

HOTSEAT SYSTEM MAINTAINANCE

DAILY

Every morning or upon start of business day, credit up HOTSEAT SYSTEM and run through motions. If any functional or limit overshoot problems are evident, follow TROUBLESHOOTING PROCEDURES and correct. DO NOT UNDER ANY CIRCUMSTANCES OPERATE SYSTEM WITH LIMIT OVERSHOOT PROBLEMS.

WEEKLY

Operator should play a game in the system and listen carefully for any unusual or abrasive sounds. Although the HOTSEAT is designed to last years with virtually no attention, it is a machine and slight misalignments due to abuse (overloading) can cause excessive wear. Grating or grinding sounds indicate a damaged or misaligned ballnut. The ballnuts really only need to be lubed once or twice a year with a light grease and can be realigned by slightly loosening the ballnut pivot block bolts, running the system unloaded, and retightening the nuts.

HOTSEAT SYSTEM TROUBLESHOOTING PROCEDURES

<u>PROBLEM</u>	<u>POSSIBLE CAUSE</u>	<u>SOLUTION</u>
Game does not fire up	No AC	Plug System in
	Improper harness connect	Check connections against game manual and rectify
	Blown fuses due to above	Replace fuses
HOTSEAT does not move	No AC	Check and rectify splice into game AC
	Sound board trigger wire is disconnected	Reconnect to proper pin on HOTSEAT comparator board
	Bad relay contacts	Manually actuate each relay momentarily and lightly sand the contacts on non-functioning relay. Check continuity with ohmeter.
	Blown component in comparator board	Look for burned parts. Check component validity against schematic and replace bad part. Check for bad suppressor diode across relay actuation contacts and replace if necessary.
	Blown fuse	Replace fuse
HOTSEAT overshoots limit	Limit switch common bus or individual return wire is disconnected	Check wiring and reconnect
	Limit switch defective	Check with ohmeter and replace
	Defective limit switch	Check with ohmeter and replace
Grinding sound is heard	Blown or disconnected brake resistor	Replace or reconnect brake resistor
	Ballnut is misaligned	Lube and realign ballnut

HOTSEAT SYSTEM LIMITED WARRANTY

The HOTSEAT is warranted for parts and workmanship for a period of ninety days from date of delivery provided certain set-up and use/maintenance conditions are met.

The SYSTEM must be set-up and tested as described in the RETROFIT PROCEEDURE and TEST PROCEEDURE outlines.

Limit Switch functions must be maintained operational at all times.

Electronic braking must be maintained functional at all times.

The SYSTEM must never be abused by people overloading the cockpit by operating with more than one rider at a time, or by people hanging off the end of the cockpit while another individual is operating or riding in it.

The SYSTEM must be maintained as described in the maintenance outline.

HOTSEAT SAFETY REQUIREMENTS AND LIABILITY DISCLAIMER

The HOTSEAT is a full dual-axis motion system designed to minimize the risk of physical injury to either game participants or spectators when properly set up. However, the potential for injury always exists whenever machinery and humanity interact - especially if the human element is acting blindly, maliciously, or stupidly.

It is the responsibility of the HOTSEAT SYSTEM purchaser/operator to provide a safe operating situation for the device. BALANCE TECHNOLOGY or its distributors will neither accept or assume any liability for physical or other injury or trauma sustained by any individual through contact with the HOTSEAT within the area either owned, rented, controlled, or operated by the purchaser, rentor, or operator of the HOTSEAT SYSTEM.

SETTING LIMIT SWITCHES

Left and right limit switches are located at the back of the lower (roll) mechanism pivot on an L-shaped bracket. The upper switch is left and the lower is right - relative to rider position. Front and back limits are located under the seat on the left and triggered by a bolt/shaft collar arrangement on the upper (pitch) mechanism pivot. The forward switch controls backward limit and the rear switch controls forward limit.

Limits are factory set for average travel in each direction. Limits are adjusted by lightly bending the limit switch leafs either closer to or farther away from the actuating bolts. A little goes a long way in the limit switch world. Adjusting the limits for less travel will result in a faster game play - wider travel results in a more gentle game. If the limits are widened over factory set-up, the mechanical stops may need to be adjusted.

HOTSEAT TEST PROCEEDURE

1. When all game components are installed and interfaced with HOTSEAT components and cables, plug system in and momentarily trigger each motor relay in turn to ensure proper current flow. The key word here is momentarily. Manual relay triggering overrides the limit switches and can cause system damage by ramming the ball nuts into the mechanical stops.
2. If all relays fire properly, credit up game and enable system by choosing difficulty level, then carefully test each direction of the HOTSEAT by moving the joystick. Run each direction to the point of actuating the limit switch - machine will stop just prior to hitting the mechanical stop (shaft collar) locked above and below each ballnut - if limit switches are operating correctly.

HOTSEAT INTERFACE & DRIVER BOARD

Theory of Operation:

IC1 is a 555 timer running at approximately 1 Hz. This pulse train clocks a 74161 counter (IC2). The divide by 4 output of the counter, if allowed to run, clears flip-flop IC3 and disables the driver circuits through IC4, a quadruple NAND gate.

Under normal operation, pulses from the game's sound board clear the counter and flip-flop keeping the driver circuits enabled. When the pulses from the game disappear, the counter times out in about four seconds and disables the drivers.

Comparator and Drivers:

IC 5 is an LM339 quad comparator. Reference voltages are set at the wipers of VR1 and VR2. The rest position of the joystick gives us a voltage of about 2.5V at the wipers of the joystick pots. So we set threshold voltages of 2.0V at VR1 and 3.0V at VR2. This leaves us a "dead space" at the center of joystick travel. When the comparators in IC5 detect an input voltage above 3.0V or below 2.0V, their corresponding outputs go high and, if IC4 is enabled, fire the proper driver circuit. The driver circuits then close the proper relay and apply power to the motors under the HOTSEAT.

See Figure 4 for IC layout.

HOTSEAT to STAR WARS RETROFIT PROCEEDURE

1. Remove HOTSEAT CRT plastic trim piece.
2. Remove HOTSEAT lower CRT and JOYSTICK plastic trim piece.
3. Remove HOTSEAT upper CRT plastic shroud.
4. Remove CRT and CRT drive boards from STAR WARS game.
5. Trim metal CRT mounting flanges with hacksaw or jigsaw as shown in figure 1.
6. Install CRT in HOTSEAT with 4½ inch bolts.
7. Install CRT drive boards on wood shelf below CRT with wood screws.
8. Replace CRT trim plastic piece.
9. Remove joystick from STAR WARS game and install in provided mount in HOTSEAT.
10. Connect joystick and CRT connectors to provided connectors in HOTSEAT frame
11. Replace the two plastic shroud pieces removed in steps 2 & 3.
12. Remove HOTSEAT front and rear base shrouds by a) loosening the lower naughahyde boot band, b) raising boot up enough to clear the retaining flanges, c) removing the 4 trim screws holding the shrouds to the base at each corner, and d) pulling each shroud away from the center.
13. Remove the main Star Wars game boards from their mounting can and modify the sound board as follows: Install chip 7408 piggyback onto chip 2H (74LS04) connecting pins 7 & 14 only, leaving all other pins unattached. Run a control wire from chip 3J (74LS139) pin 12 to pin 1 on piggybacked chip 7408. Attach output control wire from pin 3 on 7408 to HOTSEAT comparator board as indicated in figure 2. Disable attract mode sound on Star Wars game by setting switch number 7 at location 10D to off - or HOTSEAT will operate without game being credited.
14. Remove all remaining components from game cabinet and place in front base area of HOTSEAT as indicated in figure 3. Make sure playmeter/test switch plate is removed from game coin box vault and installed with other components in front base area.
15. Connect all game harnesses to game boards and to connectors provided in HOTSEAT.
16. Splice HOTSEAT motor control AC wire into game AC wire.
17. Bolt provided coinbox onto side of HOTSEAT frame. Route game coinbox harness through frame and into coinbox by either popping and reinserting the connector pins once the harness has been routed into coinbox or by cutting and splicing the harness wires. It may be necessary to clip some wire ties and open up game harness to allow coinbox harness to extend into the HOTSEAT control
18. Plug system into AC outlet.
19. Test system.
20. If system works properly, replace shrouds, place game in preferred location, and watch the quarters start rolling in.
21. If the system fails to work properly, consult the following trouble-shooting guide.

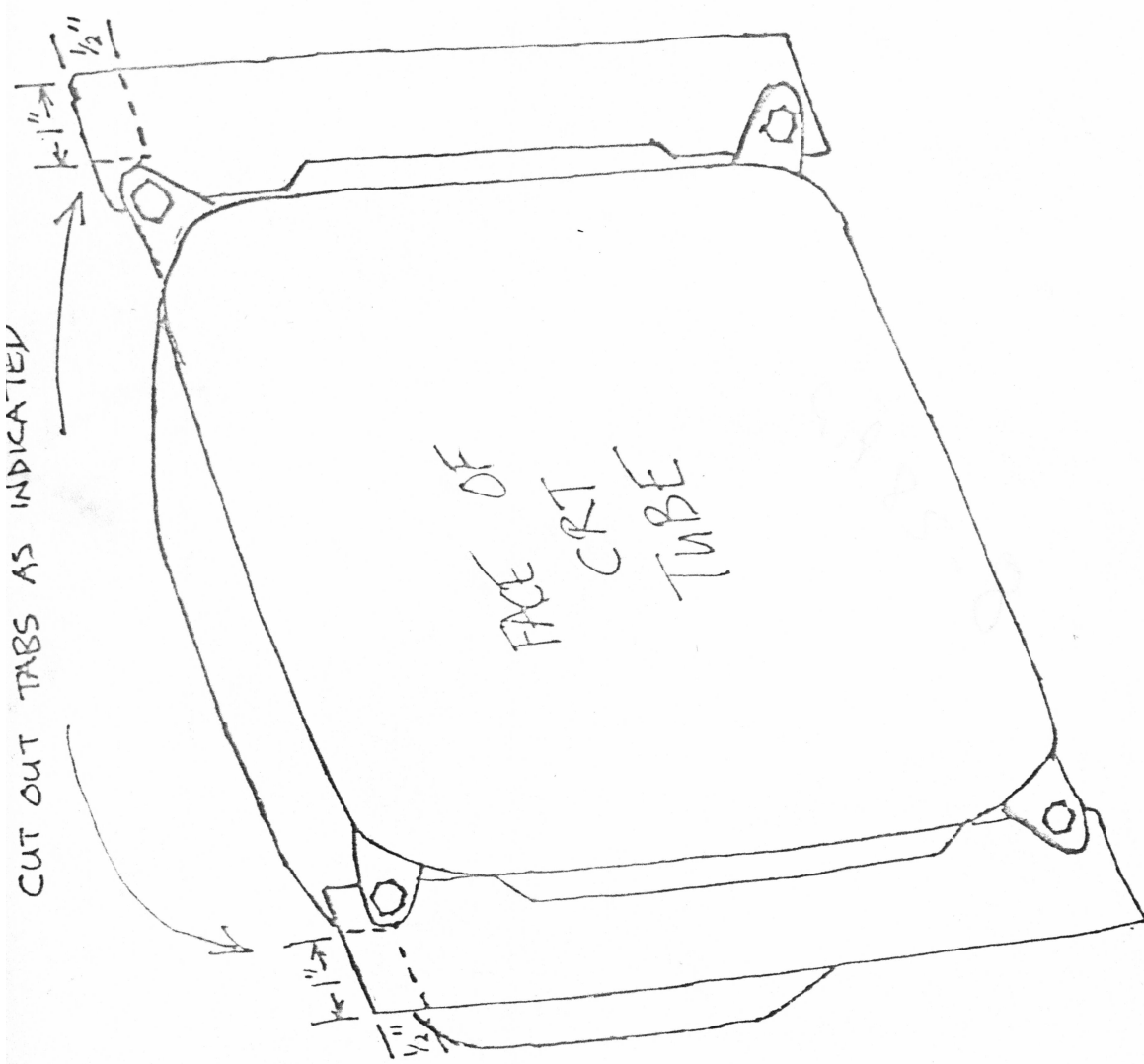


FIGURE 1

* MODIFICATION ONLY REQUIRED ON 121 SERIES HOTSEATS

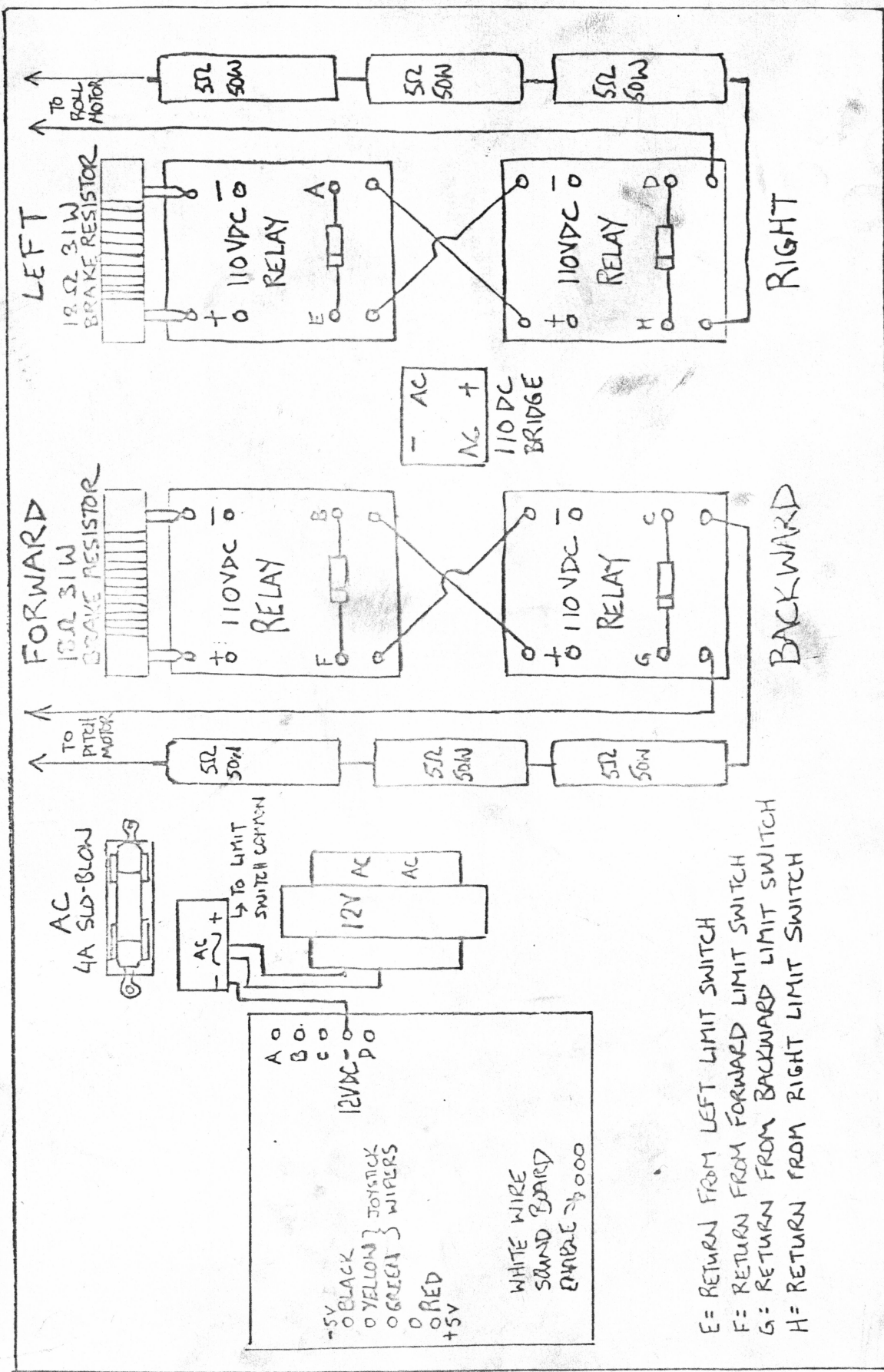


FIGURE 2

MOTOR CONTROL BOARD

OVERHEAD VIEW
OF
HOTSEAT FRAME

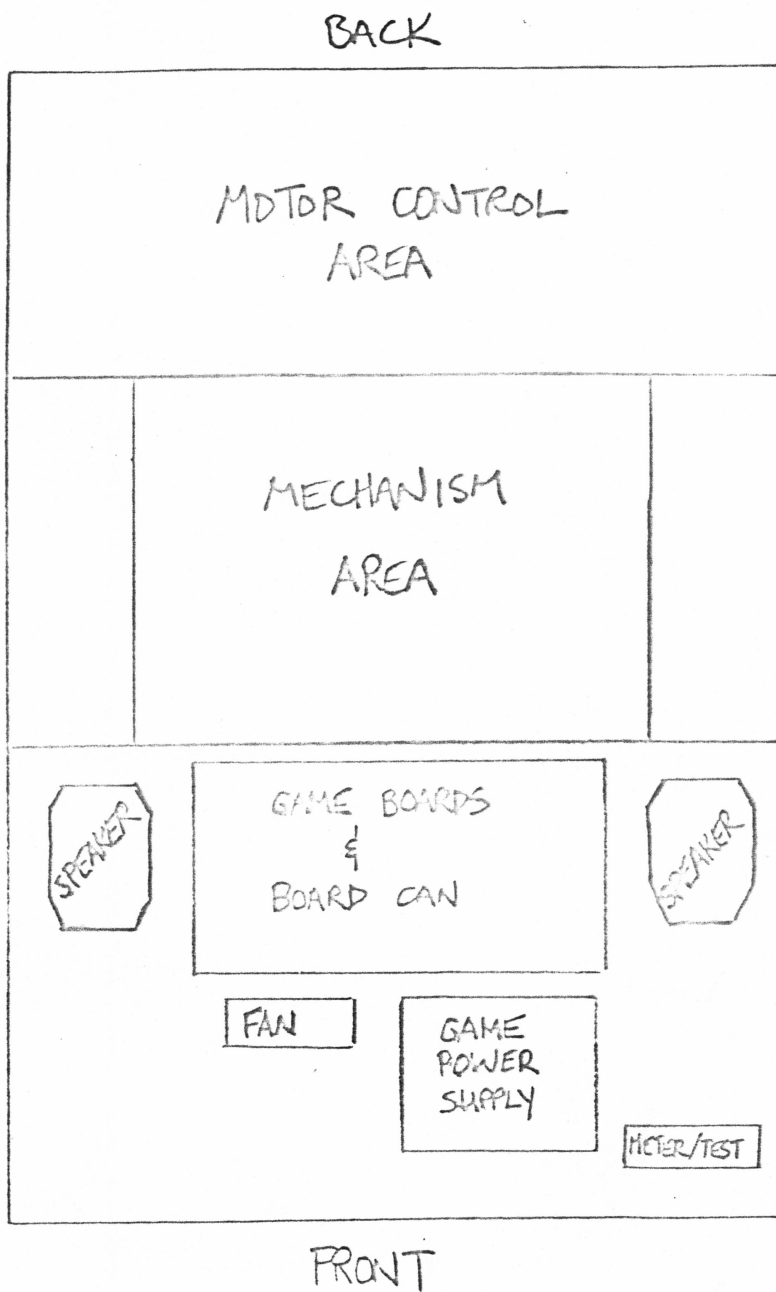
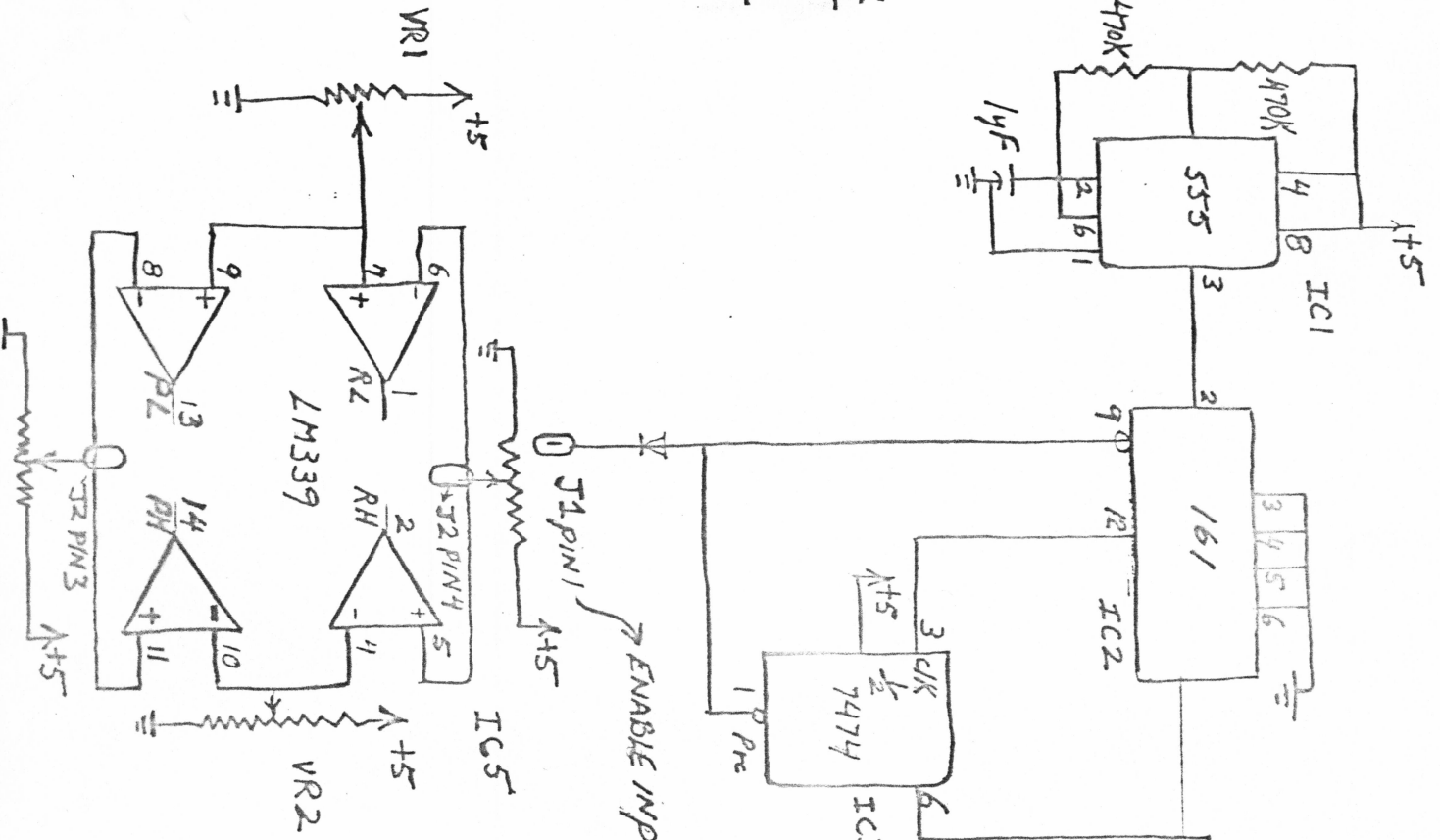


FIGURE 3

GAME COMPONENT LAY-OUT

I2 PIN 1
 0 → +5
 I1
 I2 PIN 5



ENABLE INPUT -

All comparators
 outputs connected
 to 4.7K Ω pullup

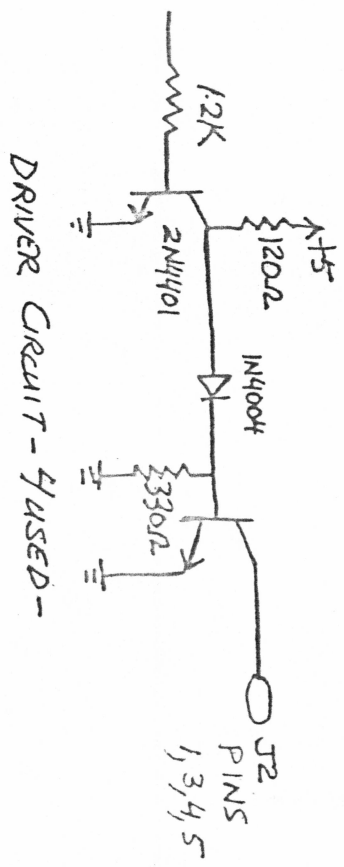


FIGURE 4

COMPARATOR BOARD
 SCHEMATIC