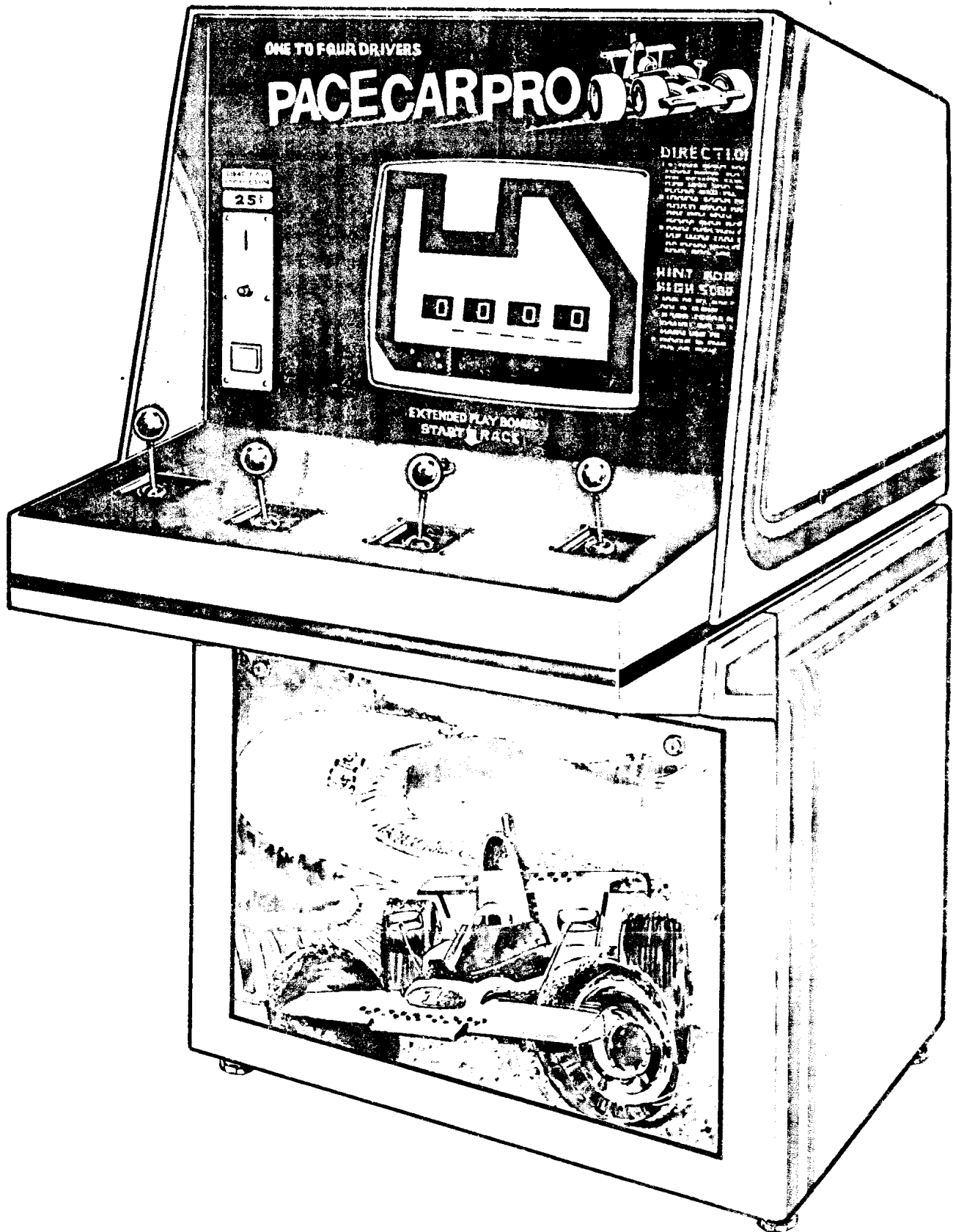


INSTRUCTION MANUAL



ELECTRA GAMES, INC.
2570 United Lane
Elk Grove Village, Illinois 60007

INTRODUCTION

"Pace Car Pro" is the first racing game in which four players can share in the excitement of a simulated high speed race.

The game has been designed to provide the same excitement for one, two, three, or four players, since a "robot" pace car provides built-in competition. To add to the excitement, there are realistic motor sounds (one for each car), crash sounds, an infield that actually causes the cars to "slow" down, and a "joy-stick" control for each car that controls speed, direction, and braking.

When set for single coin per player pricing, Pace Car Pro has the potential to increase income. It is the first game with the capability of taking in one dollar per play.

Each "Pace Car Pro" game undergoes hours of testing before it is judged acceptable for shipment. Thorough component testing involving thermal cycling, final inspection and testing - 24 hour operative testing of individual electronic assemblies and the color television, and finally a 24 hour test for the complete game. Every game must pass all tests before it can be shipped.

The game has been designed with ease of servicing in mind. All electronic p.c. modules and the color television are accessible by removing the cabinet top. The entire game electronics is contained on two plug-in logic printed circuit boards, a plug-in power supply board, and a color adjust board.

Despite all testing and precautions taken, malfunctions sometimes occur. Refer to the trouble-shooting guide to isolate the problem, and contact the distributor from whom the game was purchased for repair or replacement instructions. "Do not attempt to perform repairs on any in-warranty printed electronics boards, as the warranty will be voided."

WARRANTY

Except as hereinafter stated, Electra Games, Inc., warrants the color television and the modular electronic printed circuit boards used in "Pace Car Pro" to be free from defects in material or workmanship under normal use. Our obligation under this warranty is limited to making good at our factory any parts thereof which shall within:

90 days - color television

1 year - modular electronic printed circuit boards

after delivery of such product be returned to us, and which our examination shall disclose to our satisfaction to have been thus defective will be exchanged or repaired without charge to the owner; however, transportation costs incidental to replacement or exchange of such parts shall be borne by the owner.

This warranty does not extend (1) to any of our products which have been subject to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, (2) to units which have been repaired or altered by anyone other than us, (3) to cases where the manufacturer's date code or the serial number of the product has been removed, defaced, or changed.

This warranty is in lieu of all warranties expressed or implied, and no representative or person is authorized to assume for us any other liability in connection with the sales of our products.

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Elk Grove Village, Illinois 60007

CABINET ACCESS INFORMATION:

The "Pace Car Pro" cabinet is constructed of solid core plywood and consists of three basic parts: the Base, Top, and Control Panel.

- 1) Access into the Base is thru the Bottom Access Door; the keys to this door are located in the Instruction Manual envelope. Access into the Base is necessary to reach the Cash Box, Coin Chute, Power Cord, or to remove the Control Panel.
- 2) Removal of the Top allows access to all of the Electronics Modules, Coin Equipment, and the Color Television. The keys to the Top are also located in the Instruction Manual envelope.
- 3) Removal of the Control Panel is only necessary for access to the "Joysticks" or for additional door opening clearance. For Control Panel removal instructions, see section entitled "Door Opening Clearance".

TOP REMOVAL:

Locate the two keys for the cabinet top (in Instruction Manual envelope), and unlock top. (Top is unlocked with both keys in horizontal position.)

REFER TO FIGURE 1 FOR THE FOLLOWING:

- . Grip Cabinet top at lower front edges and lift up several inches (this will disengage the "U" channel which locks the Front Panel in position.)
- . Push the Top back several inches, until it clears the Front Panel, and then set it down, so that Top is again resting on Cabinet.
- . You should then move to rear of Cabinet and pull Cabinet Top back while holding it securely.

Note: When mounting Cabinet Top, the reverse procedure should be followed. The two bolts at lower rear of Top assembly must be aligned with the mating brackets at the rear of Base when mounting Top. (Refer to Figure 1 - C.)

INSPECTION AND PRELIMINARY SET-UP:

With the Top removed, a thorough inspection for shipping damage should be made.

Inspect complete Cabinet (Base, Control Panel, and Top) for obvious damage. If any damage is discovered, contact the carrier immediately. Then contact the distributor from whom the game was purchased for repair or replacement instructions.

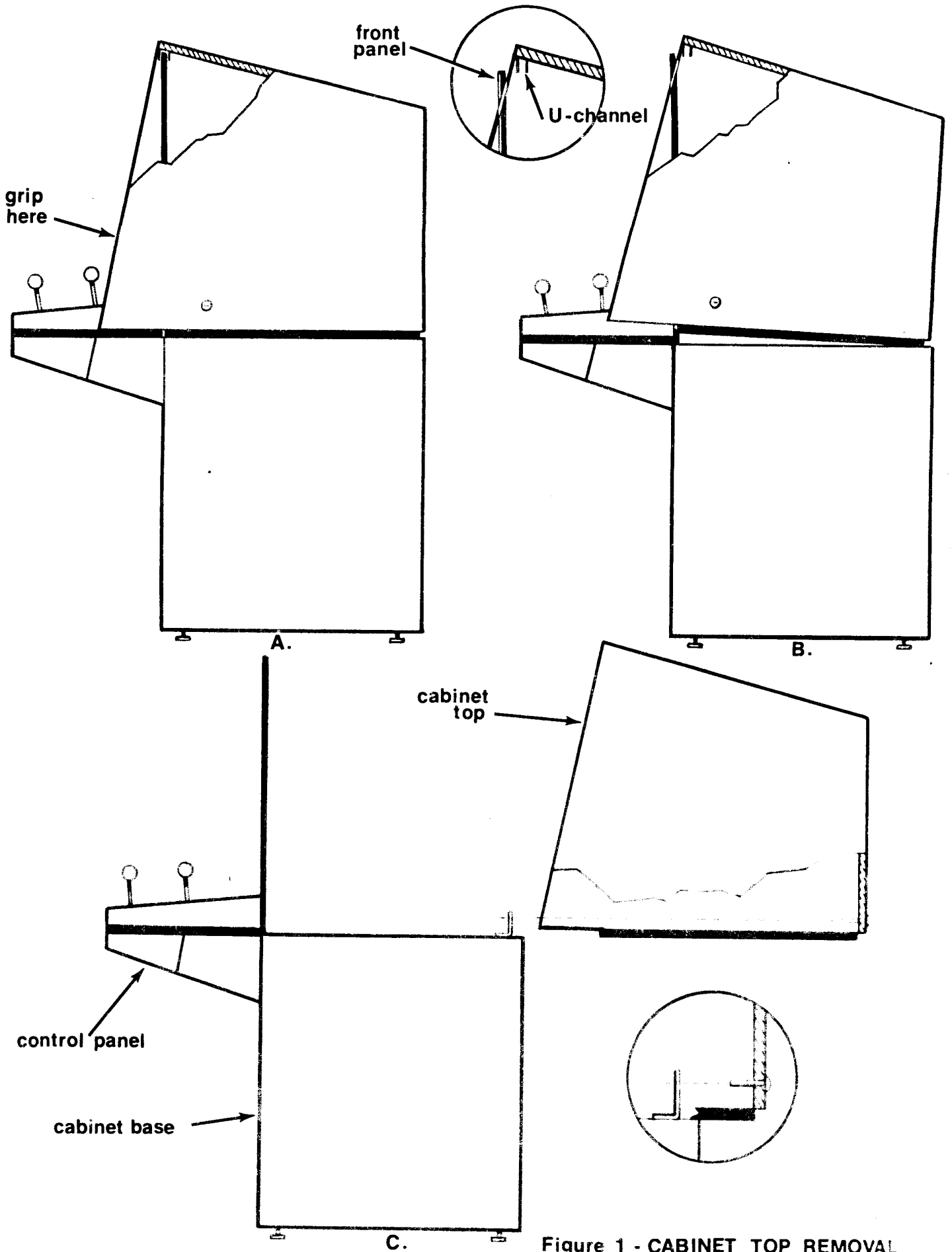


Figure 1 - CABINET TOP REMOVAL

INSPECTION AND PRELIMINARY SET-UP - CONT'D.:

Inspect the Color Television for any obvious damage, then inspect the power supply unit (located behind the television). The power supply P. C. module should be connected and securely in position. (Refer to Figure 2.)

Inspect the Logic Module Chassis. Remove the Chassis Cover, and check that both Logic Boards (EG1000-A and EG1000-D) are securely in position, and connected into their respective edge connectors. (Refer to Figures 2 and 3.)

Check connections to the Color Adjust P. C. board, mounted on the Logic Module Chassis. (Refer to Figure 2.)

Check the Coin Mechanism to see that it is properly mounted. Insert several old and new coins, into the Coin Mechanism. No genuine coins should be rejected. Operate rejector mechanism and check for any "binding".

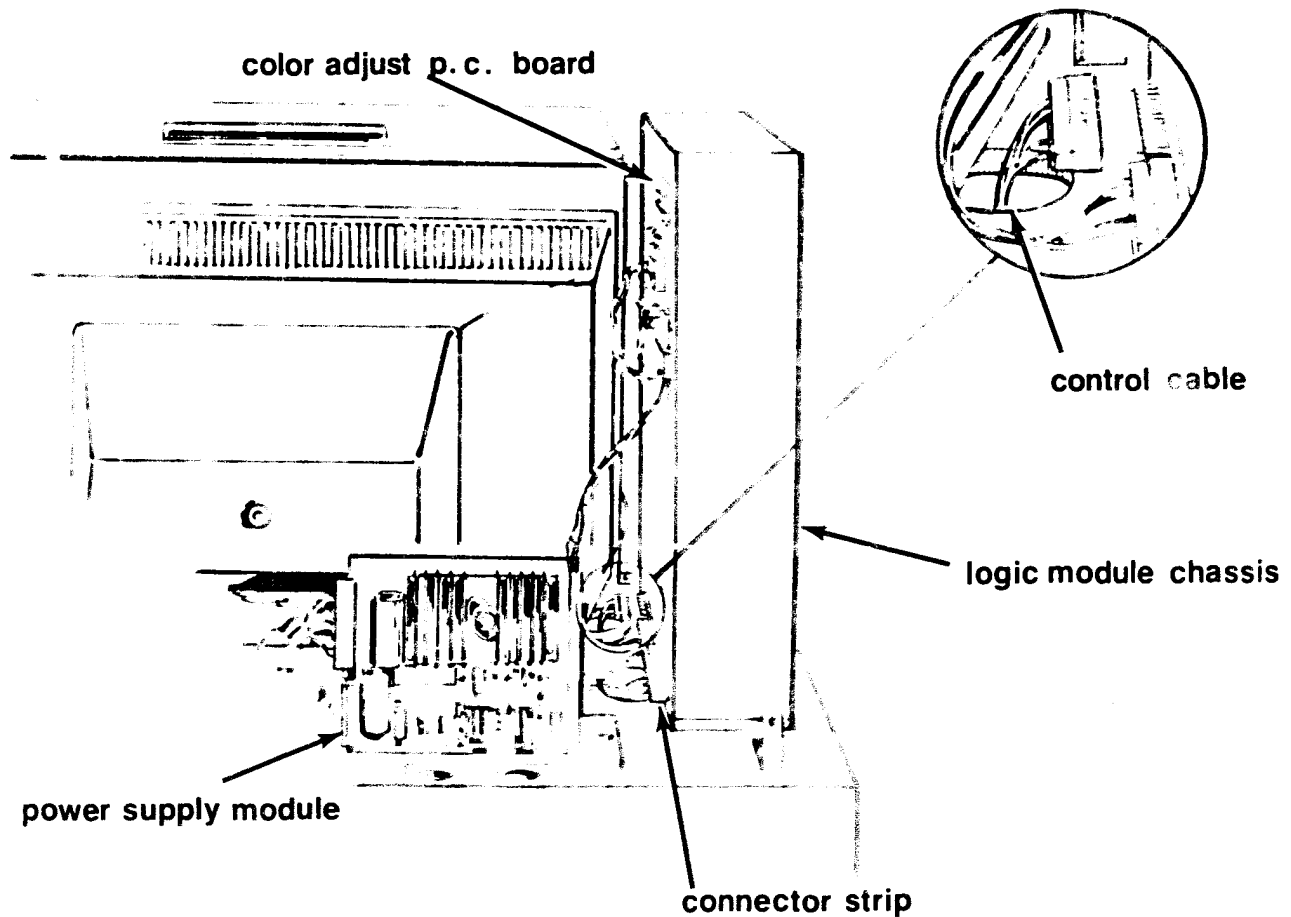


Figure 2

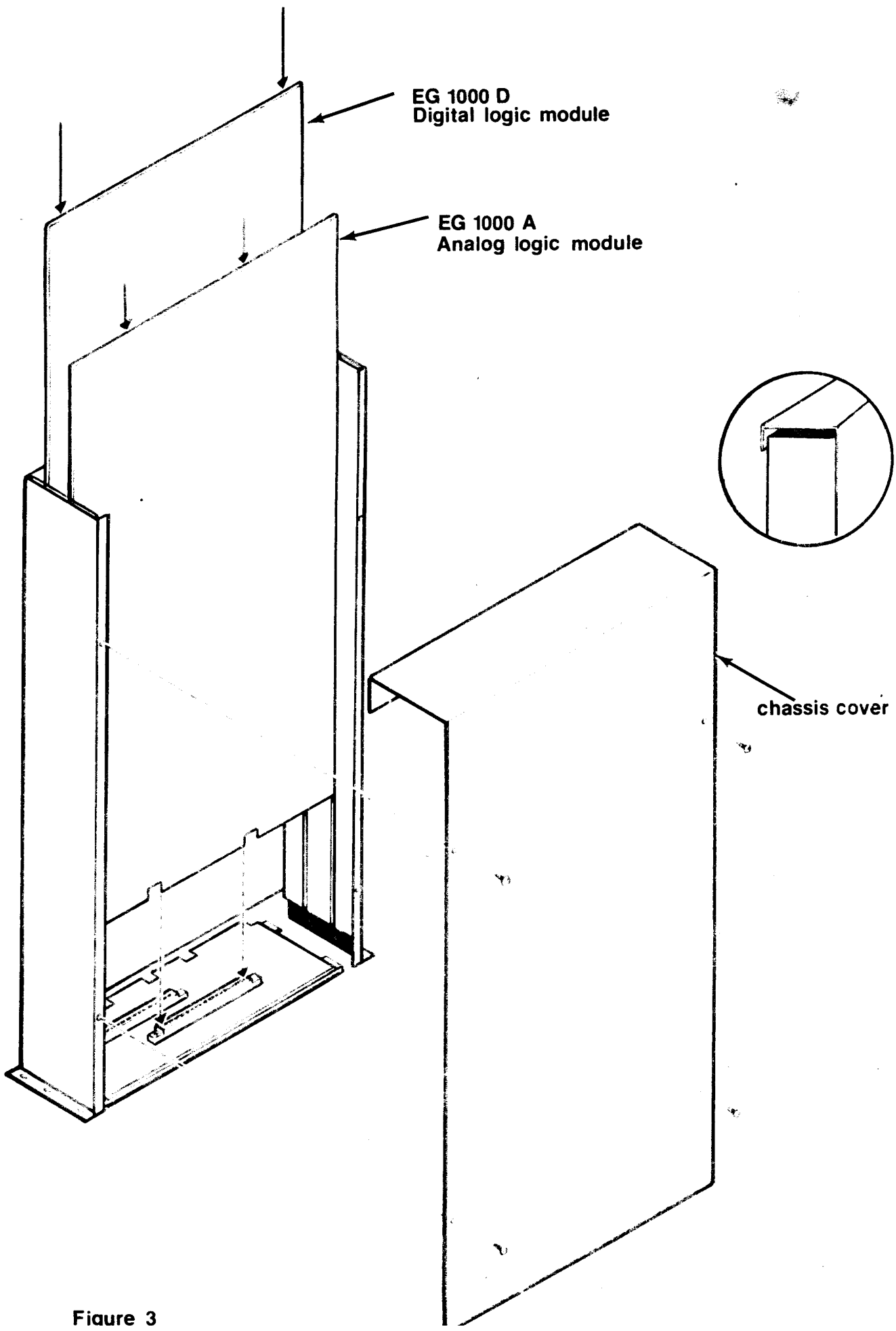


Figure 3

DISASSEMBLING SHIPPING PALLET:

The keys to the Bottom Access Door are located in the Instruction Manual envelope. Locate the keys and remove the Access Door.

Unbolt the game from the Shipping Pallet by removing four 3/8" bolts from inside Base of Cabinet - at bottom.

Install the four Adjustable Legs (located in Cash Box) into threaded "T" nuts in Cabinet Base. (See Figure 4.)

DOOR OPENING CLEARANCE:

Clearance dimensions of "Pace Car Pro" completely assembled are:

33" wide X 38 1/4" deep X 57" high

Note:

If game will not clear door opening, the Control Panel should be disassembled as follows:

Disconnect Control Cable (refer to Figures 2 and 4).
Control Cable is connected to the Interconnect Printed
Circuit Board.

While holding Control Panel, remove two 3/8" bolts which
secure the Control Panel to the Cabinet Base.

Clearance dimensions of the game with Control Panel removed are:

33" wide X 30 1/4" deep X 57" high

Note:

If additional clearance is required, remove Cabinet Top. (Refer
to "Top Removal" and Figure 1.)

Replace Control Panel by reversing procedure used to remove Panel.
(Refer to Figures 2 and 4.) Be sure to re-connect Control Cable.

SETTING UP THE GAME:

Game must be leveled by adjusting the four legs previously in the cabinet base.

Note:

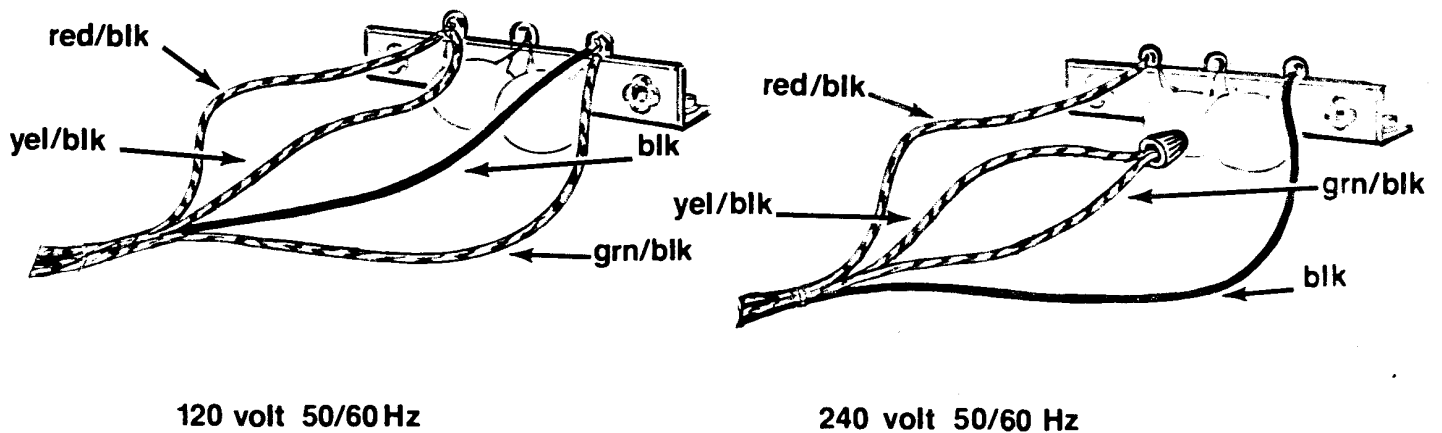
If Game is to be operated on a carpeted floor, adjust legs to a
height sufficient to allow air circulation into the vent holes in
the bottom of the Base.

SETTING UP THE GAME - CONT'D.:

Push the Power Cord Plug, located inside the Game "Base" thru the hole in the back of the base. (Strain relief on Power Cord restricts cord from being pulled entirely out of Base.)

Note:

Pace Car Pro is shipped set to operated on 120 volt 50/60 Herz Power. To set-up for 240 volt 50/60 herz:



Plug the Power Cord into the proper receptacle (120 volt - unless modified as directed), and turn on Power Switch located at the lower rear of the base. After approximately a 15 second warm-up period, the display shown in Figure 5 will appear on the cathode ray tube.

GAME OPERATION AND SEQUENCE:

Definitions:

- Standby Condition - Game power on, no Credits established
- Credit Condition - One or more Credits established (one Credit = one Quarter deposited.)
- Play Condition - Start Button activated, Game in progress

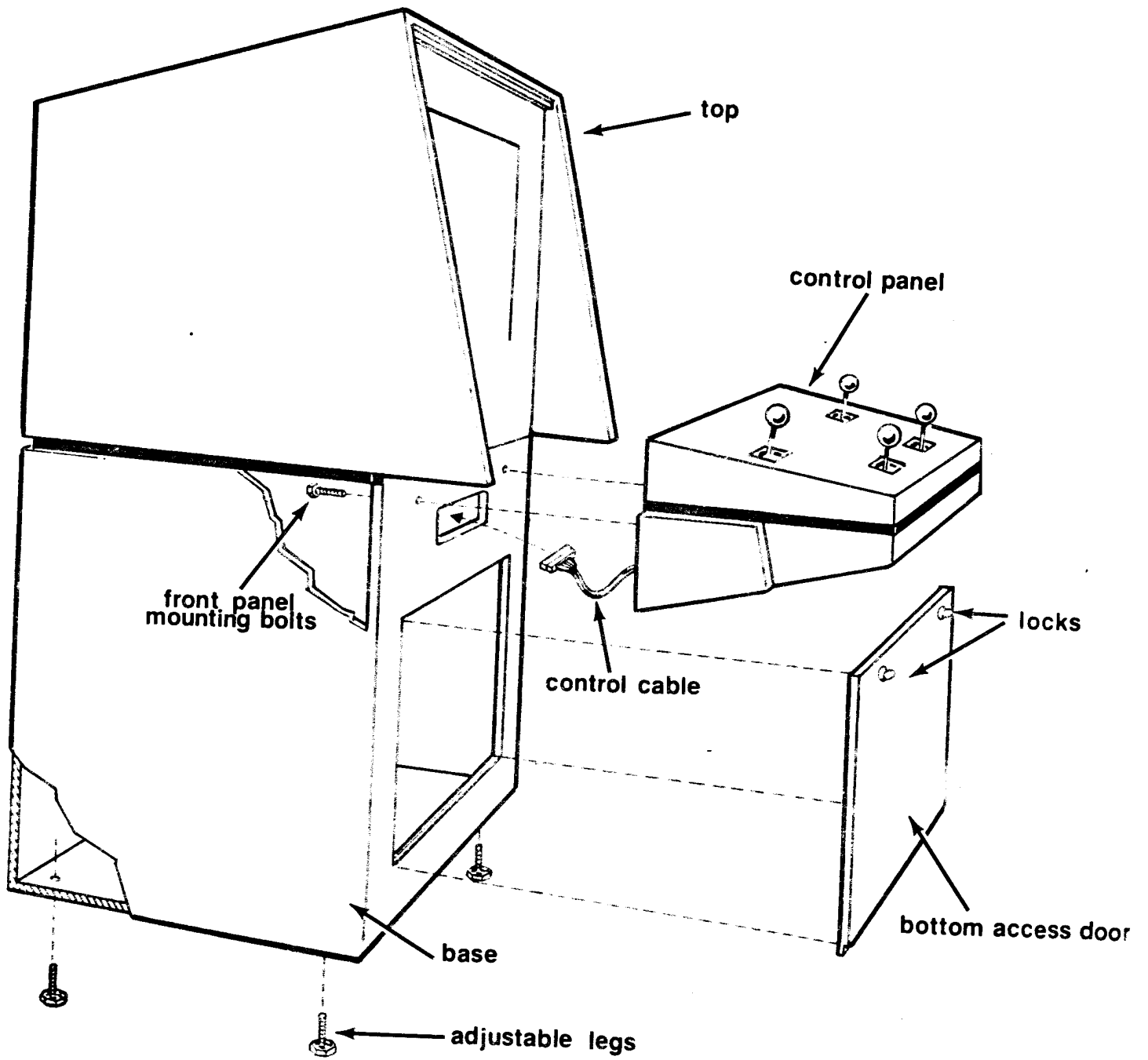


Figure 4

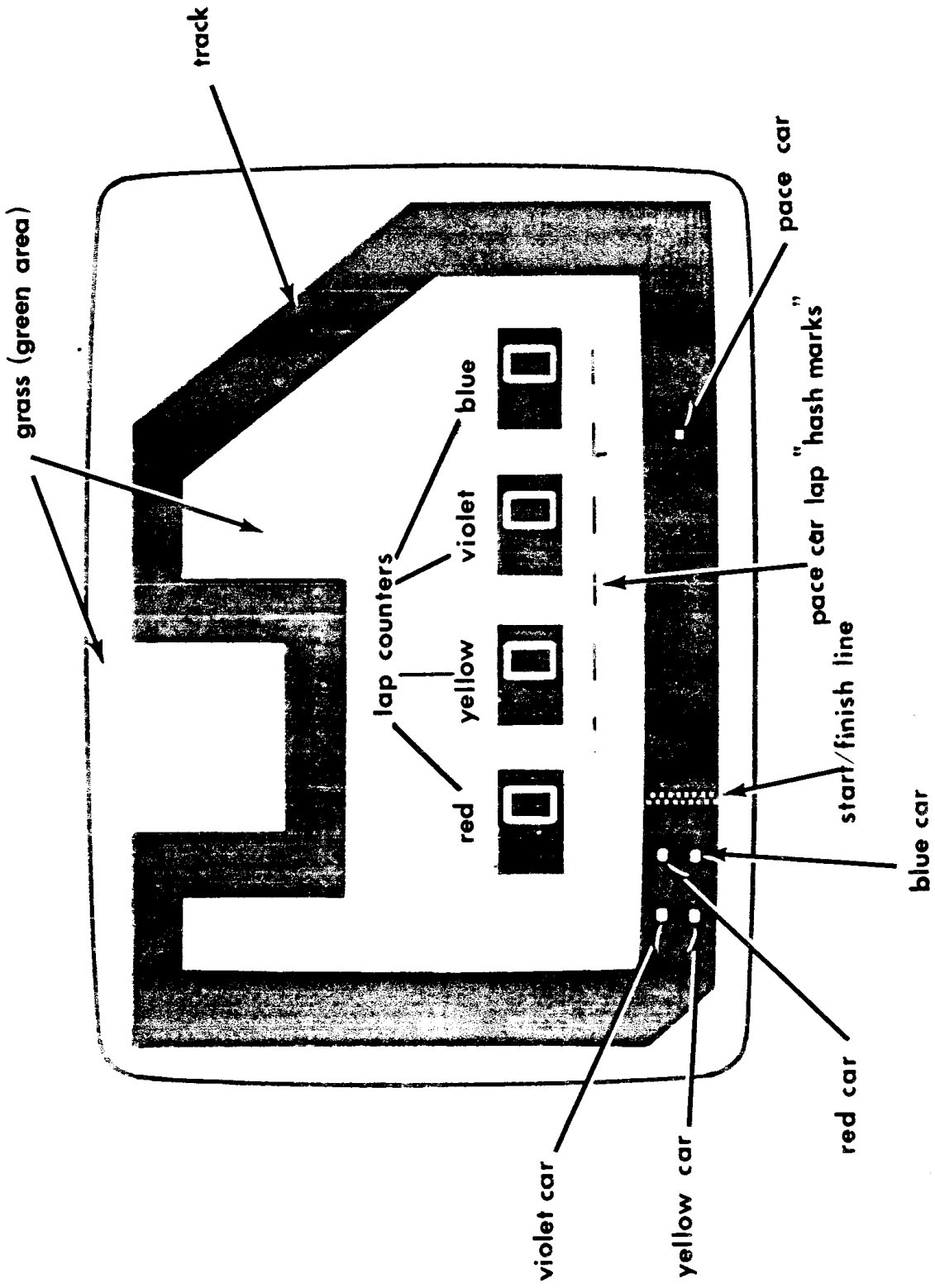


Figure 5

GENERAL:

The Pace Car (green blip) serves a two-fold purpose:

- 1) It performs the function of a "built-in" opponent making it possible for one person to play.
- 2) It operates as a Game Timer which determines the duration of each play (race).

The four opponent cars are the Red, Yellow, Violet, and Blue blips. These cars are controlled by the four color keyed "Joysticks" on the front panel. Each "Joystick" controls the Speed, Direction, and Braking of its respective car. The "Joystick" is mechanically biased to return to center position.

The four Lap Counters (color keyed to each car) show the progress of each car by advancing - one count - for each completed lap. One lap is completed when the car is moved counter-clockwise from the starting line, completely around the track and back to the starting line, (in Play Condition).

The Pace Car laps are indicated by "Hash" Marks displayed just below the four Lap Counters. The total pace car laps to be completed are shown at the beginning of the race, and then one is subtracted for each lap completed by the Pace Car until the race ends.

STANDBY CONDITION:

The Pace Car is moving about the track in a counter-clockwise direction.

The four Opponent Cars (Red, Yellow, Violet, and Blue) are displayed just to the left of the Starting Line.

The four Lap Counters show the results of the previous race.

The Pace Car Lap Indicator is not operational at "Standby"; therefore no Pace Car Laps are displayed.

If the "Joysticks" are moved, the four Cars will show some movement within a limited area.

CREDIT CONDITION:

One Quarter deposited - -

The Pace Car is moving about the track and now a Motor Sound is heard as the Pace Car moves.

CREDIT CONDITION CONT'D.:

Only the Red Car is displayed just to the left of the Starting Line, and an idling sound is heard. The four Lap Counters are re-set to "Zero". The Pace Car Lap Indicator shows six (6) laps to be completed. The "Joystick" allows movement within a limited area, the stick is held to the right (direction of race) the Motor Sound "Revs" to a higher pitch.

PLAY CONDITION:

The Start Button is depressed - -

The Pace Car is stopped and is now displayed just behind the Red Car at the Starting Line, (which is now flashing on-and-off). The Lap Counters still read "Zero" and the Pace Car Lap Indicator shows six (6) laps to complete.

The Red "Joystick" is held to the right with the Motor Sound racing: the Line stops flashing and the race begins.

With the Red "Joystick" held to the right, the Red Car begins to move to the right, picking up speed as it heads for the turn. As the Red Car comes into the turn the "Joystick" must be moved upward. The Red Car now follows the Track upward. In the diagonal stretch of the Track, the "Joystick" must be moved up and to the left. This procedure is followed for each stretch of Track; i.e. the "Joystick" is moved in the direction that the Car is to be moved. When the Red Car crosses the Start/Finish Line for the first lap, the Red Lap Counter advances to "1", and one black "Hash" Mark is subtracted for the Pace Car. This action continues for six (6) laps.

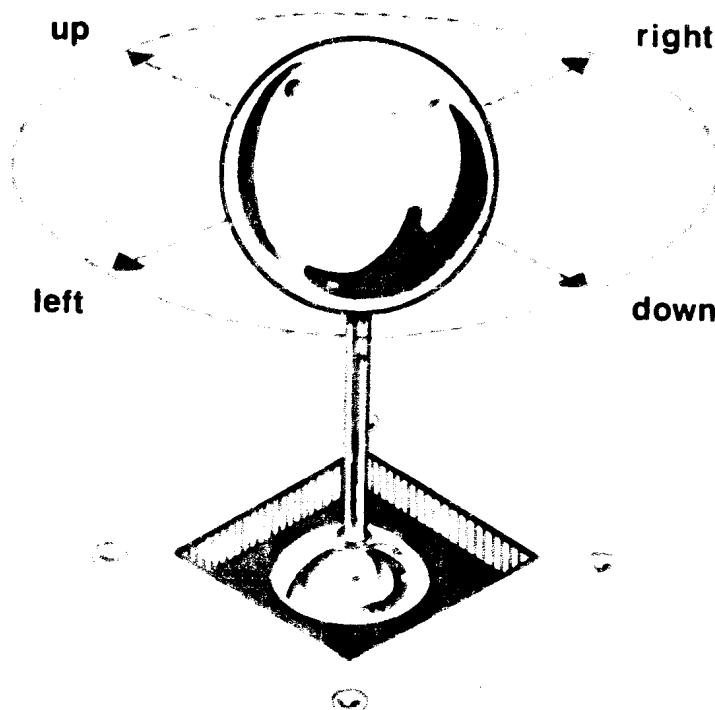


Figure 6

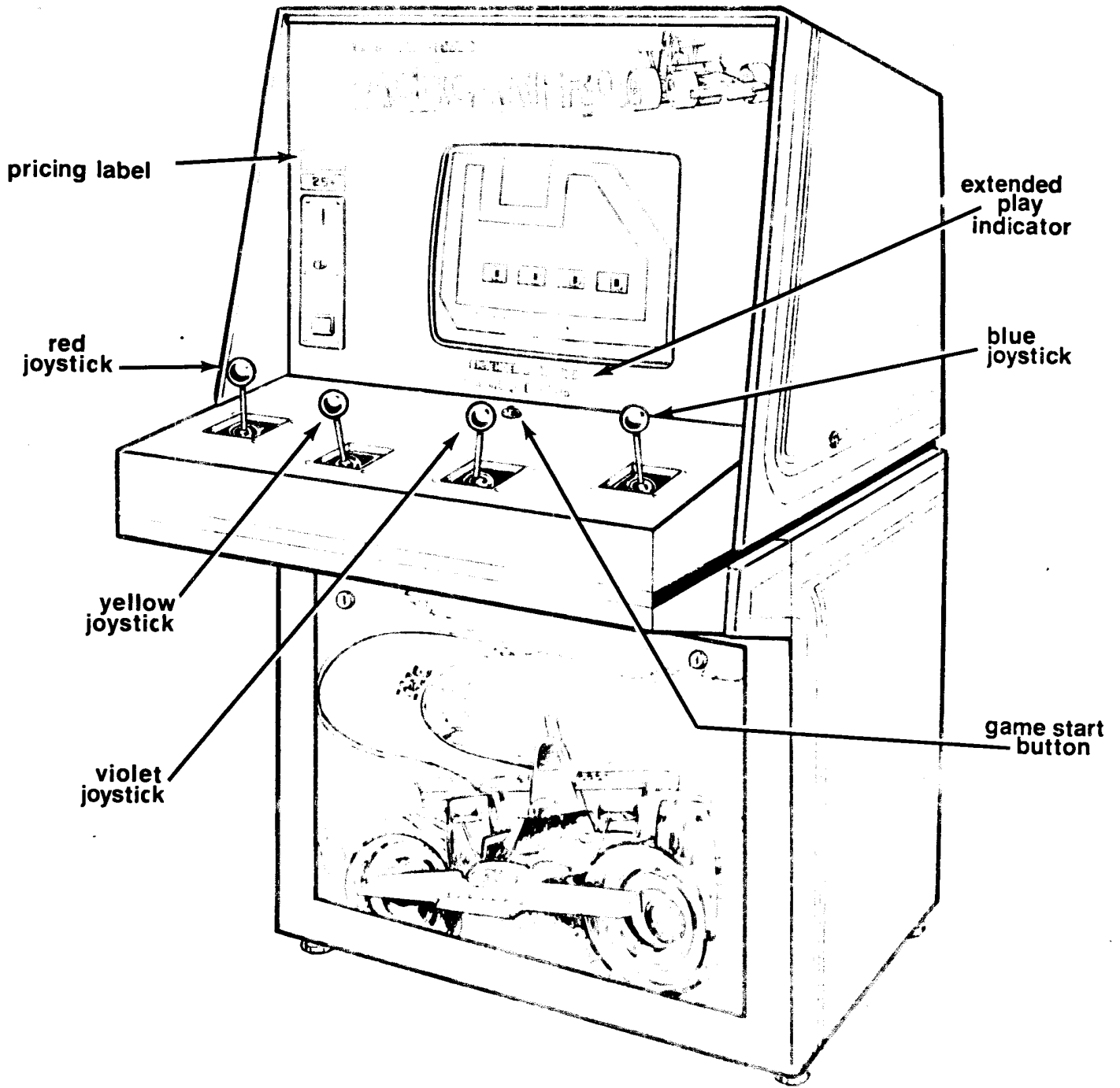


Figure 7

PLAY CONDITION CONT'D.:

At the end of the sixth lap, if the Pace Car Finishes first, all action "Freezes" for several seconds with the Pace Car at the Finish Line; the Game is then Re-set to "Standby Condition".

If the Red Car reaches the Finish Line before the Pace Car, all action "Freezes" for several seconds, with the Red Car at the Finish Line; except in this instance, the Game is automatically transferred into Extended Play Mode; the action starts again and continues for approximately 15 seconds, at the end of which the game is Re-set to "Standby Condition".

During "Play Condition", as the Car is moved about the Track, if contact is made between the Car and the "Grass" (green area), the car is "Slowed Down" substantially. The car must be kept in the Black Track area to operate at "Maximum Speed".

When several Cars are played, if contact is made between Cars, a Crash Sound is activated and the Cars are "Bumped" Apart.

Each of the four Cars has its own Motor Sound, slightly different from the other three. The PaceCar Motor Sound is activated only when the Red Car races (Single Player Mode).

PRICING AND ADJUSTMENTS:

"Pace Car Pro" is shipped with the following factory settings:

- Pricing - One player per quarter
- Pace Car - Six laps and Minimum Speed (2 1/2 minute race)

PRICING:

The Game is shipped with a "Coin Mechanisms, Inc." - Single Coin Quarter Rejector. The Coin Mechanism can be replaced by a Nickle, Dime or Foreign Coin Mechanism.

There are Two Pricing Options: One Player per Coin, or Two Players per Coin.

The pricing switch on the EG1000-D digital logic board is shown set for "Two Players per Coin" (see Figure 8). By setting the Pricing Switch to the "One Player per Coin" position, Pricing is automatically changed.

Two Pricing Labels are supplied with the Game. One Player/Quarter and Two Players/Quarter. Tape the appropriate label in position behind the Front Panel. (See Figure 7.)

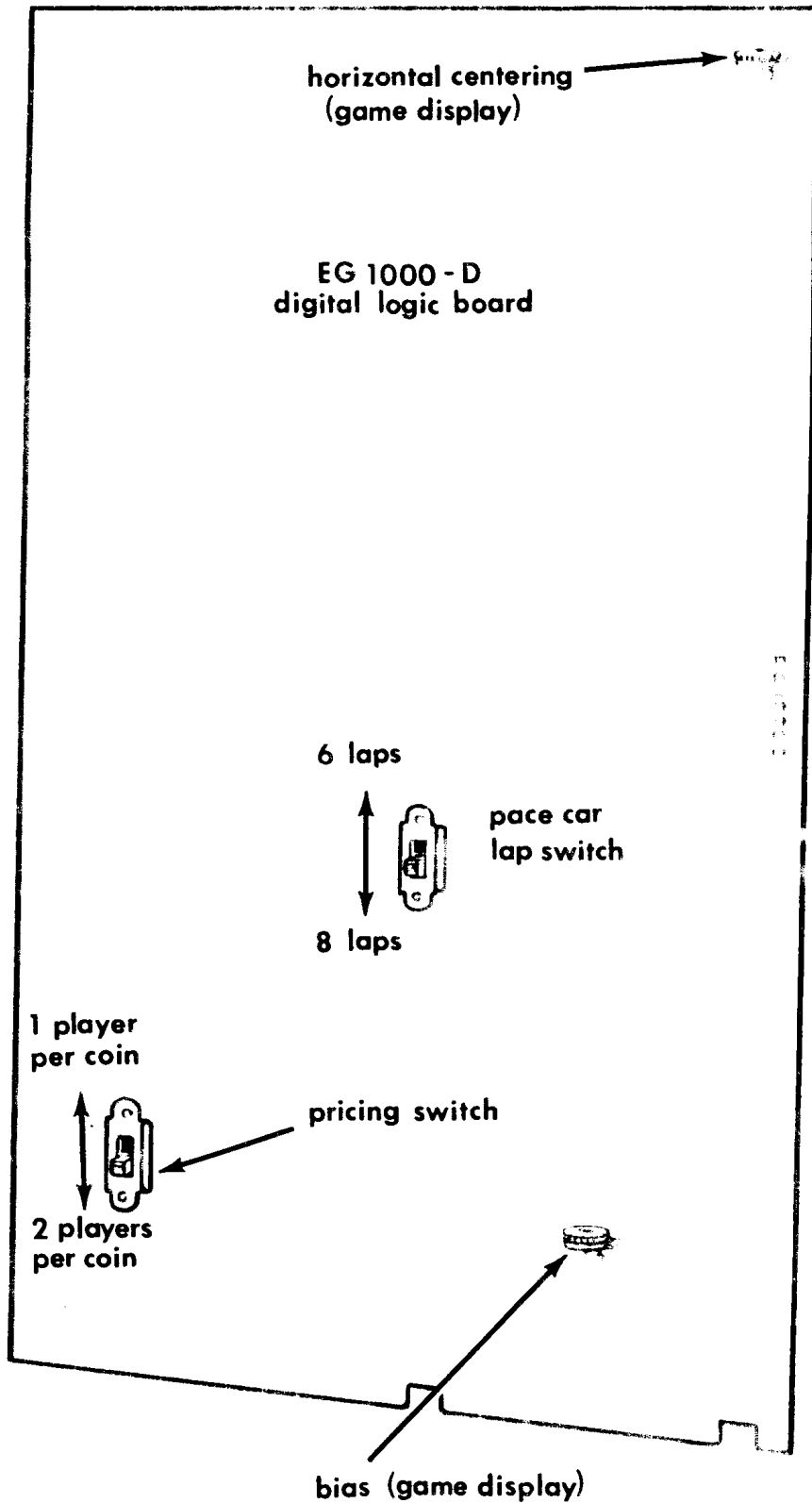


Figure 8

ADJUSTMENTS:

Pace Car laps - The Pace Car may be set-up to complete Six (6) or Eight (8) laps. The Game is shipped set for Six (6) laps. To set for Eight (8) laps, the Pace Car Lap Switch on the EG1000-D Digital Logic Board must be switched to the "Eight" lap position. (See Figure 8.)

Note:

Refer to Figure 9 for the following adjustments. Study carefully before making adjustments so as not to adjust the wrong control.

Pace Car Speed - The Pace Car Speed is adjustable so that the Game duration can be changed between 1 and 2 1/2 minutes. The Game is shipped set for 2 1/2 minutes. Control VR24 on the EG1000-A Analog Logic Board changes Pace Car Speed.

Sound Output - The Game has two Sound Output Controls:

VR21 - Controls the Output of all Sounds

VR22 - Controls the Output of the Pace Car Sound - only

The following adjustments should be changed only if necessary, since they are factory set and adjustment should not be required.

Horizontal Size of Cars -

- VR-13 - Red Car
- VR-14 - Yellow Car
- VR-15 - Violet Car
- VR-16 - Blue Car

(Adjust so that car width is slightly less than its height.)

Shape of Cars -

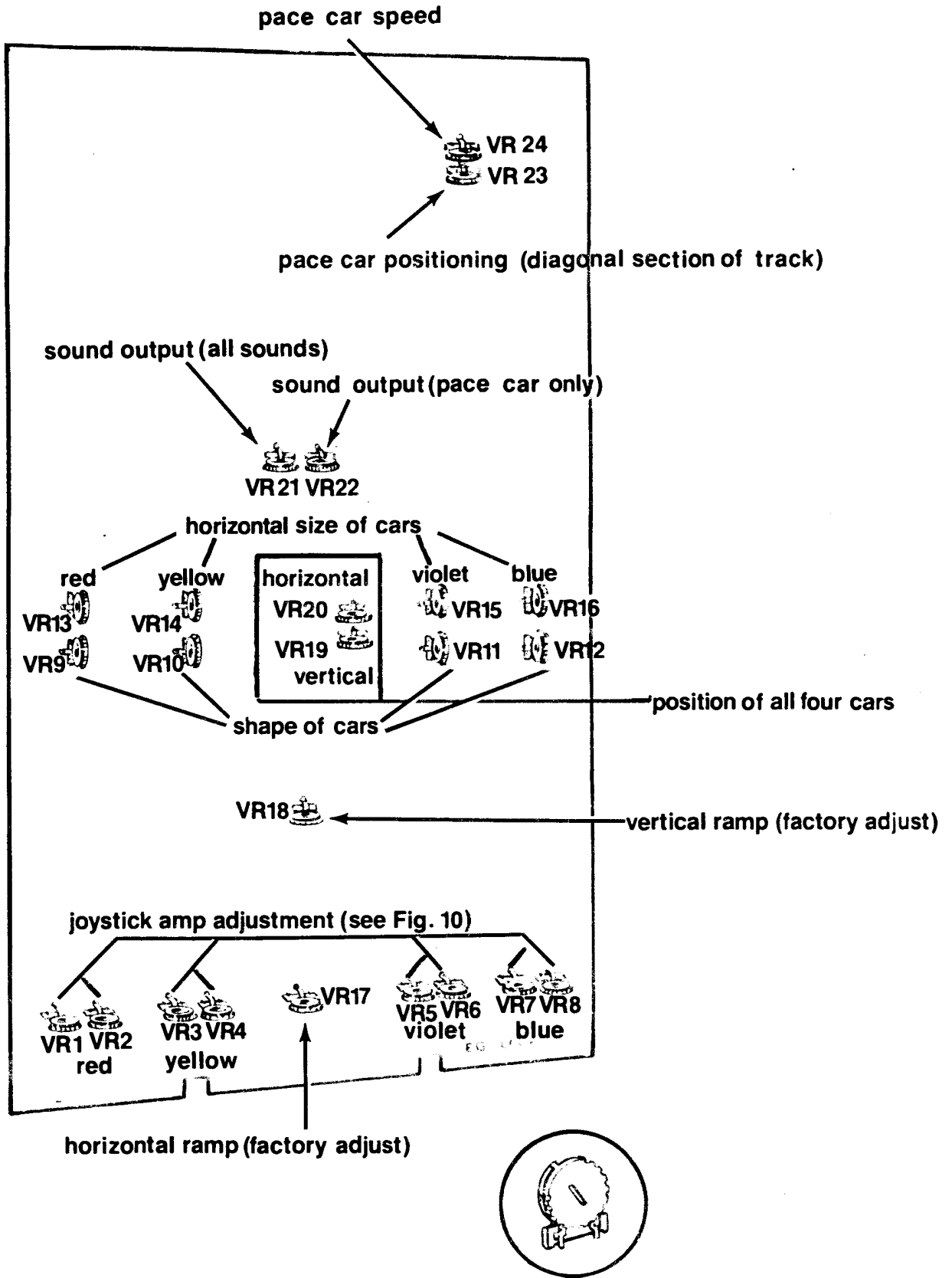
- VR-9 - Red Car
- VR-10 - Yellow Car
- VR-11 - Violet Car
- VR-12 - Blue Car

(Should be adjusted after horizontal size is set.)

Vertical Position of all Four Cars at "Standby" - VR-19

- To Adjust -
- 1) "Joysticks" must be in vertical "rest" position.
 - 2) "Joystick" amplifiers (all four) should be adjusted.

Adjust VR-19 so that all Four Cars are positioned in the center of the Track near the Starting Line.



EG 1000-A ANALOG LOGIC BOARD

Figure 9

Horizontal Position of all Four Cars at "Standby" - VR-20

- To Adjust -
- 1) "Joysticks" must be in the vertical rest position.
 - 2) "Joystick" amplifiers (all four) should be adjusted.

Adjust VR-20 so that the Two Cars closest to the "Checkered" Start Line are 1/2 inch from the line.

Face Car Positioning in the Diagonal Section of Track - VR-23 Adjust VR-23 so that Pace Car travels thru center of diagonal section of Track. (This setting may be affected by adjustment of Pace Car Speed VR-24.)

Joystick Amplifier Adjustment - Refer to Figure 10 for the following. The "Joystick" Amplifier Adjustment is factory set and normally require readjustment only when the the EG1000-A Analog Board is changed, or if any of the "Joysticks" are replaced. There are two controls for each car. The controls adjust the voltage at the output of the "Joystick" Amplifiers. The purpose of the adjustment is to minimize drift of each car in the vertical and horizontal direction when the "joystick" is in the upright "rest" position, and to standardize the speed of the cars. The adjustment is relatively simple, when using the "Joystick" Amp Adjustment Board, which is available from your distributor.

To Perform the adjustments:

- 1) All "Joysticks" must be in the upright "rest" position. "Snap" the "Joystick" to return it to center "rest" position. The "Joysticks" should not be moved while making these adjustments.
- 2) Game power should be "On" - Game in "Standby Condition."
- 3) Observing correct polarity, connect the Black and #1 Red clip leads to C173, 250 mfd capacitor as shown in Figure 10. All adjustments will be made with these leads connected.
- 4) Connect the #2 Red clip lead to the Positive (top) side of C4 (1 mfd capacitor). (See Figure 10.) Adjust VR-1 until the center LED indicator is illuminated.
- 5) Move #2 Red clip lead to Positive (top) side of C5 (1 mfd capacitor). Adjust VR-2 until the center LED indicator is illuminated.

The Red "Joystick" amp is now adjusted.

- 6) Move the #2 Red clip lead to Positive (top) side of C31 (1 mfd capacitor). Adjust VR-3 until center LED indicator is illuminated.
- 7) Repeat with C32 and VR-4 to finish adjustment for Yellow "Joystick" amp.
- 8) Repeat with C88 and VR-5, then C89 and VR-6 for Violet "Joystick" amp.
- 9) Repeat with C113 and VR-7, then C114 and VR-8 for Blue "Joystick" amp.

"Joystick" Amplifier Adjustment, Cont'd. -

This completes the "Joystick" Amplifier Adjustment.

Horizontal Ramp Adjustment - The horizontal ramp control (VR-17) adjusts the peak voltage of the horizontal ramp. This control is factory set and should not be readjusted since Game operation will be adversely affected. Refer to Service Manual for further information.

Vertical Ramp Adjustment - The vertical ramp control (VR-18) adjusts the peak voltage of the vertical ramp. This control is factory set and should not be readjusted, since Game operation will be adversely affected. Refer to Service Manual for further information.

Game Display Bias Control - This control is located on EG1000-D Digital Logic Board. (Refer to Figure 8.) Adjusts horizontal and vertical sync input to the TV input. Adjust for best picture.

Game Display Centering - This control is located on EG1000-D Digital Logic Board. (Refer to Figure 8.) Centers the picture on the TV horizontally.

Color Adjustments - The three adjustments on the color adjust p. c. module control the color intensity of the red, blue, and green guns of the color television CRT (Cathode Ray Tube). These adjustments are factory pre-set and should not normally require adjustment. When Adjustment is necessary, adjust each control for best color.

Game - TV Switch - The "Game-TV" Switch (See Figure 12) which is mounted on the left side of the color television, when facing the unit, makes it possible to display standard TV programming in TV Position of the switch. This feature is helpful when trouble-shooting the system. It also simplifies servicing, since the television may be serviced as a standard receiver.

Power Supply Adjustments - The Power Supply Module has two adjustments - 5 vdc control and 20 vdc control. These adjustments are factory pre-set and should not be changed, since Game operation will be adversely affected. Refer to Service Manual for further information.

Color Television - The color television used in "Pace Car Pro" is a Sylvania Model CX4161W all solid state unit. Other than Contrast and Brightness (located at top rear of set), adjustments to the TV in "Game Mode" are ineffective. In TV Mode, the TV operates normally and all TV controls are operative.

EG 1000-A Analog Logic Board

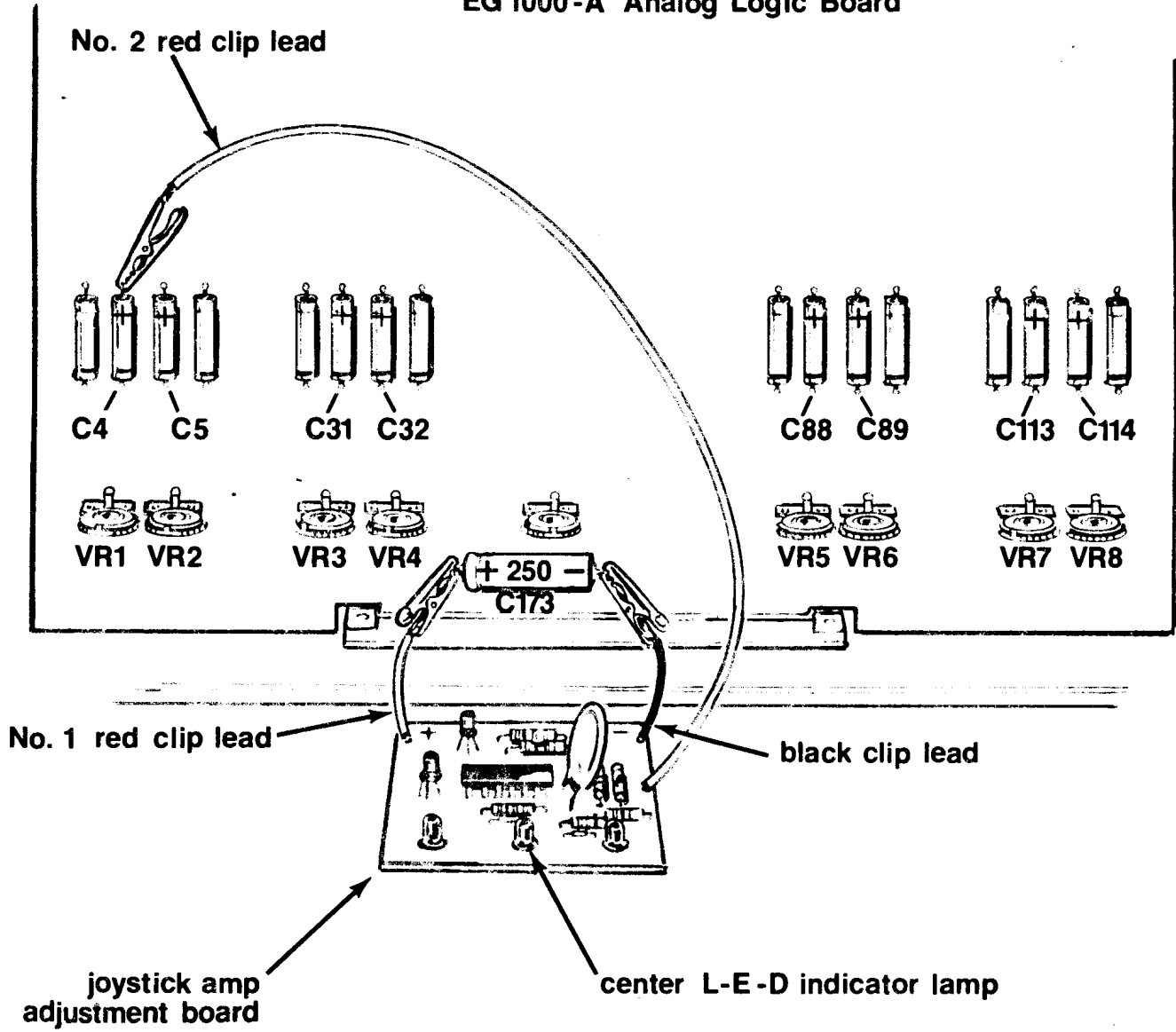
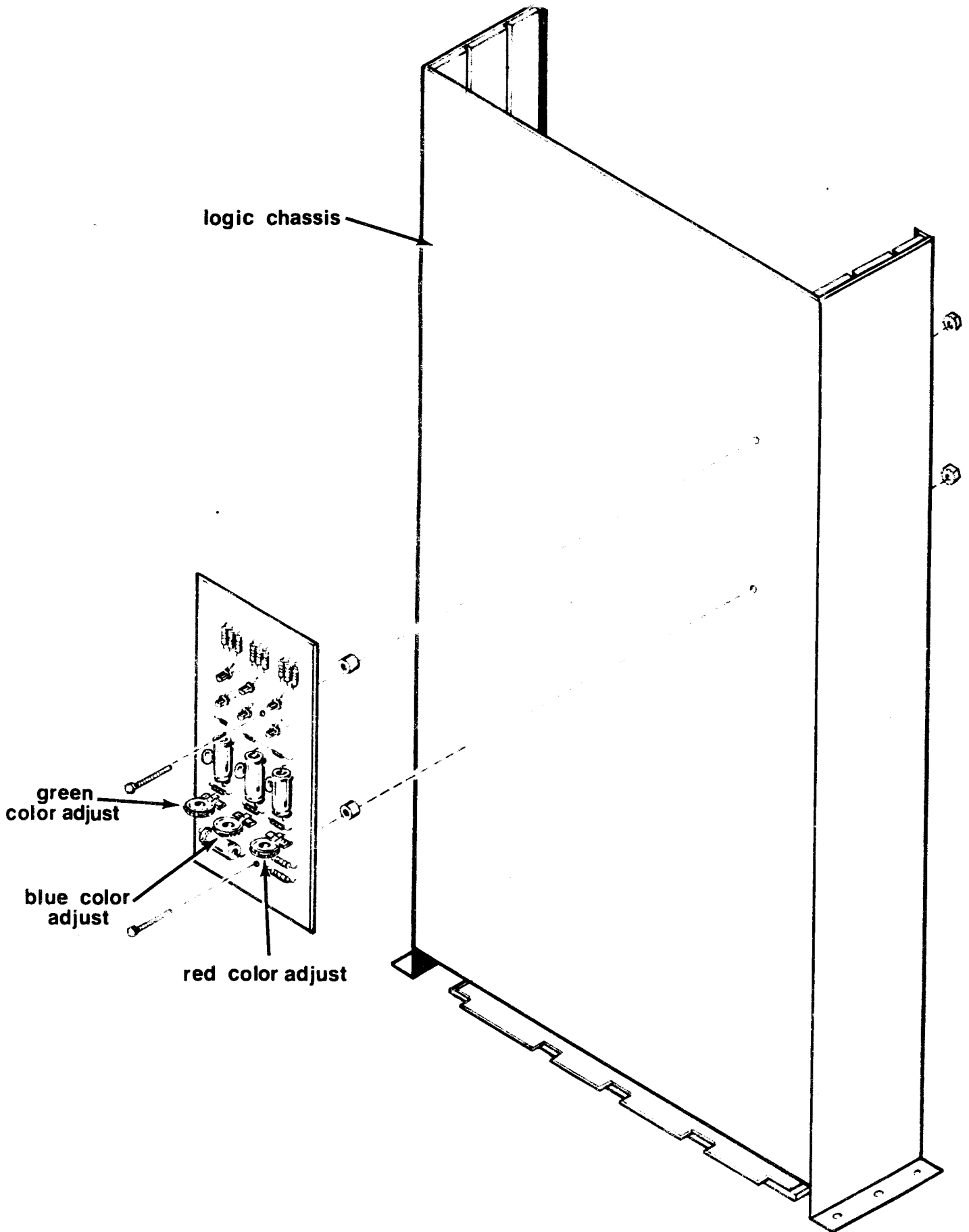


Figure 10 Joystick Amplifier Adjustment



logic chassis

green
color adjust

blue color
adjust

red color adjust

Figure 11

GAME -TV switches (shown in game position)

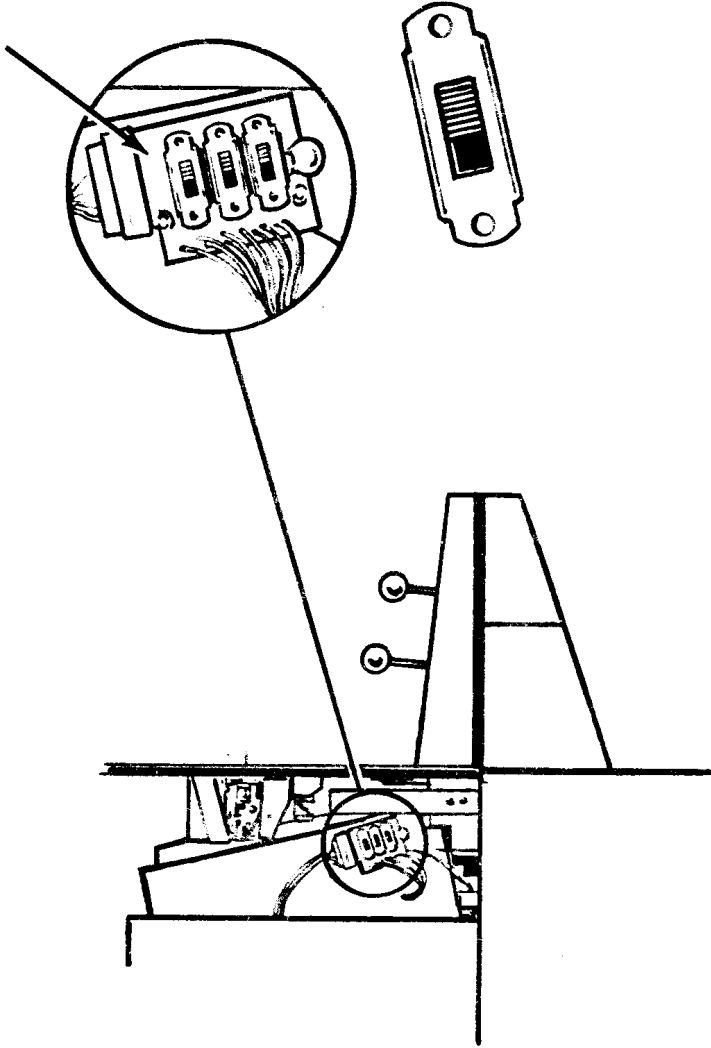
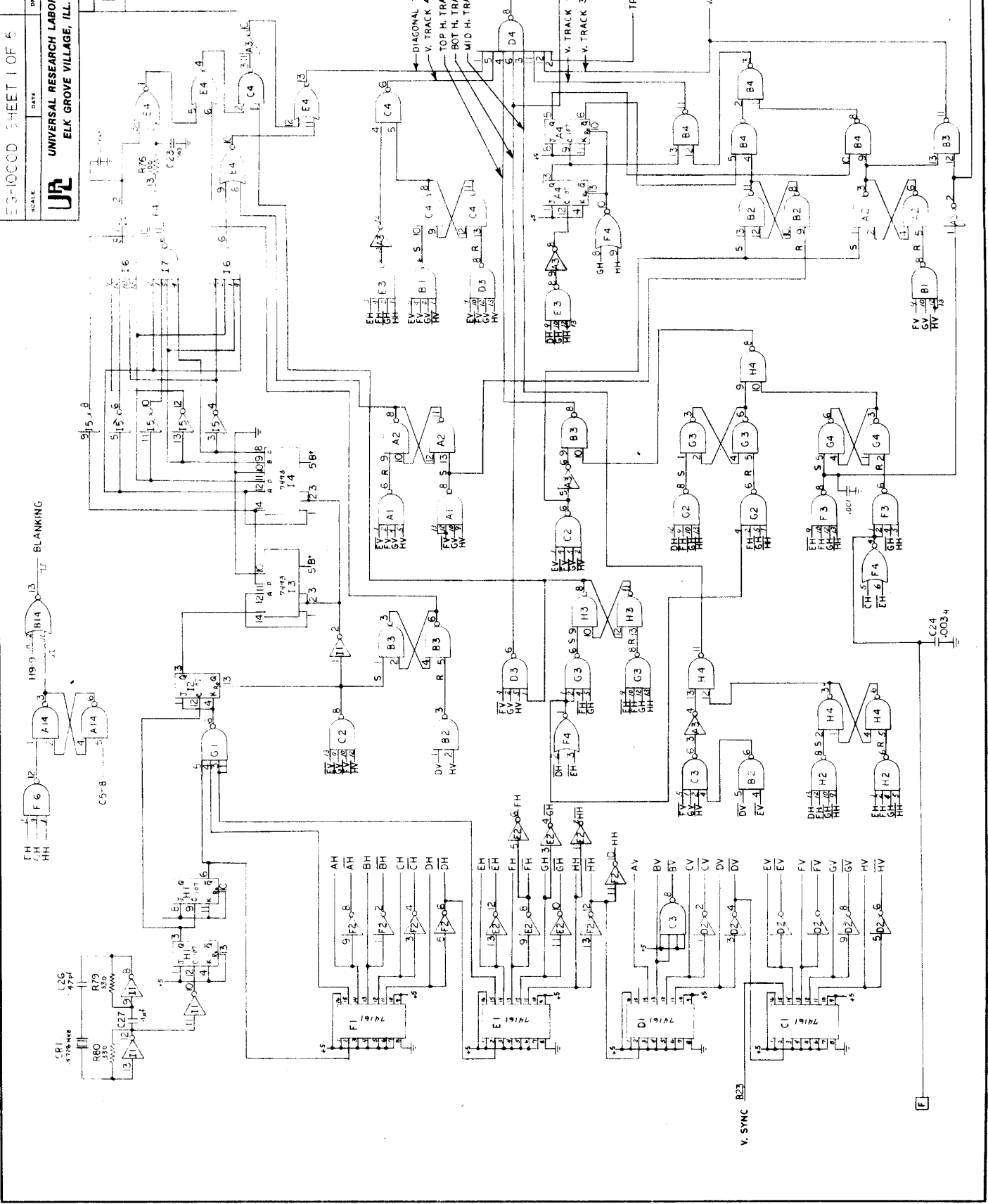
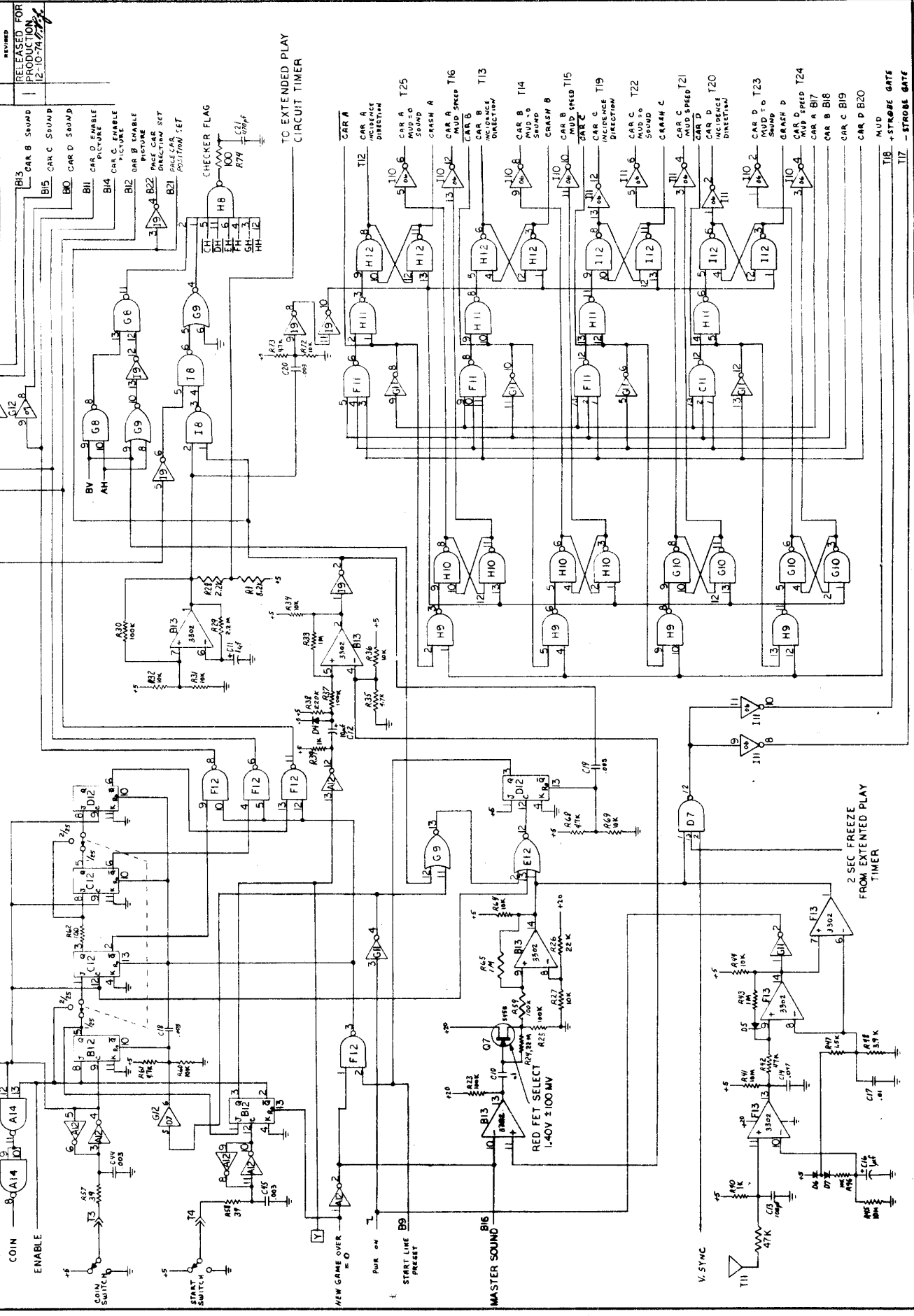


Figure 12

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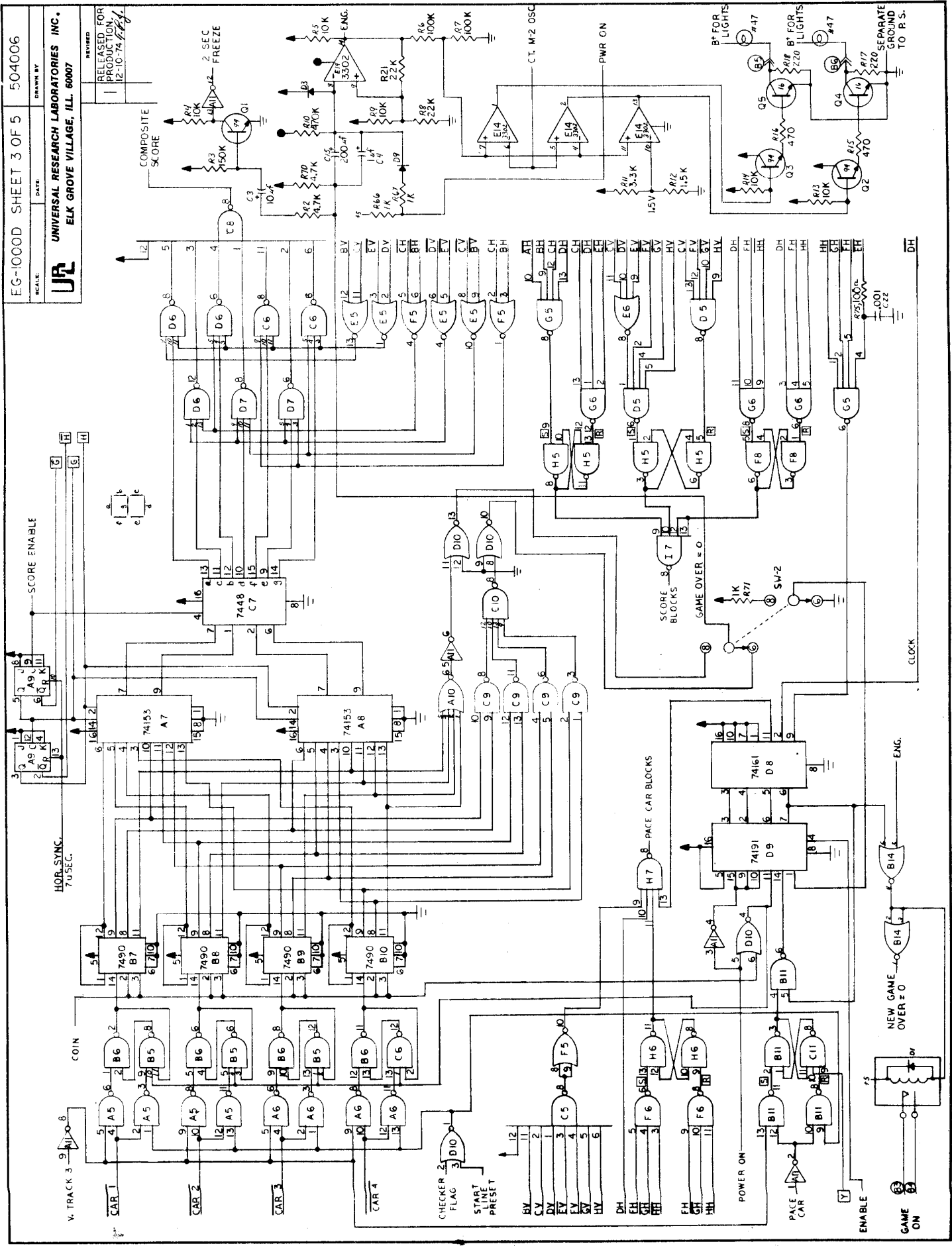
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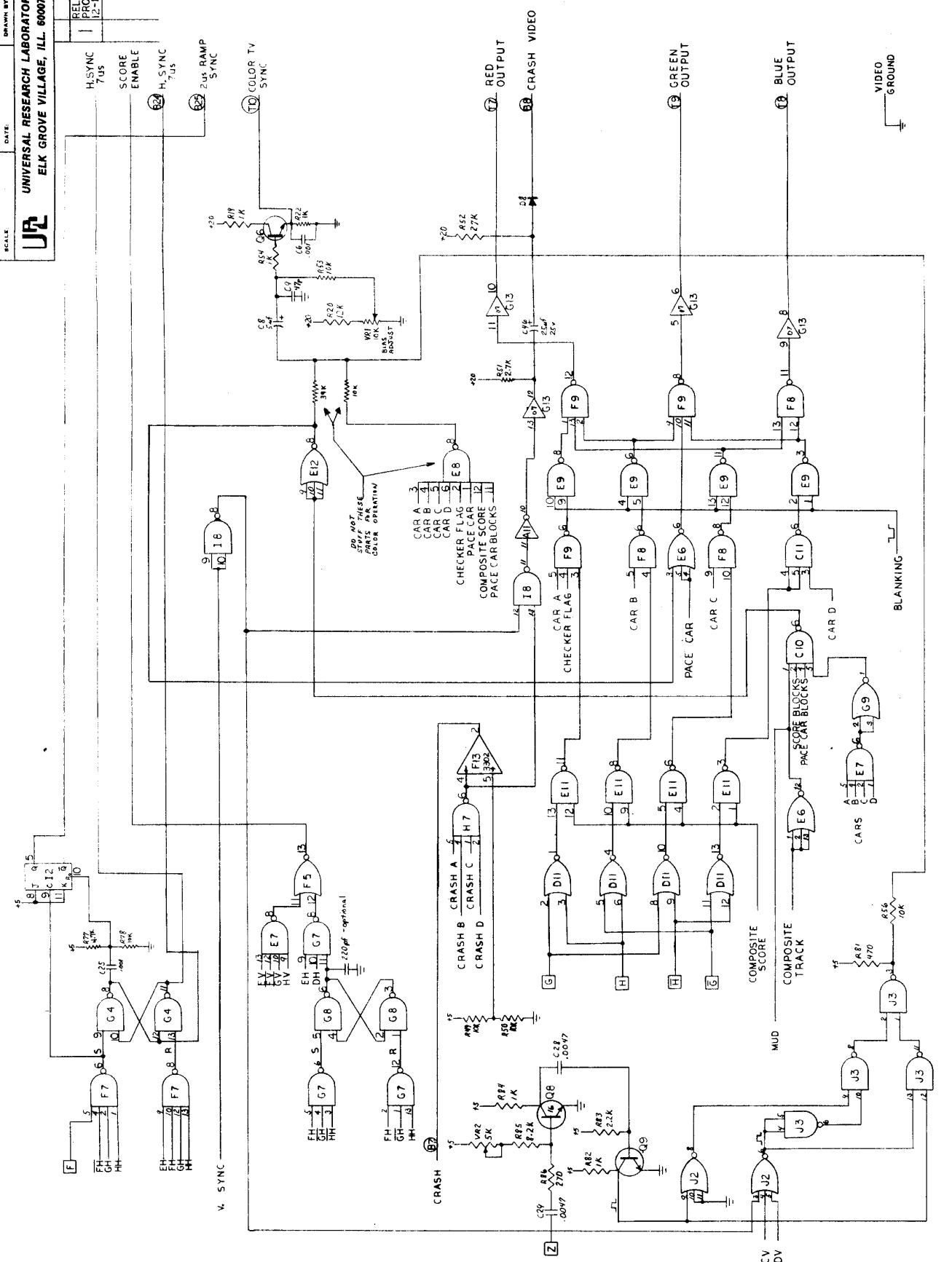
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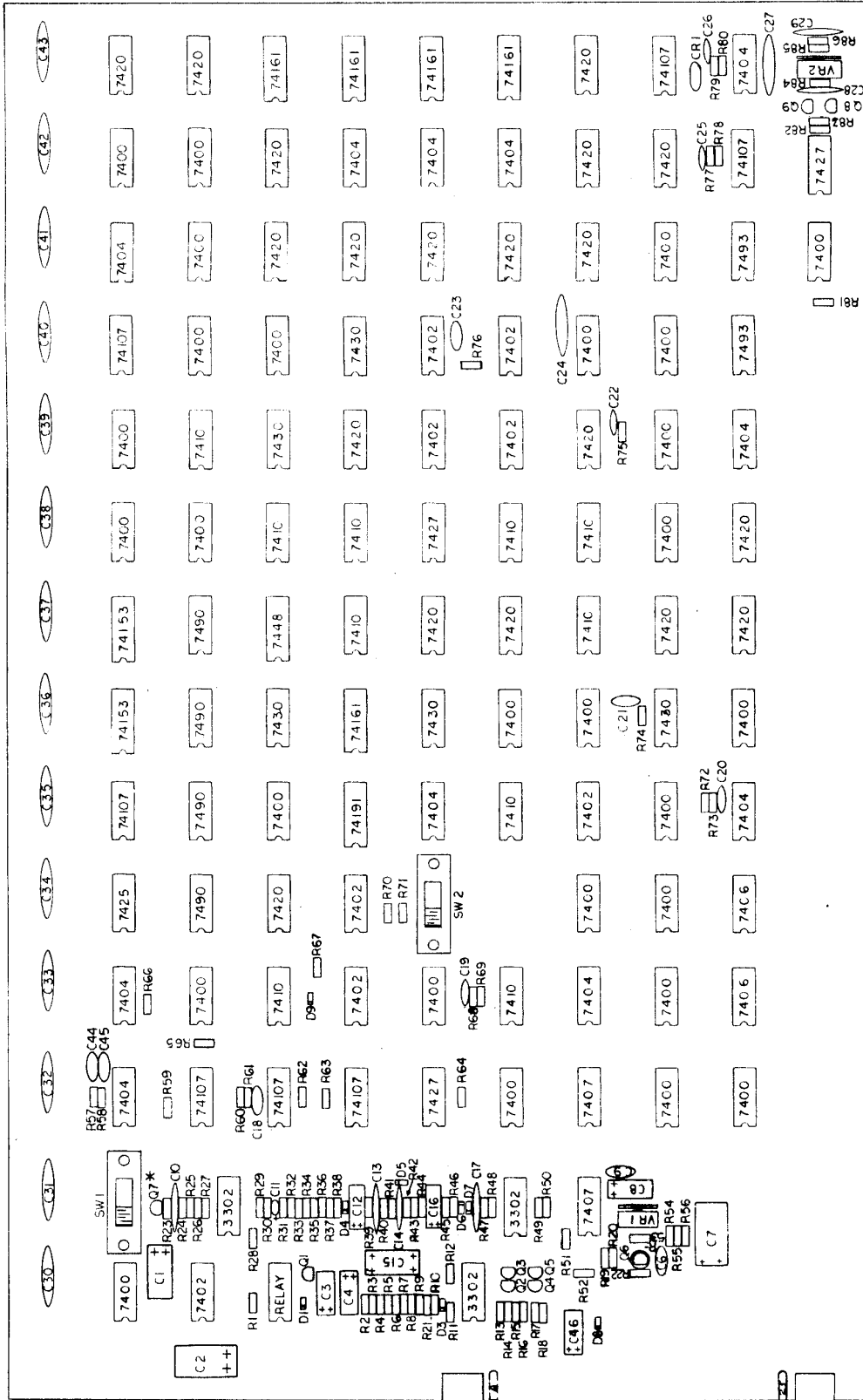


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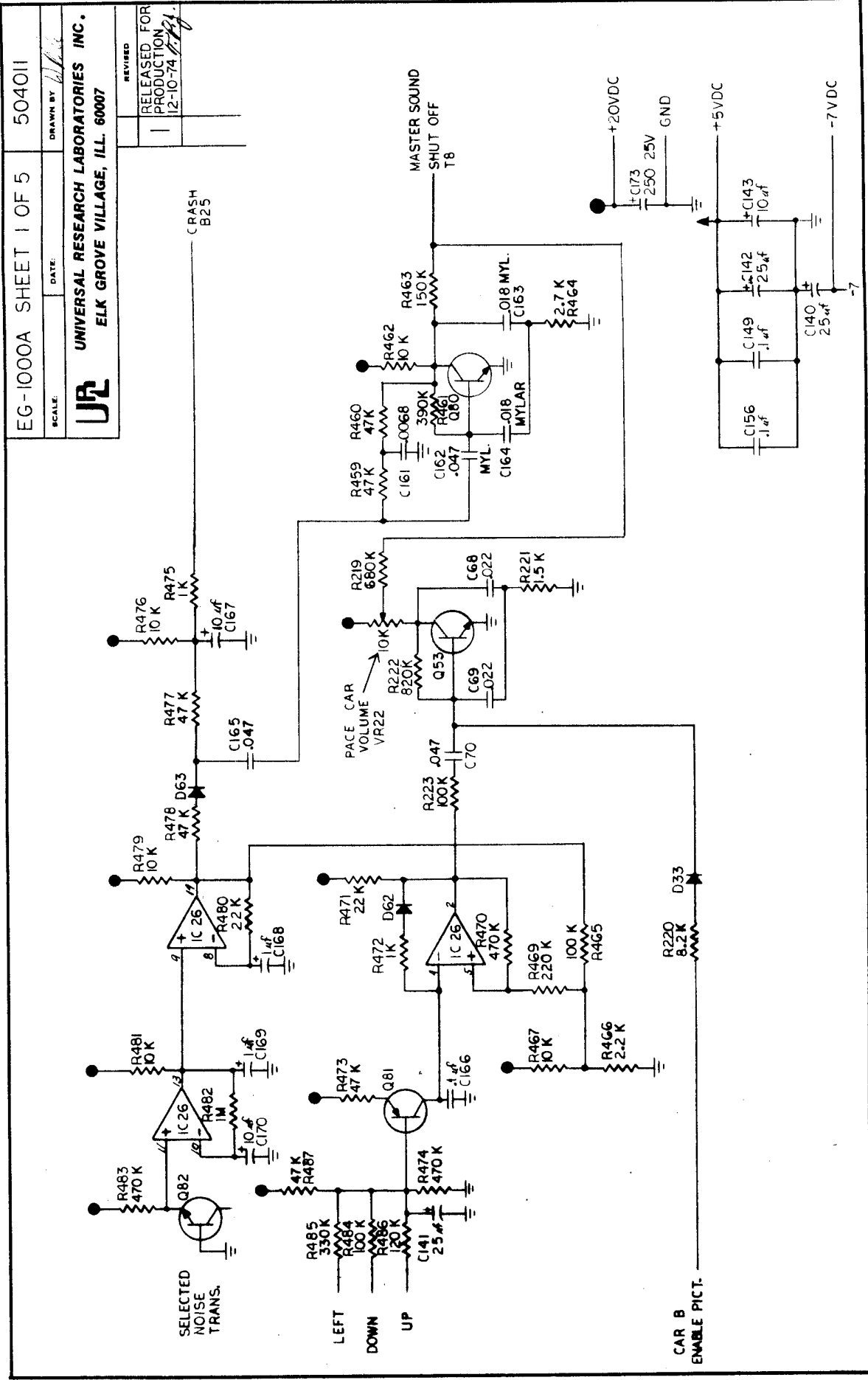
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COMPONENT SIDE

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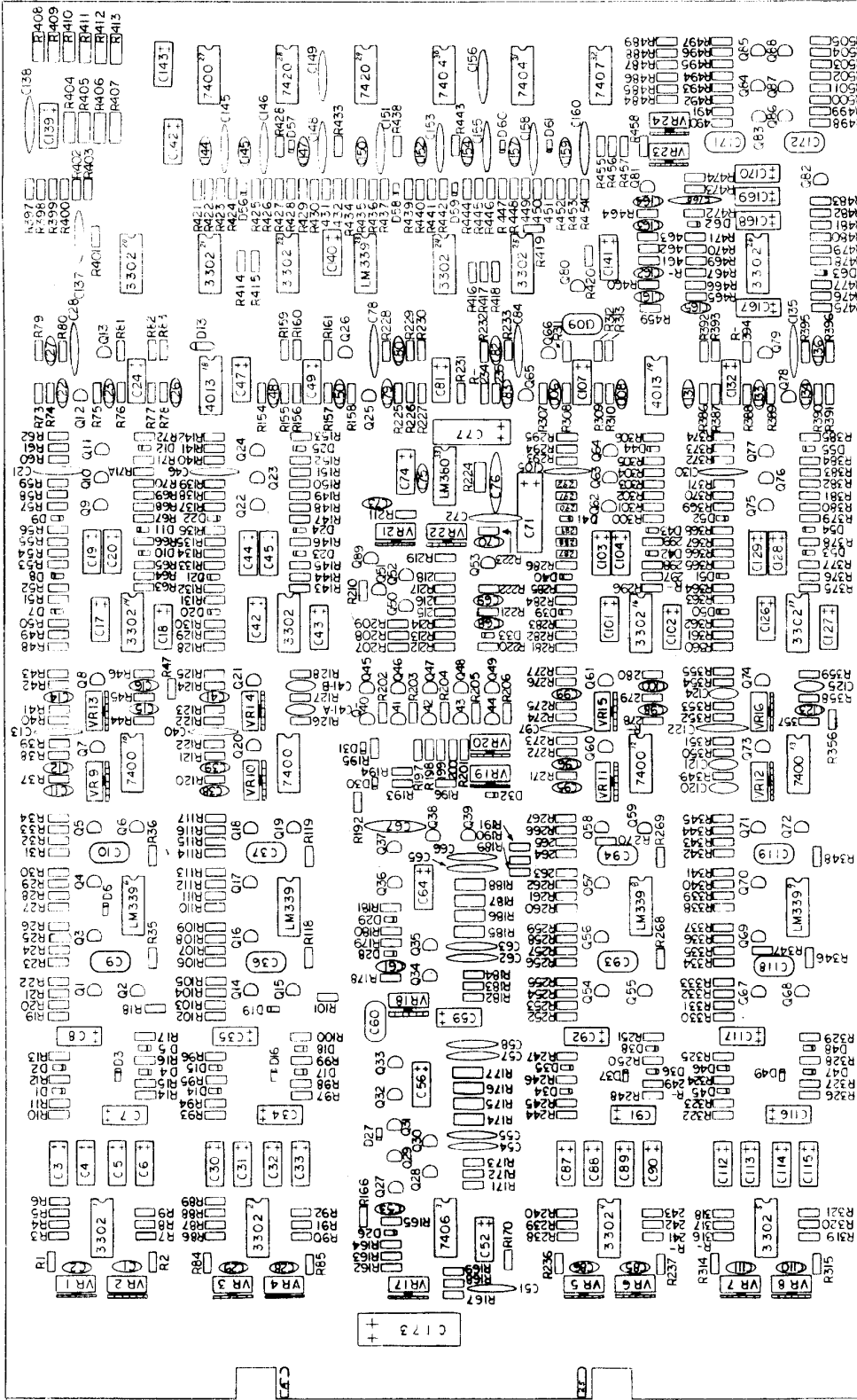
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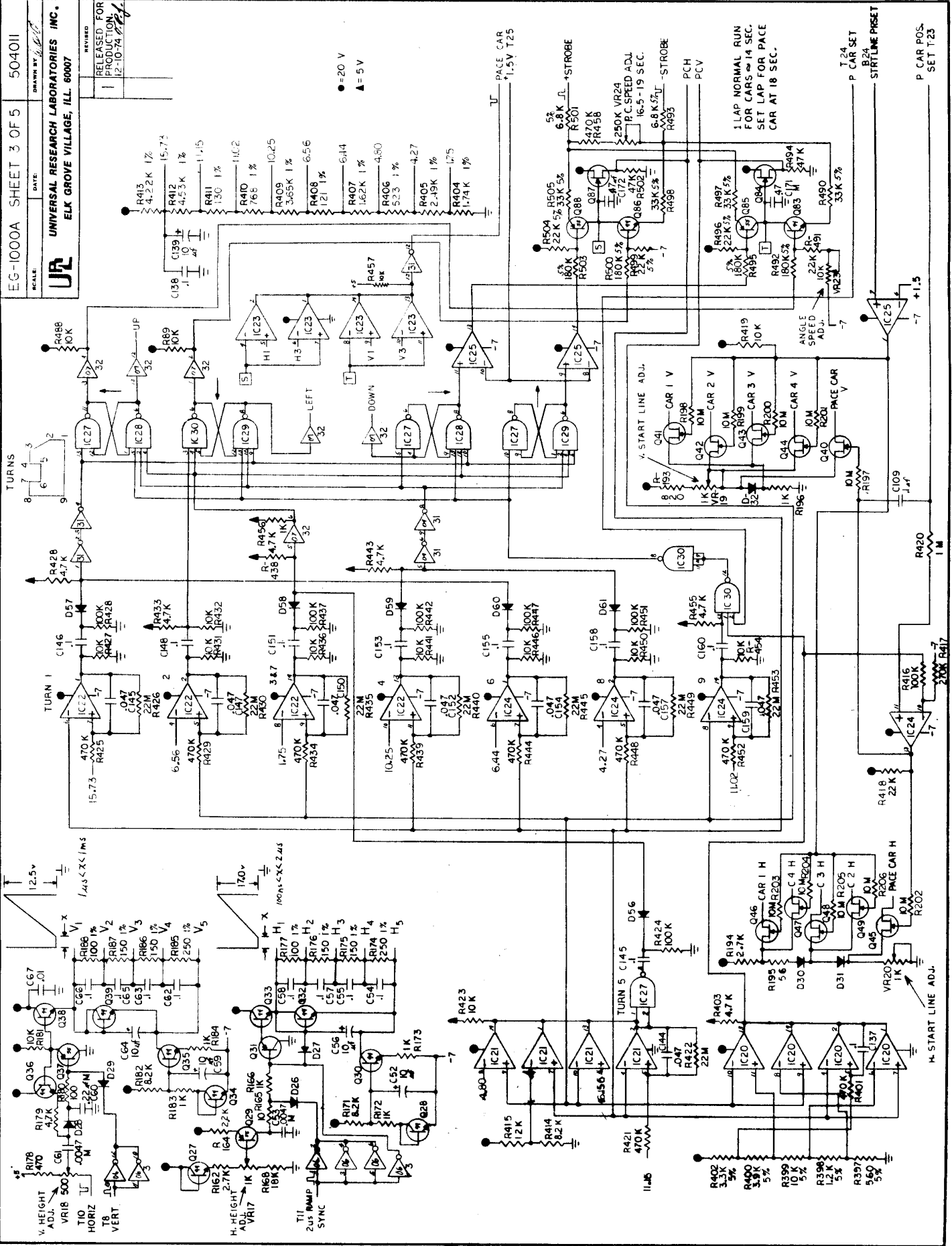
COMPONENT SIDE



- VR1 TRIMMER POT.
- VR2 RED CAR
- VR3 YELLOW CAR
- VR4 YELLOW CAR
- VR5 VIOLET CAR
- VR6 VIOLET CAR
- VR7 BLUE CAR
- VR8 BLUE CAR
- VR9 RED CAR
- VR10 VIOLET CAR
- VR11 VIOLET CAR
- VR12 VIOLET CAR
- VR13 VIOLET CAR
- VR14 VIOLET CAR
- VR15 VIOLET CAR
- VR16 BLUE CAR
- VR17 HORIZ. RAMP ADJ.
- VR18 VERT. RAMP ADJ.
- VR19 VERT. CAR PLACEMENT
- VR20 HORIZ. CAR PLACEMENT
- VR21 MASTER VOLUME ADJ.
- VR22 PACE CAR VOLUME ADJ.
- VR23 PACE CAR
- VR24 PACE CAR
- VR25 HORIZ. ADJ.
- VR26 VERT. ADJ.
- VR27 HORIZ. ADJ.
- VR28 VERT. ADJ.
- VR29 HORIZ. ADJ.
- VR30 VERT. ADJ.
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- VR84 VERT. ADJ.
- VR85 HORIZ. ADJ.
- VR86 VERT. ADJ.
- VR87 HORIZ. ADJ.
- VR88 VERT. ADJ.
- VR89 HORIZ. ADJ.
- VR90 VERT. ADJ.
- VR91 HORIZ. ADJ.
- VR92 VERT. ADJ.
- VR93 HORIZ. ADJ.
- VR94 VERT. ADJ.
- VR95 HORIZ. ADJ.
- VR96 VERT. ADJ.
- VR97 HORIZ. ADJ.
- VR98 VERT. ADJ.
- VR99 HORIZ. ADJ.
- VR100 VERT. ADJ.

UNIVERSAL RESEARCH LABORATORIES INC.
 ELK GROVE VILLAGE, ILL. 60007

REVISIONS
 1
 RELEASED FOR PRODUCTION
 12-10-74



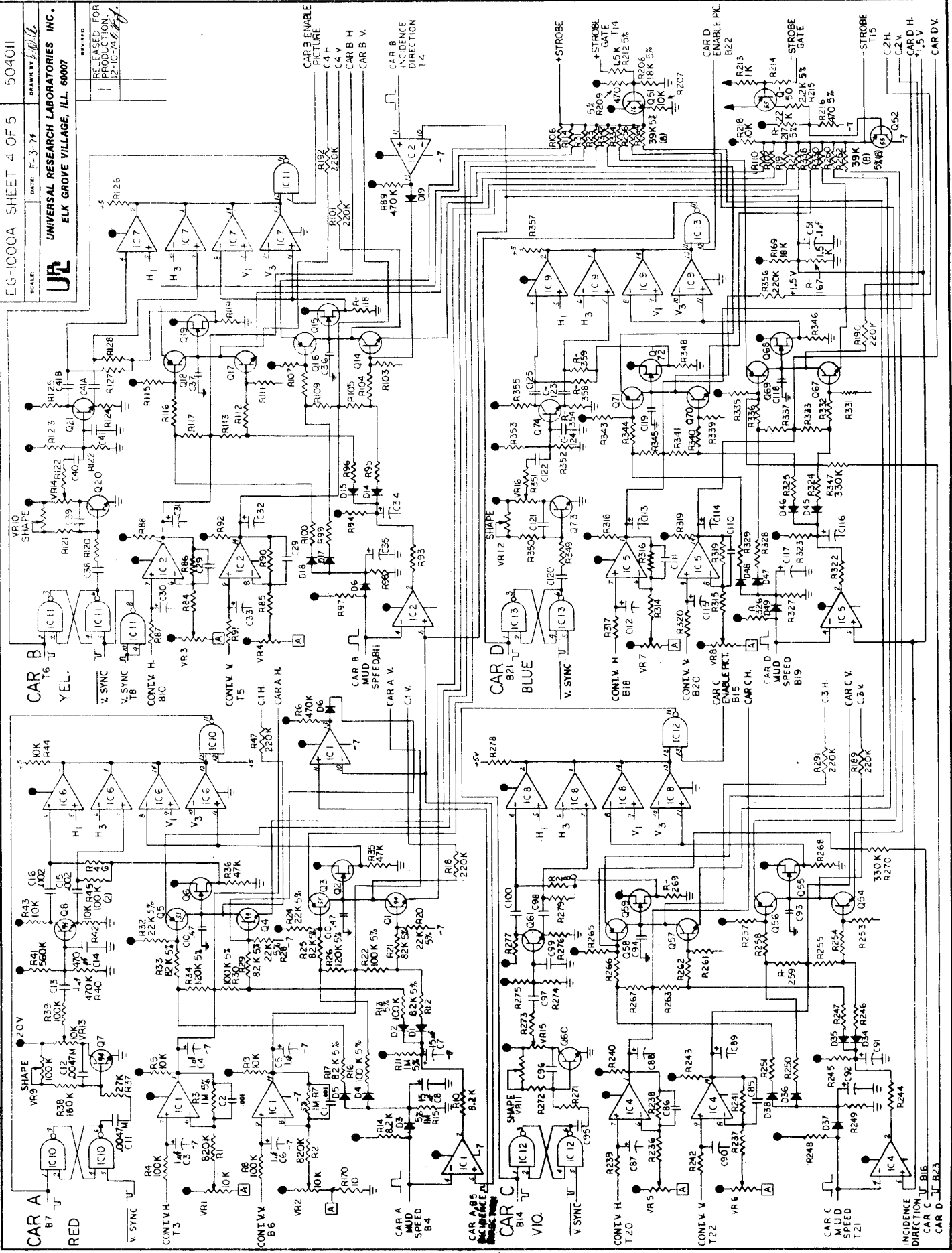
● = 20 V
 ▲ = 5 V

1 LAP NORMAL RUN
 FOR CARS 14 SEC.
 SET LAP FOR PACE
 CAR AT 18 SEC.

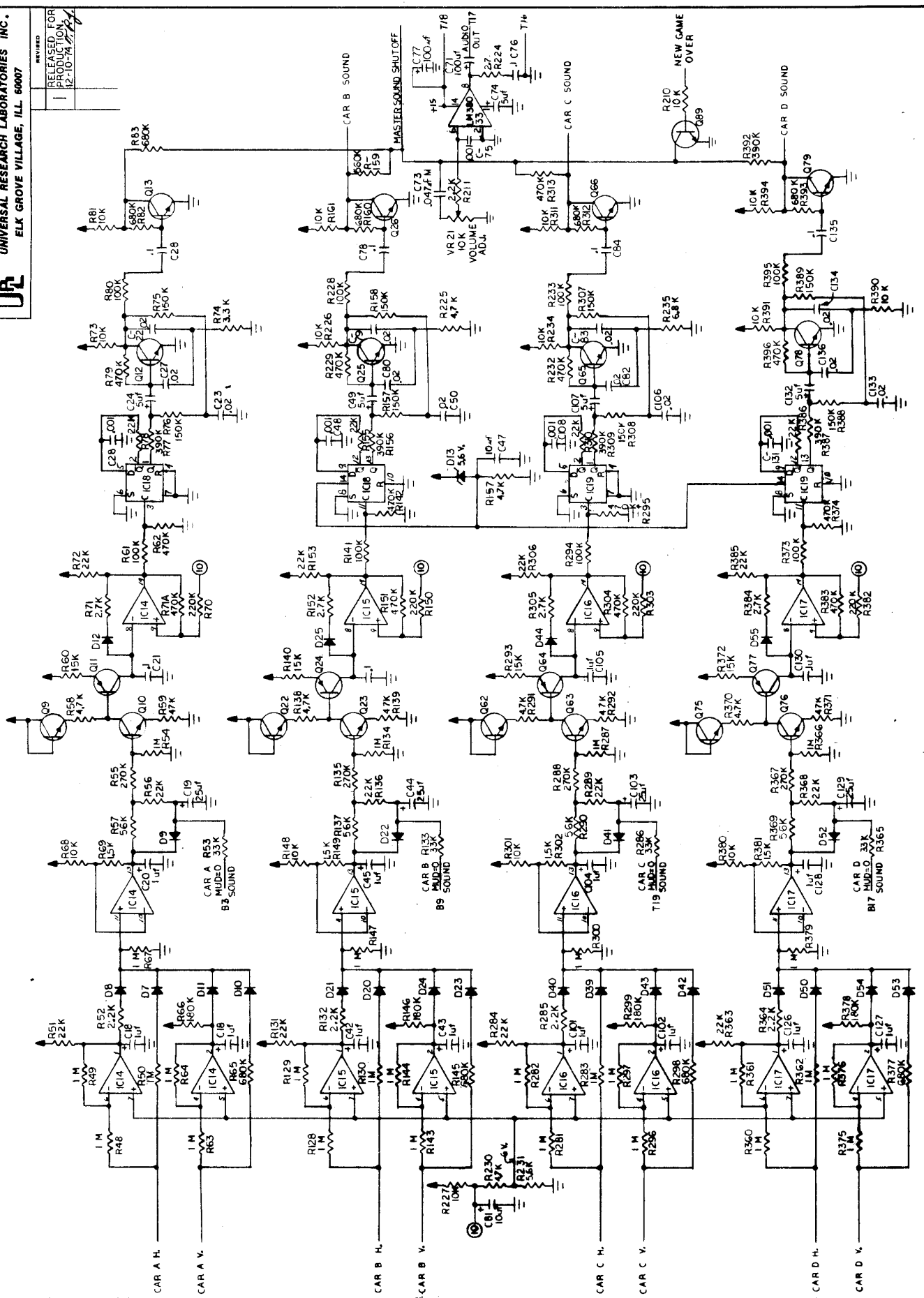
T24
 P CAR SET
 B24
 STARTLINE PRESET
 P CAR POS.
 SET T23

UNIVERSAL RESEARCH LABORATORIES INC.
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RELEASING FOR PRODUCTION
12-14-74



REVISED
RELEASED FOR PRODUCTION
12-10-74

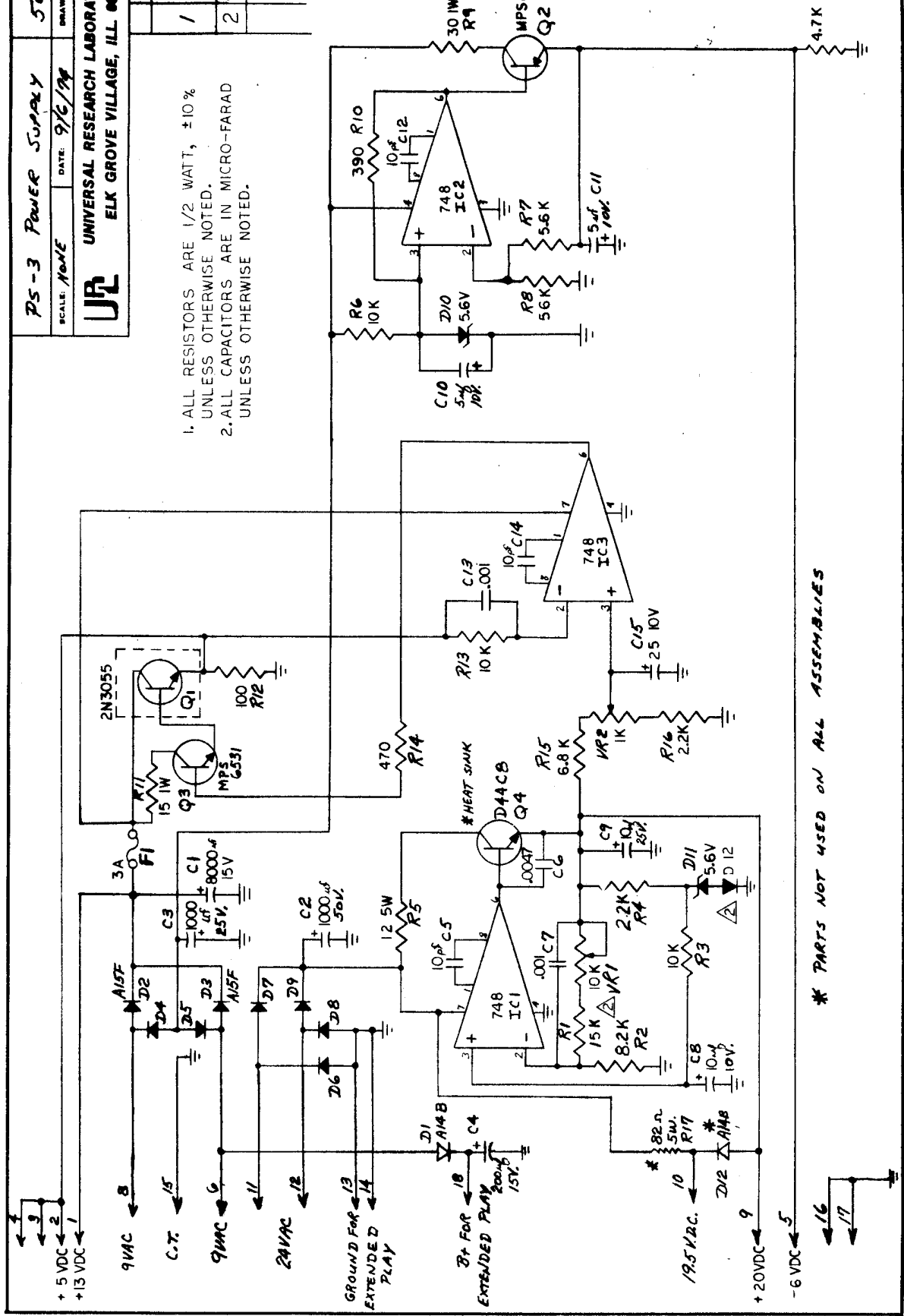


PS-3 POWER SUPPLY 581907
 SCALE: NONE DATE: 9/6/74 DRAWN BY: MDA
 UNIVERSAL RESEARCH LABORATORIES INC.
 ELK GROVE VILLAGE, ILL. 60007

REVISED

1	RELEASED FOR PRODUCTION
2	ADDED DIODE 10-4-74

1. ALL RESISTORS ARE 1/2 WATT, ±10% UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS ARE IN MICRO-FARAD UNLESS OTHERWISE NOTED.



* PARTS NOT USED ON ALL ASSEMBLIES

CA-1 BOARD

504022

SCALE: NONE

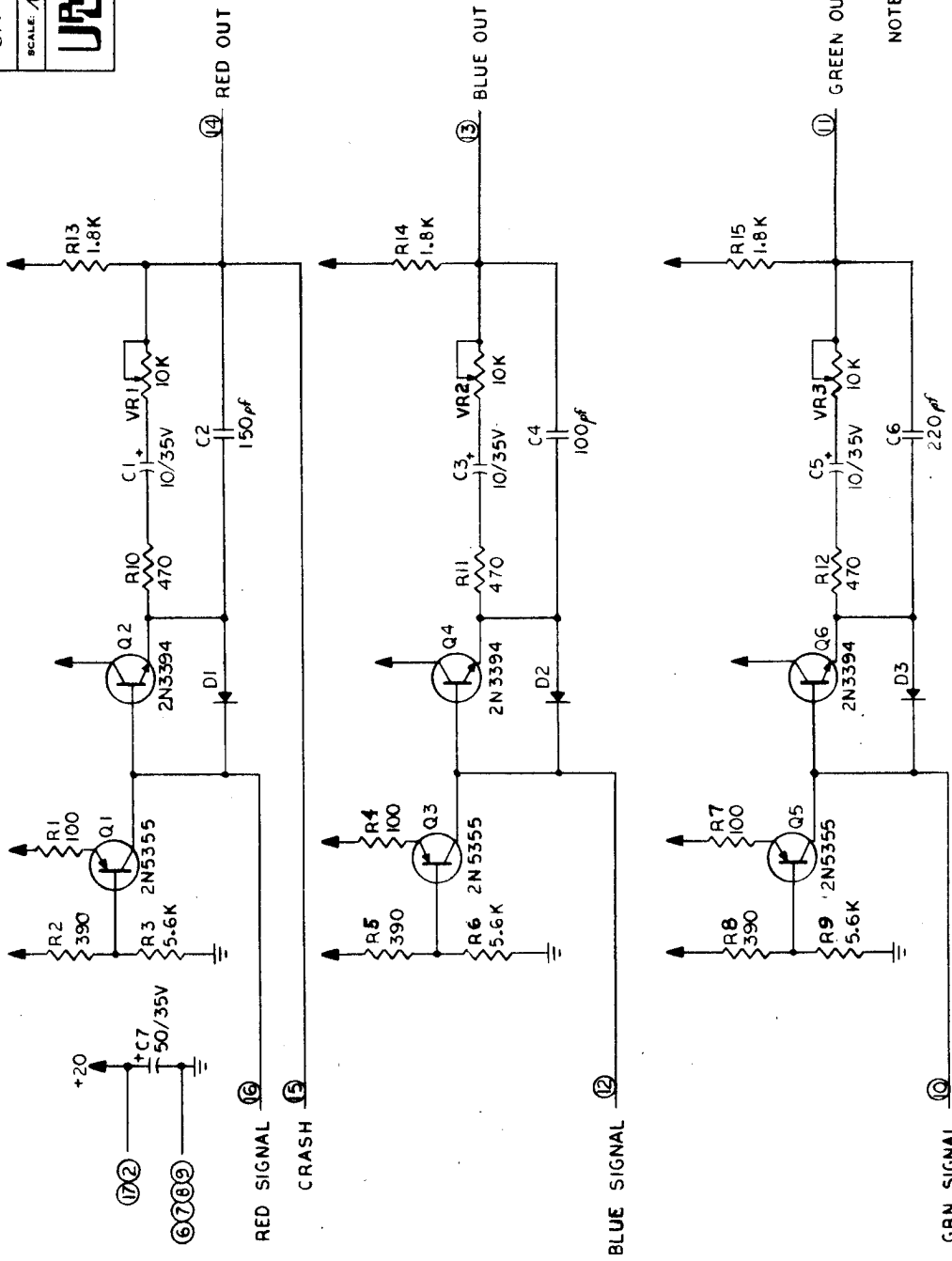
DATE: 9/26/77

DRAWN BY: NWA

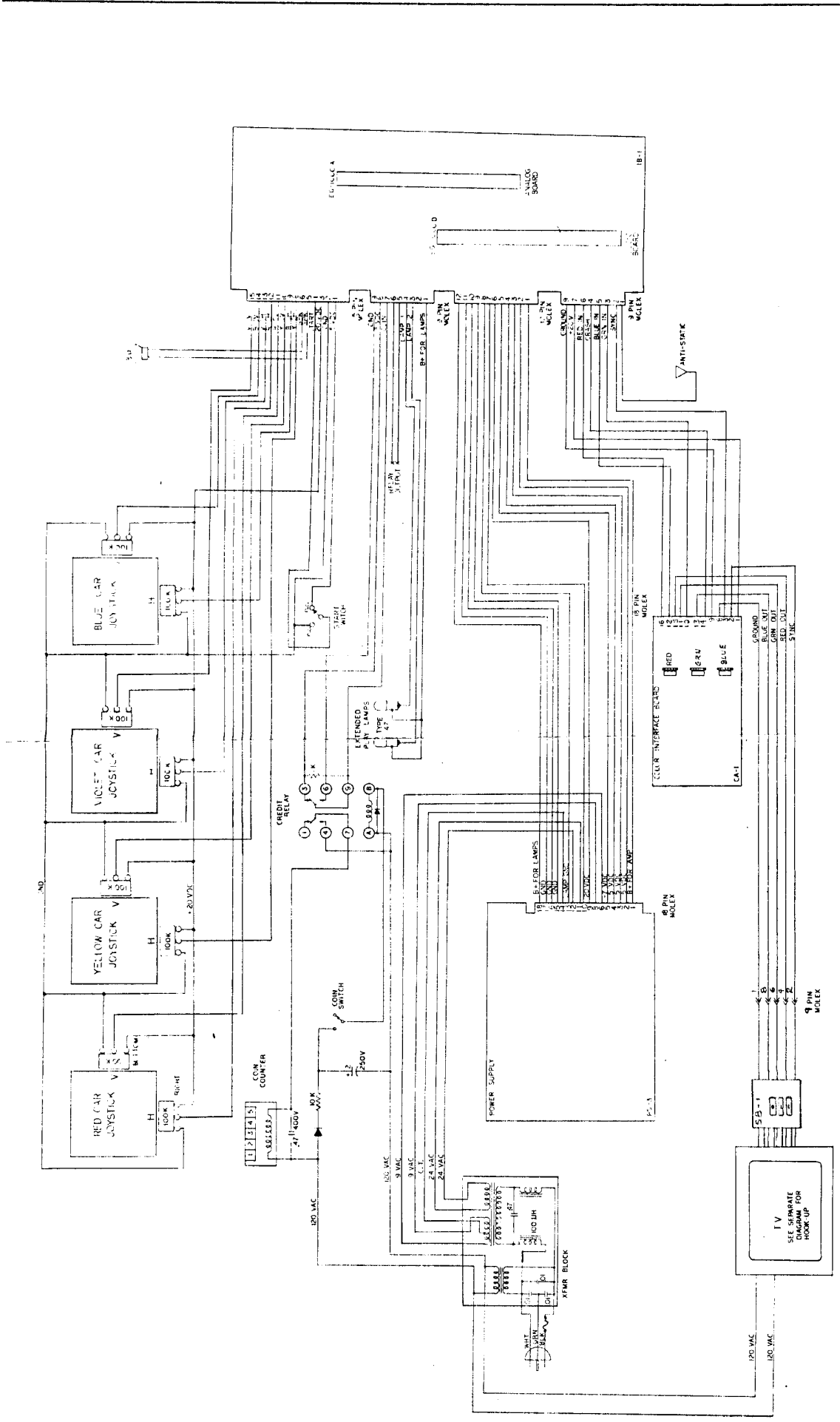


UNIVERSAL RESEARCH LABORATORIES INC.
ELK GROVE VILLAGE, ILL. 60007

REVISED	
RELEASED FOR PRODUCTION	9/26/77



- NOTES: 1. ALL RESISTORS IN OHMS AND 1/2 WATT.
2. ALL CAPACITORS, μ F, UNLESS OTHERWISE INDICATED.



HOOK UP DIAGRAM	
Model: 1	Part: 1
Universal Research Labs, Inc.	