QUARTER HORSE

Another Winner from **Electro-Sport Inc.**

OWNER'S MANUAL

FOREWORD

This manual is confidential and contains trade secret information of Electro-Sport, Inc.

This document remains the property of Electro-Sport, Inc. It is loaned under confidential custody for the sole purpose of maintanance, operation, and repair of Electro-Sport equipment and may not be used by or disclosed to any person for any other purpose whatever.

Without the written consent of Electro-Sport, Inc., neither this manual nor the information it contains may be reproduced, used or disclosed to individuals not having a need to know consistent with the purpose of the loan.

W A R N I N G

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications.

As temporarily permitted by regulation, it has not been tested for compliance pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference.

Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

W A R N I N G

For you and your customer's protection, this game is equipped with a three-prong (grounding) plug to guard against shock hazards. The plug should be plugged directly into a properly grounded three-prong receptacle. Where a two-prong wall receptable is encountered, it must be replaced with a properly grounded three-prong receptacle in accordance with the national electric code and local codes and ordinances. The work should be done by a qualified electrician.

C Electro-Sport, Inc. 1984

W A R N I N G !

The Laserdisc player's shipping screw must be removed before operating the Quarterhorse game. It MUST be reinserted whenever the Quarterhorse game is moved. Failure to do so VOIDS All Warranties!

IMPORTANT

The Quarterhorse air-filter should be replaced every three to six months to insure cleanliness of the videodisc and videodisc player.

Quarterhorse Owner's Manual

Table of Contents

Foreward.....I

Table of Contents.....III

Game Inspection.....1.0

Game Set-up and Options.....2.0

Game Play.....3.0

General Maintenance.....4.0

In Case of Trouble.....5.0

Cabinet Layout.....6.0

Game Board.....7.0

Discplayer.....8.0

Monitors.....9.0

Power Supply.....10.0

Schematics.....11.0

Service and Repair.....12.0

Warranty.....13.0

Index.....14.0

Quarterhorse Owner's Manual

Game Inspection

Game Inspection Checksheet.....1.1
Game Installation Requirements.....1.2
Physical Dimensions.....1.3

GAME INSPECTION

Quarterhorse Owner's Manual

Game Inspection Checksheet

DO NOT PLUG THE GAME IN YET!

This new game arrives ready to play upon removal from the carton, however, we recommend you perform a careful inspection and perform the following steps to insure that your game arrived in good condition.

Game Inspection

Examine the exterior of the packing materials for any indication of shipping damage. Electro-Sport uses "Tip N' Tell" level indicators on all video game cartons.

Examine the exterior of the game cabinet for any indication of shipping damage.

In the event that any damage has been noted, write down the discrepancies, save all packing materials for the insurance adjuster, and contact Electro-Sport's Customer Service Dept. at 800-367-1035 for assistance in filing a freight claim.

Unlock and open all door and access panels of the cabinet, and inspect the interior of the game as follows:

Check that all plug-in connectors are firmly seated in their sockets.

Reseat any connectors found unplugged. Refer to the Quarterhorse Block Diagrams on page 5.11 for connector locations.

DO NOT FORCE CONNECTORS TOGETHER! Forcing the connectors can damage both the connector and it's socket, and render your game inoperable.

Check the game board to insure that all plug-in integrated circuits (IC's, or chips) are firmly seated in their sockets.

Visually inspect all major game modules; power supply, front player panel, coin mechanisms, monitor, discplayer, and game board, to insure secure mounting, and that all connectors are connected.

Game Installation Requirements

Temperature must remain between 45 and 90 degrees F. (7 and 35 degrees C.) while the Quarterhorse game is operating.

Humidity must remain between 20% and 80% relative non-condensing while the Quarterhorse game is operating.

DO NOT operate the Quarterhorse outside these parameters, as it may cause damage to your discplayer!

Important:

Be sure to check the line voltage of the location where the game will be installed. Electro-Sport games are configured to operate at 115 VAC. Should the line voltage at the location differ by more than 5%, the "V" connector (Voltage Select Plug) on the power supply must be reconfigured or replaced to match the line voltage. This is to insure proper voltage to the monitor, lamps, and discplayer. See page 10.2 for the Voltage Select Plug Sheet.

PLUG THE GAME IN, and turn the power on. The ON/OFF switch is located in the rear of the machine.

Note that the Game Board has a small board on the lower left hand corner. This board has a small light, an LED, right in the center. Next to the LED is a small knob, a potentiometer, and another in front of the LED. Adjust the pot next to the LED slowly until the LED just begins to light. If it is lighted full, bring it down to the half-intensity level. This sets the proper reset level for the Voltage/Static monitor circuit.

Failure to make this adjustment will result in intermittent performance from your Quarterhorse game. For more information on the Voltage/Static Monitor circuit, see page 7.3

Press the Reject button on the front panel of the discplayer. Open the lid. REMOVE and SAVE the lens cap, shipping screw, and shipping screw plate. Remember that WHENEVER THE DISCPLAYER IS MOVED, THE SHIPPING SCREW AND LENS CAP MUST BE INSTALLED! Failure to do so will damage your game, and void your warranty.

Unwrap the disc and insert it into the discplayer. The label that faces up indicates the side that is playing, although the discplayer reads the disc from the bottom.

Press the Reset button in the rear of the Quarterhorse game. The game will come up in approximately 40 seconds.

Physical Dimensions and Power Requirements

MODEL	FLOOR SPACE D X W	HEIGHT	WEIGHT LBS	POWER
041	26" 30 1/2"	73"	400	350 W
042	26" 30"	65"	240	250 W
045	22" 23"	60"	200	200 W

Operator Selectable Options

Your Quarterhorse game will set itself to the factory default settings the first time it is powered up. To alter the operator selectable options, see page 2.1

Quarterhorse Owner's Manual

Game Set-up and Options

Quarterhorse Set-up Mode.....2.1
Set-up Mode Functions.....2.2
Coin Input.....2.3
Switch Selection 041.....2.4
Switch Selection 042, 045.....2.5
Clear Code Sequence.....2.6
Test Mode.....2.7
Test Mode Screen 041.....2.8
Test Mode Screen 042, 045.....2.9

GAME SET-UP & OPTIONS

QUARTERHORSE SET-UP MODE

The Electro-Sport Quarterhorse game incorporates a Setup Mode so the game operator may tailor the game to meet the requirements of any location. The Setup Mode may be entered and used as follows:

1. When a race is not in progress, place the game in the test mode by activating the test switch located inside the cabinet.

2. Press the bottom four buttons on the Player panel simultaneously. (Select Player A, Play Credits Player A, Select Player B, Play Credits Player B). The game will now be in the Setup Mode.

3. If DIP Switch #7 is in the ON position, you will be able to adjust coin input ratios from the setup mode. If DIP Switch #7 is in the OFF position, coin input ratios are selected by DIP switches #1 and 2.

4. To change a function or a value, move the pointer on the left hand side of the screen next to the function you wish to adjust. To move the pointer, press the lighted switch on the left side of the game.

5. To lower the value of a function, press Select button Player B. To raise the value of a function, press Play Credits button Player B.

6. To change any Setup Mode function back to the original factory setting, press Play Credits button Player A.

7. To get back into the Test Mode, press Select button Player A.

8. To get back to the Play mode, reactivate the Test switch. Be sure to close and lock the acces door when Set-up is complete.

NOTE: The DIP switches are located on the circuit board directly in front of the Voltage/Static Monitor.

SET-UP MODE FUNCTIONS

When you enter the Set-up Mode, the screen display will be as shown below. Following the display are the definitions of the Set-up mode functions.

SETUP MODE

```
>MAXIMUM BET    20 CREDITS
 DOUBLE LEVEL   80 PERCENT
 PLACE BETS VIDEO DISABLED
 CREDIT POINTS MESSAGE
 CI RATIO A1   2 HALF CREDITS
 CI RATIO A2   8 HALF CREDITS
 CI RATIO B1   2 HALF CREDITS
 CI RATIO B2   8 HALF CREDITS
```

Note that the pointer is shown pointing at Maximum Bet.

Maximum Bet

The maximum number of credits that can be played per horse is adjustable from 1 to 99. When sent from the factory, the game is set for 20 credits per horse.

Double Level

The frequency of Double Odds races is adjustable from 65% to 95%. When sent from the factory, the Double Level is set to 80%.

Place Bets Video

When set to "Enabled" the words "Place Bets Now" will be displayed on the 19" monitor, when the horses are shown in the starting gate.

When set to "Disabled" no words will appear at that time.

When sent from the factory, it is set to "Disabled".

This function has no effect on 042 and 045 games.

Credit/High Score

You may select from either "Credits" or "High Score" as the display on the tote board screen. To change the display move the cursor to the message with the "Start Race" or "Next Race" buttons and press either the "B Select" or "Play Credits" whichever is lit to change the message.

Coin Input

If DIP Switch #7 is set to ON, you will be able to adjust the coin to credit ratio through the Setup Mode, in increments of 1/2 credit at a time.

EXAMPLE

(A)	C1	RATIO A1	01	HALF CREDITS)
(B)	C1	RATIO A1	02	HALF CREDITS)
(C)	C1	RATIO A1	04	HALF CREDITS)

In example A, the player will insert two (2) coins for every one (1) credit.

In example B, the player will receive one (1) credit for every one (1) coin inserted.

In example C, the player will receive two (2) credits for every one (1) coin inserted.

If DIP Switch #7 is set to OFF, there will be no coin ratio display in the Setup Mode, and adjustment of coin to credit ratio can be achieved with Dip Switches #1 and #2 (See Switch Selection Options, next page).

Note that the four coin inputs show in the TEST mode as CA, CB, CC, and CD. These are shown in the Setup mode as A1, A2, B1, and B2. The two coin inputs that are normally used are CA and CC, corresponding to A1 and B1 in the SETUP mode.

Care shold be taken when using the Setup mode that both A and B sides have the same number of half credits per coin.

To initialize the diagnostic display, while in the test mode press the buttons in the order shown on the diagram on page 2.6. There are two different sequences, one for the 041 model, and another for the 042, and 045 models.

SWITCH SELECTION OPTIONS
Model 041

Function:					DIP Switch #							
Coin input	A1	A2	B1	B2	1	2	3	4	5	6	7	8
	1	4	1	4	ON	ON						
Credits Per Coin	1	5	1	5	OFF	ON						
	5	25	5	25	ON	OFF						
	10	50	10	50	OFF	OFF						
Minimum Odds/Play Schedule	2 to 1								ON			
	3 to 1								OFF			
Number Of Races	10 Races									OFF		
	8 Races									ON		
Coin Input Selection												
By Setup Mode Settings											ON	
By Dip Switch Settings											OFF	
Coin Input Tilt Disabled												OFF
Coin Input Tilt Enabled												ON

NOTE: DIP switch positions 3 and 4 are not used in the 041 game.

Coin Input

If DIP Switch #7 is set to ON, you will be able to adjust the coin to credit ratio through the Setup Mode, in increments of 1/2 credit at a time.

EXAMPLE

```
-------------------------------------
( A )  C1 RATIO A1   01 HALF CREDITS  )

( B )  C1 RATIO A1   02 HALF CREDITS  )

( C )  C1 RATIO A1   04 HALF CREDITS  )
-------------------------------------
```

In example A, the player will insert two (2) coins for every one (1) credit.

In example B, the player will receive one (1) credit for every one (1) coin inserted.

In example C, the player will receive two (2) credits for every one (1) coin inserted.

If DIP Switch #7 is set to OFF, there will be no coin ratio display in the Setup Mode, and adjustment of coin to credit ratio can be achieved with Dip Switches #1 and #2 (See Switch Selection Options, next page).

Note that the four coin inputs show in the TEST mode as CA, CB, CC, and CD. These are shown in the Setup mode as A1, A2, B1, and B2. The two coin inputs that are normally used are CA and CC, corresponding to A1 and B1 in the SETUP mode.

Care shold be taken when using the Setup mode that both A and B sides have the same number of half credits per coin.

To initialize the diagnostic display, while in the test mode press the buttons in the order shown on the diagram on page 2.6. There are two different sequences, one for the 041 model, and another for the 042, and 045 models.

SWITCH SELECTION OPTIONS
Model 041

Function:					DIP Switch #							
Coin input	A1	A2	B1	B2	1	2	3	4	5	6	7	8
	1	4	1	4	ON	ON						
Credits Per Coin	1	5	1	5	OFF	ON						
	5	25	5	25	ON	OFF						
	10	50	10	50	OFF	OFF						
Minimum Odds/Play Schedule	2 to 1								ON			
	3 to 1								OFF			
Number Of Races	10 Races									OFF		
	8 Races									ON		
Coin Input Selection												
By Setup Mode Settings											ON	
By Dip Switch Settings											OFF	
Coin Input Tilt Disabled												OFF
Coin Input Tilt Enabled												ON

NOTE: DIP switch positions 3 and 4 are not used in the 041 game.

SWITCH SELECTION OPTIONS
Model 042, 045

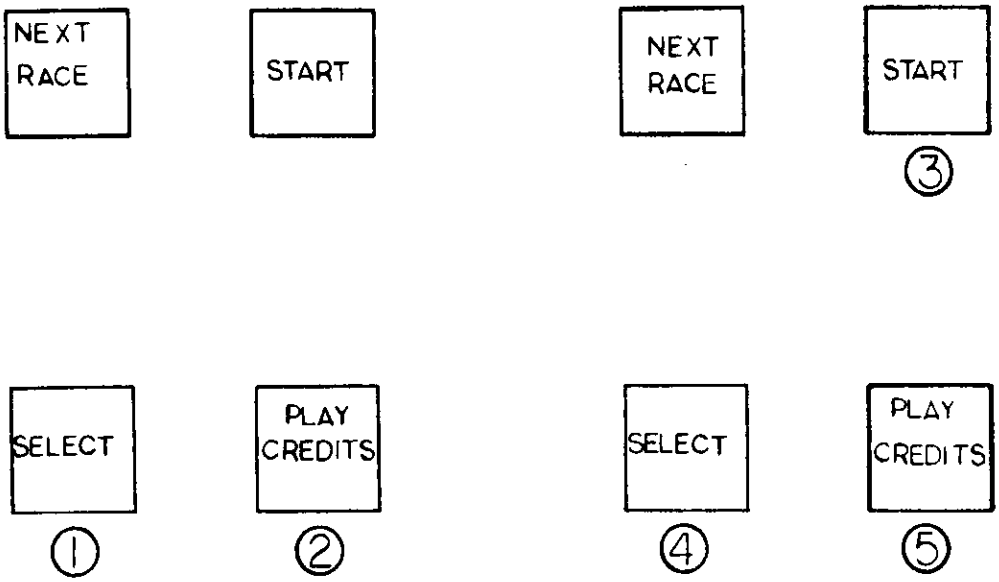
Function:					DIP Switch #							
					1	2	3	4	5	6	7	8
Coin input	A1	A2	B1	B2								
	1	4	1	4	OFF	OFF						
Credits Per Coin	1	5	1	5	ON	OFF						
	5	25	5	25	OFF	ON						
	10	50	10	50	ON	ON						
Accounting Display (See Note Below)								OFF				
Discplayer Display								ON				
Minimum Odds/Play Schedule	2 to 1								ON			
	3 to 1								OFF			
Number Of Races	10 Races									OFF		
	8 Races									ON		
Coin Input Selection												
By Setup Mode Settings											ON	
By DIP Switch Settings											OFF	
Coin Input Tilt Disabled												OFF
Coin Input Tilt Enabled												ON

ADDITIONAL DIP SWITCH SETTING

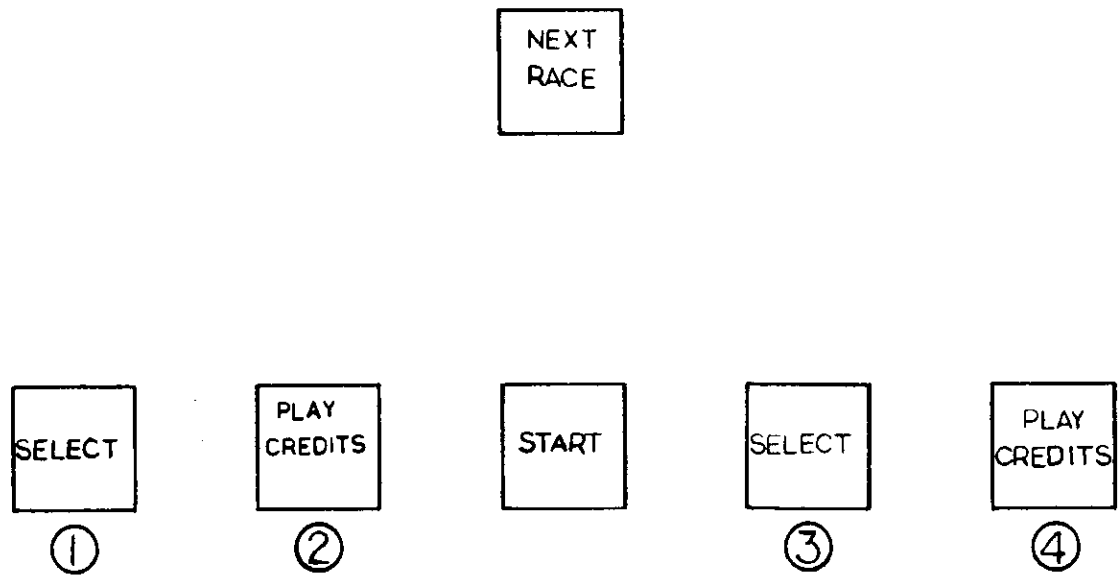
When in the test mode, DIP switch Number 4 allows you to display either the accounting information, or a freeze frame of the horse race (in order to adjust the monitor color and allignment).

Note: DIP switch #3 is not used in 042 and 045 games.

CLEAR CODE SEQUENCE



1,4,1,4,2,1,3,5
MODEL NUMBER 041



1,3,4,2,1,4,2,3
MODEL NUMBER 042 & 045

Quarterhorse Diagnostic Test Mode

To facilitate performance and failure analysis in the field, Electro-Sport's Quarterhorse game incorporates a diagnostic Test Mode. The Test Mode allows evaluation of past game performance, diagnosis of RAM and other hardware failure, allows determination of communications status from the game boad and front panel input/output, and allows determination of discplayer status and communication with controller card.

The Test Mode may be entered by activating the Test Switch inside the game cabinet.

The Test Mode screens on the following pages explain the functions of the various registers and mnemonic (alphabetical symbolic) status indicators. Note that the TS, AL, and AR indicators are always present. TS is the Test Switch, which you activated to get into the Test Mode. AL and AR are the discplayer audio indicators, which are active low and present on the Test display when they are off.AL and AR will be Off at all times except during a race, when one of them will be on.

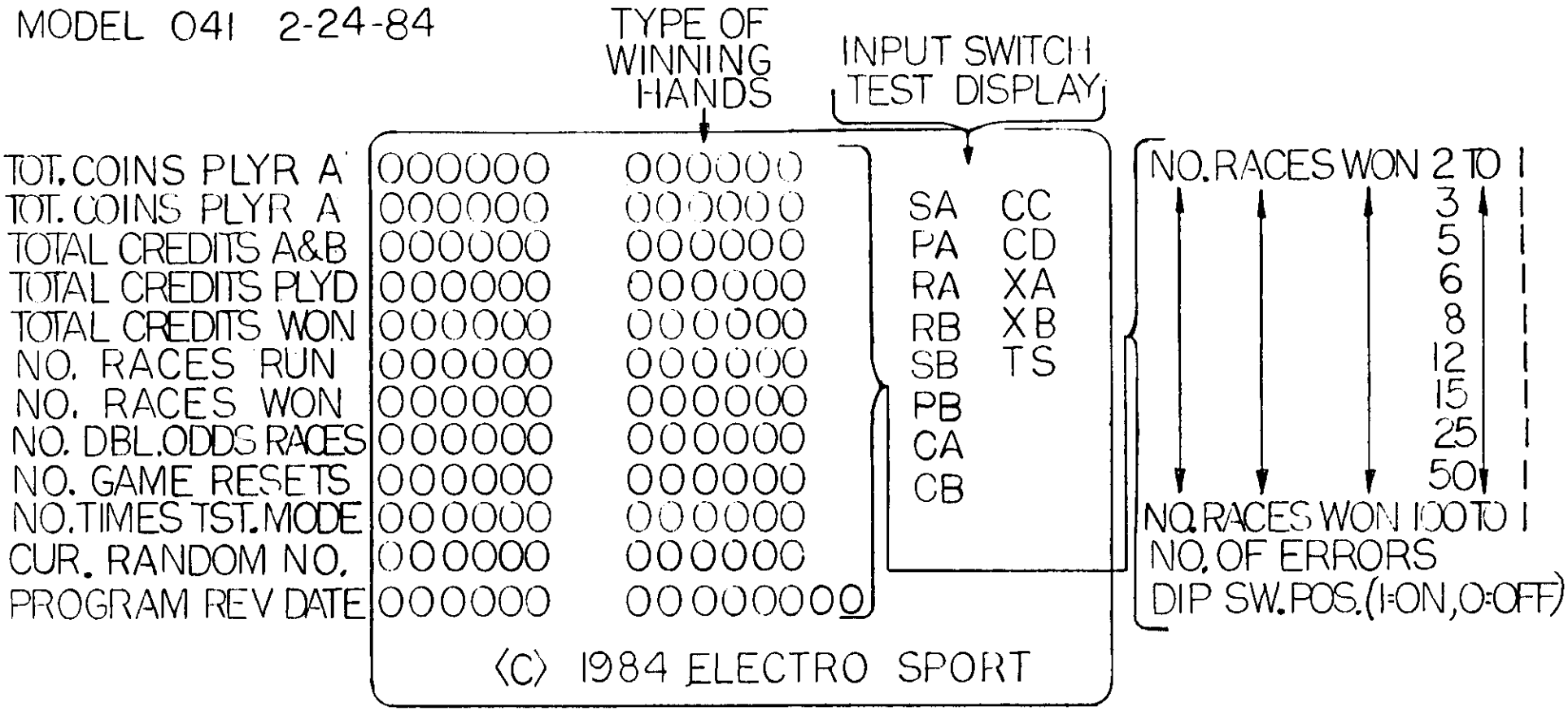
The RAM errors register indicates the number of RAM errors detected and corrected for by the Quarterhorse software. Occasional small numbers may be present in the RAM errors register, a function of electronic noise and other mysteries. However, consistent RAM errors or hexadecimal notation in the RAM error register are an indication of on-board RAM failure. The problem should be checked by a technician before it disables the game.

Electro-Sport Quarterhorse software automatically tests and corrects the on-board RAM as often as one hundred time a second, so that data integrity is always preserved.

Depending on the program revision code, there may be hexadecimal numbers in the Random Number Generator register. This should be considered normal.

Normally the Test Mode is accessed during game collections. However, for troubleshooting purposes, the Test Mode may be entered when the discplayer is not functioning. Turn power to the game off. Activate the two coin microswitches. Reapply game power. When the tote board is displayed, activate the Test switch to enter the Test Mode.

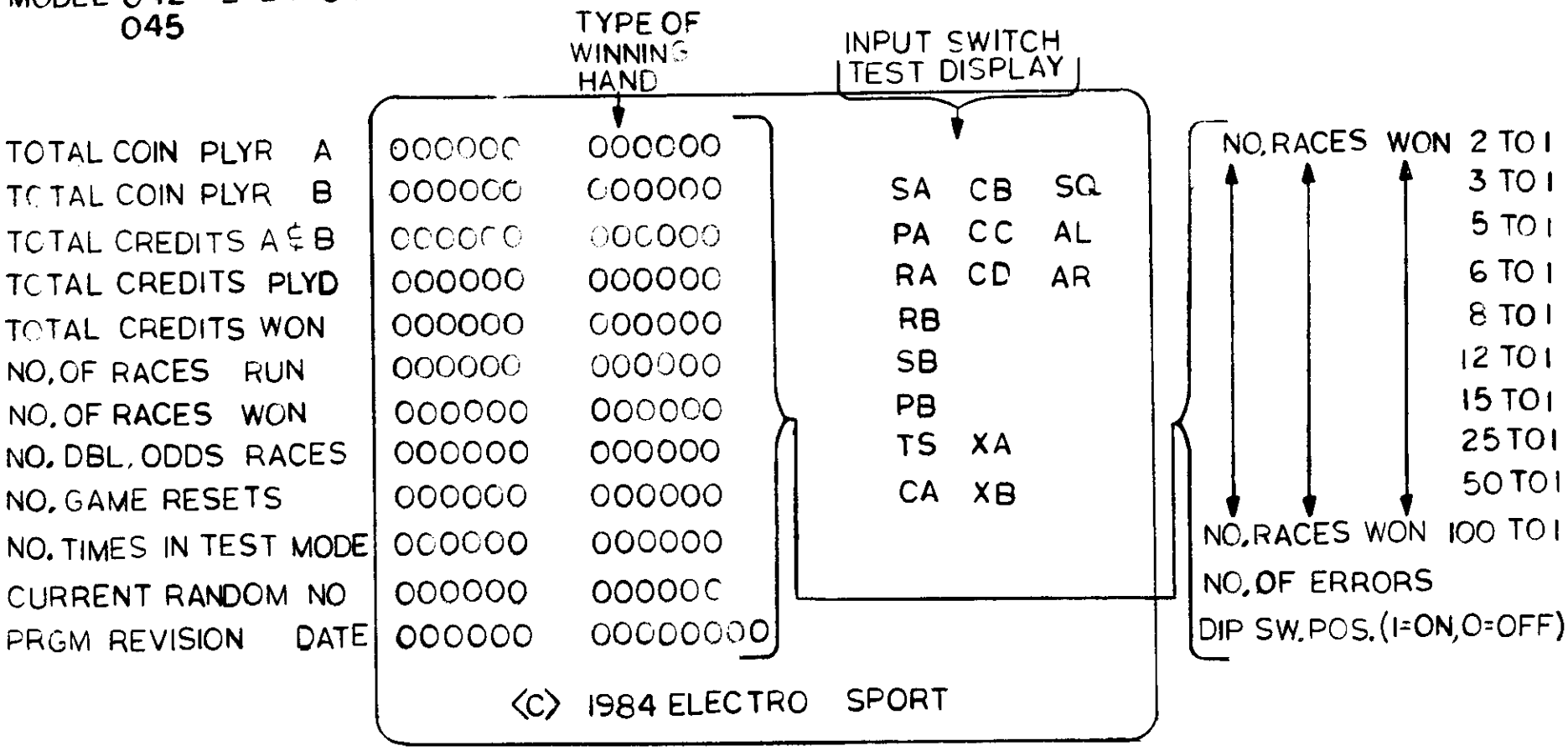
MODEL 041 2-24-84



SA - SELECT PLYR A
RA - NEXT RACE BOTH PLYR
SB - SELECT PLYR B
TS - TEST SW ALWAYS ON
CB - A2 COIN INPUT
CD - B2 COIN INPUT
XB - EXTRA INPUT B
PGM 50-2265,6,7,8

PA - PLAY CREDIT PLYR A
RB - NEXT BOTH PLYR
PB - PLAY CREDIT PLYR B
CA - A1 COIN INPUT
CC - B1 COIN INPUT
XA - EXTRA INPUT A

MODEL 042 2-24-84
045



SA-SELECT PLYR A
RA-NEXT RACE BOTH PLYR
SB-SELECT PLYR B
TS-TEST SW ALWAYS ON
CB-A2 COIN INPUT
CD-B2 COIN INPUT
XB-EXTRA INPUT B
AL-AUDIO LEFT CHANNEL ON
AR-AUDIO RIGHT CHANNEL ON

PA-PLAY CREDIT PLYR A
RB-NEXT RACE BOTH PLYRS
PB-PLAY CREDIT PLYR B
CA-A1 COIN INPUT
CC-B1 COIN INPUT
XA-EXTRA INPUT A
SQ-VIDEO SQUELCH

Quarterhorse Owner's Manual

Game Play

Quarterhorse Game Play.....3.1

GAME PLAY

Quarterhorse Game Play

Insert as many coins as you like, credits will be added to the credit display. Either player may play any number of coins. Player A and Player B may play together or separately.

Press the "Next Race" button, a new race program will appear on the Tote board display.

Press the "Select" button until the cursor is pointing to the horse you want to play.

You may now play up to the operator selected maximum credits by pressing the "Play Credit" button. If more than one credit is to be played, the button may be held down. Each credit played will decrement the credit display by one credit.

The "Select" and "Play credits" procedure above may be repeated if more that one horse is to be played in a given race.

After both players have selected all the horses they wish to play, press the "Start" button. (on model 041 games, if two players are playing, both must press their "Start" buttons)

If this race is a bonus feature race, "Double Odds" will be displayed at the bottom of the tote board monitor. When this occurs, the winning horse will return twice the odds displayed on the tote board.

When the race is completed, the name of the winning horse will flash on the tote board display. If any credits were played on the winning horse, the number of credits played will be multiplied by the odds for the horse and the product added to the credit display. At the same time, the credits won will be displayed in the "Win" display.

Quarterhorse General Maintenence

Cleaning Exterior

The exterior of the game cabinet, the metal, and acrylic sufaces may be cleaned with any non-abrasive, household cleaner. A special coin machine cleaner is available from your distributor.

DO NOT DRY-WIPE the front panel, as any particles that may be on the panel will scratch it and cause the panel to fog.

Always turn the game power OFF before cleaning the game. To clean the disc player, game power must be ON to open the disc player lid.

Unlock and open the front door. To access the front panel, unlatch the retaining latches on either side of the front panel.

On 041 games, prop-up the operating panel. On 042 and 045 games, remove the front panel. A service loop in the panel wire harness allows room to set the front panel in the coin box area for service.

Clean the monitor face, bezel, and the inside surface of the plastic panel.

Use a vacuum cleaner to remove any dust from the inside of the cabinet. Make certain the vents, power supply covers, fans, and filters are in good condition and free of dust and obstructions. On games with more than one monitor, be sure both monitors are always free of dust build-up.

IMPORTANT! Be sure to read the Care and Feeding section, next page.

If dust or smoke particles accumulate on the video disc they will reduce the reflected laser energy and reduce the picture quality or cause mis-tracking of the laser optics. For this reason the video disc should be cleaned at least once a week.

Excessive dust or smoke particles inside the cabinet will eventually coat the laser optics and reduce the effective laser energy to the disc. For this reason the air filter should be changed at least once every three months.

The Care and Feeding of Your Quarterhorse

Cleaning Procedure - NOTE: Your attention to these procedures will protect your warranty.

ONCE A WEEK!

DO - 1) Turn game on, open front door, press Reject switch on discplayer front panel. Open the lid and remove the disc.

DO - 2) Clean the video disc using a weak solution of ammonia-free window cleaner thinned with distilled water, and a LINT-FREE cloth or shammy.

DO - 3) Clean the discplayer objective lens with lens cleaning solution and optical cleaning papers, available from a camera store. After cleaning the lens, inspect to make sure the lens is free of all dust. NEVER TOUCH THE LENS!

DO - 4) Place the lens cap over the objective lens, then clean the inside of the laser disc compartment with a damp cloth.

NOTE: Save the lens cap and shipping screw, DO NOT THROW THESE AWAY, you will need them for cleaning and moving the Quarterhorse game.

DO - 5) Once the laser disc compartment is clean, remove the lens cap and replace the disc. Be sure to flip the laser disc every week and play the other side, to prevent the disc from warping.

DO - 6) Power down the game. Clean any visible dust inside the Quarterhorse cabinet with a damp cloth. Clean the air intake vent of all dust.

ONCE A MONTH!

DO - 1) TURN OFF THE GAME BEFORE CLEANING

DO - 2) At least once a month, clean the entire inside of the Quarterhorse cabinet with a vacuum cleaner. Be careful with the vacuum nozzle, to not damage the innerworkings of the game with the nozzle.

NOTE: Dust filled locations will require more frequent vacuuming and cleaning.

DO - 3) Replace the air filter. The air filter locations are shown on page 6.1 and the filter and fan mounting is shown on page 6.4. The air filter used is:

Napa Part #2054,
Fram Part #CA-184PL,

or equivalent automotive type air filter.

THINGS NOT TO DO

DO NOT use paper towels or an abrasive cleaner when cleaning the laserdisc. This may scratch the disc surface, allowing dust and oils to accumulate.

DO NOT use any kind of cleaning solution that could soften or fog the laserdisc. This will reduce laser reflectivity.

DO NOT remove the little black protecting ring around the objective lens at any time. Be careful and observant when installing or removing the lens cap.

DO NOT at any time touch the surface of the disc, or the surface of the objective lens. The result of adding skin oils to the disc or lens will not be apparent for perhaps weeks, but game performance deterioration is inevitable!

Keep the inside of the Quarterhorse game clean at all times, as this will prolong the life of the game and reduce the number of service calls.

Quarterhorse Owner's Manual

In Case of Trouble

Troubleshooting the Quarterhorse System.....5.1
Quarterhorse Nomenclature.....5.2
041 Block Diagram.....5.3
042, 045 Block Diagram.....5.4
Quarterhorse Modules.....5.5
Timing Checkout Sheet.....5.8
Troubleshooting with the Test Mode.....5.9
Troubleshooting the Conrtoller Card.....5.10
Quarterhorse Troubleshooting by Symptom.....5.11

IN CASE OF TROUBLE

Troubleshooting the Quarterhorse System

All laser games have a tendancy to seem overwhelming when a problem occurs, simply because the system becomes complex to an inexperienced serviceperson. The Electro-Sport Quarterhorse games are simple to troubleshoot when a systematic, modular approach to troubleshooting is used. Study the block diagrams at the end of this section to get a feel for the interconnection of the various modules. Use the Timing Checkout Sheet to isolate the fault to a particular module, then refer to the troubleshooting guide for that particular module.

Too often the environment in which the game is operated, i.e. the location, is overlooked as the cause of game failure. Intermittent performance problems can frequently be traced back to poor line or supply voltage at the location. Overloaded breakers, circuits, and noisy sources such as air conditioning or food processing equipment, or computers and televisions, will cause erratic performance from your Quarterhorse game.

Adherance to the environmental specification, insurance of clean, stable supply voltage, and consistent preventive maintenance will insure consistent, succesful performance from your Electro-Sport equipment.

This troubleshooting section is intended to aid the operator who is not familiar with the Quarterhorse, or laser games in general. For the repair technician, a more complete technical reference is available in the Electro-Sport Service Guide, containing detailed information on Electro-Sport electronic wizardry. Repair and troubleshooting information for all Quarterhorse system components are included.

To order a copy, ask your distributor, or call Electro-Sport, Customer Service Dept., 800-367-1035 and ask to order the Service Guide.

Quarterhorse Nomenclature

The names Quarterhorse and Quarterhorse game refer to these Electro-Sport model numbers:

041: Quarterhorse Mini. Incorporates two monitors; one 13" for the tote board display, and one 19" for display of the race and photo-finish.

042: Quarterhorse Arcade. Incorporates a 19" monitor that displays both the tote board and the race display, all housed in an arcade size cabinet.

045: Quarterhorse Salon. Incorporates a single 13" monitor that displays both the tote board and the race display, all housed in a compact salon size cabinet.

All Quarterhorse games are two player games. Players may play separately or together. Players may play as many horses per race as they wish.

Here is an explanation of common terms used in describing the Quarterhorse system workings and circuitry:

Electronics Pallet: the removeable shelf, upon which are mounted the major electronic assemblies.

Game Board: The square circuit board controlling the Quarterhorse game. Mounted either on the electronics pallet, or atop the discplayer.

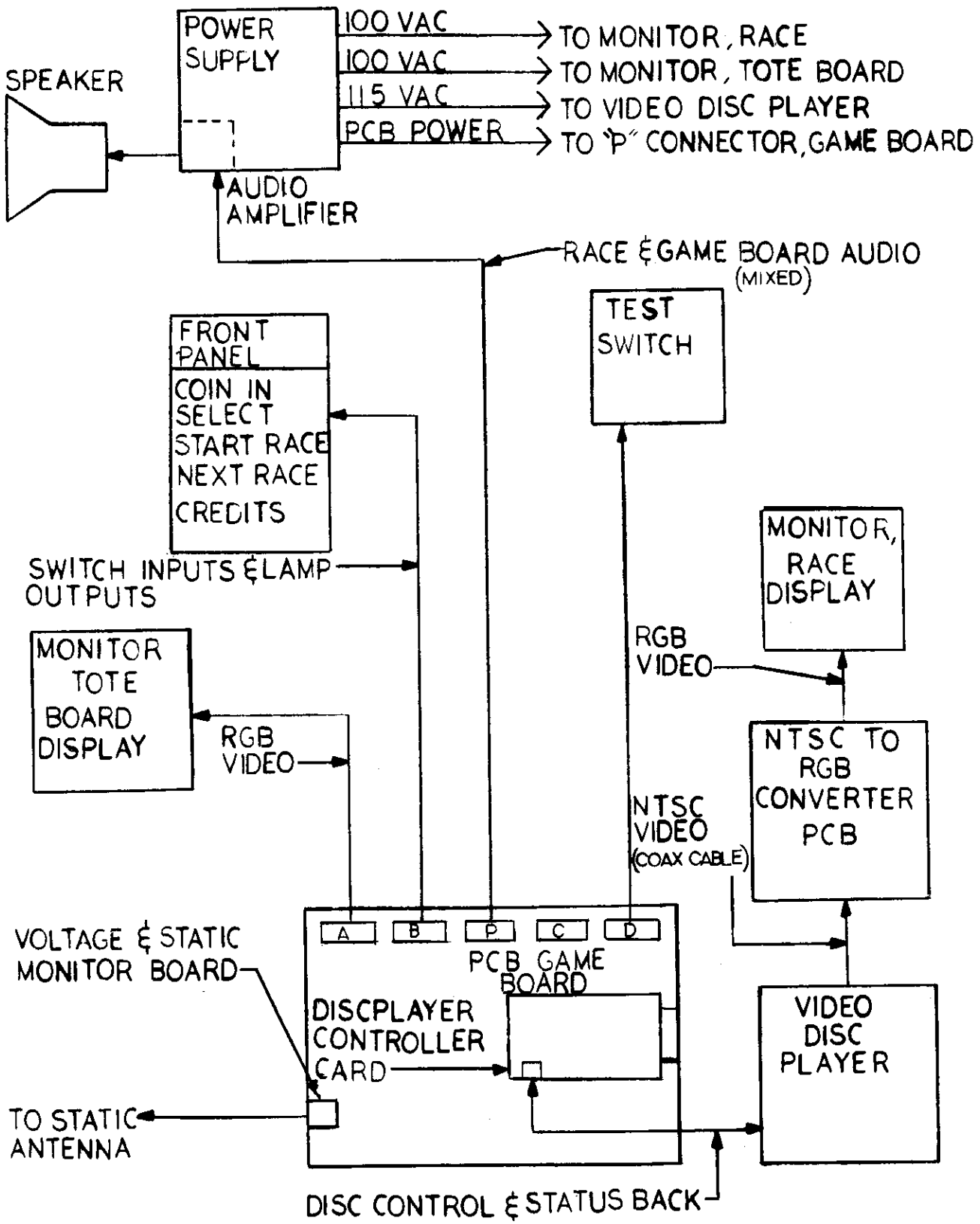
Objective Lens: The visible exterior of the slider, the "eye" you see when you open the lid of the discplayer.

Race Display: The video display of the horses in action.

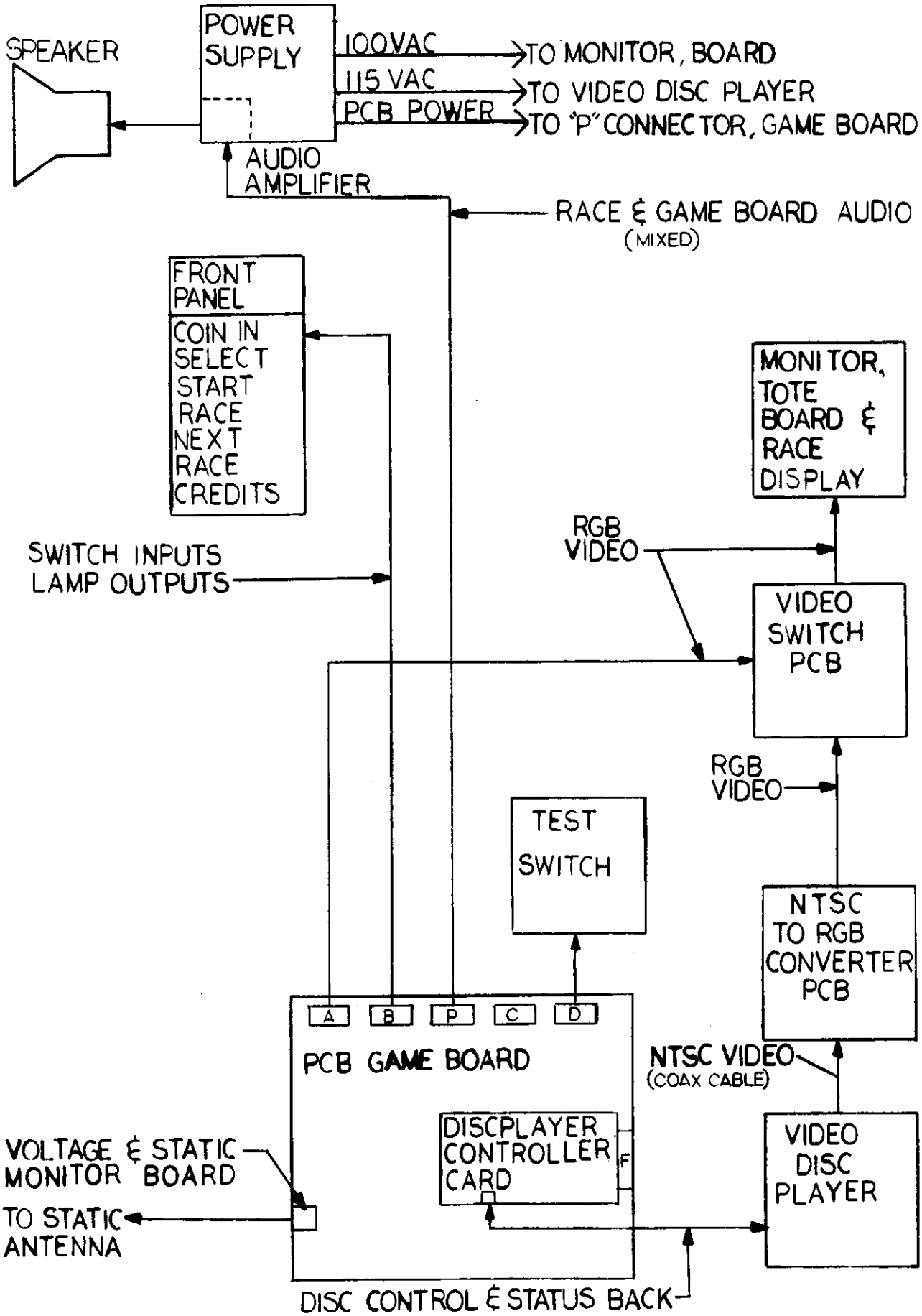
Slider: The assembly inside the discplayer, housing the laser and optical subassemblies.

Tote Board: The display of horse names and odds, used by the player when he plays his credits.

MODEL 041 BLOCK DIAGRAM



MODEL 042 & 045 BLOCK DIAGRAM



Quarterhorse Modules

Here is a brief description of the various modules that make up the Quarterhorse system. Refer to the block diagrams at the end of this section for an understanding of the communication paths between modules.

The Quarterhorse electronic system can be broken down into eight modules:

Power Supply	Game Board
Front Panel	Discplayer
NTSC Decoder	Video Switcher
13" Monitor	19" Monitor

Power Supply

Quarterhorse games use Electro-Sport's PSAA/II, an integrated power supply and audio amplifier. The PSAA/II inputs anything from 90 to 245 VAC and produces all the outputs required to run the Quarterhorse system, as well as provide an on-board audio amplifier.

Full descriptions of the PSAA/II are available in the power supply section of this manual.

Game Board

The Quarterhorse game board is an adaptation of Electro-Sport's multi-function game board, and includes a discplayer controller card, a voltage/static monitor circuit, and special software.

A description of the game board is available in the game board section of this manual.

The discplayer controller card is a proprietary product of Electro-Sport, Inc., and schematics are not available. The Game Board Troubleshooting section includes a description of what the controller card is doing, and where and how to examine board signals for troubleshooting and repair.

Front Player Panel

The front panel incorporates all operating switches and coin mechanisms, and is the means by which the player interacts with the Quarterhorse game.

The Front Panel can be removed for service, by releasing the latches on either side, inside the cabinet. An extra length is added to the Front Panel harness, as a service loop to allow the panel to be set inside the coin box area. Removing the Front Panel allows the plexiglass screen to be removed for maintenance and service of the monitor.

The Front Panel interfaces with the game board through the "B" connector (see Game Board description), and all switches, lamps, and coin mechanisms on the panel can be tested in the Test Mode.

Discplayer

All Quarterhorse games use either the Pioneer PR 8210 or the Magnavox VC 8010 laser disc player. In the Quarterhorse game, these discplayers are interchangeable.

The discplayer generates the race display and the race call (audio track). A brief guide to the discplayer is included in this manual.

NTSC Decoder

All Quarterhorse games use an NTSC decoder circuit to decode the composite video from the discplayer, into an RGB signal for the monitors. In 041 games the NTSC decoder board is next to the 19" monitor, and in 042 and 045 games, the board is part of the electronics pallet.

Video Switcher

The Video Switcher circuit is used in 042 and 045 Quarterhorse games, to switch back and forth from the tote board display, generated by the game board, and the race display, generated by the discplayer. The Video Switcher is located on the electronics pallet, and is controlled by the game boad.

Model 041 Quarterhorse games do not use the Video Switcher.

13" Monitor

In the 041 game, the 13" monitor is used as the display for the tote board, and displays the Test Mode and Set-Up Mode. In the 045 game, the 13" monitor displays all video.

Current production Quarterhorse games use Sega monitors.

A schematic for the Sega is included in this manual.

19" Monitor

In the 041 game, the 19" monitor is used as the display for the race and photo-finish. In the 042 game, the 19" monitor displays all video.

Allowing for differences in the high-voltage and horizontal drive sections, the schematic for the 13" Sega can be used to troubleshoot the 19" Sega.

Quarterhorse Timing Checkout Sheet

Here is a simple description of the timing of the Quarterhorse system. Following this guide will allow you to make field identification of faulty components.

First, find the LED's. (LED's are Light Emmiting Diodes, small low-power lamps used as indicators in the Quarterhorse game.) The Voltage/Static LED is on the 2X2" square board atop the game board. It should be set to half-intensity. Also atop the game board, the Discplayer Controller Card has an LED in it's center. This LED will give short, brief flashes. On the Discplayer, the Standby LED is near the Reject button. Whenever the discplayer is busy, (starting, stopping, searching) this LED will flash. About half-way down the Discplayer front panel, there is another LED, labeled Play. This LED will be on when the discplayer is playing. Finally, the discplayer has two audio indicators, left and right on US models. In the Quarterhorse game, only one will be on at a time, and then only during a race.

Note that the discplayer also has a power indicator LED. This should be on any time power is applied to the Quarterhorse game.

Timing sequence of the Quarterhorse system is as follows:

1. When power is applied, the Voltage/Static LED will come up to the half-intensity level.

2. The Discplayer Controller Card LED will give three quick flashes, commanding the discplayer to Play. This will be followed by single short flashes, search commands waiting for active video.

3. The Discplayer Play LED will come on and remain on. The discplayer Standby LED will begin flashing and flash for about 40 seconds, until the disc comes up to speed.

4. The two Audio Indicator LED's will be turned off by the game board shortly after the Play command is sent.

The game takes approximately 40 seconds to start after power is applied. When Reset is applied, the game takes approximately 20 seconds to restart.

When trouble occurs, this Timing Checkout Sheet will point you toward the faulty component. The Test Mode also can be used for diagnostic analysis and troubleshooting, as described on the next page.

Troubleshooting With the Test Mode

The Test Mode was designed to allow full performance analysis of the Quarterhorse system. It also allows full diagnostic interpretation and troubleshooting of the system.

In the event of a problem, the Quarterhorse display will show one of two error messages, Disc Error indicating that the game board didn't find what it expected on the VSP line from the discplayer, or Audio Error indicating that the game board didn't find what it expected on either of the audio indicators.

The Game Board will run without the discplayer, by de-energizing the game, activating the two coin switches, and re-applying power to the game. The normal Tote Board will be displayed. Activate the Test Switch to enter the Test Mode.

Examine all registers of the Test Mode display, to see if anything indicates a Game Board problem. The Discplayer Status signals AL (audio left), AR (audio right), and SQ (video squelch, same as VSP) can be observed on the right hand side of the screen, and toggled by activating switches on the discplayer front panel.

Hexadecimal numbers in the Test Mode registers usually indicate problems with the on-board RAM, however, many Quarterhorse games have hexadecimal numbers as part of the random number register routine and they regularly show up in the register. This should be considered normal.

Small numbers in the RAM Errors register will infrequently be present, a normal electric noise phenomena. Consistent RAM errors indicate that the board should be tested by a technician. The RAM may be bad.

All Electro-Sport Quarterhorse software automatically compensates for any and all RAM errors, testing RAM registers as often as 100 times per second.

Electro-Sport recommends that the Diagnostic Test Display be initialized at least once a month. The Clear Code sequence is listed on page 2.6

Troubleshooting the Controller Card

The Discplayer Controller Card, piggybacked atop the Game Board, sends commands to the discplayer, and returns status and audio tracks to the Game Board. Communication to the discplayer is through a 10-wire ribbon cable. The cable plugs into the controller card with the BROWN wire to the RIGHT.

The Brown wire is the command line, sending encoded signals the discplayer receives as instructions. The Blue wire carries both left and right audio (only one is active at any time). The White wire is the VSP or Video Squelch line. The Yellow and Orange wires are Audio 1 and Audio 2 LED indicators.

Because different Quarterhorse games reverse some of these signals, you should observe logic state changes rather than a table of levels. An oscilliscope is always the preferred tool, since you can see circuit noise, however if a logic probe is used be sure to use a probe capable of displaying tri-state levels.

The signals can be observed on IC 2F (74367 or 74LS367) on the controller card. Pin 2 is Audio 2, pin 4 is Audio 1, and pin 6 is VSP (or SQ in the Test Mode display). Toggling the switches on the discplayer front panel causes corresponding changes on the voltage levels on these pins.

The Controller Card attaches to the Game Board through a 40 pin edge connector. Inspect this connector and clean edge contacts with an eraser or alcohol as required.

We strongly recommend that any Controller Card in need of service be returned to Electro-Sport. See section 12 for details.

Quarterhorse Troubleshooting By Symptom

Symptom	Likely Cause
Race display is jittery or skips like a stuck record.	1. Dirty disc 2. Dirty objective lens 3. Scratched or damaged disc 4. Broken pinion gear in discplayer. Requires service.
Section of one race will repeat itself, displayer lid will not open.	1. Voltage/Static board not properly adjusted. 2. Discplayer out of sync, slider not moving. Get a thin, long screwdriver. Turn discplayer power switch off. Locate small rectangular opening, under front center of discplayer lid. Vertically insert screwdriver 3" and GENTLY rock blade of screwdriver toward you, activating release solenoid.
Discplayer not functional.	1. Discplayer not plugged in at junction box. 2. Discplayer power switch not turned on. 3. Ribbon cable not connected, dirty, or defective.

Note: Ribbon cable plugs in with the BROWN wire to the RIGHT.

Quarterhorse Circuit Board

The Quarterhorse game utilizes a configuration of Electro-Sport's ingenious multi-function game board. The game board is mounted on a metal plate using plastic stand-offs. Be sure to excercize care when handling the circuit board to insure against breakage of the plastic stand-offs.

The metal plate is included to insure against RF interference, and will be mounted either on the discplayer or on a separate pressboard pallet, depending on the game model number.

The Quarterhorse game board is easily identified as such by noting the serial number, which will be of the form XXXXX-Q, the Q indicating Quarterhorse. The basic circuit board is approx. 13x13", with two additional smaller boards piggybacked on the larger board. The larger of these two piggybacked boards is the discplayer controller card, which communicates between the circuit board and the discplayer. The smaller board is the voltage/static monitor circuit, a 2x2" board with an LED dead center, and an adjustment potentiometer directly next to it. Be sure to read the sections in this manual giving the adjustment procedures for the voltage/static monitor board.

Across the rear of the main circuit board are five connectors. If the board is oriented such that the connectors are opposite you, and the voltage/static circuit is directly to your left, the connectors are identified as follows:

"A" connector - far left side - outputs RGB video and sync data to the monitor
"B" connector - second from left - handles player I/O and coin mechanisms
"P" connector - center of board - inputs circuit and lamp voltage to circuit board, and inputs Sense/Reset line
"C" connector - second from right - not used in Quarterhorse
"D" connector - far right - inputs the test switch and spare I/O

The discplayer controller card mates to the game board by way of a double 20 pin edge connector, identified as the "F" connector. If this connector is found to be loose, it is a wise precaution to clean the contacts with an eraser or alcohol, and to clean the connector itself using compressed air.

The discplayer communicates with the controller card through a 10-pin ribbon cable. With the game board in it's normal mounted position, be sure that you install this ribbon cable so that the brown wire is to the RIGHT, otherwise there is a danger of damaging the discplayer.

(QH circuit board cont.)

The A, C, and D connectors are 20-pins; the B connector is 26 pins, and the P connector is 12 pins.

On the discplayer controller card, the potentiometer located just beneath the labeled ROM is the audio level adjustment for the discplayer audio. This should be set such that the discplayer audio and the "call to post" that sounds whenever the "Next Race" switch is pressed are at the same volume level. The only other adjustments on the Quarterhorse circuit board are the two potentiometers located on the voltage/static monitor board. These two pots should be adjusted in accordance with the adjustment procedure for the voltage/static monitor circuit included in this manual.

Always excercise care when handling the Quarterhorse circuit board. Never force connectors by stressing the board. Never remove or install connectors with the board energized. Take care not to install the wrong connectors in the wrong lcations; this can cause serious damage to your circuit board. Whenever you are in doubt, refer to the above connector description, and to the Quarterhorse block diagrams included in this manual.

Voltage/Static Circuit

The purpose of this circuit is to reset the game boards in the eventthat the supply voltage rises or falls more than five percent from its nominal setting, and to reset the board in the event that a static discharge is detected. The board reset will help to protect the contents of the CMOS RAM under adverse operating conditions.

Circuit Operation

The 3.3 Zener CR5, temperature compensated by CR4, sets a reference with respect to the +5 volt input. This reference is compared with the voltage from R10 to U1A. The amplified difference of these two voltages is then available on the output of U1A is then inverted by U1B. The outputs of U1A and U1B are then ORed by CR1 and CR2 and then fed to UIC. In normal operation, the outputs of U1A and U1B will equal and the output of U1C will be low. If the output of U1A or U1B drops below the voltage set by R10, the output of U1C will go highturning Q1 and Q2 on to reset the game board. For voltages too low for U1 to operate, Q3 will turn off and the voltage sourced by R12 will turn Q1 and Q2 on.

U1D compares the voltages from U1A and U1B for the purpose of adjusting R10. When R10 is properly adjusted, CR6 will be at a half intensity level. If R10 is improperly adjusted, the LED will be full on or full off.

In the case of a static discharge near the game, radio frequencies generated by the spark are picked up by the antenna and fed to the base of Q1 through R9 and C1. R9 can be adjusted to control the sensitivity to static.

Adjustment

1. Turn the game on and measure the +5 volts at the game board. Adjust the power supply if required.

NOTE: The factory sets the +5 VDC to 4.80 volts. This is the optimal setting.

2. Adjust the variable resistor marked V. Adj on voltage/ static monitor board so that the LED is at about half intensity level.

NOTE: This is the optimum setting.

Over long periods of operation the LED may turn off or on fully. Although this means the adjustment is not optimum it will not interfere with normal operation. The voltage adjust resistor should require adjustment very rarely.

Quarterhorse Owner's Manual

Discplayer

Laser Disc Players.....8.1
Discplayer Troubleshooting.....8.2

DISC PLAYER

Laser Disc Players

Electro-Sport Quarterhorse systems use either the Pioneer PR-8210 or the Magnavox VC-8010 laser disc player. For the purpose of the Quarterhorse system, these disc players are interchangeable.

The disc players are modified in order to tap some of the internal signals. The disc player communicates to the Discplayer Controller Card through a 10 pin ribbon cable. This cable attaches to the Controller Card with the BROWN wire to the RIGHT.

Disc players require consistent preventive maintenance to insure proper operation. In time disc players, like televisions, will require some realignment. Discplayer alignment must be performed by competent technicians only.

If a Quarterhorse game, or a discplayer, is to be moved for any reason, the shipping screw and lens cap must be installed to protect the slider from damage. Failure to install the shipping screw and lens cap will void all warranties.

Discplayer Troubleshooting

Allowing for differences in cosemetics and front panel layout, this troubleshooting information can be used for all Electro-Sport disc players.

As dirty discs and optics are by far the most frequent cause of discplayer failure, we suggest any troubleshooting session begin with cleaning both disc and objective lens.

For service, the discplayer can be run without the Game Board. Turn game power off and remove the ribbon cable from the Discplayer Controller Card. Turn game power back on and press the Play button on the front panel of the disc player. The disc player will function as an independent unit.

As a troubleshooting aid, Electro-Sport makes available a remote control unit for the discplayer. This battery operated unit is the standard infared discplayer control. To use on Electro-Sport discplayer, remove the dummy plug from the remote jack in the rear of the disc player. Be sure to reinstall this plug when discplayer service is complete.

Ribbon Cable Pinout

Pin number	1	Brown	Command line from Controller Card
	2	Red	No Connection
	3	Orange	Audio 2 LED indicator
	4	Yellow	Audio 1 LED indicator
	5	Green	Audio ground
	6	Blue	Mixed left and right audio (only one active at any time)
	7	Violet	Audio ground
	8	Grey	No connection
	9	White	Video Squelch (VSP)
	10	Black	Command line ground

The command line is a gated 38 KHZ pulse. The mixed audio is an audio signal. All other levels are logic levels, and discplayer front panel switches can be activated to toggle the logic states.

QUARTERHORSE VIDEO ALIGNMENT

Refer to this alignment procedure any time your Quarterhorse game is in need of video alignment. Model 041 games use separate monitors for tote board and race display. Model 042 and 045 utilize a single monitor display. The procedures remain the same in both cases, however on model 041 the "TOTE" board alignment will be on the lower monitor and the race display will be on the upper monitor.

1. Turn on the Quarterhorse game in accordance with normal set-up procedure. Wait for the tote board to be displayed.

2. Examine the tote board display. Set the focus control in the rear of the monitor for a brightness level appropriate for the location in which the game is placed (easily legible, display not smearing or overdriven). Adjust horizontal and vertical sync as required.

3. Examine the colors of the tote board display. Top center of the screen, the words "Quarterhorse" and the race number should be WHITE. Player A (left side) header (credits, insert coin, etc.) should be GREEN, and player B (right side) header should be RED.

   IF the colors are splattered or appear as a rainbow across the CRT display, degauss the monitor chassis and tube using a degaussing coil. Be sure to step back at least six feet from the monitor, and turn the coil 90 degrees before de-energizing the degaussing coil. The monnitor should be energised for the degaussing proceedure.

If the colors are off adjust the color guns in the rear of the monitor, mounted on the CRT neck board. adjust the colors to match the description above. Always start by backing off three color guns.

IF the colors are not in error do not adjust the color guns! The color guns are set at the factory and should require no further alignment, except to compensate for component aging. It is easy to cause more problems than are corrected when adjusting the color guns.

Caution! Use safety precautions when adjusting the color guns! Beware of the high-voltages present on the CRT neck board.

Note that the tote board display is generated by the game board. The race display, generated by the discplayer, is decoded by the NTSC decoder board before it is fed to the RGB monitor. All monitor adjustments should be performed with the tote board display as reference. All adjustments to the race display should be made on the NTSC decoder board. The NTSC decoder board is adjusted as follows:

4. Select the test mode by toggling the test switch.

5. On model 042, 045 games, select the discplayer display by setting DIP switch #4 on the game board to the "ON" position. ON model 041 games the race display is on the 19" monitor.

6. Pre-set the NTSC decoder board as follows:

Video Level	- R7	- to the midrange position
Contrast	- R6	- midrange
Brilliance	- R30	- midrange
Tint	- R36	- midrange
Color	- R39	- maximum clockwise
Chroma Level	- R44	- maximum counter-clockwise

7. Adjust video level (R7) for maximum brightness without image distortion.

8. Adjust contrast (R6) for maximum brightness of colors without color smearing.

9. Adjust brilliance (R30) for desired picture level and sharpness of colors without smearing or distortion.

Electro-sport's PS/AA-II

This Electro-Sport game uses the PS/AA-II modular power supply and audio amplifier combination. This rugged compact unit inputs 90 to 245 VAC and produces a number of outputs, in addition to housing a high-performance audio section. The transformer is a detached assembly, enabling simplified service.

Voltage Select Plug

The PS/AA-II uses a Voltage Select Plug, the "V" connector on the side of the PS/AA-II circuit board, to enable the regulation of certain outputs regardless of input level. The factory sets connector V for an input of 115 volts. If you install the game in a location where the voltage is more than 5% outside this range, you must reconfigure or replace the V connector. The chart for the Voltage Select Plug is on the following page.

The 5 Volt output is adjusted at the factory to 4.80 Vdc, the optimal setting, measured across the supply capacitors on the front of the game board. If adjustment is necessary, R8, the voltage adjust, is located on the PS/AA-II circuit board and may be reached by a hole located in the center of the mesh cover. An accurate volt meter should be attached to a game board supply capacitor and R8 SLOWLY turned until a reading of 4.80 VDC is obtained.

NOTE: For safety, use a plastic alignment tool when adjusting R8.

PS/AA-II Replacement

Unplug the AC line cord from the wall outlet and the PS/AA-II connector.

Unplug the monitor cable (4 pin connector) from the "M" connector on the PS/AA-II.

Unplug the speaker cable (3 pin connector) from pins 1, 2, and 3 of the "Q" connector on the PC board.

Unplug the "K" connector from the PS/AA-II.

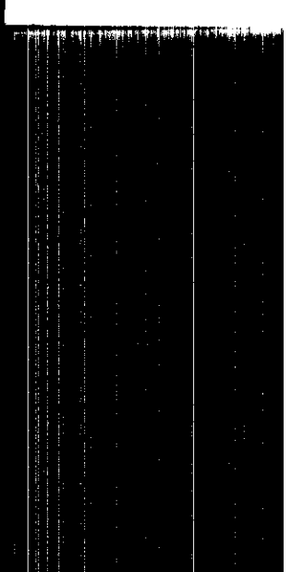
Unplug the "L" connector from the PS/AA-II.

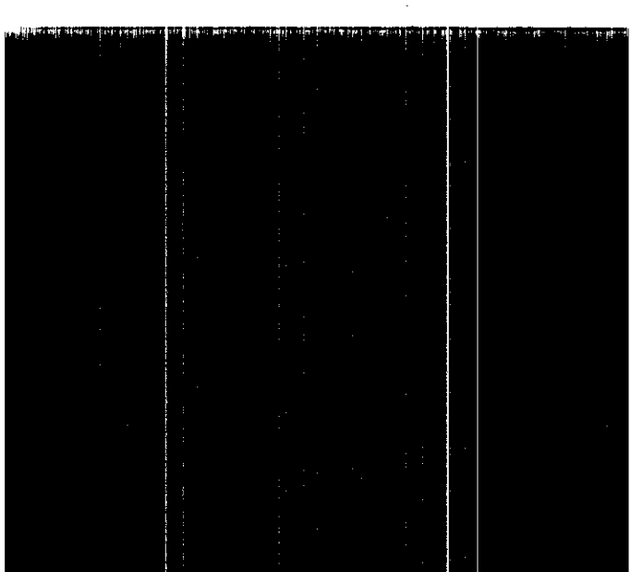
Remove the cabinet mounting screws.

To remove the transformer from the unit, remove the 4 mounting screws.

Remove the PS/AA-II unit from the cabinet.

To reinstall the PS/AA-II, reverse the above steps.





If the colors are off adjust the color guns in the rear of the monitor, mounted on the CRT neck board. adjust the colors to match the description above. Always start by backing off three color guns.

IF the colors are not in error do not adjust the color guns! The color guns are set at the factory and should require no further alignment, except to compensate for component aging. It is easy to cause more problems than are corrected when adjusting the color guns.

Caution! Use safety precautions when adjusting the color guns! Beware of the high-voltages present on the CRT neck board.

Note that the tote board display is generated by the game board. The race display, generated by the discplayer, is decoded by the NTSC decoder board before it is fed to the RGB monitor. All monitor adjustments should be performed with the tote board display as reference. All adjustments to the race display should be made on the NTSC decoder board. The NTSC decoder board is adjusted as follows:

4. Select the test mode by toggling the test switch.

5. On model 042, 045 games, select the discplayer display by setting DIP switch #4 on the game board to the "ON" position. ON model 041 games the race display is on the 19" monitor.

6. Pre-set the NTSC decoder board as follows:

Video Level	- R7	- to the midrange position
Contrast	- R6	- midrange
Brilliance	- R30	- midrange
Tint	- R36	- midrange
Color	- R39	- maximum clockwise
Chroma Level	- R44	- maximum counter-clockwise

7. Adjust video level (R7) for maximum brightness without image distortion.

8. Adjust contrast (R6) for maximum brightness of colors without color smearing.

9. Adjust brilliance (R30) for desired picture level and sharpness of colors without smearing or distortion.

INDEX

Electro-Sport, Inc.

Quarterhorse Owner's Manual

Index to Contents

Game Inspection.....1.0
Installation Requirements.....1.1

Game Set-up and Options.....2.0
QH Set-up Mode.....2.1
Set-up Mode Functions.....2.2
DIP Switch Selections.....2.4
Clear Code Sequence.....2.6
QH Test Mode.....2.7

Game Play.....3.0

General Maintenance.....4.0
QH Care and Feeding.....4.2

In Case Of Trouble.....5.0
QH Nomenclature.....5.1
Troubleshooting.....5.2
QH Modules.....5.3
Timing Checkout Sheet.....5.6
Troubleshooting By Symptom.....5.7
QH Block Diagrams.....5.11

Cabinet Layout.....6.0
Layout and Part Numbers, 041.....6.1
Layout and Part Numbers, 042.....6.2
Layout and Part Numbers, 045.....6.3
Switch Assembly.....6.4

Game Board.....7.0
Description.....7.1
Voltage/Static Circuit.....7.3
Processor Board Pictorial.....7.5
Discplayer Controller Card Pictorial.....7.6

Discplayer.....8.0
Description.....8.1
Harness Pinout Table.....8.2
Troubleshooting.....8.3

Monitors.....9.0
Description.....9.1
QH Video Alignment Procedure.....9.2
NTSC Board Adjustment Points.....9.5
13" Sega Monitor Schematic.....9.6

Electro-Sport, Inc.

Quarterhorse Owner's Manual

Index to Contents

Game Inspection.....1.0
Installation Requirements.....1.1

Game Set-up and Options.....2.0
QH Set-up Mode.....2.1
Set-up Mode Functions.....2.2
DIP Switch Selections.....2.4
Clear Code Sequence.....2.6
QH Test Mode.....2.7

Game Play.....3.0

General Maintenance.....4.0
QH Care and Feeding.....4.2

In Case Of Trouble.....5.0
QH Nomenclature.....5.1
Troubleshooting.....5.2
QH Modules.....5.3
Timing Checkout Sheet.....5.6
Troubleshooting By Symptom.....5.7
QH Block Diagrams.....5.11

Cabinet Layout.....6.0
Layout and Part Numbers, 041.....6.1
Layout and Part Numbers, 042.....6.2
Layout and Part Numbers, 045.....6.3
Switch Assembly.....6.4

Game Board.....7.0
Description.....7.1
Voltage/Static Circuit.....7.3
Processor Board Pictorial.....7.5
Discplayer Controller Card Pictorial.....7.6

Discplayer.....8.0
Description.....8.1
Harness Pinout Table.....8.2
Troubleshooting.....8.3

Monitors.....9.0
Description.....9.1
QH Video Alignment Procedure.....9.2
NTSC Board Adjustment Points.....9.5
13" Sega Monitor Schematic.....9.6