Defective yoke.

16. No brightness, power supply operating — No high voltage for the picture tube; check:

- A. Horizontal oscillator.
- B. Horizontal amplifier and output.
- C. Flyback transformer (high voltage unit).

17. No brightness, high voltage present; check:

- Heater voltage to the tube at the neck board.
- B. Screen-grid voltage for the tube.
- C. Focus voltage.
- D. Grid to cathode picture tube bias.

18. No high voltage; check:

- A. For AC input to the "flyback".
- B. Horizontal deflection stages.
- C. Flyback transformer.
- D. Yoke.
- E. Power supply.

19. No horizontal and vertical hold; check:

- A. Sync transistors and circuit.
- B. Wires and jack from logic board to the monitor.

20. Wavey picture — (power supply defect); check:

A. Transistors, diodes, electrolytic capacitors in the power supply.

21. Moving bars in picture:

- A. Ground connector off between monitor and logic boards.
- B. Defect in the power supply (see wavy picture symptom).

22. Washed out picture (see picture not bright enough):

A. Check video signal at the cathode pins with an oscilloscope. If there is about 80 volts peak to peak, the picture tube has weak emission.

23. Monitor won't turn on:

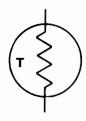
- A. Problem in the power supply: Check fuse, transistors, open fusible resistor.
- B. Shorted horizontal output transistor.

- C. Defective high voltage disabling circuit.
- D. Crack(s) somewhere on main chassis board.

24. Can't adjust purity or convergence:

- Use a degausser to demagnetize the picture tube carefully following your degausser's instructions.
- B. Picture tube defective.
- C. Nearby equipment is electromagnetically interferring.
- D. The poles of the earth are pulling off the purity see "A" above.
- E. Poor focus or width of picture.
- F. Make sure you have the correct CRT number for that brand of monitor.

Guide To Schematic Symbols



THERMISTOR
(POLARITY DOESN'T MATTER)



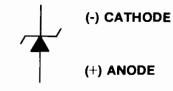
IRON CORE TRANSFORMER (SUCH AS A FLYBACK)



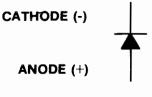
INDUCTOR, COIL, CHOKE (POLARITY DOESN'T MATTER)



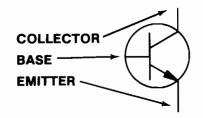
FUSE (POLARITY DOESN'T MATTER)



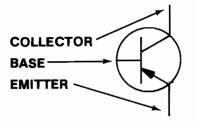
ZENER DIODE



DIODE



NPN TRANSISTOR



PNP TRANSISTOR



VARIABLE RESISTOR, POT, CONTROL (POLARITY DOESN'T MATTER)



RESISTOR (POLARITY DOESN'T MATTER)



LINES ARE CONNECTED



ELECTROLYTIC CAPACITOR



LINES ARE NOT CONNECTED



CAPACITOR (POLARITY DOESN'T MATTER)



Troubleshooting

Troubleshooting monitors requires experience, patience, and luck. The first step is to match the symptom the monitor displays to the diagnosis next to it in the "SYMPTOM-DIAGNOSIS" subsection. This will pinpoint the circuit the problem is probably in, and often the parts to check. Next, the circuit should be visually inspected to see if there are any parts broken, burned, or if something is there that shouldn't be, like a loose screw, etc. Some parts go bad before others and should be checked first. In fact, following is the general order in which parts usually go bad:

- Semiconductors (like transistors, diodes, and integrated circuits).
- Fusible resistors.
- Electrolytic capacitors.
- 4. Resistors.
- 5. Capacitors and coils.

Always remember that a monitor can bite like a snake. Even when it is turned off, capacitors hold voltage and will discharge it to you should you be touching chassis ground. The picture tube or CRT, itself, is a giant capacitor, so avoid the flyback anode plug hole. With the monitor on, the power supply circuit and/or the flyback, which puts out at least 23,000 volts, **CAN BE KILLERS!!** Avoid handling power transistors (usually output transistors) or ICs, yoke terminals, and other high power components when the monitor is on.

WARNING: That picture tube is a bomb!

When it breaks, first it implodes, then it explodes. Large pieces of glass have been known to fly in excess of 20 feet in all directions. DO NOT carry it by the long, thin neck. Discharge its voltage to ground by shorting the anode hole to ground. Use a plastic handled screwdriver, connect one end of a wire with an alligator clip at each end to chassis ground and the other end to the metal shaft of the screwdriver. Using ONE HAND ONLY (put the other in your pocket) and touching ONLY the plastic handle of the screwdriver (DO NOT TOUCH THE METAL SHAFT) stick the blade of the screwdriver into the anode hole.

IMPORTANT! The side brackets of the monitor are chassis ground as is the aquadag, the picture tube's dark conductive coating. **BUT**, on the ZENITH MONITOR there are metalic mounting parts which **ARE NOT** chassis ground. Discharging the CRT to these will damage the monitor!

Be prepared for a fairly loud pop and a flash. The longer the monitor has been turned off, the smaller the pop and dimmer the flash. But BE CARE-FUL, picture tubes will hold a very healthy charge for at least a week if not longer. Even after you've discharged it once, it may still carry a residual charge. It's better to be too careful than dead, which is why electronic equipment always carries stickers referring servicing to qualified personnel. Handle the side with the viewing screen against your chest when changing it. ALWAYS wear safety goggles when handling the picture tube.

To maintain the safety and performance of the monitor, always use exact replacement parts. For instance, the wrong components in the power supply can cause a fire, or the wrong color transistor may give a funny color to the picture. Service your monitor on a nonconductive firm table like wood, **NOT METAL**, and take off all of your jewelry just in case. With all this in mind, you are ready to begin troubleshooting.

Observe the picture carefully. Try to vary the appropriate control that would most likely affect your particular symptom. For example, if there is poor brightness or no picture, try turning up the brightness or contrast control. If the controls have no effect at all, chances are there is trouble with the control itself, the circuit it controls, or a nearby circuit that may be upsetting voltages. Go to the list of symptoms and determine with the schematic where the bad circuit is.

CAUTION:

Keep in mind that capacitors hold a charge as can the picture tube (for at least a week and usually longer), and could shock you.

First, check for obvious visual defects such as broken or frayed wires, solder where it is not supposed to be, missing components, burned components, or cracked printed circuit boards. If everything looks good up to this point, make sure that diodes, electrolytic capacitors, and transistors have their leads connected in the right polarity as shown on the schematic and the circuit board.

Turn on the power and measure the voltages at the leads of the active devices such as tubes, transistors, or integrated circuits. Any voltage that does not come within at least 10% to 15% of the voltage specified on the schematic indicates either a problem with that device or a component connected with it in the circuit. The next step is to use the ohmmeter to narrow down the field of possible offenders.

To test a transistor, one lead of the ohmmeter is placed on the base; and the other lead placed just on the emitter, then on the collector. A normal transistor will read either high resistance (infinite), or little resistance (400 to 900 ohms), depending on the polarity of this type transistor. Then the leads should be switched, one remaining on the base, and the other switched from the emitter to the collector. Now the opposite condition should result: the resistance should be infinite if it was lower when the other lead was on the base. Consistantly infinite readings indicate an open, and a short is demonstrated by 0-30 ohms on most of these test readings. Finally, place one lead on the collector, then the other on the emitter. No matter which lead is used, there should be infinite resistance. Any lower reading, such as 50 ohms (which is typical on a bad transistor), indicates a short.

This all sounds pretty confusing, but a little experience on a good transistor will make you an expert in no time. Usually, the lowest ohmmeter setting is used for testing transistors. Once in a great while a transistor may check out good on this test, but may actually be "leaky" or break down only on higher voltages. If in doubt, change it. It is also wise to check the transistor out of the circuit just in case some component in the circuit is affecting the ohmmeter reading.

A diode is tested like a transistor except it only has two leads. Again, there should be high resistance one way and little resistance the other. If it tests bad, take one lead out of the circuit in case some component is messing up the ohmmeter reading.

NOTE: DO NOT leave soldering equipment on the leads too long since all semiconductors, especially integrated circuits, are easily destroyed by heat.

Without special equipment, integrated circuits are checked by verifying the proper DC voltage on the pins and the correct AC wave form using an oscilliscope. BE CAREFUL: Shorting their pins can easily destroy them.

Resistors are checked with an ohmeter and should usually be within ten percent of the value stated on them and on the schematic. You may have to desolder one lead from the printed circuit board. If you wreck the foil on the board, carefully solder a small wire over the break to reconnect the conduc-

Capacitors are tricky. Their resistance goes up when checked with an ohmmeter which shows a charging action. As they suck up current from the meter, the voltage goes up and so does the resistance. If you are sure a particular circuit is giving you a problem and everything else checks out O.K., Electrolytic capacitors are prime suspects. Substitute a new one and keep your fingers crossed.

Theory of Operation

To understand what goes on inside the monitor, large general groups of circuits will be examined instead of laboriously analyzing the branches and small circuits that make up these groups. This will help avoid confusion and aid in a basic, concrete, knowledge of what makes up a monitor.

THE POWER SUPPLY —

The AC going to the monitor from the game transformer is just like the voltage and current from your wall outlet. It jumps up and down going positive and negative sixty times a second. But a monitor needs nice, smooth DC; direct current, not alternating. So diodes chop up the AC and a big electrolytic capacitor filters it out to make it even smoother. Since the monitor is a big piece of electronic equipment, with many circuits demanding a lot of power from the power supply, there are also zener diodes and transistors to help maintain a nice, constant, smooth voltage so that the monitor circuits don't jump around. And this is what happens when you see a wavy picture. There is AC creeping

through the power supply, so it must be malfunctioning. If the voltage from the power supply is too low, the other circuits will be starved for power and you may see a small, wavy picture, or none at all.

Some circuits receive voltages that are higher than what the power supply should put out. But they come from the flyback transformer which will be discussed later.

THE INTERFACE SECTION OF THE CHASSIS —

The interface section of the chassis is fairly easy to identify. It is right by the place where the video jack(s) from the logic board(s) plug into. There are sets of transistors that receive the separate red. green, blue, and sync information from the cables that come from the logic boards. The circuits jack up the voltage and match impedances, or in other words, prepare the logic board outputs for the circuits that will really amplify them for the output devices such as the yoke in the case of the sync, or the picture tube that shows the colors.

An interesting aside is that our sync is composite negative sync. That means two things:

- 1. The sync is a negative going wave form.
- There are two pulses going at different speeds over the same wire:
 - Vertical wave forms at 60 times per second (or Hertz) and
 - Horizontal wave forms at about 15,750 times per second (Hz).

The sync is amplified by a sync amplifier transistor and sent on its way to the oscillators. The sync or timing information will be explained along with the oscillator shortly.

The color information is sent via wires to the neck board where the main amplification occurs. This will also be discussed later.

VERTICAL AND HORIZONTAL DEFLECTION—

After the sync signal is amplified by the sync amp, it goes to two different sections, the vertical and horizontal circuits. Basically, the sync signals are for timing so the picture doesn't mess up since it is assembled like an orderly jigsaw puzzle, but so fast that you can't see the electron beams for each color painting the picture on the screen. This will all become clear soon. For now, we will follow the 60 cycle component of the sync as it goes on its journey to the deflection yoke.

The 60 cycle pulse goes to the vertical oscillator to make sure this circuit goes back and forth (or oscillates) at 60 times a second. Without this pulse keeping the circuit at the correct speed, it may get lazy and oscillate at 58 cycles or lower, or get ambitious and oscillate at 62 cycles or higher. At the wrong speed, the picture will start to roll up or down.

A Wells Gardner 13" (K4806) or 19" (K4906, K4956) color monitor uses an integrated circuit for its sync section. An Electrohome 13" or 19" color monitor uses an integrated circuit IC501 for its sync section. The Zenith monitor (CD19MXRF06) also uses an IC for the sync processing. Wells Gardner uses HA11423, Electrohome uses HA11244, and Zenith uses 221-175 (their part number). **These ARE NOT interchangeable!** The idea is all the same. The output to the vertical amplifying transistors for all monitors must form a sawtooth wave form, sort of like a bunch of pyramids, racing through the yoke's vertical coils at 60 times a second.

Along the way to the output transistors, the 60 cycle pulse is shaped and amplified to do the job: the yoke magnetically pushes the electron beam to fill the screen out sideways looking at the screen with the greatest length going up and down. Or viewing the screen sitting like a home television set, the amplified vertical output fills the screen up and down. Watching a monitor like this, seeing only a horizontal line means a problem with the vertical coils of the yoke or

anything from the vertical output section on back to the oscillator.

The horizontal section is very similar with a few exceptions. The horizontal wave shape is more like a square and has a frequency of 15,750 cycles a second. Both Wells Gardner and Electrohome use the other side of their respective integrated circuits for the horizontal circuitry. If the oscillator isn't going at the correct speed, the picture may move sideways, start to slant, or tear up with slanted thin figures. With both the vertical and horizontal of all monitors, there are variable resistors that change the speed of the oscillators up and down. This way you have controls that can make the correct frequencies to keep the electronic jigsaw puzzle nicely locked in place. If you're driving in a car and next to you someone else is driving their car at exactly the same speed, it will appear that they are not moving. And this is why the sync frequency and the oscillator's frequency must match, so the picture doesn't appear to move.

The correct wave form is shaped and amplified in the circuitry just like in the vertical section. But the horizontal output transistor is a large power transistor and not only serves to give current to the horizontal yoke windings, it also feeds the flyback transformer.

THE FLYBACK TRANSFORMER (OR HIGH VOLTAGE UNIT) —

The picture tube needs high voltage to light up, and the power supply can't meet this demand. The flyback transformer receives current alternating at about 15,750 times per second from the horizontal output transistor. The "flyback" jacks up its input voltage and puts out a higher voltage alternating at the same speed. But, in your "flyback" there are diodes that chop up the alternating voltage to make it a smooth DC output just like in the power supply. This is what goes through that thick red wire to your picture tube. THIS AREA HAS ABOUT 24,000 VOLTS ON IT AND IT CAN KILL YOU!!

The "flyback" may be dangerous, but it is also generous. It has extra output windings which give voltage to the heater pins of the picture tube, voltage for the vertical deflection circuits, and picture tube screen-grid voltage. So in a way, the high voltage "flyback" is like a second power supply.

COLOR CIRCUITS —

The color circuits are pretty straight forward. The signals go into the interface section where some amplification and impedance matching occurs. These circuits are pretty sparse and simple. Each color just has two transistors and a diode with some resistors and capacitors. From here, the AC color signal is sent by wires to the neck board.

The color output circuits are on the neck board. The color signals going to the transistors are controlled by two variable resistors called drive controls. There are only two, one for the red and one for the green on

Wells Gardner and Electrohome monitors. Zenith monitors have all three: red, blue and green.

The Wells Gardner and Electrohome monitor have another variable resistor in their emitter part of their color output transistors. These "cutoff controls" vary the amount of A.C. signal that the transistor amplifies and sends to the cathodes of the picture tube. The Zenith monitor has its cutoff controls in the interface section to vary the amount of signal going to the output transistors. The more signal, the more color.

If you think this is confusing, here is another little hitch. The Electrohome and Zenith monitors both have the actual A.C. picture information signal going through the emitters of the color output transistors. The Wells Gardner has the A.C. signal going to the base of the transistors. The blanking and beam limiting signals which come from the blanking and beam limiting transistors in the interface section go into the color output transistor base in the Electrohome and Zenith monitors, but enters into the emitter of the Wells Gardner monitor's color output transistor. Should you feel adventurous enough to look at this signal on an oscilloscope, it should look like a square.

The beam limiter helps control the brightness level, and the blanking transistor rapidly turns the picture tube on and off so that retrace lines don't show up on the screen. By turning up the brightness on a good monitor, these four to six retrace lines can be seen slanting diagonally across the picture.

PROTECTION CIRCUIT —

To protect the high voltage section against voltages that are too high coming from the power supply which could cause X-rays to be emitted from the "flyback", a circuit senses the higher power supply voltage and turns off the horizontal oscillator. Since the horizontal oscillator doesn't work, the horizontal output transistor has nothing to feed the "flyback" which in turn has nothing to feed the picture tube. The monitor will be silent, have no picture, and will appear to be off. But don't be fooled. There is still that excessive amount of voltage coming from the power supply. To find out, check at pin two of Wells Gardner's IC501 and emitter of X04 for the Electrohome monitor. Check the 95 volt test point (located near the "flyback") for the Zenith monitor. Here are the voltages you should receive:

Wells Gardner = 130VDC Electrohome = 120VDC Zenith = 95VDC

The best place to measure this voltage on an Electrohome monitor is at a pin marked B1 on the chassis. This is because a 13 inch color Electrohome monitor, The G07-FB0 or G07-902, has an integrated circuit and very little else in the power supply. Still, there should be 120VDC at B1.

THE PICTURE TUBE (OR CRT) —

ATTENTION! For information on picture tube replacement types, go to the last section, "PICTURE TUBE INTERCHANGEABILITY".

The picture tube or CRT is an output device. In other words, the end result of the circuit's work is displayed by this part. Actually, the output of other circuits is in the neck of the picture tube.

First, there is the heater. The heater boils off electrons from the cathodes so that they (the electrons) shoot up to the screen to excite the phosphors so that the three phosphors emit three colors of light.

The cathodes are next, and again they emit electrons to turn on the tube phosphors, making it glow. A defective cathode may cause the particular color it handles to be missing.

Next come the grids. The first grid is grounded. The following grid is the screen grid which receives about 300VDC depending on the brightness setting. The next grid closest to the picture tube screen is the focus grid which gets about one fifth the amount of voltage that is applied to the picture tube anode.

After jetting from the cathode through all these grids, the electrons speed through a mask, a sheet of material with tiny holes, and then excite the tiny dots of phosphor in the inside surface of the picture tube screen. The green electron gun (or cathode and circuitry) spits out electrons which head for the green phosphors only. The same goes for the red and blue guns. The way the phosphor light blends determines the color seen. Should these electron beams become too intense, they may burn the phosphor. With the monitor off, this can be seen as a dark permanent image of the video information on the tube screen.

Differences Between Monitors

The easiest way to identify the brand of monitor you are working with is to find the manufacturer's name or model number printed on the chassis or chassis base. But what if the monitor was in a Texas dust storm or buried in volcanic ash and this information is no longer there? Fear not! Each monitor has its own peculiarities and the following should help to identify them:

The **ELECTROHOME** G07-904 (19") and G07-902 (13") have their horizontal and vertical processing IC hidden under a silver can. A shiny metal top behind the "VERTICAL HEIGHT" and "HORIZONTAL FREQUENCY" control prove this is an Electrohome monitor.

The **WELLS GARDNER** K4906 (19") and K4806 (13") have their horizontal and vertical processing IC out in the open directly behind the "VERTICAL HOLD" control.

The **ZENITH** C019MXRF06 (19") monitor has its horizontal and vertical processing IC way in back by the picture tube. The monitor also has large white cables going from the main board to the neck board.

K4906 (1st TYPE) — This monitor's identifying tags have **BLACK** ink printed on a white background. There is **NO** Vertical Damping Control. (This Control would be next to the Vertical Hold Control but this area is jumpered with a small wire instead.

K4906 (2nd TYPE) — This monitor's identifying tags have RED ink printed on a white background. There IS a Vertical Damping Control next to the Vertical Hold Centrol. The Damping Control provides a few more lines on the top of the monitor screen (monitor viewed as a normal T.V. would be) for any video game that may need these lines to fit the picture on the screen. Moving the Control may distort the top part of your picture (or the side, depending on the game and how the monitor is mounted) so go ahead and move it if you are having this type of problem. To accommodate this new feature, there are a few circuit changes.

ONE MAJOR DIFFERENCE BETWEEN THESE TWO VERSIONS OF THE K4906 IS THE YOKE. They look the same but notice the part numbers:

K4906 WITHOUT the Damper Control: 2021111201

K4906 WITH the Damper Control: 2021111258

Since the companies like to change part numbers at the drop of a hat, the best thing to do is to request whatever part number is written on your yoke. If you should get the wrong yoke, the results will be:

Picture distortion.

Excessive brightness.

Too much or too little vertical picture size.

CONTROLS YOU MAY NOT TOUCH

Basically, on the Electrohome monitor, you can move any control you want **EXCEPT** for the B1 control. This sets the power supply voltage (ideally at 120 VDC) and is located right behind VERTICAL HOLD. The 13" Electrohome **DOES NOT** have this control. It may also be wise not to move the VERTICAL LINEARITY since this distorts the picture and is hard to reset perfectly. If you do move it, turn on the Cross Hatch Test Pattern of your game and try to get the squares to the point where they are equal in size by readjusting this Linearity Control.

On the Wells Gardner monitor, brightness is adjusted by the "BLACK LEVEL" Control which is right next to the Horizontal Frequency Control. Under the Focus Control is the "SCREEN" Control which you **DO NOT** touch. Yes, this control does adjust the brightness.

but it is used to set the CRT bias and is adjusted at the factory. When Wells Gardner sets it, they mark the position with a black mark on the knob. If you move it, be sure to realign the mark and THEN set the BLACK LEVEL Control to the brightness you desire. So, other than the SCREEN control, you may adjust any of the controls.

The Zenith monitor has a 95 volt adjustment control. It is green and located behind the jack labeled 3D3. To discourage you from moving it, Zenith has placed a little glue on top of this control.

Parts Interchangeability

Some parts can be interchanged on all of the monitors. Here are the rules:

- You CAN swap any resistor between monitors that has the same resistance, wattage rating, and tolerance.
- You CAN swap any capacitor between monitors that has the same capacitance and voltage rating.
- 3. You CAN swap many of the parts between the 19" and the 13" versions of each manufacturer's monitor. BUT, be certain to compare the manufacturers' part numbers to be positive the parts you want to interchange are identical. BE SURE you have read the section DIFFERENCES BE-TWEEN MONITORS which was covered earlier.
- 4. You MAY BE ABLE to swap picture tubes between monitors. In the past you could swap any picture tube, but due to rampant engineering changes and new monitor models being introduced, you would need a computer to keep track of what could be swapped. For more information on this subject, go to "PICTURE TUBE INTERCHANGEABILITY".
- 5. You CANNOT change any part that is a safety part, one that is shaded in gray on the schematic; it MUST be IDENTICAL to the original. To do otherwise IS DANGEROUS. For instance, the 13 inch Electrohome (G07-902) monitor "flyback" looks identical to the 19 inch Electrohome (G07-904) monitor "flyback". In fact, there is even a 19 inch Electrohome (G07-905) monitor (which is an obsolete model) with a similar looking "flyback". NONE OF THESE ARE INTERCHANGEABLE!!
- You CAN change any of the parts between the G07-904 and G07-907. They're essentially the same monitor except that the G07-907 has a vertically mounted picture tube.

If there is any doubt about what parts can be swapped between each manufacturer's 19 inch and 13 inch models, compare the manufacturer's part number between each one. If they match up, they are the same part.

Picture Tube Interchangeability

13" MONITORS

There are currently two 13" monitors being used: the Wells Gardner K4806 and the Electrohome G07-902. The picture tubes used are NOT interchangeable. The pins on the neck of the CRT will not fit in the socket should you use the wrong CRT.

Here is a chart for all the 13" color monitors Bally Midway uses.

ELECTROHOME G07-902 — 370ESB22 WELLS GARDNER K4806 — 370KSB22

19" MONITORS

Here it gets a little tricky. All of the picture tubes will fit no matter which is used. But if you use the wrong one, you will have problems with purity and/or dynamic convergence.

Purity trouble means that the color won't be true. If you turn up the color control for one color, instead of seeing that solid color it will show blotches or blobs of other colors on the screen.

Trouble with dynamic convergence means that there will be color fringing around solid lines at the edges of the screen.

The only way to ensure that you avoid these problems is to get the right picture tube or the right substitute.

Here is a list of the 19" monitors and the **CORRECT** CRT numbers.

ALL ELECTROHOME G07-904 -

19VMNP22 RCA 19VMJP22 RAULAND 510UJB22 HITACHI

WELLS GARDNER K4906 -

19VLTP22 RCA 19VMLP22 ZENITH 19VMKP22 PHILLIPS

ZENITH CD19MXRF06 —

19VMLP22 ZENITH 19VLTP22 RCA 19VMKP22 PHILLIPS The factory recommended CRT type could change in the future for one reason or another, but the listed picture tubes will work. As a matter of fact, you can call another picture tube company to see if they have a replacement number to recommend...but caveat emptor — let the buyer beware.

NOTES

Monitor Schematics

19" COLOR MONITOR SCHEMATIC DIAGRAM MODELS 19K4901, 19K4906, 19K4951, 19K4956

Power Supply Voltage and Symbols

Symbol	Voltage	Operating Circuit				
	15V	Vert. Osc. Sync Blanking CRT Cut-Off				
8	130 V	Horiz. Osc. Horz. Drive Horz. Output Vert. Output				
•	175V	Video Output				

SERVICE TECHNICIAN WARNING X-RAY RADIATION PRECAUTION: THIS PRODUCT CONTAINS CRITICAL **ELECTRICAL AND MECHANICAL PARTS**

PROTECTION. FOR REPLACEMENT PURPOSES, USE ONLY TYPE PARTS SHOWN IN THE PARTS LIST.

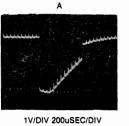
ESSENTIAL FOR X-RAY RADIATION

CAUTION: FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COM-PONENTS ONLY WITH MANUFAC-TURER'S RECOMMENDED PARTS. AVERTISSEMENT: POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT.

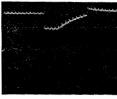
OSCILLOSCOPE WAVEFORM PATTERN

The waveforms shown are as observed on the wide band oscilloscope with the monitor turned to a reasonably strong signal and a normal picture. The voltages shown on each waveform are the approximate peak amplitudes.

if the waveforms are observed on the oscilloscope with a poor high frequency response, the corner of the pulses will tend to be more rounded than those shown and the amplitude of any high frequency pulse will tend to be less.



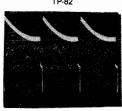




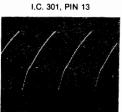
2V/DIV 200MSEC/DIV I.C. 301, PIN 3



1V/DIV 5MSEC/DIV



20V/DIV 5MSEC/DIV



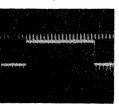
1VDIV 200uSEC/DIV



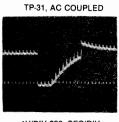
20V/DIV 10uSEC/DIV



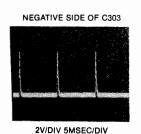
5V/DIV 20uSEC/DIV



1V/DIV 20u SEC/DIV



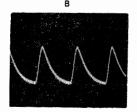
1V/DIV 200uSEC/DIV





TP-81

0.5/DIV 5MSEC/DIV

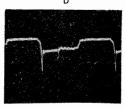


0.5/DIV 20u SEC/DIV

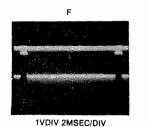
I.C. 301, PIN 15

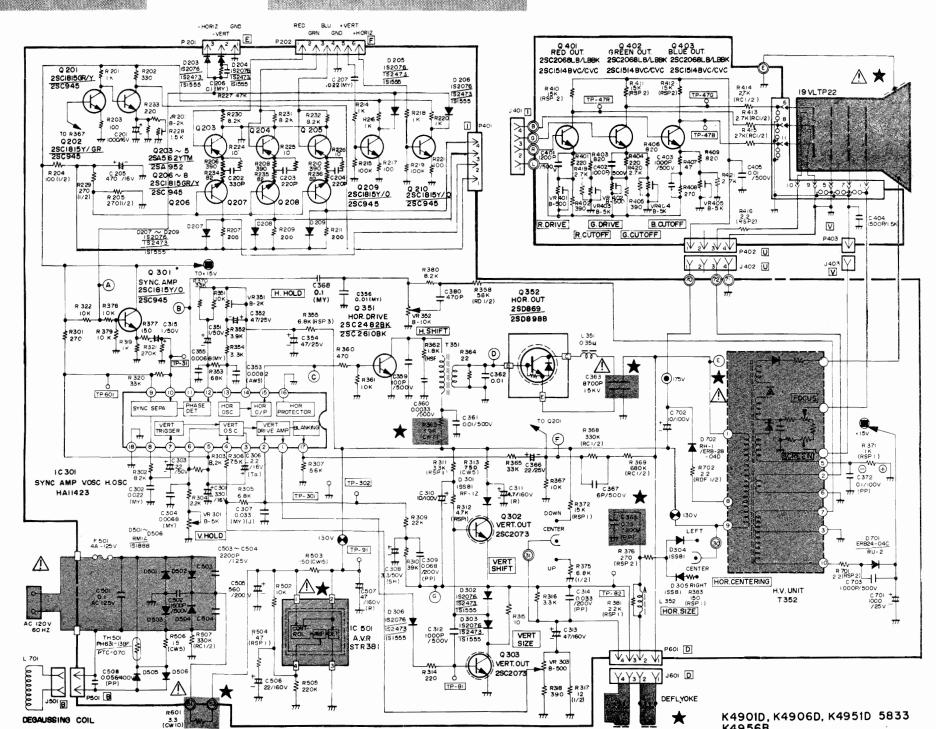


1V/DIV 10uSEC/DIV



2V/DIV 10uSEC/DIV





5-12

REPLACEMENT PARTS LIST

This monitor contains circuits and components included specifically for safety purposes.

For continued protection no changes should be made to the original design, and components shown in shaded areas of schematic, or △★ on parts list should be replaced with exact factory replacement parts. The use of substitute parts may create a shock, fire, radiation or other hazard. Service should be performed by qualified personnel only.

MAIN BOARD

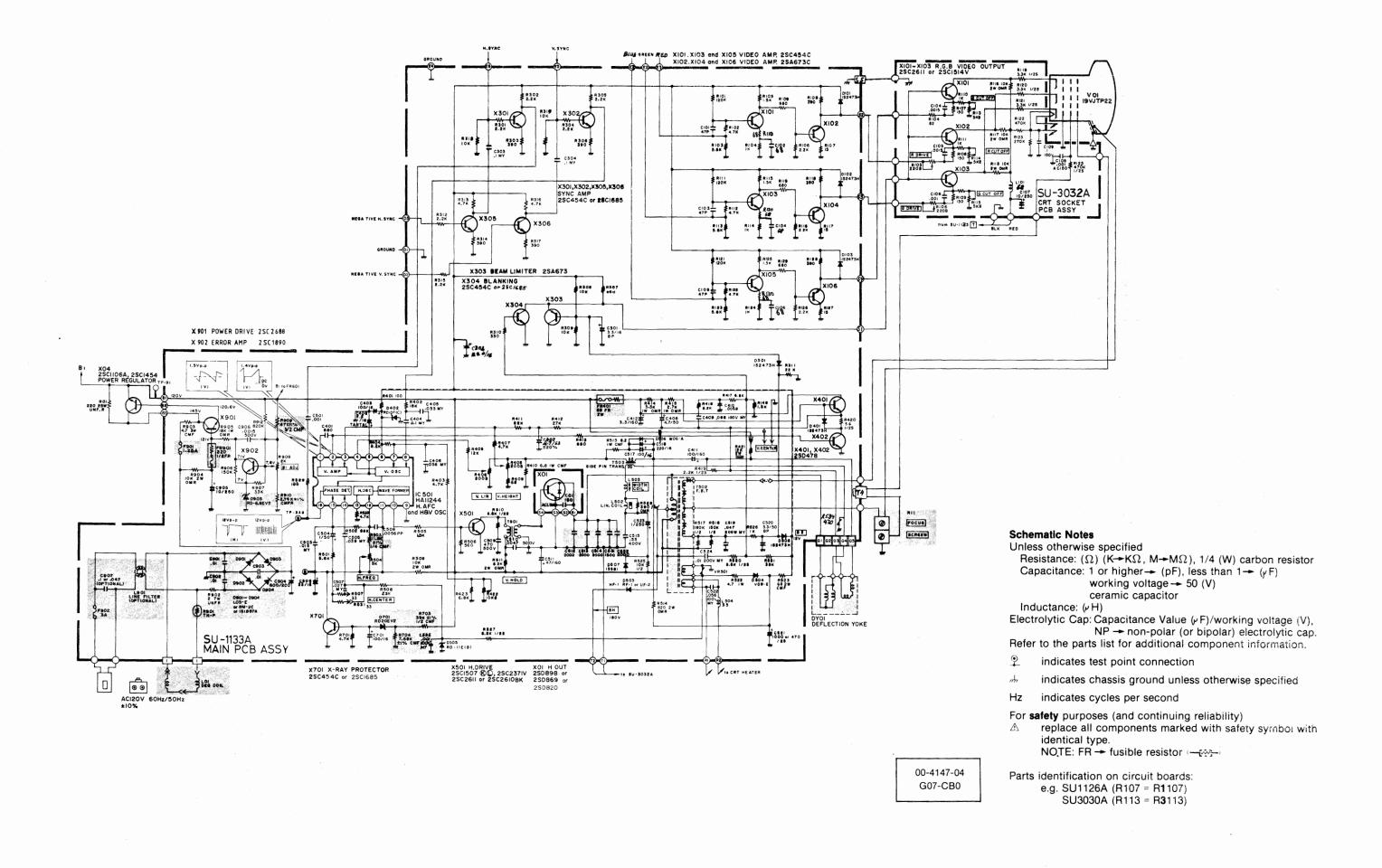
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
	RESI	STORS		RESIS	STORS (CONT.)
R201	203X6500-645	1K Ohm, 5%, 1/4W Carbon	R369	203X5602-329	680K Ohm, 5%, 1/2W Comp.
R202	203X6500-543	30 Ohm, 5%, 1/4W Carbon	R370	203X6501-002	33K Ohm, 5%, 1/4W Carbon
R203	203X6500-405	100 Ohm, 5%, 1/4W Carbon	R371	203X9014-584	1K Ohm, 5%, 1W Metal Oxide
R204	203X6700-327	100 Ohm, 5%, 1/2W Carbon	R372	203X9101-119	12K Ohm, 5%, 1W Metal Oxide
R205	203X6700-421	270 Ohm, 5%, 1/2W Carbon	R375	203X6700-763	6.8K Ohm, 5%, 1/2W Carbon
R206	203X6500-540	390 Ohm, 5%, 1/4W Carbon	R376	203X9104-404	270 Ohm, 5%, 2W Metal Oxide
R207	340X2201-934	200 Ohm, 5%, 1/4W Carbon	R377	203X6500-447	150 Ohm, 5%, 1/4W Carbon
R208	203X6500-540	390 Ohm, 5%, 1/4W Carbon	R378	203X6500-886	10K Ohm, 5%, 1/4W Carbon
R209	340X2201-934	200 Ohm, 5%, 1/4W Carbon	R379	203X6500-886	10K Ohm, 5%, 1/4W Carbon
R210	203X6500-540	390 Ohm, 5%, 1/4W Carbon	R380	203X6500-865	8.2K Ohm, 5%, 1/4W Carbon
R211	340X2201-934	200 Ohm, 5%, 1/4W Carbon	R381	203X6500-724	2.2K Ohm, 5%, 1W Metal Oxide
R214	203X6500-645	1K Ohm, 5%, 1/4W Carbon	R383	203X9014-387	150 Ohm, 5%, 1W Metal Oxide
R215	203X6501-126	100K Ohm, 5%, 1/4W Carbon	R502	203X6500-886	10K Ohm, 5%, 1/4W Carbon
R216	203X6500-645	1K Ohm, 5%, 1/4W Carbon	R503	204X1700-535	150 Ohm, 5%, 15W Metal Oxide
R217	203X6500-405	100 Ohm, 5%, 1/4W Carbon	R504	203X9014-267	47 Ohm, 5%, 1W Metal Oxide
R218	203X6500-645	1K Ohm, 5%, 1/4W Carbon	R505	203X6501-209	2.2K Ohm, 5%, 1/4W Carbon
R219	203X6501-126	100K Ohm, 5%, 1/4W Carbon	R506	203X9104-105	15 Ohm, 5%, 2W Metal Oxide
R220	203X 6 500-645	1K Ohm, 5%, 1/4W Carbon	R507	203X5602-185	330K Ohm, 5%, 1/2W Comp.
R221	203X6500-405	100 Ohm, 5%, 1/4W Carbon	△ ★R601	204X1625-058	3.3 Ohm, 5%, 10W WW
R222	203X6500-762	3.3 Ohm, 5%, 1/4W Carbon	R701	203X9105-141	2.2 Ohm, 5%, 2W Metal Oxide
R224	203X6500-169	10 Ohm, 5%, 1/4W Carbon	R702	203X6206-441	2.2 Ohm, 5%, 1/2W Carbon
R225	203X6500-169	10 Ohm, 5%, 1/4W Carbon	VR201	204X2070-072	2K Ohm-B Semi-Fixed
R226	203X6500-169	10 Ohm, 5%, 1/4W Carbon	VR301	204X2070-084	5K Ohm-B Semi-Fixed
R227	203X6501-044	47K Ohm, 5%, 1/4W Carbon	VR303	204X2070-055	500 Ohm-B Semi-Fixed
R228	203X6500-645	1K Ohm, 5%, 1/4W Carbon	VR351	204X2070-072	2K Ohm-B Semi-Fixed
R229	203X6700-421	270 Ohm, 5%, 1/2W Carbon	VR352	204X2070-072	2K Ohm-B Semi-Fixed
R230	203X6500-863	8.2K Ohm, 5%, 1/2W Comp.			
R231	203X6500-863	8.2K Ohm, 5%, 1/2W Comp.			
R232	203X6500-863	8.2K Ohm, 5%, 1/2W Comp.			
R233	203X6500-468	180 Ohm, 5%, 1/4W Carbon		CAPA	CITORS
R234	340X2820-934	82 Ohm, 5%, 1/4W Carbon			
R235	340X2820-934	82 Ohm, 5%, 1/4W Carbon	C201	203X0014-088	1000 uF, 16V, Electrolytic
R236 R301	340X2820-934 203X6500-508	82 Ohm, 5%, 1/4W Carbon	C202	202X7200-064	330 pF, 500V, Ceramic
R302	203X6500-508 203X6500-863	270 Ohm,5%, 1/4W Carbon 8.2K Ohm, 5%, 1/4W Carbon	C203	202X7200-043	220 pF, 500V, Ceramic
R303	203X6500-863	8.2K Ohm, 5%, 1/4W Carbon	C204	202X7200-043	220 pF, 500V, Ceramic
R304	203X6500-724	2.2K Ohm, 5%, 1/4W Carbon	C205	203X0014-076	470 uF, 16V, Electrolytic
R305	203X6500-842	6.8K Ohm, 5%, 1/4W Carbon	C206 C207	203X1810-149 349X2232-109	0.1 uF, 125V Mylar .022 uF, 100V M ylar
R306	203X6003-201	7.5K Ohm, 2%, 1/4W Carbon	C301	203X0014-065	330 uF, 50V Electrolytic
R307	203X6500-825	5.6K Ohm, 5%, 1/4W Carbon	C302	203X1600-563	0.033 uF, 50V Mylar
R309	203X6500-965	22K Ohm, 5%, 1/4W Carbon	C303	203X0629-037	3.3 uF, 50V Electrolytic
R310	203X6500-988	39K Ohm, 5%, 1/4W Carbon	C304	203X1600-366	0.068 pF, 50V Mylar
R311	203X6500-762	3.3K Ohm, 5%, 1/4W Carbon	C306	203X0412-012	2.2 uF, 16V Tantal
R312	203X9014-741	4.7K Ohm, 5%, 1/4W Carbon	C307	203X1600-634	0.033 uF, 50V Mylar
R313	204X1450-537	1K Ohm, 5%, 5W Carbon	C308	203X0025-174	3.3 uF, 50V Electrolytic
R314	203X6500-481	220 Ohm, 5%, 1/4W Carbon	C309	203X1207-100	0.068 uF, 100V PP
R315	203X6500-169	10 Ohm, 5%, 1/4W Carbon	C310	203X0629-061	10 uF, 100V Electrolytic
R316	203X6500-762	3.3K Ohm, 5%, 1/4W Carbon	C311	203X0041-025	10 uF, 160V Electrolytic
R317	203X6700-107	12 Ohm, 5%, 1/2W Carbon	C312	202X7050-248	1000 pF, 500V Ceramic
R318	203X6500-540	390 Ohm, 5%, 1/4W Carbon	C313	203X0040-052	47 uF, 160V Electrolytic
R319	203X6500-645	1K Ohm, 5%, 1/4W Carbon	C314	203X1201-265	0.033 uF, 200V PP
R320	203X6501-002	33K Ohm, 5%, 1/4W Carbon	C315	203X0629-023	1 uF, 50V Electrolytic
R321	203X6501-224	270K Ohm, 5%, 1/2W Carbon	C351	203X0629-023	1 uF, 50V Electrolytic
R322	203X6500-886	10K Ohm, 5%, 1/4W Carbon	C352	203X0619-045	47 uF, 25V Electrolytic
R351	203X6500-886	10K Ohm, 5%, 1/4W Carbon	C353	203X1190-015	0.0082 pF, 50V Mylar-PP
R352	203X6500-785	3.9K Ohm, 5%, 1/4W Carbon	C354	203X0619-045	47 uF, 25V Electrolytic
R353	203X6501-088	68K Ohm, 5%, 1/4W Carbon	C355	203X1600-366	0.0068 pF, 50V Mylar
R354	203X6500-762	3.3K Ohm, 5%, 1/4W Carbon	C356	202X7050-483	0.01 uF, 500V Ceramic
R355	203X9205-143	6.8K Ohm, 5%, 3W Metal Oxide	C359	202X8065-606	100 pF, 500V Ceramic
R358 R360	203X5601-878	56K Ohm, 5%, 1/2W Carbon	C360	202X7050-366	0.0033 pF, 500V Ceramic
R361	203X6500-561 203X6500-886	470 Ohm, 5%, 1/4W Carbon 10K Ohm, 5%, 1/4W Carbon	C361	202X7050-483	0.01 uF, 500V Ceramic
R362	203X9014-645	1.8K Ohm, 5%, 1/4W Carbon	C362	202X7203-032	0.01 uF, 50V Ceramic
★R363	204X1527-751	3.9K Ohm, 5%, 7W Metal Oxide	△★C363	203X1270-911	8700 pF, 1.5 KV PP
R364	203X6500-246	22 Ohm, 5%, 1/4W Carbon	★C365	203X1201-265	0.33 uF, 200V PP
R365	203X6501-002	33K Ohm, 5%, 1/4W Carbon	C366	203X0019-026	22 uF, 25V Electrolytic
R367	203X6500-886	10K Ohm, 5%, 1/4W Carbon	C367 C368	202X8065-162 202X7203-032	6 pF, 500V Ceramic 0.01 uF, 50V Ceramic
R368	203X5602-185	330K Ohm, 5%, 1/2W Comp.	C372	202X7203-032 203X1207-125	0.1 uF, 100V PP
		7	3372	2007 1207-120	0.1 df , 100 ¥ FF

MAIN BOARD (CONT.)

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
	CAPACITO	RS (CONT.)		SEMICONDUC	CTORS (CONT.)
C380	202X7200-087	470 uF, 500V Ceramic	Q206	200X3181-523	Transistor (NPN) 2SC1815GR
△ C501	203X1810-149	0.1 uF, 125V Mylar	Q207	200X3181-523	Transistor (NPN) 2SC1815GR
A C502	202X7050-282	1500 pF, 500V Ceramic	Q208	200X3181-523	Transistor (NPN) 2SC1815GR
△ C503	202X7810-214	2200 pF, 125V Ceramic	Q209	200X3181-523	Transistor (NPN) 2SC1851GR
△ C504	202X7810-214	2200 pF, 125V Ceramic	Q210	200X3181-523	Transistor (NPN) 2SC1851GR
C505	203X0220-075	560 uF, 200V Electrolytic	Q301	200X3181-523	Transistor (NPN) 2SC1851GR
C506	203X0040-034	22 uF, 160V Electrolytic	Q302	200X3207-306	Transistor (NPN) 2SC2073LBGI
C507	203X0041-057	47 uF, 160V Electrolytic	Q303	200X3207-306	Transistor (NPN) 2SC2073LBGI
C701	203X0019-092	1000 uF, 25V Electrolytic	Q351	200X3248-217	Transistor (NPN) 2SC2482BK
C702	203X0634-061	10 uF, 100V Electrolytic	Q352	200X4589-802	Transistor (NPN) 2SD898B
C703	202X7050-248	1000 pF, 500V Ceramic	IC301	200X2300-033	IC HA11423
0.00		, , , , , , , , , , , , , , , , , , , ,	Δ★ IC501	200X2600-183	IC STR381
	SEMICON	IDUCTORS	- A 1000		
D203	201X2010-159	Diode, IS2076-27		TRANSFOR	MERS & COILS
D204	201X2010-159	Diode, IS2076-27	1.054		
D205	201X2010-159	Diode, IS2076-27	L351	201X4710-134	Coll, (RF Choke)
D206	201X2010-159	Diode, IS2076-27	L352	201X5000-083	Coll, Horiz. Size
D207	201X2010-159	Diode, IS2076-27	L701	611X0004-007	Coll, Adg.
D208	201X2010-159	Diode, iS2076-27	T351	202X1300-080	Transformer, Hor. Drive
D209	201X2010-159	Diode, IS2076-27	△★ T352	200X9720-301	HV-Unit M-11
D301	201X2010-165	Diode, ISS81		MICOEL	LANEOUS
D302	201X2010-159	Diode, IS2076-27		MISCEL	LANEOUS
D303	201X2010-159	Diode, IS2076-27	△ F501	204X7120-073	Fuse, 4 Amp. 125V
D304	201X2120-009	Diode, RH-IV	J402	206X5008-632	Recep W Wire 3P-M-BG
D305	201X2120-009	Diode, RH-IV	P201	204X9600-466	Plug, PWB 3P-J
D306	201X2010-159	Diode, IS2076-27	P202	204X9601-477	Plug, PWB 6P-Q
△ D501	201X3120-216	Diode, RM-1AV	P401	204X9600-298	Plug, PWB 4P-B
∆ D502	201X3120-216	Diode, RM-1AV	P501	204X9600-249	Plug, PWB 2P-B
△ D503	201X3120-216	Diode, RM-1AV	P601	204X9600-304	Plug, PWB 4P-C
△ D504	201X3120-216	Diode, RM-1AV	TH501	201X0100-112	Thermistor
D505	201X3120-216	Diode, RM-1AV			
D506	201X3120-216	Diode, RM-1AV		EINIAL 400	514511/ 54556
D701	201X2130-234	Diode, RU-2V		FINAL ASS	EMBLY PARTS
D702	201X2120-009	Diode, RH-1V		△★ 88X0138-506	19VLTP22 Pix Tube
Q201	200X3181-523	Transistor (NPN) 2SC1815GR		205X9800-158	Lateral/Purity Assembly
Q202	200X3181-523	Transistor (NPN) 2SC1815GR		△ ★ 202X1111-201	Yoke Deflection
Q203	200X4056-260	Transistor (PNP) 2SA562-Y-TM		204X9301-255	CRT Socket
Q204	200X4056-260	Transistor (PNP) 2SA562-Y-TM		291X5004-262	Automatic Degaussing Coil Uni
Q205	200X4056-260	Transistor (PNP) 2SA562-Y-TM		20 : 7:000 : 202	

NECK BOARD

RESISTORS				CAPA	CITORS
R401	203X6000-729	220 Ohm, 5% 1/4W Carbon	C401	202X7050-269	1200 pF, 500V Ceramic
R402	203X6500-540	390 Ohm, 5% 1/4W Carbon	C402	202X7050-248	1000 pF, 500V Ceramic
R403	203X6000-661	820 Ohm, 5% 1/4W Carbon	C403	202X7050-248	1000 pF, 500V Ceramic
R404	203X6000-729	220 Ohm, 5% 1/4W Carbon	C404	202X7050-282	1500 pF, 1.5KV Ceramic
R405	203X6500-540	390 Ohm, 5% 1/4W Carbon	C405	202X7050-483	0.01 uF, 500V Ceramic
R406	203X6000-661	820 Ohm, 5% 1/4W Carbon			,
R407	203X6000-729	470 Ohm, 5% 1/4W Carbon			
R408	203X6000-998	270 Ohm, 5% 1/4W Carbon		SEMICON	IDUCTORS
R409	203X6000-661	820 Ohm, 5% 1/4W Carbon	Q401	200X3206-800	Transistor (NPN) 2SC2068L
R410	203X9104-824	15K Ohm, 5% 2W M.O. Forming	Q402	200X3206-800	Transistor (NPN) 2SC2068L
R411	203X9104-824	15K Ohm, 5% 2W M.O. Forming	Q403	200X3206-800	Transistor (NPN) 2SC2068L
R412	203X9104-824	15K Ohm, 5% 2W M.O. Forming	Q+00	200/0200-000	11411313101 (147 14) 23020001
R413	203X6000-998	2.7K Ohm, 5% 1/2W Comp.			
R414	203X6000-998	2.7K Ohm, 5% 1/2W Comp.		MISCELL	LANEOUS
R415	203X6000-998	2.7K Ohm, 5% 1/2W Comp.	1404	/	
R416	203X9105-154	2.2 Ohm, 5% 2W Metal Oxide	J401	206X5009-296	RECEP W Wire 4P-E
R419	203X6500-741	2.7K Ohm, 5% 1/4W Carbon	P402	204X9600-254	Plug, PWB 3P-A
R420	203X6500-741	2.7K Ohm, 5% 1/4W Carbon	P403 P701	204X9600-981	Plug, Pin 1P-D
R421	203X6500-741	2.7K Ohm, 5% 1/4W Carbon	P/01	204X9601-020	Plug, PWB 4P-E
VR401	204X2115-014	500 Ohm, -B Semi-Fixed			
VR402	204X2115-014	500 Ohm, -B Semi-Fixed			
VR403	204X2115-006	5K Ohm, -B Semi-Fixed			
VR404	204X2115-006	5K OhmB Semi-Fixed			
VR405	204X2115-006	5K Ohm, -B Semi-Fixed			



REPLACEMENT PARTS LIST—ELECTROHOME 19" MONITOR

Components identified by the \triangle symbol in the PARTS LIST and on the Schematic have special characteristics important to safety.

DO NOT degrade the safety of the set through improper servicing.

Abbreviations for Resistors and Capacitors

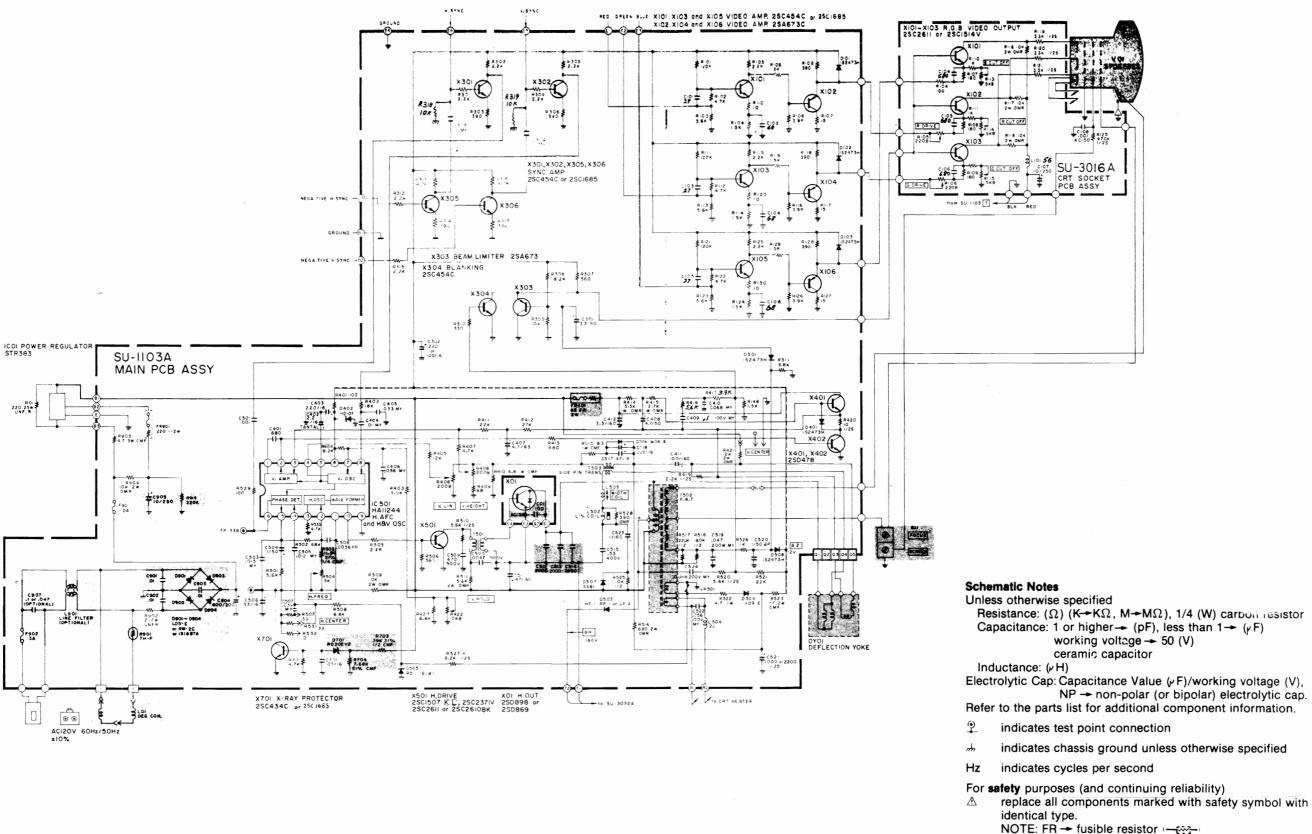
Resistor			Capacitor		
CR	:	Carbon Resistor	C Cap.	:	Ceramic Capacitor
Comp. R	:	Composition Resistor	М Сар.	:	Mylar Capacitor
OM R	:	Oxide Metal Film Resistor	E Cap.	:	Electrolytic Capacitor
V R	:	Variable Resistor	BP E Cap.	:	Bi-Polar (or Non-Polar)
MF R	:	Metal Film Resistor			Electrolytic Capacitor
CMF R	:	Coating Metal Film Resistor	ММ Сар.	:	Metalized Mylar Capacitor
UNF R	:	Nonflammable Resistor	PP Cap.	:	Polypropylene Capacitor
FR	:	Fusible Resistor	MPP Cap.	:	Metalized PP Capacitor
			PS Cap.	:	Polystyrol Capacitor
			Tan. Cap.	:	Tantal Capacitor

NOTE: When ordering replacement parts please specify the part number as shown in this list including part name, and model number. Complete information will help expedite the order.

Use of substitute replacement parts which do not have the same safety characteristics as specified, may create shock, fire or other hazards. For maximum reliability and performance, all parts should be replaced by those having identical specifications.

			ranny emola 200 y. ranto 2101					
Symbol	Description Main P.C.B. Ass'y	Part Number SU-1133A	Symbol	Descri	iption ussing Coil	Part Number 21-1007-30		
	CRT Socket P.C.B. Ass'y	SU-3032A	D911,	Dogac	200111g CO11	21 1007 00		
	Purity Shield Ass'y	07-220083-03	D912	Rectif	ier 1 Amp 600V (2)	28-22-27		
	ranty official racy	0, 220000 00	5012		rminal (2)	34-708-01		
Outside of	of the P.C.B. Ass'y				rminal Housing	34-709-01		
Symbol	Description	Part Number			Shield (2 pcs.)	35-3847-01		
·	Picture Tube 19"	17-7198-03		•	Shield (2 pcs.)	35-3847-02		
\triangle	△Deflection Yoke	A29779-D=21-141-01	C911		itor 100nF 10% 400V	48-171544 - 62		
	PC Magnet	A75034-B=29-32-01	R921		or, Wirewound 33Ω , 4W	42-113301-03		
\triangle	∆Flyback Transf.	A29951-B		Fire R	etardant Term. Strip 4 Lug	34-492-09		
\triangle	∆HVR	A46600-A						
R05	UNF Resistor 220Ω,25W K	QRF258K-221 CRT Socke		Socket P.C.B. Ass'y (SU-3032A) Parts List				
C04	C Capacitor 150pF, AC1.5KV	QCZ0101-005			,			
X01	Si. Transistor	2SD870	Resistors					
X02	Si. Transistor	2SC1106A	Symbol	Descri	•	Part Number		
SC	Screw #8-%	31-610818-06	R3105	V	R 200	QVZ3234-022		
SC	Screw ¼ x ¾ Pix Tube Mtg. (4)	31-601418-12	R3106	V	R 200	QVZ3234-022		
WA	Pyramidal Lock Washer (4)	33-255-01	R3113	V	R 5K	QVZ3234-053		
	Nut Retainer, Pix Tube Mtg. (4)	33-494-01	R3114	V	R 5K	QVZ3234-053		
	Clip—P.C.B. Support	33-629-02	R3115	V	R 5K	QVZ3234-053		
	Standoff	33-670-010R-02	R3116	ОМ	R 10KΩ2W J	QRG029J-103		
	Wire Terminal (Gnd. Strap)	34-228-03	R3117	ОМ	R 10KΩ2W J	QRG029J-103		
	Terminal Lug (Gnd.)	34-33-04	R3118	ОМ	R 10KΩ2W J	QRG029J-103		
	Groundstrap Assy.	34-574-02	R3119	Comp		QRZ0039-332		
	Grounding Spring	35-212-03	R3120	Comp	· · · · · · · · · · · · · · · · · · ·	QRZ0039-332		
	Wire Hook (Gnd. Strap)	35-3053-02	R3121	Comp	. R 3.3KΩ½W K	QRZ0039-332		
	Purity Shield Holddown Clamp	35-2348-01	Capacitors					
	Support Brkt. RH	35-3890-01	Symbol	De	escription	Part Number		
	Support Brkt. LH	35-3890-02	C3107	Е (Cap. 10uF 250V A	QEW53EA-106		
	Chassis Base	38-449-02	C3108	C (Cap. 1000pF DC1400V P	QCZ9001-102M		
	Yoke Wedge (3)	39-1233-01						

CRT Socket P.C.B. Ass'y (SU-3032A) Parts Li		s List (Cont.)	Main PCB As	s'y (SU-1133A) Pa	133A) Parts List (Cont.)		
Coils			Symbol	Description	Part Number		
Symbol	Description	Part Number	L1502	Linarity Coil	A39835		
L3101	Peaking Coil	QQL043K-101		•			
Semi- conductors			L1503 L1504	Width Coil Heater Choke	C30380-A C30445-A		
Symbol	Description	Part Number	Transformers				
X3101	Si. Transistor	2SC1514VC	Symbol	Description	Part Number		
X3102	Si. Transistor	2SC1514VC	T1501	Hor. Drive Transf.	A46022-BM		
X3103	Si. Transistor	2SC1514VC	T1503	Side Pin Transf.	C39050-A		
			11000	Older III II alisi.	000000 A		
Miscellaneous		Daut Massalaas	Semi-				
Symbol	Description	Part Number	conductors				
Δ	△CRT Socket	A76068	Symbol	Description	Part Number		
			IC1501	IC	HA11244		
Main PCB A	ass'y (SU-1133A) Parts List		X1101	Si. Transistor	2SC1685(R)		
Resistors			X1102	Si. Transistor	2SA673(C)		
Symbol	Description	Part Number	X1103	Si. Transistor	2SC1685(R)		
-		QVZ3230-002	X1104	Si. Transistor	2SA673(C)		
R1406			X1105	Si. Transistor	2SC1685(R)		
R1408	V R 200Ω	QVZ3230-002	X1106	Si. Transistor	2SA673(C)		
R1410	CMF R 6.8Ω1WJ	QRX019J-6R8	X1301	Si. Transistor	2SC1685(R)		
R1414	OM R 3.3KΩ1W J	QRG019J-332	X1301 X1302	Si. Transistor	2SC1685(R)		
R1415	OM R 2.7KΩ1W J	QRG019J-272					
R1421	OM R 12KΩ2W J	QRG026J-123Z	X1303	Si. Transistor	2SA673(C)		
R1422	V R 10KΩ	QVZ3230-014	X1304	Si. Transistor	2SC1685(R)		
△FR1401	ΔF R 68Ω2W K	QRH024K-680M	X1305	Si. Transistor	2SC1685(R)		
△R1503	ΔCMF R 11.8KΩ¼W+1%	QRV142F-1182	X1401	Si. Transistor	2SD478		
R1504	$V = R + SK\Omega$	QVZ3230-053	X1402	Si. Transistor	2SD478		
			X1501	Si. Transistor	2SC2610BK		
R1509	OM R 10KΩ2W J	QRG026J-103Z	X1901	Si. Transistor	2SC2688 (K.L.M.)		
R1512	OM R 8.2KΩ2W J	QRG026J-822Z	X1902	Si. Transistor	2SC1890A (E.F.)		
R1514	OM R 820Ω2W J	QRG026J-821Z	D1101	Si. Diode	W06A		
R1515	CMF R 8.2Ω1W J	QRX019J-8R2	D1102	Si. Diode	W06A		
R1522	CMF R 4.7Ω1WJ	QRX019J-4R7	D1103	Si. Diode	W06A		
R1523	OM R 68Ω2W J	QRG026J-680Z	D1301	Si. Diode	1SZ473H		
R1528	OM R 390Ω1WJ	QRG019J-391	D1401	Si. Diode	1SZ473H		
R1534	ZN R	ERZ-C05ZK471	D1402	Zener Diode	RD10F(C)		
VR1501	ZN R	ERZ-C05ZK271	D1503	Si. Diode	HF-1		
∆R1703	ΔCMF R 39Ω½W+1%	QRV122F-3902	D1504	Si. Diode	V09E		
∆R1703 ∆R1704	\triangle CMF R 7.68K Ω ¼W+1%	QRV142F-7681	D1505	Zener Diode	RD11E(B)		
	APosistor	A75414	D1506	Si. Diode	W06A		
∆R1901			D1507	Si. Diode	1SS81		
R1902	UNF R 2Ω7W K	QRF076K-2R0	D1507	Si. Diode	1SZ473H		
R1903	CMF R 4.7Ω3W J	QRX039J-4R7	△D1701	∆Zener Diode	RD20EV2		
R1904	OM R 10KΩ2W J	QRG026J-103Z	△D1901	∆Si. Diode	1S1887A		
R1905	OM R 18KΩ1WJ	QRG019J-183	△D1901	∆Si. Diode	1S1887A		
∆ Q1908	\triangle CMF R 47 Ω ½W+1%	QRV122F-470Z					
∆R1909	V R 2KΩ	QVP5A0B-023E	△D1903	∆Si. Diode	1S1887A		
R1910	\triangle CMF R 2.74K Ω ¼W+1%	QRV142F-274I	△D1904	∆Si. Diode	1S1887A		
∆FR1901	∆ F R 220Ω½W K	QRH124K-221M	△ D1905	∆Zener Diode	RD6.8EV3		
0			Miscellaneous				
Capacitors	Description	Don't Mumbar	Symbol	Description	Part Number		
Symbol	Description	Part Number	∆F1901	∆Fuse 1.25A	QMF53U1-1R25S		
C1301	BPE Cap. 3.3uF 50V A	QEN61HA-335Z	∆F1902	∆UL Fuse 3A	QMF66U1-3R0S		
C1402	Tan Cap. 2.2uF 16V K	QEE51CK-225B	231 1002	ZOLI GOC OA	QIVII OOO I OI IOO		
C1407	E Cap. 4.7uF 6.3V A	QEW51JA-475					
C1411	E Cap. 100uF 160V A	QEW52CA-107					
C1412	E Cap. 3.3uF 160V A	QEW52CA-335					
C1508	PP Cap. 5600uF 50V J	QFP31HJ-562					
∆C1512	△PP Cap. 2000pF DC1500V J	QFZ0082-202					
∆C1513	△PP Cap. 2000pF DC1500V J	QFZ0082-202					
∆C1514	△PP Cap. 2000pF DC1500V J	QFZ0082-202					
C1515	PP Cap. 0.53uF DC1200V J	QFZ0067-534					
C1520	BPE Cap. 3.3uF 50V A	QEN61HA-335Z					
C1523	E Cap. 1uF 160V A	QEW62CA-105Z					
C1524	M Cap. 0.1uF 200V K	QFM720K-104M					
△C1524	△PP Cap. 2000pF DC1500V J	QFZ0082-202					
	△PP Cap. 1500pF DC1500V J						
△C1532		QFZ0082-152					
C1904	E Cap.	QEY0034-001					
C1905	E Cap. 10uF 250V A	QEW52EA-106					



G07-FBO 00-4147-03 Parts identification on circuit boards: e.g. SU1126A (R107 = R1107)

SU3030A (R113 = R3113)

REPLACEMENT PARTS LIST-ELECTROHOME 13" MONITOR

Components identified by the △ symbol in the PARTS LIST and on the Schematic have special characteristics important to safety.

DO NOT degrade the safety of the set through improper servicing.

Abbreviations for Resistors and Capacitors

Resistor			Capacitor		
CR	:	Carbon Resistor	C Cap.	:	Ceramic Capacitor
Comp. R	:	Composition Resistor	М Сар.	:	Mylar Capacitor
OM R	:	Oxide Metal Film Resistor	E Cap.	:	Electrolytic Capacitor
VR	:	Variable Resistor	BP E Cap.	:	Bi-Polar (or Non-Polar)
MF R	:	Metal Film Resistor			Electrolytic Capacitor
CMF R	:	Coating Metal Film Resistor	MM Cap.	:	Metalized Mylar Capacitor
UNF R	:	Nonflammable Resistor	PP Cap.	:	Polypropylene Capacitor
FR	:	Fusible Resistor	MPP Cap.	:	Metalized PP Capacitor
			PS Cap.	:	Polystyrol Capacitor
			Tan. Cap.	:	Tantal Capacitor

NOTE: When ordering replacement parts please specify the part number as shown in this list including part name, and model number. Complete information will help expedite the order.

Use of substitute replacement parts which do not have the same safety characteristics as specified, may create shock, fire or other hazards. For maximum reliability and performance, all parts should be replaced by those having identical specifications.

SERVICE REPLACEMENT PARTS LIST

Chassis Base

Main P.C.B. Ass'y (SU-1103A) Parts List

			Resistors				
Symbo	ol Description	Part Number	Symbol	Descr	iptio	on	Part Number
	Main P.C.B. Ass'y	SU-1103A	R1406	V	R	200Ω	QVZ3230-022
	CRT Socket P.C.B. Ass'y	SU-3016A	R1408	V	R	200Ω	QVZ3230-022
Outeid	e of the P.C.B. Ass'y		R1410	CMF	R	6.8Ω1W J	QRX019J-6R8
	•		R1414	OM	R	3.3K <i>Ω</i> 1W J	QRG019J-332
Symbo		Part Number	R1415	OM	R	2.7KΩ1W J	QRG019J-272
∆V01	△Picture Tube 13"	370ESB22(E)	R1421	OM	R	12KΩ2W J	QRG029J-123
△DY01	△Deflection Yoke	C29123-V	R1422	V	R	10KΩ	QVZ3224-014H
	PC Magnet	A76366-A	∆FR1401	ΔF	R	68Ω2W K	QRH024K-680M
	Wedge	C30006	∆R1503	Δ CMF	R	11.8 <i>Ω</i> ¼W +1%	QRV142F-1182
	△Flyback Transf.	A19183-A	R1504	V	R	5KΩ	QVZ3230-053
∆R11	∆Focus V R	A46606-A	R1509	OM	R	10KΩ2W J	QRG029J-103
∆R05	UNF Resistor 220Ω,25W. K	QRF258K-221	R1511	OM	R	5.6K <i>Ω</i> 2W J	QRG029J-562
Δ C04	△C Capacitor 150pF, A C1.5KV	QCZ0101-005	R1514	OM	R	6 8 0Ω2W J	QRG029J-681
X01	Si. Transistor	2SD869	R1515	CMF	R	8.2Ω1W J	QRX019J-8R2
IC01	IC Regulator	STR383	R1522	CMF	R	4.7Ω1W J	QRX019J-4R7
L01	Degaussing Coil	21-1007-31	R1523	OM	R	56Ω2W J	ORG029J-560
	Degaussing Coil Pin Terminal (2)	34-708-01	R1528	OM	R	390Ω1W J	ORG019J-391
	Degaussing Coil Pin Terminal		R1534	ZN	R		ERZ-C05ZK471
	Housing	34-709-01	VR1501	ZN	R		ERZ-C05DK271
	Groundstrap Ass'y	34-697-04	∆R1703	Δ CMF	R	39KΩ½W +1%	QRV122F-3902
	Groundstrap Wire Terminal	34-228-03	∆R1704	Δ CMF	R	7.68KΩ¼W +1%	QRV142F-7681
	Groundstrap Spring (2)	35-3560-01	∆R1901	△Posist	or		A75414
BR	Support Bracket RH	35-3919-01	R1902	UNF	R	2Ω7W K	QRF076K-2R0
BR	Support Bracket LH	35-3919-02	R1903	CMF	R	5.6 <i>Ω</i> 3W J	QRX039J-5R6
SC	SCREW 10-1/2 Pix Tube Mtg. (4)	31-631018-08	R1904	OM	R	10KΩ2W J	QRG026J-103Z
WA	Pyramidal Lockwasher (4)	33-255-01	∆FR1901	ΔF	R	220Ω½W K	QRH124K-221M
	Clip P.C.B. Support (2)	33-629-02					
	Ground Lug	34-33-04					

38-452-01

Main P.C.B. Ass'y (SU-1103A) Parts List

Capacitors Symbo! Description Part Number QEE51CK-225B C1402 Tan. Cap. 2.2uF 16V K E Cap. 100uF 160V A E Cap. 3.3uF 160V A PP Cap. 5600pF 50V J E Cap. 47uF 160V A C1411 QEW52CA-107 C1412 QEW52CA-335 C1508 QFP31HJ-562 C1511 QEW52CA-476S △PP Cap. 2000pF DC1500V J △C1512 QFZ0082-202 **∆**C1513 △PP Cap. 2000pF DC1500V J QFZ0082-202 △C1514 ΔPP Cap. 2500pF DC1500V J QFZ0082-252 C1515 PP Cap. 0.53uF DC1200V K QFZ0067-534 BPE Cap. 1uF 50V A C1520 QEN61HA-105Z C1524 Cap. 0.1uF 200V K QFM72DK-682M C1904 Cap. QEY0034-001 E Cap. 10uF 250V A C1905 QEW52EA-106 △MM Cap. 0.1uF AC150V Z QFZ9008-104

Coils Symbol	Description	Part Number
L1501	Peaking Coil	A75360-6
L1502	Liniarty Coil	A39934
L1503	Width Coil	C30380-A
L1504	Heater Choke	C30333-A
L1901	Line Filter	A39475-J

Transforme	ers	
Symbol	Description	Part Number
T1501	Hor. Drive Transf.	A46022-BM
T1503	Side Pin Transf.	C39050-A

Semi- conductor	s	
Symbol	Description	Part Number
IC1501	I.C.	HA11244
X1101	Si. Transistor	2SC1685(R)
X1102	Si. Transistor	2SA673(C)
X1103	Si. Transistor	2SC1685(R)
X1104	Si. Transistor	2SA673(C)
X1105	Si. Transistor	2SC1685(R)
X1106	Si. Transistor	2SA673(C)
X1301	Si. Transistor	2SC1685(R)
X1302	Si. Transistor	2SC1685(R)
X1303	Si. Transistor	2SA673(C)

X1303	Si. iransistor	25A6/3(C)
X1304	Si. Transistor	2SC1685(R)
X1305	Si. Transistor	2SC1685(R)
X1401	Si. Transistor	2SD478
X1402	Si. Transistor	2SD478
X1501	Si. Transistor	2SC2610BK
X1701	Si. Transistor	2SC1685(P-
D1101	Si. Diode	W06A
D1102	Si. Diode	W06A
D1103	Si. Diode	W06A
D1301	Si. Diode	1S2473H
D1401	Si. Diode	1S2473H
D1402	Zener Diode	RD10F(C)
D1503	Si. Diode	HF-1
D1504	Si. Diode	V09E
D1505	Zener Diode	RD11E(B)
D1506	Si. Diode	W06A
D1507	Si. Diode	1S S 81
D1508	Si. Diode	1S2473H
△D1701	∆Zener Diode	D20EV2
A	A	

∆D1901

△D1902

∆D1903

△D1904

Wilscellan	eous	
Symbol	Description	Part Number
∆ F1901	∆Fuse 1A	QMF53U1-1R0
 ∆F1902	∆UL Fuse 3A	QMF66U1-3R0

CRT Socket P.C.B. Ass'v (SU-3016A) Parts List

CUI SOCKAI	P.C.D. ASS y (30-3010A) i	raits List
Resistors Symbol R3105 R3106 R3113 R3114 R3115 R3116 R3117 R3118 R3119 R3120	Description V R 200Ω V R 200Ω V R 5KΩ V R 5KΩ V R 5KΩ OM R 10KΩ2W J OM R 10KΩ2W J OM R 10KΩ2W J Comp. R 3.3KΩ½W K Comp. R 3.3KΩ½W K	Part Number QVZ3234-022 QVZ3234-022 QVZ3234-053 QVZ3234-053 QVZ3234-053 QRG029J-103 QRG029J-103 QRG029J-103 QRZ0039-332 QRZ0039-332
R3121	Comp. R 3.3KΩ½W K	QRZ0039-332
Capacitors Symbol C3107 C3108	Description E Cap. 10uF 250V A C Cap. 1000pF DC1400V P	Part Number QEW52EA-106 QCZ9001-102
Coils Symbol L3101	Description Peaking coil	Part Number QQL043K-101
Semicondu Symbol X3101 X3102 X3103		Part Number 2SC2611 2SC2611 2SC2611
Miscellaneo	ous	
Symbol $ riangle$	Description CRT Socket	Part Number A75522

∆Si. Diode

△Si. Diode

∆Si. Diode

∆Si. Diode

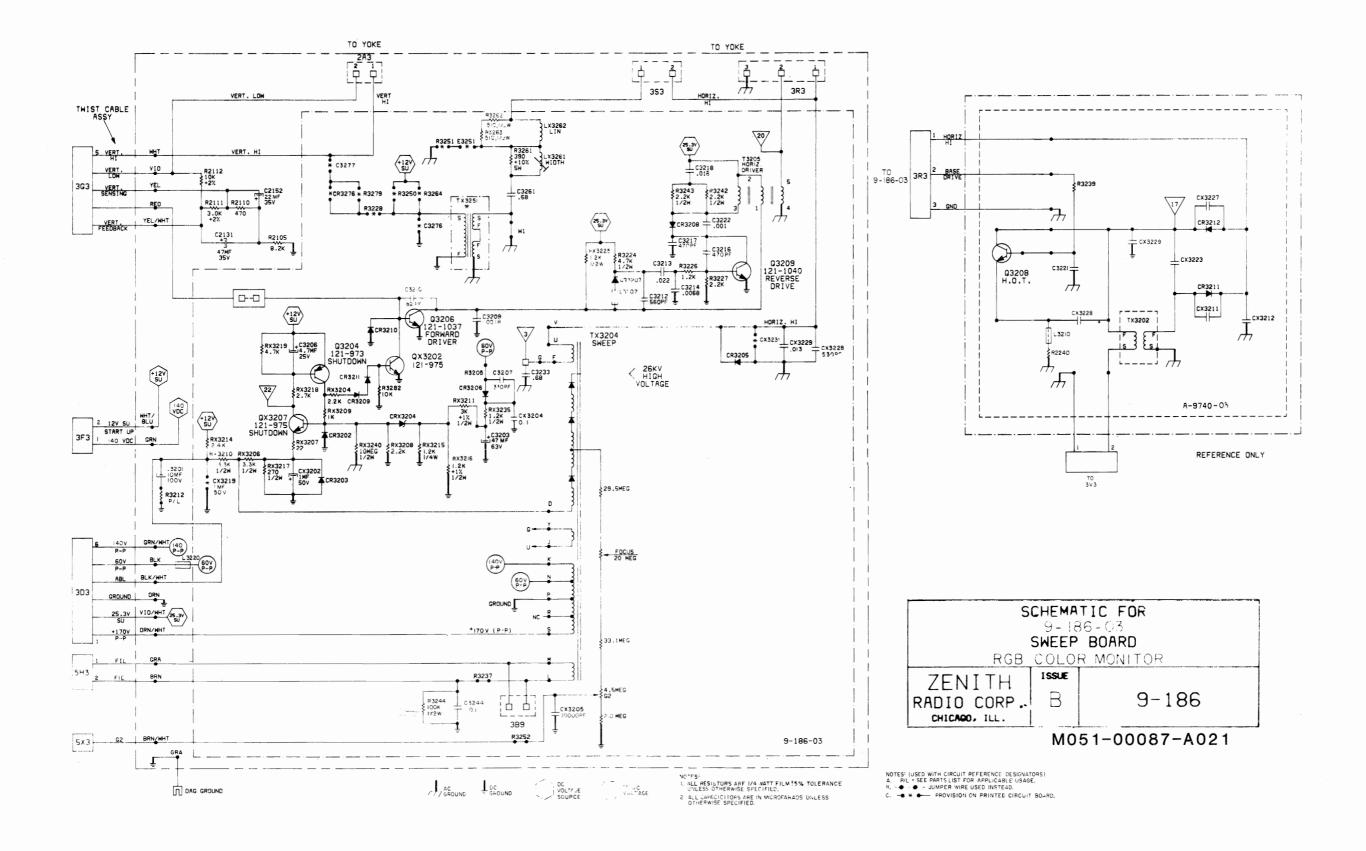
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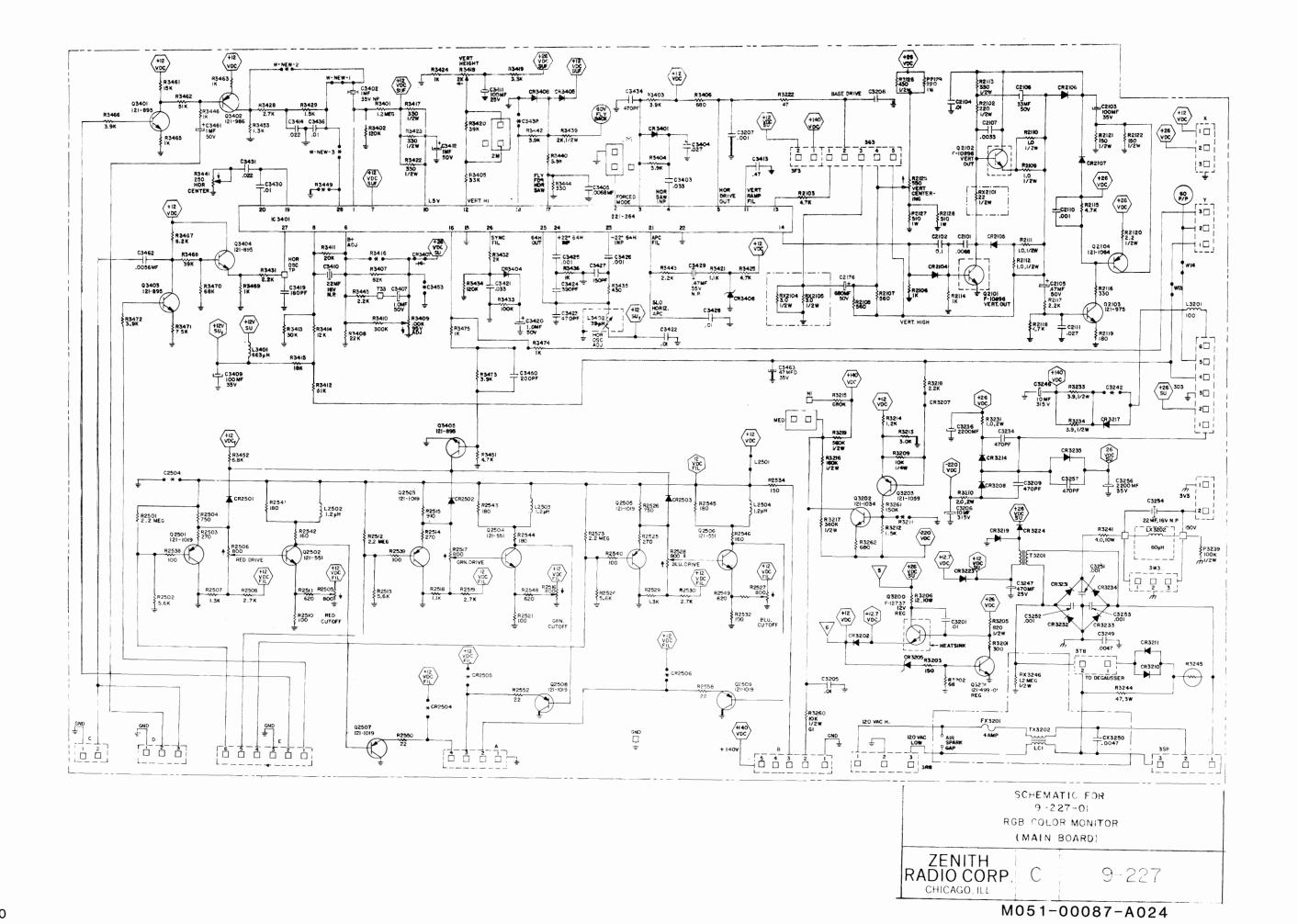
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SWEEP BOARD (9-186-03)

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
	CAP	ACITORS		TRANSFO	RMERS & COILS
C2131	22-7508	47 MF, 35V, ±20% Electrolytic	L3207	149-454	Core, Ferrite Bead
C2152	22-7508-01C	22 MF, 35V, ±20% Electrolytic	L3220	F-13834	Core & Sleeving Assy. (149-509-01)
C3201	22-7410-05	10 MF, 100V, ±20% Electrolytic	LX3261	20-3976	Coil Width
CX3202	22-7710-01C	1 MF, 50V, +50%-10% Electrolytic	LX3262	20-3975	Coil, Linearity, with 205-271 Hot Mel
C3203	22-7711-08C	47 MF, 63V, +50%-10% Electrolytic	T3205	95-3344	Transformer, Horizontal Driver
CX3204	22-7773-24A	0.1 MF, 100V, ±5% Polyester	TX3204	95-3581-01	Transformer, Sweep
CX3205	22-7523-01	0.01 MF, 2KV, ±20% Disc			•
C3206	22-7708-04C	4.7 MF, 25V, +50%-10% Electrolytic		RES	SISTORS
C3207	22-5665	330 PF, 1000V, ±10% Disc	R2105	63-9921-94	8.2K Ohm, ±5% 1/4W Film
C3209	22-7242	0.0018 MF, 200V, ±10% Disc	R2110	63-9921-64	470K Ohm, ±5% 1/4W Film
C3211	22-7777 - 20B	0.047 MF, 200V, ±10% Polyester	R2111	63-9919-83	3K Ohm, ±2% 1/4W Film
C3212	22-7234	560 PF, 500V, ±10% Disc	R2112	63-9919-96	10K Ohm, ±2% 1/4W Film
C3213	22-7775-16A	0.022 MF, 100V, ±20% Polyester	RX3204	63-9921-80	2.2K Ohm, ±5% 1/4W Film
C3214	22-7775-10A	0.0068 MF, 100V, ±20% Polyester	RX3204	63-7805	3.3K Ohm, ±5% 1/2W Carbon
C3216	22-5684	470 PF, 500V, ±20% Disc	RX3200	63-9921-32	22 Ohm, ±5% 1/4W Film
C3217	22-5684	470 PF, 500V, ±20% Disc	RX3208	63-10235-80	2.2K Ohm, ±5% 1/4W Film
C3218	22-7774-15C	0.018 MF, 100V, ±10% Polyester	RX3200	63-10235-72	1K Ohm, ±5% 1/4W Film
C3222	22-7742-10	0.001 MF, 50V, ±10% Axial	RX3210	63-7805	3.3K Ohm, ±5% 1/2W Carbon
CX3228	22-6466	530 PF, 3KV, ±10% Disc	RX3211	63-10810-07	3K Ohm, ±1% 1/2W Film
CX3229	22-7672-07	0.013 MF, 1.6KV, ±5% Polypropylene	RX3211	63-10233-81	2.4K Ohm, ±2% 1/4W Film
C3233	22-7728	0.68 MF, 200V, ±10% Polyester	RX3216	63-10233-61	1.2K Ohm, ±1% 1/2W Film
C3244	22-7566-24	0.1 MF, 250V, ±10% Polyester	RX3217	63-7760	270 Ohm, ±5% 1/2W Carbon
C3261	22-7683-01	0.68 MF, 200V, ±5% Polypropylene	RX3217	63-10235-98	12K Ohm, ±5% 1/4W Film
			RX3218	63-10235-82	2.7K Ohm, ±5% 1/4W Film
	SEMICO	NDUCTORS	RX3219	63-10235-88	4.7K Ohm, ±5% 1/4W Film
CR3202	103-142-01	Diode, Low Voltage	R3224	63-9946-88	4.7K Ohm, ±5% 1/2W Film
CR3202	103-142-01 103-330A	Diode, Low Voltage	R3225	63-10836-68	680 Ohm, ±5% 2W Wire Wound
CRX3204	103-308A	Diode, Low Voltage Diode, Zener	R3226	63-10235-74	1.2K Ohm, ±5% 1/4W Film
CR3204	103-305	Diode, Zener Diode, Damper	R3227	63-10235-80	2.2K Ohm, ±5% 1/4W Film
CR3206	103-303 103-284A	Diode, Damper Diode, Low Voltage	RX3235	63-10233-80	1.2K Ohm, ±1% 1/2W Film
CR3206 CR3207	103-295-01A	Diode, Low Voltage	RX3240	53-10657-04	10 Meg Ohm, ±20% 1/2W Carbon
Ch3201	103-293-01A	(used with 149-454)	R3242	63-10243-80	2.2K Ohm, ±5% 1/2W Film
CR3208	103-295-01A	Diode, Low Voltage	R3243	63-10243-80	2.2K Ohm, ±5% 1/2W Film
CR3209	103-293-01A 103-142-01	Diode, Low Voltage	R3244	63-7868	
CR3209 CR3210	103-142-01	Diode, Low Voltage	R3261	63-10444-86	100K Ohm, ±5% 1/2W Carbon 390 Ohm, ±10% 5W Wire Wound
	103-142-01		R3262	63-10565-65	
CR3211 QX3202	121-975	Diode, Low Voltage Transistor, NPN	R3262 R3263	63-10565-65	510 Ohm, ±10% 1/2W Film 510 Ohm, ±10% 1/2W Film
QX3202 QX3204	121-975	Transistor, NPN Transistor, PNP, Shutdown	R3282	63-10235-96	10K Ohm, ±5% 1/4W Film
	121-973	Transistor, PNP, Shutdown Transistor, NPN, Forward Driver	M3282	03-10233-90	10K OHIII, ±5% 1/400 FIIIII
Q3206	121-1037	, ,			
QX3207		Transistor, NPN, Shutdown			
Q3209	121-1040	Transistor, NPN, Reverse Driver			

ZENITH MONITOR — SWEEP BOARD REPLACEMENT PARTS LIST



ZENITH MONITOR — MAIN BOARD REPLACEMENT PARTS LIST

MAIN BOARD (Continued)

Вог					Board				Воа	rd 9-227	,			Ref. No.	Part No.	Description
9-227	9-22 -01		Part No.	Description		-227 -01 Ref.	No. Part No.	Description			Ref. No	. Part No.	Description			ACITORS
			RESISTO)BS		R	SISTORS (Continued)			RES	ISTORS (C	continued)	C2101		
V	v	DV0101		22 Ohm, ±5%, 1/2W Film		X R25	•	1.1K Ohm, ±5%, 1/4W Film	Y	Y	R3222	•	47 Ohm, ±5%, 1/4W Film	C2102	22-7775-24A	0.1 MF, 100V ±20% Polyester
Ŷ	Ŷ	R2101		220 Ohm, ±5%, 1/2W Film	x	R25		7.5K Ohm, ±5%, 1/4W Film	x	X	R3231	63-9982	1 Ohm, ±10%, 2W Wirewound	C2103	22-7709-09C	100 MF, 35V +50%-10% Electrolytic
Ŷ	Ŷ	R2102		4.7K Ohm, ±5%, 1/2W Film	^	X R25		2.7K Ohm, ±5%, 1/4W Film	X	x	R3233		3.9 Ohm, ±5%, 1/2W Film	C2104	22-7613-24D	0.01 MF, 50V ±10% Disc
Ŷ	x			3 Ohm, ±5%, 1/2W Film	X	R25		2.2K Ohm, ±5%, 1/4W Film	X	X	R3234		3.9 Ohm, ±5%, 1/2W Film	C2105	22-7390-02	0.47 MF, 50V ±20% Electrolytic
x	x			3 Ohm, ±5%, 1/2W Film	X	R25		120 Ohm, ±5%, 1/4W Film	X	X	R3239	63-10244-20	100K Ohm, ±5%, 1/2W Film	C2106	22-7710-07C	33 MF, 50V +50%-10% Electrolytic
x	X	R2106		1K Ohm, ±5%, 1/4W Film		X R25		100 Ohm, ±5%, 1/4W Film	X	X	R3241	63-8246	4 Ohm, 10W Wirewound		22-7615-03D	0.0033 MF, 50V +80%-10% Disc
X	X	R2107		560 Ohm, ±5%, 1/4W Film	X	R25	2 63-10235-74	1.2K Ohm, ±5%, 1/4W Film	X	X	R3244	63-10840-40	47 Ohm, ±5%, 3W Film,		22-7742-10	0.001 MF, 50V ±10% Polyester
X	X	R2108		560 Ohm, ±5%, 1/4W Film	X	R25	3 63-10236-28	220K Ohm, ±5%, 1/4W Film					Tin Oxide	C2111	22-7774-17A	0.027 MF, 100V ±10% Polyester
X	X	R2109	63-10565	1 Ohm, ±5%, 1/2W Film		X R25	3 63-10236-52	2.2 Meg Ohm, ±5%, 1/4W Film	X	X	R3245	63-10710A	Thermistor	C2176	22-7725	680 MF, 50V +100%-10% Electrolytic
X	X	R2110	63-10565	1 Ohm, ±5%, 1/2W Film	X	X R25		5.6K Ohm, ±5%, 1/4W Film	X	X	RX3246	63-10657-03	1.2 Meg Ohm, ±20%,	C2501	22-7621-42C	220 PF, 50V ±5% Disc 220 PF, 50V ±5% Disc
X	Х	R2111	63-10565	1 Ohm, ±5%, 1/2W Film	X	R25		220 Ohm, ±5%, 1/4W Film					1/2W Carbon	C2502	22-7621-42C 22-7621-42C	220 PF, 50V ±5% Disc
X	Х	R2112	63-10565	1 Ohm, ±5%, 1/2W Film	.,	X R25		270 Ohm, ±5%, 1/4W Film		X	R3260		10K Ohm, ±5%, 1/2W Film	C2503 C3201	22-7775-24A	0.1 MF, 100V ±20% Polyester
X	X	R2113		330 Ohm, ±5%, 1/2W Film	X	R25		2.2K Ohm, ±5%, 1/4W Film		X	R3261	63-10244-24		C3204	22-7603	4.7 MF, 315V +100%-10% Electrolytic
X	X	R2114		1K Ohm, ±5%, 1/4W Film	v	X R25		750 Ohm, ±5%, 1/4W Film	v	Š	R3262		680 Ohm, ±5%, 1/4W Film	C3205	22-3512	0.01 MF, 1KV +40%-20% Disc
X	X	R2115		4.7K Ohm, ±5%, 1/4W Film	X	R25	7 63-10857-3	5K Ohm, Control-Rotary	X	Š	R3401 R3402		1.2 Meg Ohm, ±5%, 1/4W Film 120K Ohm, ±5%, 1/4W Film	C3206	22-7603-01A	10 MF, 315V +100%-10% Electrolytic
X	X	R2116		330 Ohm, ±5%, 1/4W Film		V D05	7 62 10057-20	Single-Blue 800 Ohm, Control-Rotary	÷	÷	R3402		3.9K Ohm, ±5%, 1/4W Film	C3207	22-7742-10	0.001 MF, 50V ±10% Axial
X	X	H211/		2.2K Ohm, ±5%, 1/4W Film		X R25	7 03-10657-20	Single-Blue Cut-Off	÷.	÷.	R3404		3.9K Ohm, ±5%, 1/4W Film	C3208	22-7742-10	0.001 MF, 50V ±10% Axial
X	X	R2118		4.7K Ohm, ±5%, 1/4W Film	X	R25	8 63-10857-30	1K Ohm, Control-Rotary	Ŷ	Ŷ	R3405		33K Ohm, ±5%, 1/4W Film		22-7395	470 PF, 500V ±5% Disc
Š.	X	R2119 R2120		180 Ohm, ±5%, 1/4W Film 2.2 Ohm, ±5%, 1/2W Film	^	1120	.0 00-10007-00	Single-Yellow	â	Ŷ	R3406		680 Ohm, ±5%, 1/4W Film	C3234	22-7395	470 PF, 500V ±5% Disc
Ŷ	Ŷ	R2121		150 Ohm, ±5%, 1/2W Film		X R25	8 63-10857-26	800 Ohm, Control-Rotary	x	x	R3407		82K Ohm, ±5%, 1/4W Film	C3236	22-7861-14	2200 MF, 35V ±20% Electrolytic
Ŷ	â	R2122		150 Ohm, ±5%, 1/2W Film		/ III		Single-Blue Drive	x	X	R3408		22K Ohm, ±5%, 1/4W Film	C3246	22-7603-01A	10 MF, 315V +100%-10% Electrolytic
x	x	R2125	63-9023-02	550 Ohm, ±20%, Control-	X	R25	9 63-10235-76	1.5K Ohm, ±5%, 1/4W Film	X	X	R3409		100K Ohm, Control-Rotary	C3247	22-7860-12	470 MF, 25V \pm 20% Electrolytic
^	^	1120	00 0020 02	Rotary Single-GRA	~	X R25		1.3K Ohm, ±5%, 1/4W Film					Single-Green	C3249	22-7431-06	0.0047 MF, ±20% Disc
	X	R2126	63-10243-66	560 Ohm, ±5%, 1/2W Film	X	R25		7.5K Ohm, ±5%, 1/4W Film	X	X	R3410	63-10236-31	300K Ohm, ±5%, 1/4W Film	CX3250	22-7431-06	0.0047 MF, ±20% Disc
Х		R2126	63-10243-53			X R25	0 63-10235-8	2.7K Ohm, ±5%, 1/4W Film	X	Х	R3411	63-10236-03	20K Ohm, ±5%, 1/4W Film	C3251	22-7811	0.001 MF, 1KV ±10% Disc
	Χ			750 Ohm, ±5%, 1W Carbon	X	R25	63-10235-8	2.2K Ohm, ±5%, 1/4W Film	X	X	R3412	63-10236-13	51K Ohm, ±5%, 1/4W Film	C3252	22-7811	0.001 MF, 1KV ±10% Disc
Х		R2128		560 Ohm, ±5%, 1/2W Film	X	R25		120 Ohm, ±5%, 1/4W Film	X	X	R3413		30K Ohm, ±5%, 1/4W Film	C3253	22-7811	0.001 MF, 1KV ±10% Disc
	X	R2128	63-6058	510 Ohm, ±5%, 1W Carbon		X R25		3 100 Ohm, ±5%, 1/4W Film	X	Х	R3414		12K Ohm, ±5%, 1/4W Film	C3254	22-7404-06	22 MF, 16V ±20% Electrolytic
	Χ	R2129		510 Ohm, ±5%, 1/2W Carbon	X	R25		1.2K Ohm, ±5%, 1/4W Film	X	X	R3415		18K Ohm, ±5%, 1/4W Film	C3256	22-7508-05B 22-7395	2200 MF, 35V +50%-10% Electrolytic 470 PF, 500V ±5% Disc
X		R2501		220K Ohm, ±5%, 1/4W Film		R25		2 150 Ohm, ±5%, 1/4W Film	X	X	R3417		330 Ohm, ±5%, 1/2W Film	C3257	22-7393 22-7613-24D	0.01 MF, 50V ±10% Disc
	Х	R2501		2.2 Meg Ohm, ±5%, 1/4W Film	X	R25		150 Ohm, ±5%, 1/4W Film	X	Х	R3418	63-10857-08	2K Ohm, Control-Rotary	C3401 C3402	22-7406-01	1.0 MF, 35V ±20% Electrolytic
Х	Х	R2502		5.6K Ohm, ±5%, 1/4W Film	X	R25		150 Ohm, ±5%, 1/4W Film			D0440	00 40005 04	Single-Yellow	C3402 C3403	22-7773-18A	0.033 MF, 100V ±5% Polyester
X		R2503		220 Ohm, ±5%, 1/4W Film	X	R25		150 Ohm, ±5%, 1/4W Film	X	Š	R3419		3.3K Ohm, ±5%, 1/4W Film 39K Ohm, ±5%, 1/4W Film	C3404	22-7773-17A	0.027 MF, 100V ±5% Polyester
.,	Х			270 Ohm, ±5%, 1/4W Film	Χ.	R25		3 220 Ohm, ±5%, 1/4W Film	X X	x	R3420 R3421		1.1K Ohm, ±5%, 1/4W Film	C3405	22-7775-10A	0.0068 MF, 100V ±20% Polyester
Х	.,	R2504		2.2K Ohm, ±5%, 1/4W Film	~	X R25		3 100 Ohm, ±5%, 1/4W Film 5 220 Ohm, ±5%, 1/4W Film	â	Ŷ	R3422		330 Ohm, ±5%, 1/2W Film	C3407	22-7710-01A	1.0 MF, 50V +50%-10% Electrolytic
V	Х	R2504		750 Ohm, ±5%, 1/4W Film	^	X R25		3 100 Ohm, ±5%, 1/4W Film	Ŷ	Ŷ	R3423		330 Ohm, ±5%, 1/2W Film	C3409	22-7709-09C	100 MF, 35V +100%-10% Electrolytic
X		R2505	63-10657-11	5K Ohm, Control-Rotary Single-RED	X	R25		5 220 Ohm, ±5%, 1/4W Film	x	x	R3424		1K Ohm, ±5%, 1/4W Film	C3410	22-7404-06A	22 MF, 16V ±20% Electrolytic NP
	v	R2505	63_10857_27	800 Ohm, Control-Rotary	^	X R25		3 100 Ohm, ±5%, 1/4W Film	X	X	R3425		4.7K Ohm, ±5%, 1/4W Film	C3411	22-7708-09	100 MF, 25V +50%-10% Electrolytic
	^	112303	00-10007-27	Single-Red Cut-Off		X R25		180 Ohm, ±5%, 1/4W Film	X	X	R3428		2.7K Ohm, ±5%, 1/4W Film	C3412	22-7710-01C	1.0 MF, 50V +50%-10% Electrolytic
X		R2506	63-10857-30	1K Ohm, Control-Rotary		X R25		3 160 Ohm, ±5%, 1/4W Film	X	X	R3429	63-10235-76	1.5K Ohm, ±5%, 1/4W Film	C3413	22-7562-32	0.47 MF, 100V \pm 5% Polyester
^		112000	00 10001 00	Single-Yellow		X R25		180 Ohm, ±5%, 1/4W Film	X	X	R3431	63-10235-80	2.2K Ohm, ±5%, 1/4W Film	C3414	22-7774-16A	0.022 MF, 100V ±10% Polyester
	Х	R2506	63-10857-27	800 Ohm, Control-Rotary		X R25	4 63-10235-5	180 Ohm, ±5%, 1/4W Film	X		R3432		200 Ohm, ±5%, 1/4W Film	C3419	22-7751-39	180 PF, 50V ±5% Axial
				Single-Red Drive		X R25	5 63-10235-5	180 Ohm, ±5%, 1/4W Film		X	R3432		2K Ohm, ±5%, 1/4W Film	C3420		1.0 MF, 50V +50%—10% Electrolytic
X		R2507	63-10235-76	1.5K Ohm, ±5%, 1/4W Film		X R25		3 160 Ohm, ±5%, 1/4W Film	X	X	R3433		100K Ohm, ±5%, 1/4W Film	C3421	22-7773-18B	
	Χ	R2507	63-10235-75	1.3K Ohm, ±5%, 1/4W Film		X R25		620 Ohm, ±5%, 1/4W Film	X	X	R3434		120K Ohm, ±5%, 1/4W Film	C3422	22-7613-24D	
	Χ	R2508	63-10235-93	7.5K Ohm, ±5%, 1/4W Film		X R25		620 Ohm, ±5%, 1/4W Film	X	X	R3435		430 Ohm, ±5%, 1/4W Film	C3423	22-7613-08D	390 PF, 50V ±10% Disc
X		R2508		2.7K Ohm, ±5%, 1/4W Film		X R25		2 22 Ohm, ±5%, 1/4W Film	X	X	R3436		1K Ohm, ±5%, 1/4W Film	C3424 C3425	22-7742-05 22-7742-10	0.001 MF, 50V ±10% Axial
X		R2509		2.2K Ohm, ±5%, 1/4W Film		X R25		2 22 Ohm, ±5%, 1/4W Film	X	X	R3439		2K Ohm, ±5%, 1/2W Film	C3426	22-7742-10	0.01 MF, 50V ±10% Axial
X		R2510		120 Ohm, ±5%, 1/4W Film	.,	X R25		2 22 Ohm, ±5%, 1/4W Film	X	Х	R3440		3.9K Ohm, ±5%, 1/4W Film	C3427	22-7647-35C	
	Х	R2510		100 Ohm, ±5%, 1/4W Film	X	X R32		300 Ohm, ±5%, 1/4W Film	X		R3441	63-10857	100 Ohm, Control-Rotary Single-Horizontal Center	C3427	22-7774-12	0.01 MF, 100V ±10% Polyester
Х		R2511		1.2K Ohm, ±5%, 1/4W Film	X	X R32		68 Ohm, ±5%, 1/4W Film		~	R3441	62-10857-02	250 Ohm, Control-Rotary	C3428	22-7774-20A	0.047 MF, 100V ±10% Polyester
	Х	R2511		620 Ohm, ±5%, 1/4W Film	X	X R32		2 150 Ohm, ±5%, 1/4W Film 820 Ohm, ±5%, 1/2W Carbon		^	N3441	03-10037-02	Single-Horizontal Center	(on -01 version)		 ,,,
Х	V	R2512		220K Ohm, ±5%, 1/4W Film	× ×	X R32		12 Ohm, ±10%, 10W Resistor	Y	Х	R3442	63-10235-86	3.9K Ohm, ±5%, 1/4W Film	C3429	22-7405-04	4.7 MF, 25V ±20% Electrolytic NP
V		R2512		2.2 Meg Ohm, ±5%, 1/4W Film	^	noz	0 F-11031	& Splice Assy.	x	^	R3443		510 Ohm, ±5%, 1/4W Film	C3429	22-7406	0.47 MF, 35V ±20% Electrolytic NP
× ×	Х			5.6K Ohm, ±5%, 1/4W Film 220 Ohm, ±5%, 1/4W Film		X R32	63-10460-5	12 Ohm, ±10%, 10W	^	Χ			2.2K Ohm, ±5%, 1/4W Film	(on-01 version)		
^	Х	R2514 R2514		270 Ohm, ±5%, 1/4W Film		7 1102	00 10 10 0	Wirewound	X	X	R3444		330 Ohm, ±5%, 1/4W Film	C3430	22-7613-24D	0.01 MF, 50V $\pm 10\%$ Disc
х	^	R2515		2.2K Ohm, ±5%, 1/4W Film	X	X R32	0 63-10420-3	2 Ohm, ±5%, 2W Wirewound	X	X	R3445		2.2K Ohm, ±5%, 1/4W Film	C3431	22-7774-16A	
^		R2515		910 Ohm, ±5%, 1/4W Film	X	X R32		5 1.5K Ohm, ±5%, 1/4W Film		X			1K Ohm, ±5%, 1/4W Film	C3434	22-7742-06	470 PF, 50V ±10% Axial
X				5K Ohm, Control-Rotary	x	R32		3 K Ohm, ±5%, 1/4W Film	X		R3449		1.5K Ohm, ±5%, 1/4W Film	C3436	22-7613-24C	
^		112010	00 10001-02	Single-Green		X R32		3.9K Ohm, ±5%, 1/4W Film	X		R3451		2.7K Ohm, ±5%, 1/4W Film	C3450	22-7739-29A	
	X	R2516	63-10857-25	800 Ohm, Control-Rotary	X	X R32		1.2K Ohm, ±5%, 1/4W Film		Χ	R3451	63-10235-88	4.7K Ohm, ±5%, 1/4W Film	C3450		200 PF, 50V \pm 5% Disc
	^		22 .000, 20	Single-Green Cut-Off	X	R32		3 560K Ohm, ±5%, 1/2W Film	X	X	R3452	63-10235-92	6.8K Ohm, ±5%, 1/4W Film	(on-01 version)		1 0 ME 50V 150W 100V Electrical
X		R2517	63-10857-30	1K Ohm, Control-Rotary		X R32		680K Ohm, ±5%, 1/2W Film		Χ	R3453		1.3K Ohm, ±5%, 1/4W Film	C3461	22-7710-01C	
				Single-Yellow	X	X R32		160K Ohm, ±5%, 1/2W Film	X	X	R3461	63-10236	15K Ohm, ±5%, 1/4W Film	C3462	22-7710-01C	
	X	R2517	63-10857-25	800 Ohm, Control-Rotary	Χ .	X R32		360K Ohm, ±5%, 1/2W Film	X	X	R3462	63-10236-13	51K Ohm, ±5%, 1/4W Film	C3462	22-7739-09	0.0056 MF, 100V \pm 10% Polyester
				Single-Green Drive	X	X R32		2.2K Ohm, ±5%, 1/4W Film						(on-01 version)	22-7508	47 MF, 35V ±20% Electrolytic
X		R2518	63-10235-76	1.5K Ohm, ±5%, 1/4W Film		X R32	9 63-10244-3	3 560K Ohm, ±5%, 1/2W Film						C3463	LL-1000	, oorcoa_loonory no

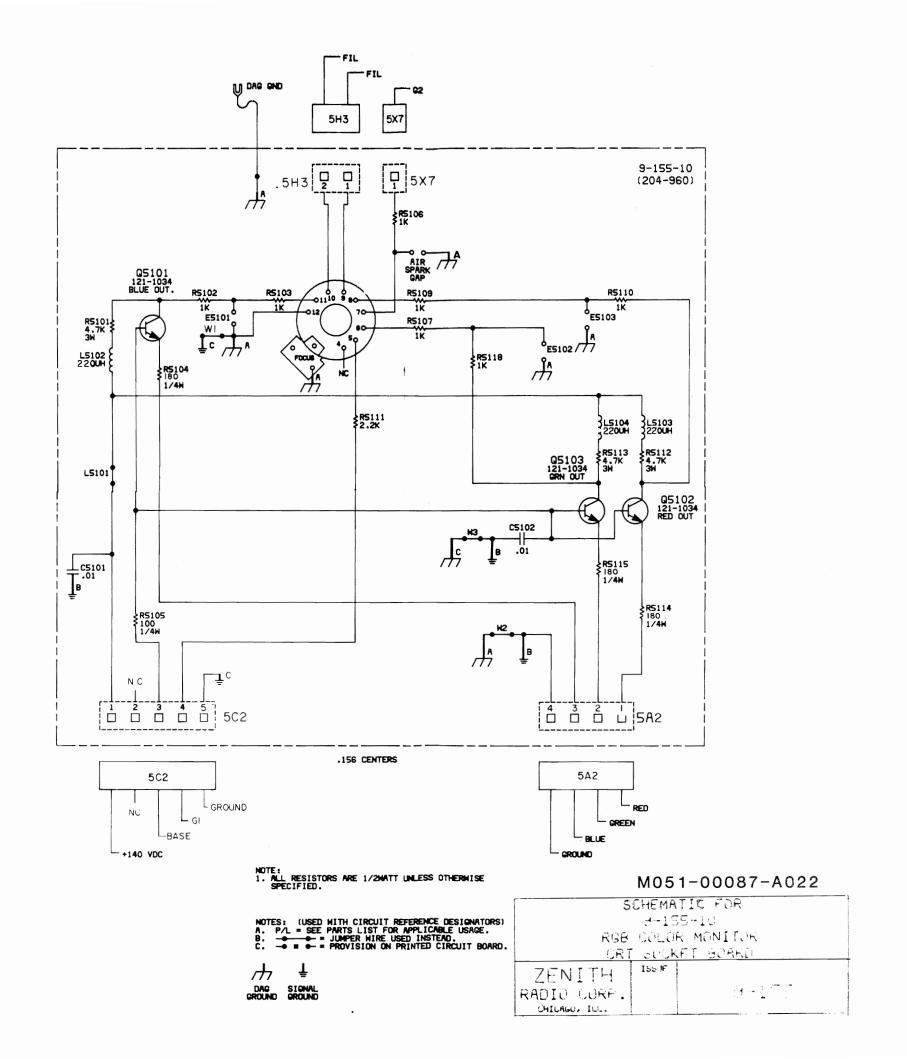
MAIN BOARD (Continued)

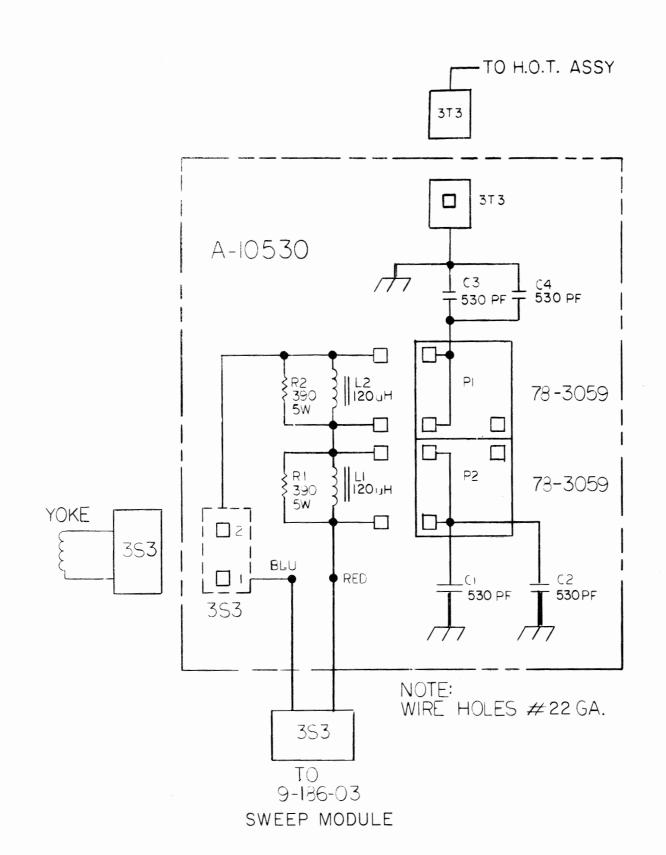
Ref. No.	Part No.	Description
	SEMICO	NDUCTORS
CR2104	103-142-01	Diode, Low Voltage
CR2105	103-254-01	Diode, Low Voltage
CR2106	103-254-01	Diode, Low Voltage
CR2107	103-254-01	Diode, Low Voltage
CR2501	103-142-01	Diode, Low Voltage
CR2502	103-142-01	Diode, Low Voltage
CR2503	103-142-01	Diode, Low Voltage
CR3202 CR3205	103-330A 103-309-01	Diode, Low Voltage Diode, Zener 10V 1W
CR3205	103-309-01	Diode, Low Voltage
CR3208	103-326A	Diode, Low Voltage
CR3210	103-254-01	Diode, Low Voltage
CR3211	103-254-01	Diode, Low Voltage
CR3214	103-284-A	Diode, Low Voltage
CR3217	103-326A	Diode, Low Voltage
CR3219	103-330A	Diode, Low Voltage
CR3223	103-330A	Diode, Low Voltage
CR3224	103-330A	Diode, Low Voltage
CR3231	103-315-06A 103-315-06A	Diode Diode
CR3232 CR3233	103-315-06A	Diode
CR3234	103-315-06A	Diode
CR3235	103-284A	Diode, Low Voltage
CR3401	103-142-01	Diode, Low Voltage
CR3404	103-143-01	Diode, Low Voltage
CR3405	103-142-01	Diode, Low Voltage
CR3406	103-142-01	Diode, Low Voltage
CR3408	103-279-14	Diode, Zener 6.8V 1/2W
Q2101	F-10896	Transistor & Heat Sink Assy.
Q2102	F-10896	Transistor & Heat Sink Assy.
Q2103 Q2104	121-975 121-1064	Transistor NPN Transistor PNP
Q2104 Q2501	121-1004	Transistor PNP
Q2502	121-895	Transistor NPN
Q2502	121-551	Transistor NPN
(on -01 version)		
Q2503	121-1019	Transistor PNP
Q2504	121-895	Transistor NPN
Q2504	121-551	Transistor NPN
(on -01 version)	101 1010	To a sister DND
Q2505	121-1019	Transistor PNP
Q2506 Q2506	121-895 121-551	Transistor NPN Transistor NPN
(on -01 version)	121-331	Transistor INFIN
Q2507	121-1019	Transistor
Q2508	121-1019	Transistor
Q2509	121-1019	Transistor
Q3200	F-12737	Transistor & Heat Sink Assy.
Q3201	121-499-01	Transistor NPN Regular Feed Back
Q3202	121-1034	Transistor NPN
Q3203	121-1059	Transistor PNP
Q3401	121-895	Transistor NPN
Q3402	121-986 121-985	Transistor PNP Transistor NPN
Q3403 Q3404	121-985 121-895	Transistor NPN Transistor NPN
Q3404 Q3405	121-895	Transistor NPN
		MERS & COILS
L2502	20-3887-01	Coil Peaking 1.2 UH
L2503	20-3887-01	Coil Peaking 1.2 UH
L2504	20-3887-01	Coil Peaking 1.2 UH
L3201	20-2021 95-3501-01	Coil Peaking 100 UH Transformer Choke 60 UH
LX3202 L3401	20-3831	Coil Peaking 663 UH
L3402	20-3998	Coil Peaking 39 UH
L3402	20-3996	Coil Turnable 39 UH
(on -01 version)		
,		

ZENITH MONITOR — CRT SOCKET BOARD REPLACEMENT PARTS LIST

CRT SOCKET (9-155-10)

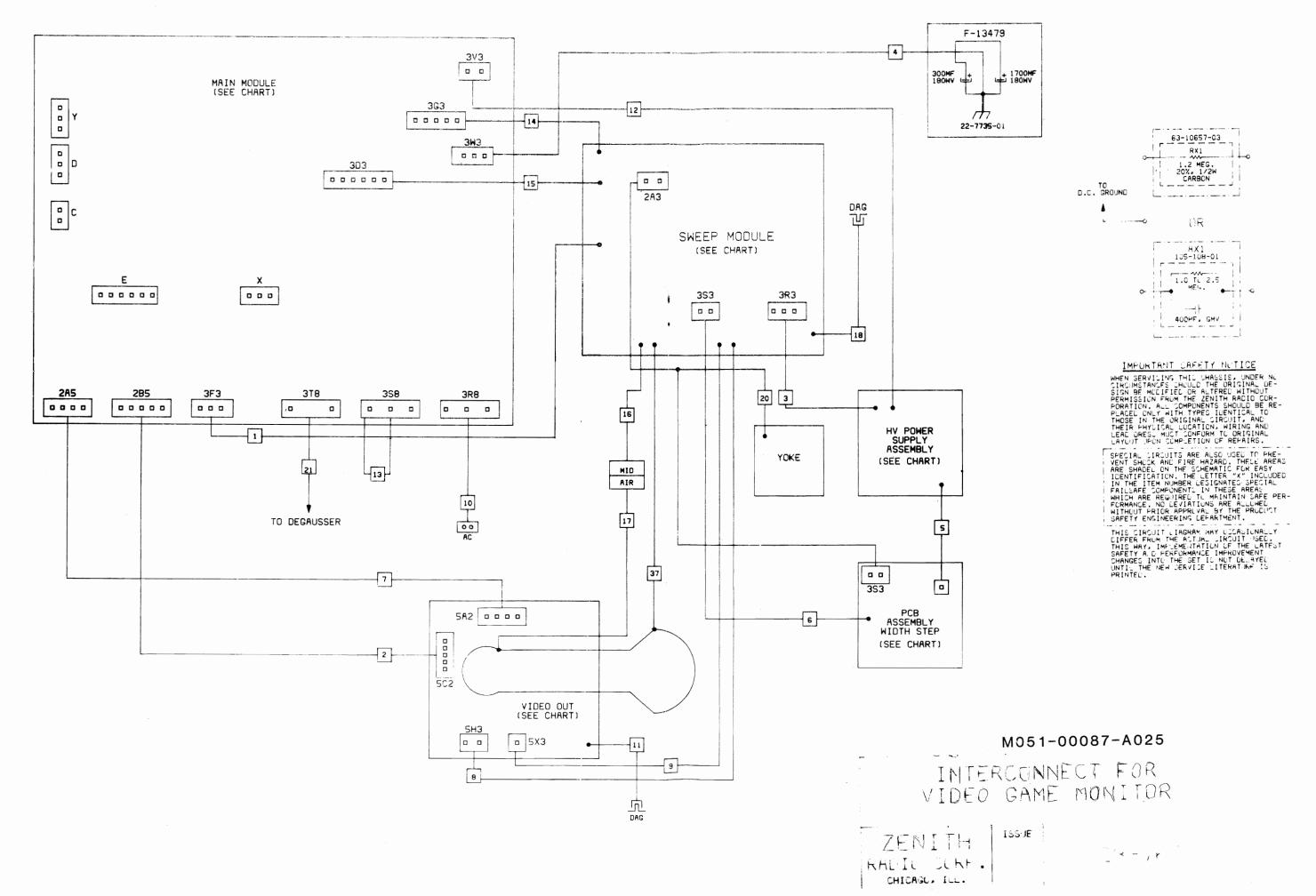
Ref. No.	Part No.	Description
	CAP	ACITORS
C5101 C5102	22-4671 22-3512	0.01 MF, 1.5KV, +80%-20% Disc 0.01 MF, 1KV, +40%-10% Disc
	TRANSFOR	RMERS & COILS
L5102 L5103 L5104	20-3887-28E 20-3887-28E 20-3887-28E	220 MH Peaking 220 MH Peaking 220 MH Peaking
	SEMICO	NDUCTORS
Q5101 Q5102 Q5103	F7510 F7510 F7510	Transistor, NPN, Video Out, Blue Transistor, NPN, Video Out, Red Transistor, NPN, Video Out, Green
	RES	SISTORS
R5101 R5102 R5103 R5104 R5105 R5106 R5107 R5108 R5109 R5110 R5111 R5112 R5113 R5114 R5115	63-10840-88 63-7785 63-7785 63-10235-54 63-10235-48 63-7785 63-7785 63-7785 63-7785 63-7785 63-7785 63-7785 63-10840-88 63-10840-88 63-10840-88 63-10235-54	4.7K Ohm, ±5%, 3W Film 1K Ohm, ±10%, 1/2W Carbon 1K Ohm, ±10%, 1/2W Carbon 180 Ohm, ±5%, 1/4W Film 100 Ohm, ±5%, 1/4W Film 1K Ohm, ±10%, 1/2W Carbon 2.2K Ohm, ±10%, 1/2W Carbon 4.7K Ohm, ±5%, 3W Carbon 4.7K Ohm, ±5%, 3W Carbon 180 Ohm, ±5%, 1/4W Film 180 Ohm, ±5%, 1/4W Film
	MISCE	LLANEOUS
5A2 5C2 5H3 5X7	86-799 86-799 86-799 86-799 A-10008	Stake Connector 4/.156 Stake Connector 4/.156 Stake Connector 2/.156 Stake Connector 1/.312 CRT Socket



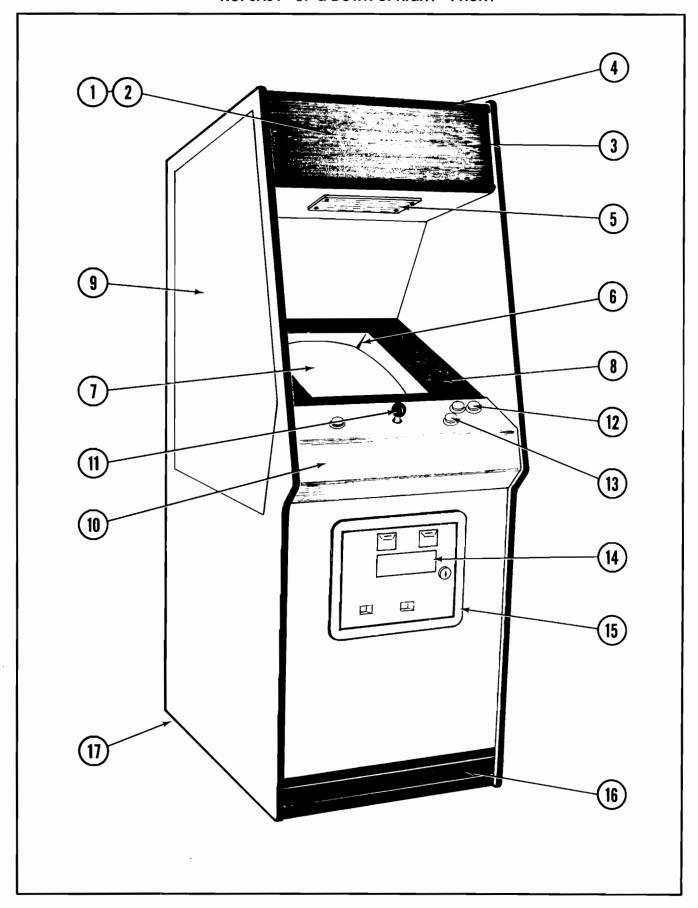


M051-00087-A023

SCHEMATIC FOR A-10530 WIDTH STEP ASSY.					
ZENITH RADIO CORP.	ISSUE B	A-10530			

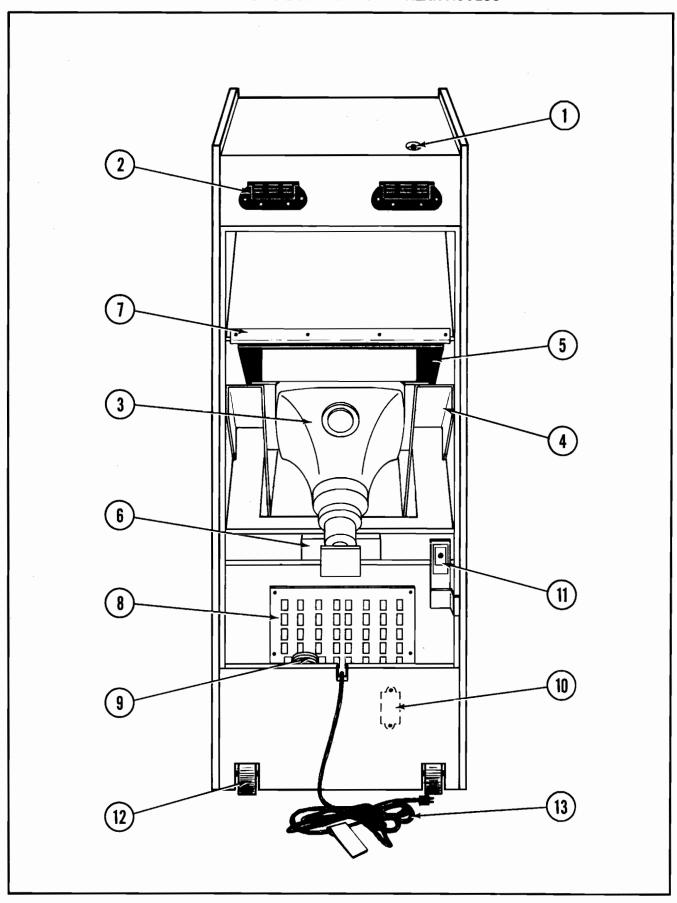


VI Illustrated Parts Breakdown



NO. 0A64 - UP & DOWN UPRIGHT - FRONT PARTS LIST

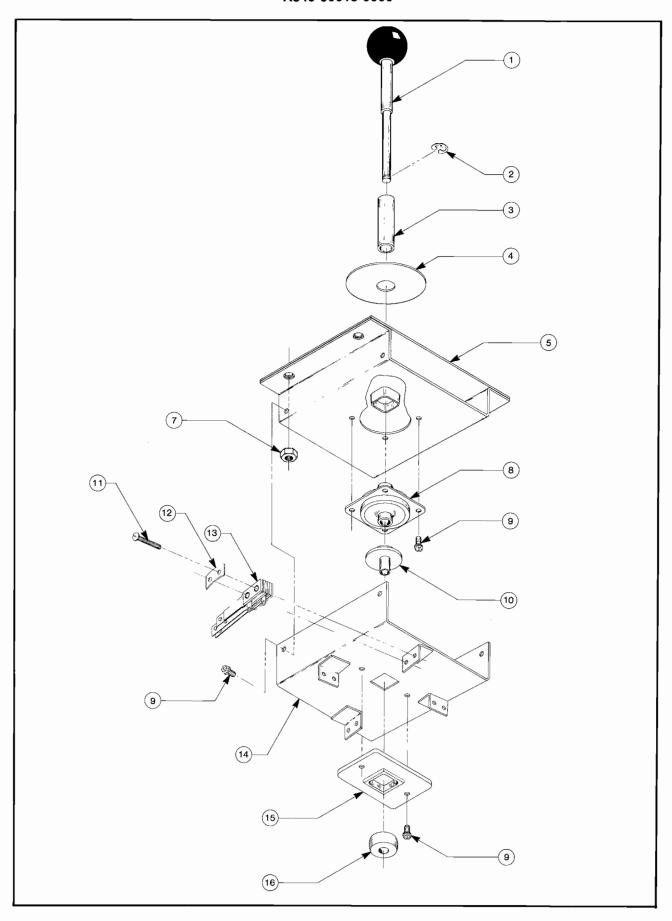
ITEM	PART NO.	DESCRIPTION
1	0A64-00901-00XF	HEADER GLASS
2	A595-00011-0000	HEADER FLUORESCENT LIGHT ASSY.
3	0537-00903-0048	GLASS CHANNEL - 7-1/2" LG. (2 REQ'D)
4	0574-00903-0100	HEADER RETAINING BRKT. (2 REQ'D)
1	0017-00101-0138	#8x5/8 TORX TAMPER PROOF SCREW (10 REQ'D)
1	0017-00009-0522	LONG ARM KEY T-20 (FOR ABOVE SCREW)
5	0017-00009-0393	BLACK SPEAKER GRILLE W/SLOTS
	0017-00003-0259	6"x9" SPEAKER - 8 OHM, 8W.
	0017-00101-0127	#8-32x1-1/2 CARRIAGE BOLT (4 REQ'D)
	0017-00103-0061	#8-32 HEX NUT W/SEMS (4 REQ'D)
6 7	0017-00042-0314	19" T.V. BEZEL-INJECTION MOLDED
7	0333-00902-0000	DIFFUSER
1	0508-00901-0000	PLEXI-GLASS MTG. CLIPS (4 REQ'D)
	0017-00101-0017	#6x1/2 BLK. SLT. HEX HD. SCREW (4 REQ'D)
8	0A64-00902-00XF	MAIN VIEWING GLASS
	0508-00108-0000	GLASS STOP BRKT.
9	0A64-00903-0100	DECAL - LEFT
	0A64-00903-0200	DECAL - RIGHT (OPPOSITE SIDE)
10	A303-00013-0000	CONTROL SHELF PLATE WELD ASSY.
	0A64-00900-0000	DECORATIVE CONTROL SHELF OVERLAY
1	0595-00106-0100	CONTROL SHELF MTG. BRKT RIGHT
	0595-00106-0200	CONTROL SHELF MTG. BRKT LEFT
	0555-00901-0000	PLASTIC LOCATING PIN (4 REQ'D)
	0017-00009-0534	BASSICK CLAMP (3 REQ'D)
	0017-00101-0141	#8x11/16 UNSLOT HEX HD. SCREW (10 REQ'D)
	0316-00903-0000	CONTROL SHELF STRAP
11	A349-00015-0000	CONTROL ASSEMBLY - 8 POSITION
	A303-00010-0000	CONTROL SHELF CABLE ASSY.
12	0017-00042-0260	PUSH BUTTON ASSY WHITE (2 REQ'D)
13	0017-00042-0303	PUSH BUTTON ASSY GREEN (2 REQ'D)
	0017-00032-0093	PUSH BUTTON SWITCH W/HOLDER (4 REQ'D)
	0017-00103-0054	5/8-11 PAL NUT (4 REQ'D)
14	A982-00014-0000	U.S.A. 25¢ DOUBLE COIN DOOR & CABLE ASSY.
15	0090-00002-04BK	LARGE BLACK DOUBLE COIN DOOR FRAME
16	0935-00906-0100	KICK PLATE - 23" LG.
17	0017-00102-0048	3/8-16x2" LEG LEVELERS (4 REQ'D)
	0017-00103-0026	3/8-16 LEG LEVELERS HEX NUTS (4 REQ'D)



NO. 0A64 - UP & DOWN UPRIGHT - REAR ACCESS PARTS LIST

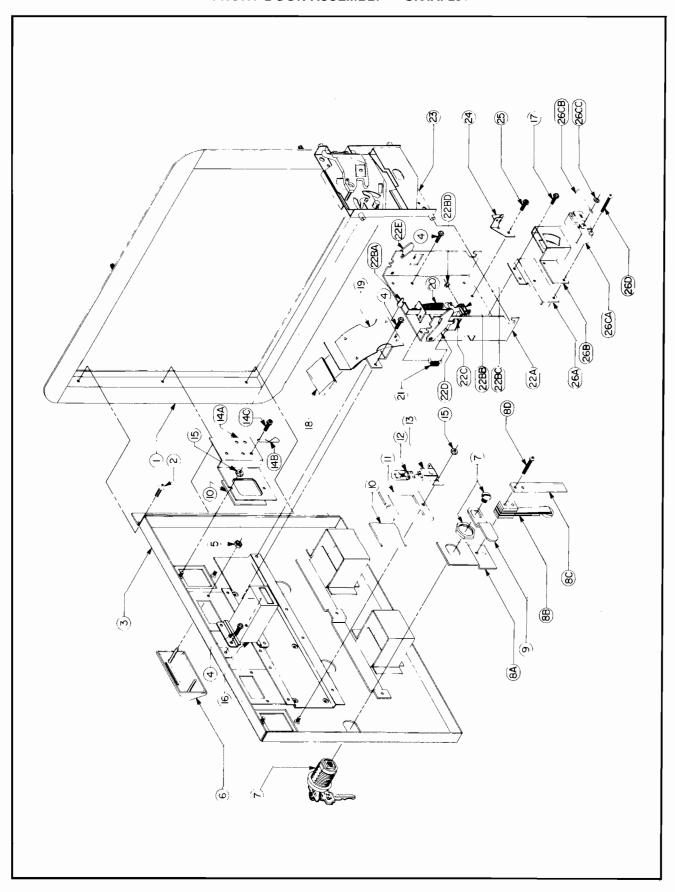
*ITEM	PART NO.	DESCRIPTION
1	A945-00038-0000	ON-OFF SWITCH & PLATE ASSY.
2	0894-00916-0000	PLASTIC PULL & VENT (2 REQ'D)
	0017-00101-0141	#8x11/16 UNSLOT HEX HD. M.S. (8 REQ'D)
3	0017-00003-0473	WELLS-GARDNER - 19" COLOR DUAL SYNC VERTICAL MTG.
		MONITOR (OR)
3	0017-00003-0474	ELECTROHOME - 19" COLOR DUAL SYNC VERTICAL MTG. MONITOR
4	AA64-00006-0000	VERTICAL MONITOR MTG. BRKT. ASSY. (2 REQ'D)
	0555-00901-0000	PLASTIC LOCATING PIN (4 REQ'D)
	0017-00101-0144	#10-24 x 5/8 SLT. HEX WASHER HD. (4 REQ'D)
	0017-00103-0018	1/4-20 HEX NUT (4 REQ'D)
	0017-00104-0014	DISH WASHER (4 REQ'D)
	0017-00101-0141	#8x11/16 UNSLOT HEX HD. M.S. (4 REQ'D)
5	0017-00042-0314	19" T.V. BEZEL
	0311-00100-0000	BEZEL MTG. BRKT.
6	A950-00004-0000	COIN BOX ASSY.
	A950-00006-0100	COIN BOX CRADLE ASSY.
	0950-00105-0000	COIN BOX COVER
	0950-00104-0000	COIN BOX HANDLE
	0950-00101-00XF	COIN DEFLECTOR (2 REQ'D)
	0950-00900-0000	LARGE PLASTIC CASH BOX
	0950-00103-0000	COIN BOX DIVIDER - OPTIONAL
	0017-00101-0142	1/4-20x1-3/8 BLACK RND. HD. BOLT (4 REQ'D)
'	0017-00104-0014	7/8" DISH WASHER (4 REQ'D)
	0017-00103-0018	1/4-20 HEX NUT (4 REQ'D)
7	0508-00108-0000	GLASS STOP BRKT.
8	AA64-00004-0000	CARD RACK W/BOARDS ASSY.
	A084-91718-BA64	GAME LOGIC P.C.B. ASSY.
· ·	0017-00042-0328	SPACER (6 REQ'D)
	0017-00101-0030	#8x1"SLOT HEX HD. SCREW (6 REQ'D)
9	Q834-00513-0000	SEGA POWER SUPPLY ASSY.
10	A945-00025-0000	LINE FILTER ASSY.
	0017-00101-0141	#8x11/16 UNSLOT. HEX HD. SCREW (2 REQ'D)
11	A088-00016-0000	INTERLOCK SWITCH & SPRING BRKT. ASSY.
	0303-00904-0000	INTERLOCK SWITCH COVER
12	A961-00007-0000	CASTER ASSY. (2 REQ'D)
	0961-00109-0000	WHEEL BRKT.
	0017-00042-0255	PLASTIC WHEEL
	0894-00702-00XF	SHAFT
	0017-00100-0037	3/8" E-RING
13	A945-00019-0000	LINE CORD ASSY.
		ADDITIONAL PARTS LIST
	A097-00009-0000	BACK DOOR LOCK ASSY.
	0017-00009-0490	5-5/8 SQR. BACK DOOR VENT GRILLE (4 REQ'D)
	AA64-00008-0000	MASTER CABLE W/BRKT. ASSY.
	AA64-00010-0000	HIGH VOLTAGE CABLE ASSY.

UP & DOWN - CONTROL ASSEMBLY -8 POSITION A349-00015-0000



UP & DOWN - CONTROL ASSEMBLY - PARTS LIST

ITEM	PART NO.	DESCRIPTION
1	A932-00022-0000	BALL & SHAFT ASSEMBLY
2	0017-00100-0025	1/4" E-RING
3	0921-00702-0000	STOP SPACER
4	0921-00902-0000	SLIDE PLATE
5	A349-00014-0000	TOP PLATE TO PIVOT PLATE ASSY.
7	0017-00103-0011	#8-32 HEX LOCK NUT (4 REQ'D.)
8	0932-00902-0000	GROMMET
9	0017-00101-0598	#8-32 x 5/16 SLT. HEX HD. M.S. (10 REQ'D.)
10	0962-00904-0000	SLEEVE
11	0017-00101-0527	#5-40 x 5/8 SLT. RND. HD. SCR. (8 REQ'D.)
12	0020-00202-0000	SWITCH PLATE (4 REQ'D.)
13	A932-00009-0000	SWITCH ASSEMBLY (4 REQ'D.)
14	A921-00009-0000	STOP PLATE & SWITCH BRKT, ASSY.
15	0927-00908-0000	WEAR PLATE
16	0921-00700-0000	ACTUATOR



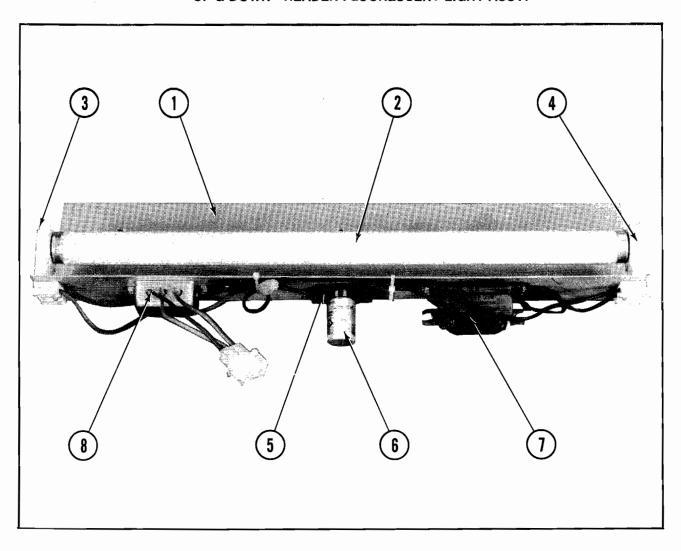
FRONT DOOR ASSEMBLY — U.S.A. 25¢ — PARTS LIST

ITEM	PART NO.	DESCRIPTION					
1	0090-0 0 002-04BK	DOUBLE ENTRY COIN DOOR FRAME					
2	0017-00101-0121	#6-32 x 5/16 PHIL. TRS. HD. SCR. (3 REQ'D.)					
3	A090-00073-02BK	DOUBLE ENTRY COIN DOOR W/DRESS PLATE					
4	0017-00101-0123	#8 x 1/4 UNSLOT. HEX HD. SCREW (10 REQ'D.)					
5	0017-00103-0059	PUSH NUT (4 REQ'D.)					
6	0090-00912-0000	COIN ENTRY PLATE — 25¢ (2 REQ'D.)					
7	A097-00005-0000	DOOR LOCK & KEY W/SCREW & NUT (OR)					
7	A097-00006-0000	DOOR LOCK & KEY W/SCREW, & NUT					
8	A090-00096-0000	DOOR TILT SWITCH & BRKT. ASSY.					
8A	0090-00185-00XF	DOOR TILT SWITCH BRKT.					
8B	A 090- 000 9 5-0000	DOOR TILT SWITCH					
8C	0090-00126-01XF	SWITCH BACK-UP PLATE					
8D	0017-00101-0155	#4-40 x 9/16 PHIL. PAN HD. (2 REQ'D.)					
9	0017-00005-0225	DOOR CAM					
10	0090-00903-9500	25¢ WINDOW (2 REQ'D.)					
11	0090-00143-00XF	COIN PLEX RETAINER					
12	0017-00003-0219	12 VOLT LAMP — G.E. #194 (2 REQ'D.)					
13	0017-00031-0048	WEDGE SOCKET W/BRKT. (2 REQ'D.) CABLE & KEY HOOK BRKT. ASSY.					
14	A090-00100-0000 0090-00179-0000	CABLE & SWITCH MTG. BRKT.					
14A 14B	0090-00179-0000	KEY HOOK					
14C	0017-00007-0019						
15	0017-00101-0123	#8 x ½ UNSLOT. HD. SCR. (2 REQ'D) #6-32 HEX NUT W/SEMS (4 REQ'D.)					
16	A090-00089-0000	COIN METER W/DIODE					
17	0017-00101-0124	#6 x 1/4 UNSLOT. HEX HD. SCR. (4 REQ'D.)					
18	0090-00911-0000	INSULATOR (2 REQ'D.)					
19	A090-00087-0000	COIN CHUTE & TOP ASSY. (2 REQ'D.)					
	A090-00081-00XF	COIN CHUTE & BRKT, ASSY.					
1 1	0090-00172-00XF	COIN-CHUTE TOP					
1 1	0017-00101-0140	#4-40 x 5/16 PHIL. PAN HD. (3 REQ'D)					
	0017-00007-0162	COTTER PIN (4 REQ'D)					
20	0010-00134-0000	SPRING					
21	0010-00181-0000	SPRING					
22	A090-00115-0000	COIN ACCEPTOR FRAME SUB-ASSY. (2 REQ'D.)					
22A	A090-00118-0000	COIN ACCEPTOR & BUSH. ASSY.					
22B	A090-00116-0000	REJECT LEVER ASSY. (2 REQ'D.)					
22BA	0090-00182-00XF	REJECT LEVER					
22BB	0090-00129-00XF 0090-00167-00XF	PIVOT POST PIVOT LEVER					
22BC 22BD	00 9 0-00167-00XF 0017-00007-0083	E-RING					
22BD	0017-00007-0083	1/8 x 1-5/8 ROLL PIN					
22C 22D	0017-00100-0018 0093-00145-01XF	LATCH - LEFT					
22E	0093-00145-00XF	LATCH - RIGHT					
	0017-00072-0036	120 x .218 x 7/32 RIVET (2 REQ'D)					
	0090-00910-00XF	REJECT BUTTON					
	0090-00183-0000	BUTTON STOP					
	0017-00101-0140	#4-40 x 5/16 PHIL. PAN HD.					

FRONT DOOR ASSEMBLY - U.S.A. 25¢ - PARTS LIST (Continued)

ITEM	PART NO.	DESCRIPTION			
23 23 23 24 25 26 26A	0017-00005-0003 0017-00005-0211 0017-00005-0214 A090-00064-0000 0017-00101-0099 A090-00077-0000 0090-00162-00XF	COIN ACCEPTOR W/STRING CUTTER (2 REQ'D.) (OR) COIN ACCEPTOR W/ANTI STRING DEVICE (2 REQ'D.) (OR) COIN ACCEPTOR W/STRING CUTTER (2 REQ'D.) ANTI-PENNY DEVICE #6 x 1/4 SLT. HEX HD. M.S. (2 REQ'D.) COIN GUIDE & SWITCH ASSY. COIN SWITCH MTG. BRKT.			
26B 26C 26CA 26CB 26CC 26D	0017-00005-0203 A090-00059-0400 0017-00005-0195 0010-00599-0000 0017-00007-0015 0017-00101-0147	COIN SWITCH CHUTE COIN SWITCH & WIRE ASSY. COIN SWITCH COIN SWITCH WIRE PUSH-ON RING #4-40 x 3/4 PHIL. PAN. HD. (2 REQ'D.)			

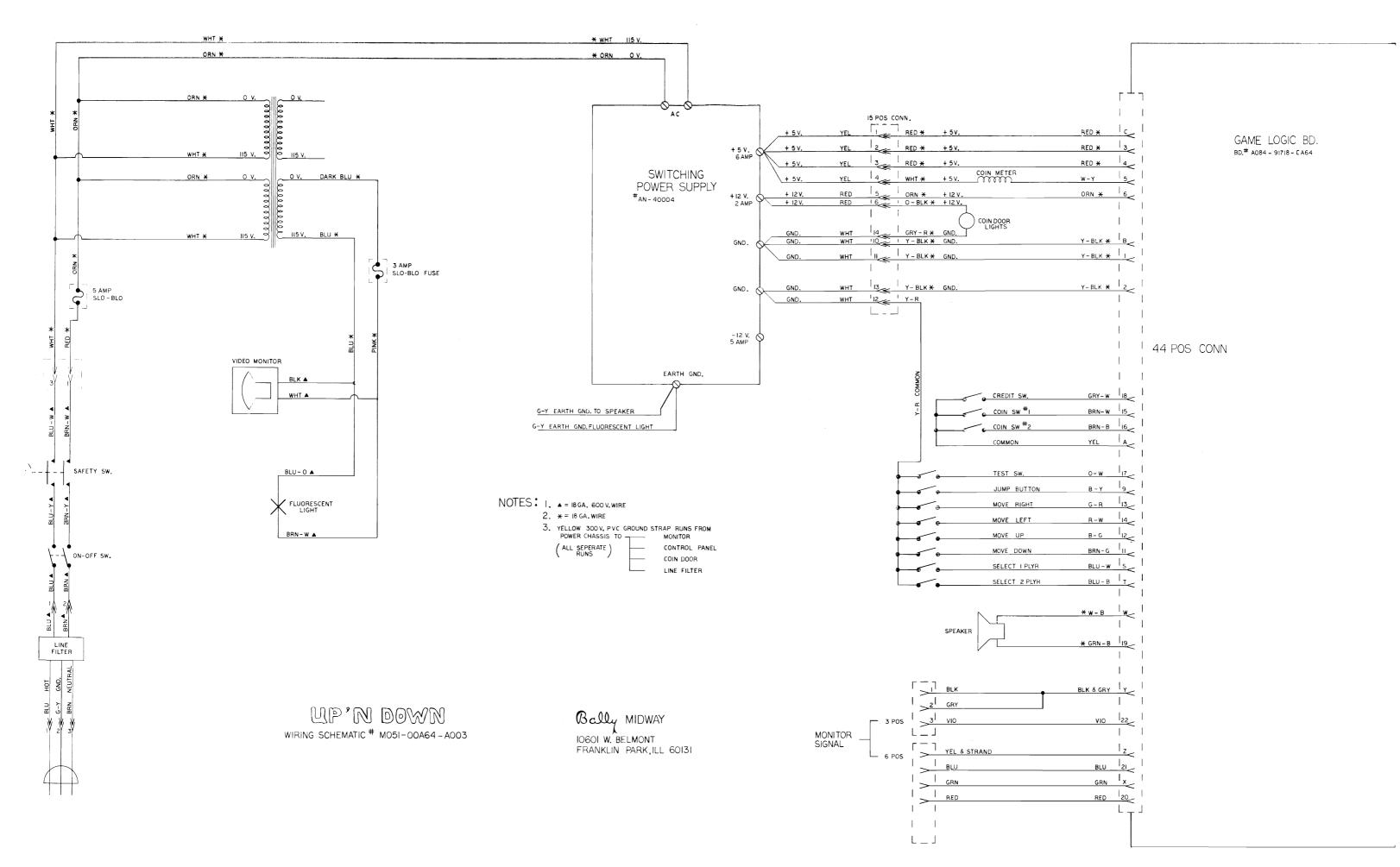
UP & DOWN - HEADER FLUORESCENT LIGHT ASSY.

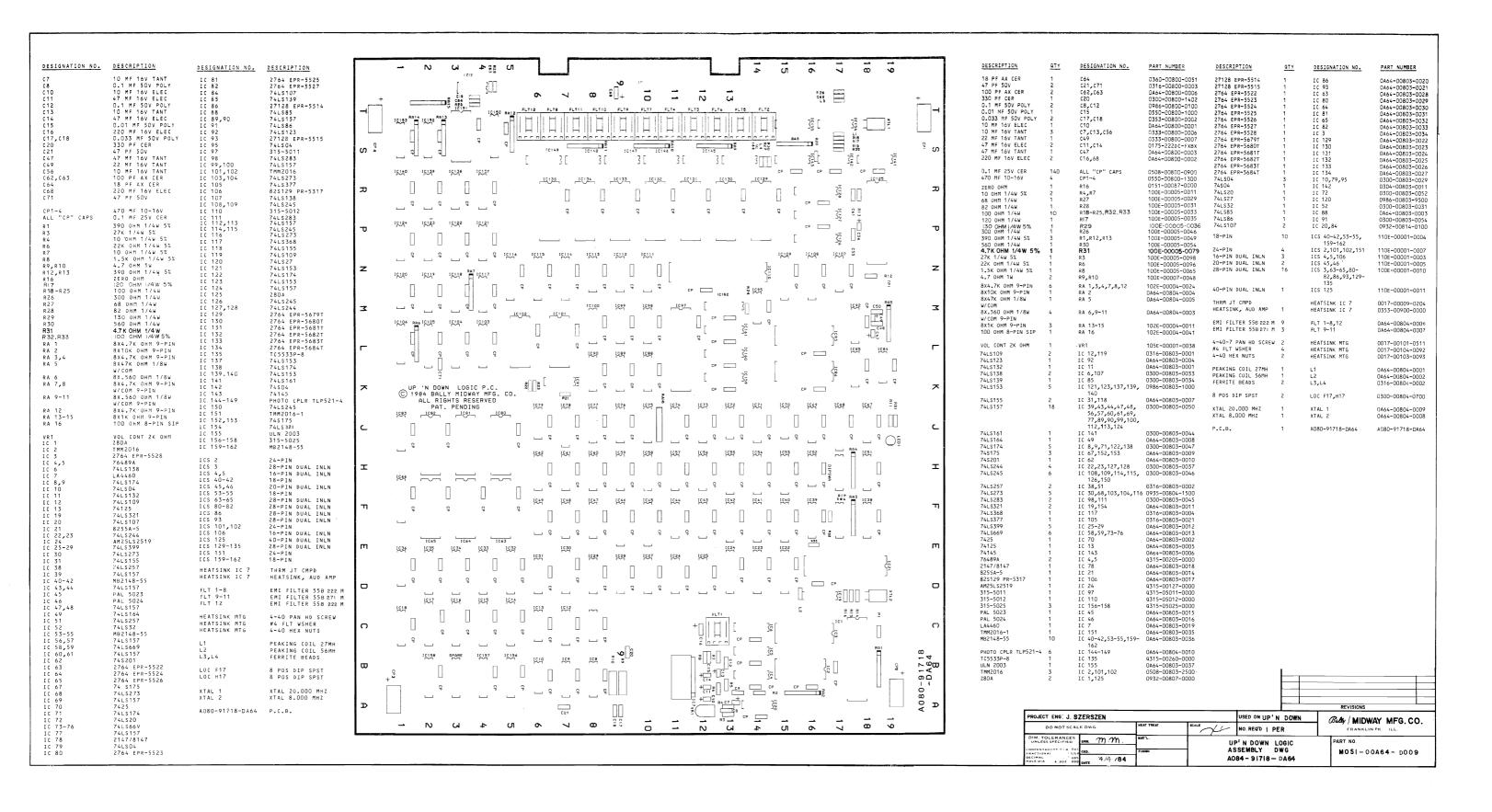


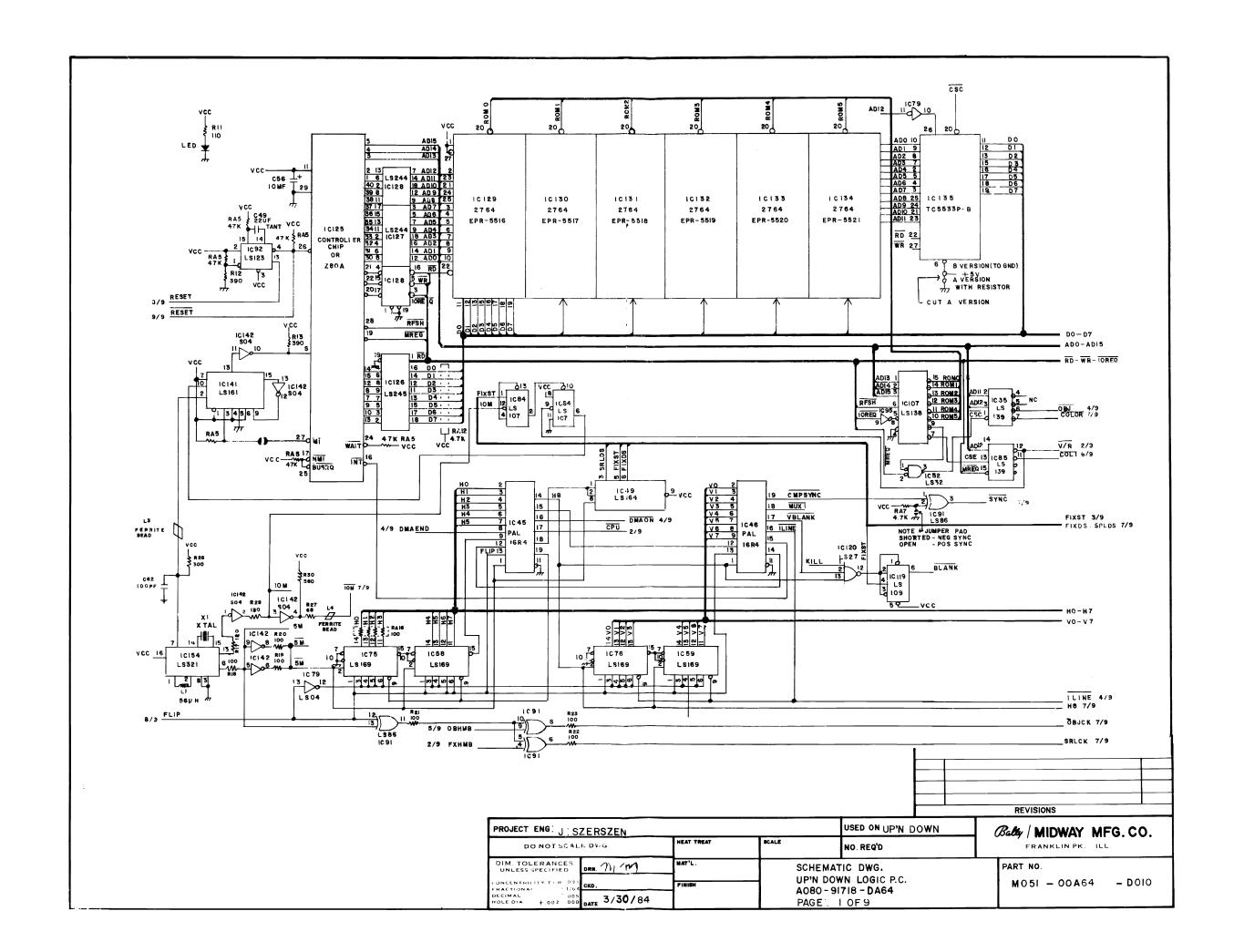
UP & DOWN - HEADER FLUORESCENT LIGHT ASSY. - PARTS LIST

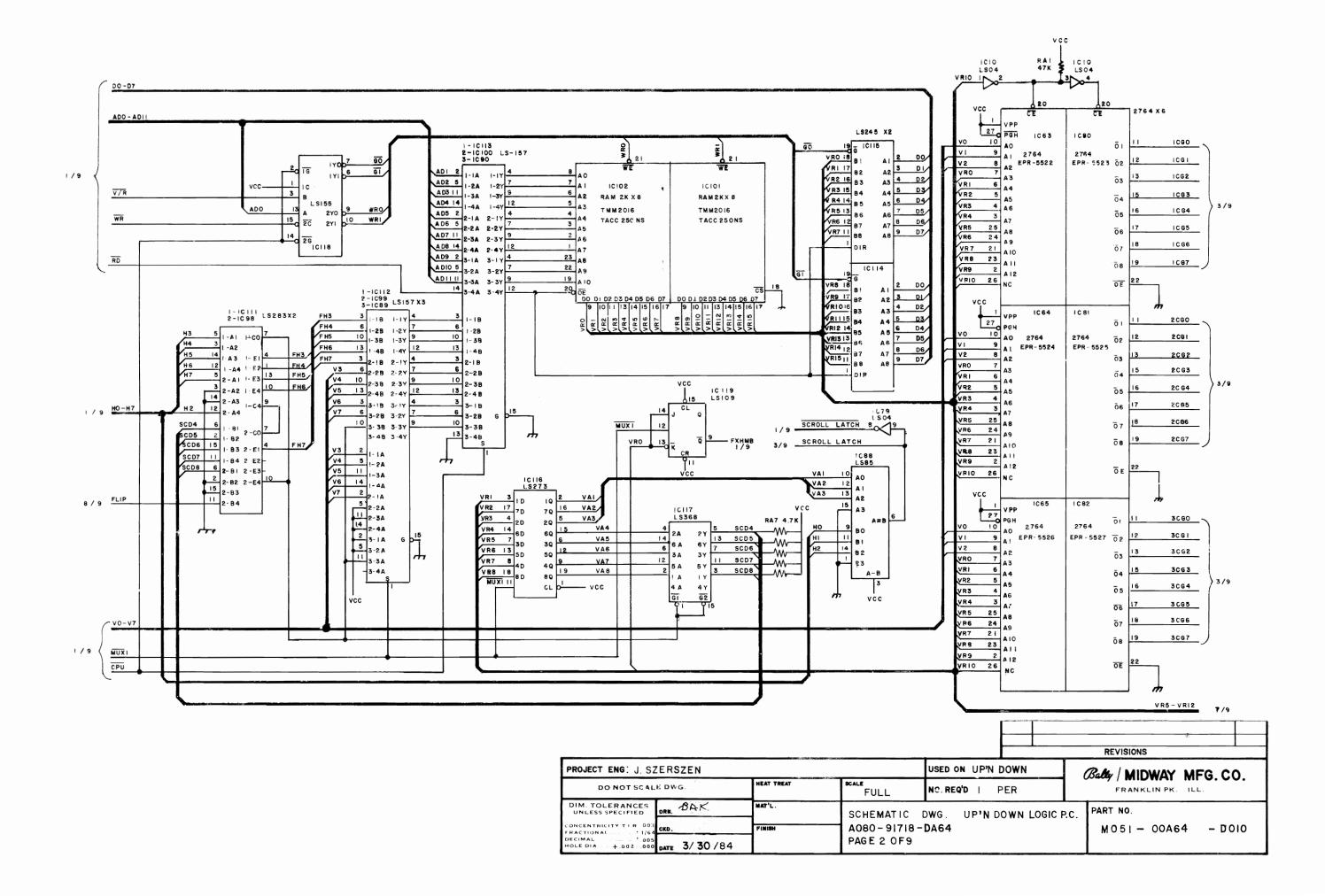
ITEM	PART NO.	DESCRIPTION
1	0595-00105-0000	FLUORESCENT BRKT.
2	0017-00003-0043	18" COOL WHITE FLUORESCENT LAMP
3	0017-00003-0445	LAMP LOCKS (2 REQ'D.)
4	0017-00031-0036	FLUORESCENT SOCKET (2 REQ'D.)
5	0017-00003-0412	FLUORESCENT STARTER HOLDER W/LEADS
	0017-00101-0573	#6-32 x 1/2 PHIL. RND. HD. M.S. (4 REQ'D.)
	0017-00104-0009	#6 EXT. WASHER (4 REQ'D.)
6	0017-00003-0019	FLUORESCENT STARTER
7	0017-00003-0026	BALLAST
	0017-00101-0598	* #8-32 x 5/16 SLT. HEX HD. SCR. (4 REQ'D.)
8	A961-00042-0000	LINE FILTER ASSY.

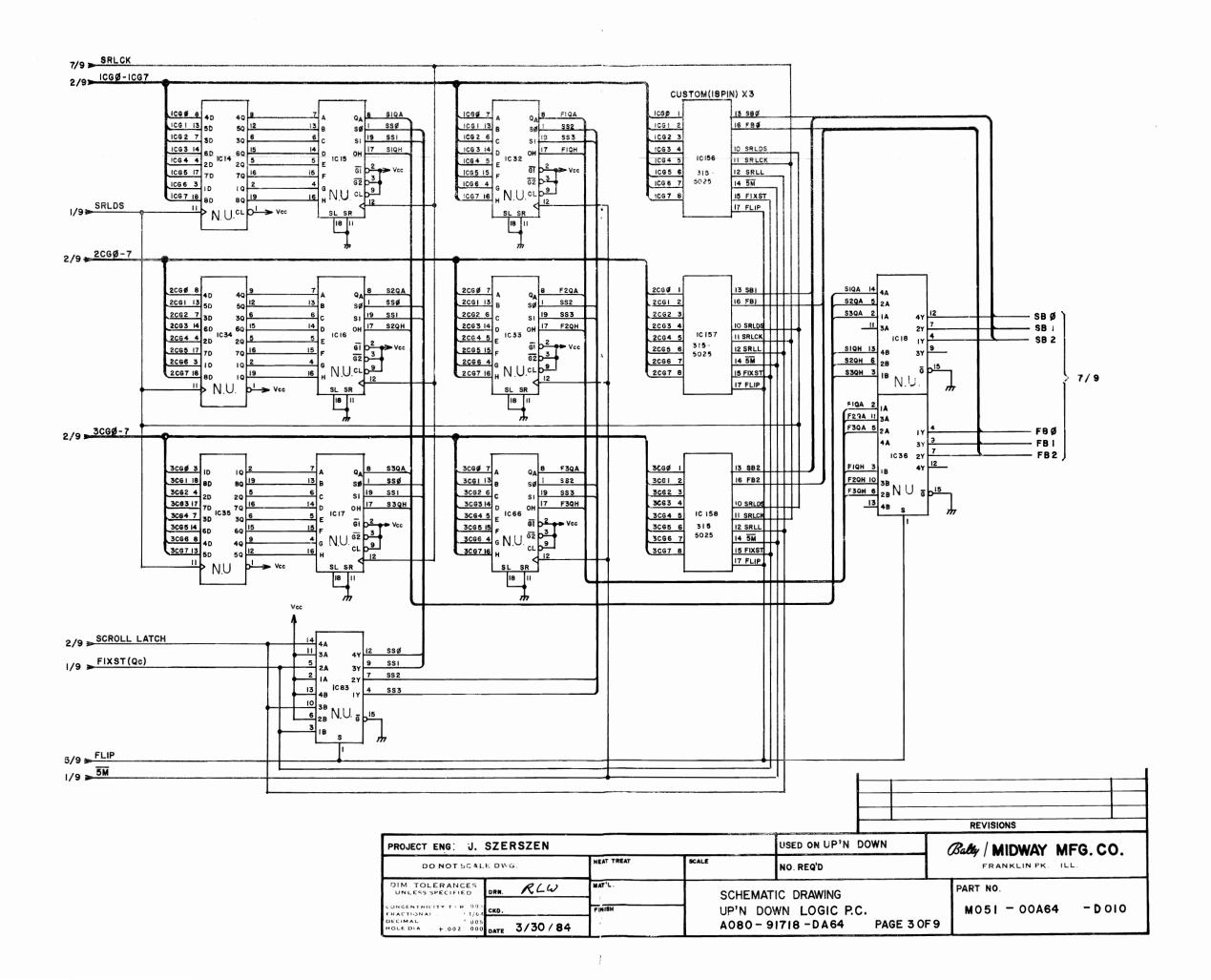
Schematics and Wiring Diagrams

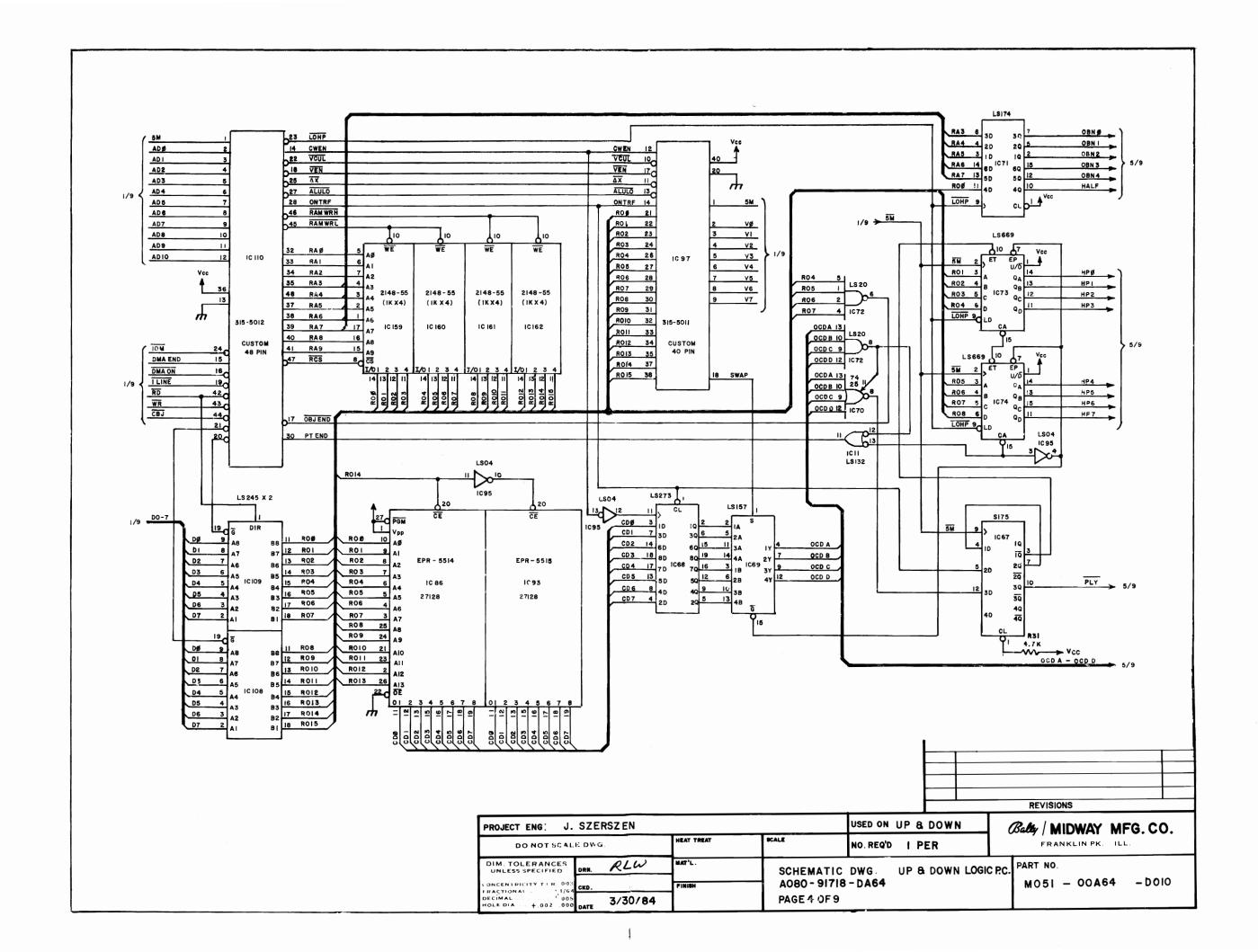


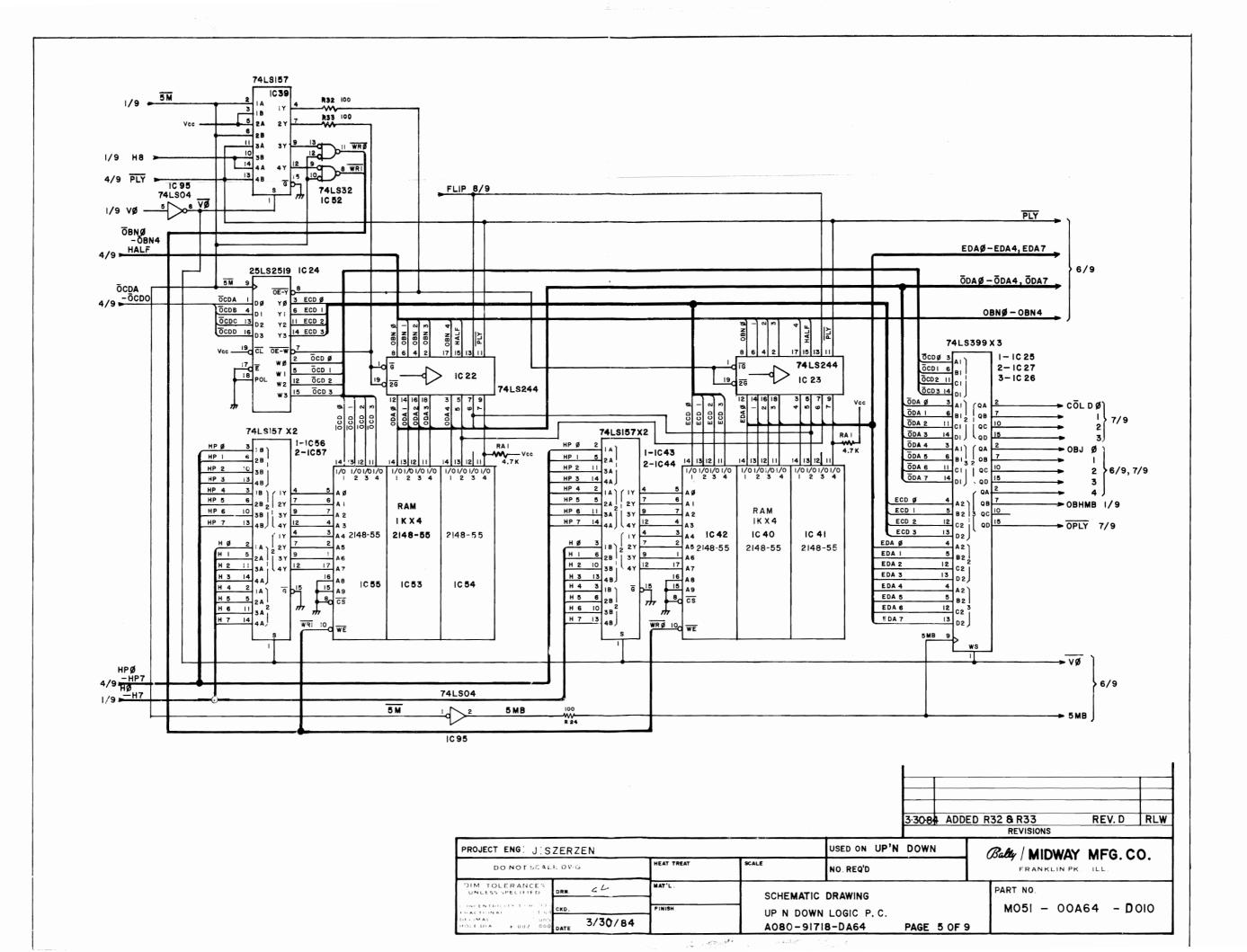


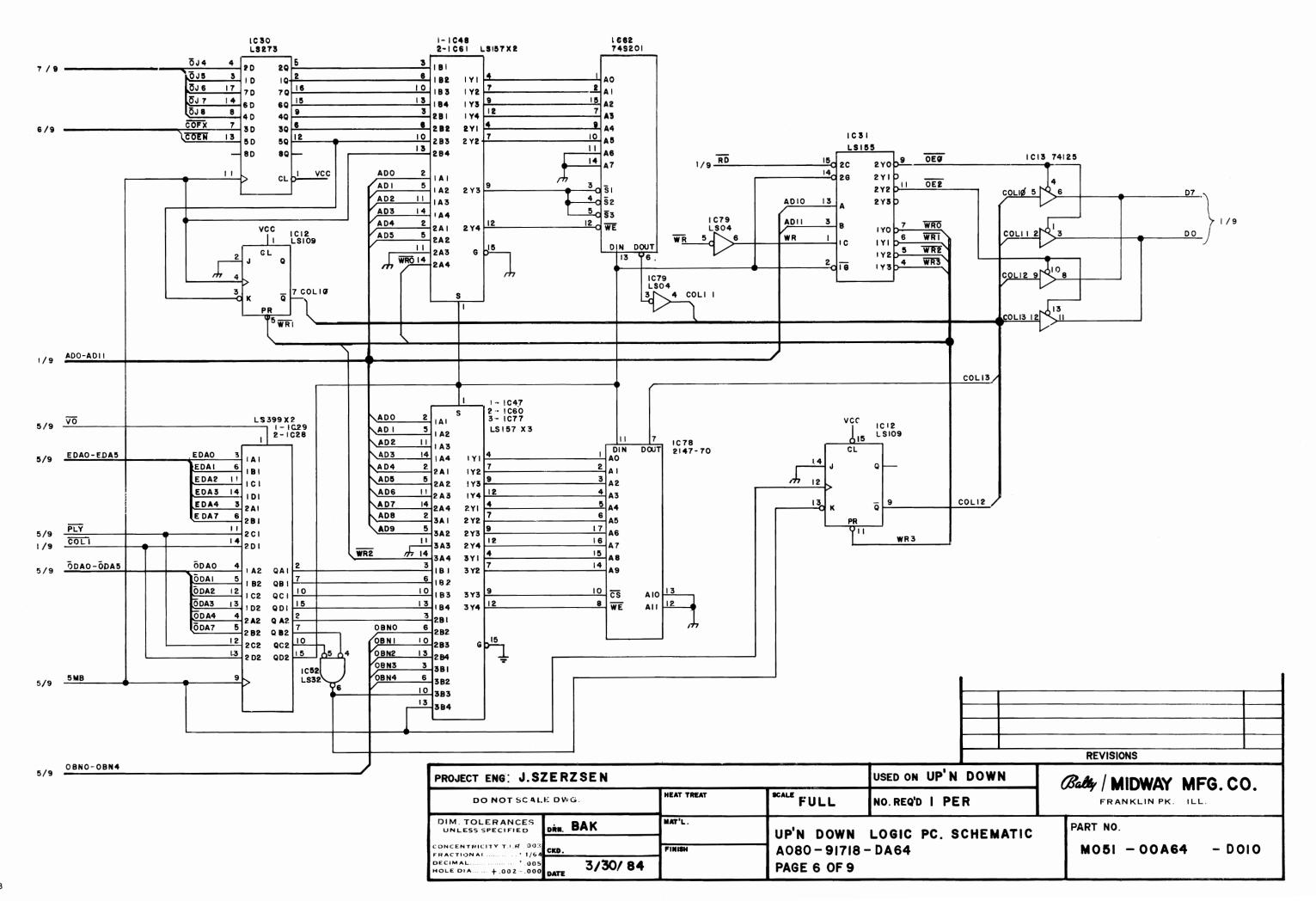


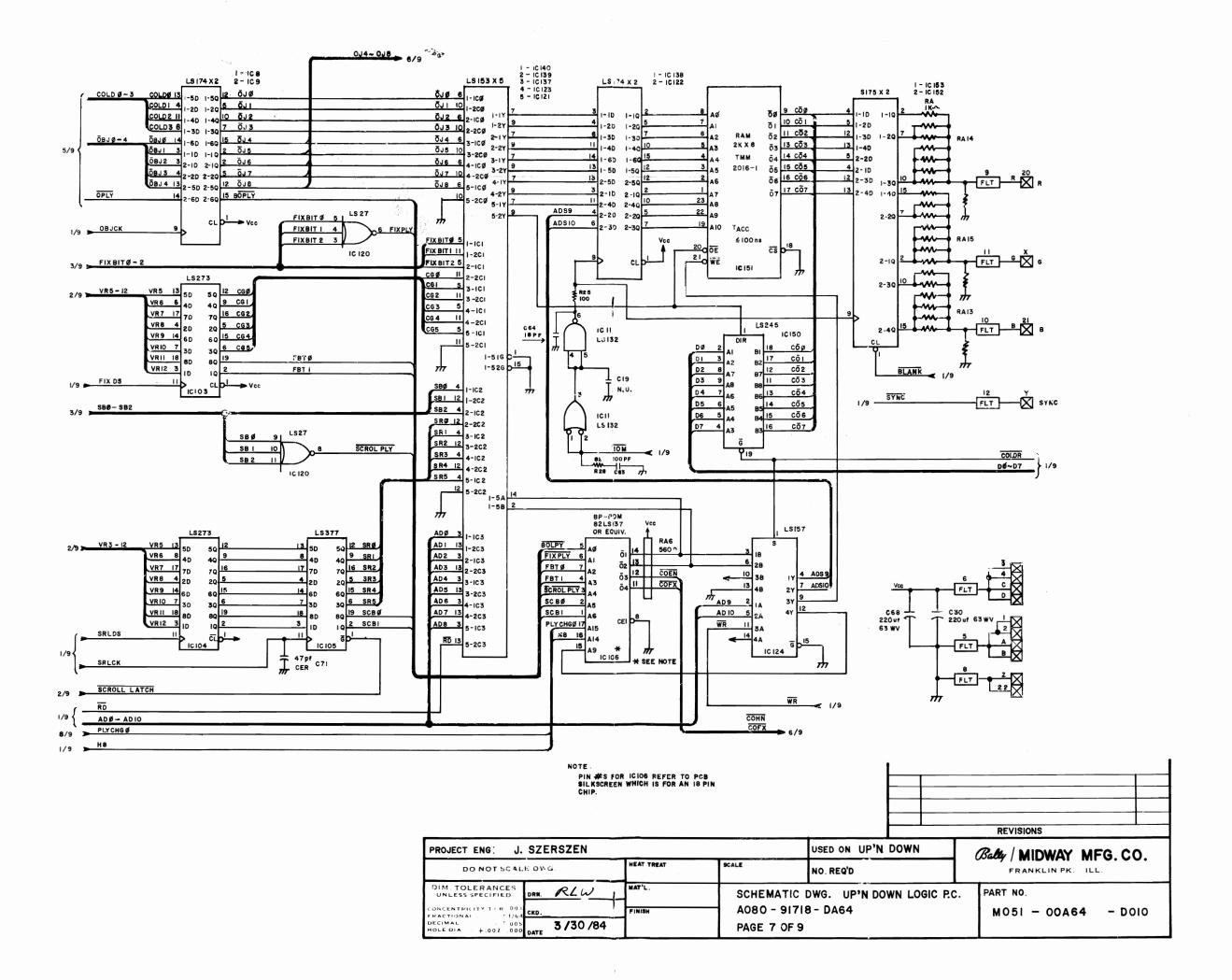


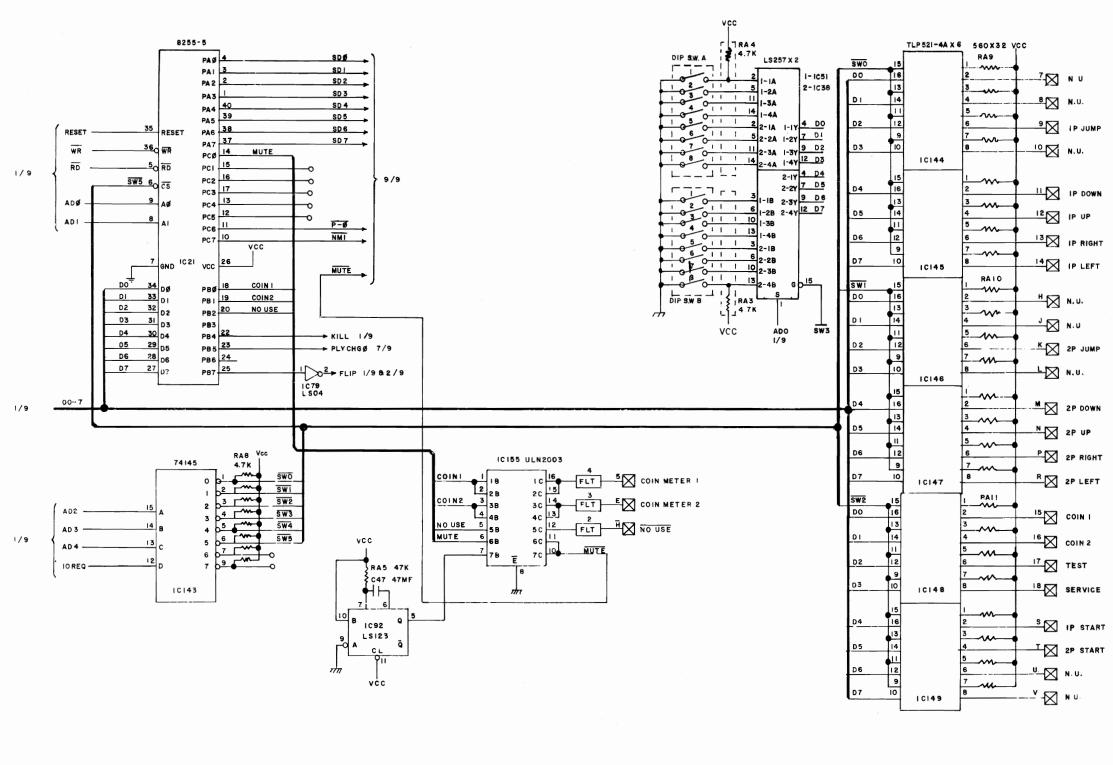


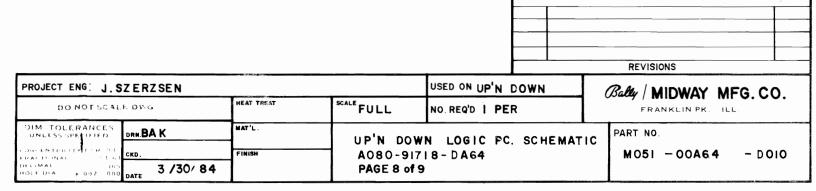


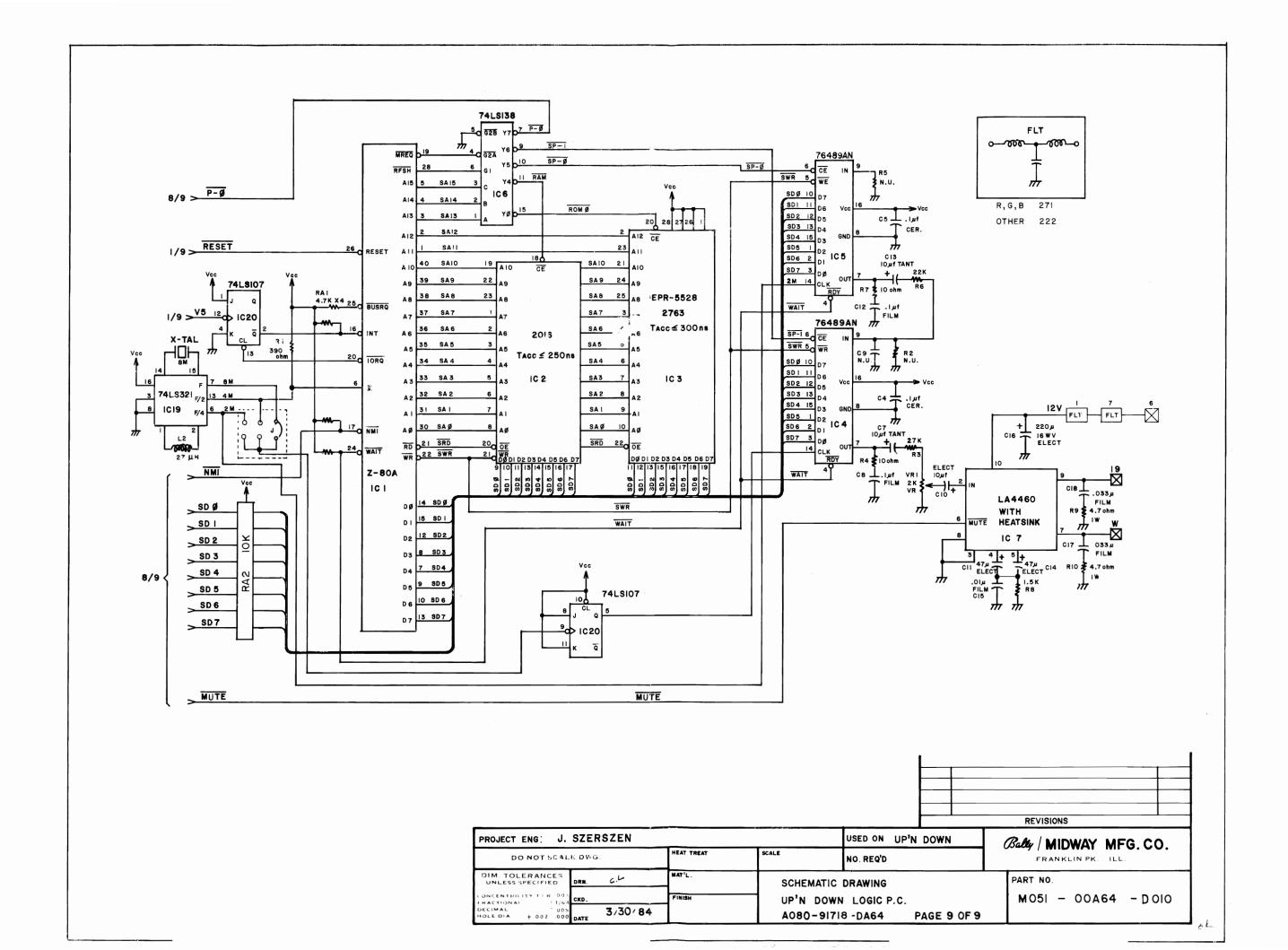












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