TOURNAMENT TIME II

OPERATING MANUAL

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1. INTRODUCTION AND WARRANTY INFORMATION

Tournament Time II is a coin operated video amusement device which accurately simulates the experience of a doubles tennis match. The game may be operated by two, three or four players simultaneously and accomodates groups of players who have differing degrees of skill.

The electronics of this game incorporate the latest advances in semiconductor technology resulting in long life and low maintenance.

However - as with all devices mechanical or electrical - there will inevitably be minor problems. This manual describes all adjustments, repairs and troubleshooting procedures which you will need to know to operate the game.

If either printed circuit board (PCB) fails within the one-year warranty period, immediately contact _____ *for repair or replacement instructions.* NOTE: *Any PCB repair attempted by anyone other than factory authorized service personnel will void PCB warranties.* If your computer PCB or power supply/flasher PCB fails *after* the warranty period has expired, it will be repaired for a nominal parts and labor charge.

The TV monitor is under warranty for a period of thirty days and if the monitor should fail within this period, immediately contact _____ *for repair or replacement instructions.* NOTE: *Any TV monitor repairs attempted by anyone other than factory authorized service personnel will void TV monitor warranty.* If the TV monitor fails *after* the warranty period has expired, take it to any reputable TV repair shop for servicing.

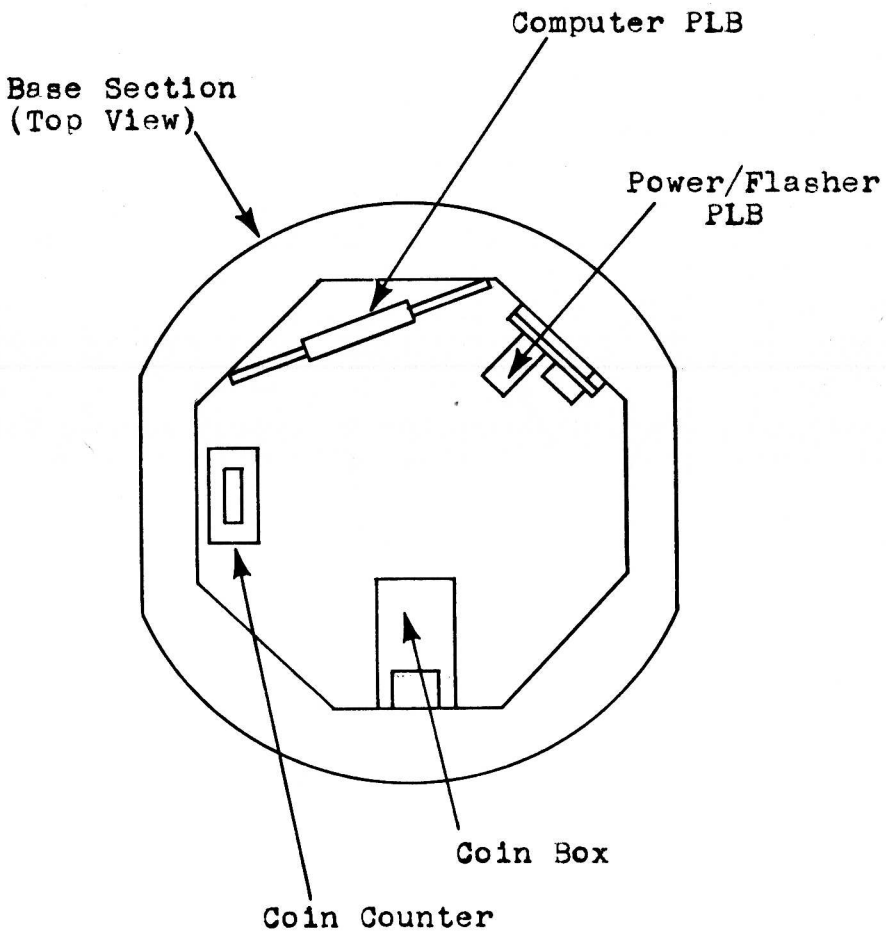
2. SERVICE ACCESS AND BASIC CONSTRUCTION

All service procedures (except coin removal) are performed with the control panel (table top) raised away from the base or pedestal section. To raise control panel, unlock and lift up. Secure with wooden brace found inside base section. Remove safety chain prior to servicing the underneath of the control panel.

Access to the coin box is gained by unlocking lock underneath coin acceptor and removing coin box/lock unit.

The control panel contains the TV monitor sub-assembly, the paddle controls, the speed buttons and the paddle size select buttons. All TV monitor components are separately harnessed and mounted to a single insert to facilitate removal.

Mounted in the base section is the coin handling equipment (the coin acceptor, coin box and coin counter), the computer PCB, the power supply/flasher PCB and the transformers.



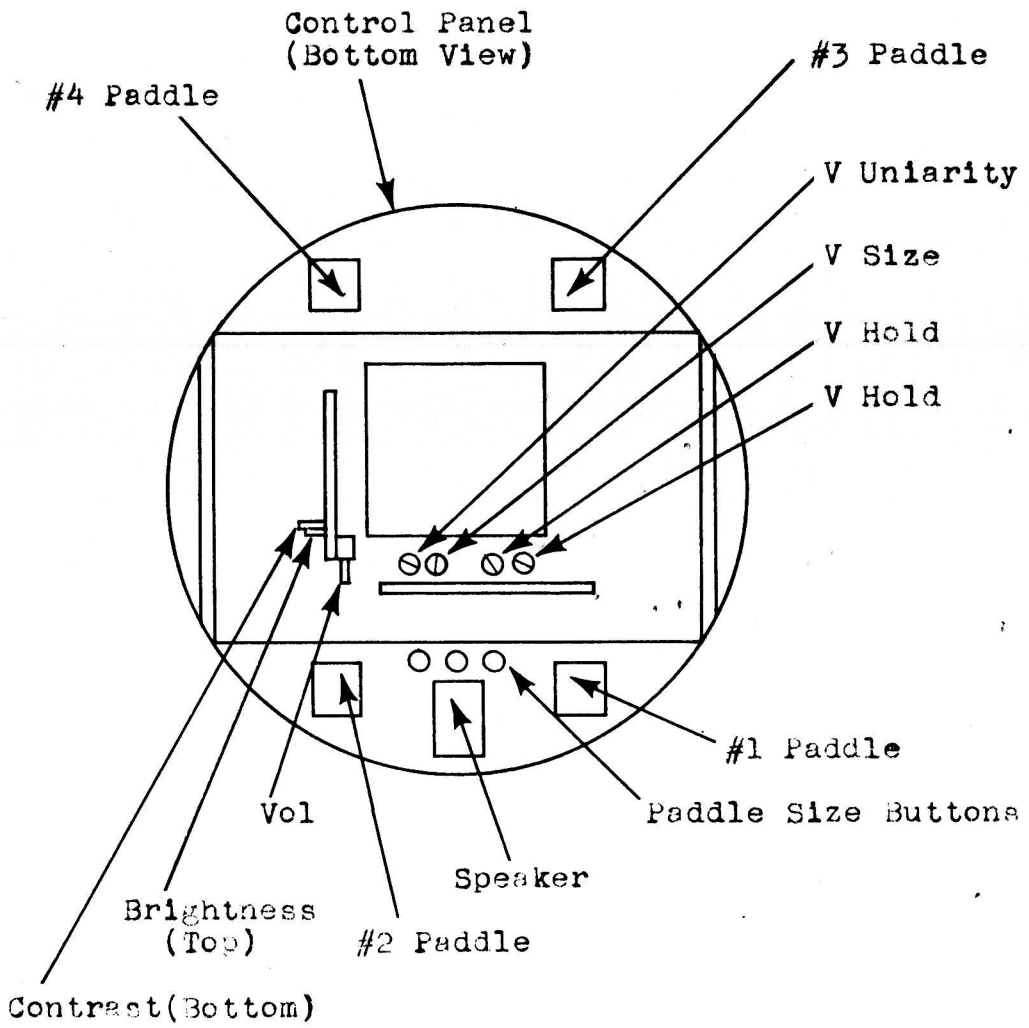


FIGURE 1

LOCATION OF MAJOR
COMPONENTS

3. NEW MACHINE SET-UP AND CHECK-OUT PROCEDURES

After uncrating, save all packing materials in the event the machine needs to be returned.

As each new Tournament Time II leaves the factory, every component and sub-assembly is carefully checked for proper operation. However, since parts may have been damaged or adjustments changed during shipping, the following check-out procedure *must* be performed prior to placing the machine on location.

a. With the machine unplugged, raise the control panel and carefully inspect both the exterior and interior for any obvious damage to the cabinet or internal components which may have occurred during shipping. *If any such damage is discovered, immediately contact the freight carrier.* Then contact _____ for repair or replacement instructions.

b. Inspect the interior of the machine more carefully, looking for broken or disconnected wires, sub-assemblies not securely mounted and any foreign objects shorting or interfering with electrical connections. Pay particular attention to the connections to the TV monitor, the players' controls and the coin switch. Check the security of the computer PCB and power supply/flasher PCB edge connectors, the in-line Molex connectors and the main fuses on the power PCB. NOTE: The main power cord is located inside the cabinet for shipping purposes and should be fed through the hole in the base section bottom.

c. Plug the machine in and check the CRT (Cathode Ray Tube) image which should be steady, centered, sharp and exhibit the proper levels of brightness and contrast. With the machine plugged in, but not started, the CRT will display the Attract Mode (see next section for Attract explanation).

d. Insert several old *and* new coins into the coin acceptor. No genuine coin should be rejected. Operate the coin return button while checking for signs of stickiness or binding. Lightly spray the coin acceptor, return button and the inside of both lock cylinder with WD-40, a silicone lubricant.

e. Check the computer for proper operation by playing several complete games and compare the results with the game sequence analysis in the next section.

4. THE GAME SEQUENCE

With the game plugged in but not started, the CRT will display the Attract Mode. During Attract, the general illumination lamps are lighted, the attract lamps flash and the ball rebounds off the playfield walls.

Coin insertion produces game credit and the players may select either the Two Player Mode or the Four Player Mode by depositing one or two coins. The game is started by pressing one of the paddle size selector buttons.

THE TWO PLAYER MODE: If only one coin is inserted, the Two Player Mode will automatically be selected by the computer and the two player configuration will appear on the CRT after one of the paddle size selector buttons is pressed. These buttons control the relative difficulty of the game by changing the paddle sizes so the game can accommodate players of differing abilities yet offer each the same challenge.

The two player CRT configuration consists of a playfield bounded by walls on all four sides, a dotted net line separating the players' courts, two paddles (one for each side) and the score remaining from the last game. The attract lamps do not flash during the play mode.

The score is reset to zero at the beginning of each game and will count to a maximum of 11 or 15, depending on the position of the score switch (see section 5). The ball is automatically served from the middle of the CRT and is manipulated by placing the paddle directly in the path of the ball. The direction the ball is bounced is controlled only by where on the paddle the ball strikes. For instance, if the ball encounters the upper-most portion or "segment" of the paddle, it will be bounced upward at the maximum angle. "Striking" the ball with a moving paddle will not produce a

greater or different effect than simply placing the paddle in the path of the ball. There are only two ball speeds: the normal or "slow" speed, and the "fast" speed produced by pressing the speed buttons. The player's speed button will have an effect only after he has just hit the ball and pressing this button causes the ball to be drastically shifted horizontally.

After a player has reached the maximum number of points, End Game occurs, the paddles disappear, and the attract lamps commence flashing again.

THE FOUR PLAYER MODE: Two coins must be deposited to produce the four player CRT configuration which will appear on the CRT when the desired size button is pressed. In this configuration, an additional horizontal net line divides the playfield into two sections. Four paddles appear and each paddle is permitted movement only within its own quadrant. Other than these differences in the CRT display, the four player game sequence is identical to the two player sequence.

5. SCORE ADJUSTMENT

A maximum score of 11 or 15, may be operator selected by changing the position of the slide switch found in the bottom right hand corner of the computer PCB (Figure 2). If the switch is in the right hand position, the game will end at 11 points. Adjusting the switch to the left will produce End Game at 15, which is the recommended setting. If changing the switch does not have the desired effect, see Section 12.

6. FLASHER ADJUSTMENT

Turn the small blue trim pot on the power supply/flasher PCB to adjust the flash rate of the attract lamps.

7. TV MONITOR ADJUSTMENT

The TV monitor adjustments function like those of any normal TV set. Refer to Figure 1 for the locations of the following adjustments.

a. VOLUME: Adjust the volume to the preference of the location. Keep in mind that the machine will sound *louder* with the control panel raised.

b. BRIGHTNESS: Brightness is adjusted *before* contrast. Adjust so the CRT background is as dark as possible without diminishing the brightness of the playfield walls.

c. CONTRAST: Adjust so that the CRT images are as bright as possible against the pre-adjusted dark background without being blurred.

d. VERTICAL HOLD: Adjust only if the picture appears to be rolling up or down the screen. Adjust for a stable, centered picture.

e. HORIZONTAL HOLD: Adjust if the picture appears to be shifted off center horizontally, the images are warped, or if the whole picture is broken into diagonal lines.

f. VERTICAL SIZE: The vertical size and liniarity adjustments

are interdependent. The vertical size adjustment changes the vertical dimension of the picture. Adjust for optimum size.

g. VERTICAL LINIARITY: Change this adjustment only if the paddles appear to become compressed at the top or bottom of the CRT. Adjust so paddle size remains constant from top to bottom. If liniarity adjustment has adversely affected vertical size, re-adjust vertical size.

h. YOKE: The yoke should never require adjustment unless the adjustors have been tampered with or the machine is physically damaged. If yoke adjustment is indicated, adjust both yoke rings simultaneously for optimum centering of the playfield in the CRT. Generally, yoke adjustment is best handled by qualified service personnel.

i. TV FUSES: Two fuses are soldered directly to the monitor. Replace only with same type fuses and if fuse blows a second time, remove monitor and take it to a reputable TV repair shop.

8. PADDLE ADJUSTMENT

The importance of properly adjusted paddle travel cannot be over-stressed as a maladjusted paddle will discourage players from continuing to use the machine. Each paddle should travel fully to the boundaries of its court or quadrant and not enter the other players' areas. If paddle movement is restricted or impinges on other players' areas, paddle adjustment is necessary.

Three different adjustments are required for each paddle. Adjustment is performed by turing *potentiometers* or "pots" found on the computer board and on the joystick units (Figures 2 and 3). Two adjustments (one vertical and one horizontal) are located on each joystick and a second set of vertical adjustments is found in the upper left hand corner of the computer PCB.

Each paddle should be adjusted separately with the game in the Four Player Mode. Set the paddle size to "pro" and use the following procedure:

a. First, center the paddle horizontally within its quadrant. The horizontal adjustment determines the right hand limit of paddle travel (right, left, etc. Refer to your right and left when facing the coin acceptor). Move the joystick to the extreme right hand position and turn the "ears" of the horizontal adjuster (Part #33, Figure 6) until the paddle is just inside its right hand boundary.

b. The other adjustment on each joystick unit determines the upper limit of paddle travel. Set the joystick to the extreme upper position and turn the adjustor until the paddle is barely below its upper boundary.

c. Adjust the lower limit of paddle travel by turning the appropriate pot located on the computer PCB (Figure 2). Set the

joystick in the extreme lower position and turn the pot until the paddle is just inside its lower boundary.

d. If the last adjustment disturbed the upper limit adjustment, it will be necessary to repeat Steps b and c until the proper vertical positioning is achieved.

NOTE: Each joystick potentiometer has a physical stop which has been pre-adjusted at the factory. This stop has been glued in place and should not be tampered with.

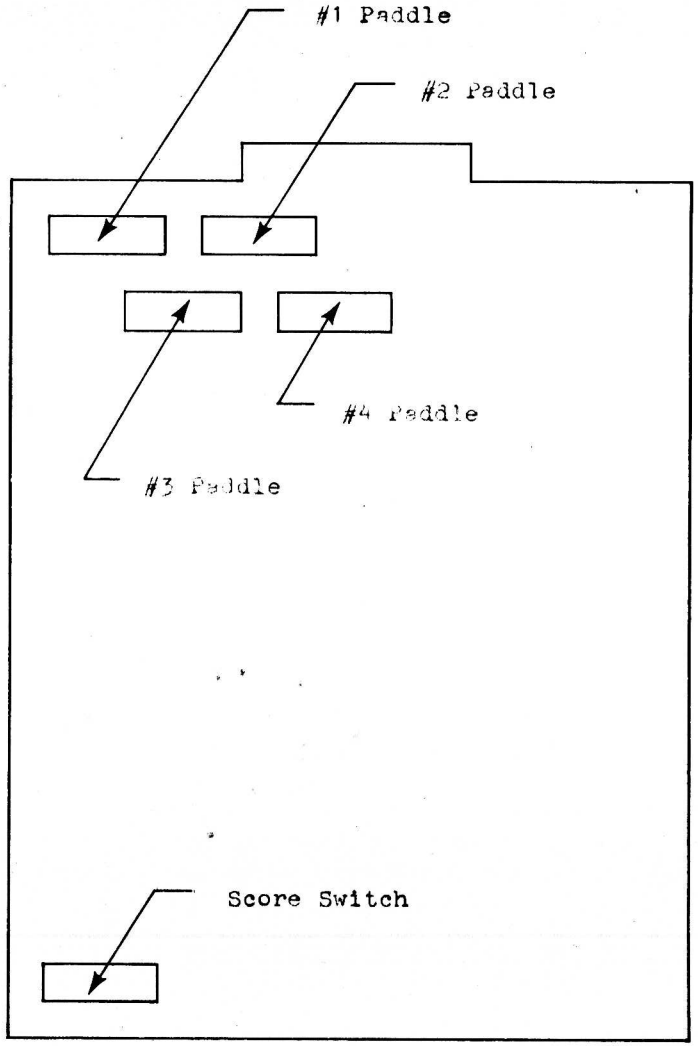


FIGURE 2

LOCATION OF COMPUTER PLB ADJUSTMENTS

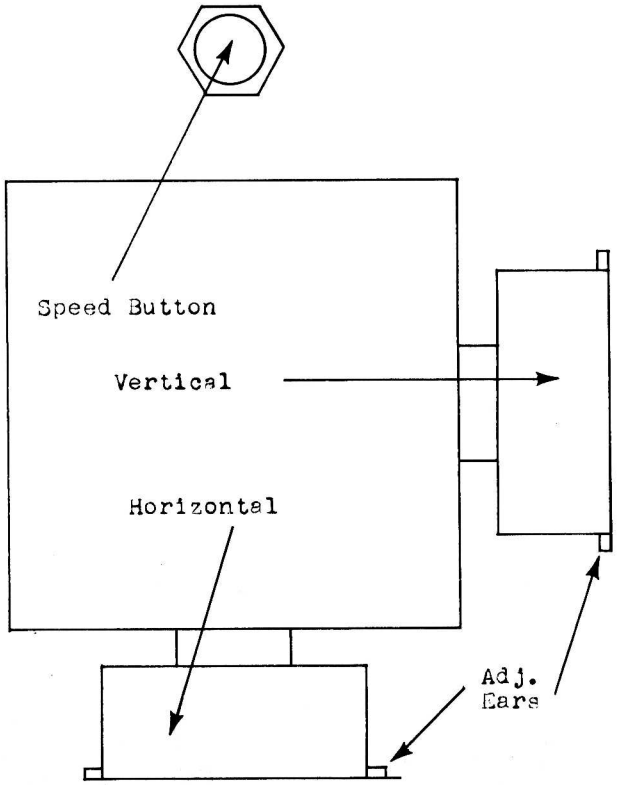


FIGURE 3

JOYSTICK ADJUSTMENTS
(Bottom View)

9. COIN ACCEPTOR OPERATION, ADJUSTMENT AND MAINTENANCE

OPERATION: The detection and rejection of undesired or counterfeit coins are determined by size (both thickness and diameter), weight, and metallic composition.

The transfer cradle (#9 in Figure 4) is used to test both the size and weight of the coin. The quarter must first pivot an "undersize" lever (10) to unlock the transfer cradle. Undersize "quarters" will fail to unlock the transfer cradle and can be returned by actuating the wiper operating lever (17). Oversize diameter coins will fail to pass between the transfer cradle and the wiper and can be returned by operating the wiper lever. Coins that are oversize in thickness will fail to pass between the magnet gate (11) and the main channel (5) and will have to be dislodged by actuating the wiper operating lever. Underweight coins will fail to overcome the transfer cradle counterweight and can be returned by operating the wiper lever.

A magnet is used to test the metallic composition of the coin. Highly magnetic coins, such as steel or iron, will be retained by the magnet and can be returned by actuating the wiper operating lever. Coins having comparatively high magnetic properties will be slowed down by the magnet and will drop off the rail short of the "accept" entrance and will be returned. Coins having little or no magnetic properties, such as brass or zinc, will pass through the magnetic field so fast they will overshoot the accept entrance and will be returned.

ADJUSTMENT: All coin acceptors leave the factory adjusted for maximum performance. If, however, more critical adjustment is desired, or if the unit has been disassembled for cleaning, the following adjustment procedure is suggested.

KICKER AND SEPARATOR:

a. Set the acceptor on a level surface with the back of the unit facing you (the kicker and separator are on the back).

b. Loosen the screws holding the kicker (1) and the separator (3) and move both the kicker (2) and the separator (4) as far to the right as they will go. Tighten the screws lightly.

c. Insert several test coins (both old and new) and note that some are returned by striking the separator.

d. Loosen the separator screw and move the separator a slight amount to the left. Retighten the screw.

e. Insert the test coins again, and if some are still returned, repeat Step d until all the coins are accepted.

f. Loosen the kicker screw and move the kicker a slight amount to the right. Retighten the screw.

g. Insert the test coins again and, if some of them are returned, repeat Step f until all coins are accepted.

h. Be sure that both screws are tight after the adjustments have been made.

THE MAGNET GATE:

a. Set the acceptor with the front of the unit facing you in the test position.

b. Turn the magnet gate adjustor (12) out (counter-clockwise) until none of the coins will fit through.

c. With a coin resting in the transfer cradle, turn the adjustor in (clockwise) until the coin barely passes through the magnet gate.

d. Test this adjustment using several coins, and, if any fail to

pass the magnet gate, repeat Step c until all coins are accepted.

e. Fix the magnet gate adjustor in this position with a drop of glue or Lok-Tite, if necessary.

ACCEPTOR MAINTENANCE:

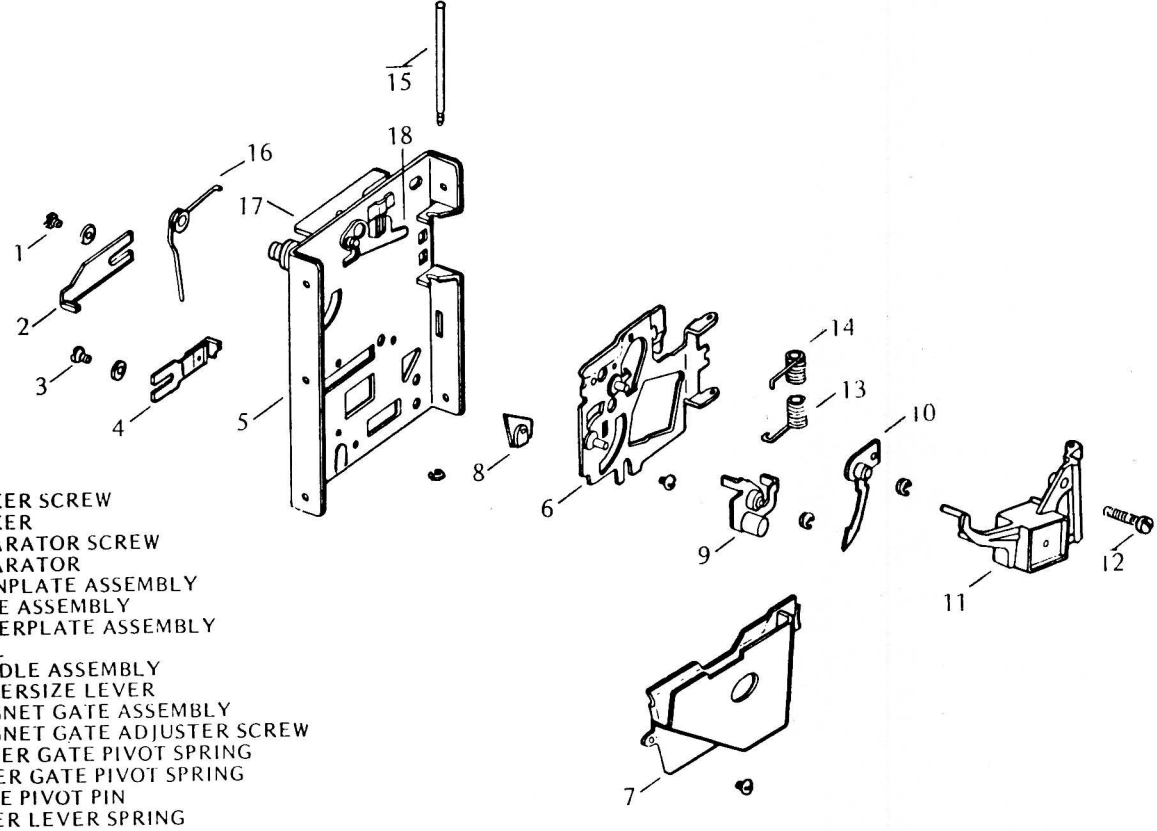
Depending on the environment in which the acceptor is used, periodic preventative maintenance should be performed.

The mainplate (5) may be cleaned with any household cleaner. Thorough rinsing and drying are necessary to remove deposits and/or film.

Remove all metal particles from the magnet by guiding a screw-driver along the edges of the magnet.

Remove the transfer cradle and undersize lever and clean the bushings and pivot pin. Apply powdered graphite or pencil lead to the pivot pins and bushings and re-assemble.

Spray the entire unit lightly with WD-40, a silicone lubricant.



1 KICKER SCREW
2 KICKER
3 SEPARATOR SCREW
4 SEPARATOR
5 MAINPLATE ASSEMBLY
6 GATE ASSEMBLY
7 COVERPLATE ASSEMBLY
8 RAIL
9 CRADLE ASSEMBLY
10 UNDERSIZE LEVER
11 MAGNET GATE ASSEMBLY
12 MAGNET GATE ADJUSTER SCREW
13 LOWER GATE PIVOT SPRING
14 UPPER GATE PIVOT SPRING
15 GATE PIVOT PIN
16 WIPER LEVER SPRING
17 WIPER LEVER
18 WIPER

FIGURE 4 COIN ACCEPTOR – EXPLODED

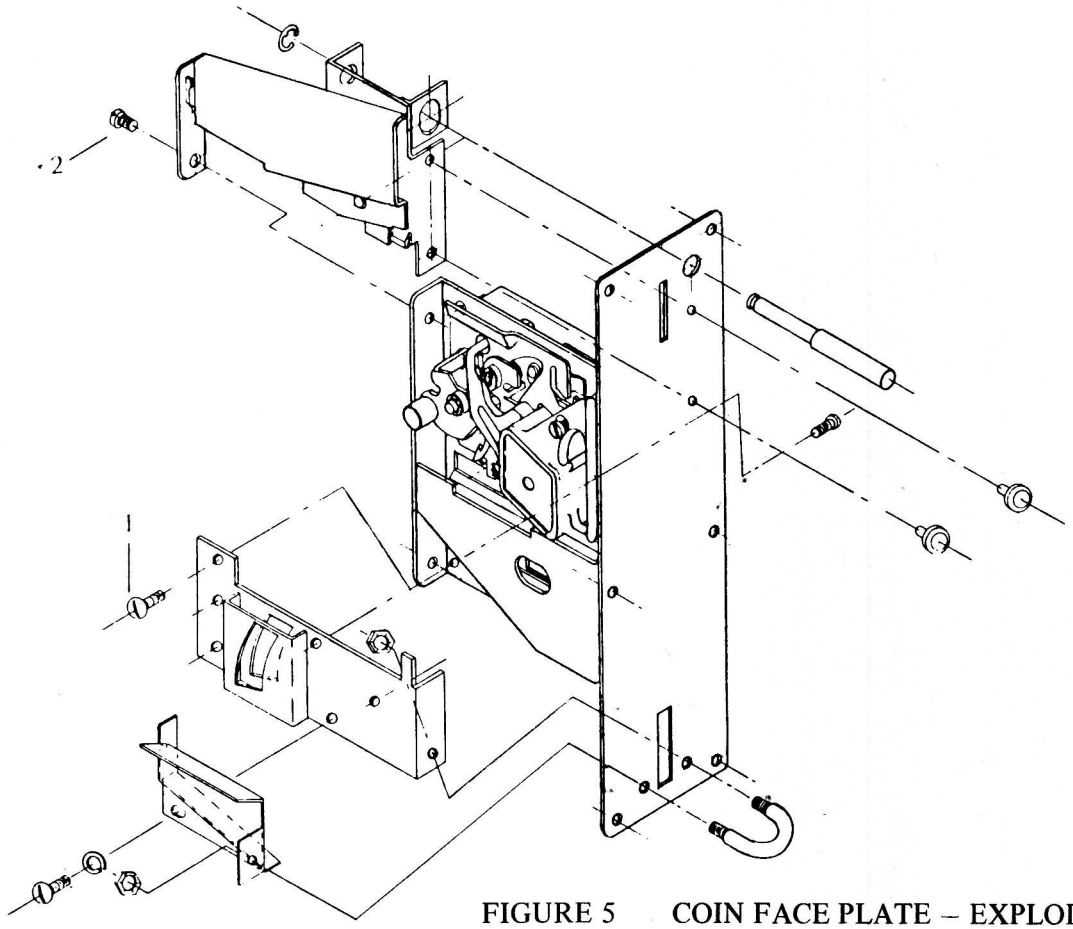


FIGURE 5 COIN FACE PLATE – EXPLODED

10. GENERAL MAINTENANCE

The cabinet and plexiglass screen may be cleaned with any non-abrasive household cleaner; do not wax. The coin acceptor, rejector linkage, moving parts of joystick units and the door locks should be lightly sprayed with WD-40 approximately once every three months. The joystick potentiometers should *never* be lubricated in any way.

11. DISASSEMBLY PROCEDURES

a. COIN ACCEPTOR: The entire coin acceptor/face plate unit is removed by first disconnecting the coin switch wires and removing the six face plate mounting screws. The coin acceptor is separated from the face plate by removing screws #1 and #2 in Figure 5.

b. COMPUTER PCB: Disconnect the edge connector and lift PCB out. Handle and ship the computer carefully because it is a rather delicate and expensive item.

c. POWER SUPPLY/FLASHER PCB: *Unplug the machine before removing power PCB.* Disconnect both edge connectors, remove four mounting screws and spacers and lift out.

d. TRANSFORMERS: *Unplug machine before removing transformers.* Record wire colors and their positions, unsolder wires, remove mounting screws and lift out.

e. TV MONITOR: *Unplug machine before removing monitor.* All TV monitor components are mounted to a single board to facilitate removal. First disconnect the monitor Molex connector, unscrew the harness from the TV board and pull the harness out of the way. Then remove the six TV board mounting screws and lift the monitor sub-assembly out. CAUTION: DISCHARGE SECOND ANODE BEFORE SERVICING.

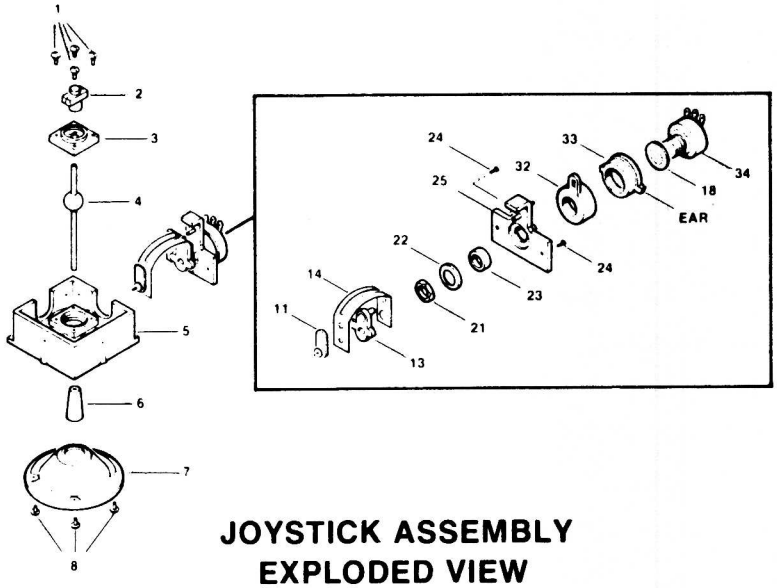
f. JOYSTICK UNITS: Disconnect four push-on connectors from the joystick potentiometer and two from the speed button. Remove the four nuts from the mounting bolts and push unit out through top of control panel. *Defective joystick potentiometers are replaced only by sending the entire unit to* _____ *for rebuilding.* If it is necessary to disassemble the joystick unit for some other reason, consult the exploded view in Figure 6.

The speed button is separated from the joystick unit plate by first

disconnecting the push-on connectors and then removing the *inside* retaining nut.

g. PADDLE SIZE BUTTON: Remove in the same fashion as the speed buttons in the previous paragraph.

h. SIDE PANELS: Each upholstered side panel may be removed individually if damaged by removing the mounting screws from inside the base section, and any components mounted to the panel.



JOYSTICK ASSEMBLY
EXPLODED VIEW

FIGURE 6

12. TROUBLESHOOTING TECHNIQUES

The first step in any troubleshooting procedure is correct identification of the observable symptoms of the malfunction. This includes not only the circuits or features which are malfunctioning, but also those which are still operational. Then, with these clues in mind, examine the areas of the machine which might cause those symptoms.

For instance, if the CRT is completely dark, yet the control panel general illumination lamps are lighted, you know that the game is receiving power but that it is not reaching the monitor or the monitor is defective. With this information in mind, consult the wiring diagram (Figure 7) and begin troubleshooting where the line voltage enters the monitor. If the TV is energized, yet not functioning at all, it must be replaced. If you do not find line voltage at the monitor, follow the harness until the fault is located.

To troubleshoot this machine you *must* have a VOM (Volt-Ohmeter), available at a minimal cost ($10 for less expensive models) at any electronics supply house. The VOM is used to check voltages and continuity.

It is helpful for troubleshooting purposes to isolate four main areas: the TV monitor, the computer PCB, the power supply/flasher PCB and the harness.

a. TV MONITOR: Most monitor malfunctions are due to improper adjustment or lack of correct line voltage. However, other TV problems do occur and if this is definitely the case, remove the entire TV monitor sub-assembly board and take it to a reputable TV repair shop (if failure occurs during warranty period, see page 1 for warranty instructions).

b. POWER SUPPLY/FLASHER PCB: This unit generates the +5 VDC required to operate the computer PCB and also operates the flashing and general illumination lamps. The two main game fuses are located on this board.

c. COMPUTER PCB: Most computer malfunctions will not be within your scope to repair. If you can positively determine your computer has failed, see page 1 for repair and replacement instructions. Please be aware that some malfunctions which may at first appear to be computer-related are actually the result of maladjusted TV monitor or paddle potentiometers. *Do not attempt to repair the PCB yourself unless you have been specifically instructed to do so by factory authorized service personnel.*

d. WIRING HARNESS: For troubleshooting purposes, the harness includes the line cord, transformers, paddle controls, paddle size buttons, speed buttons, coin switch, control panel lamps, speaker, edge connectors and all the lengths of interconnecting wire. A complete wiring diagram has been included to aid in troubleshooting the harness.

GENERAL TROUBLESHOOTING SUGGESTIONS: For many problems, *substitution* may be the simplest way to troubleshoot. For example, if you suspect a computer malfunction, try substituting another and known-to-be-good PCB and if the malfunction is corrected, the first PCB must have been the cause. Conversely, if the malfunction persists, the cause of the problem must be located in the TV, the harness or the power supply/flasher PCB.

The TV monitor and the power supply/flasher PCB can also be checked by the same method, however the harness must be checked by elimination. If everything else checks out, you can assume the harness is at fault.

If you do not have access to spare parts to use in the substitution test, following are some general test procedures for checking the major components.

TV MONITOR TROUBLESHOOTING: Typical TV monitor malfunctions are no video at all, raster only or distorted display.

If you do not have a raster (raster is the pattern of horizontal lines visible when the brightness is turned all the way up), the TV is probably not receiving power. Check for 110 VAC at pins 4 and 5 of the TV Molex connector. If the control panel lamps are lit and there is no power at the TV, examine the harness to locate the fault. If there is power at the monitor and no raster, check the monitor fuses. If the fuses are O.K. (if in doubt check them with your VOM), remove the monitor sub-assembly and have it repaired.

If you have a raster and no video display, you have one of three problems; (1) the computer is not outputting the video, (2) the computer is generating these signals but the harness is discontinuous or (3) the monitor is receiving the signals but is not able to display them. To check the TV, turn brightness full up, disconnect computer PCB edge connector, place one clip or prod of a test lead on the video pin (violet wire) of the TV Molex connector *on the TV side of the connector* and grip the other end with your fingers. If the monitor is O.K., you should see faint black bars on the screen. If so, check the video wire back to the computer PCB and if it is continuous, check for +5 VDC at pin 1 of connector J2. If O.K. here, replace computer PCB.

If the TV is displaying information, but the picture is warped, broken up, rolling, wavy, flickering or otherwise distorted, perform the TV adjustment procedure explained in section 7. If adjustment does not correct the situation, remove the monitor and have it repaired.

POWER SUPPLY/FLASHER PCB: If the monitor appears to be functioning, yet no video is displayed, check for +5 VDC at pin 1 of connector J2. If you find yourself in this situation and do not have a VOM handy, remove one of the 6V control panel lamps and use it to check for power. If there is +5 VDC at J2-1, check J1-3. If O.K. here, you know the computer is receiving power, so recheck violet video wire to TV and if it is O.K., replace the computer.

If you do not find +5 VDC at the power PCB, first check the on-board fuses. If both fuses are good, connect your VOM to J3-14 and check J3-15 and J3-16 (transformer T1 secondaries) which should be about 8 volts RMS. If the transformer is O.K., replace the power PCB. If the secondary readings of T1 do not check out, check the transformer primary and replace the transformer if you read 110 VAC at the primary.

LAMP MALFUNCTIONS: The lamps are divided into three groups; one group (the general illumination lamps) is always lit while the game is plugged in; the other two groups flash during the Attract Mode and are unlit during the Play Mode. Therefore, it is possible to have malfunctions which affect only a certain group of lamps and not others. If only one lamp of a group is unlit, check the bulb socket and wire connections. If still in doubt, jump it to a lit lamp. If it lights, bulb and socket are good and harness and power PCB are suspected.

If none of the lamps will light, place COM (black) lead of VOM on pin 13 of J3 and touch the other (red) lead to the brown wire on one of the lamp sockets. If you do not get +6 VDC, check for voltage at lamp connector J5. If still not O.K., check at J2-16. If no voltage there, turn VOM to 10 VAC and check for +6VAC at pins 11 and 12 of J3. If you get +6 VAC, the diodes on the power PCB are bad and you must replace the power supply/flasher PCB. If you do not get +6 VAC, check the transformer

T2 by checking the primary. If you find 110 VAC at the primary and no secondary voltages, replace T2.

If none of the general illumination (always lit) lamps will light, check the black ground wires for continuity.

If one or both groups of flashing lamps are not lighting, first check the bulbs and sockets and, if O.K., check the wires from pin 3 and 4 of connector J2 to the lamps. If the wiring is continuous, place the COM lead of your VOM on pin 7 of J2 and check pins 3 and 4 with the other lead. The needle of the VOM should jump to about +6 VDC for a short period of time and then drop back to 0 VDC for an equal length of time. If not, check the Inhibit Line to pin 6 of J2. This pin should be about 4 volts during the game and about 0 volts during Attract. If the Inhibit Line does not go HI during the game, the lamps will not go out. If the Inhibit Line is discontinuous, none of the flashing lamps will light. If the Inhibit Line is continuous, yet not functioning properly, replace the computer PCB. If the Inhibit Line is O.K. and you still do not get +6 VDC at pins 3 and 4 of J2, replace the power supply/flasher PCB.

A good way to check unlit flashing lamps is to clip a test lead to the wire opposite the brown wire and touch the other end to a convenient ground. If the bulb still will not light, the bulb is burned out or the brown wire (hot common) is discontinuous.

CHECKING THE HARNESS: Most harness problems are due to edge connectors not making good contact with the printed circuit board traces, improperly crimped wires within the edge connectors, cold solder joints or improperly seated push-on connectors. These problems can usually be tracked down by checking for continuity using a test lamp or your VOM set to any of the "R" scales. Simply unplug the power cord and check the beginning and end of the suspected wire. When checking the wires to a p.c.

board, leave the board connected and check by touching one test prod to the trace on board and the other to the opposite end of the wire. This will check the entire wire length as well as the board-to-edge-connector contact. Intermittant problems are checked by connecting test instrument and slightly pulling or wiggling suspected wires or connectors.

The speed buttons, paddle size buttons and coin switch are all checked by testing for continuity between switch terminals while operating the switch.

The score switch located on the computer PCB is often the source of problems. If such is the case, the game will end at 11 when set for 15. Correct by spraying light amount of contact cleaner into the switch and operating the switch a few times.

MISCELLANEOUS PROBLEMS:

a. NO GAME START: Does operating coin switch step coin counter? If not, check the coin switch and wires to computer PCB. If it does step the counter, replace the computer PCB.

b. NO AUDIO: Test the speaker by jumping it *momentarily* to an AC voltage source. If a loud buzz results, speaker is O.K. and proceed to check harness wires from computer to speaker. If wire is O.K., and if a game is visible on CRT, check monitor and computer.

c. PADDLES MISSING: First, check the adjustment of the problematic paddle. Check for pulled off wires, poor contact at computer PCB edge connector. Check paddle size buttons and connections between buttons and PCB. Replace computer if all else fails.

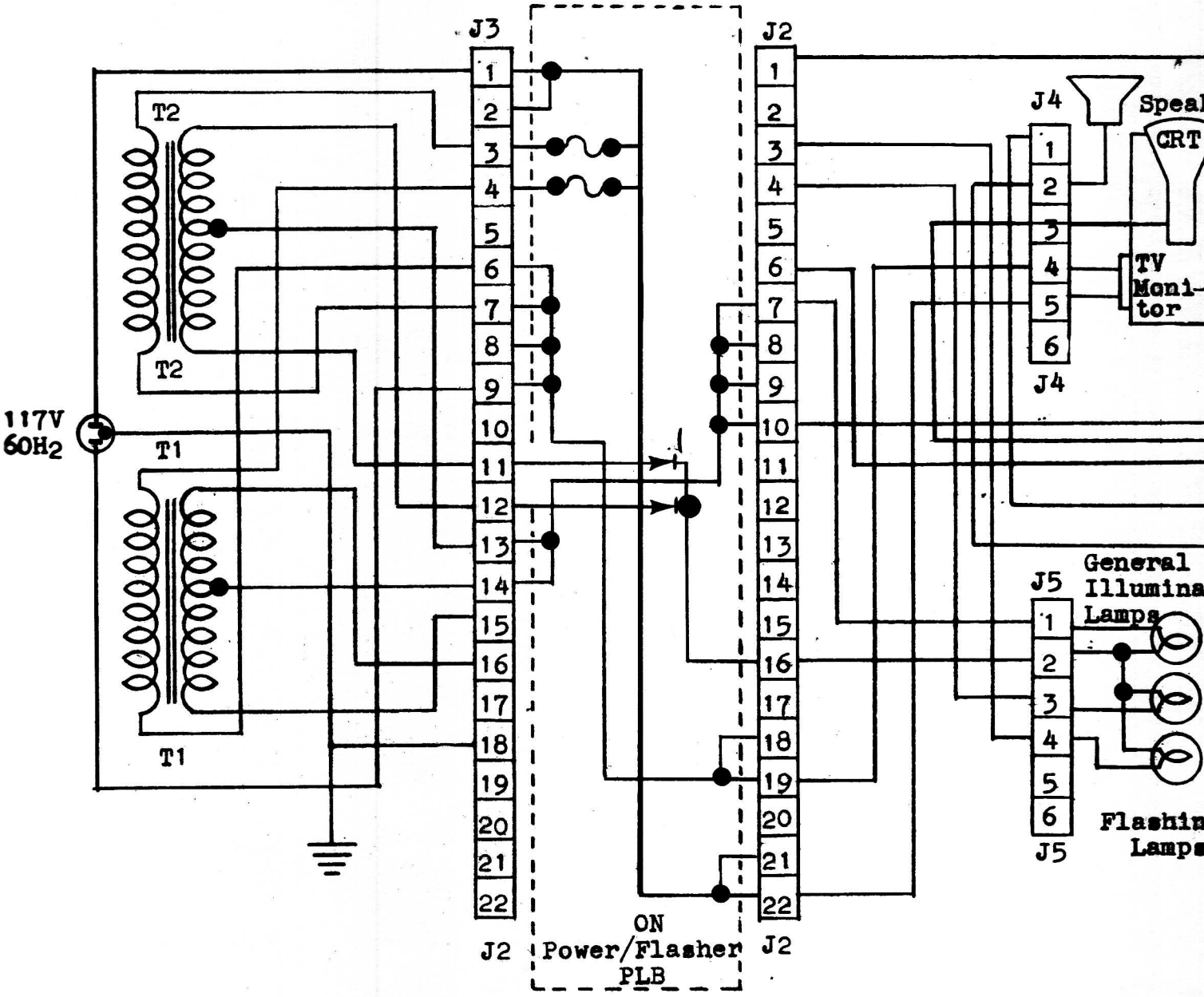
d. PADDLE APPEARS FAINT AND OSCILLATES: Adjust paddle pot on computer PCB.

e. PADDLE JUMPS: If a paddle skips or jumps as you move it, one of the joystick pots has a small piece of dirt in it. Return joystick unit for overhaul.

f. SPEED BUTTONS DO NOT WORK: Check for continuity between switch terminals while pressing button. Check wires to computer PCB. If all is O.K., replace computer.

g. PADDLE SIZE BUTTONS NOT WORKING: Check by using above procedure.

h. SOME VIDEO FUNCTIONS NOT WORKING: Typical examples are no ball, incorrect scoring, segments missing from score numerals, erratic ball movement, etc. Replace computer PCB.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Lamps
J5

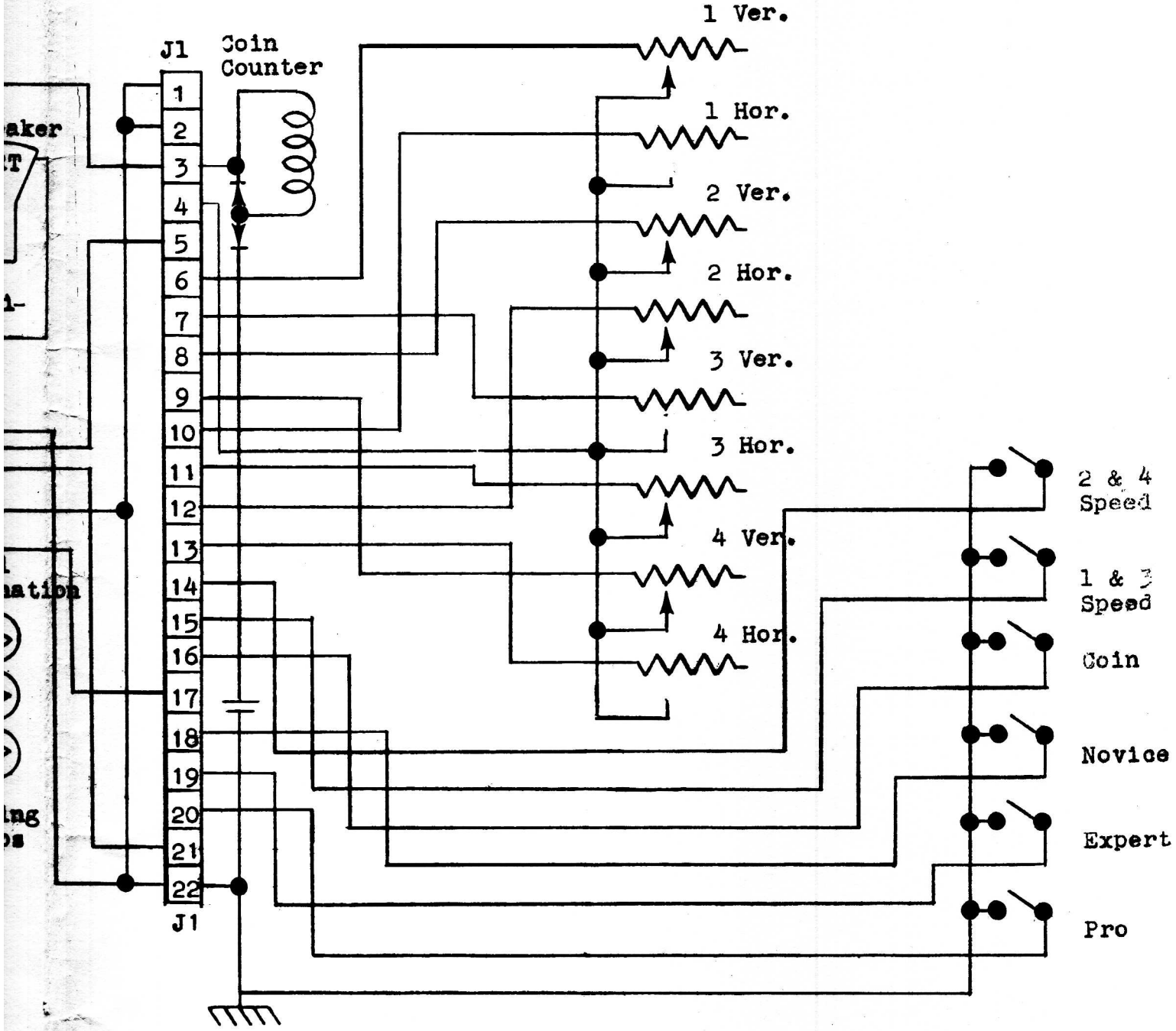

J1
Coin
Counter
1 Ver.
1 Hor.
2 Ver.
2 Hor.
3 Ver.
3 Hor.
4 Ver.
4 Hor.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
J1
2 & 4
Speed
1 & 3
Speed
Coin
Novice
Expert
Pro

FIGURE 7

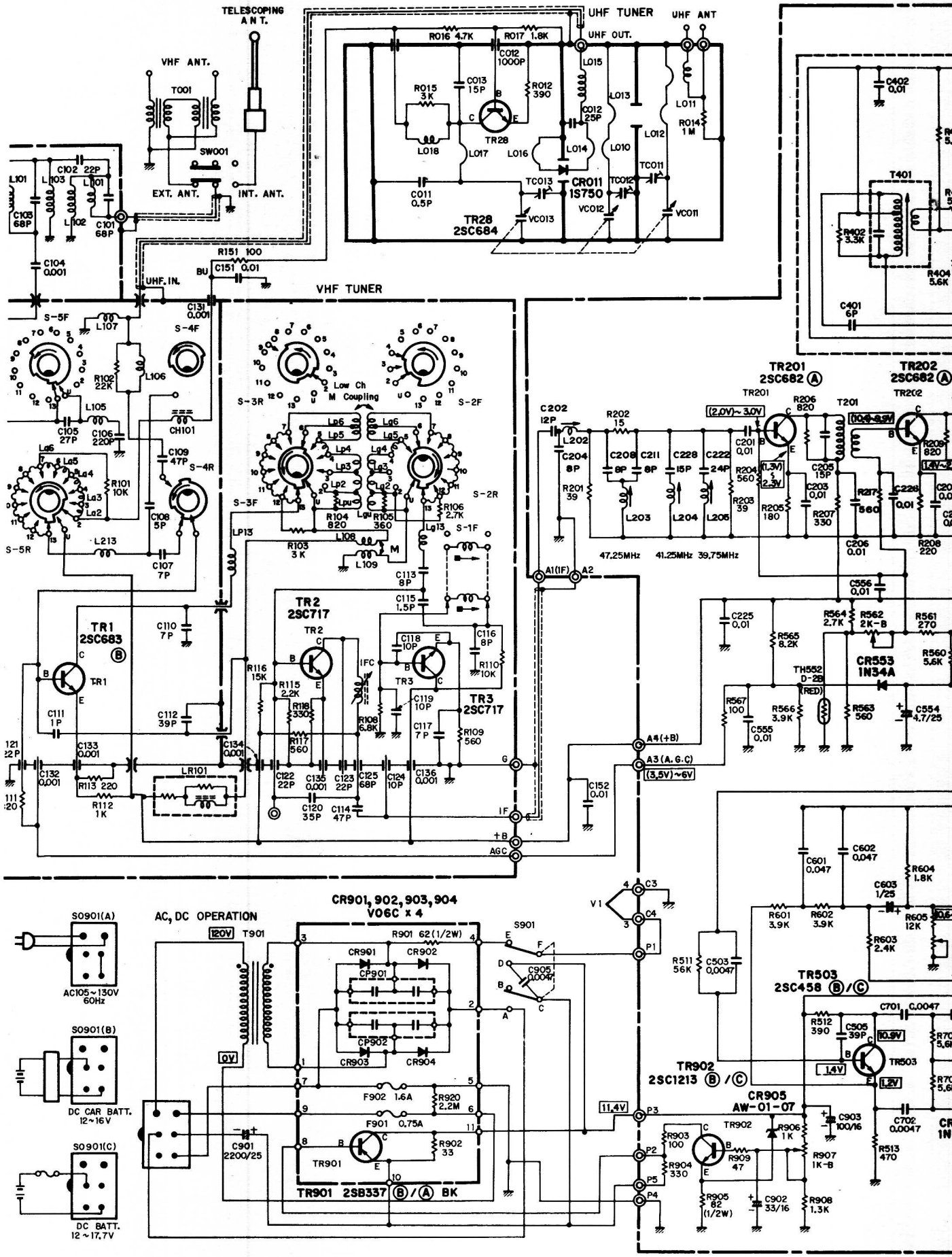
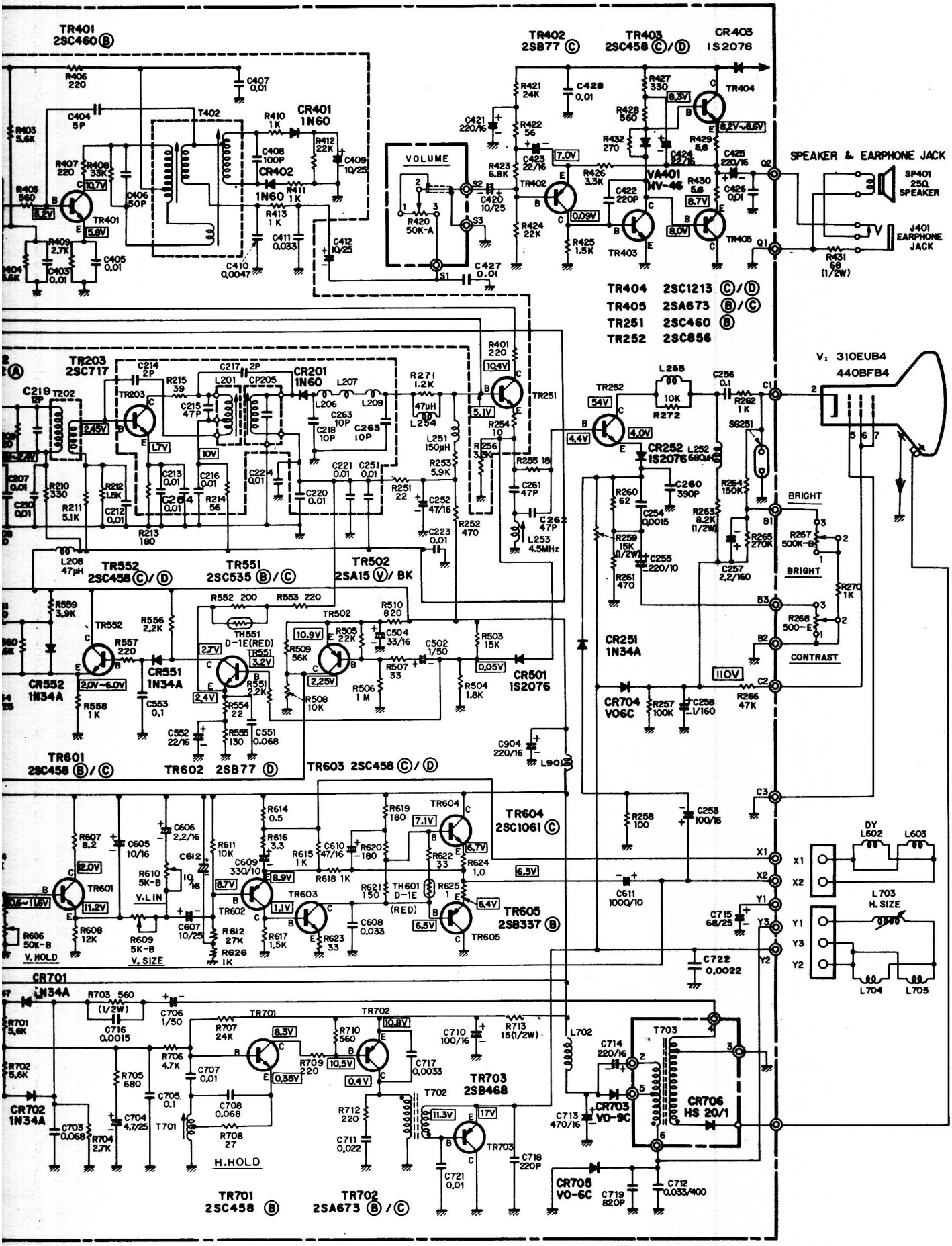

TELESCOPING ANT.
VHF ANT.
T001
SW001
EXT. ANT.
INT. ANT.
UHF TUNER
UHF ANT
UHF OUT.
TR28
2SC684
CR011
1S750
VHF TUNER
UHF. IN.
Low Ch
M Coupling
TR1
2SC683 (B)
TR2
2SC717
TR3
2SC717
TR201
2SC682 (A)
TR202
2SC682 (A)
T401
CR553
1N34A
TR503
2SC458 (B)/(C)
TR902
2SC1213 (B)/(C)
CR905
AW-01-07
TR901
2SB337 (B)/(A) BK
CR901, 902, 903, 904
V06C x 4
AC, DC OPERATION
S0901(A)
AC105~130V
60Hz
S0901(B)
DC CAR BATT.
12~16V
S0901(C)
DC BATT.
12~17.7V
47.25MHz
41.25MHz
39.75MHz
(2.0V)~3.0V
(3,5V)~6V
11.4V
1.4V
10.9V
1.2V

FIGURE 8

HEMATIC DIAGRAM



REPLACEMENT PARTS LIST

STRIKE OFF PARTS LIST

PLACE	SYM-BOL NO.	STOCK NO.	DESCRIPTION
	CP201	2790071	compound component
	CP202	2790072	compound component
	CP203	2790073	compound component
	CP204	2790065	compound component
	CP206	2790074	compound component
	PR251	2121132	compound component
	PR252	2120624	compound component

NEWLY ADOPTED PARTS LIST

PLACE	SYM-BOL NO.	STOCK NO.	DESCRIPTION		
	C202	0248662	ceramic, discal	12pF ±5%	50WV
	C204	0248638	ceramic, discal	8pF ±5%	50WV
	C208	0246418	ceramic, discal	8pF ±0.25pF	50WV
	C211	0246418	ceramic, discal	8pF ±0.25pF	50WV
	C222	0246449	ceramic, discal	24pF ±5%	50WV
	C226	0244171	ceramic, discal	0.01μF $^{+80}_{-20}$%	50WV
	C228	0246444	ceramic, discal	15pF ±5%	50WV
	C612	0252521	electrolytic	10μF	16WV
	R217	0131658	composition	560Ω ±10%	RC¼GF
	R271	0114163	carbon film	1.2KΩ ±5%	SRD¼P
	R272	0137651	carbon film	10KΩ ±5%	SRD¼SD
	R626	0114161	carbon film	1KΩ ±5%	SRD¼P
	L202	2120197	trap coil		
	L203	2120197	trap coil		
	L204	2120095	IF coil		
	L205	2120197	trap coil		
	L254	2120239	peaking coil	47μH	
	L255	2120256	peaking coil		
	CR403	2330351	silicon	1S2076	

(NOTE)

1 R626, CR403 are shorted with jumper wire on Model P-02.

2 New P.C.B. Assembly Parts Number

2503021····· P-121, P-22, SU-861

2503022····· P-021