TM-088
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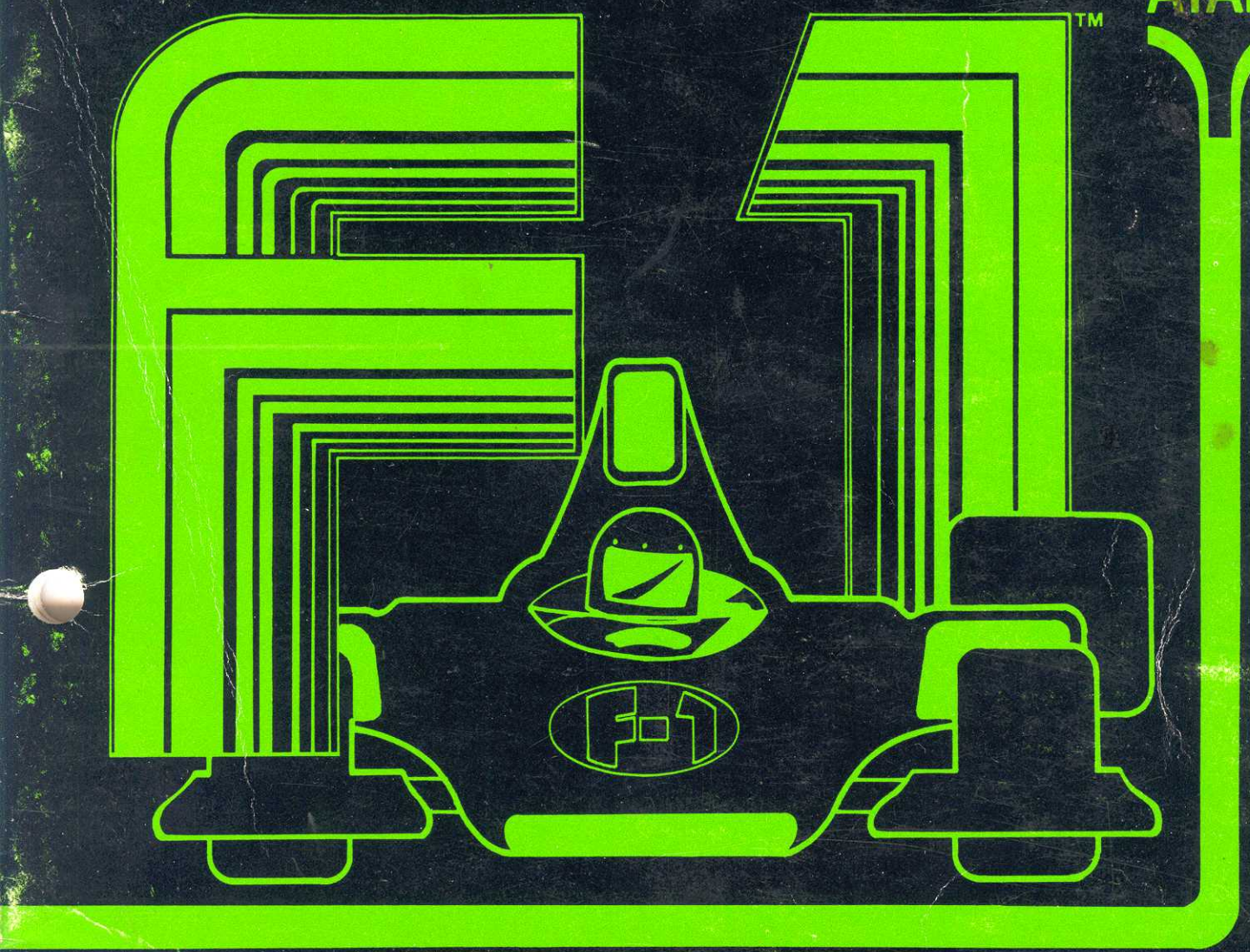

Operation, Maintenance and Service Manual

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(b) Such products are returned prepaid to Sellers' plant; and

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F-1™

Operation, Maintenance and Service Manual

ATARI INC.
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SUNNYVALE, CA 94086
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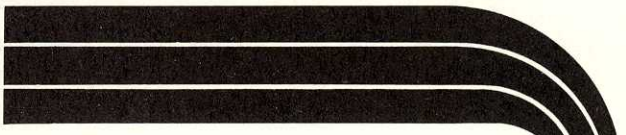

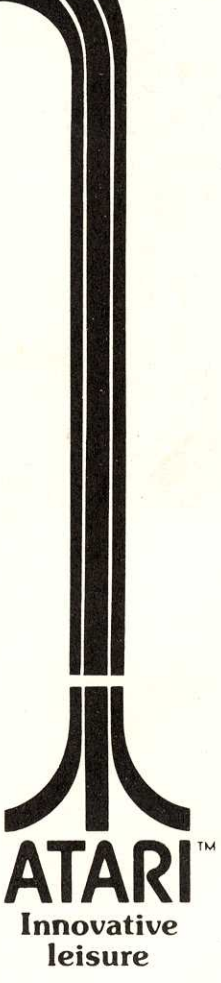

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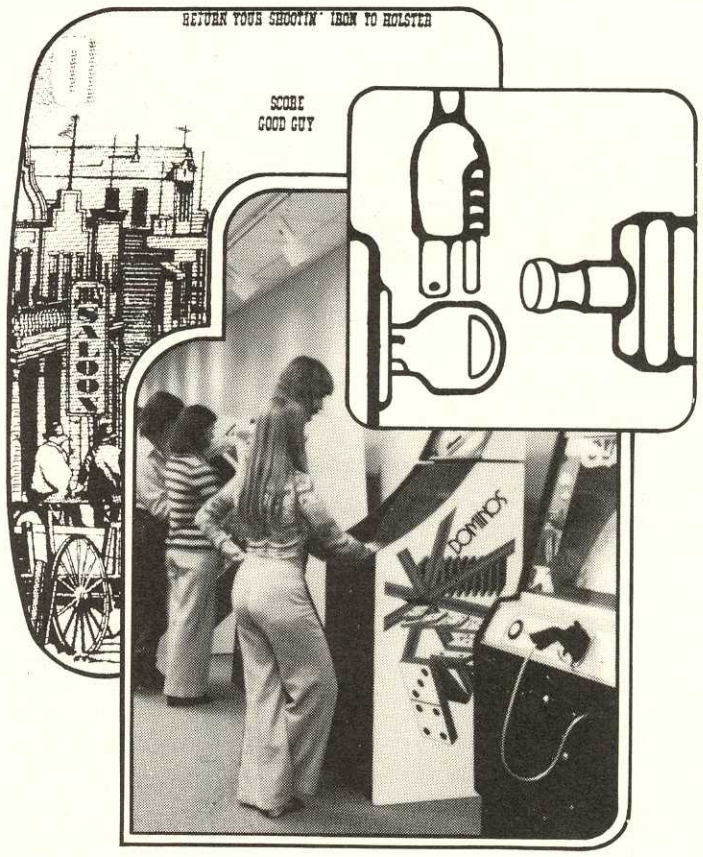


LOCATION SETUP

Introduction

Congratulations, you have just received an action-filled Atari driving game. The game is relatively easy to set up if you follow the instructions. However, there are many pieces to assemble. Please begin by ensuring that you have received all parts of F-1.

Inventory of F-1

Unpack all shipping containers. Inventory the parts by matching with Table 1 and Figure 1. If any parts appear damaged, contact your distributor immediately.

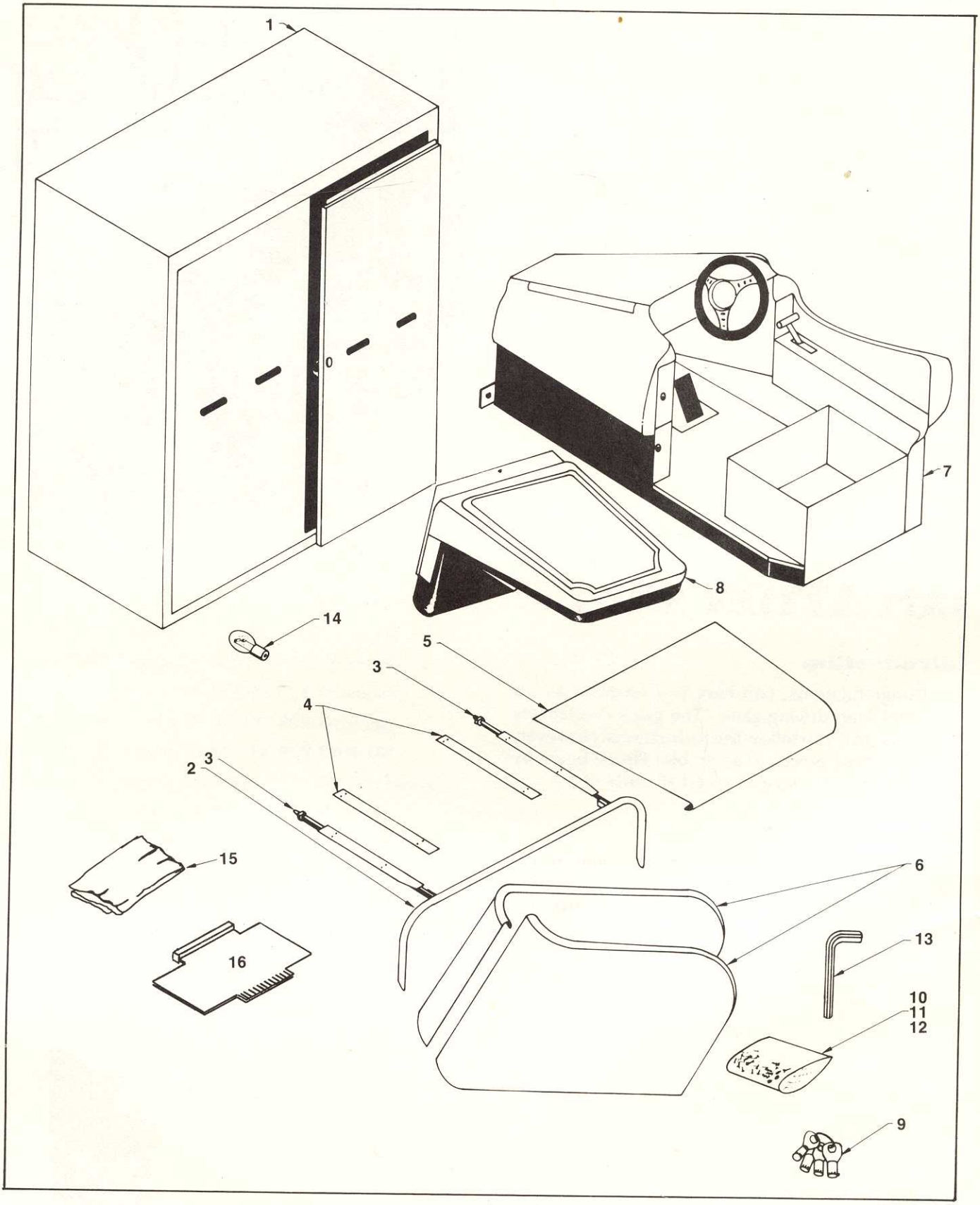


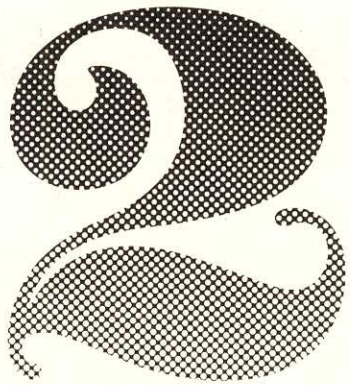
Figure 1 Inventory of Parts

Table 1 Inventory of F-1

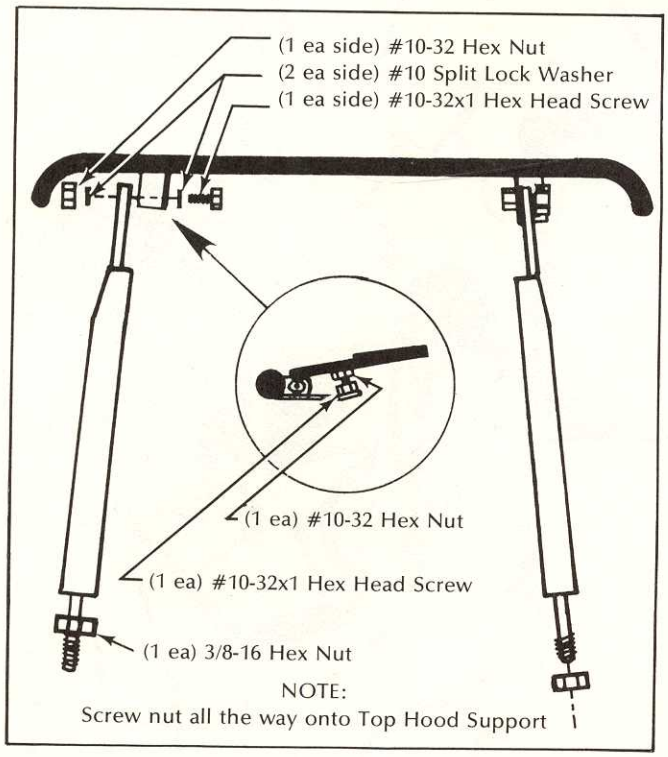
Item	Qty.	Item Name	Item Description
1	1	Electronics Cabinet Assembly	Large black cabinet with two doors on the back and a window on the front.
2	1	Hood Main Support	Metal U-shaped bar.
3	2	Top Hood Support	Metal flat-top bar with one end rounded and threaded.
4	2	Top Hood Support Attachment	Flat metal strip with four holes.
5	1	Hood Top	Plastic hood top panel.
6	2	Hood Sides	Plastic hood side panels. Mirror images.
7	1	Car Chassis	Race-car-like fiberglass car body.
8	1	Seat	Fiberglass car seat.
9	4	Keys	Tubular security-type keys.
10	41	Machine Screws	Five assorted sizes.
11	28	Flat Washers	Four assorted sizes.
12	4	Split Lock Washers	Compression washers.
13	3	Hex Wrenches	Three different sizes.
14	1	Projector Lamp	Spare projector lamp.
15	1	Cleaning Cloth	Antistatic cleaning cloth.
16	1	Extender Card	Printed circuit board with edge connector on one end.

How to Assemble F-1

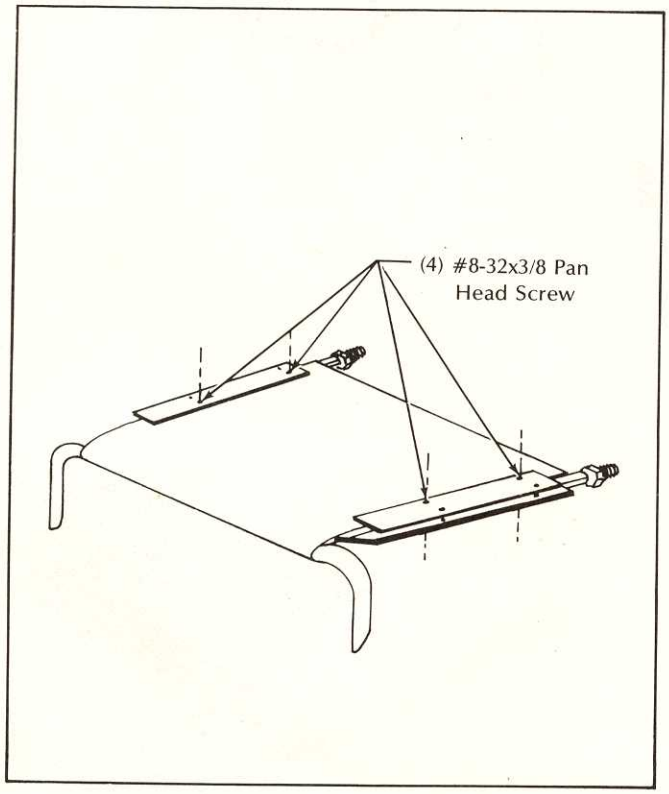
There are basically two ways to assemble F-1 1) the easy way and 2) the hard way. It is beyond the scope of this manual to discuss the hard way. Therefore we present the following—the easy way.



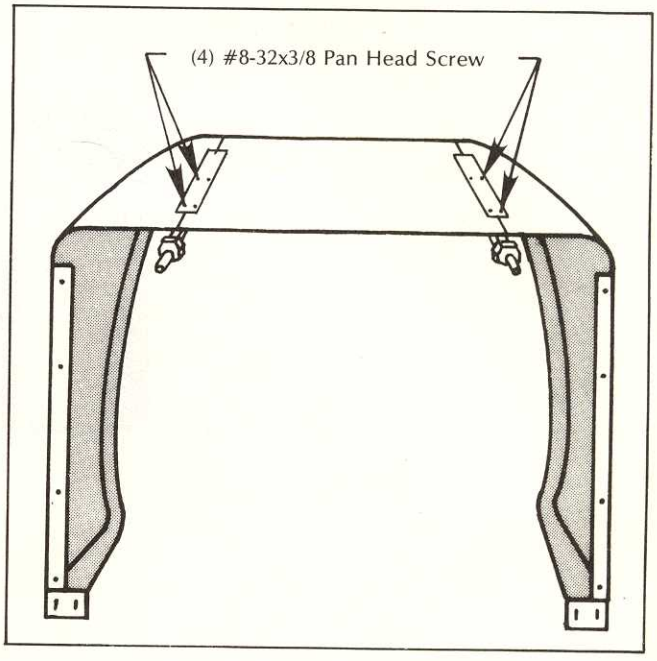
Step 1 ATTACH LEFT AND RIGHT TOP HOOD SUPPORTS TO MAIN HOOD SUPPORT



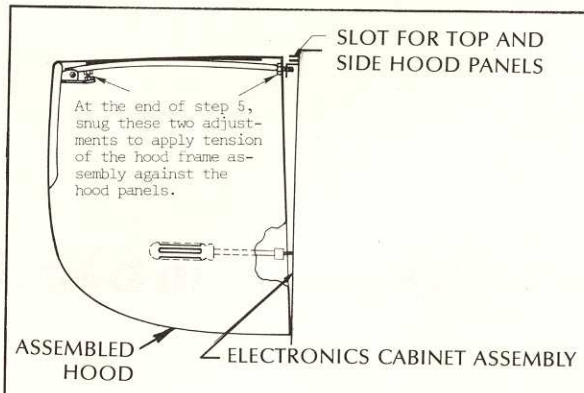
Step 2 ATTACH TOP HOOD PANEL TO ASSEMBLY OF STEP 1



Step 3 JOIN TOGETHER ASSEMBLIES OF STEP 1 TO ASSEMBLY OF STEP 2



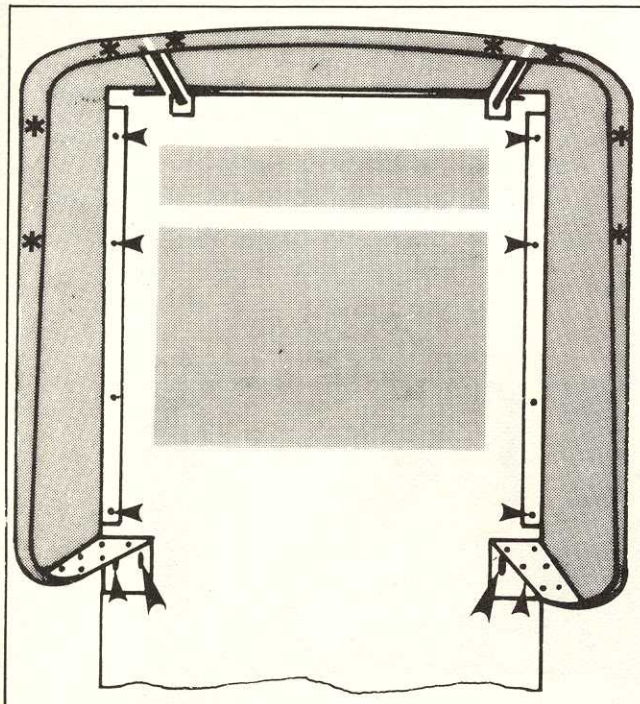
Step 4 ATTACH HOOD ASSEMBLY TO ELECTRONICS CABINET ASSEMBLY



At the end of Step 5, snug these two adjustments to apply tension of the hood frame assembly against the hood panels.

1. Insert threaded end of both top hood supports into holes of bracket along top front edge of Electronics Cabinet Assembly.
2. Insert one 1/4-20x1/2 hex head screw and one 1/4-inch split lock washer into second hole from bottom of each hood side panel. Match screw holes in hood side panels with appropriate holes in Electronics Cabinet Assembly. Just barely start each screw.
3. Slowly tighten screw on each side of hood assembly while maneuvering top hood panel into slot across the top of the Electronics Cabinet Assembly.

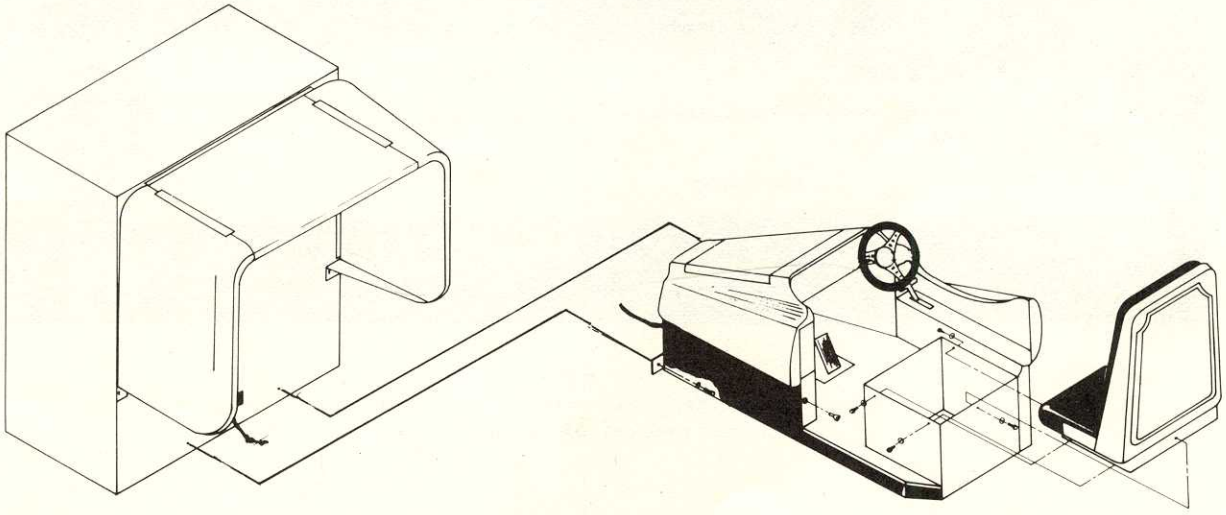
Step 5 ATTACH REMAINING SCREWS



1. Insert and tighten six 1/4-20x1/2 hex head screws and 1/4-inch flat washers in remaining holes of the hood side panels.
2. Insert and tighten one 1/4-20x1/2 hex head screw and 1/4-inch split lock washer into *outside* holes of "L" brackets located at the bottom of each hood side panel. Insert and tighten one #8-32x1/2 pan head screw and #8-32 split lock washer into *inside* holes of each hood side panel "L" bracket.
3. As illustrated in Step 4, snug adjustment screws and nuts to apply tension of the hood frame assembly against the hood panels.
4. *Optional:* Drivers of F-1 sometimes grab the hood assembly to climb into and out of the cockpit. This sometimes results in the dislocation of the Hood Main Support from the hood panels. To prevent the dislocation of the hood assembly, drill 0.1405-inch holes through the plastic hood panels and into the Hood Main Support at locations as identified by asterisks. Insert #6 self-tapping screws into the drilled holes.

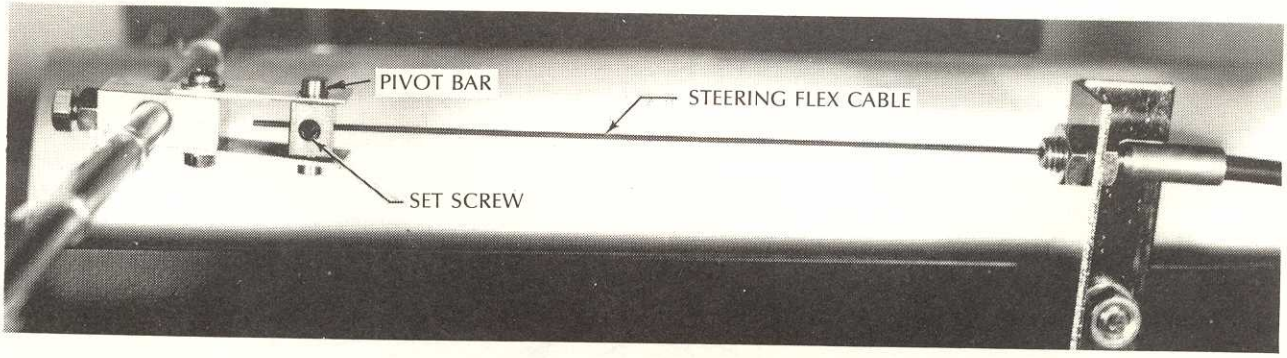
Step 6 ATTACH CAR CHASSIS TO ELECTRONICS CABINET ASSEMBLY

1. Align car chassis with centerline of Electronics Cabinet Assembly.
2. Reach into front of car chassis and pull out flex steering cable and black harness wire with connector on one end. Pass both flex steering cable and connector of black harness wire through hole in front center bottom of the Electronics Cabinet Assembly.
3. Attach car chassis to the Electronics Cabinet Assembly with two 1/4-20x3/4 socket head screws and 1/4-inch split lock washers.
4. Attach seat to car chassis with four 5/16-24x3/4 hex head screws and four 5/16-inch split lock washers.
5. Screw down feet located on outer sides of casters under car chassis until casters are suspended above the floor.



Step 7 ATTACH STEERING FLEX CABLE TO CAR STEERING BAR ARM

1. Open rear door of Electronics Cabinet Assembly by unlocking and lifting door up and out of cabinet.
2. Remove packing from beneath racetrack turntable; remove paper from competition cars on top of racetrack turntable; and remove tape from main car steering arm.
3. Plug in connector of harness wire (passed through front of cabinet in Step 6 to COCKPIT connector, as illustrated in Step 8. Attach steering flex cable as shown below.
4. Pass power cord through hole in right-hand rear area (as you face rear of cabinet) of Electronics Cabinet Assembly.



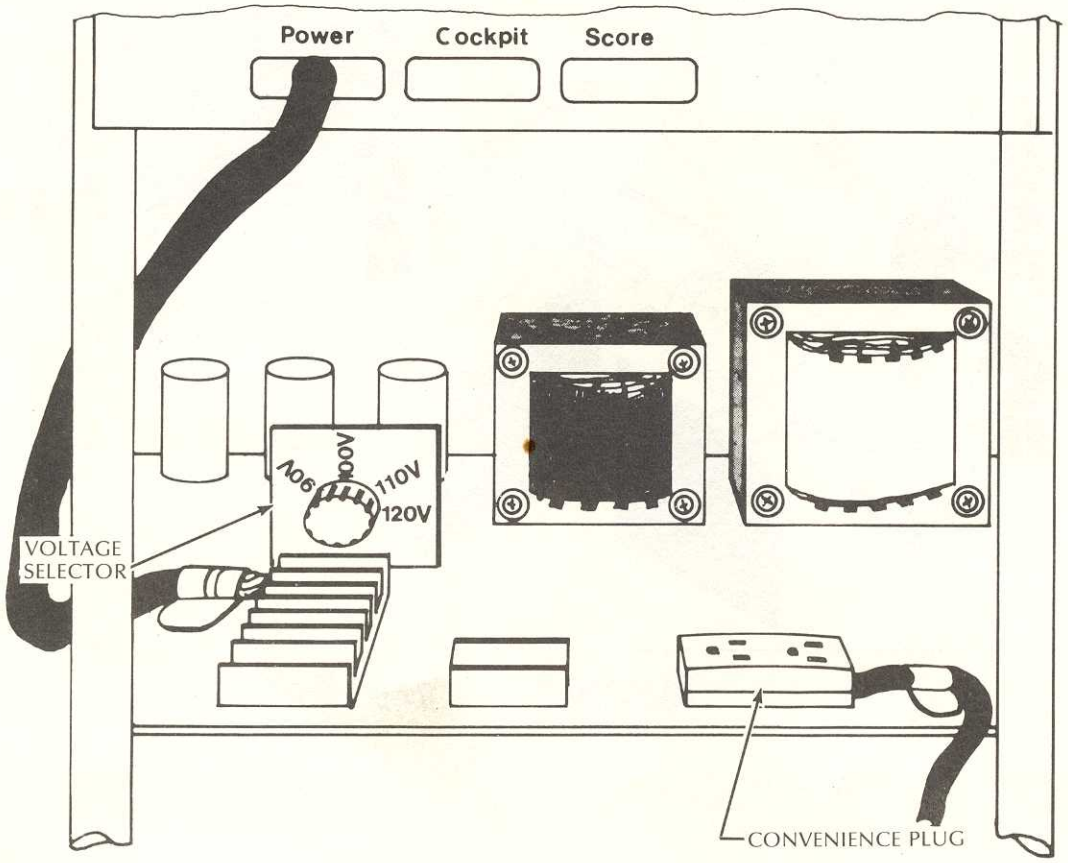
NOTE:
Tighten set screws on both sides of pivot bar for equal pressure on steering flex cable.

Step 8 ADJUSTING VOLTAGE SELECTOR TO MATCH VOLTAGE SOURCE

WARNING

To prevent the hazard of electrical shock, unplug F-1 before handling any of the lamps on the score panel or before handling any of the motors. 110 VAC is wired directly to the racetrack, crash, and timer motors and to the lamps of the score panel within the electronics cabinet assembly.

1. Determine the AC voltage source into which you will plug F-1 (must be between 90 and 120 VAC).
2. Locate voltage selector as identified below. Adjust voltage selector for closest voltage of AC source.
3. Plug F-1 power cord into AC source.

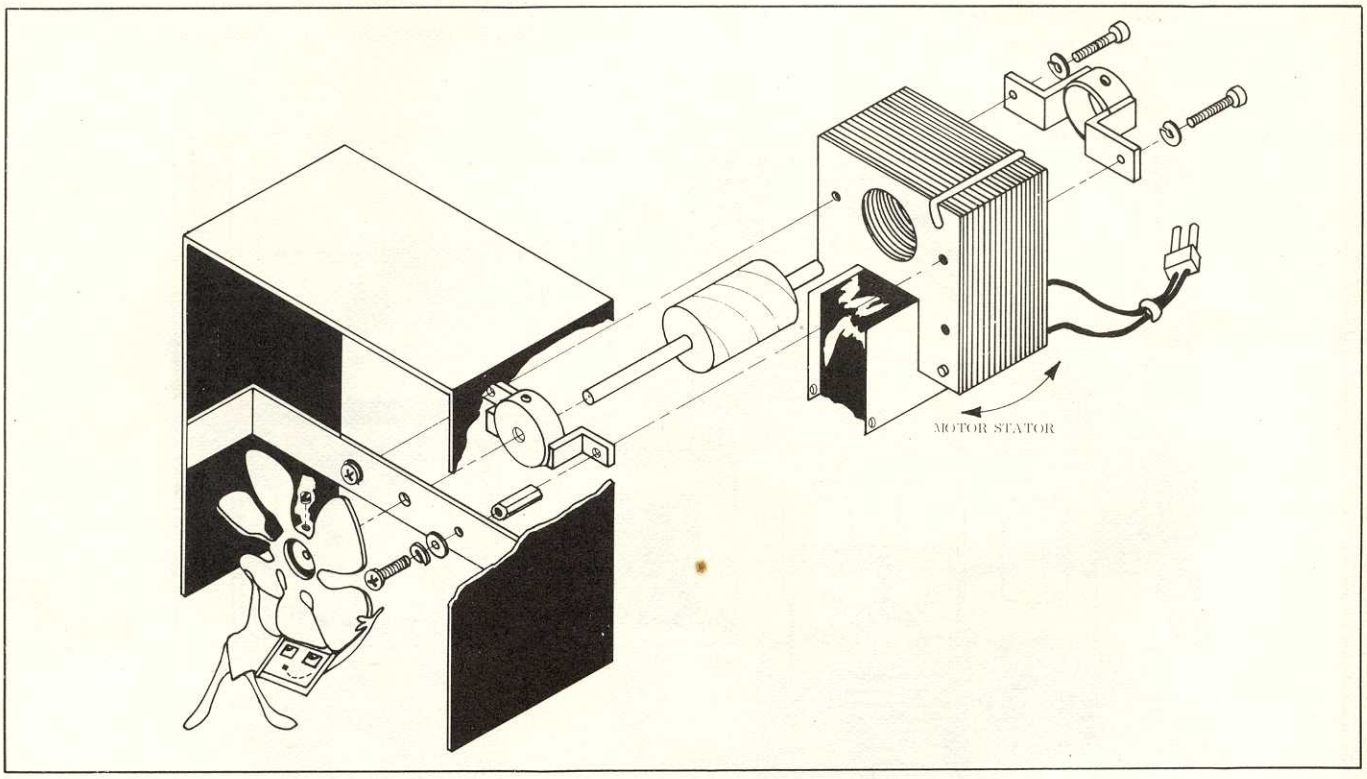


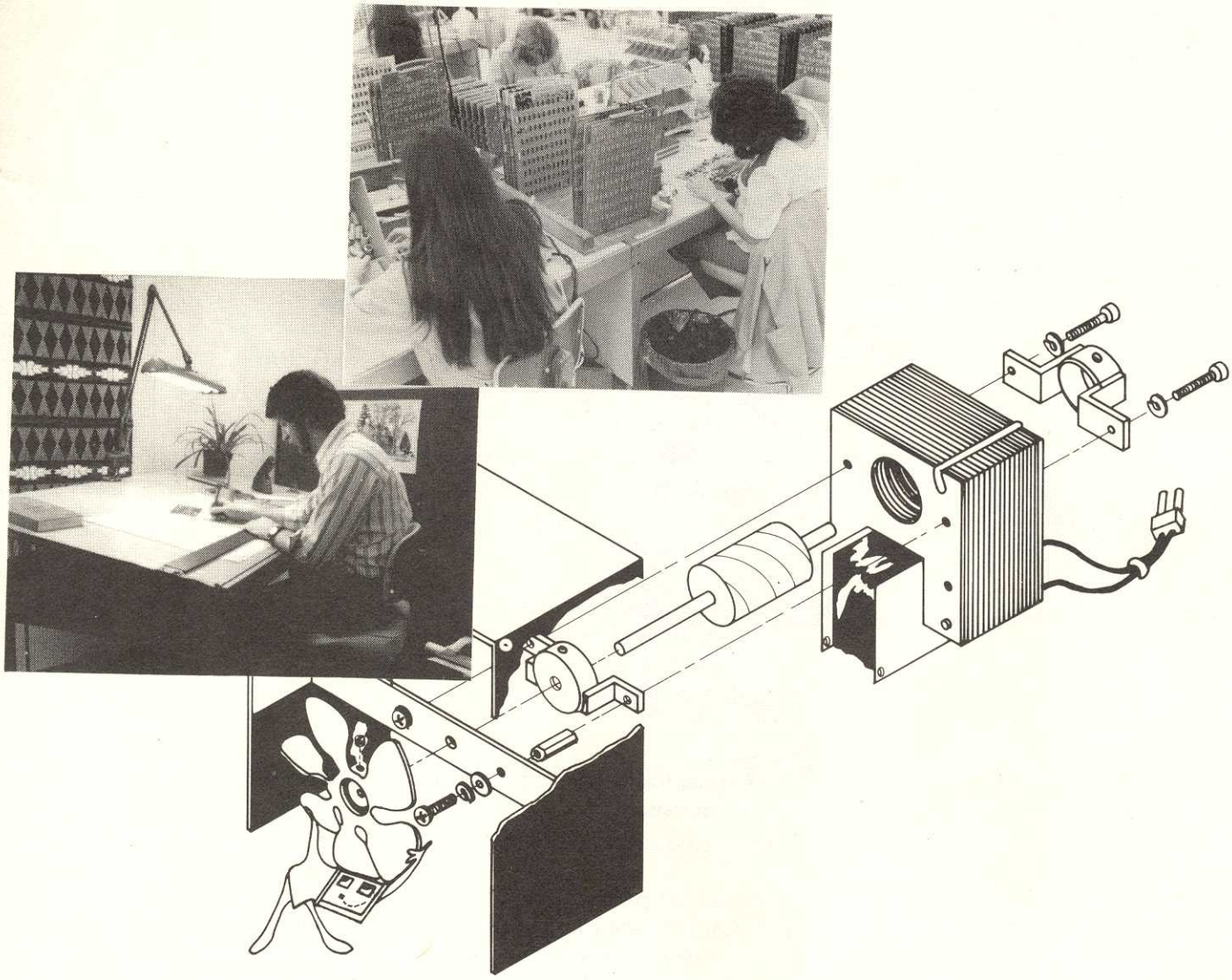
Step 9 CHECKING FOR PROPER AIR MOVEMENT FROM COOLING FAN

NOTE:

We have discovered that some of the main projector cooling fan motors have been incorrectly assembled. The result is that the fan sucks air *from* the playfield and the playfield will warp from the heat of the projector lamp.

1. Determine air movement from cooling fan by placing hand between fan blade and projector lamp. If fan blows air *toward* the projector lamp, proceed to next section. If not, perform the following.
2. Remove fan from mounting and invert the fan motor stator as shown below.





Game Operation Check

Your new F-1 was carefully checked before it left Atari. However, there are many things that could affect its operation during shipping. It is therefore necessary for you to provide the final step of quality control for F-1. This is accomplished by you climbing into the car cockpit, inserting two 25¢ coins and "driving" the game. While driving F-1, refer to the checklist in Table 2.

If all items prove to be functioning, you'd best stand aside. There is probably someone anxiously waiting for his or her chance to drive F-1.

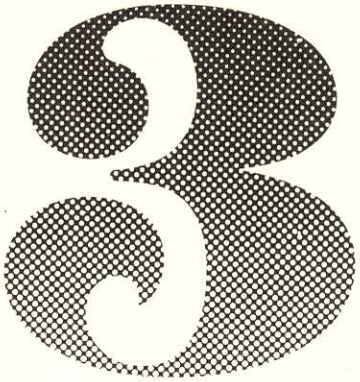
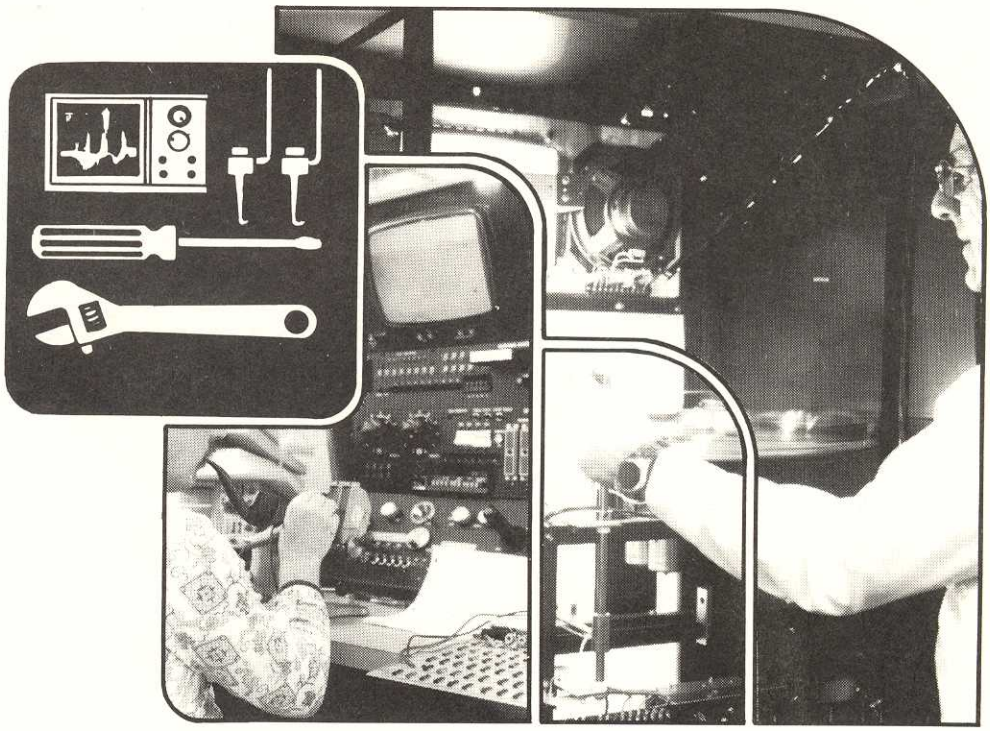


Table 2 Final Checklist

Checked Item	Response
• Projected Racetrack	Reasonably clear image on viewing screen.
• Projected Cars	Reasonably clear image on viewing screen.
• Crash Scene	Projected when main car comes in contact with: 1. Either of the two competition cars, or 2. Side of racetrack. When crash scene begins, score tally will "freeze" for approximately five seconds. When crash scene begins, sound of an explosion is heard on the game speaker.
• Acceleration	Accelerator has two positions: 1. Partially depressed. 2. Fully depressed. Depressing the accelerator causes increase of motor sound.
• Gear Shifter	Low gear has immediate and rapid accelerating motor response. High gear has gradual accelerating motor response.
• Brake	Brake foot pedal: 1. Causes race track projection to decrease in rotational speed. 2. Causes squealing tires sound.
• Steering	Steering wheel has smooth action and does not bind.



MAINTENANCE AND ADJUSTMENTS OF F-1

CAUTION

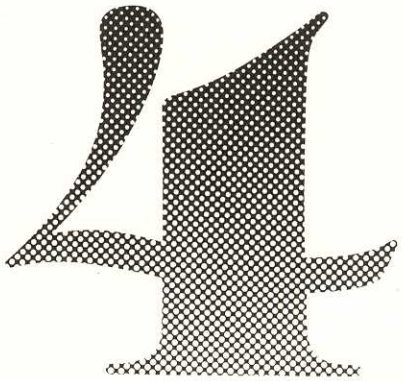
Do not adjust potentiometers on printed circuit boards if potentiometers are glued with white glue. The consequences may cost you money.

NOTE:

Early F-1 games were shipped with projector lamps that have a life span of approximately 100 hours. Later F-1 games were shipped with long-life projector lamps with a life span of approximately 500 hours. The two lamps require different mountings. If you desire a long-life projector lamp, get one from your distributor and refer to Figure 2 for proper mounting of the projector lamp.

There are few adjustments that need be made on F-1. However, there is one adjustment that you might check quite regularly. Due to heat buildup within the electronics cabinet assembly, the plastic suspension that supports the competition cars may sag. This will result in scratching the racetrack. Refer to Table 3 for adjustment suggestion.

For other adjustment, also refer to Table 3 below. For maintenance suggetions, refer to Table 4. Figure 3 illustrates the locations of all adjustment potentiometers.



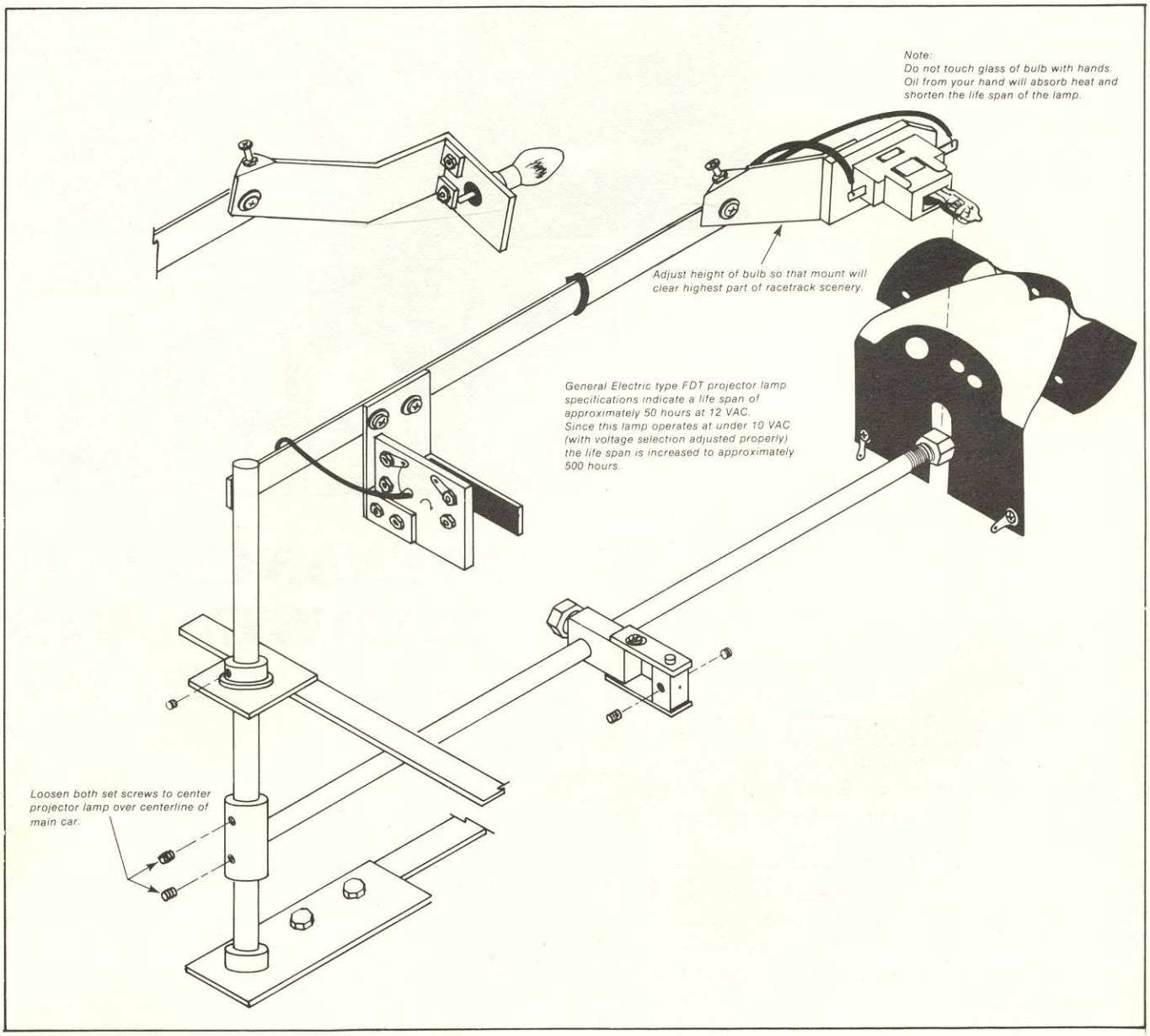


Figure 2 Main Car Projector Lamp Mounting

Table 3 Adjustments

Problem	Cause	Cure
Volume too loud or too soft	Volume controls incorrectly adjusted	Brake volume: Rotate BRAKE potentiometer located on SOUND PCB clockwise to increase, counterclockwise to decrease. Accident volume: Rotate BONG potentiometer located on SOUND PCB clockwise to increase, counterclockwise to decrease. All volumes: Rotate MAIN VOL potentiometer located on SOUND PCB clockwise to increase, counterclockwise to decrease.

Table 3 Adjustments

Problem	Cause	Cure
Accident scene appears every five seconds or not at all	Photocell (CdS) adjustment is incorrect	NOTE: There are three photocells located on the main car (car on end of bar that moves with steering wheel). When light from main screen projector lamp is interrupted from any one of these photocells, the accident scene should occur. Rotate CdS potentiometer located on CONT 2 PCB fully clockwise, then during game play slowly rotate counterclockwise until accident scene occurs when projection of main car comes in contact with either of the competition cars or in contact with shoulder (side) of racetrack.
Competition cars drag on racetrack	Competition cars plastic suspension sagging from heat of projection lamp	Refer to Figure 4. Loosen nuts of two Phillips-head screws on vertical edge of "L" bracket that mounts competition car to car drive mechanism. Adjust L bracket until car is between 2mm (5/64 in.) and 8mm (5/16 in.) above racetrack turntable.
Repeat players winning too many games	Scoring is incorrect	Remove main screen projector lamp. 1. Adjust LOW potentiometer located on CONT 2 PCB for a game score result of between 2800 and 3200 (nominal 3000) points when game is driven with shifter in LOW gear position and accelerator is fully depressed for the duration of the game time. 2. Adjust HIGH potentiometer located on CONT 2 PCB for a game score result of between 7700 and 8300 (nominal 8000) points when game is driven with shifter in HIGH gear position and accelerator is fully depressed for duration of the game time.

Table 4 Maintenance

Item	Maintenance Required
Racetrack turntable plastic	Spray glass cleaner on dust, then remove with clean soft cloth.
Electronics cabinet assembly Plexiglas window	Spray glass cleaner on dust, then remove with clean soft cloth.
Competition car transport	Refer to Figure 4.
Blown fuse	Replace with only same size and type of fuse.

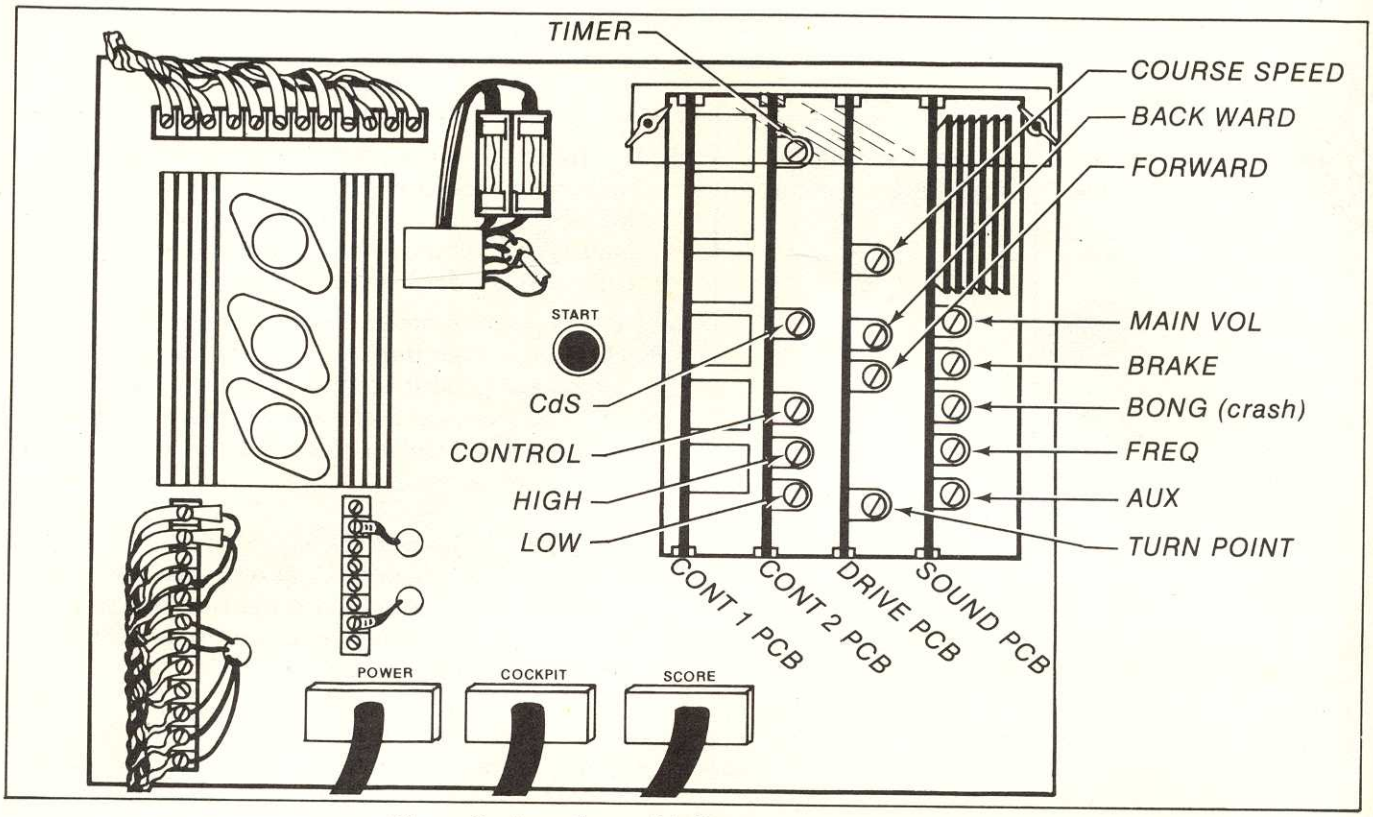


Figure 3 Locations of Adjustment Potentiometers

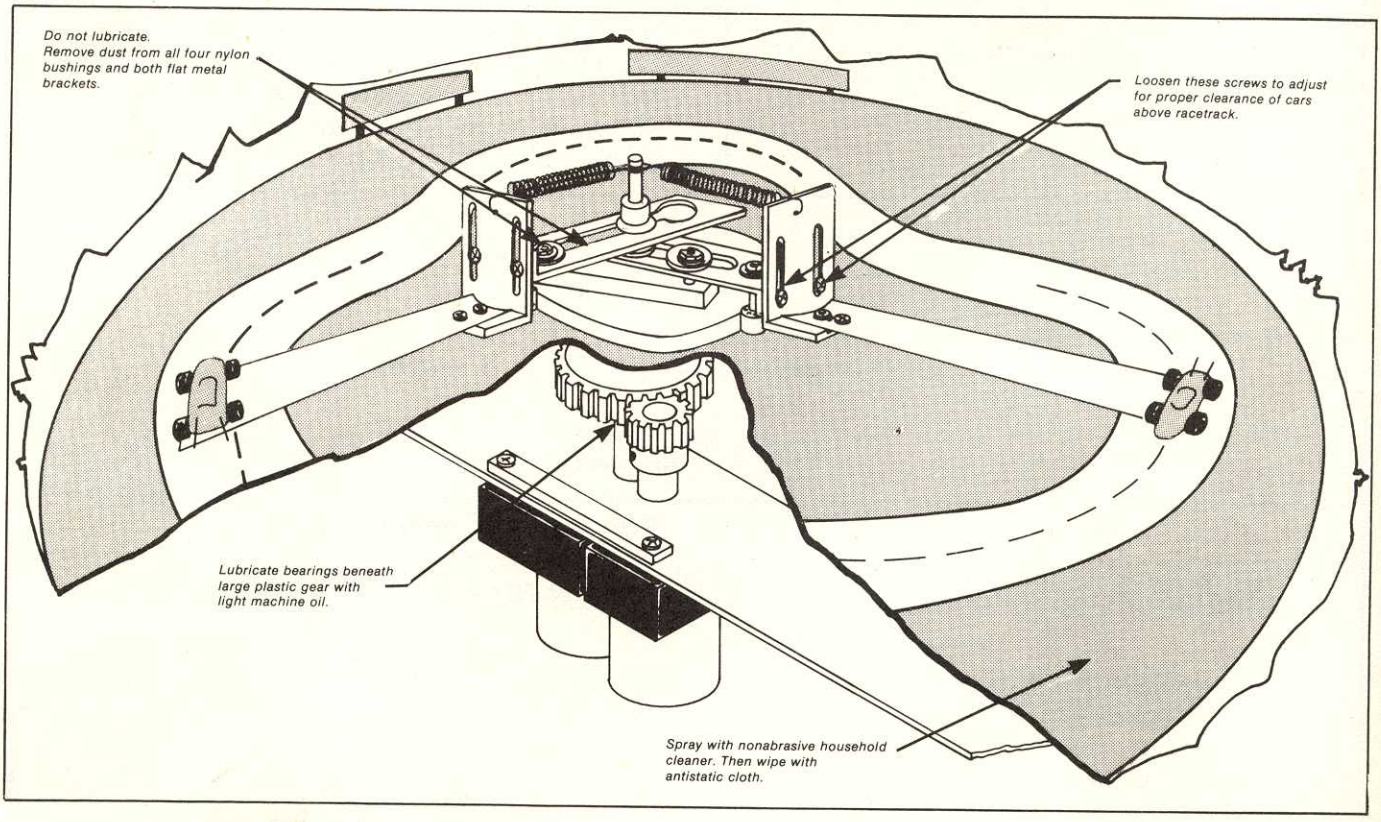
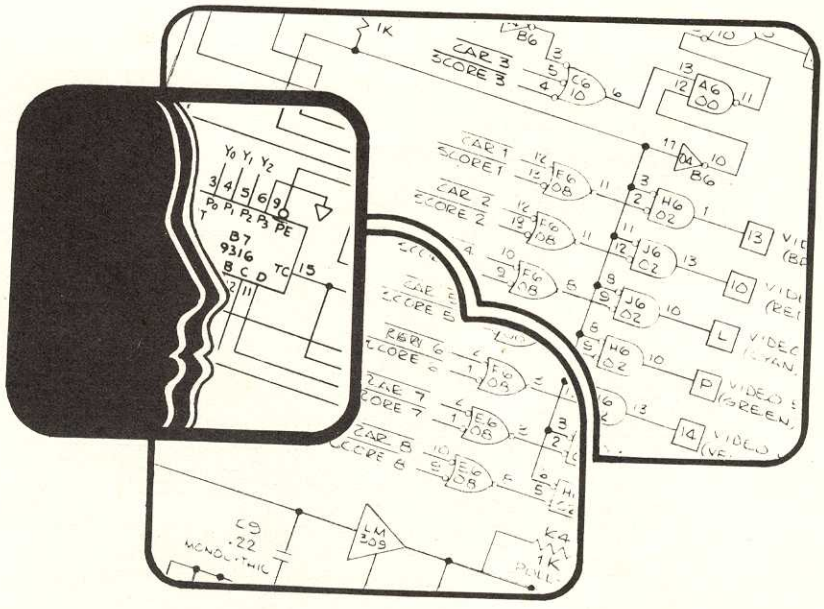


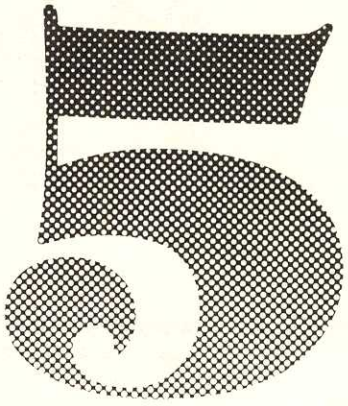
Figure 4 Maintenance of Competition Car Transport



Theory of Operation

In this section, you will find most all that is necessary for determining how F-1 operates. This information is presented to you in two different forms—schematic and block diagram. The block diagrams illustrate the operation of F-1 during different modes of operation. These modes are game start, drive, accident, scoring, and extended play.

You will find these block diagrams useful for troubleshooting F-1. To do so, identify the problem by determining the mode in which the game fails. Refer to the appropriate block diagram to determine the related *circuits* that are failing, then refer to the schematic diagrams to isolate the failing *components*.



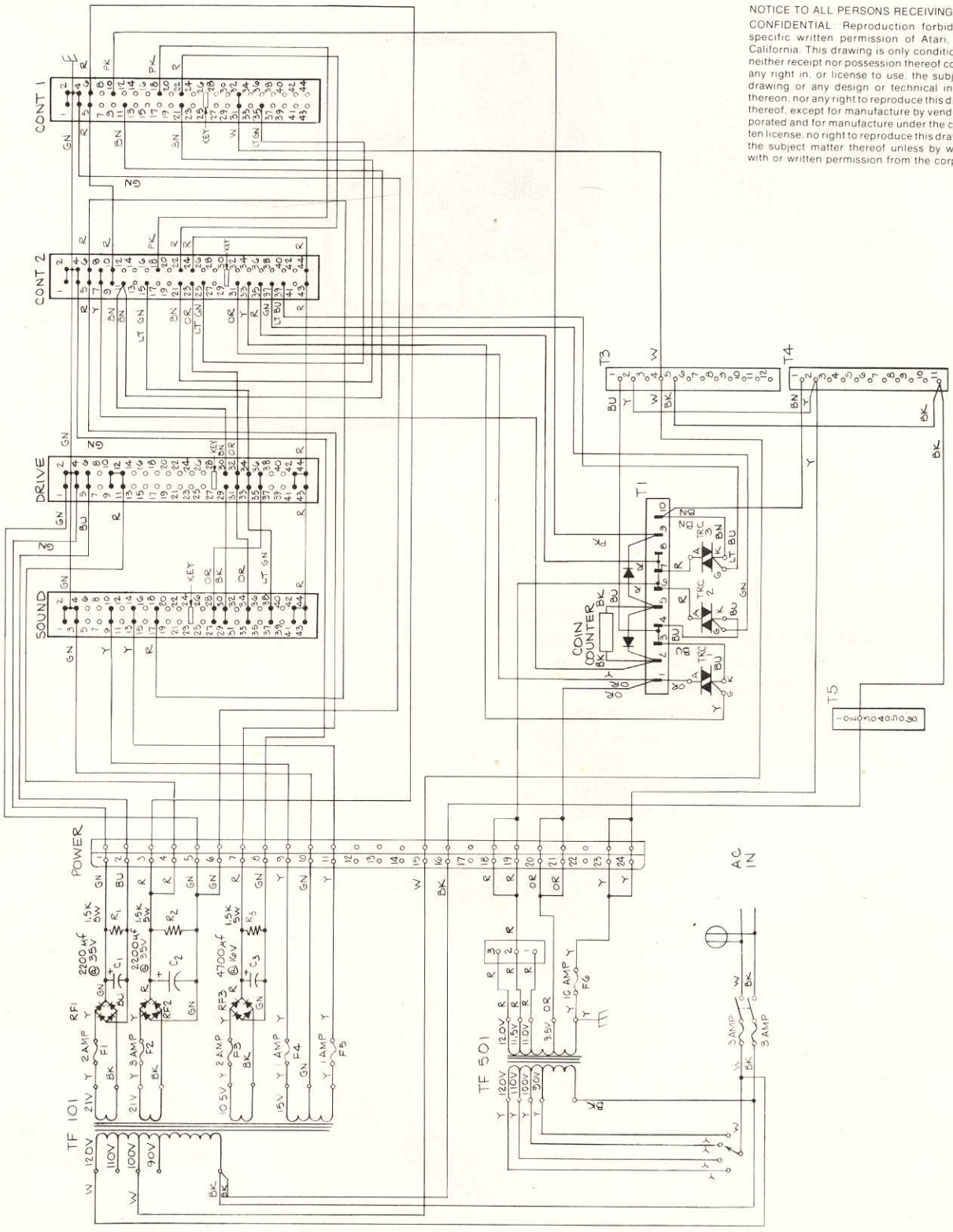


Figure 5 Harness Schematic, Early Version
Sheet 1 of 3

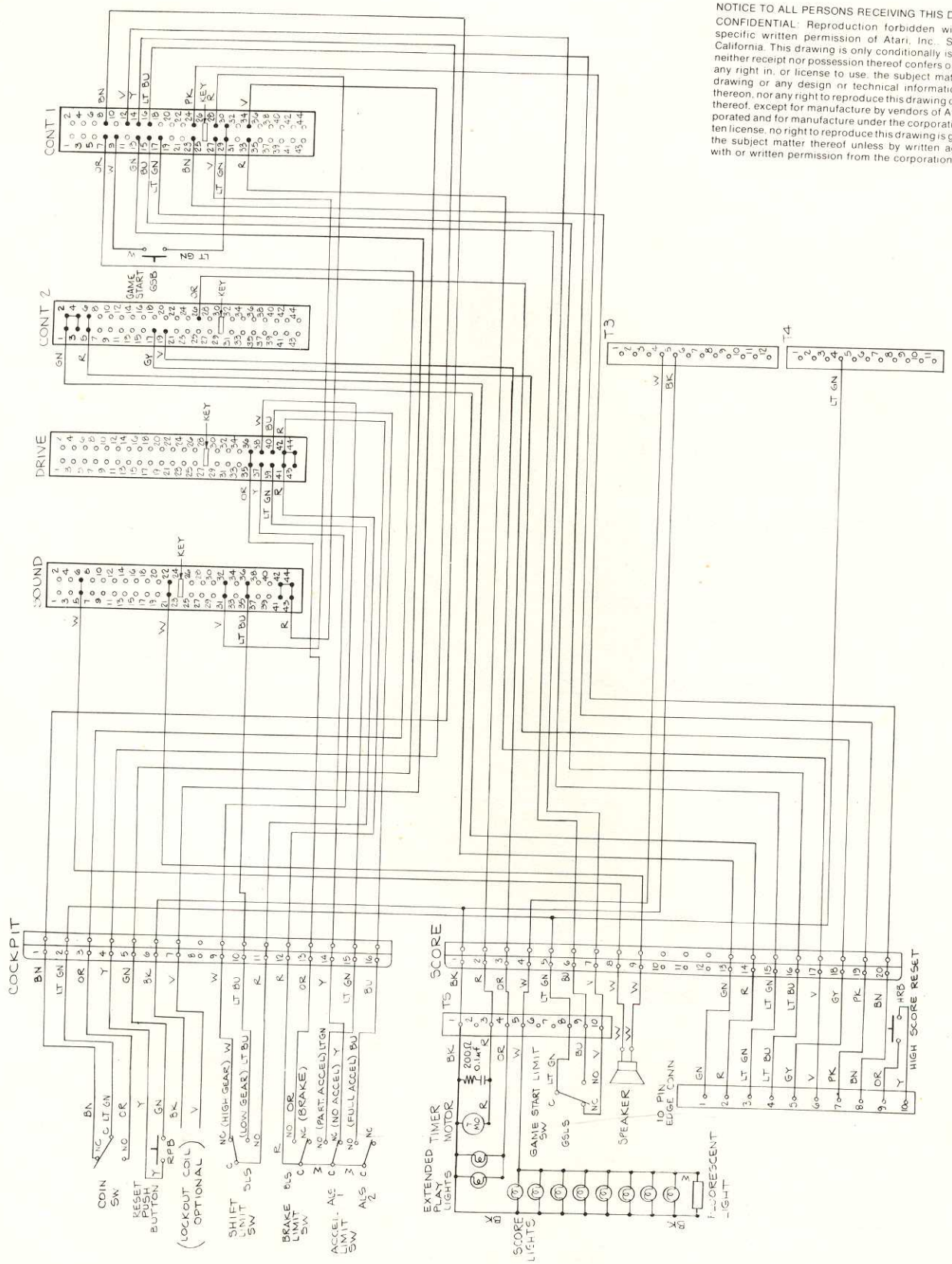


Figure 5 Harness Schematic, Early Version Sheet 2 of 3

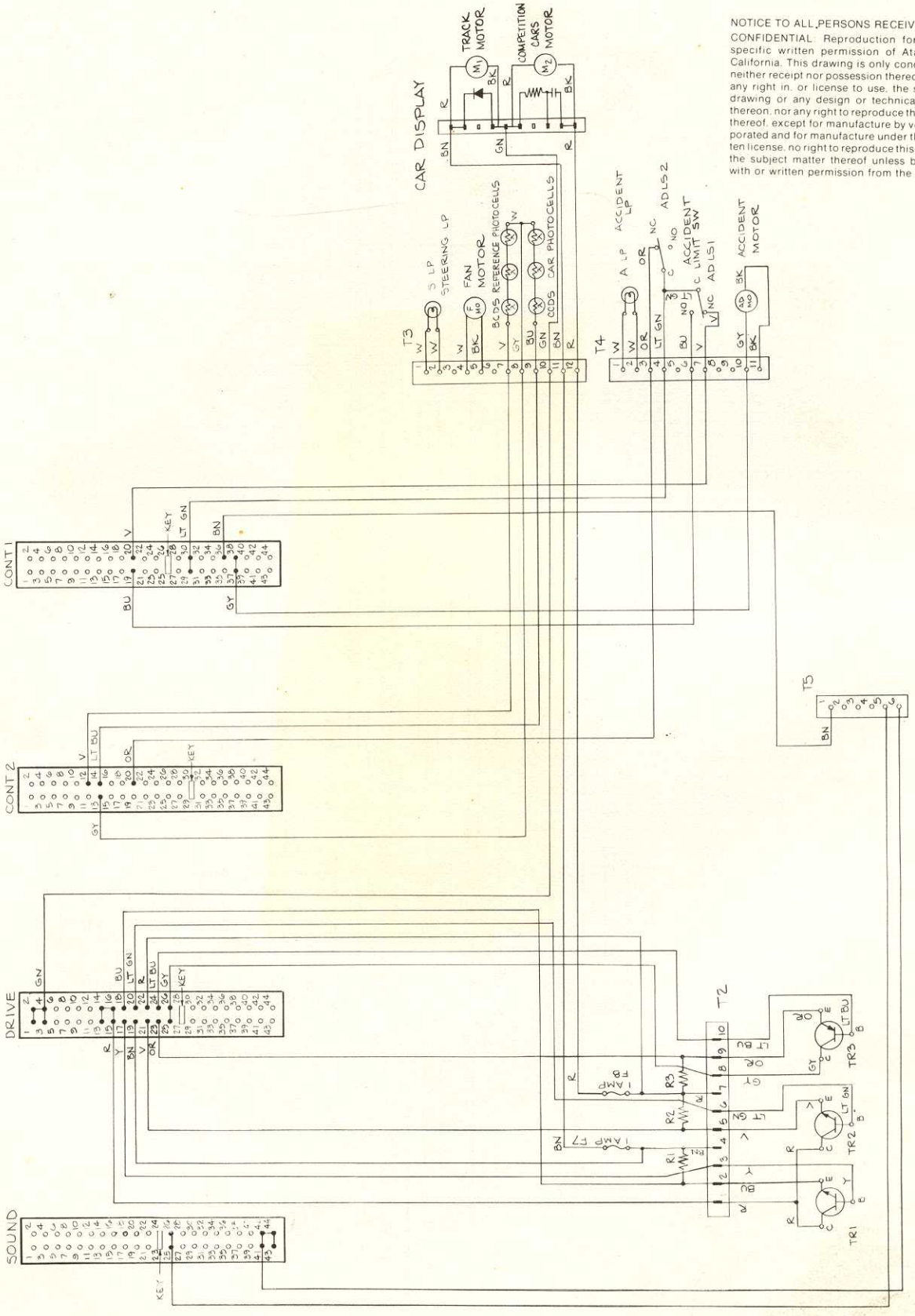


Figure 5 Harness Schematic, Early Version
Sheet 3 of 3

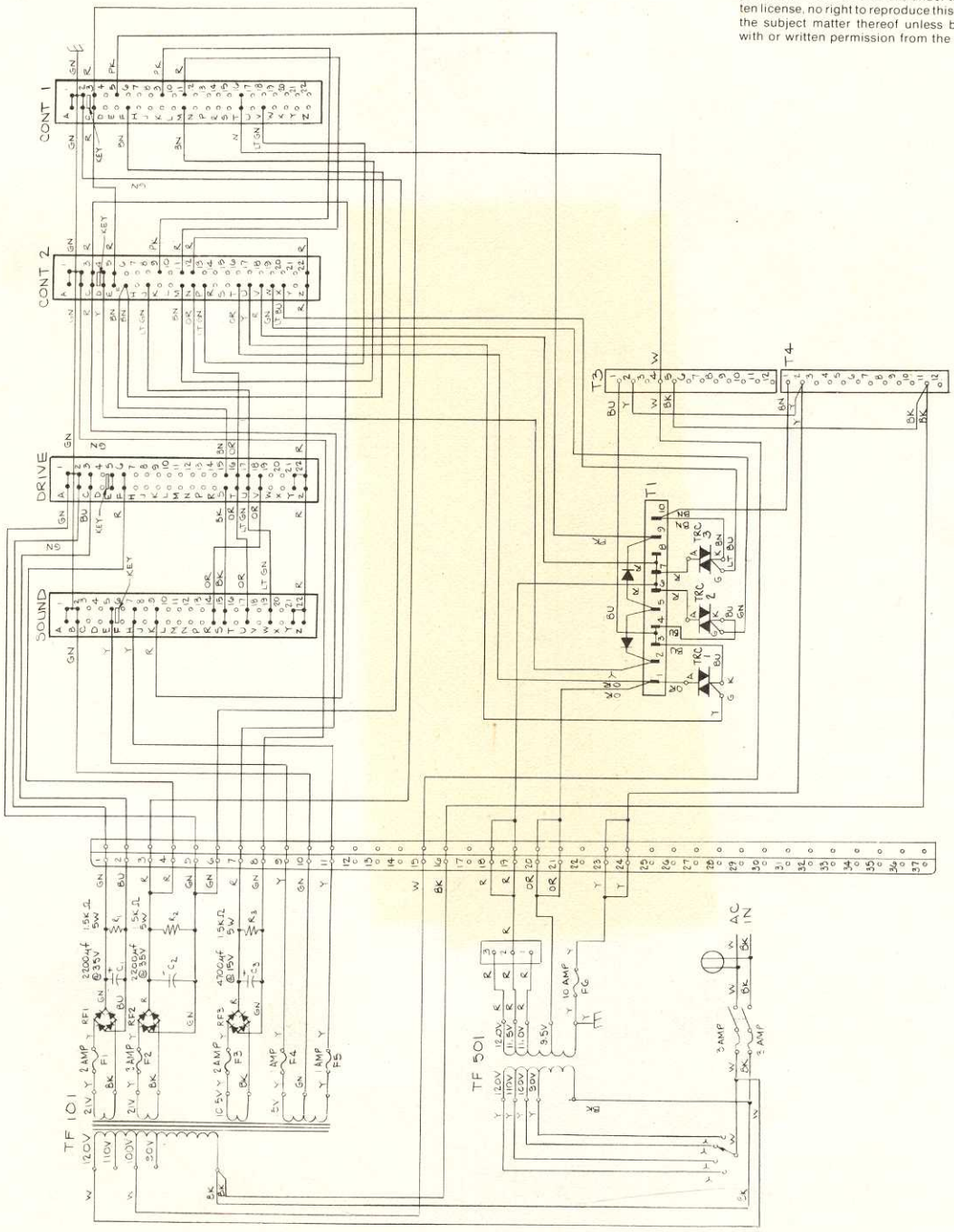


Figure 5A Harness Schematic, Latest Version
Sheet 1 of 3

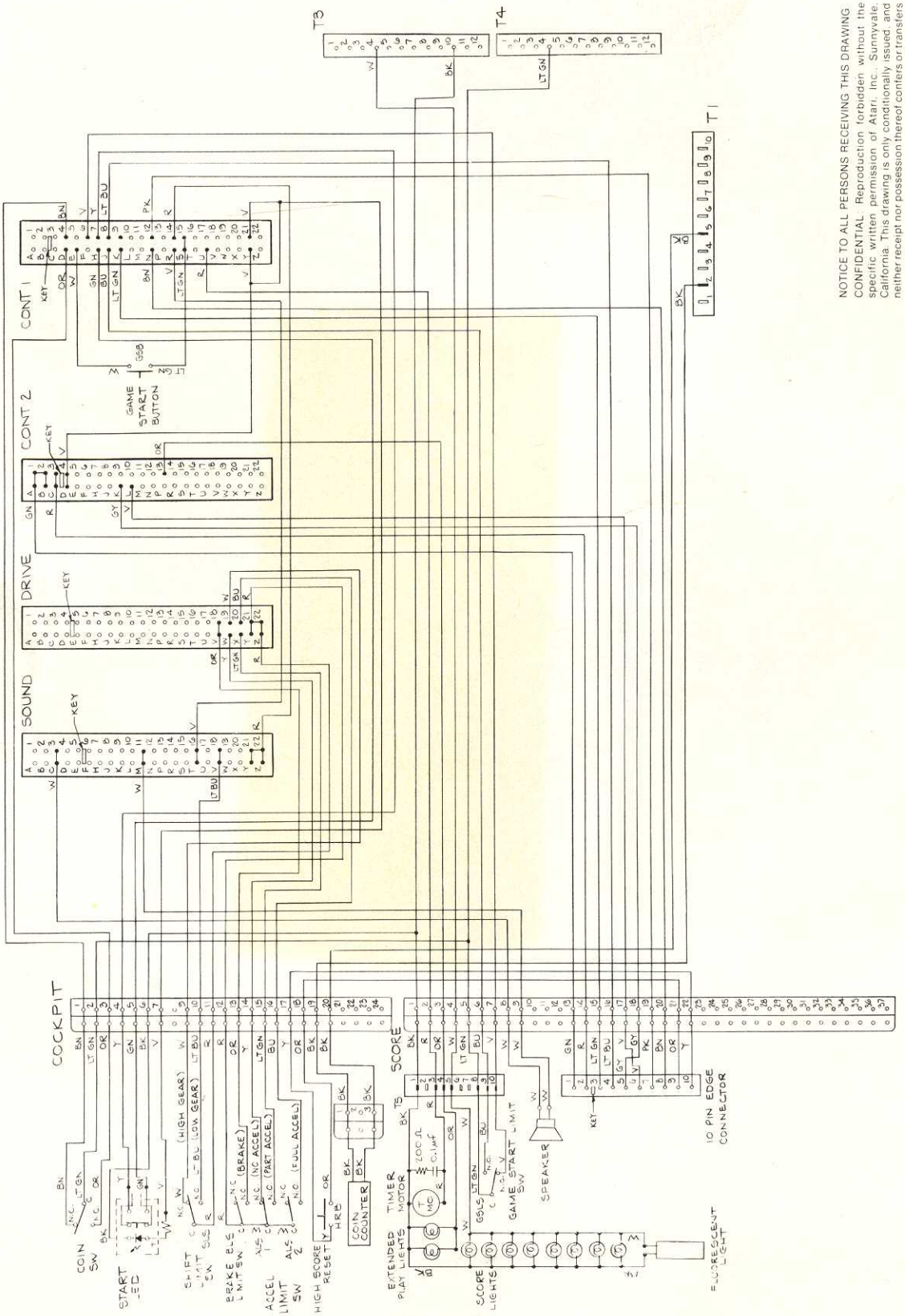


Figure 5A Harness Schematic, Latest Version
Sheet 2 of 3

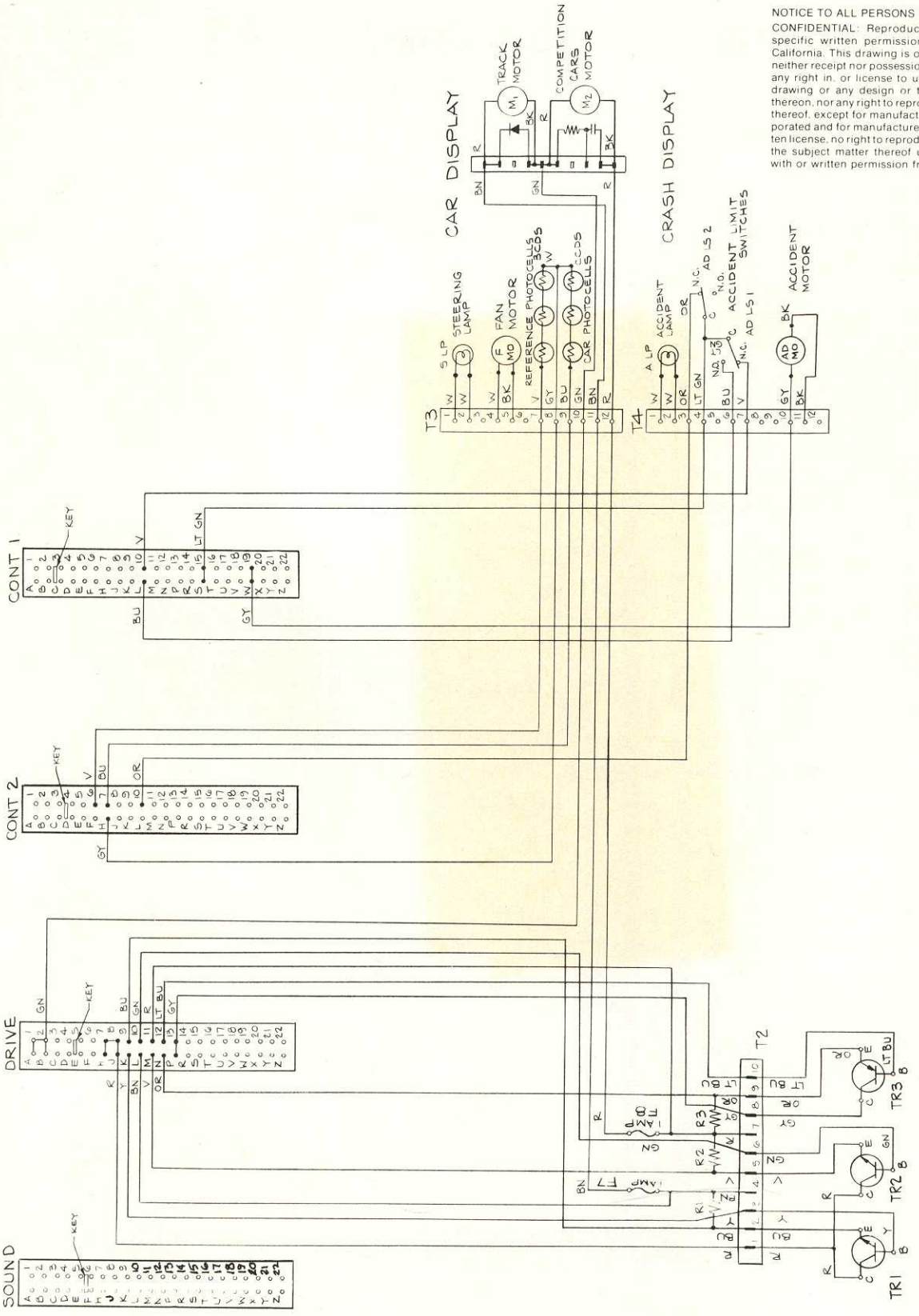


Figure 5A Harness Schematic, Latest Version
Sheet 3 of 3

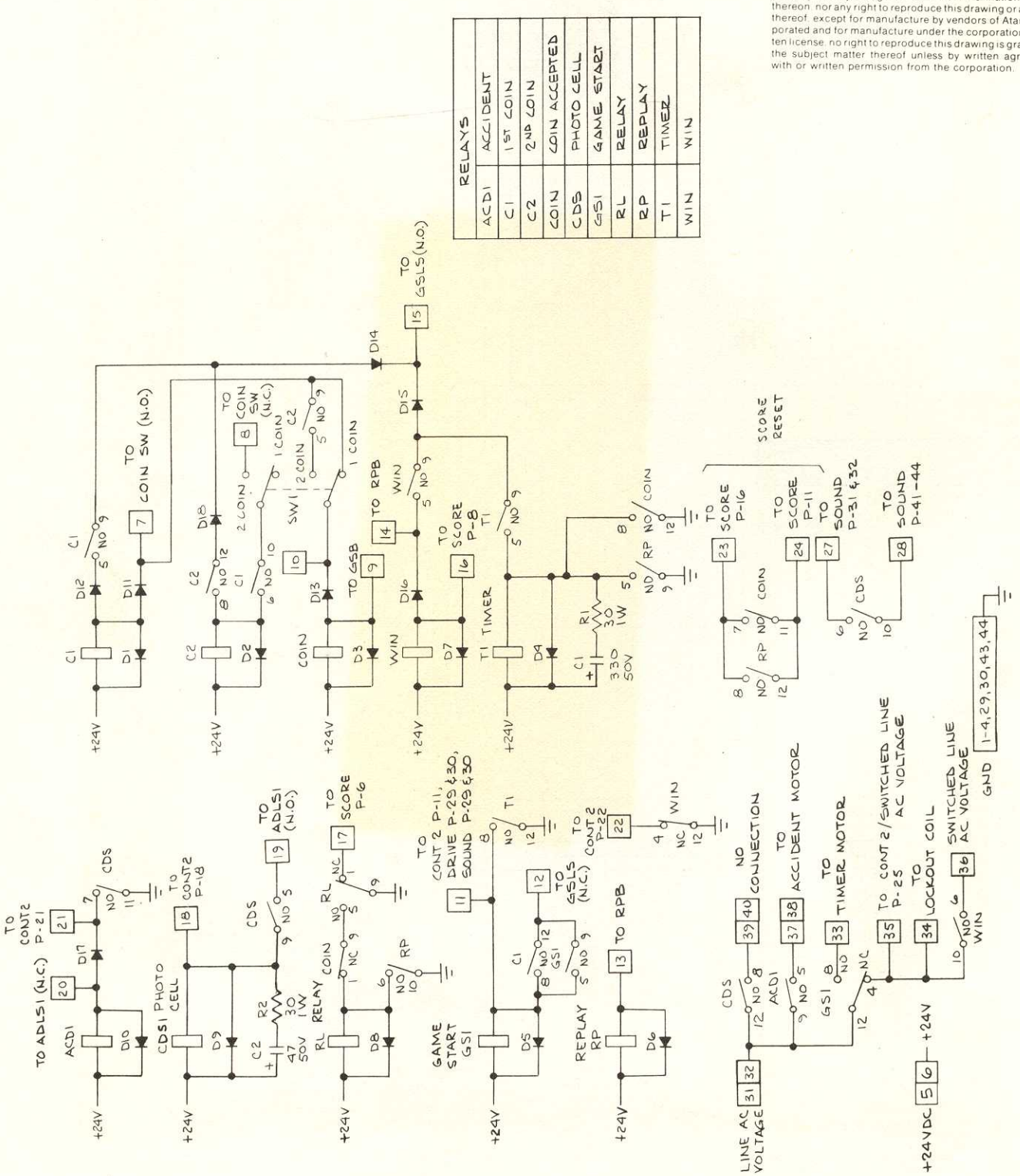


Figure 6 CONT 1 PCB Schematic

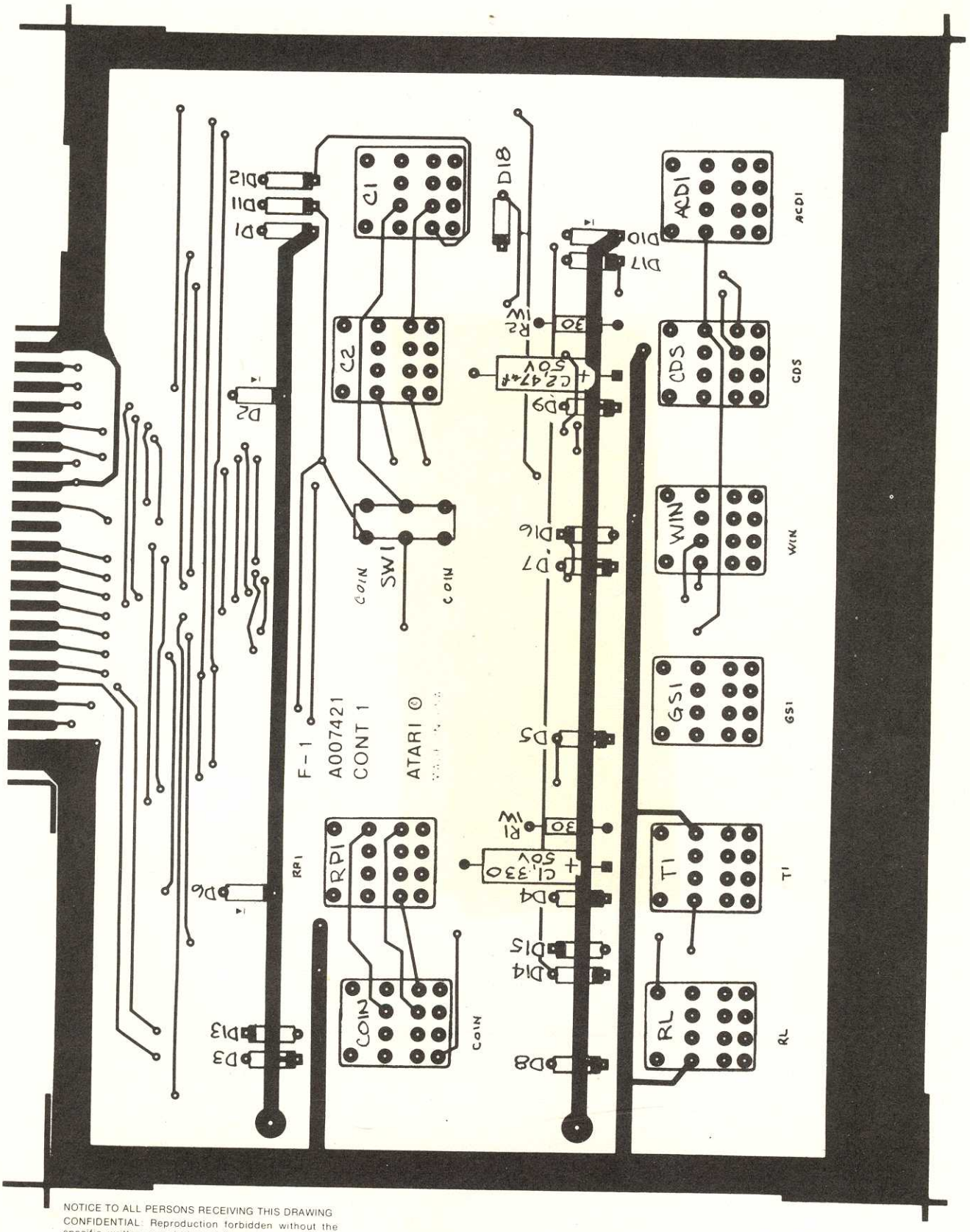


Figure 6 CONT 1 PCB Drawing

Item	Part Number	Qty.	Description	
1	007422-01	1	P.C. Board, Cont 1	
2	19-815C300	2	Resistor 1 W, 30 OHM	R1,2
3	24-500476	1	Cap Elect 47uf 50V	C2
4	24-500337	1	CAP, ELECT, 330uf, 50V	C1
5	31-1N4001	18	Diode, 1N4001	D1-18
6	43-9001	10	Relay, 24V, 4 PDT	CDS,WIN,C1,RP1,COIN,C2
7				ACD1,GS1,T1,RL
8	69-001	1	Switch, Slide, DPDT	SW1

Figure 6 CONT 1 PCB Parts List

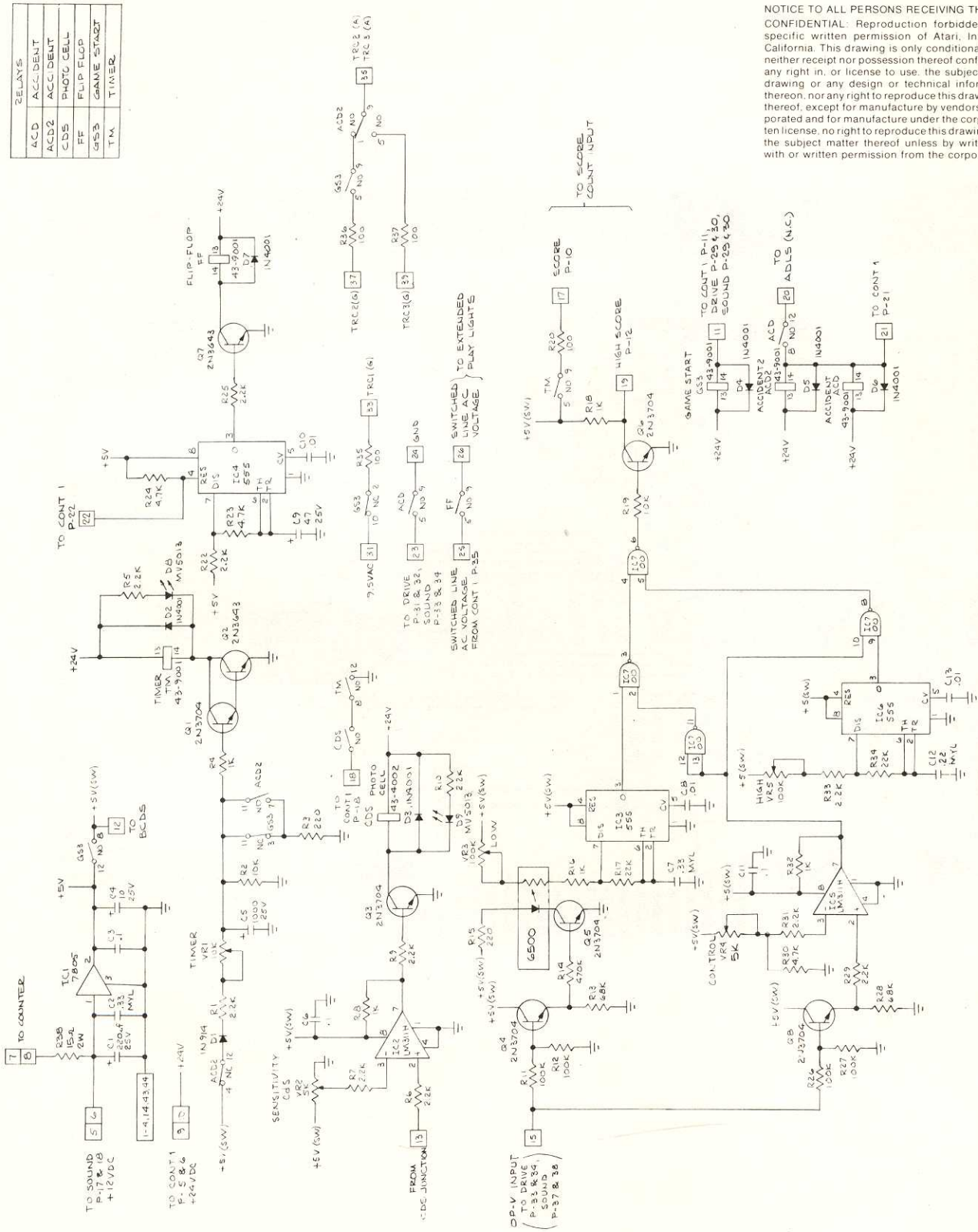


Figure 7 CONT 2 PCB Schematic

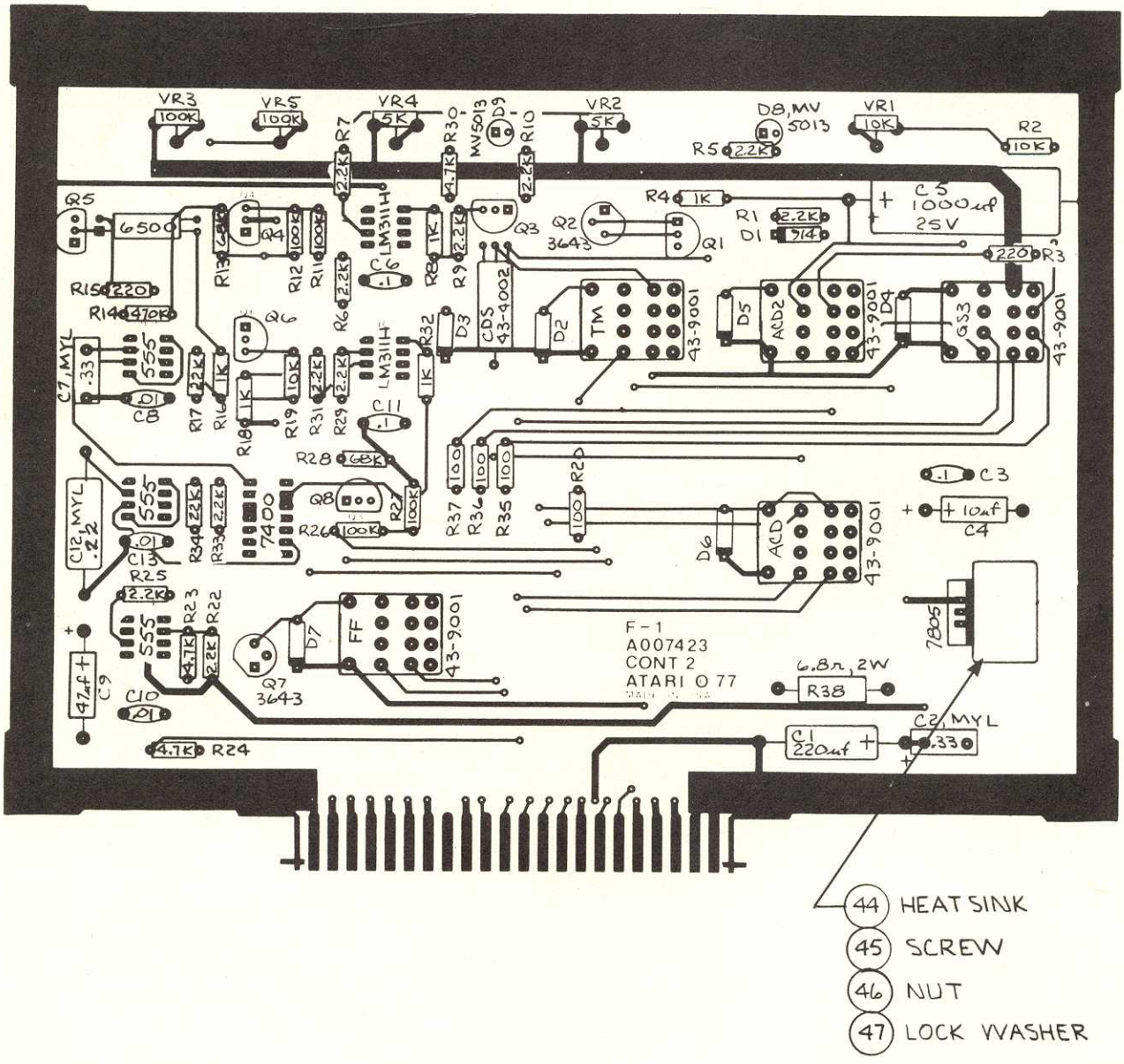


Figure 7 CONT 2 PCB Drawing

Item	Part Number	Qty.	Description	
1	007424-01	1	P.C. Bd, Control 2	
2	10-5101	4	Res, Car. Comp, ¼ W 5% 100 OHM	R20,35-37
3	10-5221	2	" " " " 220 "	R3,15
4	10-5102	5	" " " " 1K "	R4,8,16,18,32
5	10-5222	11	" " " " 2.2K "	R1,5-7,9,10,22, 25,29,31,33
6	10-5472	3	" " " " 4.7K "	R23,24,30
7	10-5103	2	" " " " 10K "	R2,19
8	10-5223	2	" " " " 22K "	R17,34
9	10-5683	2	" " " " 68K "	R13,28
10	10-5104	4	" " " " 100K "	R11,12,26,27
11	10-5474	1	Res, Car. Comp, ¼ W 5% 470K OHM	R14
12	19-825C6P8	1	" " " 2W 5% 6.8 OHM	R38
13				
14				
15	19-311502	2	Trimpot 5K	VR2,4
16	19-311103	1	" 10K	VR1
17	19-311104	2	" 100K	VR3,5
18				
19				
20	24-250106	1	Cap, Elect 10uf 25V	C4
21	24-250476	1	" " 47uf 25V	C9
22	24-250227	1	" " 220uf 25V	C1
23	24-250108	1	Cap, Elect 1000uf 25V	C5
24	22-101224	1	Cap, Mylar, .22uf 100V	C12
25	21-101334	2	Cap, Mylar, .33uf 100V	C2,7
26	27-250103	3	Cap Cer Disc .01uf 25V	C8,10,13

Item	Part Number	Qty.	Description	
27	27-250104	3	Cap Cer Disc. .1uf 25V	C3,6,11
28				
29	31-1N914	1	Diode, 1N914	D1
30	31-1N4001	6	" 1N4001	D2-7
31	38-MV5013	2	LED, Red MV5013	D8,9
32	34-2N3704	6	Transistor, 2N3704	Q1,3-6,8
33	34-2N3643	2	Transistor, 2N3643	Q2,7
34				
35	37-7400	1	I.C., 7400	1C7
36	37-LM311H	2	" LM311H	1C2,5
37	37-555	3	" 555	1C3,4,6
38	37-7805	1	Regulator F 7805	1C1
39				
40	43-4002	1	Relay, 24V, SPST	CDS
41	43-9001	5	Relay, 24V, DPDT	ACD,TM,FF
42				ACD_2,GS3
43				
44	78-06014	1	Heatsink (7805)	
45	72-1406C	1	Screw, Pan Hd, Phil, 4-40 x 3/8 Lg, Cres	
46	75-914C	1	Nut, Hex #4-40	
47	75-054	1	Washer, Lock Int Star #4	
48	38-6500	1	Photo Isolator	

Figure 7 CONT 2 PCB Parts List

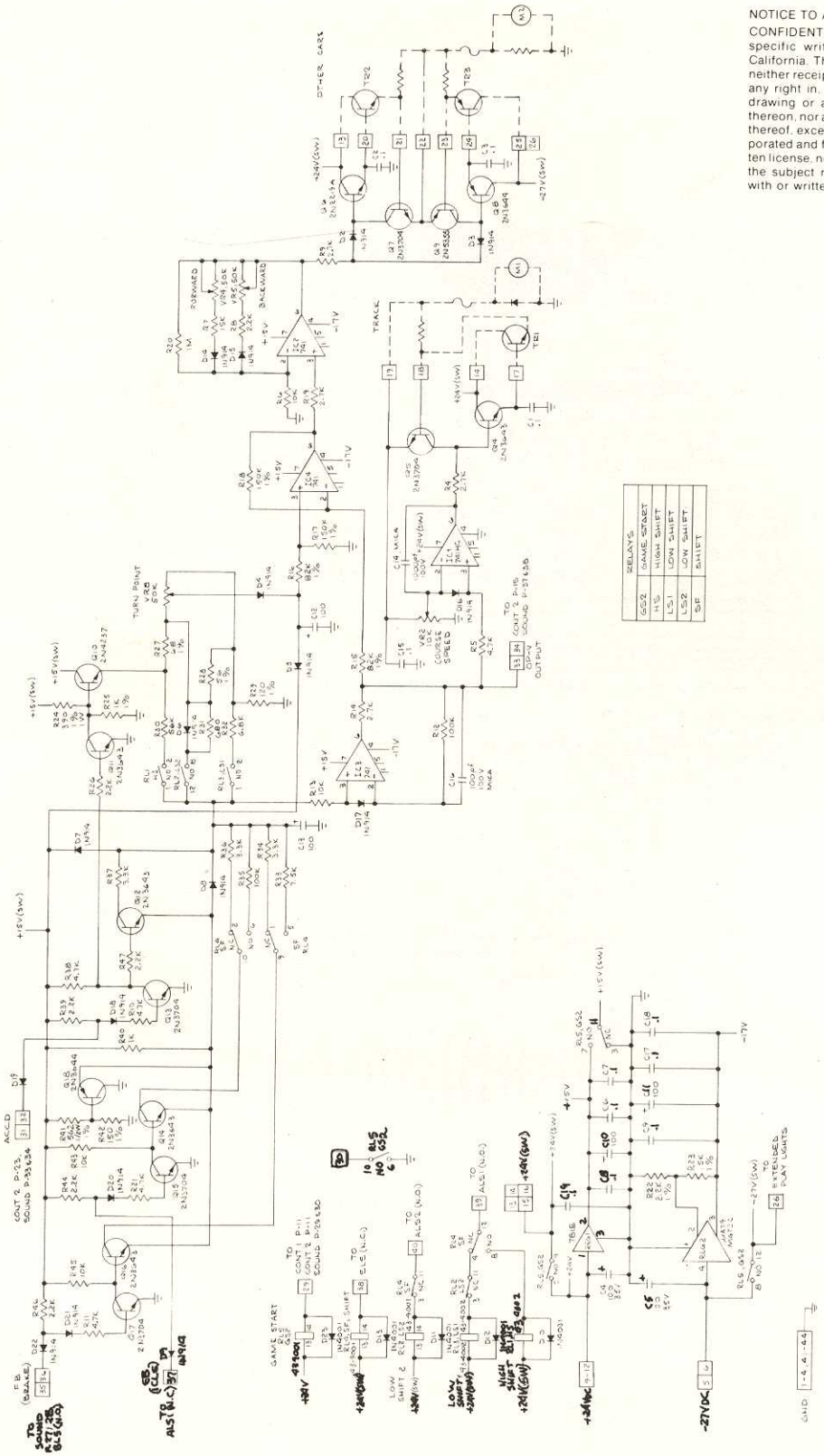


Figure 8 DRIVE PCB Schematic

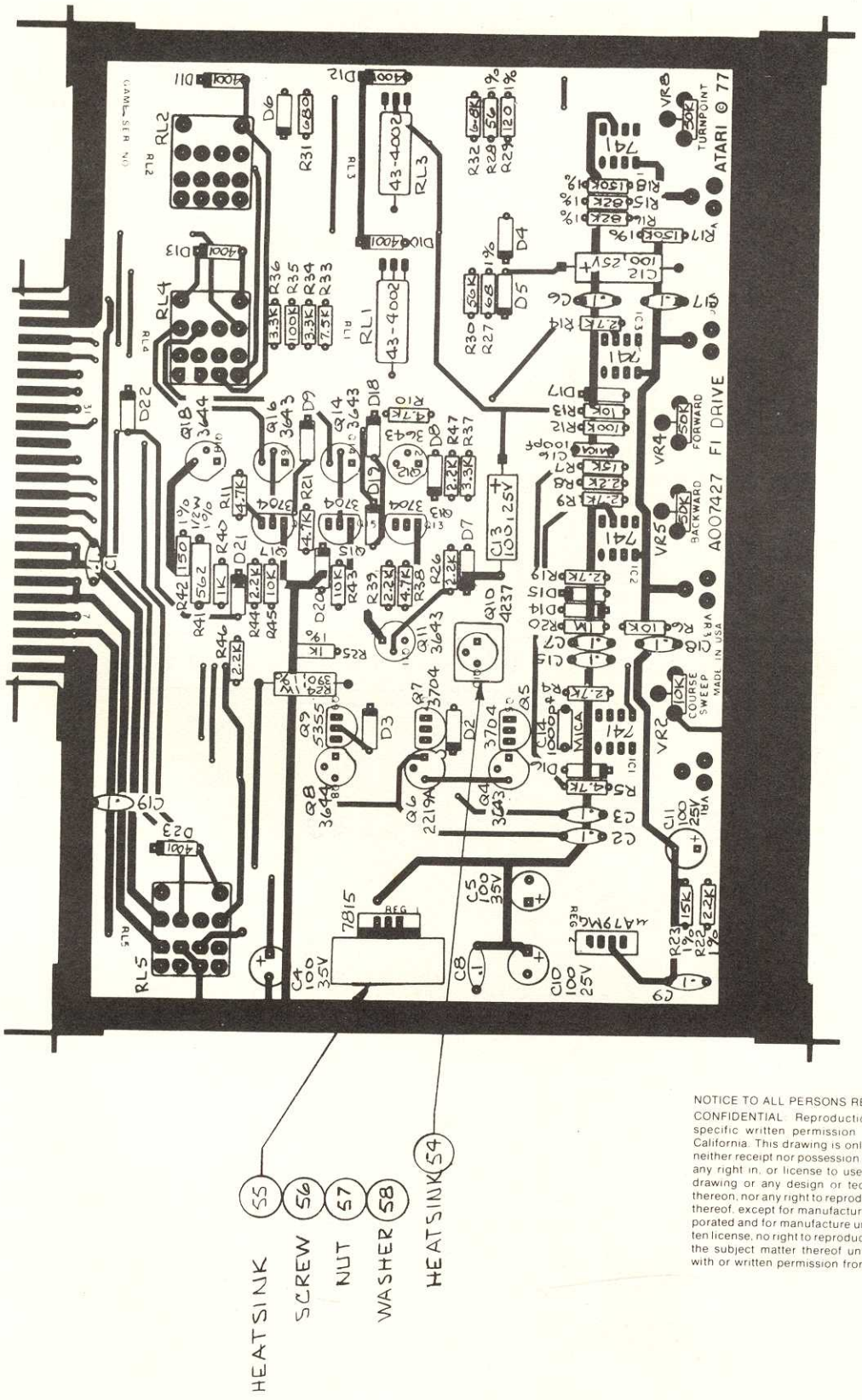


Figure 8 DRIVE PCB Drawing

Figure 8 DRIVE PCB Parts List

Item	Part Number	Qty.	Description	
1	007428-01	1	P.C. Bd, Drive	
2	10-5681	1	Res Car. Comp ¼ W 5% 680 OHM	R31
3	10-5102	1	" " " " 1K "	R40
4	10-5222	6	" " " " 2.2K "	R8,26,39,44,46, 47
5	10-5272	4	" " " " 2.7K "	R4,9,14,19
6	10-5332	3	" " " " 3.3K "	R34,36,37
7	10-5472	5	" " " " 4.7K "	R5,10,11,21,38
8	10-5682	1	" " " " 6.8K "	R32
9	10-5752	1	" " " " 7.5K "	R33
10	10-5103	4	" " " " 10K "	R6,13,43,45
11	10-5153	1	" " " " 15K "	R7
12	10-5563	1	" " " " 56K "	R30
13	10-5104	2	" " " " 100K "	R12,35
14	10-5105	1	Res, Car. Comp. ¼ W 5%, 1 Meg OHM	R20
15	14-1560	1	Res, Film ⅛ W 1% 56 OHM	R28
16	14-1680	1	" " " 68 "	R27
17	14-1121	1	" " " 120 "	R29
18	14-1151	1	" " " 150 "	R42
19	14-1102	1	" " " 1K "	R25
20	14-1222	1	" " " 2.2K "	R22
21	14-1153	1	" " " 15K "	R23
22	14-1823	2	" " " 82K "	R15,16
23	14-1154	2	" " " 150K "	R17,18
24	15-1561	1	" " ½ W 1% 562 OHM	R41
25	19-811W391	1	Res, Wirewound 1W 1% 390 OHM	R24
26				
27				
28	19-311103	1	Trimpot 10K	VR2
29				
30	19-311503	3	" 50K	VR8,4,5
31				
32	23-250107	2	Cap, Elect, 100uf, 25V	C10,11
33	23-350107	2	" " " 35V	C4,5
34	24-250107	2	" " " 25V	C12,13
35	27-250104	11	" Cer Disc, .luf, 25V	C1-3,6-9,15,17-19
36	28-101101	1	" Dip Mica, 100pf 100V	C16
37	28-101102	1	" Dip Mica, 1000pf 100V	C14
38				
39	31-1N914	17	Diode, 1N914	D2-9,14-22
40	31-1N4001	5	" 1N4001	D10-13, 23
41	34-2N4237	1	Transistor, 2N4237	Q10
42	34-2N2219A	1	Transistor, 2N2219A	Q6
43	34-2N3643	5	" 2N3643	Q4, 11,12,14,16
44	33-2N3644	2	" 2N3644	Q8,18
45	34-2N3704	5	" 2N3704	Q5,7,13,15,17
46	33-2N5355	1	" 2N5355	Q9
47	37-741	4	I.C., uA741	1C1-4
48	37-7815	1	Regulator, F7815	REG 1
49	37-79MG	1	" uA79MG	REG 2
50	43-4002	2	Relay SPST, 24V	RL1,3
51	43-9001	3	Relay 4PDT, 24V	RL2,4,5
52				
53				
54	78-06015	1	Heatsink	Q10
55	78-06014	1	Heatsink	REG 1
56	72- 1406C	1	Screw, Mach, Pan Hd Phil, #4-40 x 3/8 CRES	
57	75-914S	1	Nut, Hex #4-40	
58	75-054	1	Washer, Lock Internal Tooth #4	

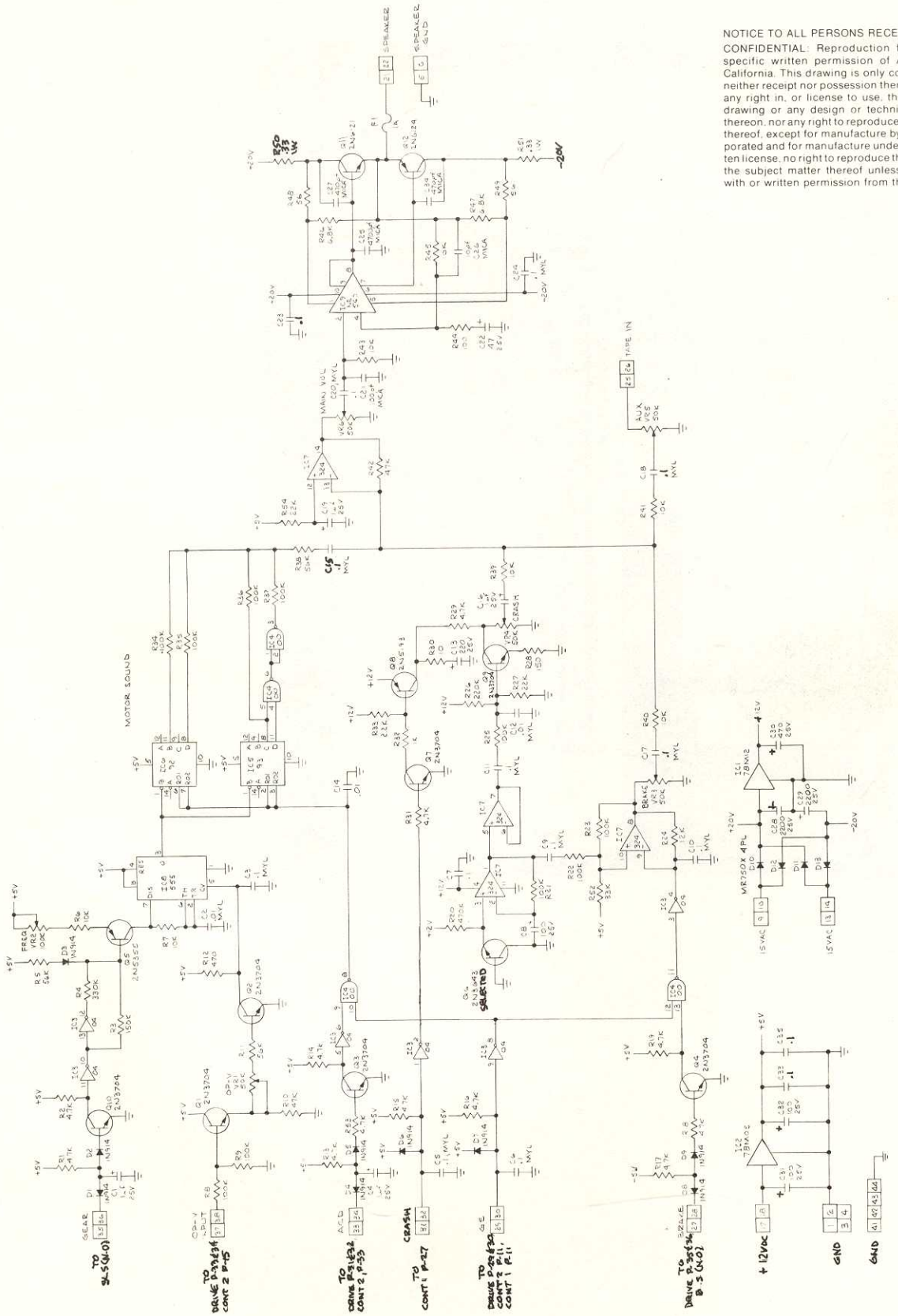


Figure 9 SOUND PCB Schematic

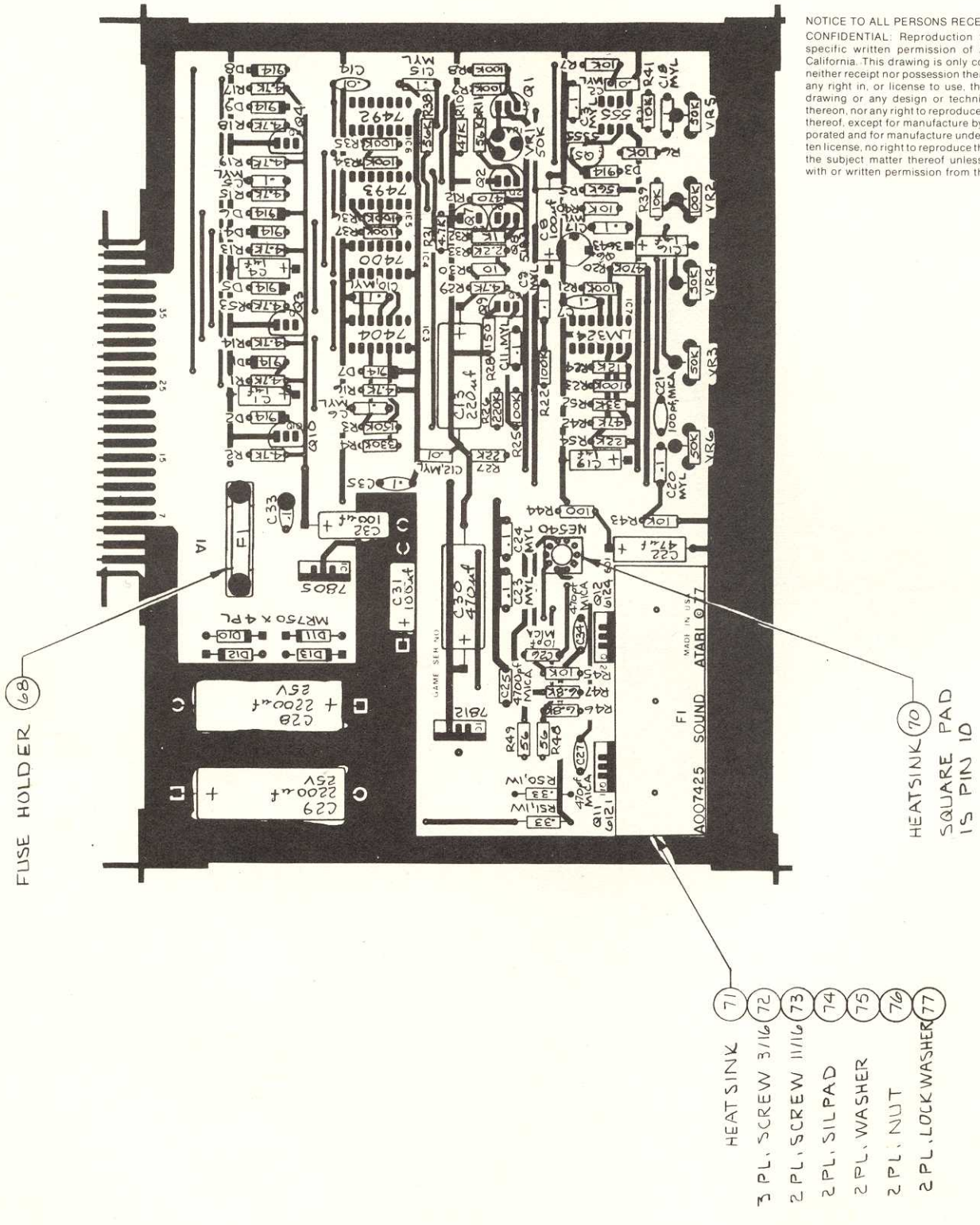


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Figure 9 SOUND PCB Drawing

Item	Part Number	Qty.	Description	
1	007426-01	1	P.C. Board, Sound	
2	10-5100	1	Res, Car Comp, ¼ W 5%, 10 OHM	R30
3	10-5560	2	" " " " 56 "	R48,49
4	10-5101	1	" " " " 100 "	R44
5	10-5151	1	" " " " 150 "	R28
6	10-5471	1	" " " " 470 "	R12
7	10-5102	1	" " " " 1K "	R32
8	10-5222	1	" " " " 2.2K "	R33
9	10-5472	12	" " " " 4.7K "	R1,2,13-19, 29,31,53
10	10-5682	2	" " " " 6.8K "	R46,47
11	10-5103	7	" " " " 10K "	R6,7,39,40, 41,43,45
12	10-5123	1	" " " " 12K "	R24
13	10-5223	2	" " " " 22K "	R27,54
14	10-5333	1	" " " " 33K "	R52
15	10-5473	2	" " " " 47K "	R10,42
16	10-5563	3	" " " " 56K "	R5,11,38
17	10-5104	10	" " " " 100K "	R8,9,21-23, 25, 34-37
18	10-5154	1	" " " " 150K "	R3
19	10-5224	1	" " " " 220K "	R26
20	10-5334	1	" " " " 330K "	R4
21	10-5474	1	" " " " 470K "	R20
22	19-819WP33	2	Res, Wirewound, 1 W 10%, 0.33 OHM	R50,51
25	19-317503	1	Pot, Flush Mtg 50K	VR1
26	19-311503	4	Pot, Upright 50K	VR3-6
27	19-311104	1	Pot, Upright 100K	VR2
28				
29	24-250105	4	Cap, Elect. 1uf 25V	C1,4,16,19
30	24-250476	1	" " 47uf 25V	C22
31	24-250107	3	" " 100uf 25V	C8,31,32
32	24-250227	1	" " 220uf 25V	C13
33	24-250477	1	" " 470uf 25V	C30
34	24-250228	2	" " 2200uf 25V	C28,29
35	21-101103	2	" Mylar, .01uf 100V	C2,12
36	21-101104	12	" Mylar, 0.1uf 100V	C3,5,6,9-11,15,17 18,20,23,24
37	27-250103	1	" Cer. Disc .01uf 25V	C14

Item	Part Number	Qty.	Description	
38	27-250104	3	" Cer. Disc 0.1uf 25V	C7,33,35
39	28-101100	1	" Dipped Mica 10pf 100V	C26
40	28-101101	1	" Dipped Mica 100pf 100V	C21
41	28-101471	2	" Dipped Mica 470pf 100V	C27,34
42	28-101472	1	" Dipped Mica 4700pf 100V	C25
43				
44				
45				
46	31-1N914	9	Diode 1N914	D1-9
47	31-MR750	4	Diode MR750	D10-13
48				
49	34-2N3643	1	Transistor, 2N3643	Q6
50	34-2N3704	7	" 2N3704	Q1-4,7,9,10
51	33-2N5355	1	" 2N5355	Q5
52	33-2N5193	1	" 2N5193, Case 77-03	Q8
53	34-2N6121	1	" 2N6121	Q11
54	33-2N6124	1	" 2N6124	Q12
55				
56				
57	37-7400	1	I.C., 7400	1C4
58	37-7404	1	" 7404	1C3
59	37-7492	1	" 7492	1C6
60	37-7493	1	" 7493	1C5
61	37-540	1	I.C., NE540	1C9
62	37-555	1	" NE555	1C8
63	37-LM324	1	" LM324	1C7
64	37-7805	1	Regulator +5V, 7805	1C2
65	37-7812	1	Regulator +12V, 7812	1C1
66				
67				
68	79-3205	1	Fuse Holder	
69	46-203102	1	Fuse, 1 AMP	F1
70	78-06015	1	Heatsink (NE540)	
71	007660-01	1	Heatsink (Q11 & Q12)	
72	72-1403C	3	Scr, Mach, Pan Hd Phil, 4-40 x 3/16	
73	72-1411C	2	" " " " " 4-40 x 1 1/16	
74	78-06010	2	Sil-Pad (Q11 & Q12)	
75	75-09012T	2	Shoulder Washer #4 (Teflon)	
76	75-914C	2	Nut Hex #4-40	
77	75-054	2	Lock Washer, Int Star #4	

Figure 9 SOUND PCB Parts List

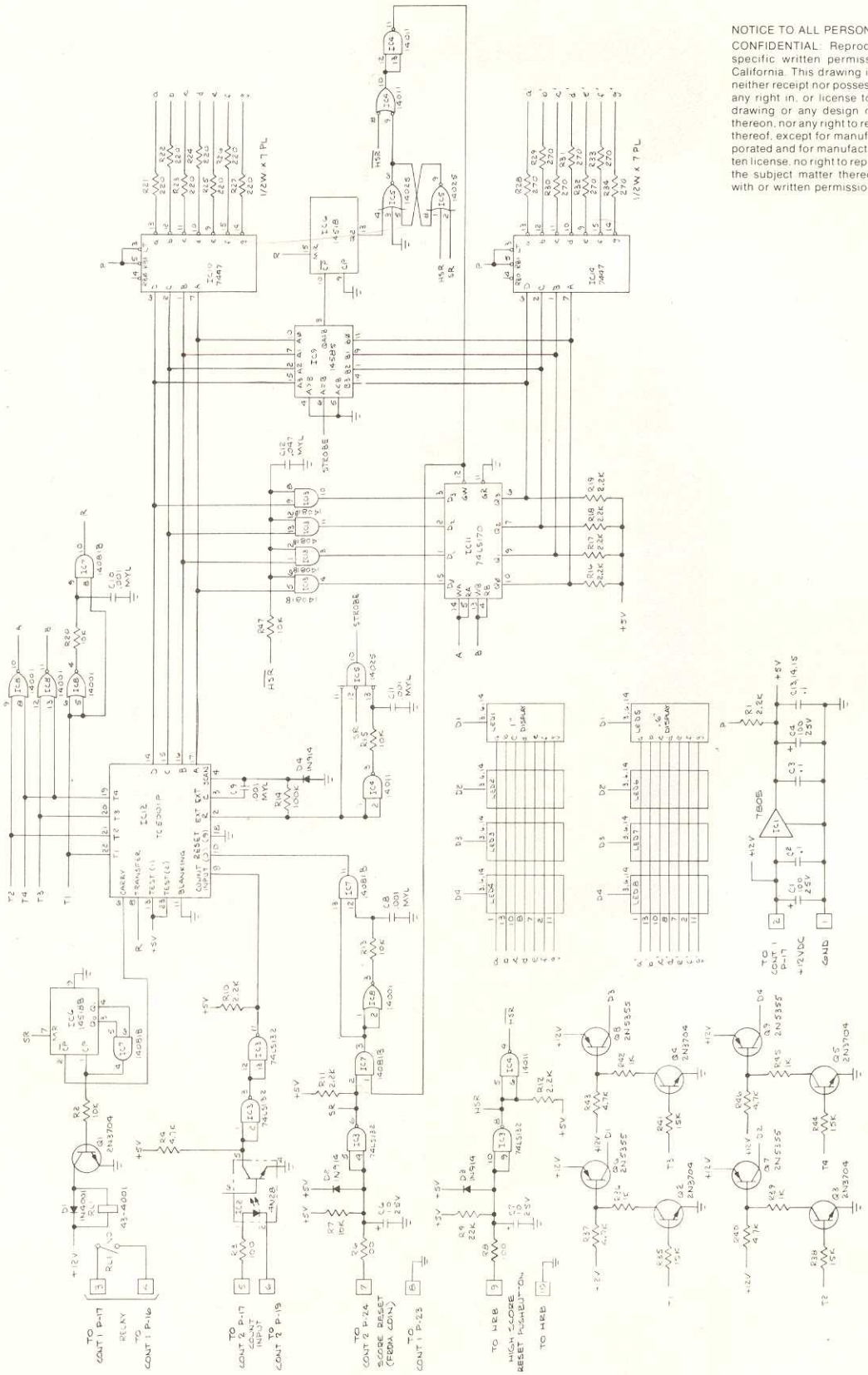


Figure 10 SCORE PCB Schematic

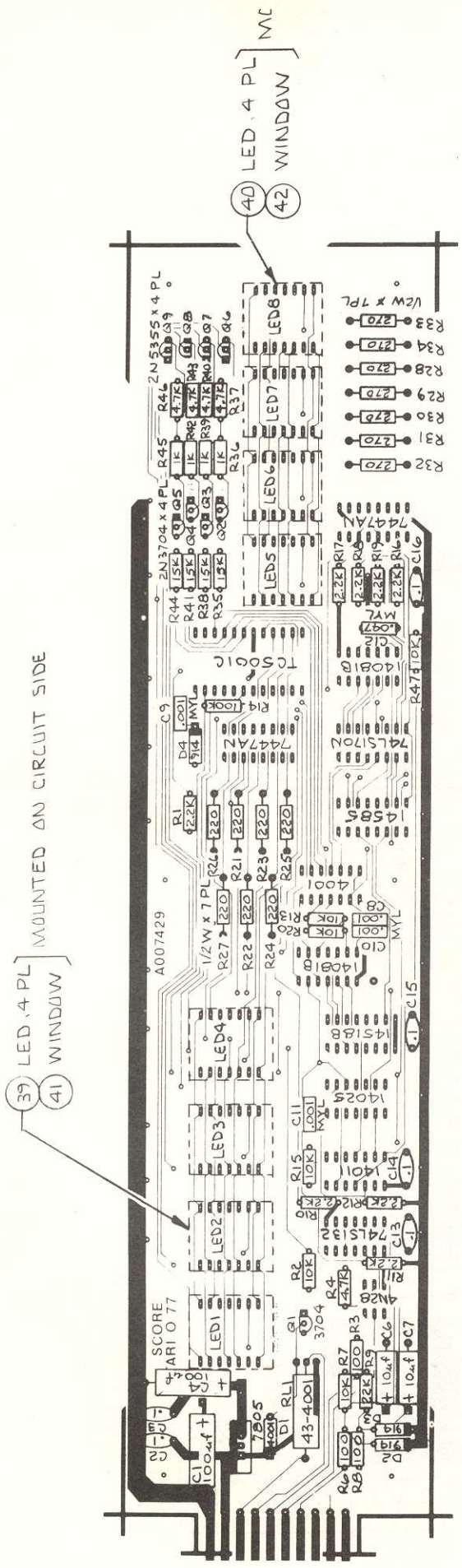
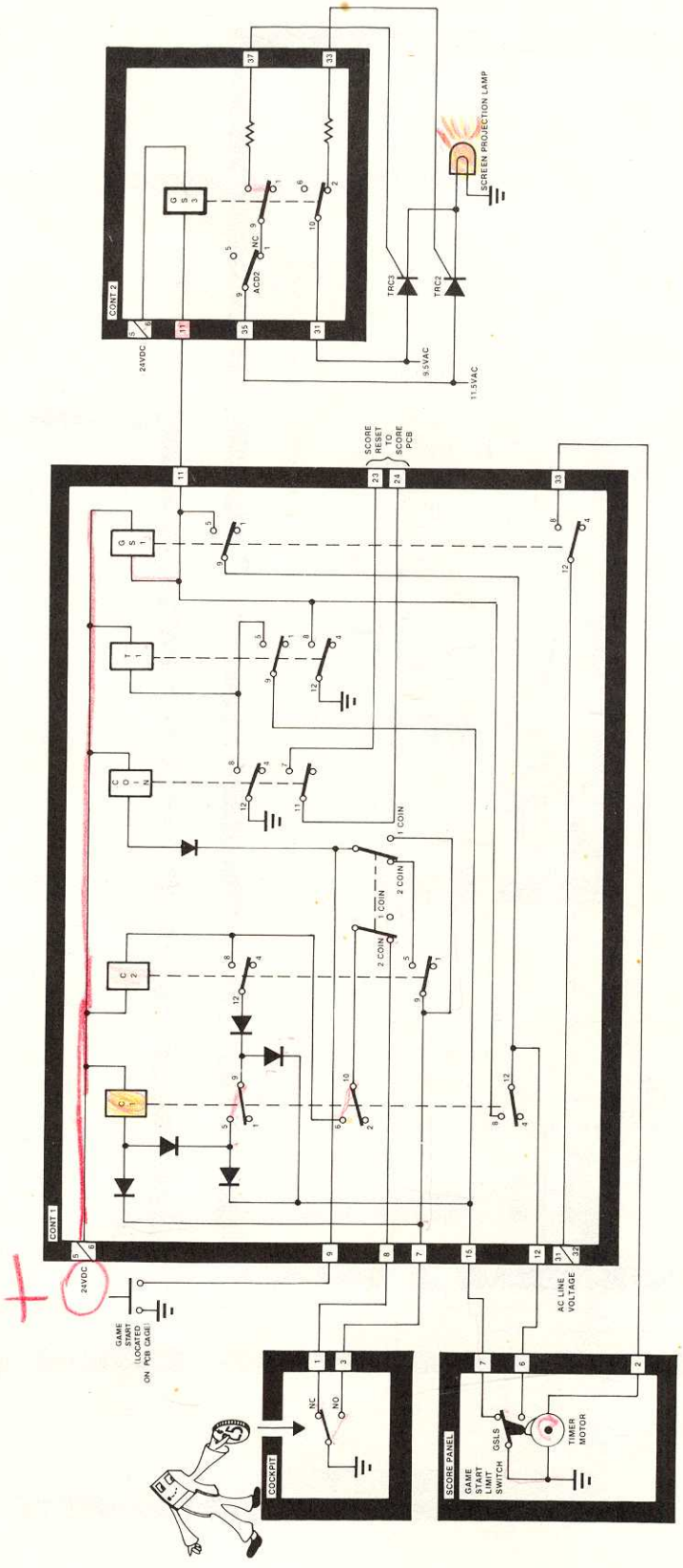


Figure 10 SCORE PCB Drawing

Figure 10 SCORE PCB Parts List

Item	Part Number	Qty.	Description	
1	007430-01	1	P.C. Board, Score	
2	10-5101	3	Res, Car. Comp. ¼ W 5% 100 OHM	R3,6,8
3	10-5102	4	" " " " " 1K "	R36,39,42,45
4	10-5222	8	" " " " " 2.2K "	R1,16-19,10-12
5	10-5472	5	" " " " " 4.7K "	R4,37,40,43,46
6	10-5103	6	" " " " " 10K "	R2,7,13,15,20,47
7	10-5153	4	" " " " " 15K "	R35,38,41,44
8	10-5223	1	" " " " " 22K "	R9
9	10-5104	1	" " " " " 100K "	R14
10	12-5221	7	" " " ½ W 5% 220 "	R21-27
11	12-5271	7	" " " ½ W 5% 270 "	R28-34
12				
13				
14	24-250106	2	Cap, Elect 10uf 25V	C6,7
15	24-250107	2	Cap, Elect 100uf 25V	C1,4
16				
17	21-101102	4	Cap, Mylar .001uf 100V	C8-11
18	21-101473	1	Cap, Mylar .047uf 100V	C12
19	27-250104	6	Cap, Cer Disc .1uf 25V	C2,3,13-16
20				
21	31-1N4001	1	Diode, 1N4001	D1
22	31-1N914	3	Diode, 1N914	D2-4
23	34-2N3704	5	Transistor, 2N3704	Q1-5
24	33-2N5355	4	Transistor, 2N5355	Q6-9
25				
26	37-4N28	1	I.C., 4N28	1C2
27	37-74L5132	1	I.C., 74LS132	1C3
28	37-14011	1	" 14011	1C4
29	37-14025	1	" 14025	1C5
30	37-14518B	1	" 14518B	1C6
31	37-14081B	2	" 14081B	1C7,13
32	37-14001	1	" 14001	1C8
33	37-14585	1	" 14585	1C9
34	37-7447AN	2	" 7447AN	1C10,14
35	37-74LS170N	1	" 74LS170N	1C11
36	37-TC5001C	1	" TC5001C	1C12
37	37-7805	1	Regulator, F7805	1C1
38	43-4001	1	Relay SPST	RL1
39	38-1720	4	LED Display (GL-9R10)	LED1-4
40	38-1721	4	LED Display (GL-9R06)	LED5-8
41	007775-01	1	MASK, 1" LED	
42	007774-01	1	MASK, .6" LED	



GAME START

Figure 11 Game Start Circuit Diagram

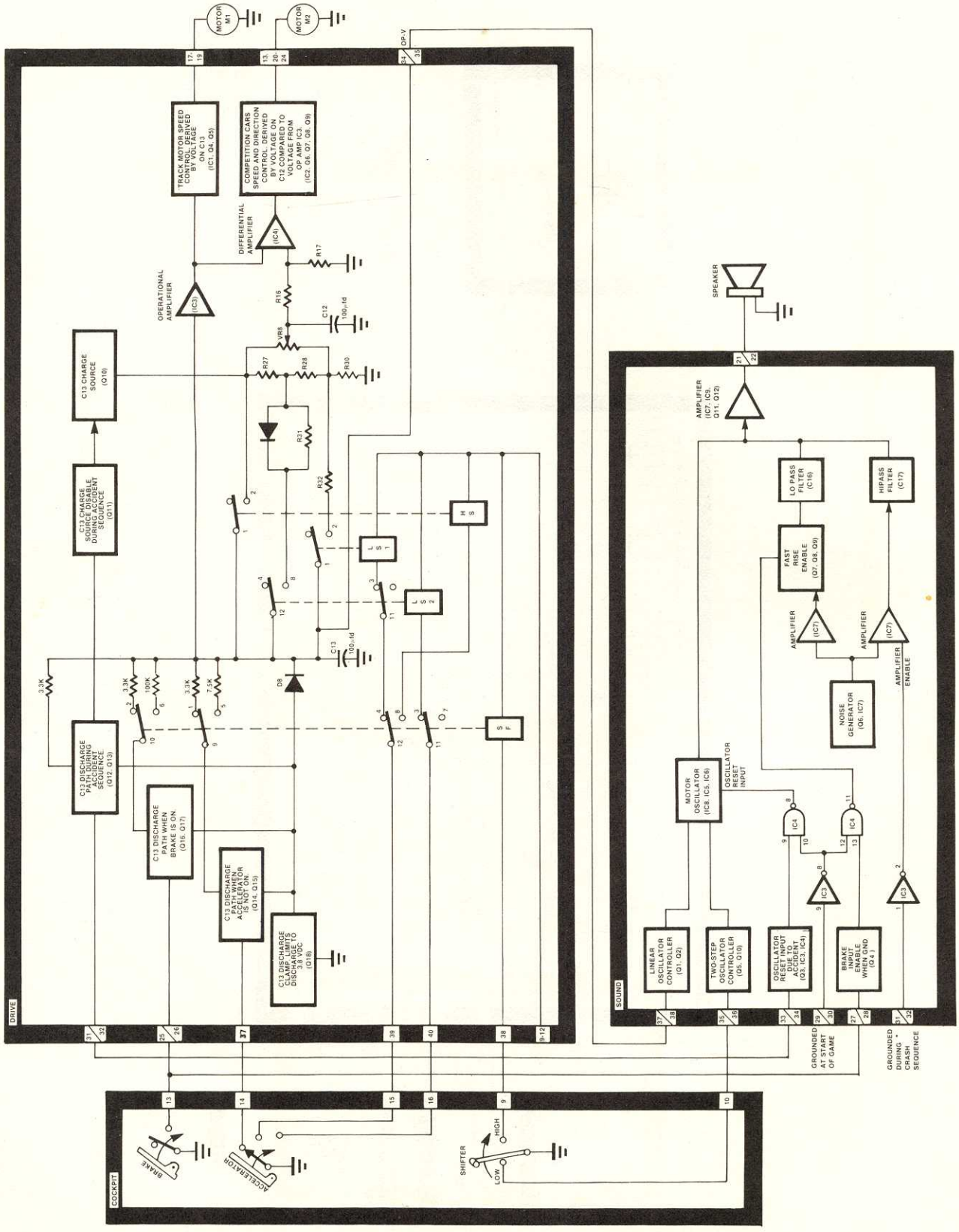
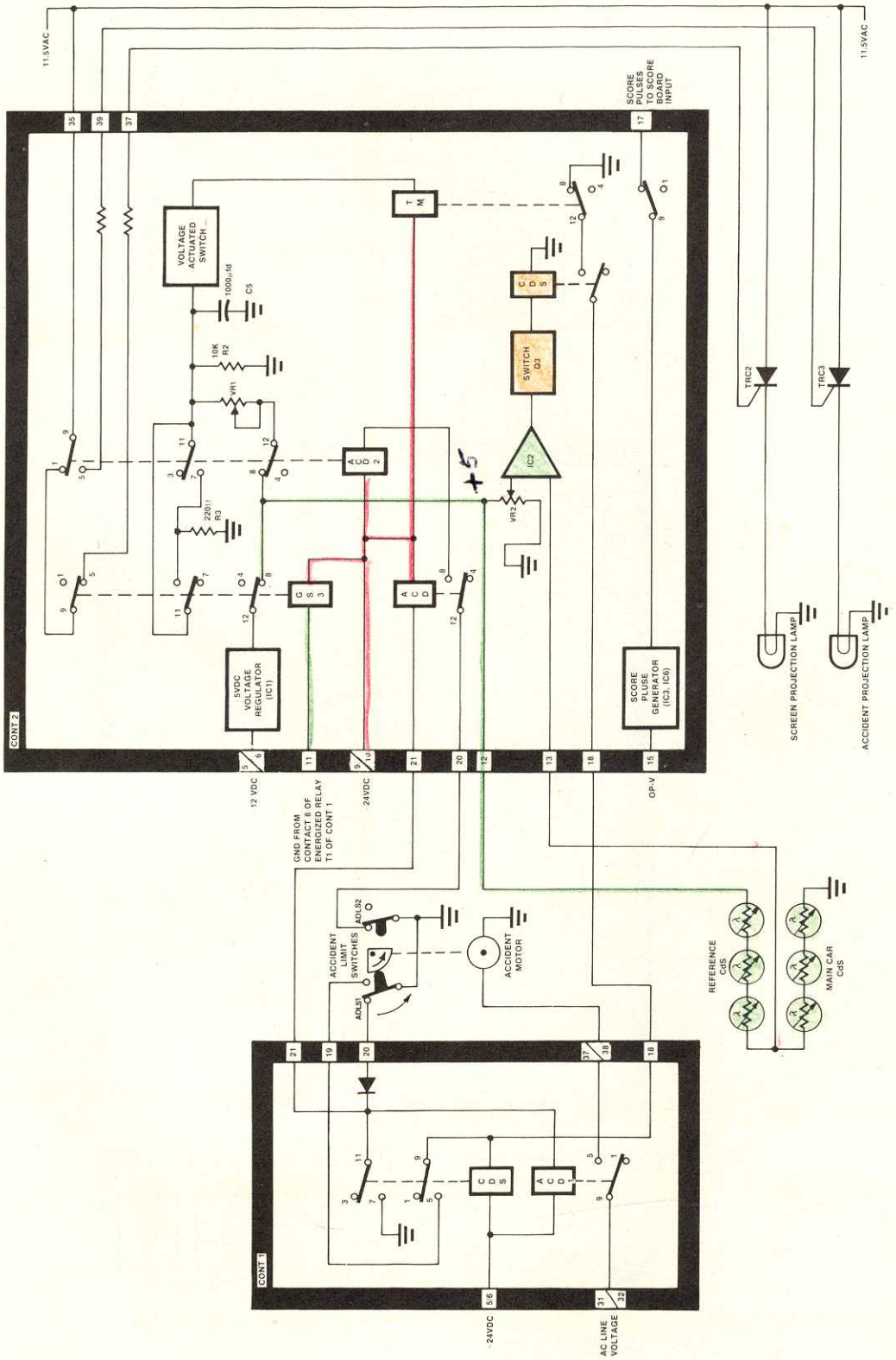


Figure 12 Drive Block Diagram



ACCIDENT Block

Figure 13 Accident Block Diagram

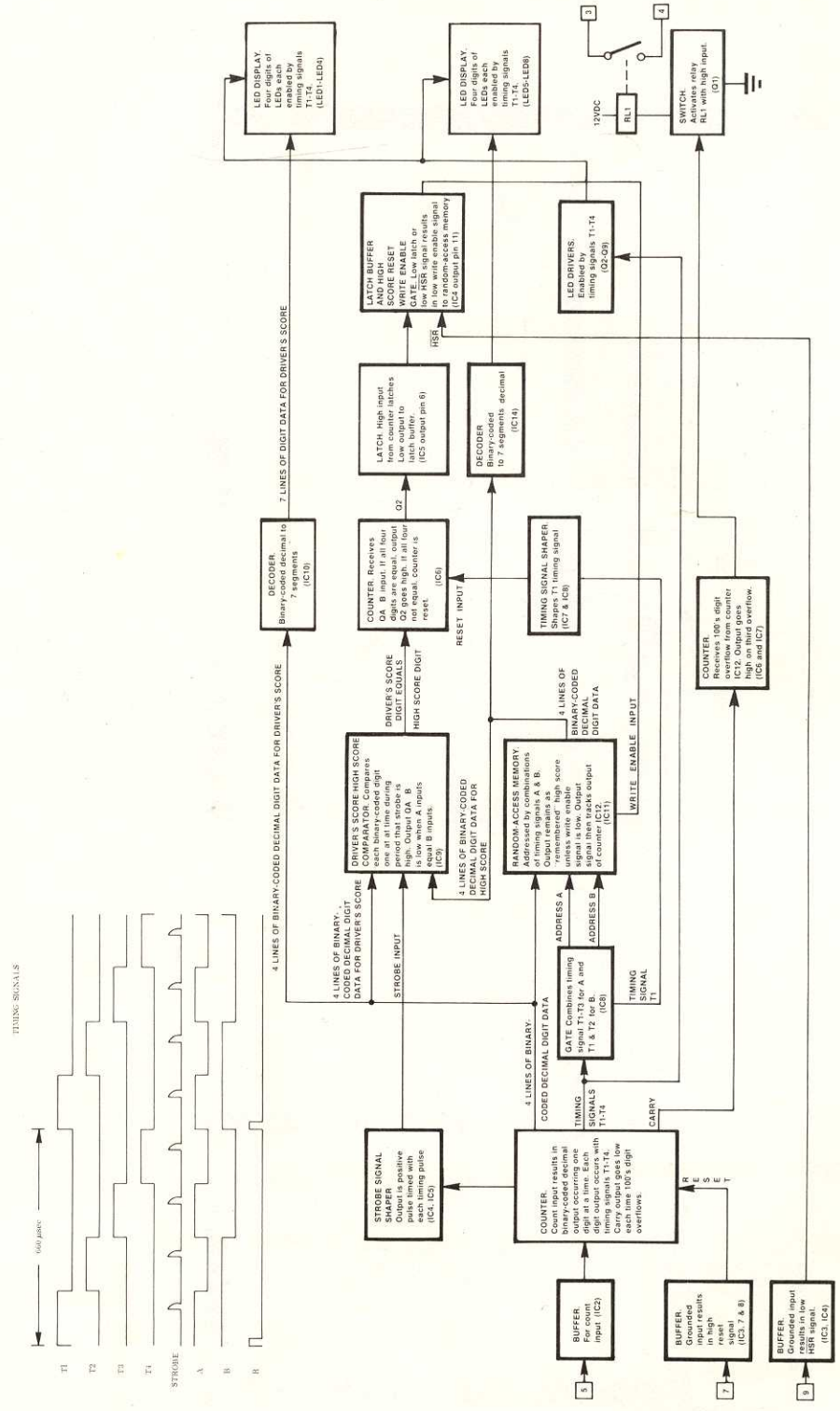


Figure 14 Score Block Diagram

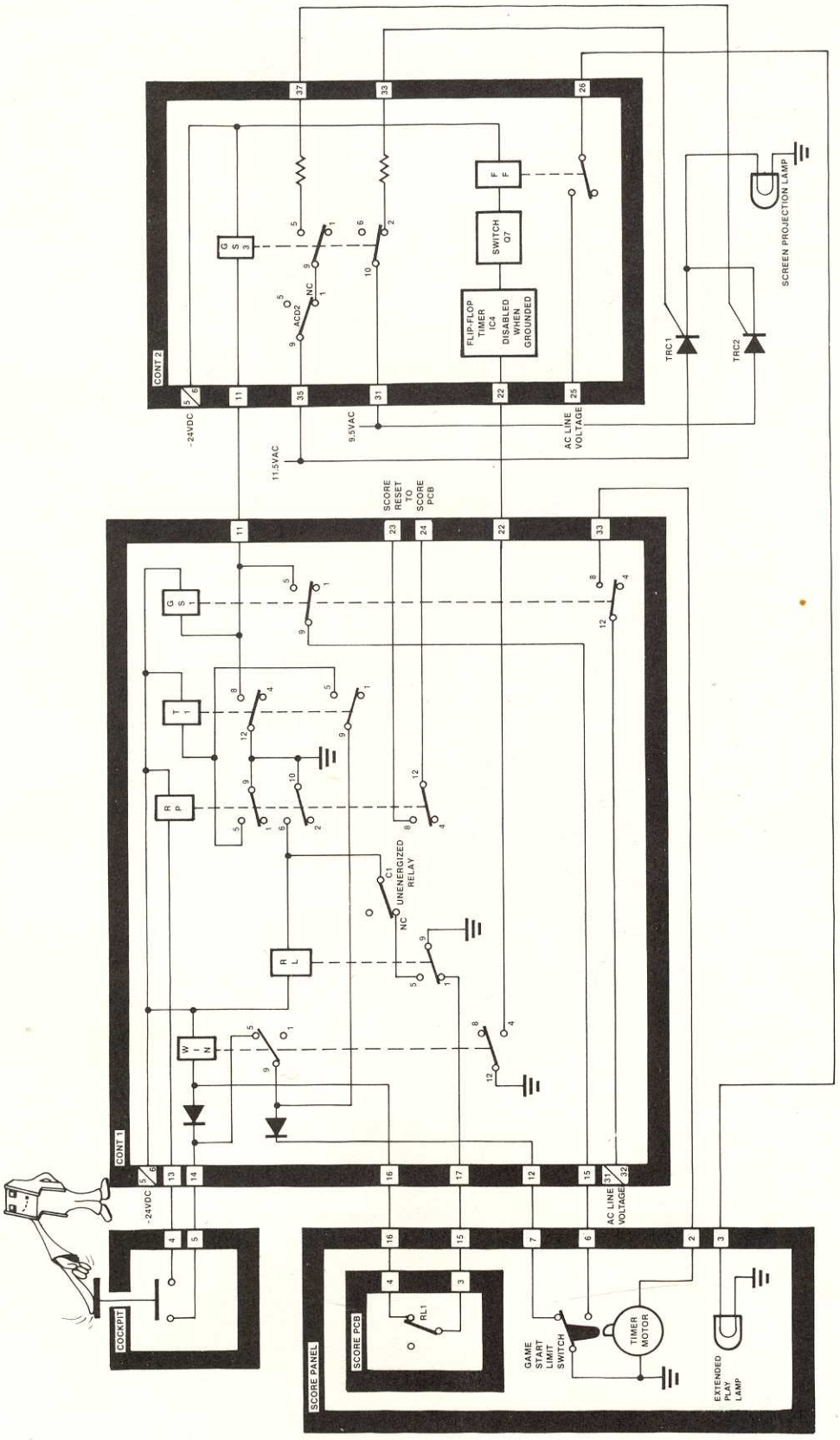
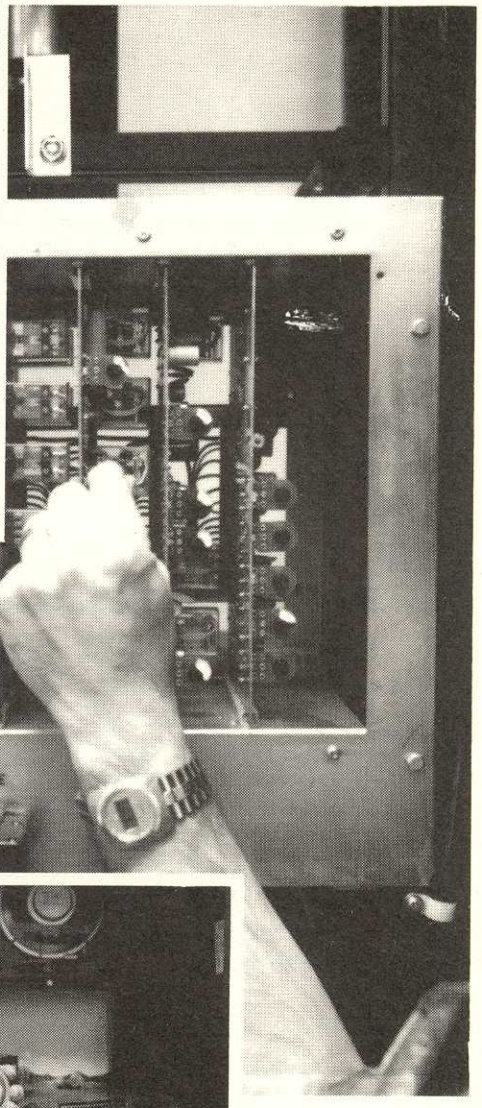


Figure 15 Extended Play Block Diagram



CALIBRATION

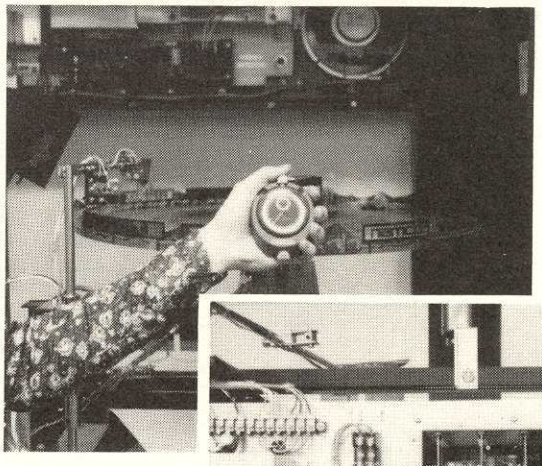
Calibration should be performed each time one of the following has been replaced:

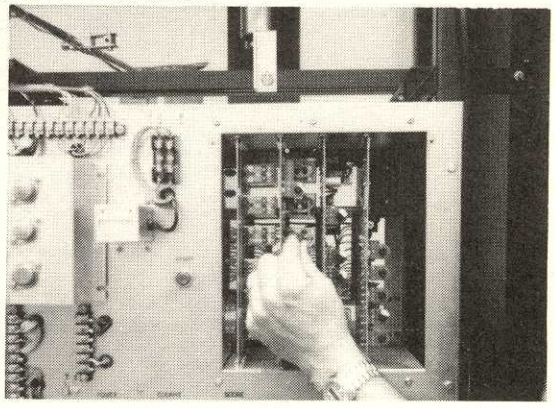
1. Competition car motor
2. Racetrack motor
3. Control 2 PCB
4. Drive PCB

The only special equipment necessary for this procedure is a stop watch and, if you desire (not absolutely necessary), a test panel. The calibration procedure requires two people without the test panel and only one person with the test panel. Figure 16 is a schematic diagram of the test panel.

Before you attempt the calibration, perform the following procedure:

1. Remove CONT 1 PCB and set coin switch to 100 (1 coin) position. Reinstall CONT 1 PCB.
2. Measure AC line voltage, then set Voltage Selector at setting nearest to your line voltage (90, 100, 110, or 120 volts).
3. Measure AC voltage on screen projection lamp for 9.6 ± 0.2 VAC.



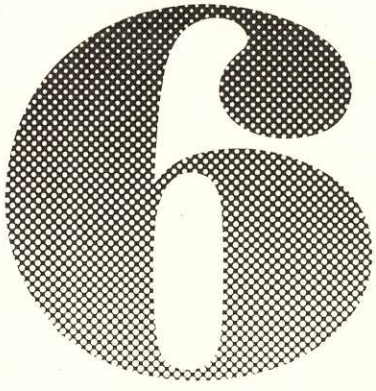


Score calibration

Perform the calibration procedure as follows;

1. Start F-1 game and stop watch simultaneously. Score panel will begin to increment 3.5 to 4.5 seconds (nominal 4 seconds) after game has started. This is adjustable by rotating VR1 TIMER on CONT 2 PCB.
2. Set shifter to LOW and accelerator to full acceleration. Start F-1 game. Score panel will increment to a score of 2800 to 3200 (nominal 3000) points during full game time. This is adjustable by rotating VR3 LOW on CONT 2 PCB.

   NOTE: Steps 1 and 2 are both adjusted by VR2 on DRIVE PCB. You may have to play with the two speed adjustments to get step 2 within reason.



3. Set shifter to LOW and accelerator to full acceleration. Start F-1 game. Soon after starting F-1, set shifter to HIGH and leave accelerator at full acceleration. Score panel will increment to a score of 7700 to 8300 (nominal 8000) points during full game time. This is adjustable by rotating VR5 HIGH on CONT 2 PCB.

Main Car Calibration

1. Set shifter to LOW and accelerator to IDLE. Start F-1 game. After a few rotations, check that the time for one revolution of the racetrack is 6.5 to 7.5 seconds (7 nominal). This is adjustable by rotating VR2 COURSE SPEED on DRIVE PCB.
2. Set shifter to LOW and accelerator to full acceleration. Start F-1 game. Soon after starting F-1, set shifter to HIGH and leave acceleration at full acceleration. Wait 30 seconds, then check that time for one revolution of the racetrack is approximately 2.4 seconds.

Competition Cars Calibration

NOTE: The following adjustments interact with VR8 TURNPOINT on DRIVE PCB. If adjustments of Steps 2 and 3 below are not possible, adjust VR8 TURNPOINT until all of the following steps are within reason.

1. Set shifter to LOW and accelerator to partial acceleration. Simultaneously start F-1 and stop watch. Competition cars will begin moving after approximately 3.9 seconds.
2. Check time that one of the competition cars takes to advance (in forward direction) one revolution. Time will be 40 to 44 seconds (nominal 42). This is adjustable by rotating VR4 FORWARD on DRIVE PCB.
3. Set shifter to LOW and accelerator to full acceleration. Start F-1 game. Check time that one of the competition cars takes to advance (in backward direction) one revolution. Time will be 10.0 to 10.6 seconds (nominal 10.3). This is adjustable by rotating VR5 BACKWARD on DRIVE PCB.
4. Set shifter to LOW and accelerator to full acceleration. Simultaneously start F-1 game and stop watch. Immediately after game is started, set shifter to HIGH. Competition cars will begin moving backwards after approximately 3.1 seconds.

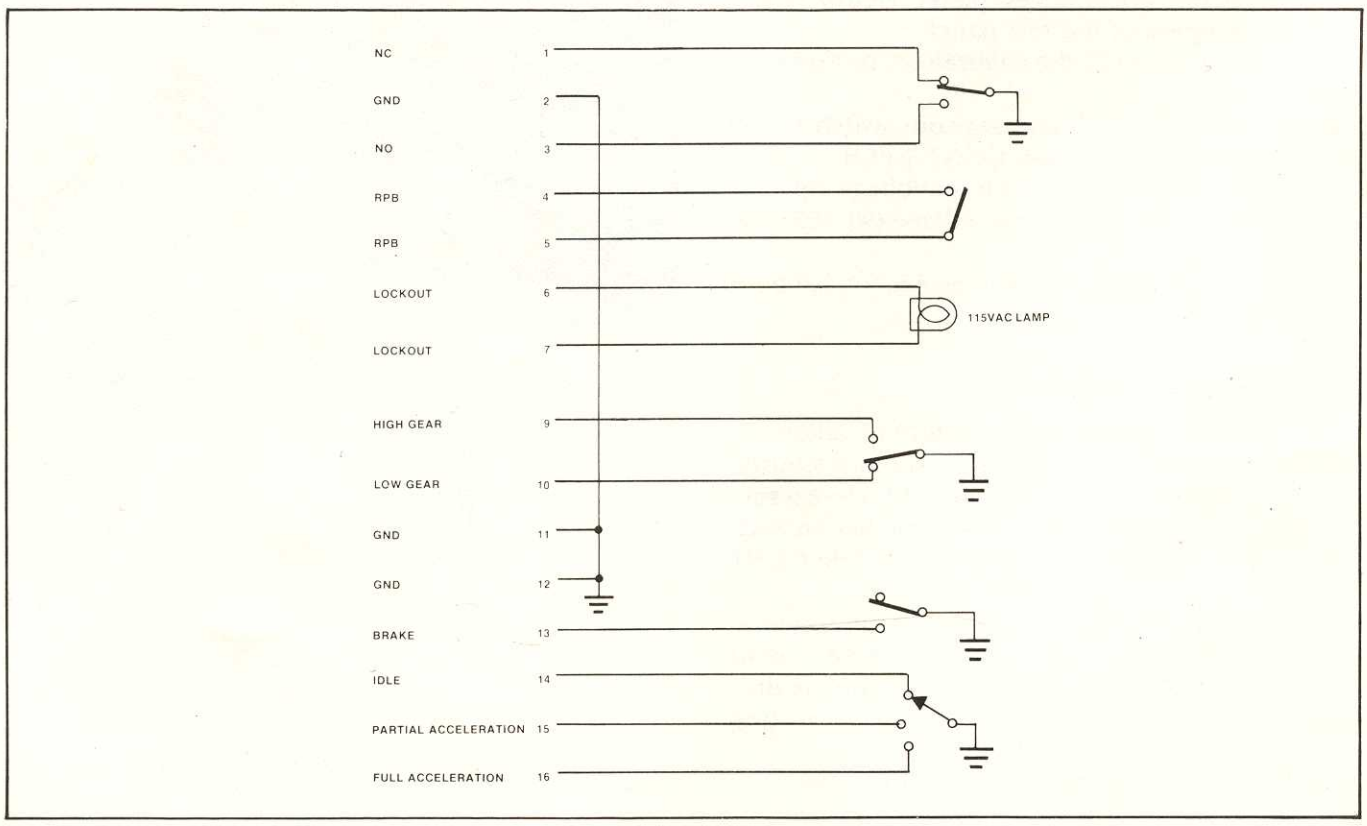
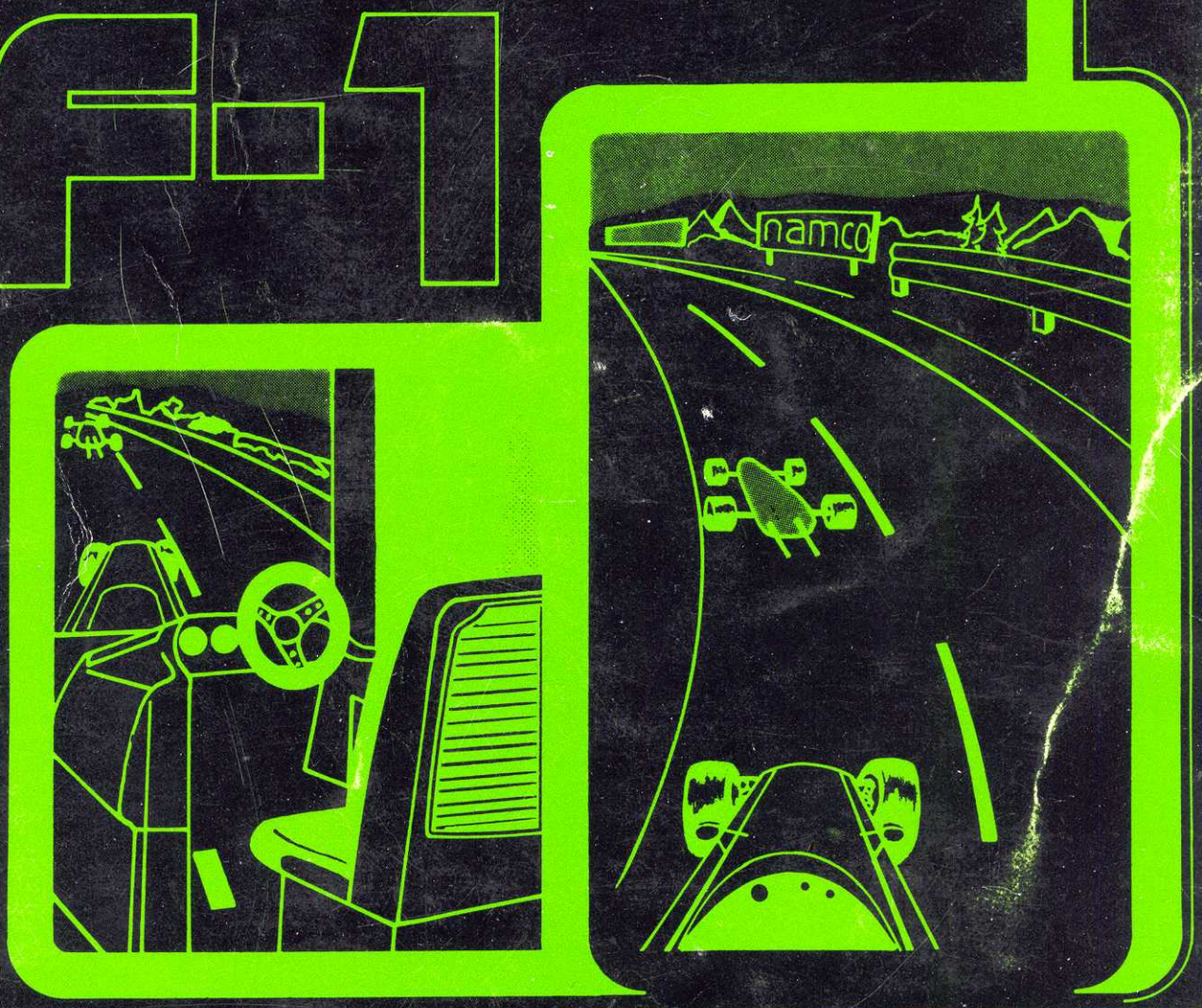


Figure 16 Cockpit Simulator Test Panel Schematic

F-1



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