

# SERVICE BULLETIN BOOK

## 1995

### *WMS GAMES* PARTS AND SERVICE INC.

WILLIAMS ELECTRONIC GAMES, INC.  
MIDWAY MANUFACTURING COMPANY  
*MAKERS OF WILLIAMS AND BALLY AMUSEMENT GAMES*

3401 N. CALIFORNIA AVE.  
CHICAGO, IL 60618  
SERVICE DEPT. PHONE: (312) 961-1544 FAX: (312) 961-1080

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# W M S G A M E S

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### SERVICE TIP

#### FLIPPER COILS USED IN WILLIAMS AND BALLY PINBALL MACHINES

AT WILLIAMS BALLY/MIDWAY, WE TRY TO HAVE A BALANCE OF POWER FOR THE FLIPPERS WHICH IS REALLY BASED ON THE LAYOUT AND DESIGN OF A GIVEN GAME. OBVIOUSLY, FLIPPERS ARE ONE OF THE MOST IMPORTANT PARTS FOR PLAYER SATISFACTION. AND, IF YOU HAVE A WEAK FLIPPER IT CAN ADVERSELY EFFECT A PLAYER'S ENJOYMENT AND ABILITY TO PLAY A MACHINE. CONVERSELY, IF THE FLIPPER IS TOO STRONG, THE BALL WILL TEND TO BOUNCE AND COULD CAUSE UNNECESSARY DAMAGE TO THE PLAYFIELD.

GOING FROM THE LIGHTEST, OR WEAKEST, THIS IS A HANDY REFERENCE LIST.

FL-11753 YELLOW: USED WITH SHORT FLIPPERS AND CLOSE SHOTS.

FL-11722 GREEN: USED FOR CLOSE SHOTS NEAR DROP TARGETS.

FL-11630 RED: THE STANDARD AND MOST FREQUENTLY USED.

FL-15411 ORANGE: USED ON LONG PLAYFIELD SHOTS.

FL-11629 BLUE: USED ON LONG SHOTS AND HIGH RAMPS.

IN REBUILDING OLDER 50 VOLT (FIREPOWER II UP TO F-14 TOMCAT) GAME FLIPPERS THAT DID NOT HAVE PARALLEL WOUND STYLE COILS, MAKE CERTAIN THAT YOU DO NOT HAVE AN OVER-POWERED COIL (TOO STRONG), BECAUSE THE PLAYFIELDS DID NOT HAVE THE EXTRA SUPPORT FOR THE PLASTIC POSTS AND PLAYFIELD RAMPS THAT ARE BUILT INTO TODAY'S GAMES.

## WILLIAMS AND BALLY GAMES BY SYSTEM

THIS IS A LISTING OF GAMES BY THE CPU SYSTEM IT USED. 11A BOARDS CAN BE USED FOR 11 AND 11A GAMES. 11B BOARDS CAN BE USED FOR 11A, 11B, AND 11C. SYSTEM 9, 11, AND 11C CAN ONLY BE USED FOR THEIR OWN SYSTEMS RESPECTIVELY. WPC CPU'S BEFORE "INDIANA JONES" CAN ONLY BE USED ON GAMES MADE BEFORE "INDY". ANY WPC CPU'S AFTER "INDY" (GAMES WITH A "\*" AFTER THEM) ARE DOWNWARD COMPATIBLE. STARTING WITH "WORLD CUP" (GAMES WITH A "S" AFTER THEM) WE WILL BE USING A SECURITY CPU, THESE CPU'S ARE NOT DOWNWARD COMPATIBLE.

<u>GAME</u>	<u>SYSTEM</u>
SPACE SHUTTLE	9
SORCERER	9
COMET	9
STRIKE ZONE	9
HIGH SPEED	11
GRAND LIZARD	11
ROAD KINGS	11
ALLEY CATS	11
PINBOT	11A
MILLIONAIRE	11A
F-14 TOMCAT	11A
FIRE!	11A
TIC TAC STRIKE	11A
BIG GUNS	11A/11B
SPACE STATION	11B
CYCLONE	11B
BANZAI RUN	11B
SWORDS OF FURY	11B
TAXI	11B
JOKERZ	11B
GOLD MINE	11B
TOP DAWG	11B
EARTHSHAKER	11B
BLACK KNIGHT 2000	11B
POLICE FORCE	11B
ELVIRA	11B
TRANSPORTER	11B
BAD CATS	11B
SHUFFLE INN	11B
MOUSIN' AROUND	11B
WHIRLWIND	11B
SHUFFLE INN DELUXE	11B
GAME SHOW	11C
POOL SHARKS	11C
ROLLER GAMES	11C

WILLIAMS AND BALLY GAMES BY SYSTEM (CONTINUED)

<u>GAME</u>	<u>SYSTEM</u>
DINER	11C
RIVERBOAT GAMBLER	11C
BUGS BUNNY	11C
DR. DUDE	11C/WPC
FUNHOUSE	WPC
HARLEY DAVIDSON	WPC
THE MACHINE	WPC
SLUGFEST	WPC
GILLIGAN'S ISLAND	WPC
TERMINATOR 2	WPC
PARTY ZONE	WPC
ADDAMS FAMILY	WPC
STRIKE MASTER	WPC
STRIKE MASTER JR.	WPC
HURRICANE	WPC
THE GETAWAY	WPC
BLACK ROSE	WPC
FISHTALES	WPC
DOCTOR WHO	WPC
CREATURE FROM THE BLACK LAGOON	WPC
WHITE WATER	WPC
HOT SHOT	WPC
DRACULA	WPC
TWILIGHT ZONE	WPC
INDIANA JONES	WPC*
JUDGE DREDD	WPC*
STAR TREK	WPC*
POPEYE	WPC*
DEMOLITION MAN	WPC*
WORLD CUP	WPC(S)
THE FLINTSTONES	WPC(S)
CORVETTE	WPC(S)
ROADSHOW	WPC(S)
THE SHADOW	WPC(S)
DIRTY HARRY	WPC(S)

# **W M S G A M E S**

## **PARTS & SERVICE INC.**

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### **SERVICE BULLETIN**

DATE: OCTOBER 7, 1994

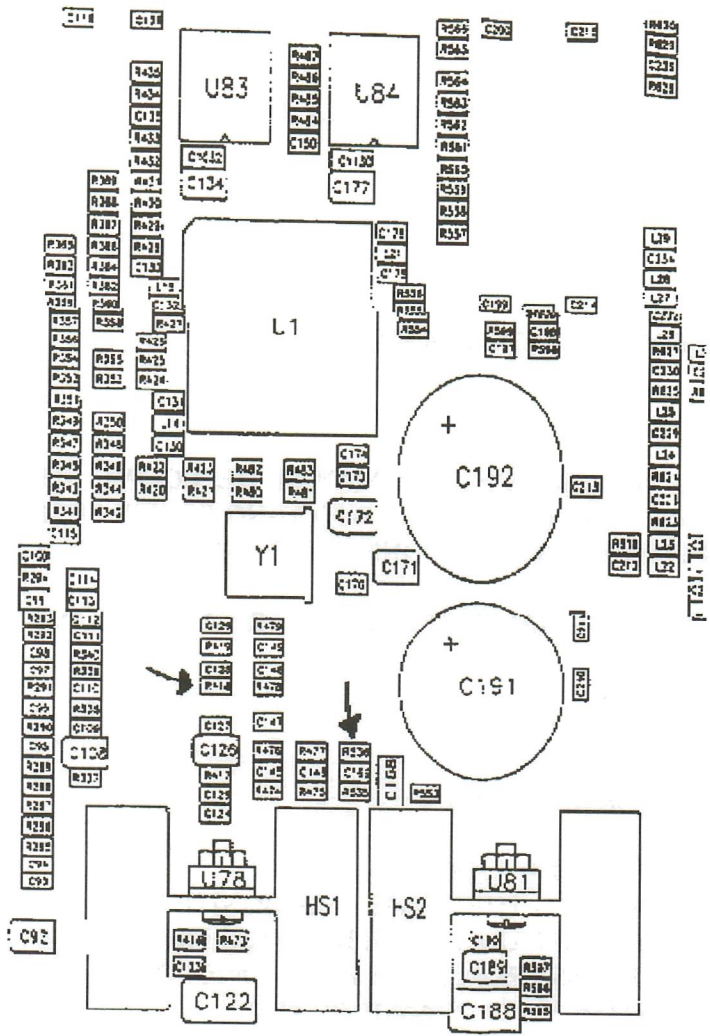
SB71

GAME: "CRUIS'N USA"

SUBJECT: VOLUME TOO LOW FOR SOME LOCATIONS.

THE MAXIMUM VOLUME LEVEL ON "CRUIS'N USA" (ALL MODELS) MAY NOT BE LOUD ENOUGH FOR SOME LOCATIONS. THE MAXIMUM VOLUME CAN BE INCREASED BY CHANGING THE VALUE OF TWO RESISTORS, R418 AND R536 ON THE VIDEO\SOUND BOARD (PART # A-19233-40033). FROM A 47K, 1/10w, 5% TO A 22K, 1/10w, 5% (PART # 5020-14381-00).

**NOTE:** TO HELP IN LOCATING THE RESISTORS, PLEASE REFER TO THE ARROWS IN THE DIAGRAM ON PAGE 2 OF THIS BULLETIN. THE RESISTORS ARE LOCATED BETWEEN U1 (THE ADSP-2105) AND THE TWO HEAT SINKS FOR THE POWER AMPLIFIERS (LABELED HS1 & HS2).



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### SERVICE BULLETIN

DATE: OCTOBER 27, 1994

SB72

GAME: "CRUIS'N USA"

SUBJECT: POSSIBLE DEFECTIVE MONITOR CABLE

SOME MONITOR CABLES ON "CRUIS'N USA" MAY BE DEFECTIVE. THE CABLE IN QUESTION GOES BETWEEN THE (MONITOR) SWITCHING POWER SUPPLY CONNECTOR # CN104 AND THE MAIN CHASSIS BOARD CONNECTOR P150 ON WELLS-GARDNER MONITORS.

THE SERIAL NUMBERS OF THE GAMES INVOLVED ARE AS FOLLOWS:

DOMESTIC - 232001 TO 232498

INTERNATIONAL - I 234001 TO I 234683

THE PART # FOR THIS CABLE IS A-19817

THE PROCEDURE TO CHANGE THE CABLE IS:

1. DISCONNECT POWER TO THE GAME AND MONITOR.
2. CUT TIE-WRAP(S) TO SEPARATE THE HARNESS FROM THE OTHER CABLES.
3. DISCONNECT HARNESS FROM EACH END. (CN104 ON MONITOR POWER SUPPLY AND P150 ON MAIN CHASSIS BOARD.
4. RE-CONNECT NEW HARNESS (PART # A-19817)
5. SECURE THE FERRITE BEAD (ORANGE WIRE GOES THROUGH IT) WITH A TIE-WRAP TO THE MONITOR FRAME.
6. TIE-WRAP ALL CABLES BACK TOGETHER.

THANK YOU,

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### SERVICE BULLETIN

DATE: OCTOBER 28, 1994

SB 73

GAME: "CRUIS'N USA" (MANUFACTURED BEFORE 10\28\94)

SUBJECT: FAILURE OF U6 (LM12) ON WHEEL DRIVER BOARD ASSEMBLY.

TO REDUCE FAILURE OF THE LM12 (U6) ON THE WHEEL DRIVER BOARD (A-18004-40033) WE HAVE MADE SOME MODIFICATIONS.

TWO, 1 OHM, 10 WATT RESISTORS WILL BE INCORPORATED INTO A 2 OHM, 20 WATT SERIES CURRENT LIMITING RESISTOR CABLE ASSEMBLY. THE PART NUMBER IS A-19807. THIS WILL LIMIT THE AMOUNT OF CURRENT FEEDING BACK INTO THE DRIVER CIRCUIT.

THIS CABLE ASSEMBLY PLUGS INTO THE TWO PIN MOTOR CONNECTOR (RED & BLACK WIRES) AND THE TWO PIN CONNECTOR WITH THE BROWN AND BROWN-WHITE WIRES LOCATED IN BACK OF THE CONTROL PANEL. PLEASE SECURE THE CABLE ASSEMBLY WITH CABLE CLAMPS TO PREVENT MOVEMENT.

AFTER THE RESISTOR ASSEMBLY IS INSTALLED, THERE MIGHT BE A DETECTABLE LOSS OF MOTOR POWER. THIS POWER CAN BE REGAINED BY CHANGING R41 ON THE WHEEL DRIVER BOARD FROM A 75K OHM RESISTOR TO A 62K OHM RESISTOR.

THANK YOU,

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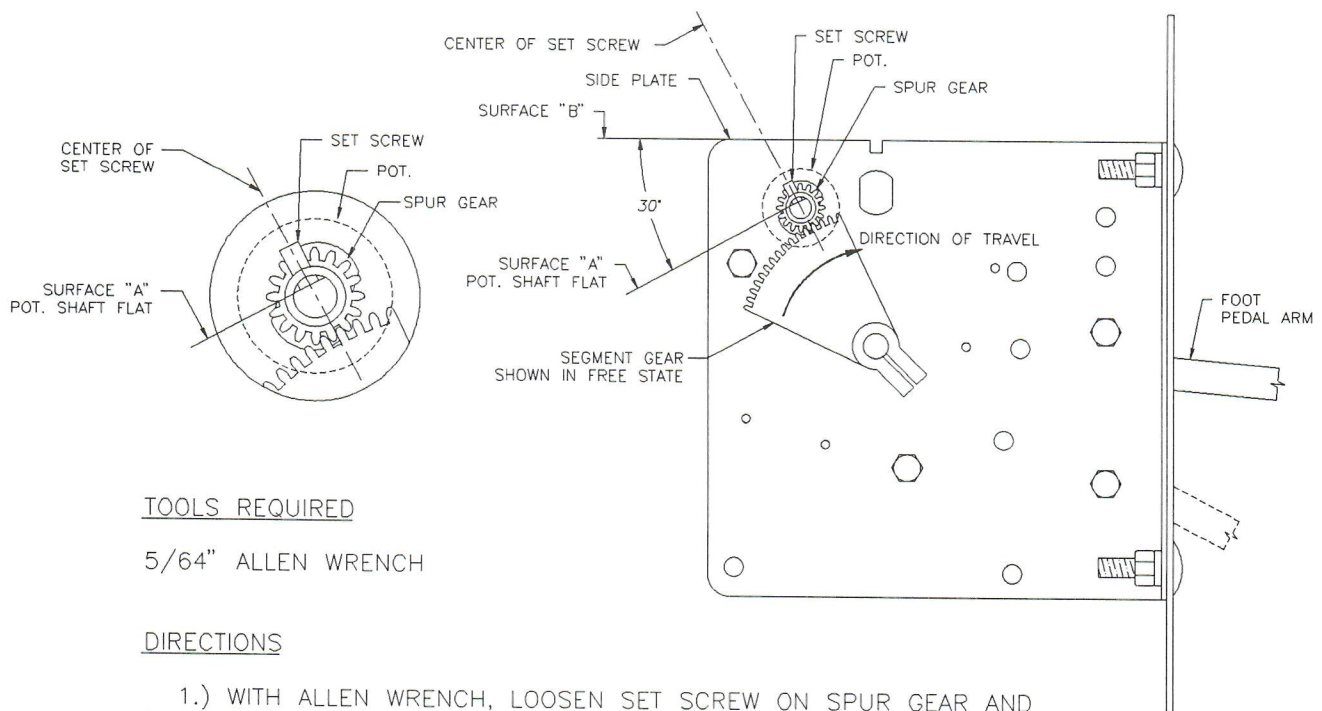
### SERVICE BULLETIN

SB74

DATE: 11/1/94

GAME: CRUIS'N SIT-DOWN

SUBJECT: GAS & BRAKE PEDAL POTENTIOMETER (POT.) RANGE ADJUSTMENT



#### TOOLS REQUIRED

5/64" ALLEN WRENCH

#### DIRECTIONS

- 1.) WITH ALLEN WRENCH, LOOSEN SET SCREW ON SPUR GEAR AND REMOVE SPUR GEAR.
- 2.) ROTATE SHAFT ON POT. SO THAT THE FLAT (SURFACE "A") IS APPROX. 30° OFF THE TOP OF THE PEDAL SIDE PLATE (SURFACE "B").
- 3.) REPLACE THE SPUR GEAR ON THE POT. SHAFT SO THAT THE SPUR GEAR AND THE SEGMENT GEAR MESH WHILE KEEPING SURFACE "A" AND SURFACE "B" AT APPROX. 30°, THEN FIRMLY TIGHTEN THE SET SCREW.
- 4.) REPEAT STEPS ONE THRU THREE WITH THE OTHER PEDAL.

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### SERVICE BULLETIN

SB75

DATE: 11/1/94

GAME: CRUIS'N USA FULL MOTION SIMULATOR

SUBJECT: GAS & BRAKE PEDAL POTENTIOMETER (POT.) RANGE ADJUSTMENT

#### TOOLS REQUIRED

1/16" ALLEN WRENCH

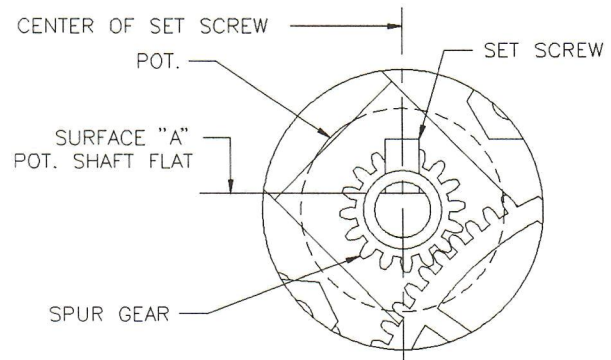
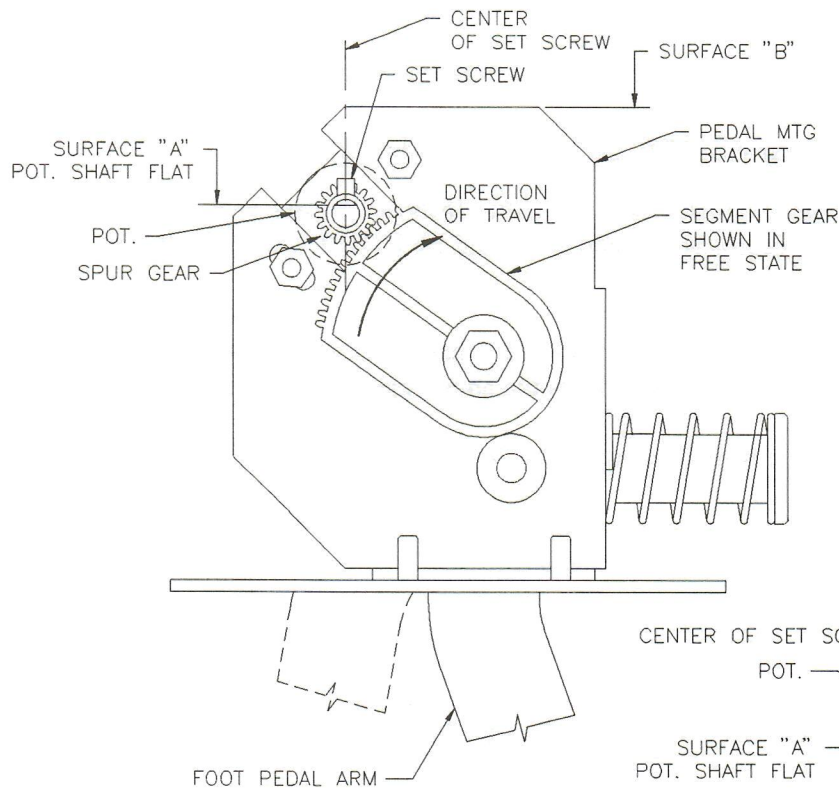
#### DIRECTIONS

1.) WITH ALLEN WRENCH, LOOSEN SET SCREW ON SPUR GEAR AND REMOVE SPUR GEAR.

2.) ROTATE SHAFT ON POT. SO THAT THE FLAT (SURFACE "A") IS PARALLEL TO THE TOP OF THE PEDAL MTG. BRACKET (SURFACE "B").

3.) REPLACE THE SPUR GEAR ON THE POT. SHAFT SO THAT THE SPUR GEAR AND THE SEGMENT GEAR MESH WHILE KEEPING SURFACE "A" AND SURFACE "B" PARALLEL, THEN FIRMLY TIGHTEN THE SET SCREW.

4.) REPEAT STEPS ONE THRU THREE WITH THE OTHER PEDAL.



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### SERVICE BULLETIN

DATE: 12-21-94

SB76

GAME: "KILLER INSTINCT"

SUBJECT: POSSIBLE FAILURE WITH WELLS-GARDNER U2000 MONITORS.

THE WELLS-GARDNER SERVICE DEPARTMENT HAS IDENTIFIED A POSSIBLE PROBLEM WITH THEIR U2000 MONITORS THAT WE HAVE BEEN USING IN "KILLER INSTINCT". BELOW IS A COPY OF A BULLETIN THAT WELLS-GARDNER IS GOING TO PUBLISH IN THE JANUARY 1995 'STAR\*TECH JOURNAL'.

\*\*\*\*\*

#### FET Failures in U2000 "Killer Instinct" Monitors

A torrid choke was added to the U2000 monitor used in "Killer Instinct" to pass FCC requirements. This choke causes a voltage peak to occur across diode D107 and FET Q101 which can exceed their breakdown rating.

If the monitor is working OK, it is recommended that R108 be changed from .22ohm to .47ohm, 2 watt, 5% metal oxide type, when convenient. This limits the amplitude of the pulse to safe levels.

If either the FET or diode has failed, it is recommended that both be changed along with R108.

A kit of parts consisting of fuse, FET, diode, and resistor can be obtained by calling Wells-Gardner service department at our toll free number (1-800-336-6630).

\*\*\*\*\*

GAMES MANUFACTURED AFTER DECEMBER 16th WILL HAVE CORRECTED MONITORS. WE ARE SUPPLYING WELLS-GARDNER WITH QUANTITIES OF GAMES EACH DISTRIBUTOR HAS BEEN SHIPPED. THEY WILL SUPPLY YOU WITH THE APPROPRIATE NUMBER OF KITS. IF YOU HAVE ANY PROBLEMS PLEASE CONTACT MARK KOMOROWSKI (WELLS-GARDNER SERVICE) AT THE ABOVE MENTIONED TOLL-FREE NUMBER OR 312-252-8220. IF YOU STILL NEED FURTHER ASSISTANCE PLEASE DON'T HESITATE TO CALL US.

THANK YOU,

WMS GAMES PARTS AND SERVICE INC.

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### SERVICE BULLETIN

DATE: JANUARY 24, 1995

SB77

GAME: "CRUIS'N USA" MOTION

SUBJECT: CLEARANCE BETWEEN MOTION FRAME AND THE UMBILICAL SUPPORT SPRING.

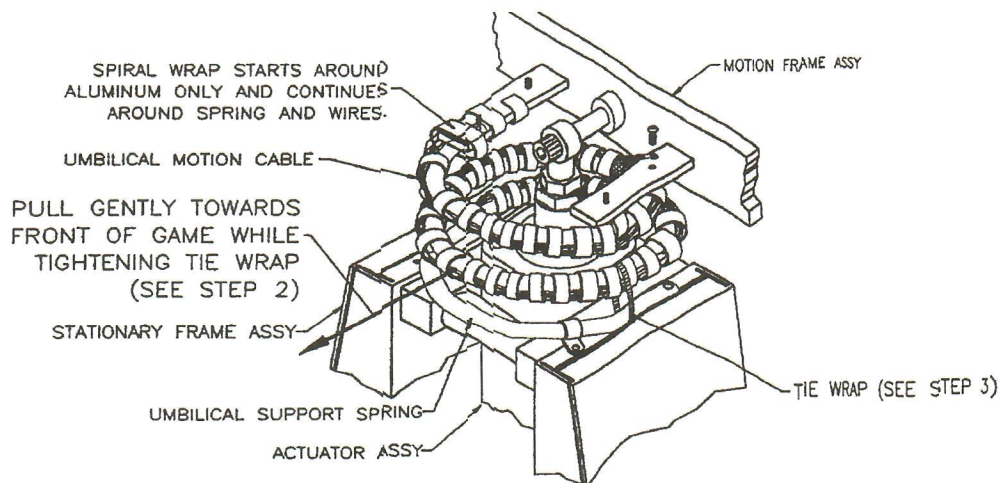
NOTE: THE PURPOSE OF THIS BULLETIN IS TO ENSURE THAT PROPER CLEARANCE EXISTS BETWEEN THE UMBILICAL SUPPORT SPRING AND THE MOTION FRAME. THE UMBILICAL SUPPORT SPRING (ALONG WITH ITS ASSOCIATED CABLING) IS THE WIRING HARNESS THAT SUPPLIES ALL POWER AND SIGNALS FROM THE GAME BASE TO THE MOVING PORTION OF THE GAME. THE ADJUSTMENT PROCEDURE IS AS FOLLOWS:

#### PROCEDURE:

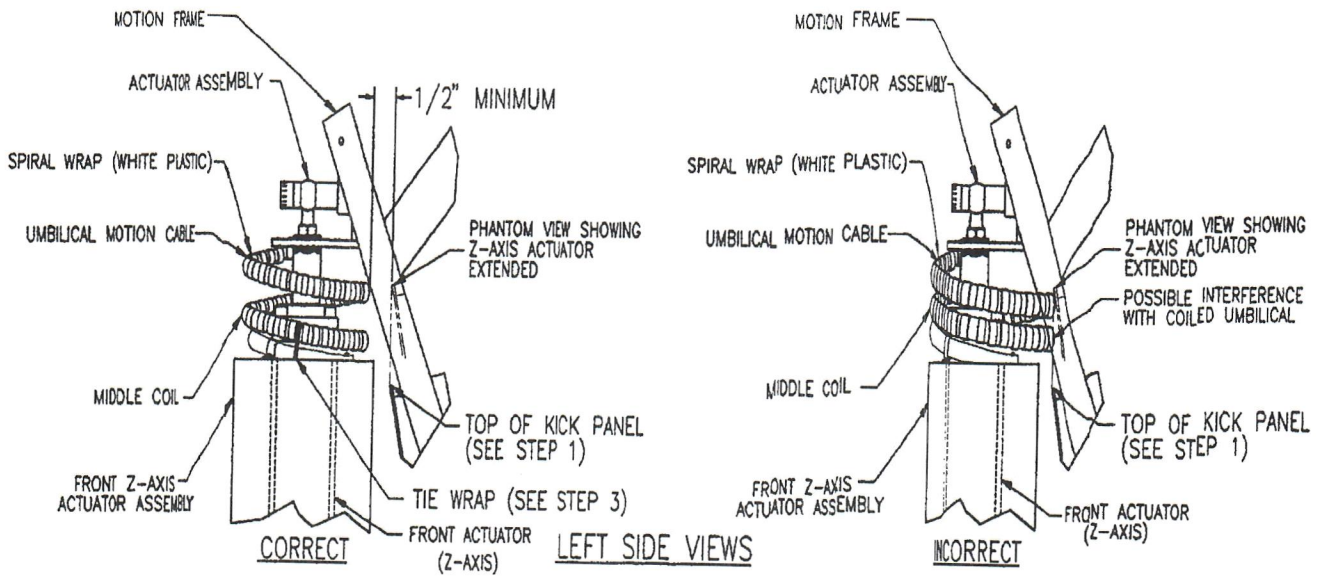
1. REMOVE THE MONITOR CANOPY (BLACK WINDSHIELD) FROM THE FRONT CLIP (THE FRONT BODY OF THE GAME). CHECK THE TOP OF THE KICK PANEL (SEE LEFT SIDE VIEWS ON PAGE 2) FOR ANY PLASTIC SHAVINGS FROM THE SPIRAL WRAP AND/OR THE UMBILICAL COIL. VERIFY MINIMUM 1/2" CLEARANCE BETWEEN COIL AND KICK PANEL. IF CLEARANCE IS EQUAL TO OR GREATER THAN 1/2" NO ADJUSTMENT IS NEEDED. END OF PROCEDURE. IF CLEARANCE IS LESS THAN 1/2", PROCEED TO STEP 2.

2. TURN THE MIDDLE COIL OF THE UMBILICAL SLIGHTLY CLOCKWISE WHILE PULLING IT FORWARD TOWARDS THE FRONT OF THE GAME. CONTINUE UNTIL THERE IS APPROXIMATELY 1/2" CLEARANCE BETWEEN THE UMBILICAL COIL AND THE TOP OF THE KICK PANEL.

3. WHILE HOLDING THE COIL IN THIS POSITION, INSTALL THE TIE WRAP AROUND THE TWO BOTTOM WINDINGS OF THE UMBILICAL SUPPORT SPRING AND TIGHTEN. (SEE DETAIL "A")



DETAIL A



THANK YOU,

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### **SERVICE BULLETIN**

DATE: MARCH 2, 1995

SB78a

GAME: "CRUIS'N USA" SITDOWN MODEL

SUBJECT: SEAT PLATE KIT (PART # A-19999.1)

AVAILABLE THROUGH THE PARTS DEPARTMENT IS A METAL SEAT PLATE KIT, PART # A-19999.1. THIS KIT MUST BE INSTALLED (USING INSTRUCTION SHEET #16-10015 SUPPLIED WITH KIT) IN ALL THE SITDOWN GAMES (WITH WOOD MOUNTING BASE) BECAUSE THE SEAT ASSEMBLY CAN PULL AWAY (OR OUT) FROM THE PEDESTAL BASE ASSEMBLY (A-19305). PLEASE DISREGARD SERVICE BULLETIN #SB78. THIS IS AN UPDATED VERSION OF THAT BULLETIN.

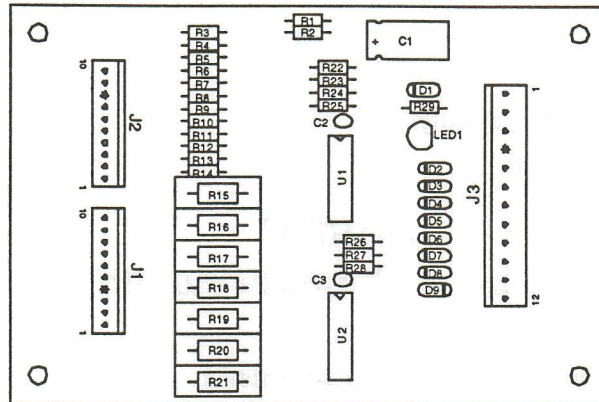
THANK YOU,  
WMS GAMES PARTS AND SERVICE INC.

# AMENDMENTS



# World Cup Manual Amendment

Please make note of the changes on the resistor values for part number A-15576 on page 2-15 of the World Cup manual.



Part Number	Designator	Description
5040-12298-00	C1	Cap., 100µfd, 40v, (±50%)
5043-08980-00	C2, C3	Cap., .01M, 50v
5671-09019-00	LED1	Display LED Red
5370-12272-00	U1, U2	IC, LM339 Quad
5070-09054-00	D1 - D9	Diode, 1N4004, 1.0A.
5010-12928-00	R15-R21	Res., 270W, 2w, 5%
5010-09999-00	R1-R14	Res., 2KW, 1/4w, 5%

Part Number	Designator	Description
5010-10631-00	R29	Res., 1.2KW, 1/4w, 5%
5010-09162-00	R23, R25, R26	Res., 100KW, 1/4w, 5%
5010-08774-00	R22, R24	Res., 22KW, 1/4w, 5%
5010-09034-00	R28	Res., 10KW, 1/4w, 5%
5791-10862-12	J3	Connector, 12-pin Header
5791-12462-10	J1, J2	Connector, 10-pin Header

# CRUIS'N USA

## Single SIT DOWN

### Amendment

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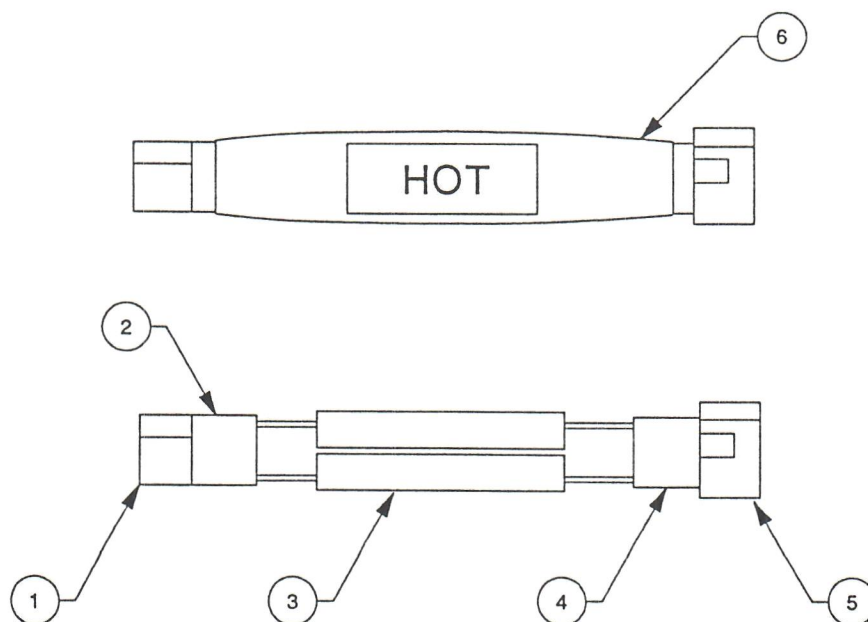
The following assembly has been added to the **Cruis'n USA Sit Down Operations Manual**. Please keep this amendment with your manual.

Page 2-15 Add the following assembly:

### A-19807

#### Wheel Limit Resistor Assembly

<u>Item</u>	<u>Part Number</u>	<u>Description</u>
1	5821-13238-00	Female Reel Pin 18-22G
2	5792-12561-00	Female Connector
3	5012-13138-00	Resistor, 1 $\Omega$ , 10w
4	5791-12570-00	Male Connector
5	5820-13237-00	Male Reel Pin 18-22G
6	RM-23-07	Heat Shrink Tubing 1"



# CRUIS'N USA LINKING KIT

## MANUAL AMENDMENT

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# IMPORTANT INFORMATION!

DIP Switch Settings for linked games should be as follows:

### **Left Game (Player 1)**

DIP Switch 2 (U97)	SW6 = ON (Link On)
	SW8 = ON (Master)

### **Right Game (Player 2)**

DIP Switch 2 (U97)	SW6 = ON (Link On)
	SW8 = OFF (Slave)

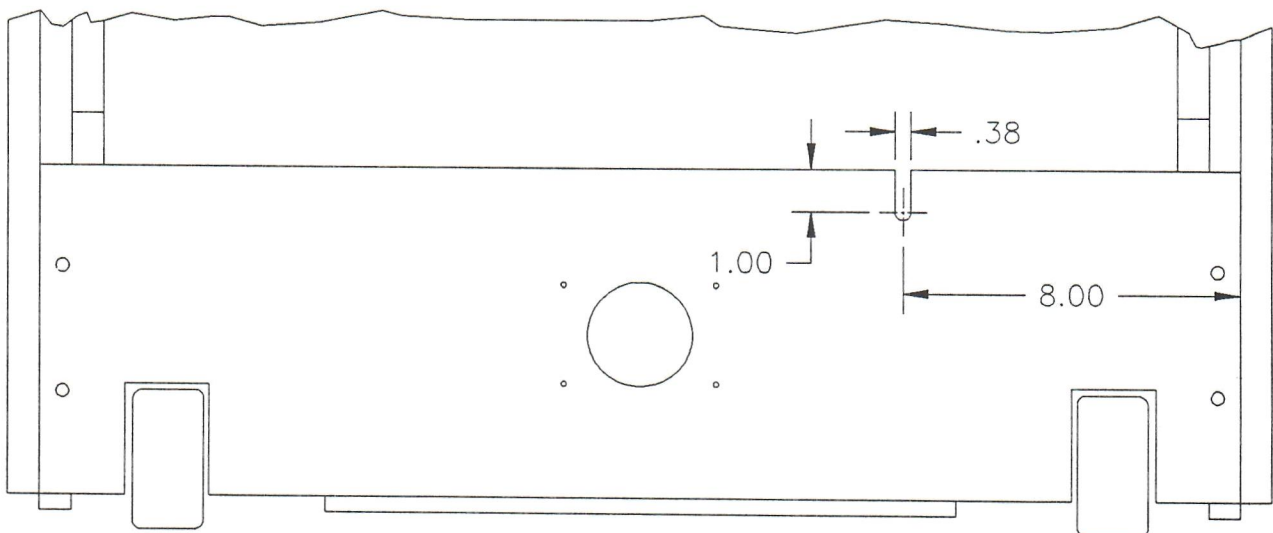
# CRUIS'N USA LINKING KIT

## MANUAL AMENDMENT

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Your existing Cruis'n USA cabinets may not have a linking cable exit slot. If not, apply the following procedure to both machines before Step 8g of the Installation Manual.

- 1) Locate and drill a  $3/8"$  hole, 1 inch from the top, and 8 inches from the inside of the outer cabinet wall (see dimensions below).
- 2) Using a saw, make two cuts from the top of the wood to the hole, creating a slot as shown.



# CRUIS'N USA

## Manual Amendment

The following is an updated Pricing Table for all versions of Cruis'n USA video. Please keep this amendment with your manual for future reference.

### Pricing Table

Name	Settings Credit/Coin	Left Chute	Center Chute	Right Chute	Fourth Chute
USA1	1/3X25	.25	.25	.25	\$1.00
USA2	1/2X25	.25	.25	.25	\$1.00
USA3	1/4X25	.25	.25	.25	\$1.00
USA4	1/5X25	.25	.25	.25	\$1.00
USA5	1/6X25	.25	.25	.25	\$1.00
USA6	1/8X25	.25	.25	.25	\$1.00
USA7	1/8X25, 1/2X100, 3/500	.25	.25	.25	\$1.00
USA8	1/25, 3X25/START, 2X25 CONT	.25	.25	.25	\$1.00
USA9	1/25, 2X25/START, 1/25 CONT	.25	.25	.25	\$1.00
USA10	200/START, 150 CONT	.25	.25	.25	\$1.00
USA11	1/6X25, 4/500	.25	.25	.25	\$1.00
USA12	100/START, 3X25/CONT	.25	.25	.25	\$1.00
GERMAN1	1/3X1DM, 2/5DM	1DM		5DM	
GERMAN2	1/1DM, 5/5DM	1DM		5DM	
GERMAN3	1/2X1DM, 3/5DM	1DM		5DM	
GERMAN4	2/5DM, 1/3X1DM ECA	5DM	1DM	2DM	
GERMAN5	3/5DM, 1/2DM, 1/2X1DM ECA	5DM	1DM	2DM	
GERMAN6	1/3X1DM, 2/5DM NO BONUS	1DM		5DM	
GERMAN7	1/2X1DM, 3/5DM NO BONUS	1DM		5DM	
GERMAN8	1/1DM, 6/5DM NO BONUS	1DM		5DM	
FRENCH1	1/10F, 2/20F, 4/30	10F		20F	
FRENCH2	1/10F, 2/20F, 5/40F	10F		20F	
FRENCH3	1/10F, 3/20F, 7/40F	10F		20F	
FRENCH4	1/5F, 2/10F, 5/20F	5F		10F	
FRENCH5	1/5F, 3/10F, 7/20F	5F		10F	
FRENCH6	1/10F 2/20F, 4/30F ECA	1F	10F	5F	20F
FRENCH7	1/10F 2/20F, 5/40F ECA	1F	10F	5F	20F
FRENCH8	1/10F 3/20F, 7/40F ECA	1F	10F	5F	20F
FRENCH9	1/5F 2/10F, 5/20F ECA	1F	10F	5F	20F
FRENCH10	1/5F 3/10F, 7/20F ECA	1F	10F	5F	20F
FRENCH11	1/3X5F, 4/50F	5F		10F	
CANADA1	1/2X25, 2/100	.25		\$1.00	
CANADA2	1/4X25, 1/100	.25		\$1.00	
CANADA3	1/4X25, 1/100, 3/2X100	.25		\$1.00	
SWISS1	1/3X1F, 2/5F	1F		5F	
SWISS2	1/1F, 5/5F	1F		5F	
SWISS3	1/2X1F, 3/5F	1F		5F	
ITALY1	1/500LIRE	500 LIRE		500 LIRE	
ITALY2	1/2X500LIRE	500 LIRE		500 LIRE	
ITALY3	1/4X500LIRE	500 LIRE		500 LIRE	
UK1	2/100P, 1/50P, ECA	100P	20P	50P	10P
UK2	1/100P, 1/2X50P, ECA	100P	20P	50P	10P
UK3	1/3X20P, 1/50P	20P		50P	
SPAIN1	1/100PESETA, 6/500PESETA	100P		500P	
SPAIN2	3/2X100PESETA, 7/500PESETA	100P		500P	
SPAIN3	100PESETA, 5/500PESETA	100P		500P	
SPAIN4	1/2X100PESETA, 3/500PESETA	100P		500P	
SPAIN5	2/100PESETA, 10/500PESETA	100P		500P	
SPAIN6	1/100PESETA ECA	25P	200P	100P	500P
AUSTRALIA1	1/5X20, 1/100	.20		\$1.00	
AUSTRALIA2	1/10X20, 1/2X100	.20		\$1.00	
AUSTRALIA3	1/2X100	\$1.00		\$2.00	
AUSTRALIA4	1/3X100	\$1.00		\$2.00	

## Pricing Table Continued

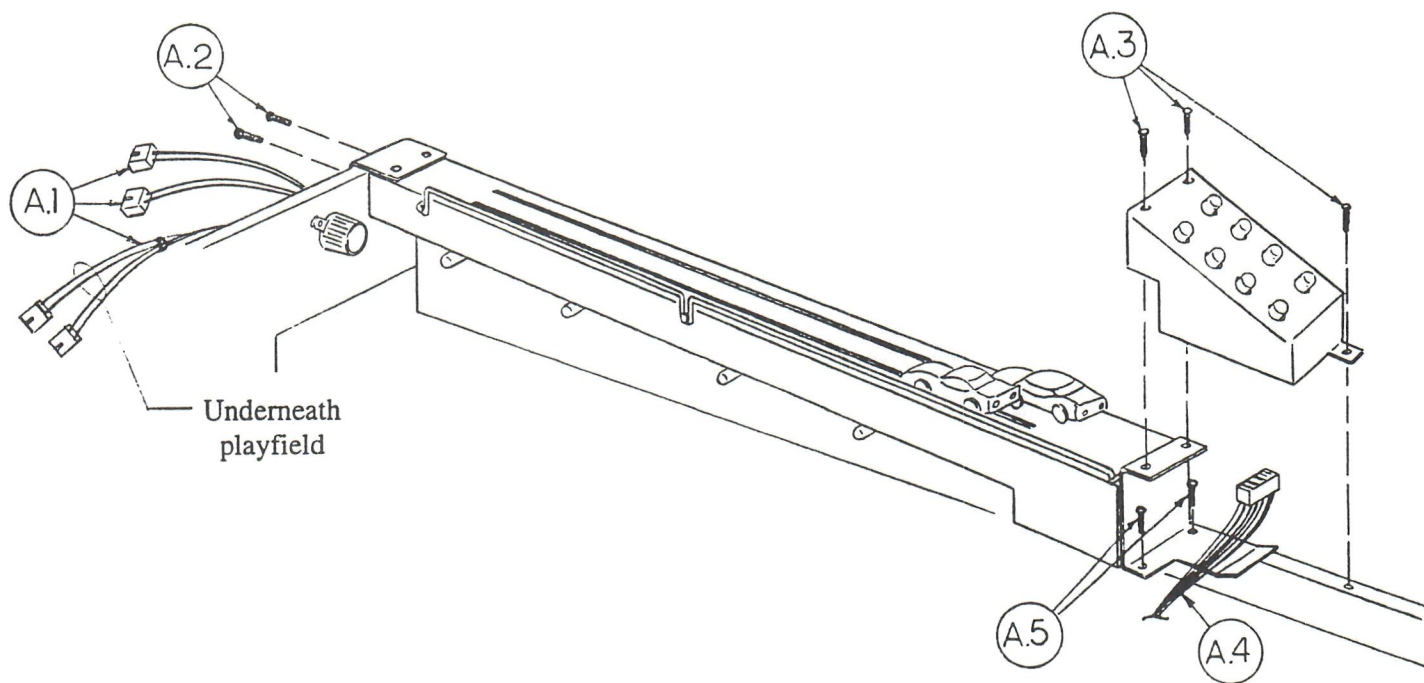
Name	Settings Credit/Coin	Left Chute	Center Chute	Right Chute	Fourth Chute
JAPAN1	1/100	100 YEN		100 YEN	
JAPAN2	1/2X100	100 YEN		100 YEN	
JAPAN3	1/100, 3/500	100 YEN		500 YEN	
TAIWAN1	1/NT10	NT10		NT10	
TAIWAN2	1/2X US .25	.25 US		.25 US	
TAIWAN3	2/1 2 PLAYS FOR 1 COIN	1 COIN		1 COIN	
AUSTRIA1	1/5SCHIL, 2/10SCHIL	5 schilling		10 schilling	
AUSTRIA2	1/10SCHIL, 3/20SCHIL	10 schilling		20 schilling	
AUSTRIA3	1/2X5SCHIL, 1/10SCHIL	5 schilling		10 schilling	
AUSTRIA4	1/2X10SCHIL, 2/30SCHIL	10 schilling		20 schilling	
BELGIUM1	1/20F	20F		20F	
BELGIUM2	1/2X20F	20F		20F	
BELGIUM3	1/20FB 3/50FB ECA	5F	50F	20F	
SWEDEN1	1/5 KRONA ECA	1 KRONA	10 KRONA	5 KRONA	
FINLAND1	1/5 MARKKA ECA	1 MARKKA	10 MARKKA	5 MARKKA	
NETHERLAND1	1/2.50 HFI	2.5 HFI		2.5 HFI	
NETHERLAND2	1/1HFI, 3/1X2.50HFI	1 HFI		2.5 HFI	
NORWAY1	1/5 KRONE ECA	5 KRONE	20 KRONE	10 KRONE	
DENMARK1	1/5 KRONE ECA	1 KRONE	10 KRONE	5 KRONE	20 KRONE
HUNGARY1	1/4X20FORINT, 2/140FORINT	20 FORINT		100 FORINT	
GENERAL1	1 CREDIT / 1 COIN	1 COIN	1 COIN	1 COIN	4 COINS
GENERAL2	1 CREDIT / 2 COINS	1 COIN	1 COIN	1 COIN	4 COINS
GENERAL3	1 CREDIT / 3 COINS	1 COIN	1 COIN	1 COIN	4 COINS
GENERAL4	1 CREDIT / 4 COINS	1 COIN	1 COIN	1 COIN	4 COINS
GENERAL5	1 CREDIT / 5 COINS	1 COIN	1 COIN	1 COIN	4 COINS
GENERAL6	1 CREDIT / 6 COINS	1 COIN	1 COIN	1 COIN	4 COINS
GENERAL7	2 CREDITS / 1 COIN	1 COIN	1 COIN	1 COIN	4 COINS
GENERAL8	3 CREDITS / 1 COIN	1 COIN	1 COIN	1 COIN	4 COINS

August 29, 1994  
16-9887

# **CORVETTE**

## **UNIT DISASSEMBLY for REPAIR**

Major component service instructions



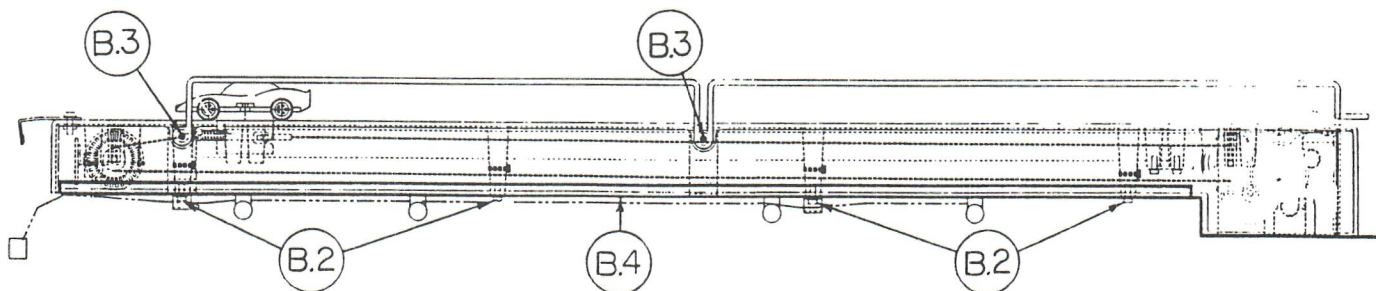
## RACE TRACK

### A. To Remove Track From Game

1. Unplug cables, two from behind back panel, one from underneath play field.
2. Remove two screws from back side of back panel
3. Remove three screws securing X-mass tree. (two on top, one in wood rail.)
4. Remove cable.
5. Remove two screws in bracket under X-mass tree bracket.
6. Lift race track out of game.

### B. To Service Track

1. Turn unit over so it is up side down.
2. Remove four screws from bottom of track.
3. Remove two screws securing side rail (wireform) on race track.
4. Remove stainless steel bracket from bottom of track.



**SIDE VIEW**

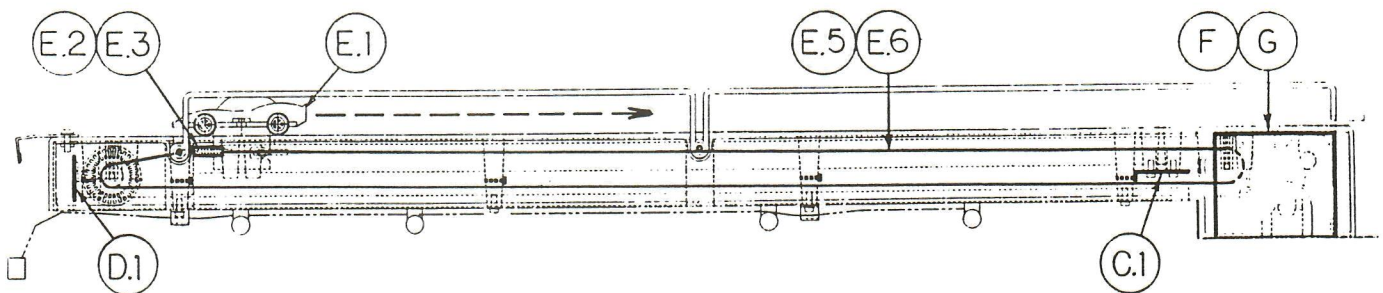


- C. Track limit Board** 1. Remove two screws from board. Lift and rotate board and remove from unit. Repair or replace board. Reassemble in same manner.
- D. Track Opto Board** 1. Remove cords, (see changing cord and springs). remove two screws and lift board up and out. Repair or replace board. Insert board and two screws. Reattach cords and springs.
- E. Cord and Springs** 1. Slide car to center of track.  
 2. Unhook spring from wire loop attached to car chassis.  
 3. Remove spring from cord loop.  
 4. Spread track slot and car will fall out of plastic frame.  
 5. Unthread cord from opto pulleys and gear train.  
 6. Remove cord from car chassis.  
 7. Reverse steps to reassemble.
- F. Gear Train** 1. Remove cords and springs.  
 2. Remove cable harness from screw bosses at wire ties.  
 3. Remove connectors from both circuit boards.  
 4. Turn track right side up  
 5. Remove three 4-40 flat head screws from top side of track.  
 6. Holding gear box from falling out of track and turn track over.  
 7. Lift gear box out of track.

**CAUTION: THE AXLES IN THE GEAR BOX ARE LOOSE THEY WILL FALL OUT, LIFT THE GEAR BOX OUT CAREFULLY**

- G. To remove motors** 1. Slide the axles out of the gears and metal bracket.  
 2. Work from the pulley gears in toward the motors.  
 3. Remove the gears before removing the motors  
 4. Remove screws on back side of gear box frame.  
 5. Two screws secure the motor o the motor bracket.  
 6. To reassemble reverse the procedure.

**NOTE:** When building the gear box insert the gears from the motor out to the pulley gears. As you insert one axle and two gears you can put a piece of tape over the ends of the axles to keep the axles from falling out while working on the other gears.



When reassembling the gear train be sure to reapply grease to all gears. After assembling the gear train back into the race track check for proper backlash in the gear train. There should be a slight amount of movement between all the gears.

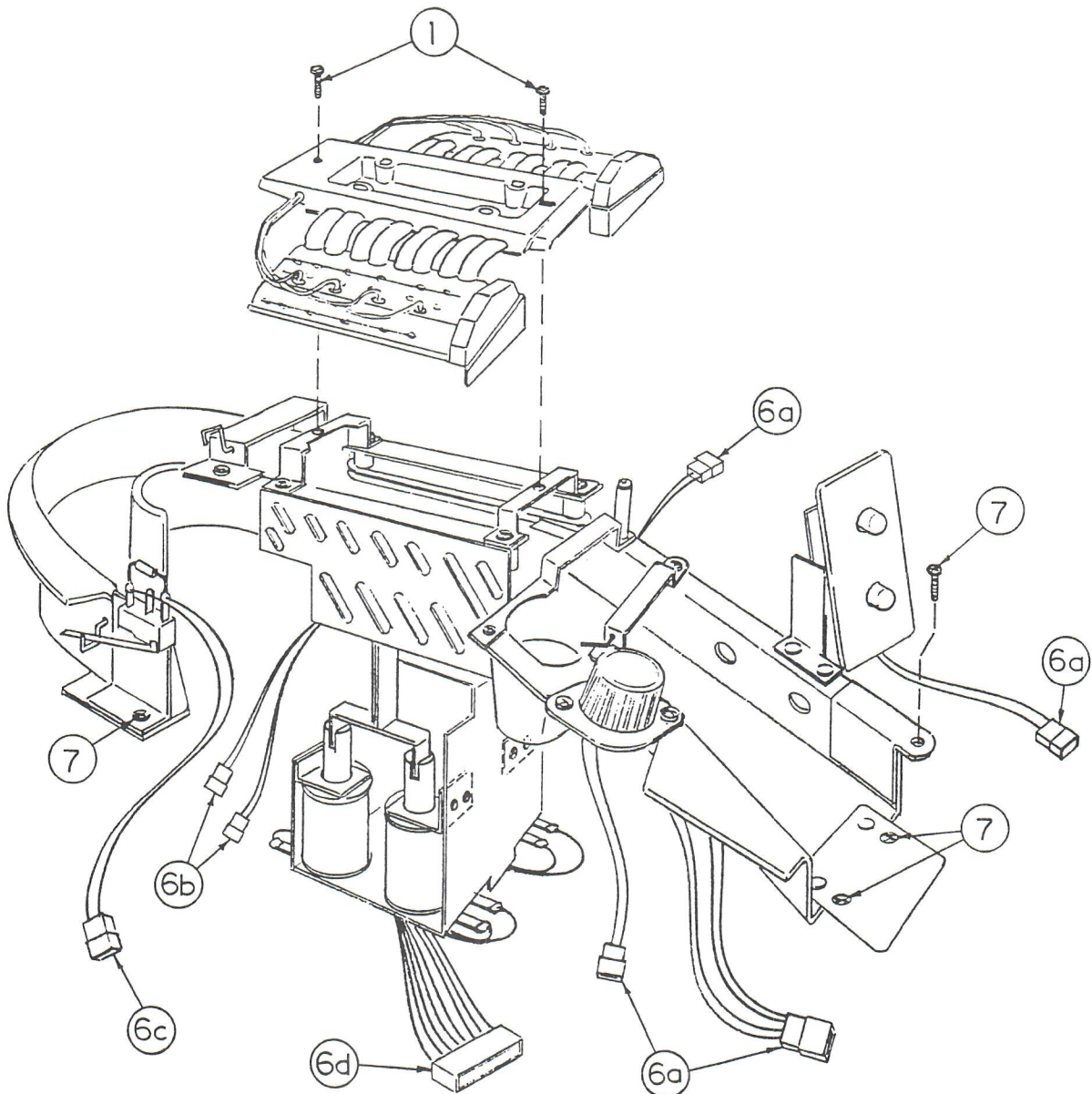
If there is no clearance between the pinion gear and the first gear on the right side of the assembly you made need to **SLIGHTLY** bend the motor bracket up. This will remove some pressure from the gear train and allow for the proper amount of backlash in the system. Insufficient backlash will cause excessive wear in the gear train, and shorten the life of the mechanism.

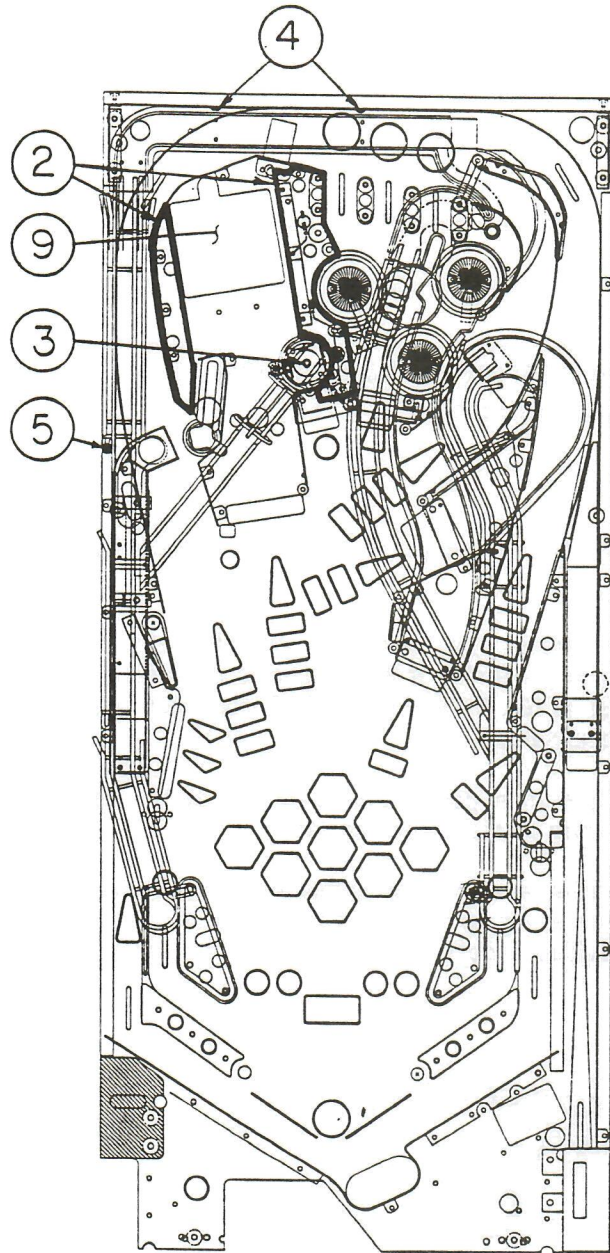
## CORVETTE ENGINE MECHANISM

### REMOVE COMPLETE ENGINE MECH FROM PLAY FIELD

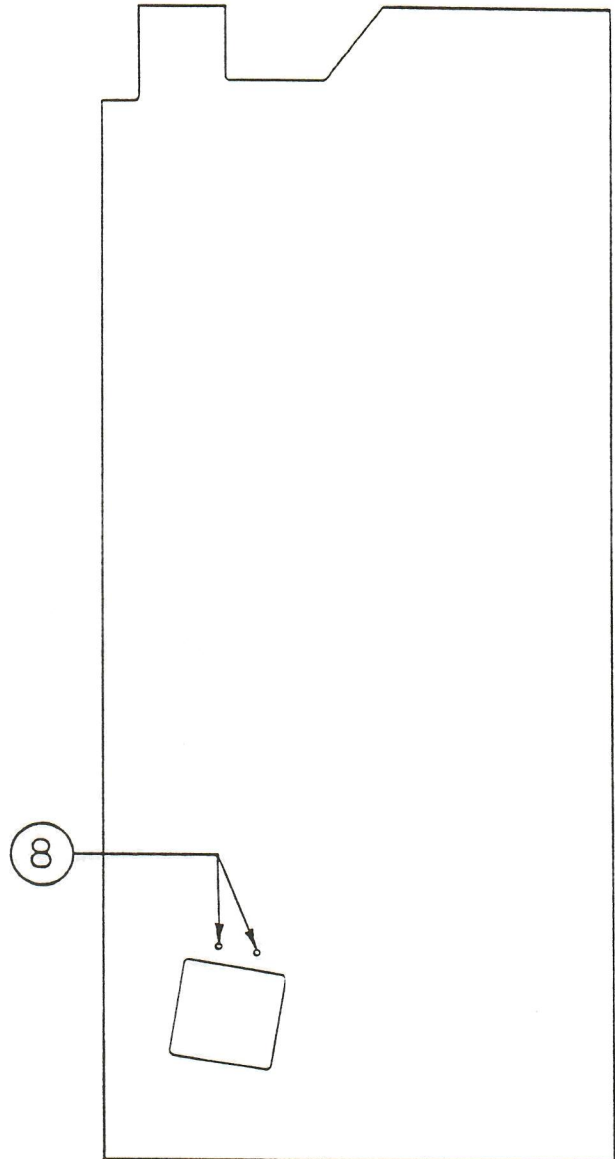
1. Remove plastic LT-5 cover from engine mech. (2 screws)
2. Remove play field plastics on both sides of engine. (6 screws)
3. Remove garage popper wire. (2 screws, 1 nut)
4. Remove two screws holding race ramp brackets in back panel.
5. Remove Left wire. (1 screw, 1 nut)
6. Unplug all connectors.
  - a. Four from front of ramp.
  - b. Two from behind coils.
  - c. One from gate at back of ramp coming from inside engine.
  - d. One from coils.
7. Remove screws in ramp. (2 in front, 1 in side rail in back, 1 in ramp guard)
8. Lift up play field remove 2 screws holding engine from under side of play field.
9. Put play field down, remove engine assembly. Lift back of engine first and push back toward back panel. Lift up and look to see if coils are clear of cut out as you remove the assembly.
10. Reassemble in reverse order.

NOTE: when assembling plastic LT-5 cover be sure sides of engine are clipped into the spring clips on both sides of the slotted engine head plates.





Underside View  
(Playfield in upright position)



# CORVETTE

## Manual Amendment

The following information has been updated or added to the Corvette manual since final printing. Please keep this amendment with your manual .

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**If experiencing difficulty with the Engine Assembly, read the new ZR-1 Adjust Test. This test will help solve the problem.**

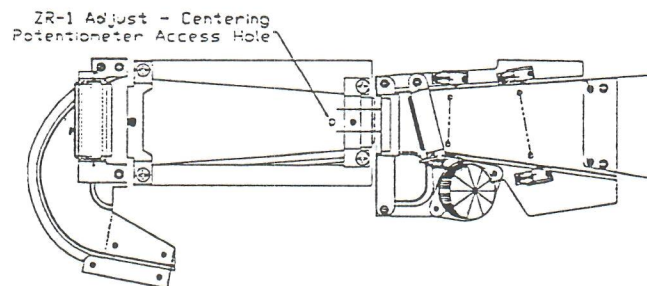
### NEW Test Procedure:

**T.18 ZR-1 ADJUST** Select T.18 from the Test Menu and press "ENTER" to perform the ZR-1/LT-5 engine adjustment procedure.

The purpose of this procedure is to adjust the centering potentiometer of a malfunctioning engine assembly. In order to determine if the engine is malfunctioning, first run the ZR-1/LT-5 TEST, SELF TEST (T16). If the SELF TEST does not indicate failure, then this adjustment may not be necessary.

This test function enables the ZR-1/LT-5 engine power and places it at the center position. (Note, the door must be closed to turn on the engine power.)

With the engine held at the center position (the result of running this test), use a small flat blade screw driver to adjust the potentiometer located beneath the ramp, inside of the engine assembly. A hole in the ramp provides access to the potentiometer, as shown below.



A-19140  
Engine & Ramp Assembly

Turning the potentiometer clockwise moves the engine to the left (as viewed from the front of the machine) and turning the potentiometer counter-clockwise moves the engine to the right.

The potentiometer should be adjusted to position the engine as close to the center of movement as possible.

Once this adjustment is complete, run the ZR-1/LT-5 TEST, SELF TEST (T16) again to verify the proper functionality of the engine assembly.

## CHANGE to Test Procedures: Pages 1-16 and 1-17

- T.16 ZR-1/LT-5 TEST** Select T.16 from the Test Menu and press "ENTER" to begin the ZR-1/LT-5 (engine) test. Once the "SELF TEST" completes successfully, the "UP" and "DOWN" buttons can be used to select the following tests. Use the "ENTER" button to start the selected test, and the "ESCAPE" button to abort the selected test. (Note, the door must be closed to turn on the engine power.)

The status of the "FULL LEFT" and "FULL RIGHT" optical switches and the angular position are displayed on the dot matrix display during all tests.

**SELF TEST** - This test verifies that the engine is fully operational. This test is run automatically upon entry to the ZR-1/LT-5 TEST. It can also be started manually by pressing the "ENTER" button when selected. If this test fails, the ZR-1 ADJUST test (T.18) may need to be run.

**AUTO RUN** - This test runs the engine in an oscillatory fashion until the "ESCAPE" button is pressed. The test pauses the engine periodically.

**ENGINE LEFT** - This test moves the angular position of the engine to the left (counter-clockwise) until the "FULL LEFT" optical switch closes.

**ENGINE RIGHT** - This test moves the angular position of the engine to the right (clockwise) until the "FULL RIGHT" optical switch closes.

**ENGINE CENTER** - This test moves the angular position of the engine to the center. At this point, neither the "FULL LEFT" nor the "FULL RIGHT" optical switches should be closed.

- T.17 RACE TEST** Select T.17 from the Test Menu and press "ENTER" to begin the RACE TRACK test. Once the "SELF TEST" completes successfully, the "UP" and "DOWN" buttons can be used to select the following tests. Use the "ENTER" button to start the selected test, and the "ESCAPE" button to abort the selected test. (Note, the door must be closed to turn on the race track power.)

The status of the "LEFT START", "RIGHT START", "LEFT ENCODER", and "RIGHT ENCODER" optical switches are displayed on the dot matrix display during all tests. The car position value is displayed when possible.

**SELF TEST** - This test verifies that the race track is operational. This test is run automatically upon entry to the RACE TEST. It can also be started manually by pressing the "ENTER" button when selected.

**RESET** - This test positions both cars to the starting line.

**LEFT FORWARD** - This test drives the left car forward while the "ENTER" button is pressed.

**RIGHT FORWARD** - This test drives the left car in reverse while the "ENTER" button is pressed.

**T.19 Empty Balls Test** Select T.19 from the Test Menu and press "ENTER" to begin the EMPTY BALLS test.

This test kicks out all balls loaded in troughs, lockups, poppers, and kickouts until no balls remain in those locations.

Note: As the trough kicks out balls, they will stack up in the shooter groove, which may require manual clearing in order to allow further balls to be kicked out.

### **CHANGE to Rules: Pages E & F**

**LITE LT-5 LOCK:** During main play, the left outer loop shot lights the LT-5 LOCK lamp on the ZR-1/LT-5 ramp for a timed period. The duration of the timed period becomes shorted with each successive multiball.

**ROUTE 66:** The Route 66 (right ramp) shot gives a progression of awards for every other completion of the shot. The qualifying shot tells the player what to expect for the next shot. The next shot gives an award as follows:

Award Level	Award
0	Start Catch Me
1	Award Challenge Car
2	Start Pitstop Hurryup
3	Enable QuadraJets
4	Start Catch Me
5	Bonus X Increase
6	Award Points
7	Start Pitstop Hurryup
8	Enable QuadraJets
9	Start Catch Me
10	Bonus X Increase
11	Award Points
12	Award Special

**PITSTOP HURRY UP:** This is a timed sequence in which a point value is reduced until the player shoots the PIT-IN shot. If the shot is made before the time expires, a two ball multiball is started during which the PIT-IN shot becomes a JACKPOT worth the stopped point value.

### **NEW Rules:**

**FUTURE CAR CHAMPION:** When a player collects the tenth car, they become the FUTURE CAR CHAMPION. The reward for this honor is to place their initials in the license plate of the car shown during game play, when the ball is in the shooter groove.

**QUALIFY:** Each time the RIGHT RETURN LANE switch is made, the QUALIFY lamp (left outer loop shot) is lit for a timed period. Making this shot awards an incremental point value.

**CHANGE to Difficulty Settings Tables: Page 1-19**

**Game Difficulty Setting Table for U.S./Canadian/French Games**

Adj. No.	Adjustment Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03	Hard U.0 04	Extra Hard U.9 05
A.2 05	Ball Saves	2	2	1	1	0
A.2 06	Ball Save Time	9	7	5	4	2
A.2 07	Lock Difficulty	Extra Easy	Easy	Medium	Hard	Extra Hard
A.2 08	Race Difficulty	Extra Easy	Easy	Medium	Hard	Extra Hard
A.2 09	Catch Difficulty	Extra Easy	Easy	Medium	Hard	Extra Hard
A.2 10	Challenge Difficulty	Extra Easy	Easy	Medium	Hard	Extra Hard

**Game Difficulty Setting Table for German/European Games**

Adj. No.	Adjustment Description	Extra Easy U.9 01	Easy U.9 02	Medium U.9 03	Hard U.0 04	Extra Hard U.9 05
A.2 05	Ball Saves	2	2	1	1	0
A.2 06	Ball Save Time	9	7	5	4	2
A.2 07	Lock Difficulty	Extra Easy	Easy	Medium	Hard	Extra Hard
A.2 08	Race Difficulty	Extra Easy	Easy	Medium	Hard	Extra Hard
A.2 09	Catch Difficulty	Extra Easy	Easy	Medium	Hard	Extra Hard
A.2 10	Challenge Difficulty	Extra Easy	Easy	Medium	Hard	Extra Hard

**CHANGE to Preset Game Adjustments Tables: Page 1-20**

**Preset Game Adjustments Table for U.S./Canadian Games**

Adjustment Number	Adjustment Description	Install 3-Ball U.9 07 (factory)	Install 5 Ball U.9 06
A.1 01	Balls Per Game	3	5
A.1 07	Replay Start	850,000,000	1,200,000,000
A.2 04	Extra Ball Level	7	18
A.2 05	Ball Saves	1	1
A.2 06	Ball Save Time	5	4
A.2 07	Lock Difficulty	Medium	Hard
A.2 10	Challenge Difficulty	Easy	Medium

**CHANGE to Feature Adjustments: Pages 1-27 thru 1-30**

**A.2 04 EX. BALL LEVEL**

This is the number of SPARK PLUGS necessary to light the EXTRA BALL lamp. The machine will start with this value and modify it as necessary to achieve the percentage specified in A.2 03. To use a fixed level for the extra ball, set A.2 03 to FIXED, then set this level.

Setting: 4-60  
Factory Default: 7

**A.2 05 BALL SAVES**

This determines how many times a ball will be saved when it drains. The ball will be saved only once per ball-in-play. The ball saver is available each ball until the adjusted number of ball saves is used by the player.

Settings: OFF  
 1-5  
 Factory Default: 1

Example of ball save usage:  
 With BALL SAVES = 1 (factory default)

- BALL 1: Ball save available  
 Ball drains after ball saver time-out
  
- BALL 2: Ball save available  
 Ball drains during ball saver timer, and ball is delivered back onto the playfield
  
- BALL 3: Ball save NOT available

**Note:** In addition to the BALL SAVES adjustment, a very short DEFAULT ball save is provided after the player has used all of their STANDARD ball saves when the ENABLE DEF SAVER (A.2 14) adjustment is set to YES.

**A.2 06 BALL SAVE TIME**

This sets the number of seconds that the ball saver is activated.

Setting: 4-15  
 Factory Default: 5

**A.2 10 CHALLENGE DIFFICULTY**

This determines the difficulty of the CORVETTE CHALLENGE feature. This affects the START CHALLENGE lamp.

Settings: EXTRA EASY  
 EASY  
 MEDIUM  
 HARD  
 EXTRA HARD  
 Factory Default: EASY

	Game Start	Ball Start	Memory
	START CHALLENGE	START CHALLENGE	START CHALLENGE
Extra Easy	--	yes	yes
Easy	yes	--	yes
Medium	--	--	yes
Hard	--	--	no
Extra Hard	--	--	no



## NEW Feature Adjustments:

### **A.2 13 ENDGAME LOCK REL.**

This determines whether balls locked in the ZR-1/LT-5 lockup are released or held at the end of a game.

Setting:        YES  
                  NO

Factory Default: YES

### **A.2 14 ENABLE DEF SAVER**

This determines whether the DEFAULT ball saver is enabled (see A.2 05 above).

Setting:        YES  
                  NO

Factory Default: NO

### **A.2 15 ENABLE CENSOR**

This determines whether the FUTURE CAR CHAMPION initials are censored before being displayed on the shooter groove car's license plate.

Setting:        YES  
                  NO

Factory Default: NO

### **A.2 16 DISABLE ZR-1/LT-5**

This disables the ZR-1/LT-5 engine assembly in the event that it becomes broken and lock-down bracket is installed.

Setting:        YES  
                  NO

Factory Default: NO

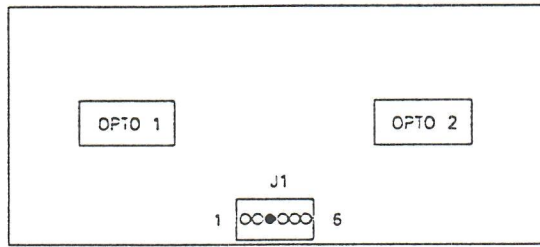
### **A.2 17 NO MATCH SPEECH**

This determines whether the end of match speech "Hey, these number don't match!" is said when the game is set for CREDIT PLAY. The speech is always said when the game is set for FREE PLAY.

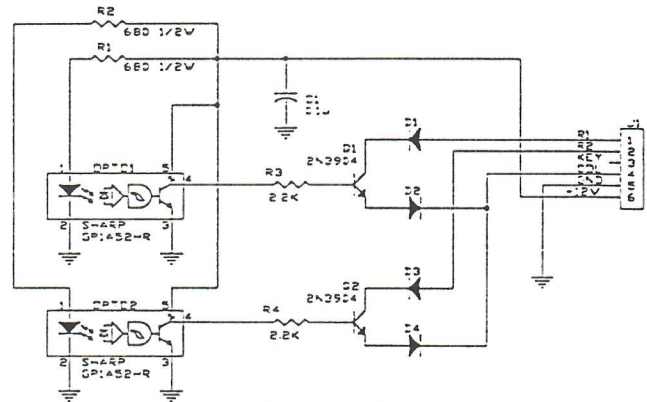
Setting:        YES  
                  NO

Factory Default: NO

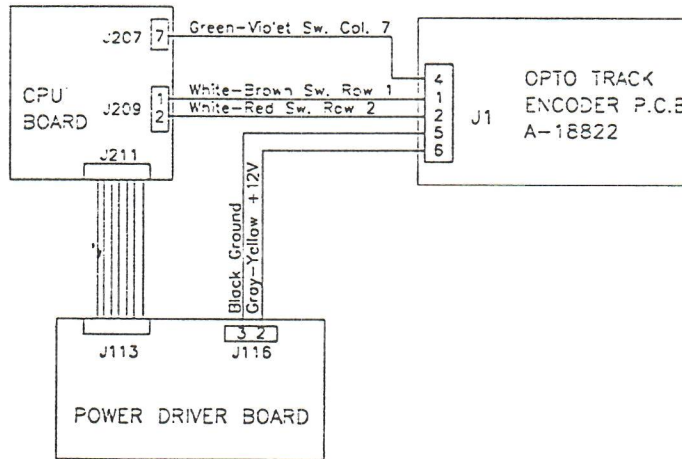
**CHANGE to Opto Track Encoder P.C.B. A-18822: Page 3-21**



- J1-1 White-Brown from J209-1
- J1-2 White-Red from J209-2
- J1-3 Key
- J1-4 Green-Violet from J207-7
- J1-5 Black ground from J116-3
- J1-6 Gray-Yellow +12VDC from J116-2



**Schematic**



# SECTION 2 Corrections/Changes

Page 2-3

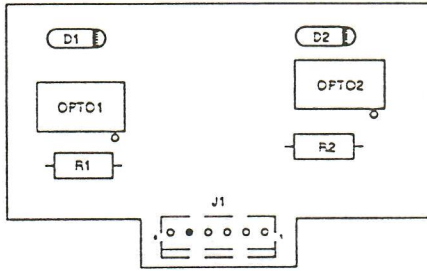
## Cabinet Assembly

Item #5 changed to A-18531-1 4-Ball Cashbox Assembly.

Page 2-11

## Printed Circuit Boards

Replace PCB A-18821 with A-19606 Opto Track Limit PCB Assembly.



Part No.	Designator	Description
5791-13830-06	J1	Connector, 6-pin
5010-08930-00	R1, R2	Res., 470, 1/2w, 5%
5070-09054-00	D1, D2	Diode, 1N4004
5490-12451-00	OPTO1, OPTO2	Opto Integrated, 10mA.

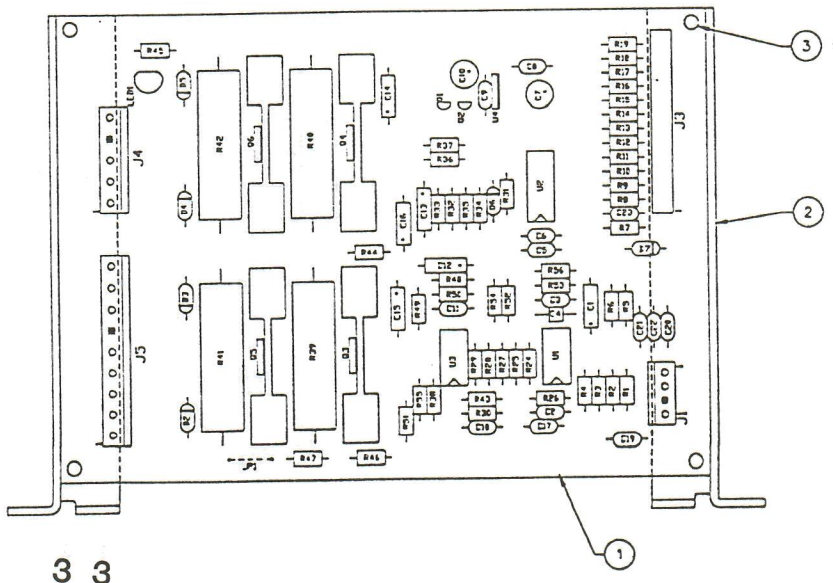
Page 2-14

## Printed Circuit Boards

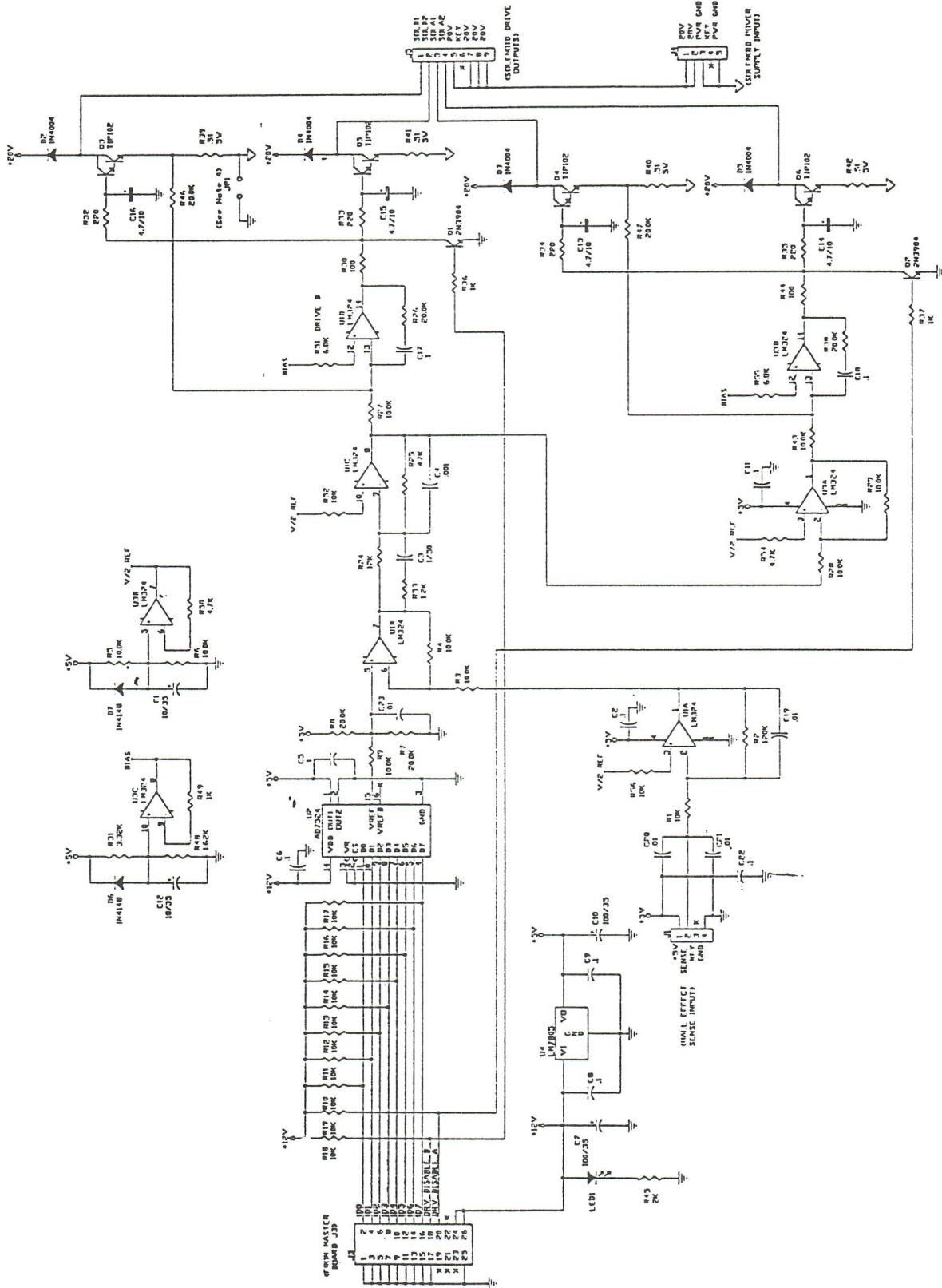
Item #1 changed to A-19625 Motor Driver Slave Board Assembly.

### A-19243 Motor Driver Slave Board & Bracket Assembly

Part Number	Designator	Description	Part Number	Designator	Description
① A-19625		Motor Driver Slave Board	5010-09314-00	R53	Res., 1.2KW, 1/4w, 5%
5040-12808-00	C1, C12	Cap., 10µFd, 35v, Axial	5705-12454-00	Q3 - Q6	Heatsink, w/pins
5040-10974-00	C7, C10	Cap., 100µFd, 35v, Radial	4004-01005-06	Q3 - Q6	Mach. Screw, 4-40 x 3/8"
5040-12751-00	C13-C16	Cap., 4.7µFd, 10v, Axial	4404-01119-00	Q3 - Q6	Nut, 4 x 40 SNUT
5043-12807-00	C3	Cap., 1µFd, 50v, Axial	5010-09035-00	R25	Res., 47KW, 1/4w, 5%
5043-09845-00	C4	Cap., 1KP, 50v, ±20% Axial	5010-09036-00	R30, R44	Res., 100W, 5%, 1/4w
5043-08996-00	C2, C5, C6, C8, C9, C11, C17, C18, C22	Cap., 0.1µFd, 50v, ±20% Ax	5010-08991-00	R50, R54	Res., 4.7KW, 1/4w, 5%
5370-12960-00	U1, U3	IC LM324N OPAMP	5010-09086-00	R51, R55	Res., 6.8KW, 1/4w, 5%
5371-12727-00	U2	IC DAC AD7524	5043-08980-00	C19-C21, C23	Cap., 0.01M, 50v (+80,-20%)Axial
5250-09157-00	U4	Reg 7805 1.0A. 5V	② 01-10756		Bracket
5070-09054-00	D2 - D5	Diode, 1N4004 1.0A.	③ 07-6688-18N		Rivet, 3/16 x 1/8"
5160-10269-00	Q1, Q2	Trans 2N3904 NPN			
5162-12635-00	Q3 - Q6	Trans TIP102			
5013-14455-00	R48	Res., 1.62KW, 1/4w, 1%			
5671-13732-00	LED1	Display LED Red			
5013-14135-00	R3-R6, R9, R27-R29, R43	Res., 10KW, 1/4w, 1%			
5010-09269-00	R24	Res., 12KW, 1/4w, 5%			
5013-14136-00	R7, R8, R26, R38, R46, R47	Res., 20KW, 1/4w, 1%			
5013-14456-00	R31	Res., 3.32KW, 1/4w, 1%			
5010-12065-00	R2	Res., 120KW, 1/4w, 5%			
5010-09534-00	JP1	Res., 0W			
5010-08984-00	R36, R37, R49	Res., 1.0KW, 1/4w, 5%			
5010-09034-00	R1, R10-R19, R52, R56	Res., 10KW, 1/4w, 5%			
5010-09999-00	R45	Res., 2KW, 1/4w, 5%			
5070-08919-00	D6, D7	Diode, 1N4148 1500MA			
5010-09160-00	R32 - R35	Res., 220W, 1/4w, 5%			
5012-14318-00	R39 - R42	Res., 0.51W, 5w, 5%			
5791-10862-05	J4	Connector, 5-Pin Header			
5791-10862-09	J5	Connector, 9-Pin Header			
5791-10850-00	J3	Connector, 26-Pin Header			
5791-13830-04	J1	Connector, 4-Pin Header			

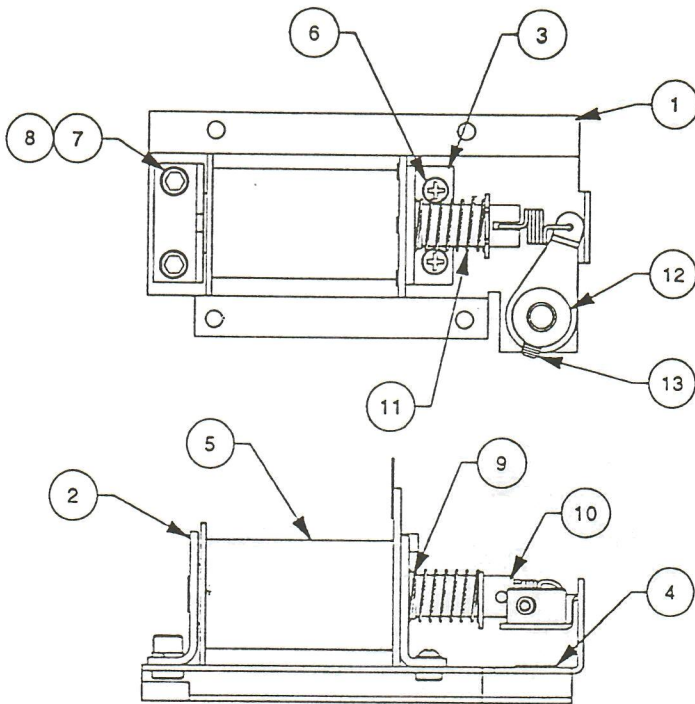


# Motor Driver Slave Board Schematic A-19625



Ramp Diverter

The Ramp Diverter Assembly has changed. The new part number is A-19630 and contains the following:



Item	Part No.	Description
1.	01-11957	Mounting Bracket
2.	A-16886	Flipper Stop Bracket
3.	01-7695	Solenoid Bracket
4.	20-8790	Nyliner Bearing
5.	A-15943-1	Flipper Coil Assembly
6.	4006-01017-04	MS, #6-32 x 1/4"
7.	4010-01066-06	MS, #10-32 x 3/8"
8.	4701-00004-00	Lockwasher #10 Split
9.	03-7066-5	Coil Tubing
10.	A-16636	Diverter Plunger Assembly
11.	10-303	Spring
12.	A-14185	Drive Arm Assembly
13.	4010-01169-04	SetScrew, #10-32 x 1/4"

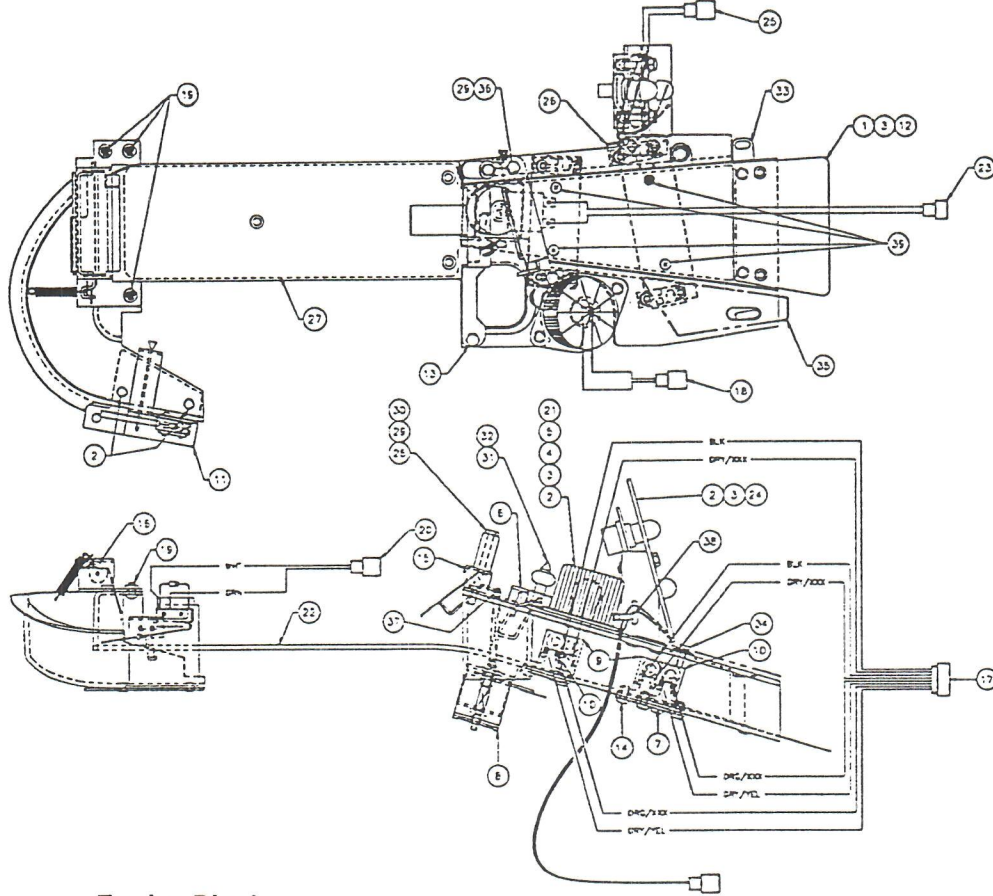
Engine Ramp

Pictorial and parts list were revised.

A-19008  
Engine Ramp Assembly

Item	Part No.	Description	Item	Part No.	Description
1.	01-13130	Skirt-Engine	20.	H-18214-3	Cable - Engine Switch
2.	07-6688-20N	Rivet, 1/4"	21.	24-8802	Bulb #906
3.	4700-00003-00	Flatwasher, 1/8x9/32x21ga.	22.	03-9213.5	Ramp
4.	A-14265-13	Recpt. - Skt. Assy., Clear	23.	H-19183	Cable - V8 Rev Gate
5.	03-8171-9	T-L Mini Dome, Trans. Red	24.	A-19155	Challenge Lamp Assembly
6.	A-19002	Flopgate Assembly	25.	H-19218.1	Cable - Challenge Lamps
7.	A-19688	Opto Plate 2-Eng. Ramp	26.	01-11985	Shield - Opto
8.	A-19253	Opto/Actuator Assembly	27.	31-1997-1	Decal
9.	A-16908	Opto LED Assembly-RTV	28.	02-4433	Post Spacer, #8 x 1-3/16"
10.	A-16909	Opto Photo Trans. Assy., -RTV	29.	4406-01119-00	Nut 6-32 ESN
11.	A-19092	Ramp Switch - Engine	30.	4006-01005-24	Mach. Screw, #6-32x1-1/2"
12.	07-6688-18N	Rivet, 7/32"	31.	02-3905	Post
13.	4608-01081-07	H-F #8 x 7/16"	32.	23-6694-1	Rubber Ring, Black 3/32I.D.
14.	4106-01013-06	Sh. Metal Screw, #6 x 3/8"	33.	01-13434	Ramp Guard
15.	A-19110	Frontgate	34.	4106-01115-06	Sh. Metal Screw, #6x3/8"
16.	A-19099	Backgate	35.	31-1997-5	Decal
17.	H-19219	Cable - Optos	36.	4006-01005-06	Mach. Screw, #6-32x3/8"
18.	H-18219-1	Cable - Flasher	37.	03-7796-1	Washer, Nylon
19.	4006-01017-05	Mach. Screw, #6-32x5/16"			

## A-19008 Engine Ramp Assembly



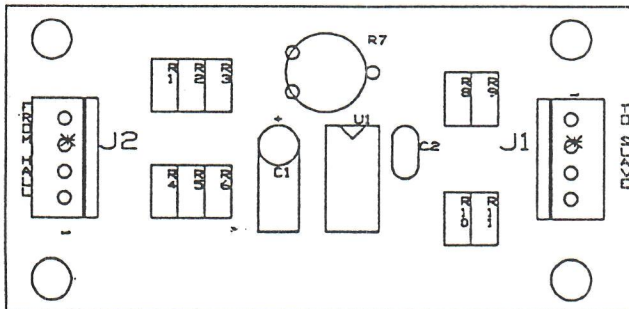
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### Engine Block

Items #7 and 14 were changed; item #15, 16, 17 and 18 were added.

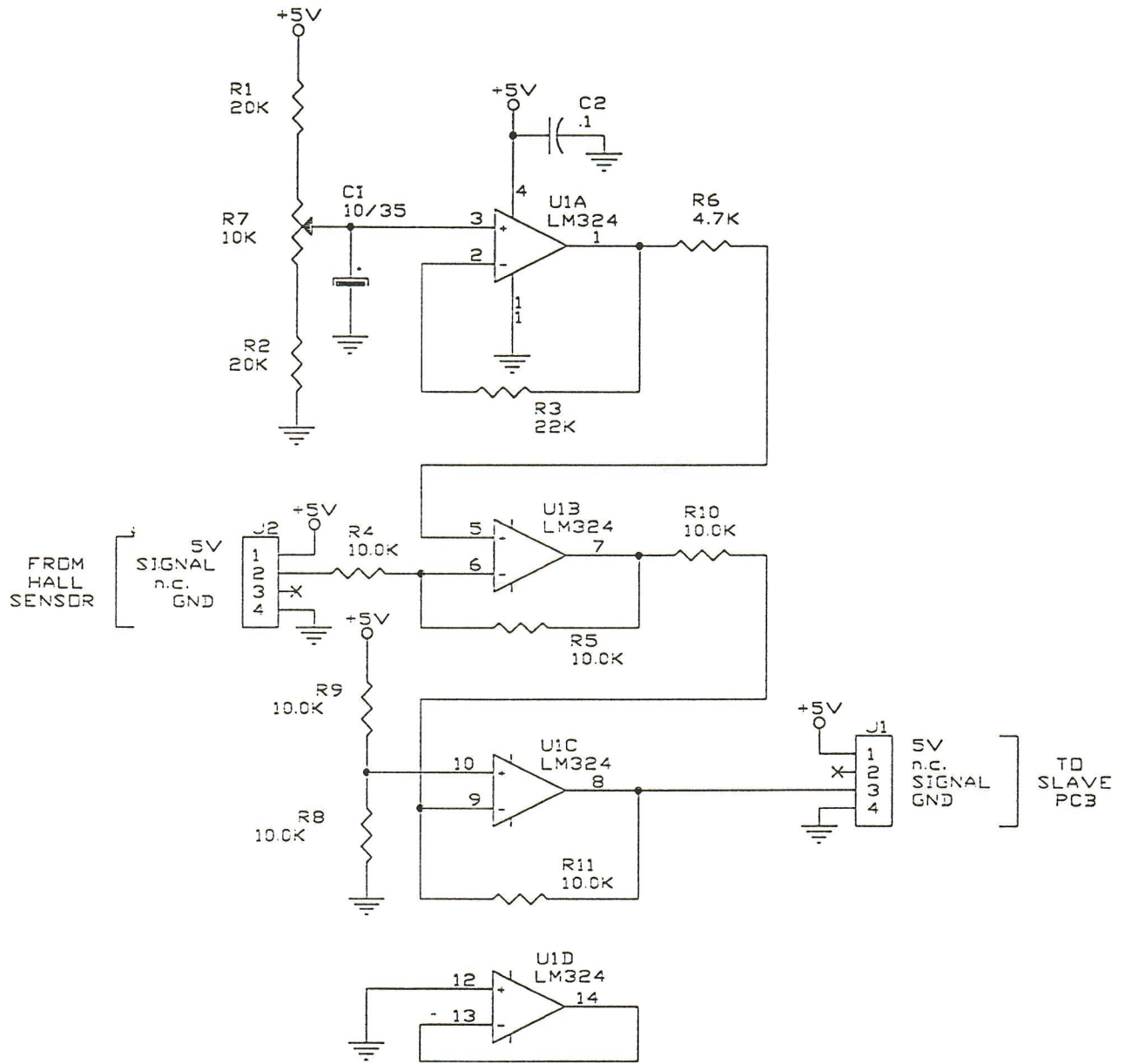
Item	Part No.	Description
7.	4006-01003-06	MS #6-32 x 3/16"
14.	4006-09168-02	MS #6-32 x 1/8"
15.	H-19182	V8 Sw/FI Cable
16.	23-6622	Double Sided Tape
17.	03-7655-4	Cable Clamp
18.	A-19711	Hall Adjustment Assembly (See assembly below)

## A-19711 Hall Adjustment Assembly



Part No.	Designator	Description
A-19706	-	Hall Offset Adjustment PCB
5040-12808-00	C1	Cap., 10 $\mu$ Fd, 35v Axial
5043-08996-00	C2	Cap., 0.1M, 50v, $\pm$ 20%
5370-12960-00	U1	IC, LM324 N OPAM
5791-13830-04	J1, J2	Connector, 4-pin
5014-10261-00	R7	Pot 10K, $\frac{1}{4}$ w, $\pm$ 20%
5010-08774-00	R3	Res., 22K, $\frac{1}{4}$ w, 5%
5010-08991-00	R6	Res., 4.7K, $\frac{1}{4}$ w, 5%
5010-10985-00	R1, R2	Res., 20K, $\frac{1}{4}$ w, 5%
5013-14135-00	R4, R5, R8-R11	Res., 10K, $\frac{1}{4}$ w, 5%
01-13609	-	Adjust Board Bracket
20-9811-1	-	Support Post
H-19707	-	Cable Assembly

## Hall Offset Adjust P.C.B. Schematic A-19706



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**Exhaust Pipe**

Added item #14, 03-7520-2 *Nylon Tie-Wrap 3-7/8"*.

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**Back Panel**

Item #11 changed to 31-1995-11 *Decal*,

Item #13 changed to A-17983 *Light & Socket Assembly*,

Item #14 changed to 03-8022-4 *Spacer 1/4"*.

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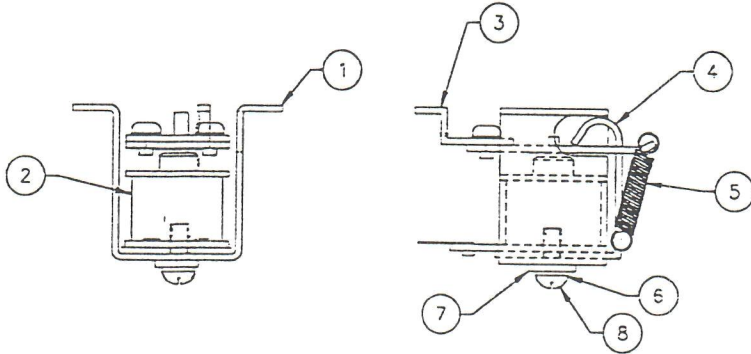
**Kick-Out Coil**

Added item #17, RM-22-08 *Tape*.

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**Ball Gate Actuator**

Added assembly.

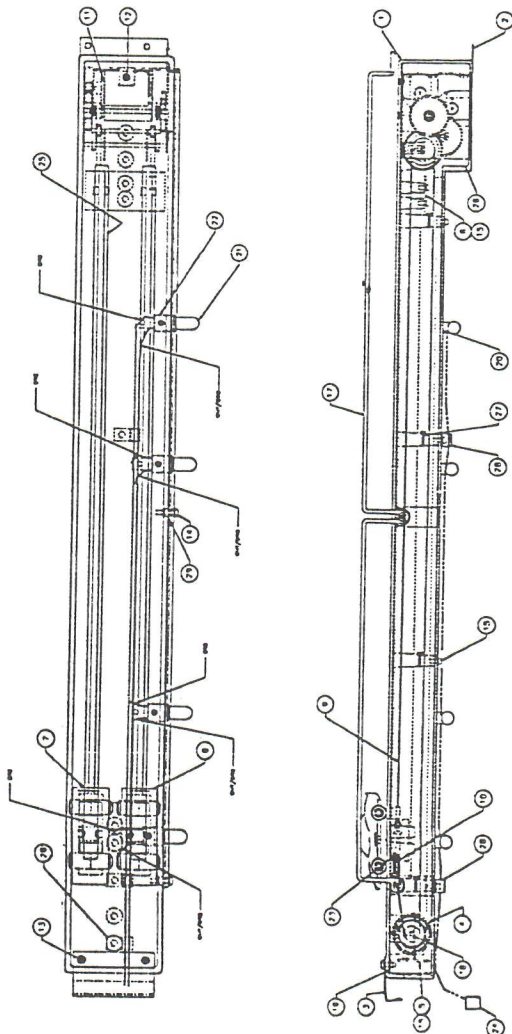


Item	Part Number	Description
1.	01-12348	Ball Gate Coil Bracket
2.	SMI-35-4000-DC	Coil Assembly
3.	A-11146	Armature Assembly
4.	A-6892	Frame & Eyelet Assembly
5.	10-96	Spring
6.	4701-00003-00	Lockwasher #8 Split
7.	4700-00089-00	FW, 11/64 x 7/16 x 16ga.
8.	4008-01021-07	MS, #8-32 x 7/16"

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**Track**

Pictorial and parts list were revised.



Item	Part No.	Description
1.	03-9217	Racetrack Frame
2.	01-13069.1	Track Bottom
3.	01-13272	Top Bracket - Racetrack
4.	03-9221	Opto - Pulley
5.	A-19141	Opto Board Assembly
6.	A-19606	Limits Opto Board Assembly
7.	A-19146	Right Car Assembly
8.	A-19145	Left Car Assembly
9.	20-10116	Cord
10.	10-489	Spring-Cord
11.	A-19134	Gear Box Assembly
12.	4004-01041-04	Mach. Screw, #4-40 x 1/4"
13.	4006-01003-06	Mach. Screw, #6-32 x 3/8"
14.	4006-01003-10	Mach. Screw, #6-32 x 5/8"
15.	4106-01114-08	Sh. Metal Screw, #6-32 x 1/2"
16.	A-19013	Bottom Bracket, Racetrack
17.	12-7226	Wireform
18.	02-5087	Shaft- Opto Pulley
19.	H-19608	Cable, Track Opto G.I.
20.	07-6688-16N	Rivet
21.	03-8063-6	Bulb Sleeve, Yellow
22.	A-12887	Socket & Bulb
23.	10-491	Loop Spring
24.	H-19607	Cable
25.	*31-1996-1	Decal - Top
26.	*31-1995-7	Decal - Side
27.	03-7520-2	Tie Wrap, Nylon
28.	03-7655-4	Wire Harness Clip, 1/4"
29.	4700-00011-00	Flatwasher, 11/64 x 7/16 x 16ga.

\* Not available for individual sale. Order Decal Set 31-1995 and 31-1996 respectively.



## Unique Parts List

Part Number	Description	Part Number	Description
A-12359-4-B	Side Molding Assembly, Black	A-19208-1	Flipper Guide Right Lane Assy.
A-13204-50036	Bottom Arch Assembly	A-19208-2	Flipper Guide Left Lane Assembly
A-13769-50036	Playfield & Insert Assembly	A-19223-R	Flipper Assembly Complete
A-15368-1	Eject Assembly	A-19242	Dual H-Driver & Bracket Assembly
A-16917-50036	Sound Board Assembly	A-19243	Motor Driver Slave & Bracket Assy.
A-17347-1	3-Lamp Assembly & Spacer	A-19259	Xmas Tree Lamp & Bracket Assy.
A-17651-50036	WPC CPU Security Board	A-19260	Right Wire Ramp Assembly
A-17730-2	Ball Shooter Assy., w/Knob (Black)	A-19294	3-Bank Standup Target
A-17814-50036	Backbox Assembly	A-19314-1	Playfield Plastic Assembly
A-18532	Motor Driver Master Board	A-19314-2	Playfield Plastic Assembly
A-18587	Ball Guide Assembly #1	A-19314-3	Playfield Plastic Assembly
A-18588.2	Ball Guide Assembly #2	A-19316	Ramp Cover Assembly #1
A-18589	Ball Guide Assembly #3	A-19317	Ramp Cover Assembly #2
A-18590	Ball Guide Assembly #4	A-19332	Lt-5 Engine Wire Assembly
A-18591	Ball Guide Assembly #5	A-19521	Bumper Gate Assembly
A-18592	Ball Guide Assembly #8	A-19630	Ramp Diverter Assembly
A-18593	Ball Guide Assembly #9	01-13020	Ball Guide #6
A-18594.2	Ball Guide #11	01-13021	Ball Guide #7
A-18614	Speaker/Display Panel Assembly	01-13022.2	Ball Guide #10
A-18967	Ball Guide #3	01-13023.1	Ball Guide #12
A-18975	Garage Guide Weld Assembly	01-13186.1	Opto Mounting Bracket
A-18977	Diverter Flag Rivet Assembly	01-13223	Race Track Bracket
A-18982	Spinner Gate Assembly	01-13245.1	Front Gate Engine Bracket
A-19001	Ball Gate Special Assembly	01-13273.1	Arch Ball Guide
A-19003	2-Switch & Bracket Assembly	01-13296	Left Corner Bracket
A-19004	Race Track Assembly	01-13297.3	Right Corner Bracket
A-19005	Popper Assembly	01-13298	Car Light Baffle
A-19007	Loop Ramp Assembly	01-13413.1	Right Lane Divider
A-19009	Race Track Ramp Assembly	01-13424	Bracket
A-19035-1	4-Lamp PCB & Spacers	02-4425-3	Post Fastner, 8-32 x 5/8"
A-19036-1	5-Lamp PCB & Spacers	02-5108	Post Standoff-Loop Ramp
A-19037-1	9-Lamp PCB & Spacers	11-1213	Cabinet
A-19038-1	2-Lamp Board & Spacers	11-1214-A	Wood Rail
A-19039-1	3-Lamp Board & Spacers	11-1214-B	Wood Rail
A-19123	Front Molding, Black	11-1214-C	Wood Rail
A-19140	Engine & Ramp Assembly #6	12-7214.1	Left Wire Ramp
A-19151	Upper Loop Switch Assembly	12-7215	Garage Wire Ramp
A-19154	Exhaust Pipe Assembly	12-7231	Right Lane Wire #2
A-19175	Linear Hall PCB Assembly	5795-14325-00	Ribbon Cable V-8 Mtr. Control
A-19177	Back Panel Assembly		

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## Upper Playfield Parts

Item #27 changed to A-18594.1 *Ball Guide*,  
 Item #40 changed to A-19630 *Ramp Diverter Assembly*,  
 Item #66 changed to 01-13273.1 *Bottom Arch Ball Guide*,  
 Item #68 changed to A-18587.1 *Ball Guide*.

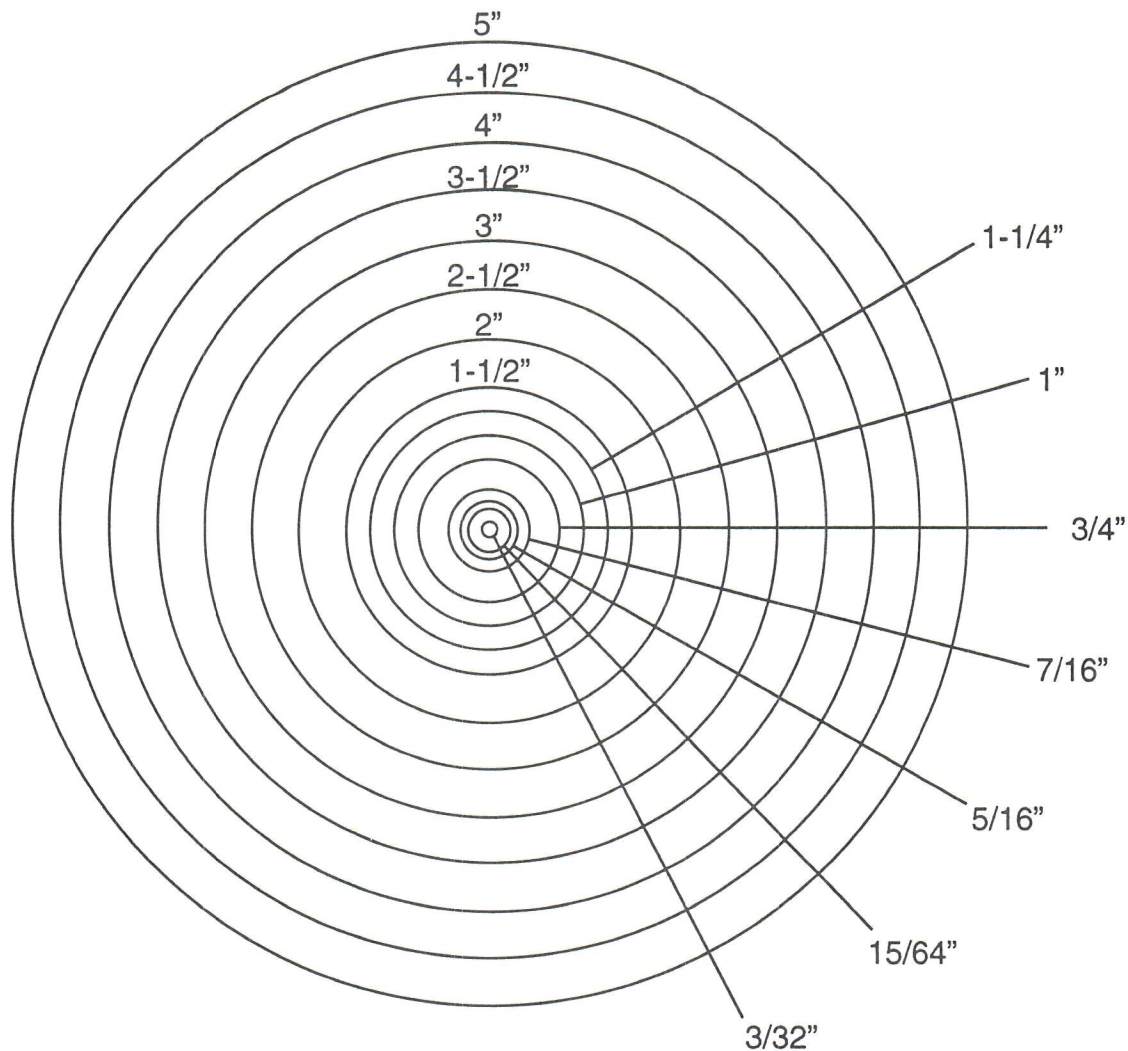
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## Lower Playfield Parts

Item #27 changed to A-19630 *Ramp Diverter Assembly*.

# Rubber Rings

(Inside Dimension Reference)



Also available in black per charts:

Black Part No.	I.D.	White Part No.
23-6694-1	3/32	23-6535
23-6694-2	15/64	23-6641-1
23-6694-3	5/16	23-6300
23-6694-4	7/16	23-6599
23-6694-5	3/4	23-6301
23-6694-6	1	23-6302
23-6694-7	1-1/4	23-6303

Black Part No.	I.D.	White Part No.
23-6694-8	1-1/2	23-6304
23-6694-9	2	23-6305
23-6694-10	2-1/2	23-6306
23-6694-11	3	23-6307
23-6694-12	3-1/2	23-6308
23-6694-13	4	23-6309
23-6694-14	4-1/2	23-6530
23-6694-15	5	23-6310



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