



WHAC-A-MOLE[®]
ARCADE

OWNERS MANUAL

W A R N I N G :

ALL BOB'S SPACE RACERS®
GAMES ARE SHIPPED WITH THE
SAME KEY AND LOCK SETS.

IT IS IN YOUR BEST INTEREST
TO CHANGE THE KEYS AND
LOCKS ON YOUR GAMES WHEN
YOU RECEIVE THEM.

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Bob's Space Racers, Inc.'s

One-Year New Equipment Warranty

1. **INCLUDED IN THIS WARRANTY** Bob's Space Racers, Inc. warrants to the original purchaser only that new equipment that is the subject of this sale conforms to its specifications, and is free from defects under normal service for a one-year period from the original date of delivery. This warranty does not include any damages resulting from occurrences listed in Paragraph 2 below. This Warranty is not transferable under any circumstance. Any claims under this warranty must be received in writing by Bob's Space Racers, Inc. within 13 months from the date of delivery. Within a reasonable time of such written notification Bob's Space Racers, Inc. will replace or repair any defective component of the equipment of part thereof which fails for reasons other than normal services, use, or wear. Light bulbs are specifically excluded from this warranty and shall be the sole responsibility of the purchaser. Bob's Space Racers, Inc., within its sole discretion, makes the final determination as to whether to repair or replace any component and whether any such repair or replacement shall be performed where the equipment is located or at its home facility in Volusia County, Florida, or another facility of its sole choice. Any and all freight charges for the purposes of repair or replacement shall be paid by the original purchaser. All defective parts shall be returned to Bob's Space Racers, Inc. if requested. Bob's Space Racers, Inc. does not warrant that the equipment will meet any original purchaser's specific requirements or that the operation of the equipment will be uninterrupted. These remedies are the original purchaser's exclusive remedies for breach of warranty.
2. **EXCLUDED BY THIS WARRANTY.** Bob's Space Racers, Inc. does not warrant (a) any product, components or parts not manufactured by Bob's Space Racers, Inc.; (b) damage caused by use of the equipment for purposes other than those for which it was designed; (c) defects caused by failure to provide a suitable installation environment for the equipment; (d) damage caused by unauthorized attachments, modification, or service; (e) damage caused by normal wear and tear or improper power supply; (f) damage caused by accident or disaster such as fire, flood, lighting and wind; (g) any other abuse or misuse of the equipment.
3. **EXCLUSIVE WARRANTY. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OR REMEDIES, WHETHER WRITTEN, ORAL OR IMPLIED. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, COURSE OF DEALING OR USAGE OF TRADE ARE HEREBY EXPRESSLY DISCLAIMED AND EXCLUDED.**
4. **REMEDIES LIMITED. UNDER NO CIRCUMSTANCES, EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, SHALL BOB'S SPACE RACERS, INC. BE LIABLE FOR ANY LOSS OR DAMAGE, DIRECT OR INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL ARISING OUT OF THE USE OR INABILITY TO USE THIS EQUIPMENT INCLUDING BUT NOT LIMITED TO ANY CLAIM FOR LOSS OR PROFITS, LOSS OF SAVINGS OR REVENUE, LOSS OF USE OF THE EQUIPMENT, OR ANY ASSOCIATED EQUIPMENT, FACILITIES OR SERVICE, DOWNTIME, THE CLAIMS OR COSTS OF THIRD PARTIES INCLUDING CUSTOMERS, AND INJURY TO PROPERTY.**
Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.
5. **NO OTHER WARRANTIES.** Unless modified in writing and signed by both parties, this agreement is understood to be the complete and exclusive agreement between the parties, superseding all prior agreements, oral or written, and all other communications between the parties relating to the subject matter of this agreement. No employee or representative of Bob's Space Racers, Inc. of any other party is authorized to make any other warranty or to assume any other liability in connection with the sale of its equipment.
6. **TIME LIMIT FOR CLAIMS.** Any claim for breach of warranty or claims under this warranty must be received in writing by Bob's Space Racers, Inc. within 13 months following delivery of the equipment.
7. **FUTURE CHANGES.** Bob's Space Racers, Inc. reserves the right to reserve, change or modify the construction and design of its equipment. Or any component part or parts thereof without incurring the obligations to make such changes or modifications in present equipment.
8. **ALLOCATION OF RISKS.** This agreement allocates the risks of equipment failure between Bob's Space Racers, Inc. and the original purchaser. This allocation is recognized by both parties and is reflected in the price of the goods. **THE PURCHASER ACKNOWLEDGES THAT IT HAS READ THIS AGREEMENT, UNDERSTANDS IT, AND IS BOUND BY ITS TERMS.**
9. **TO OBTAIN WARRANTY SERVICE.** The original purchaser must, at his own expense, bring or ship the equipment to an authorized location for service. Additionally, the original purchaser must pay all freight, shipping or transportation charges for the return of the equipment from Bob's Space Racers, Inc. to the original purchaser. Telephone or write:

Bob's Space Racers, Inc.
427 15th Street
Daytona Beach, Florida 32117
Telephone number 386/677-0761
FAX 386/677-0754

SERVICE POLICY

At **BOB'S SPACE RACERS®**, INC., our strength lies in the high quality, long lasting equipment we manufacture.

Should the need arise, we maintain both Technical Support and Customer Service staff.

Technical Support is available whenever you should need it. The direct technical 'hot line' is (386) 677-0761. This line is manned 8:30AM to 5:00PM, EST, excluding holidays. During all other times an operator will be available to relay your problem to the technician on call. Technical Support will assist you in troubleshooting a service problem or setting equipment options.

Customer Services telephone lines are manned 8:00AM to 5:00PM, EST, excluding holidays. The direct Customer Service telephone number is (386) 677-0761, Ext. 34. Customer Service Representatives will take parts orders and research the status of previous orders.

As always, you can call (386) 677-0761 to reach all other departments, or you can FAX anyone at **BOB'S SPACE RACERS®** by calling (386) 677-0794, 24 hours a day.

ADVANCED REPLACEMENT POLICY

After speaking with our Technical Department, it may be necessary for **Bob's Space Racers** to ship an assembly or part to repair your game.

We will ship, via your preference (i.e., United Parcel Service, Federal Express, etc.), the part(s) needed. We do not ship via the postal service or to PO Boxes. You will be billed, per your account status, for the total cost of the part(s) plus shipping charges.

An RMA# will be issued or you may use the order number to return the defective part(s) to **Bob's Space Racers**. After returning the part(s) your account will be issued:

- a) warranty credit, if your game is under warranty (See Warranty Policy) which does not include shipping charges, or
- b) credit for that item minus the repair charges.

If the part(s) cannot be repaired to the point where it could be shipped to another customer as an Advanced Replacement (i.e., cosmetic damage), we will ship your original parts back to you. You will be required to return the Advanced Replacement part(s) or pay for the item(s). You will be responsible for all freight charges.

A REQUEST FROM BOB'S SPACE RACERS

When you request an advanced replacement from us we would like to follow a few simple rules.

1. Wait until the replacement part arrives before returning the defective part. This way we can verify that the part is correct, and if not, what differences there are.
2. Please return the defective part in the same package the advanced replacement arrives in. This will insure no further damage will result in return shipping.
3. **DO NOT** disassemble the returned part or try to repair it. There are not any user serviceable parts inside. Further damage will most likely result. Also there is the possibility of our vendors voiding their warranty on parts disassembled.

Thank You For Your Cooperation.

BOB'S SPACE RACERS®

WHAC-A-MOLE®

ARCADE OWNERS MANUAL

*** Revised January 1998 ***

**427 - 15th Street
Daytona Beach, FL 32117**

**(386) 677-0761
(386) 677-0794 FAX**

TABLE OF CONTENTS

OWNERS MANUAL

INTRODUCTION AND SET-UP

Manual Introduction	1
Installation	2
Assembly Diagrams - New Design	3
Electrical Requirements	5

OPERATION

Basic Game Operation	6
Sequence of Play	7
Game Models	8
Game Options	9
Options Registers - 2300 Boards	10
Options Registers - 2400 G Board.	11

MAINTENANCE

General Maintenance	15
Air Pressure Adjustment	16

TECHNICAL DATA

Control Box Electronics

Whac-A-Mole® Control Box Overview	17
Whac-A-Mole® Control Box Schematics	18
Control Box Input/Output Connectors Diagram	19
Sequencer Models	20

BOB'S SPACE RACERS®**WHAC-A-MOLE® ARCADE**

Sequencer Models #2 & #3	20
Model 3 Sequencer Drawing	21
Sequencer Control Board	22
Control Board Schematic	23
Troubleshooting - Whac-A-Mole® Control Box Electronic	24
<u>Large Processor Electronics</u>	
Large Processor Board Overview	26
Large Processor Board Drawing	27
Large Processor Board Schematic	28
Board Layout - Inside Back Door	29
Universal Relay Board Overview/Drawing	30
Universal Relay Board Wiring Diagrams	31
Kiddie Whac-A-Mole® Wiring Diagram - Rear Door.	33
Sound Board Wiring Harness	34
Troubleshooting - Processor and Relay Boards	35
BSR Music Board Overview	38
BSR Sound Board Chip Layout Diagram	39
Display Board Overview/Drawing	40
Display Board Schematic	41
<u>2300 Series Electronics</u>	
2300 Series Electronics	42
2300 Microprocessor Board Overview	42
2300 Microprocessor Board Drawing	43
2300 Microprocessor Board Wiring	44
2300 Front Panel Board Overview/Drawing	45

BOB'S SPACE RACERS®**WHAC-A-MOLE® ARCADE**

2300 Front Panel Board Schematic	46
2300 Front Panel Board Wiring Diagram	47
2300 Credit Display Board Overview/Drawing	48
2300 Display Board Overview/Drawing	49
2300 Relay Board Overview	50
2300 Relay Board Drawing/Schematic - BSR1110	50
2300 Relay Board Drawing/Schematic - BSR1120	52
2300 Relay Board Drawing/Schematic - BSR1130	54
2300 Board Troubleshooting	56

Whac-A-Mole® Box Electronics

Whac-A-Mole® Box.	62
Mole® Bracket w/Electric Switches - Pre '90.	63
Top Limit Valve Assembly - Pre '90	64
Whac-A-Mole® Bracket Assembly Diagram - Old Style.	65
Mole® Bracket Assembly w/Limit Valves.	66
Top Limit Valve Assembly	67
Limit Valve Assembly Detail	68
Whac-A-Mole® Bracket Assembly Diagram - New Design	69
Whac-A-Mole® Housing Assembly Diagrams - New Design	70
Whac-A-Mole® Pneumatic Schematic	72
Whac-A-Mole® Wiring Diagram	73
Mole® Box Troubleshooting.	74
Parts List	77

* * * * *

BOB'S SPACE RACERS®

WHAC-A-MOLE® ARCADE

- APPENDICES -

COIN MECHANISM

Coin Mechanism

COMPRESSOR

Compressor Overview
Compressor Drawings
Compressor Troubleshooting

LIGHTING

Flashers and Bally Lights
Troubleshooting

MATERIAL SAFETY DATA SHEETS

REDEMPTION

Introduction
What is Redemption?
What is Percentage?
Why Does It Work?
Merchandising

TICKET DISPENSER

Ticket Dispenser Overview
Ticket Dispenser Troubleshooting

* * * * *

INTRODUCTION AND SETUP

MANUAL INTRODUCTION

This manual will be used for the following games: Whac-A-Mole®, Whac-A-Munch™, Kiddie Whac-A-Mole®, Pattie Cakes™ Hot Spot™, and Bully Buster™. These games operate basically the same and have the same Electronics, as you will see throughout the Manual.

Your Owners Manual is divided into several sections beginning with Set-up and Operation and continuing with Maintenance of the game and pertinent Technical information. The Appendices cover such topics as Compressors, Lighting, Ticket Dispensers, and Troubleshooting Guides. The Troubleshooting Guides, for instance, contain enough information so that the game can be repaired with little difficulty. If this information is not sufficient, a call to **Bob's Space Racers®** will provide additional assistance. Between the Manual and the personal assistance, downtime of your game will be minimal. (When you call, we assume that you have read the Manual and tried the suggested repairs.)

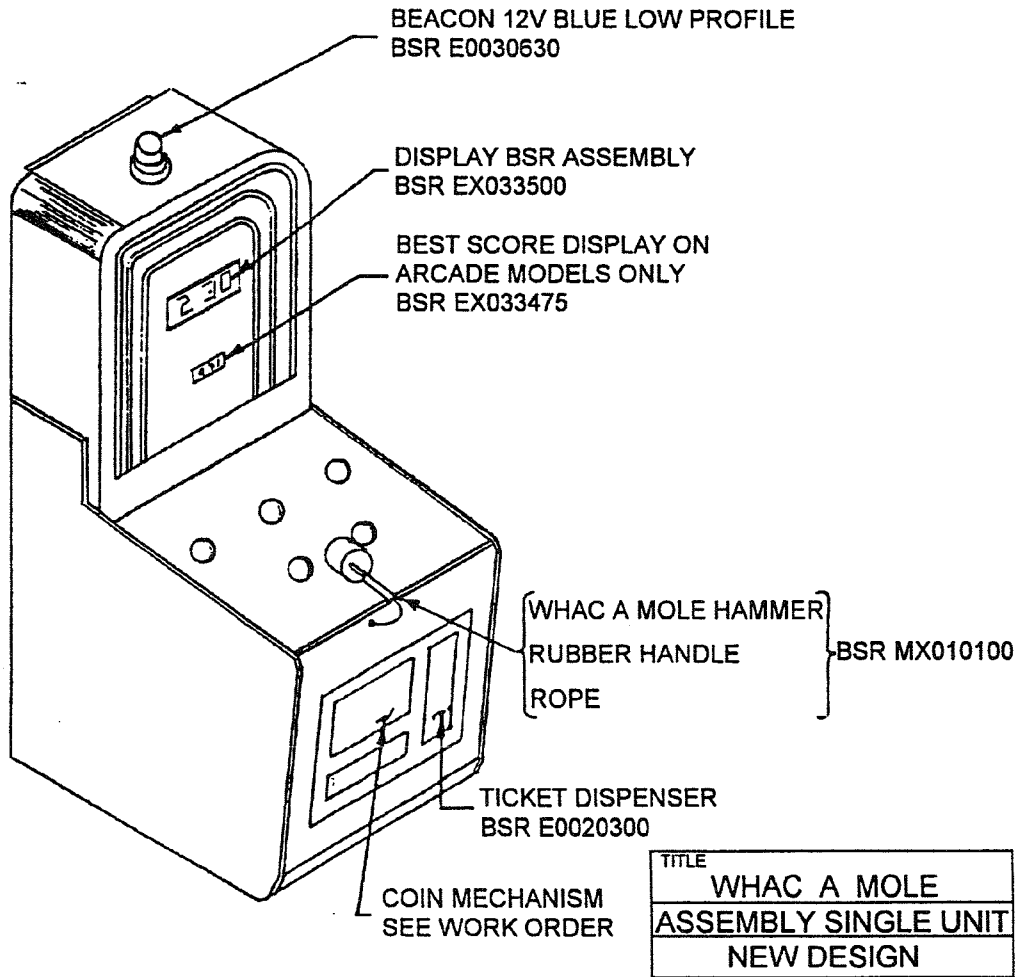
Of great importance covered in the Manual are the Maintenance and Operation sections. Two ways to attract business are as follows:

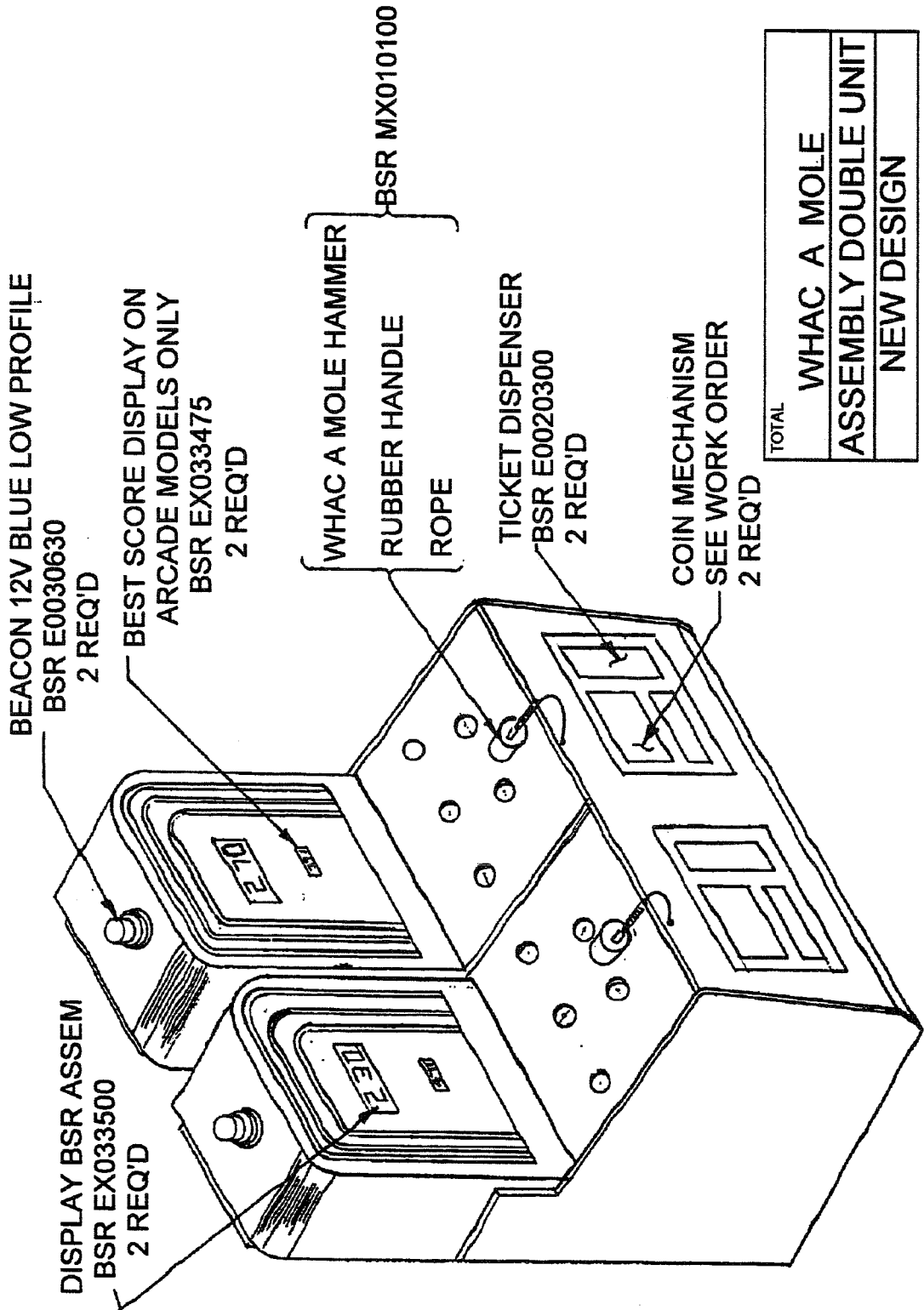
1. Keep the game clean and pleasing to the eye.
2. Make sure that you maintain your flashing lights (replace burnt bulbs regularly).

Your pride is reflected by the cleanliness and flash. A good game with good flash will make money. The very best game, if not clean or improperly operating flash, will be easily passed by. Remember, no one can enjoy the game until you get them to play it. Also of equal importance is the Sound System. This should be checked regularly.

INSTALLATION

1. Choose a suitable indoor location for the game and set in place.
2. Make sure there is adequate power for the game according to the Power Requirement Label(s) on the back of the game.
3. Remove all the spare parts that were shipped with the game from inside the upper back door before the game is plugged in. After this is done, no one other than a qualified service technician should have access to the game inside the back door.
4. Plug the Air Compressor and the game into a power outlet. When the Compressor shuts off, open the back door and switch the game on. The game is ready for use.





TOTAL
WHAC A MOLE
ASSEMBLY DOUBLE UNIT
NEW DESIGN

BOB'S SPACE RACERS®

WHAC-A-MOLE® ARCADE

ELECTRICAL REQUIREMENTS

Two Unit Whac-A-Mole®

Voltage	Hz	Amps
100v - 125v	60	1.6 Amps Max Operating

Single Unit Whac-A-Mole®

Voltage	Hz	Amps
100v - 125v	60	1.6 Amps Max Operating

Single Unit Kiddie Whac-A-Mole®

Voltage	Hz	Amps
100v - 125v	60	1.6 Amps Max Operating

1/2 Hp Gast Compressor

Voltage	Hz	Amps
100v - 125v	60	6.8 Amps

3/4 Hp BSR Compressor

Voltage	Hz	Amps
100v - 125v	60	11.8 amps

OPERATION

BASIC GAME OPERATION

All Whac-A-Moles®, Kiddie Whac's, Pattie Cakes™, Bully Busters™ and Hot Spots™ have different options and capabilities, but the object of the game is the same. The Player hits the Moles on their head as they pop up (or hits the lights as they light up).

As the Mole Heads or lights are hit, the pace at which they pop up will increase. When the game ends, the Bell and the Beacon will sound. If enough points are scored, tickets will be dispensed (if applicable).

SEQUENCE OF PLAY

1. Insert coin(s) required for a Credit.
2. At this point, the sound will start (depending on the game) and, after a one second delay, the Moles will start popping up (lights will flash) in a random pattern at a slow pace.
3. The Player hits the Heads as they pop up (hits the lights when they turn on) to score points. As a Mole is hit on the head, 10 points are scored; the pace of the Moles (or lights) will accelerate.
4. Once three misses occur after the first 20 moles pop up (or lights light up), or a Player runs out of time, the Bell and Beacon will sound, signifying the end of the game.
5. If enough points are scored, tickets will be dispensed. If The Best Score of The Day is beaten (Whac-A-Mole®), at the End Of The Game, all the Moles, Bell and Beacon will activate for ten 10 seconds and a new Best Score will be displayed.

MODELS

This Manual covers the various games that use Whac-A-Mole® Electronics. The games may look different and use light switches instead of Moles (or other heads), but the operation of the game and its electronics are the same.

Whac-A-Mole® -

- Original Versions -

- o Blue Control Boxes, Batteries and Chargers (or Power Supply)
 - One Board in the Control Box (on the Ticket Dispenser there is a Driver Board as well as a Ticket Dispenser Board).
- o Control Box Models #2, #3, and Beige Control Box Model #3.
 - There are 2 Circuit Boards in the Box, a Control Board, and a Three Ticket Board.

- Intermediate Version -

- o Large Microcontroller Board and two Large Relay Boards. Various software versions are available depending on your game.

- 2300 Version -

- o 2300 Microprocessor Board, Front Panel Board, Credit Display, BSR 1110 Relay Board and a BSR 1120 Relay Board.

NOTE: On the Intermediate Version, and beginning in 1993, we use software to change from a Whac-A-Mole®, to a Pattie Cakes™, to a Bully Buster™, etc.

GAME OPTIONS

Original Versions

Early model Whac-A-Mole® games with the Control Boxes had the option to select 1 coin or 2 coins and three score limits at which one ticket will be dispensed when the Player reaches each preset limit if the Control Box had a 3 ticket board inside it. The final limit was a Win and Game Over setting.

Intermediate Version

The Intermediate Version used the large Controller Board. There are numerous versions of software available for the games that we manufacture with this style of electronics.

Inside the back door is a switch bracket and some adjustments can be made to the overall game:

1 Coin/2 Coin Switch

Difficulty Switch - this switch will control how quickly the game will progress after a Mole is hit,

1. Beginner
2. Average
3. Advanced

Ticket Output - On the original version of the game, there was no Toggle Switch to set the ticket payout. There was a jumper installed on the input plug of the large processor board 12 pin Molex plug as follows:

<u>Jumper</u>	<u>Ticket Payout</u>
Pin 10 & Pin 12	0
No Jumper	50
Pin 11 & Pin 12	100

On later versions the Toggle Switch controls the ratio of tickets awarded for a number of points scored.

- 0 - No Ticket Given
- 50 - One Ticket for Every 50 Points Scored
- 100 - One Ticket for Every 100 Points Scored

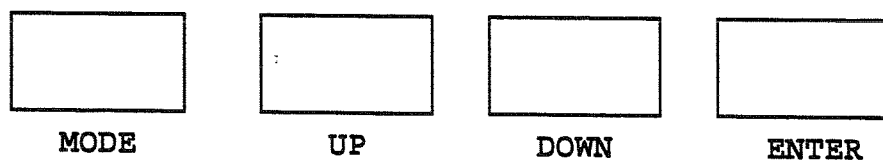
2300 Version:

'93 and on use setable Registers that can be changed to accept multiple coins and multiple ticket output. (See following pages.)

WHAC-A-MOLE®, KIDDIE WHAC-A-MOLE®, BULLY BUSTER™,
 PATTIE CAKES™, HOT SPOT™
 Option Registers - 2300 Boards

In order to set the Option Registers, first locate the Front Panel Board and Credit Display. The Front Panel Board (also called the Register Select Board) is located inside the game, behind the Coin Door, and ontop of the Coin Box. The Credit Display is on the Ticket Dispenser door and is part of the Coin/Ticket Box. They will be used in conjunction with one another to set the Registers. Turn the game power ON.

The two digits to the left on the Credit Display represent the number of coins required to play the game; the two digits to the right on the Credit Display represent the number of credits remaining. To set the Registers and enter the desired Options, locate the four white push buttons on the Front Panel Board labeled "MODE", "UP", "DOWN", and "ENTER" (see diagram below). To enter the Options, press the two buttons on the right ("DOWN" and "ENTER") simultaneously. On the Credit Display, the first two digits indicate the Register you are in; the two digits on the right show the value in that Register. The value can be set from 00 to 255 maximum. Some registers do not go that high. If there is a decimal point after the last digit, this means there is a value of 100 plus that value; if there is a decimal point after the third and fourth digits, it means there is a value to 200 plus that value. Once the system has reached the maximum value, the counter will default back to 00. The system is now ready to accept changes in the Options.



The "MODE" button sequences through each Register displaying the value in that Option Register. The "UP" and "DOWN" buttons increase or decrease the value of the current register. The change is NOT made permanent until the "ENTER" button is pressed. Doing this also advances to the next Register. Pressing the "MODE" button before pressing "ENTER" leaves the register unchanged. Once all changes have been made, press the "MODE" and "UP" buttons simultaneously. This will cause the Credit Display to return to its normal operation.

WHAC-A-MOLE
2400 G BOARD
WAM 2401 V-3

<u>Reg#</u>	<u>Reg Name</u>	<u>BSR</u>	<u>Actual</u>	<u>Description</u>
00	GAME TYPE		_____	0 = Whac-A-Mole (Adult, 5 head); 1 = Pattie Whac-A-Mole (5 head); 2=Kiddie/Toddler Whac-A-Mole (3 head) & Toddler Pattie Whac-A-Mole (3 head)
01	COIN/GAME	1	_____	Number of Coins Required per Game
02	PLAYS/GAME	1	_____	Number of Plays per Game
03	POINTS/TICKET	5	_____	Number of Points per Ticket (X 10)
04	FREE TICKETS	0	_____	Number of Free Tickets
05	MIN TICK/GAME	0	_____	Minimum Number of Tickets per Game
06	MAX TICK/GAME	99	_____	Maximum Number of Tickets per Game
07	BELL TIME	20	_____	Bell Time in 0.1 Seconds
08	BEACON TIME	50	_____	Beacon Time on 0.1 Seconds
09	GAME TIME	20	_____	Game Time in Seconds
10	MOLE SPEED	50	_____	Starting Mole Speed
11	MOLE DOWN	25	_____	Mole Down Time
12	COIN/BONUS	4	_____	Number of Coins per Bonus 1
13	BONUS VALUE	1	_____	Value of Bonus 1 in Extra Coins
14	BALLY TIME	60	_____	Bally Time Register (in Seconds)
15	MIN BEACON	0	_____	Minimum Win Score for Beacon to Run (X 10)
16	MIN BELL	0	_____	Minimum Win Score for Bell to Sound (X 10)
17	LIGHT CHASE	0	_____	Light Chase; Type 0 = Single; 1 = 3 light
18	DISPLAY TYPE	1	_____	Display Type; 0 = 2 Digit; 1 = 3 Digit
19	HIGH SCORE	0	_____	Starting High Score (X 10)
20	SCORE NOTICE	0	_____	High Score Notification

Game Sound: Whac-A-Mole Adult: Can't Touch This (File Name: cantouch.vox); Whac-A-Mole Kiddie: Rocky Theme (File Name: rocky.vox); Whac-A-Mole Toddler: Pop! Goes The Weasel (File Name: pgw.vox); Pattie Whac-A-Mole: ABC (File Name: abc.vox)

Other Settings: _____

Program Approved For: BSR

Tested By: [Signature] Approved By: [Signature]

Date: 4-4-03

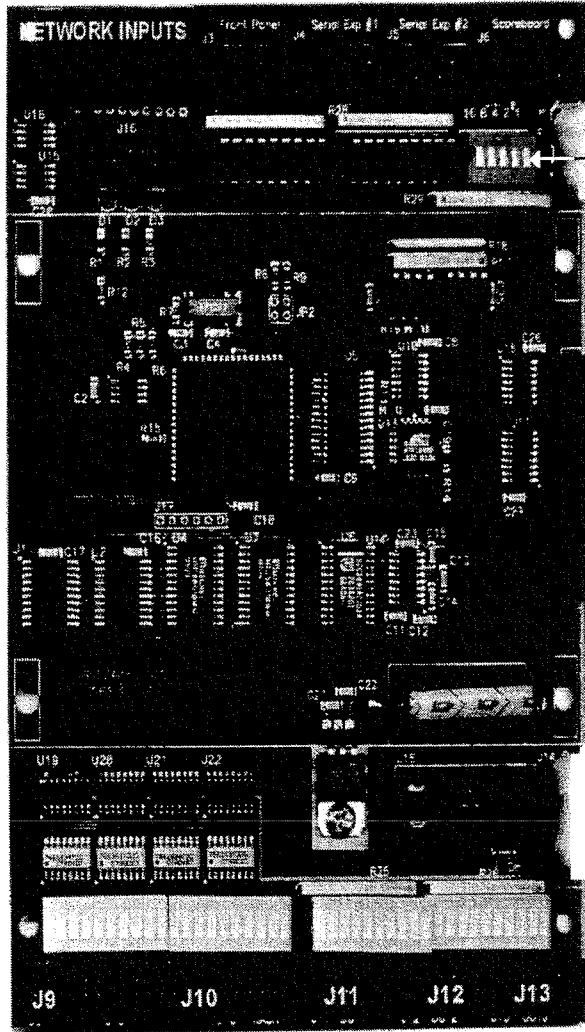
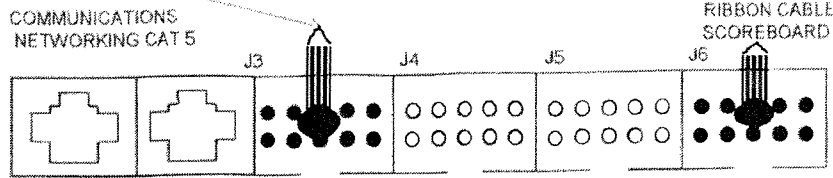
Date: 4/1/03

Release Date: 4/4/2003

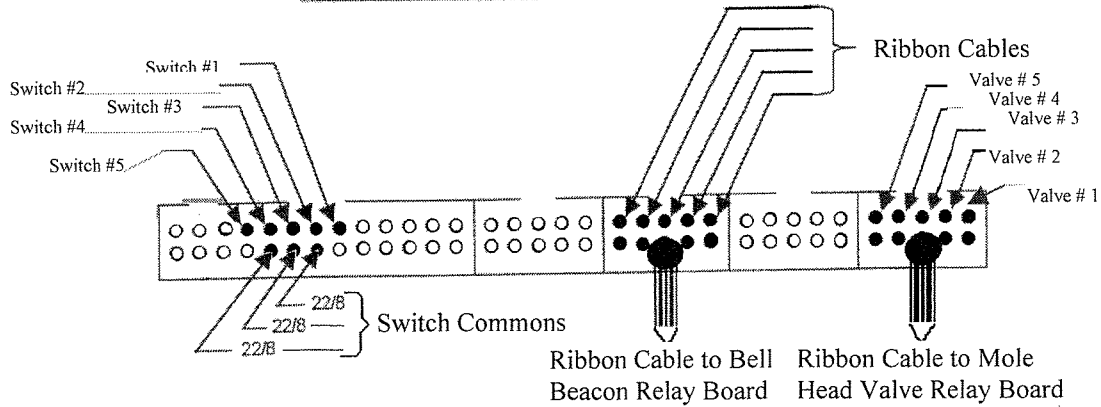
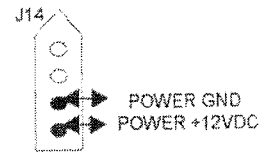
WHAC-A-MOLE ARCADE

2400 UNIT BOARD

Ribbon Cable to Front Panel Board



Set all dip switch settings up on single player arcade games.



VERSION WAM 44 AND WAM 44.3

PURPOSE OF THE REGISTERS

<u>REG #</u>	<u>DEFAULT AND NOTES</u>
REG 01	4; The Number of Coins for Bonus 1
REG 02	20; The Number of Coins for Bonus 2
REG 03	0; The Value of Bonus 1 in Extra Coins
REG 04	0; The Value of Bonus 2 in Extra Coins
REG 05	1; The Number of Plays per Game
REG 06	5; The Number of Points per Ticket; if 0, use Minimum Number of Tickets
REG 07	1; The Minimum Number of Tickets per Game
REG 08	12; The Maximum Number of Tickets per Game
REG 09	15; Bell Time in 0.1 Seconds
REG 10	30; Beacon Time on 0.1 Seconds
REG 11	10; Game Delay Time in 0.1 Seconds
REG 12	18; Time Between Bally Messages
REG 13	35; Starting Mole Speed
REG 14	20; Down Time in 8.19 millisecond Steps
REG 15	10; Game Time in Seconds +20
REG 16	1; Time Between Game Start and Theme Song
REG 17	30; Time from Theme to Play
REG 18	1; Ticket Sound Enable: 0-OFF, 1=ON
REG 19	0; Light Chase Type: 0=Single, 1=3-Light
REG 00	1; The Number of Coins Required Per Game

NOTE: The Registers cannot be changed in the middle of a game.

VERSION WAM 23XX

PURPOSE OF THE REGISTERS

<u>REG #</u>	<u>DEFAULT AND NOTES</u>
REG 01	1; The Number of Coins Required Per Game
REG 02	4; The Number of Coins for Bonus 1
REG 03	20; The Number of Coins for Bonus 2
REG 04	0; The Value of Bonus 1 in Extra Coins
REG 05	0; The Value of Bonus 2 in Extra Coins
REG 06	1; The Number of Plays per Game
REG 07	5; The Number of Points per Ticket; if 0, use Minimum Number of Tickets
REG 08	1; The Minimum Number of Tickets per Game
REG 09	12; The Maximum Number of Tickets per Game
REG 10	15; Bell Time in 0.1 Seconds
REG 11	30; Beacon Time on 0.1 Seconds
REG 12	10; Game Delay Time in 0.1 Seconds
REG 13	18; Time Between Bally Messages
REG 14	35; Starting Mole Speed
REG 15	20; Down Time in 8.19 millisecond Steps
REG 16	10; Game Time in Seconds +20
REG 17	1; Time Between Game Start and Theme Song
REG 18	30; Time from Theme to Play
REG 19	1; Ticket Sound Enable: 0-OFF, 1=ON
REG 20	0; Light Chase Type: 0=Single, 1=3-Light
REG 21 - 23	0; System Parameter - Do Not Change!
REG 24	98; Bally Sound

BOB'S SPACE RACERS®**WHAC-A-MOLE® ARCADE**

REG 25	96;	System Parameter - Do Not Change!
REG 26	98;	Theme Song or Message
REG 27	96;	System Parameter - Do Not Change!
REG 28	4;	Hit or Play Sounds
REG 29	0;	System Parameter - Do Not Change!
REG 30	98;	Start of Game Message
REG 31	4;	System Parameter - Do Not Change!
REG 32	4;	System Parameter - Do Not Change!
REG 33	0;	System Parameter - Do Not Change!
REG 34	4;	System Parameter - Do Not Change!
REG 35	0;	System Parameter - Do Not Change!
REG 36	241;	Ticket Sound
REG 37	96;	System Parameter - Do Not Change!
REG 38	16;	Game Over Message
REG 39	79;	High Score Sounds
REG 40	0;	System Parameter - Do Not Change!
REG 00	?	0=Whac-A-Mole®/Bully Buster™; 1=Pattie Cakes™/Hot Spot™; 2=Kiddie Whac-A-Mole®

NOTE: The Registers cannot be changed in the middle of a game.

ADDITIONAL

NOTE: A note on Bonus Coins--To be compatible with multi-coin systems and dollar bill acceptors around, this game is equipped with bonus levels for additional coins. If you want customers to put in a dollars worth of coins (or a dollar bill) instead of just a 25 cent piece, set bonus level to 4 (4-25 cent coins = 1 dollar). Then set the bonus coins to a number greater than zero. If it was set on 1, then 4 coins would be the same as putting in 5 coins, one after each game. To get the bonus, all coins need to be put in before a game is played. Once a game is played, the bonus level starts from zero.

MAINTENANCE

MAINTENANCE

DAILY

1. Check oil (For Compressor, use 30 weight non-detergent; for Lubricator, use 10 weight non-detergent for lubricator on FRL).
2. Check dryer and drain, if necessary.
3. Visual inspection of game for debris under the heads. (Inside the Whac-holes).
4. Check bulbs.
5. Clean all formica.
6. Start all units; check for score on each figure head.

WEEKLY

1. Drain air tank.
2. Clean cooling surfaces of compressor.
3. Remove countertops -
 - o inspect microswitches and attached wires;
 - o check wires at Terminal Block strips;
 - o check tightness of all bolts and nuts in Mole assembly.
 - o check hammers and adjust ropes (adjust hammer so it does not touch the mirror).
4. Lemon oil all formica.
5. Blow out the optic sensor on your Ticket Dispenser Board.
6. Lubricate Mole shaft with Lithium grease. **Note:** DO NOT lubricate if your Mole brackets have Oilite Bushings. They are self lubricating.

MONTHLY

1. Operate safety valves on compressor or tank.
2. Replace or clean air filter.
3. Check belt tensions on compressor.
4. Check pulley clamp bolt and set screws.
5. Inspect air lines, rubber and PVC.

SEMI-ANNUALLY

1. Inspect valve assemblies.
2. Check pressure hoses from compressor to tank.
3. Check discharge line for carbon build-up.
4. Check contact points in pressure switch.
5. Lubricate electric motor.

AIR PRESSURE ADJUSTMENT

The air pressure coming from the tank and into the game needs to be regulated air. Depending on the number of units in your game will depend on the style of compressor and F.R.L. (Filter Regulator and Lubricator) you have. *See Compressor Section for compressor models.

With either style of compressor, the air which goes into the game should be regulated by a pressure gauge. You can adjust this pressure by the pressure regulator knob. The air pressure needs to be the minimum possible. Adjust the pressure down so that the heads barely come up. Keep adjusting the pressure up so as the heads come up a little further each time. The maximum pressure (which will vary) should be when all the heads reach their fullest extent. If you need further assistance, call Bob's Space Racers® at 386-677-0761 and ask to speak to a technician.

CONTROL BOX ELECTRONICS

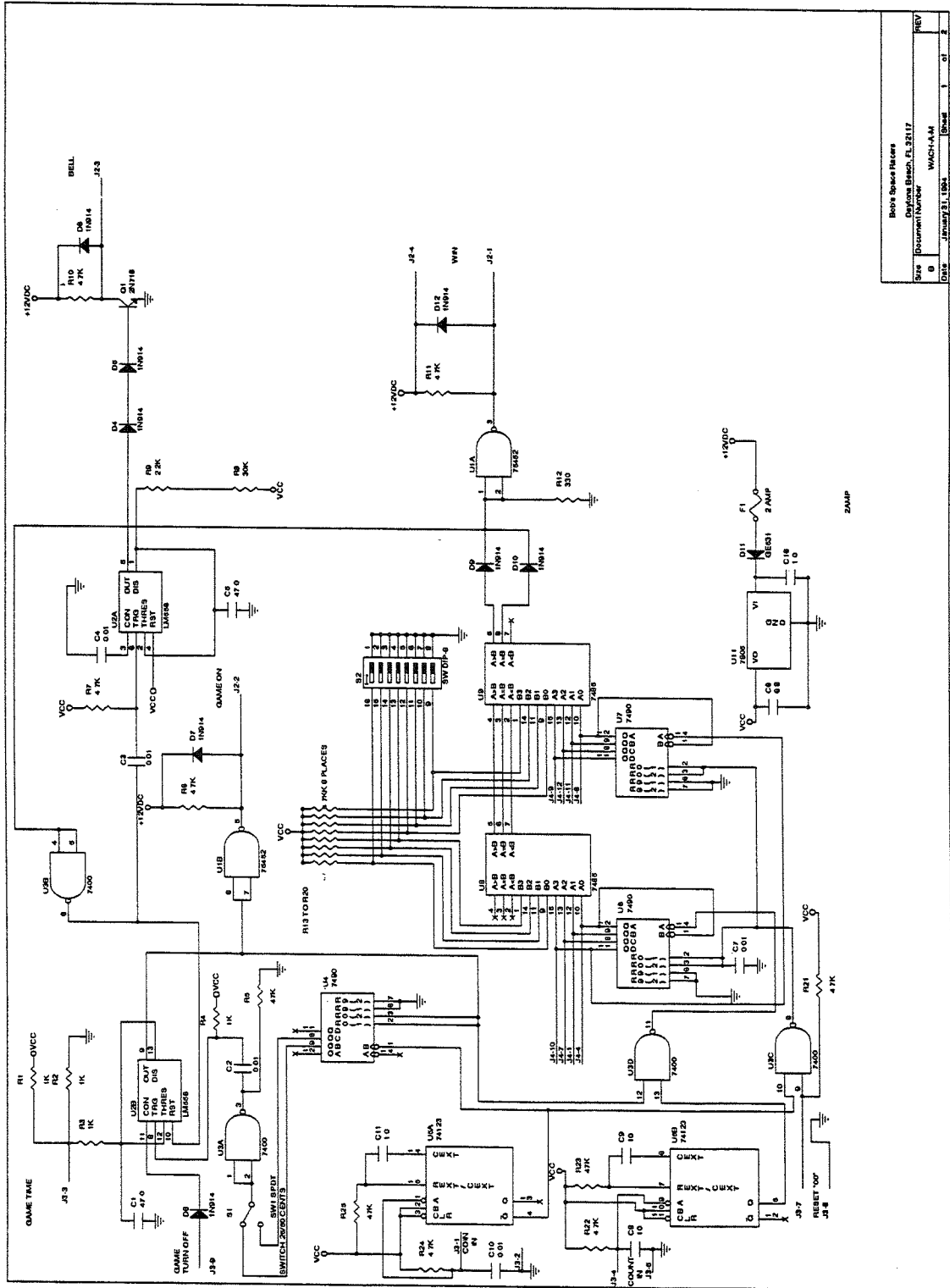
CONTROL BOX OVERVIEW
E0025500

On the early Whac-A-Moles®, we used Control Boxes to control the functions on the game. There are three versions of Control Boxes that were used on the games: Blue Model 2, Blue Model 3 DTA, and a Beige Model 3 (manufactured by BSR).

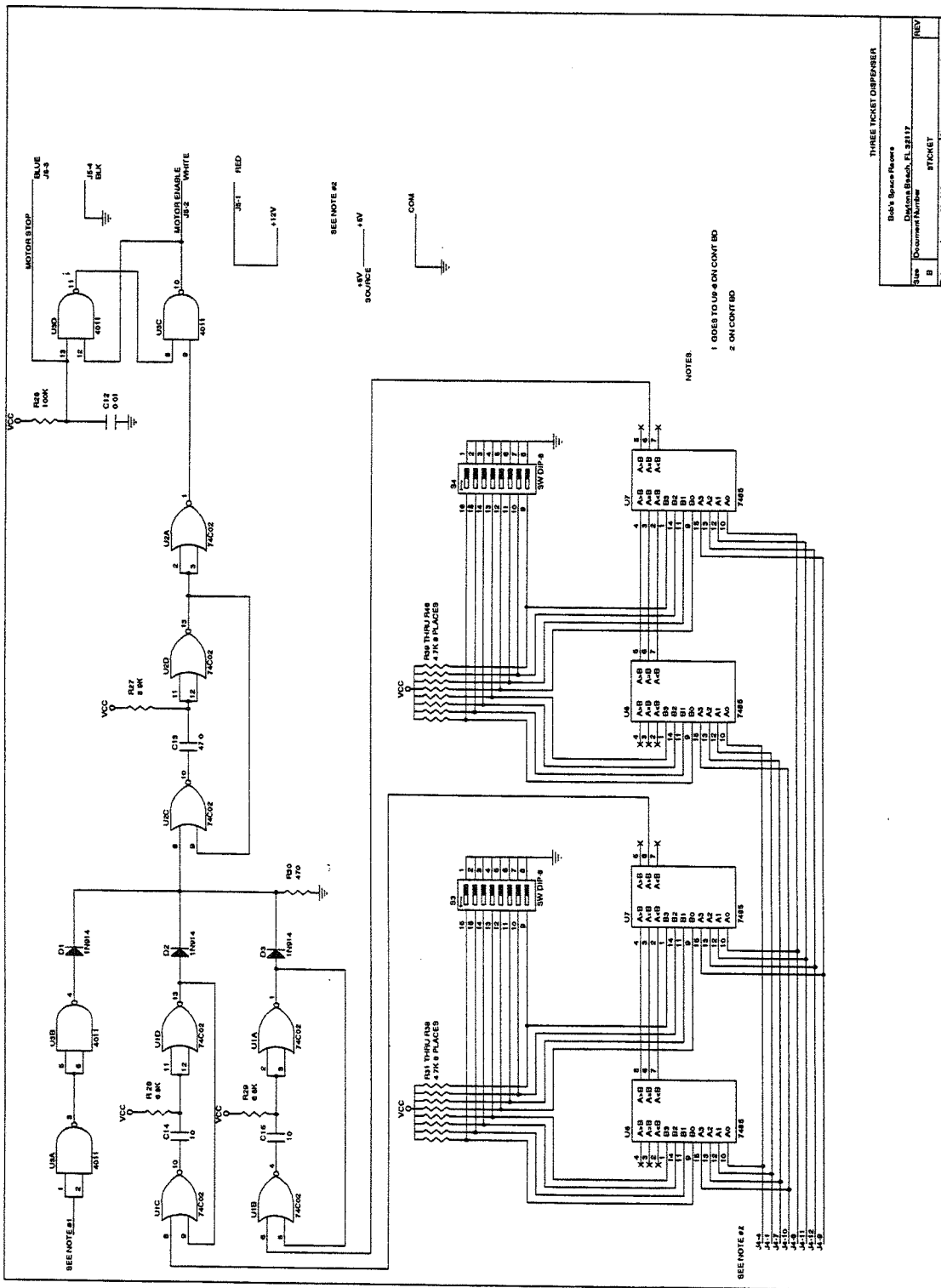
The Blue Model 2 has external wires for the Ticket Dispenser hookup (provided it gives tickets). The Count In and Coin In inputs come into 74123 pins. On initial coin up, the game will start immediately.

The Blue Model 3 controllers have the Ticket Dispenser Output mounted into the Box. The Count In and Coin In inputs come into the 556 input pins and, on initial coin up, there will be a one second delay, due to the 555 Timer. One fault we have found on some Blue Model 3's is that on initial power up, the first game played may take more than one coin, but after the first game, the game will coin up fine. The manufacturer of that box never provided schematics and made several modifications to remove the problem, but no one design worked everytime. After this, Bob's Space Racers® began manufacturing all their own electronic controllers.

The final box used was a Beige Model 3. The difference is that Bob's Space Racers® actually manufactured these and the connections between them was a Ribbon Cable instead of Hard Wire Jumpers. It's schematic is approximately the same as a Model 2.



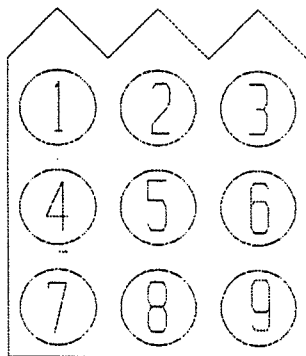
Rev	1	of	2
Doc	WACH-A-M		
Doc	WACH-A-M		
Doc	WACH-A-M		



BOB'S SPACE RACERS®

WHAC-A-MOLE® ARCADE

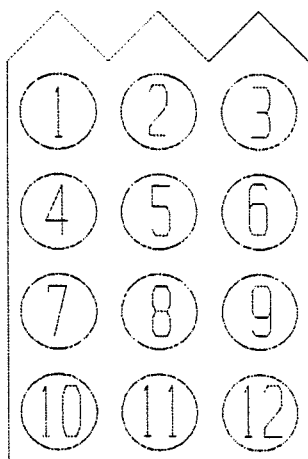
CONTROL PLUG
(wire side view)



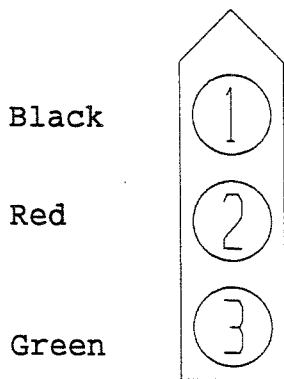
CONTROL BOX INPUT/OUTPUT CONNECTORS

- 1 - Coin Input
- 2 - Coin Input (Ground)
- 3 - Pot
- 4 - Count Input
- 5 - Count Input (Ground)
- 6 - Pot
- 7 - Reset
- 8 - Reset (Ground)
- 9 - Time Out

DISPLAY PLUG
(wire side)



- 1 - 2 Pin #9
- 2 - +5 VDC
- 3 - +12 VDC
- 4 - 1 Pin #12
- 5 -
- 6 - Ground
- 7 - 3 Pin #8
- 8 - 5 Pin #12
- 9 - 8 Pin #11
- 10 - 4 Pin #11
- 11 - 6 Pin #9
- 12 - 7 Pin #8

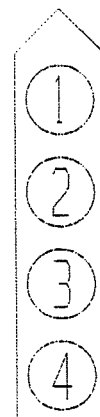


Black
Red
Green

POWER PLUG

- 1 - Ground
- 2 - Display
- 3 - +12VDC

Red
Green
Brown
Black



OUTPUTS

- 1-Winner
- 2-Game On
- 3-Bell
- 4-+12VDC

SEQUENCER MODELS

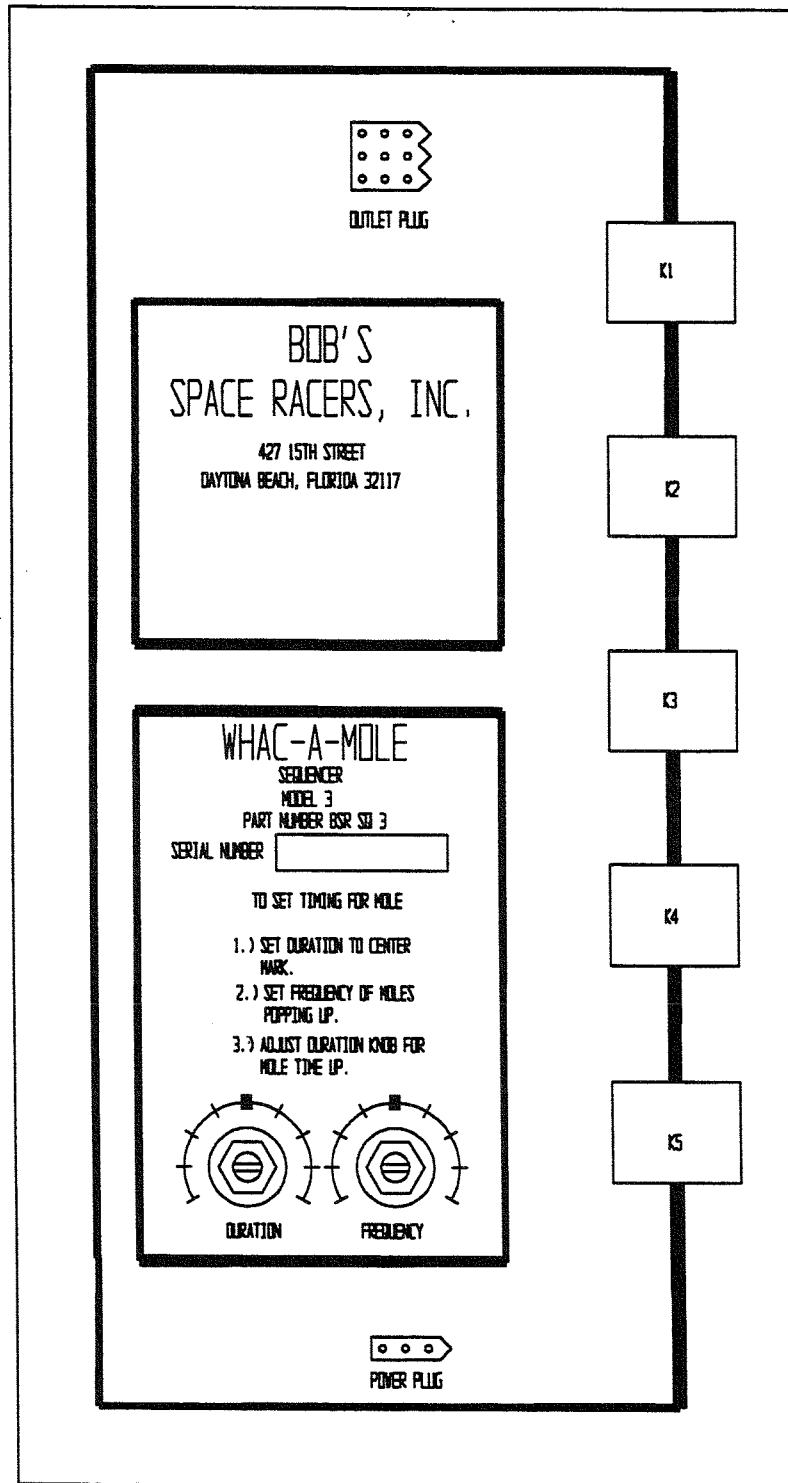
Throughout the years, Bob's Space Racers® has used a variety of Sequencers for its' games. The model of Sequencer you have will depend on the Electronics in your game. If you have a Control Box (Beige or Blue), one for each unit; you should have a Sequencer Model #2, #3 (Pre 1986). If your game has a Control Board with 2 large Relay Boards for each unit, your game will not require a Sequencer Box. You need to determine which model of electronics you have in your game, and then see its corresponding Technical Data sheets.

SEQUENCER MODELS 2 & 3
Overview

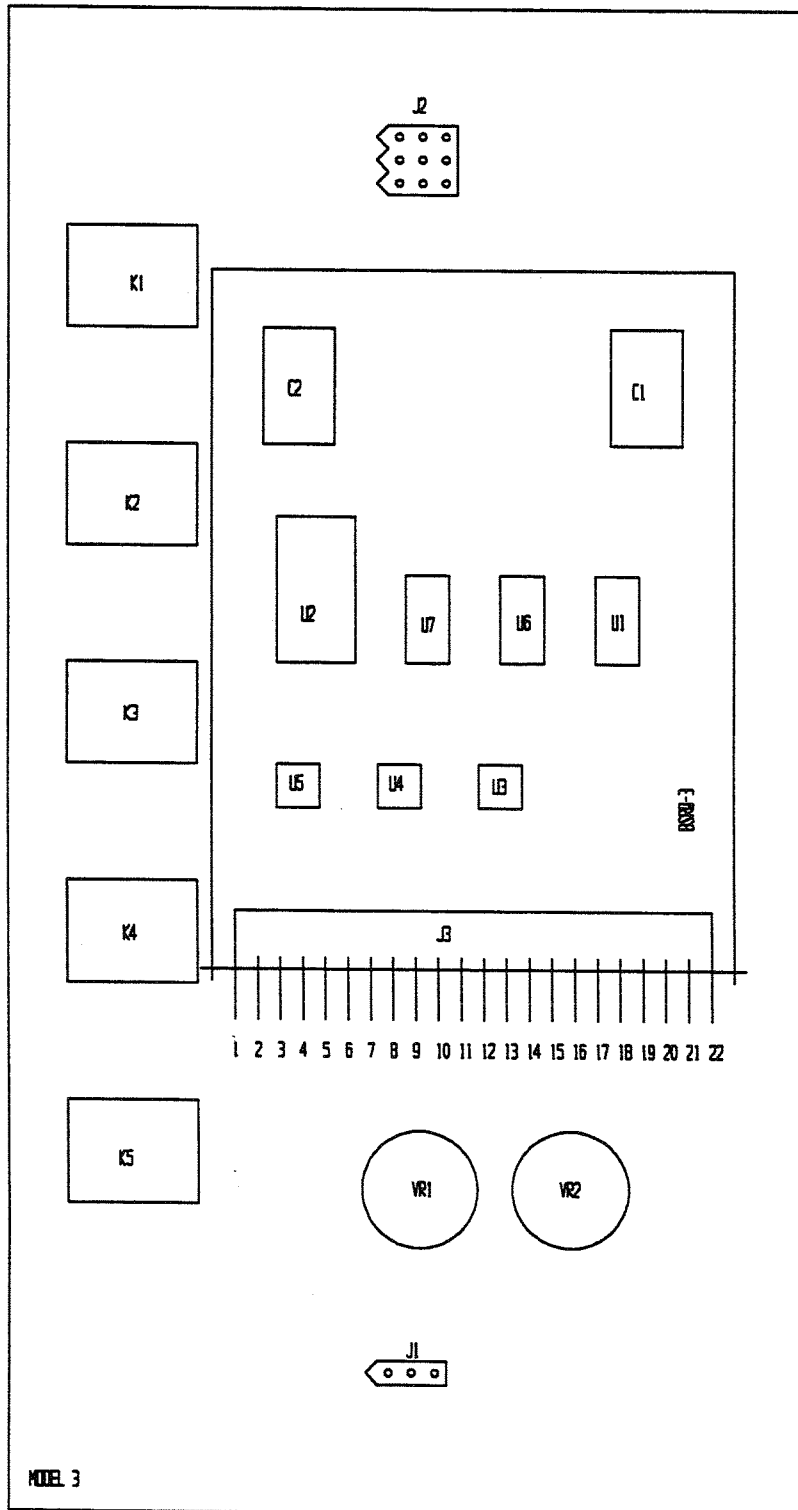
The original Sequencer--Model #2, #3--had 5 Relays on the front (K1 - K5). These Relays ran continuously to sequence the Mole Heads. There were also two potentiometers on the face of the Sequencer. One of the potentiometers was for the frequency - how often new Moles pop up. The other potentiometer adjusted the duration-duty cycle of the heads (up time versus down time).

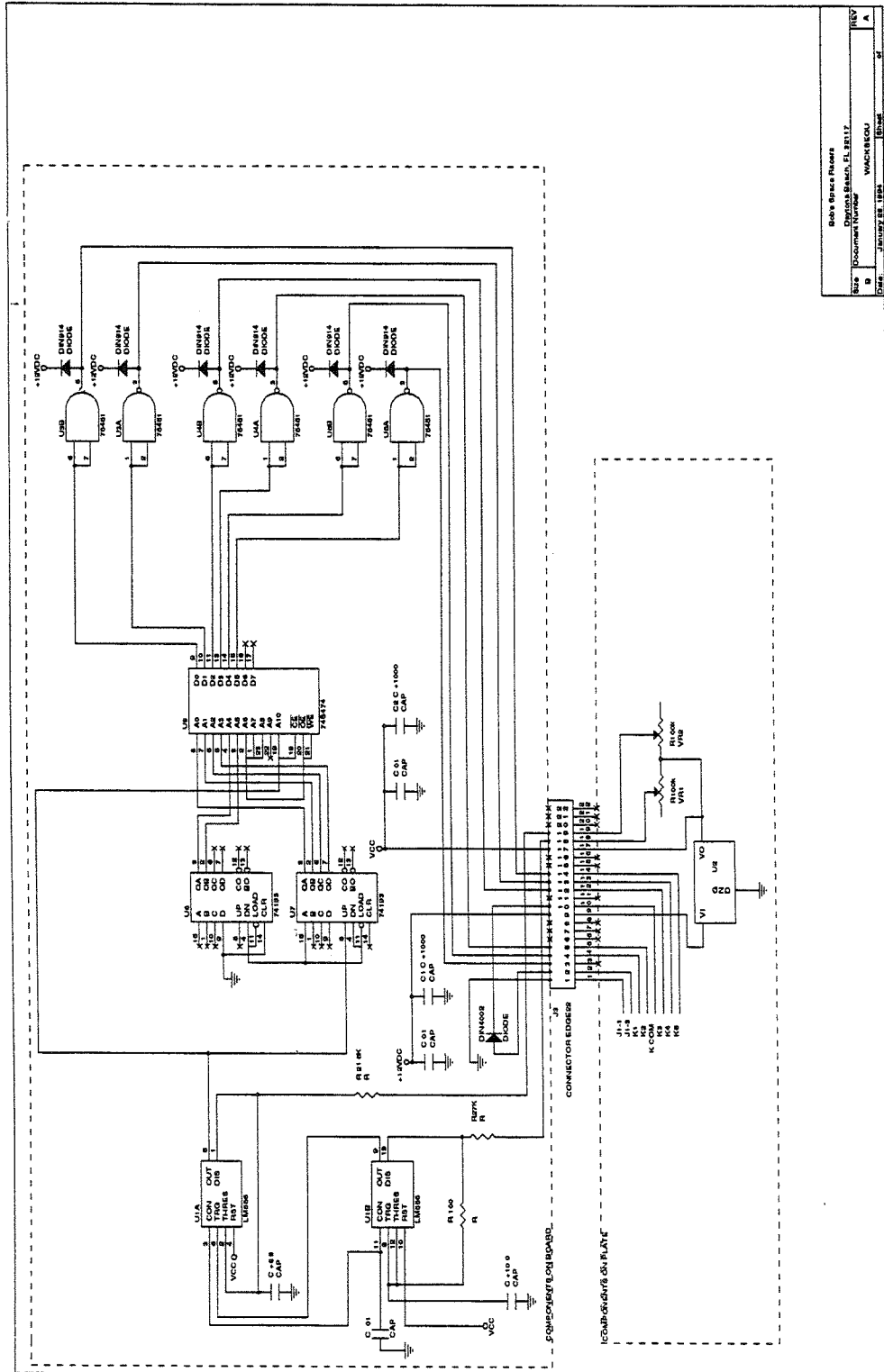
The Control Board had all the drive electronics to support the Sequencer unit. On the Control Circuit Board, there is a 74S474 IC (U2) which is an 8-bit ROM: it contains a table indicating which Relays need to be turned on/off to make the heads pop up. There are also 2-74193 ICs (U7 and U6), which are binary counters to provide the address for the EPROM (they 'sequence' through the ROM table to make the Heads pop up). We only use 64 of the addresses available in the ROM Table. The 556 IC (U1) is an IC which has 2 timers internally: one is adjusted by the Frequency Pot and the other timer is adjusted by the Duration Pot. The Frequency Pot adjusts how long we wait for the next head to pop up. The Duration Pot adjusts how long the head stays up before it comes down.

There are also 3-75451 ICs (U3 - U5) which turn on/off the Relays. These ICs convert TTL Outputs of the ROM into 300mA Outputs to turn on the coils of the Relay. J1 is the Power plug. J2 is the Output plug, and J3 is a connector from the Relays.



E0025700





REV	A
DATE	JANUARY 1984
DESIGNER	WACHSBAUM
DOCUMENT NUMBER	WACHSBAUM
PROJECT NUMBER	21-1117
BOB'S SPACE RACERS	

TROUBLESHOOTING - Control Boxes

<u>PROBLEM/CAUSE</u>	<u>FIX</u>
<u>Coining Up One Unit Turns Other Unit On</u>	
Bad Ground Connection	Check grounds on Coin Doors, Electrical Boxes. Check Voltage Regulator. Ground on power cord.
<u>Unit Will Not Coin Up After Initial Coin-Up</u>	
Bad/Wrong Value Capacitor/Resistor on 74123 IC for Count In	Replace Cap and/or Resistor on 74123 that controls Coin Up. If that did not work, replace the chip.
<u>Heads Will Multiple Count When Hit</u>	
Bad/Wrong Value Capacitor/Resistor on 74123 IC for Count In	Replace Cap and/or Resistor on 74123 that controls Coin Up. If that did not work, replace the chip.
<u>Dispenses Too Many Tickets</u>	
Bad IC	Replace 4011 IC that controls the Ticket Enable; otherwise, see TICKET DISPENSER Appendix.
<u>Bell Does Not Work</u>	
Blown Transistor	Change transistor from Pin 5 of 556 IC.
<u>Bell and Beacon Turn on After Power Up</u>	
Bad Timer IC	Replace 556 with National 556 Brand IC.

BOB'S SPACE RACERS®

WHAC-A-MOLE® ARCADE

N O T E S

PROBLEM/CAUSE

FIX

Should you encounter a particular problem not covered in this or any other Troubleshooting Section of your Owners Manual, please contact the Technical Support Staff at BOB'S SPACE RACERS® by telephoning them at (386) 677-0761, or by FAX at (386) 677-0794.

LARGE PROCESSOR ELECTRONICS

LARGE MICROPROCESSOR BOARD
Overview

The basic operation of the Microprocessor Board is as follows:

The Inputs on this Board are two 12-Pin Molex connectors. Depending on application, we may only use one connector.

The Inputs are tied through opto-couplers (4N26s) and drive the LEDs to signal which input is on. From there, the signal travels to a 74LS240 Tri-State Buffer for processing.

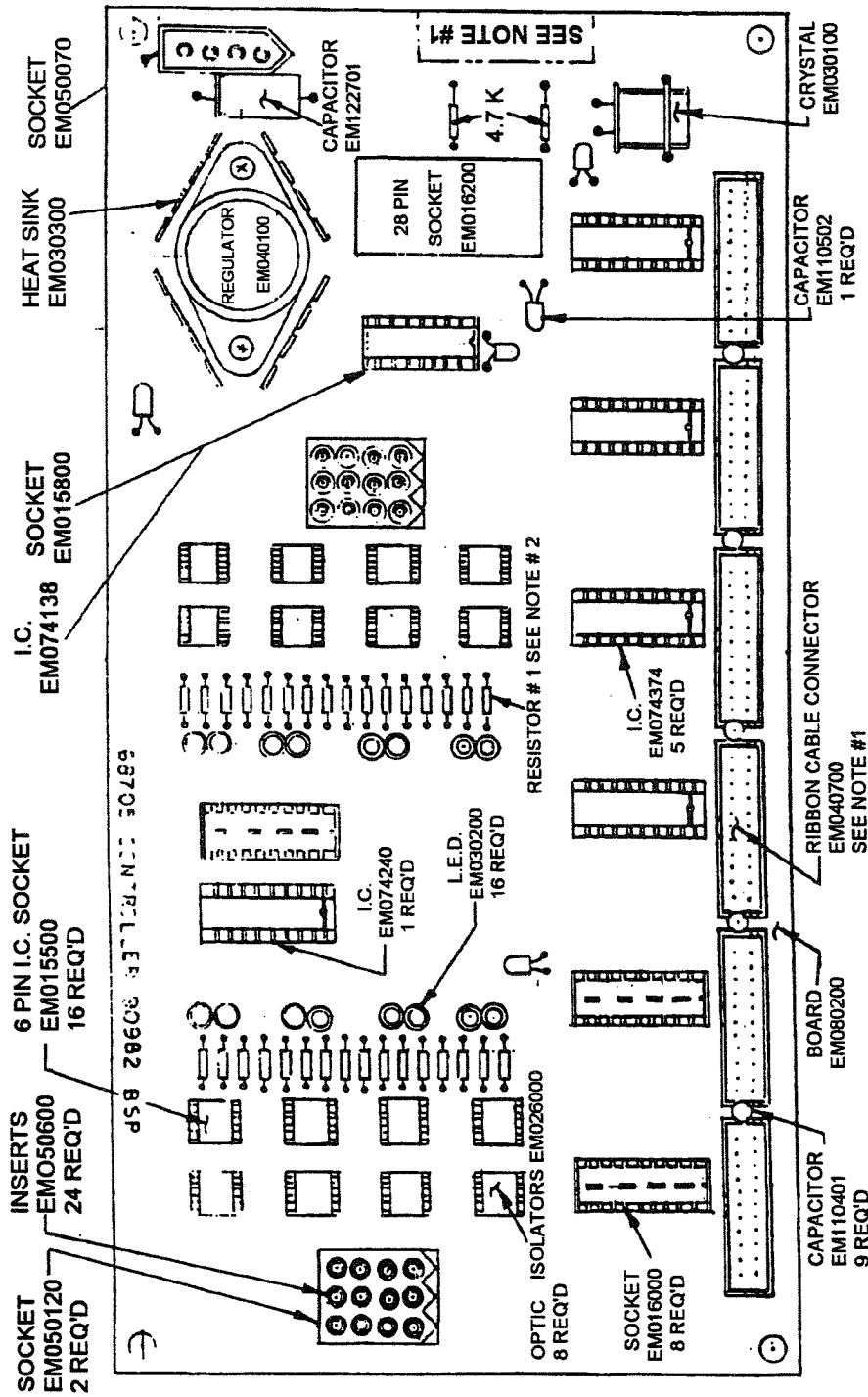
The Microprocessor we use is a Motorola 68705P3. The EPROM Processor Chip is a programmable chip that has been programmed for the games' application.

Next to the EPROM is an 8 Bit Port that is bi-directional.

Along one side of the Board there are six 20-Pin Connector Outputs.

A 74LS138 Address Decoder processes a command from the EPROM and turns on either a 74LS374 Output or a 74LS240 Input to bring the signal on to the Data Bus.

The 4 Pin Molex Connector is the +12VDC Input for the Board.

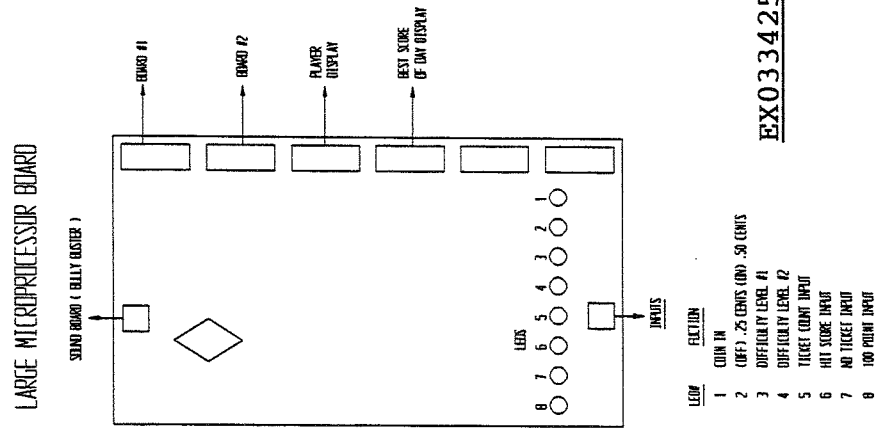


LARGE PROCESSOR BOARD

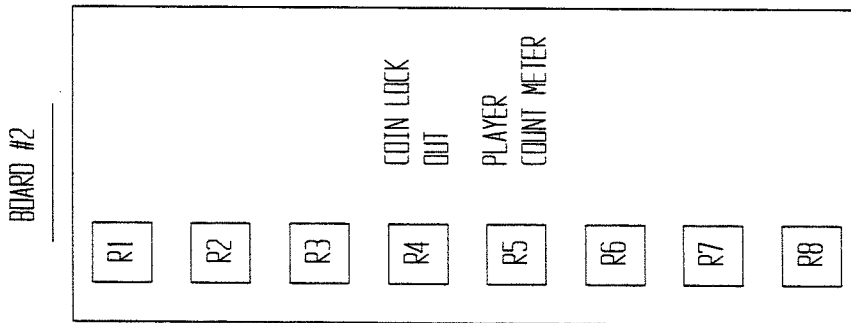
NOTE:

1. 7 RIBBON CABLE CONNECTORS USED WHEN BOARD SHOWN IN PHANTOM IS USED ON SUPER SHIFTER.
2. RESISTORS IN BOTH BANKS ARE IDENTICAL 1,2,5,6,9,10,13 & 14 VALUE 4.7K 18 REQ'D BSR EM004725 3,4,7,8,11,12,15 & 16 VALUE 470 Ω 16 REQ'D. BSR EM004715

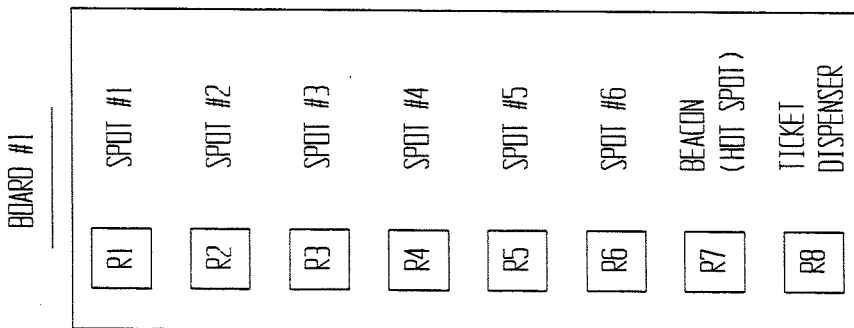
BSR EX033425



EX033425



EX033450



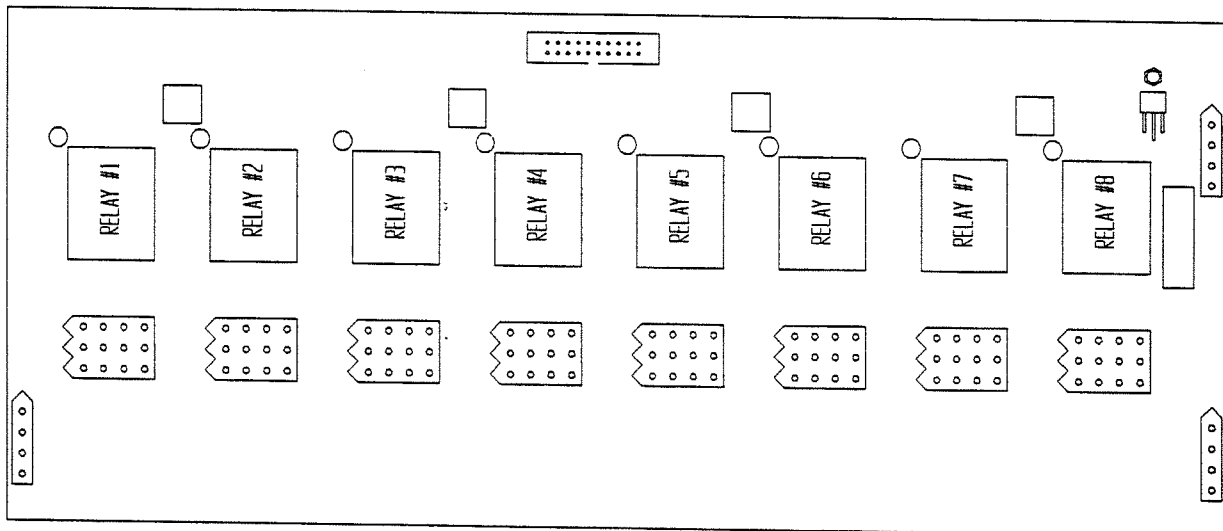
EX033425

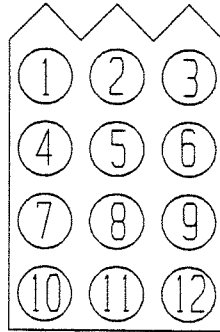
UNIVERSAL RELAY BOARD
Overview

The Inputs to the Board are via a 20-pin ribbon cable from the Serial Display Board. These Inputs are TTL to the 75452 IC, which convert TTL to a high current output, and basically either turn the relay On or Off, depending on the Input signal. There is a 4-pin Molex plug (closest to the voltage regulator) which is for the +12VDC and ground for the Circuit Board. The 12-pin Molex connectors bring the Outputs to a variety of peripheral devices, depending on the game's application. The pinout for all of the relay contacts are as follows:

- 1, 4, 7, 10 - Common contacts
- 2, 5, 8, 11 - Normally Open contacts
- 3, 6, 9, 12 - Normally Closed contacts

There is a power bus on the edge of the Board which accommodates several jumpers; the voltages and the applications required will depend on the location of the jumpers. FOR THE PINBALL GAME THIS BOARD WILL CONTROL THE BACKGROUND AND COUNTER LIGHTS IN A RANDOM PATTERN.





ALL RELAY CONTACTS WILL BE CODED IN THE FOLLOWING MANNER:

K2 = RELAY #2

B1 - DESIGNATES WHICH BOARD THE RELAY IS ON

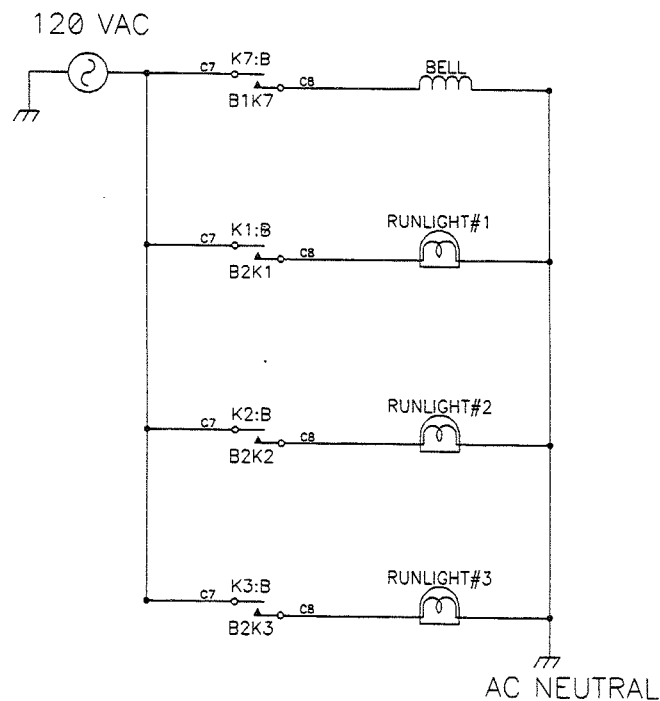
1,2,3 = PINS #1,2,3 OF THE RELAY PLUG ARE USED AS SHOWN IN THE SCHEMATIC.

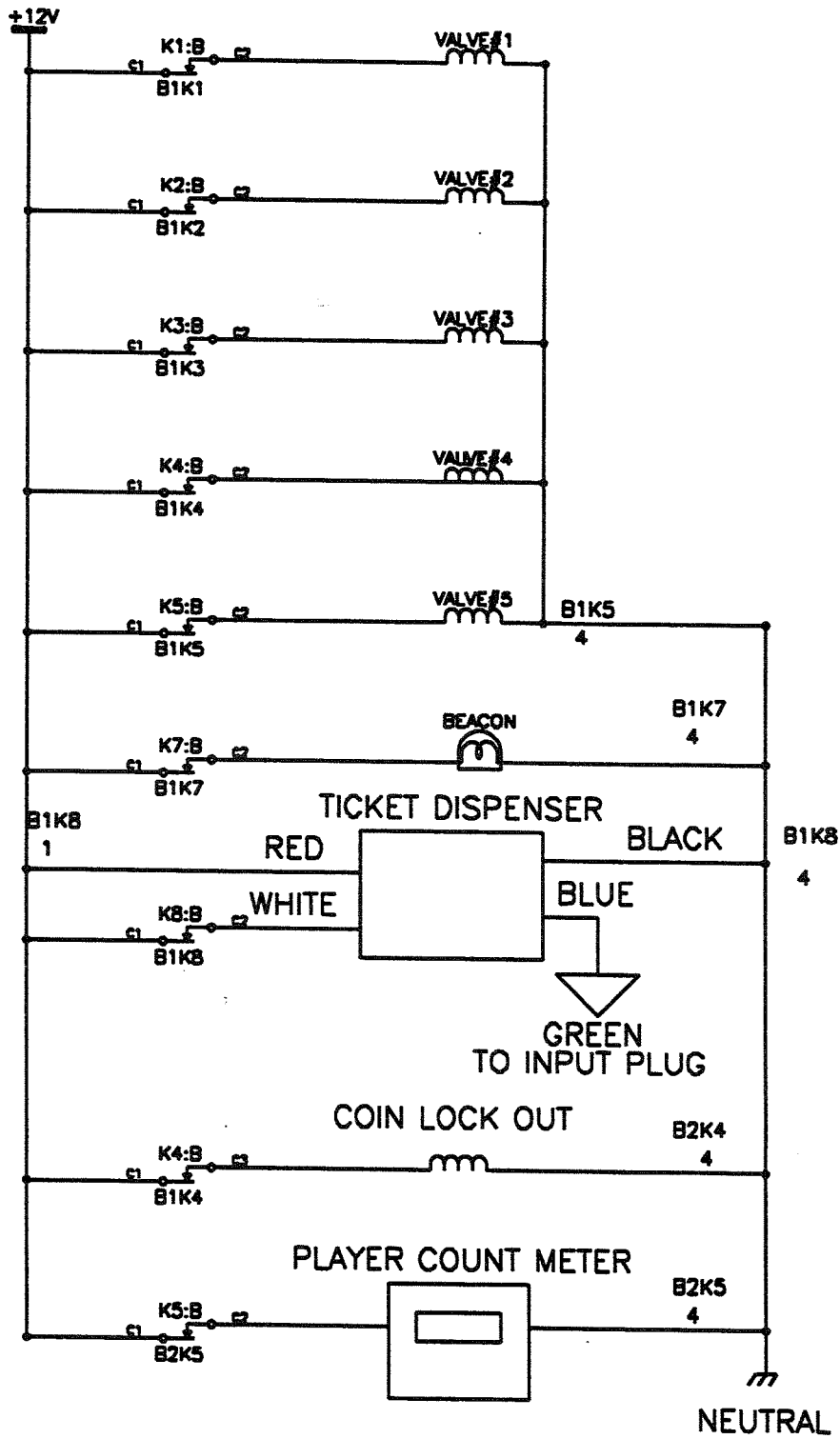
12-PIN MOLEX PLUG PINOUT FOR ALL RELAY CONTACTS:

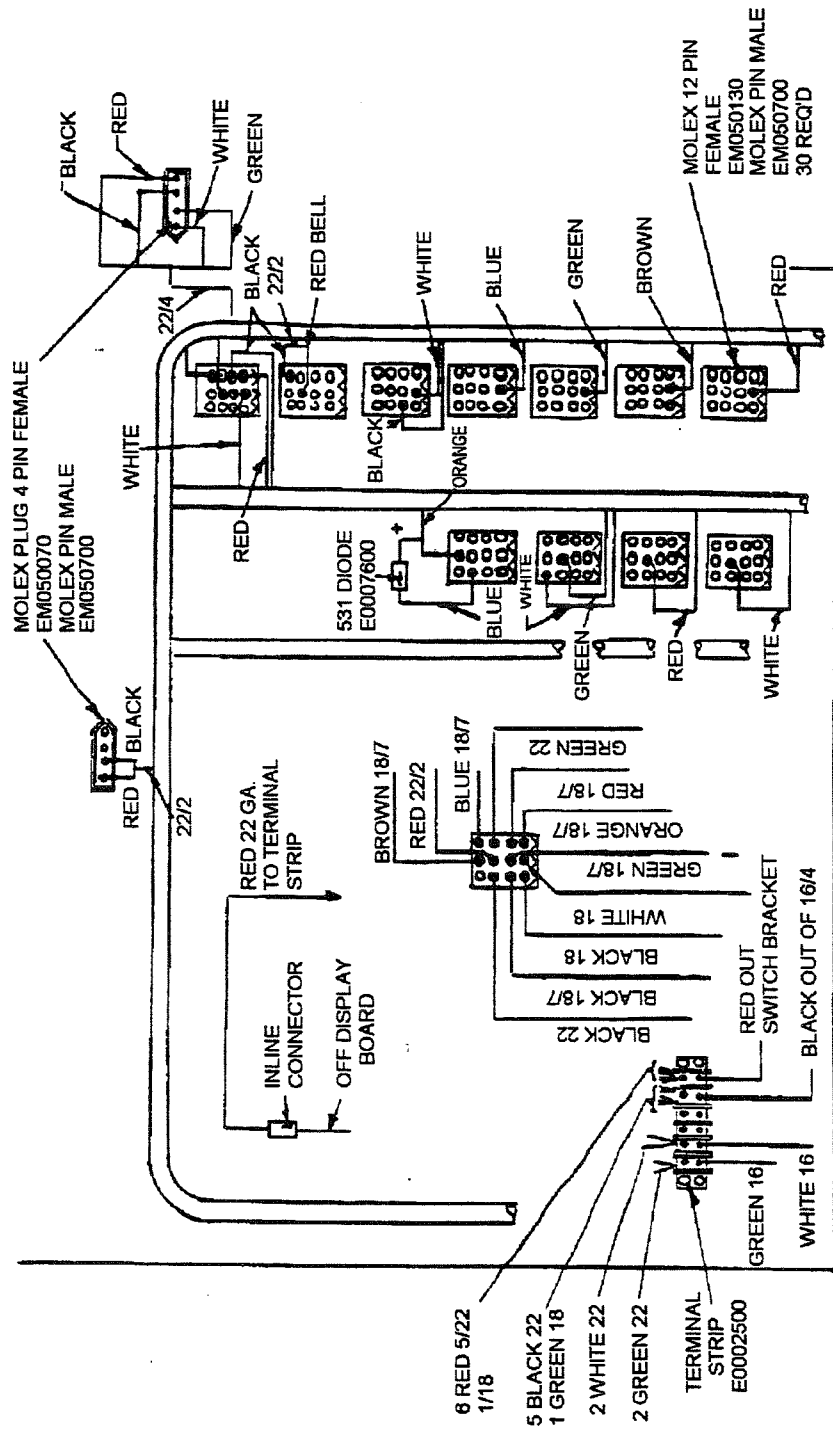
1,4,7,10 - COMMON CONTACTS

2,5,8,11 - NORMALLY OPEN CONTACTS

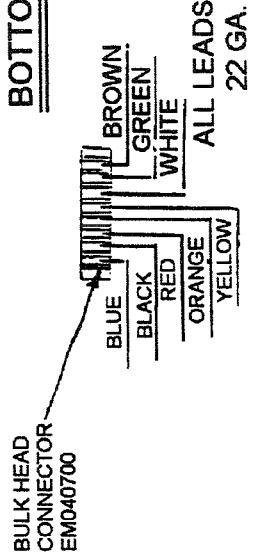
3,6,9,12 - NORMALLY CLOSED CONTACTS







BOTTOM OF DOOR

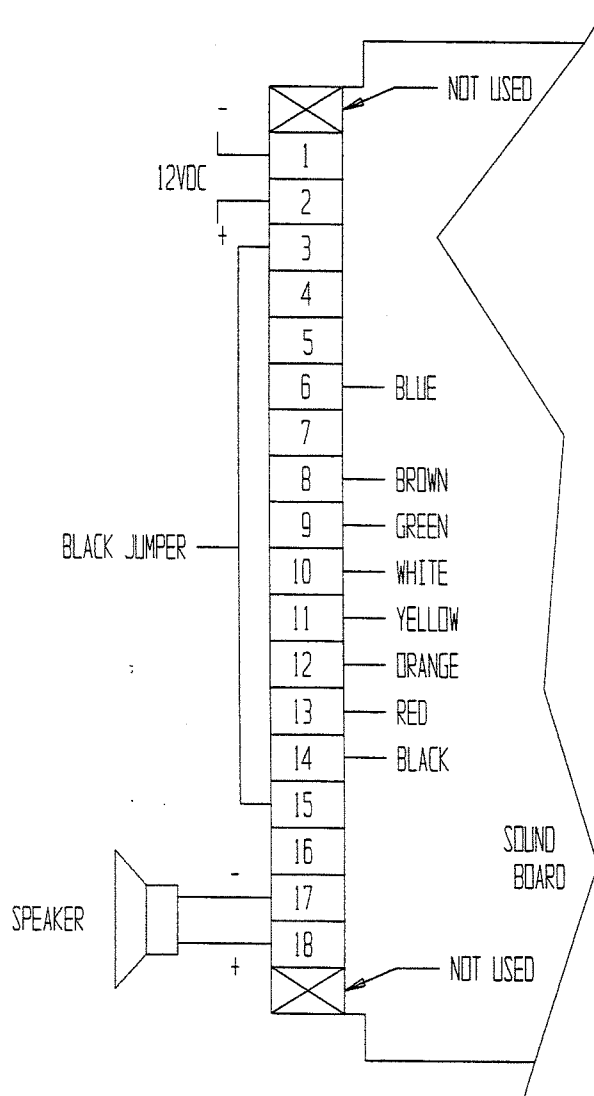


TITLE
WHAC A MOLE KIDS GAME
WIRING DIAGRAM
REAR DOOR

SOUND BOARD WIRING HARNESS

Starting mid '92 on Whac-A-Mole® Arcade Games (and all '93 models) we included sound. The Sound Board is a microprocessor controlled solid state Audio Module. The Unit converts digital recordings into an audio signal. The harness is wired as shown.

SOUNDBOARD CONNECTOR



TROUBLESHOOTING - Processor and Relay Boards

PROBLEM/CAUSEFIX10 Amp Fuse Blows

Short In Wiring; Wrong
Value Fuse

Disconnect all the 4-Pin Molex
Plugs to Relay Boards. Turn
Game on and replace plugs one
at a time until fuse blows.
Unplug the connectors on that
Board. Put in a new fuse and
plug one connector at a time
to isolate shorted plug.

Game Plays by Itself Until
It Reaches 990; Scores By
Itself

Shorted "Hit" Wire

Check for short at Air Switch
and 22/2 from Air Switch.

Wrong Air Pressure Setting

Check air pressure. Should be
approximately 20 psi for
proper operation.

Bad IC

Check Score Input LED.

Bad Air/Electric Switch.

Replace.

Beacon Doesn't Work

No Power

Check for 12V at Beacon.
Check Beacon Relay.

Bad IC

If Beacon is good, check Relay
7 on WAM #1 and associated
Resistor and Diode. Also
check 75452 IC and LED.

TROUBLESHOOTING - Processor and Relay Boards

<u>PROBLEM/CAUSE</u>	<u>FIX</u>
<u>Every Third Chase Light Not Working</u>	
Bad Relay on Relay Board	Check Relay #3 on WAM #2; check to see if LED is on.
Bad Connection	Check connections, wiring, sockets and bulbs.
Blown Copper Trace Under Relay Board	Repair trace with 22 gauge insulated wire.
<u>Rope Lights Not Working</u>	
No Power	Check for 12VDC at the Rope Lights. If no 12V, check Relay.
Bad Light String	If 12V there, it is a bad strand of lights. Replace.
<u>Mole Not Popping Up On One Unit</u>	
No Power	Check Relay. Check Voltage at Electric Valve. Bad diode on Terminal Block.
Bad Valve or Cylinder	If voltage on valve, swap the air line between suspect valve and any other valve. If problem moves to a different head, replace valve. If same head still doesn't work, replace cylinder.

BOB'S SPACE RACERS®

WHAC-A-MOLE® ARCADE

N O T E S

PROBLEM/CAUSE

FIX

Should you encounter a particular problem not covered in this or any other Troubleshooting Section of your Owners Manual, please contact the Technical Support Staff at BOB'S SPACE RACERS® by telephoning them at (386) 677-0761, or by FAX at (386) 677-0794.

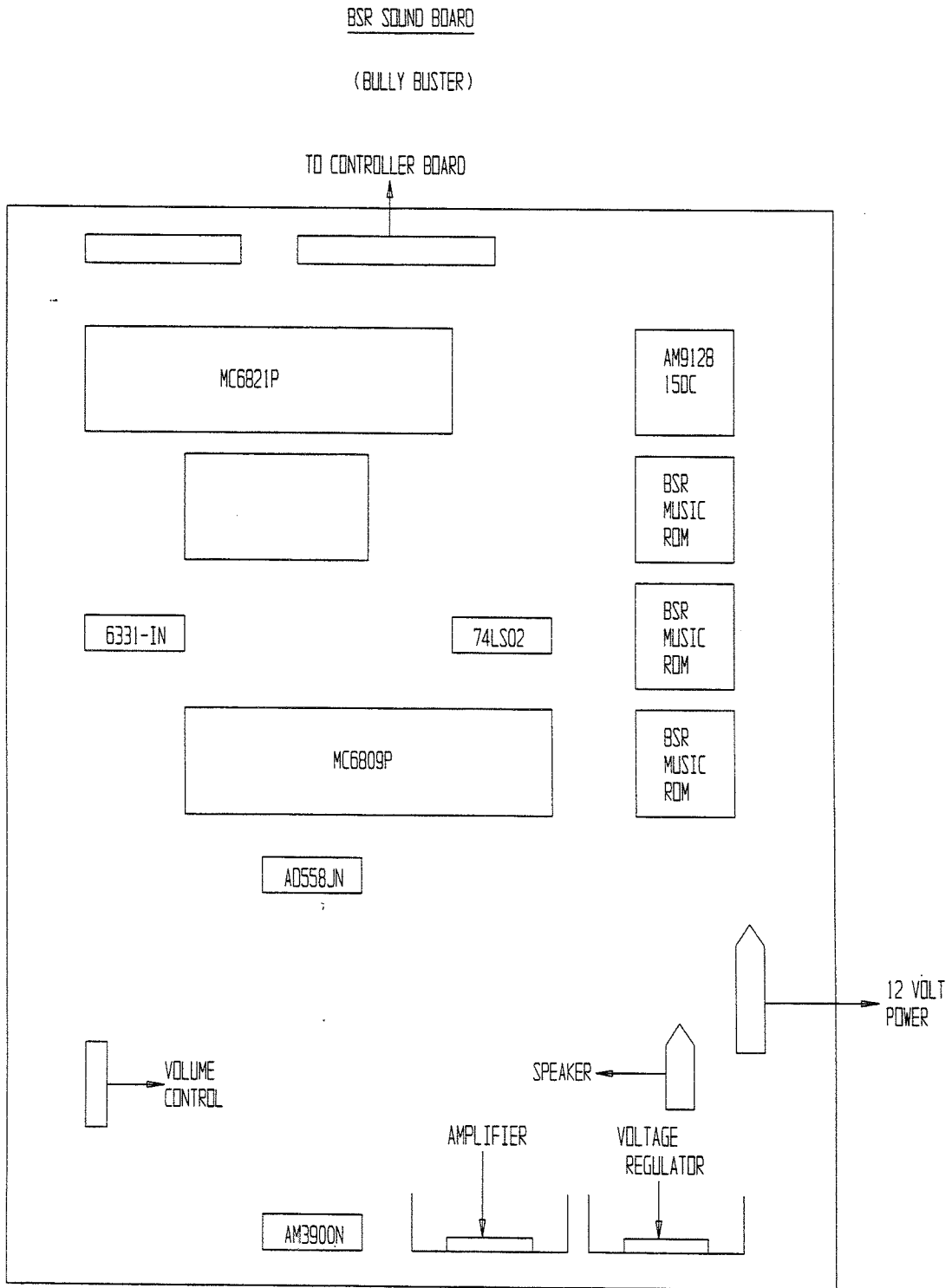
BSR MUSIC BOARD
Overview

The BSR Music Board is a microprocessor-based system. I/O is through the 20 Pin Ribbon Cable closest to the center of the Board and goes into the 6821 which is a programmable I/O port for the 6809 Microprocessor.

The program for the sound to work is located in the two ROMs: F000 and F800. The tune that it plays is a table in the tune EPROM and the RAM is for system overhead.

The 74LS02 and a programmable P.L.D.6331 take care of Address Decoding. An Analog Devices AD558 Digital-to-Analog Converter takes the sounds and runs it into an LM3900 Quad Op Amp that does wave shaping. This signal is sent into the Main Amplifier which is an 8 watt LM383. This signal is sent to the 3 Pin Molex connector which is the speaker output. The 4 Pin Molex Connector is the main 12VDC input to the Board.

As of 1994, this board is no longer supported for the newer software revisions. A better quality "Sound Board" may be used in its place. An update is available. Bob's Space Racers® still repairs these boards, just new ones are not available and newer program features are not available for this board.



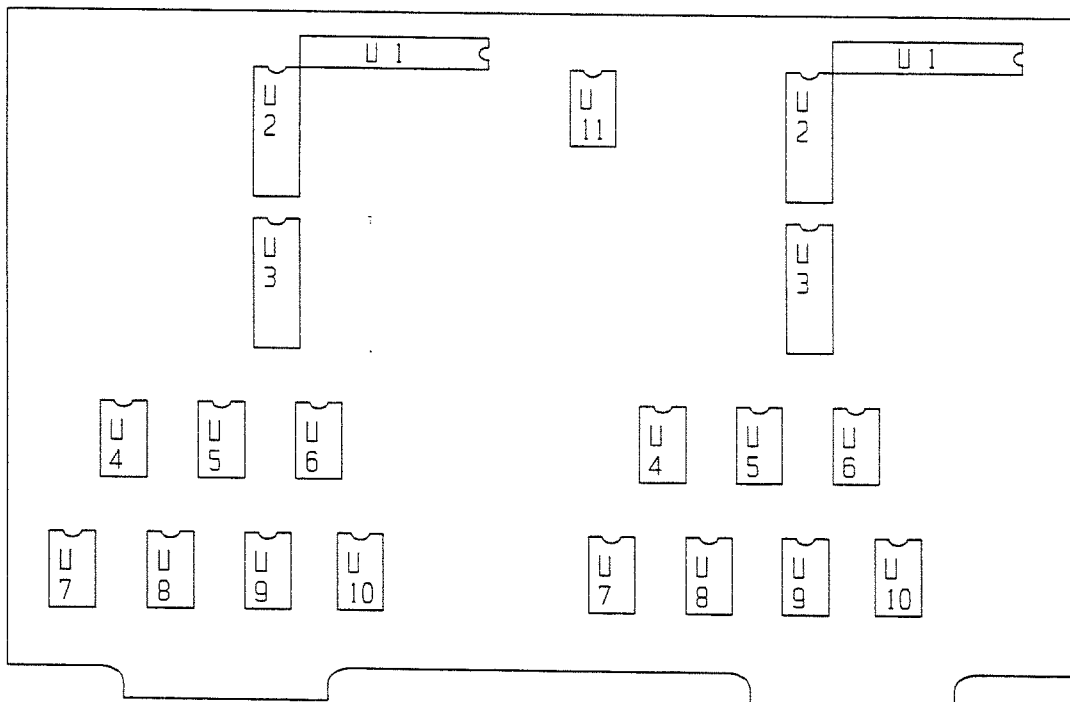
EX033575

DISPLAY BOARD Overview

The signal input, which is BCD, comes in via the 12-conductor cable. The 7448 ICs (U1) convert the BCD inputs to 7-Segment display signal. The 7404 ICs (U2,U3) provide an inverted signal for each segment signal. The signal from the 7448 and the 7404 ICs go to the Output Drivers, which are 75452 ICs (U4-U10). The 75452s provide the appropriate signal to the 7-Segment Display. The signals from the 7448 make the segments visible when it is time to, by powering the correct 1/2 of the segment coil. The 7404 signals make the segment disappear by powering the other 1/2 of the coil when it is time to "turn off" the segment coil. The 555 (U11) is a timer IC which provides a 1/2 second update for all of the segments.

NOTE: On 1983 models and later, we put a 3 amp, 25 Watt regulator on the Display for its electronics; prior to this, the Display was driven by the Regulator in the Control Box.

LARGE DISPLAY EX033500
SMALL DISPLAY EX033475



**2300 SERIES
ELECTRONICS**

2300 SERIES ELECTRONICS

We use our 2300 Series of Electronics for this game incorporating it's many features and capabilities. It is based on one main board and several peripheral circuit boards.

2300 MICROPROCESSOR BOARD OVERVIEW

The basic operation of the Processor Board is as follows.

The Inputs on this Board are on connector J9. The Inputs are ground seeking which means to check an input, simply ground the Inputs corresponding pins and the corresponding LED should light up, if good. These LEDs are tied to Opto-couplers which convert the 12 volt circuit to TTL for the Board.

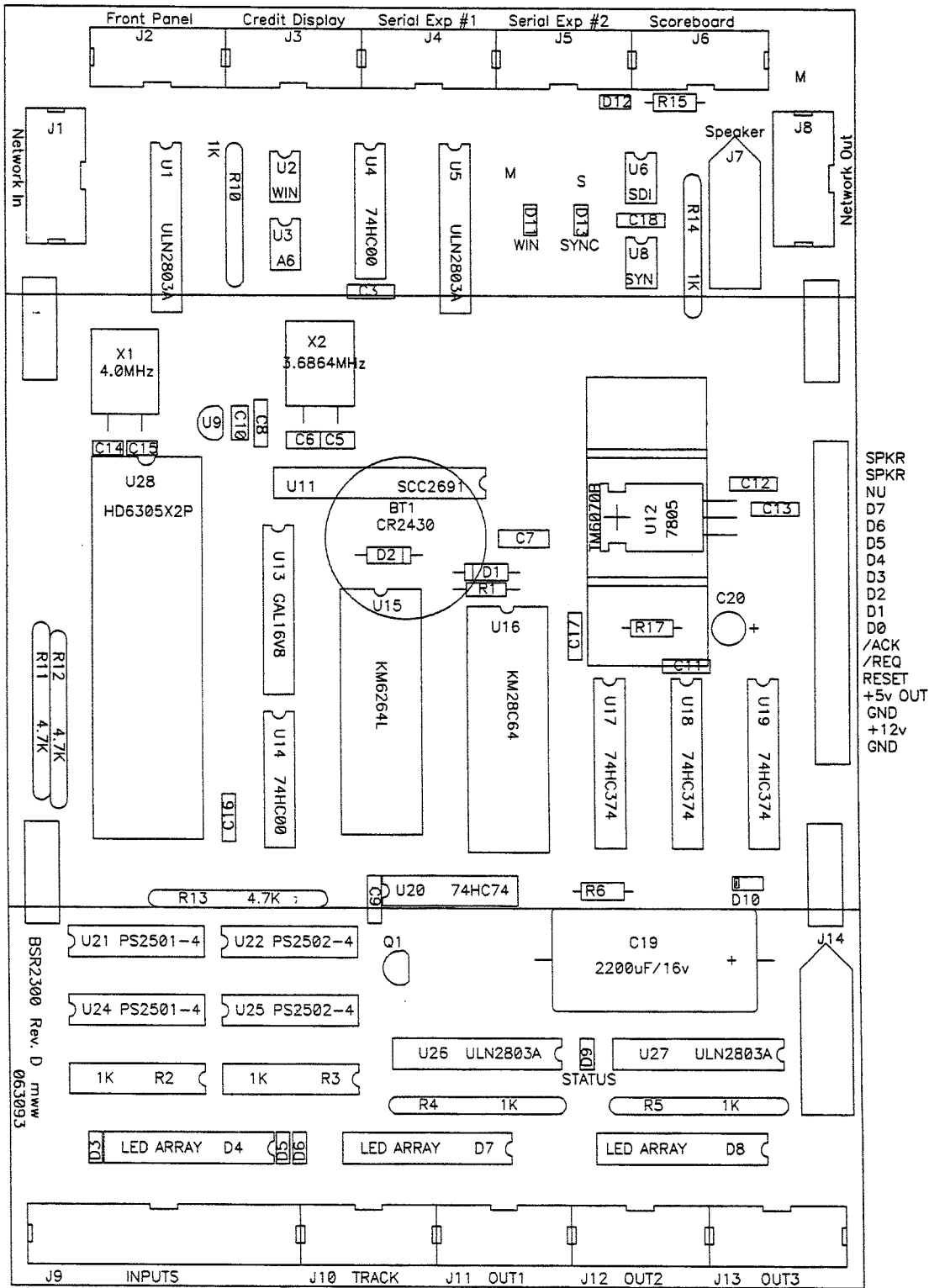
The output connectors, J10 through J13, are open collector to ground. If the LED is on, the output is working because they are tied directly to the output pin. DO NOT ever short a front and back row pin on the Output Connector together. If the Output was good, it isn't any more!

The 4-Pin Molex Connector supplies +12V (Pin 4) and Ground (Pins 2 & 3) to the Board.

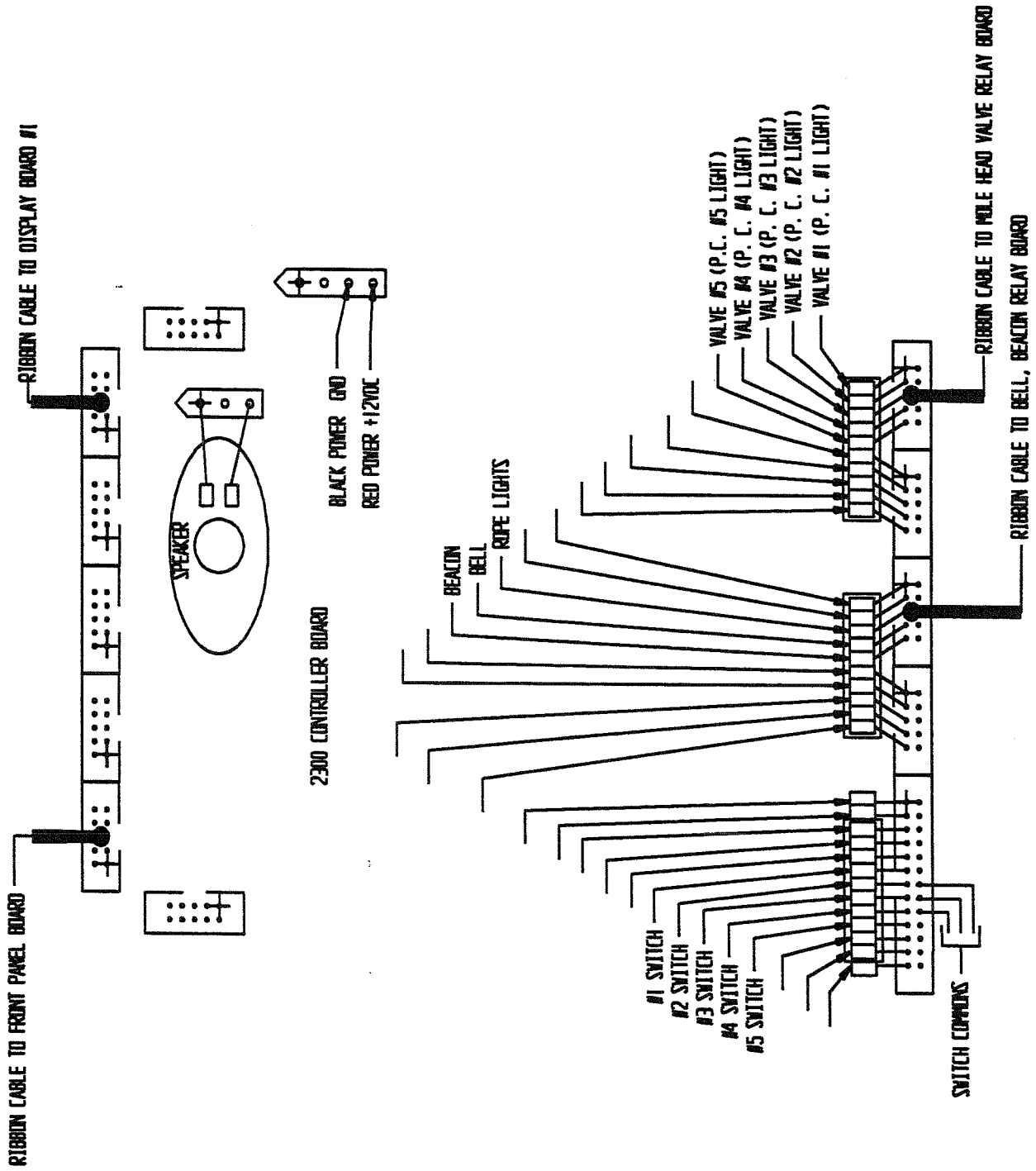
The two, 10-Pin Connectors labeled Network In and Network Out are communication ports to other boards and displays.

There is a row of Serial Expansion Connectors that are used to communicate with Serial Devices, such as the Front Panel Board, Credit Display, etc. There is a total of five (5) connectors, only three (3) of these ports are being used at this point. The other two (2) ports are for future use.

There is an 18-position SIP Header connector. This is an 8-bit, clocked Parallel TTL Port. It is set up to be used for a Sound Board to plug 'piggyback' on top of this Board.



EX033655



**FRONT PANEL BOARD
Overview/Drawing**

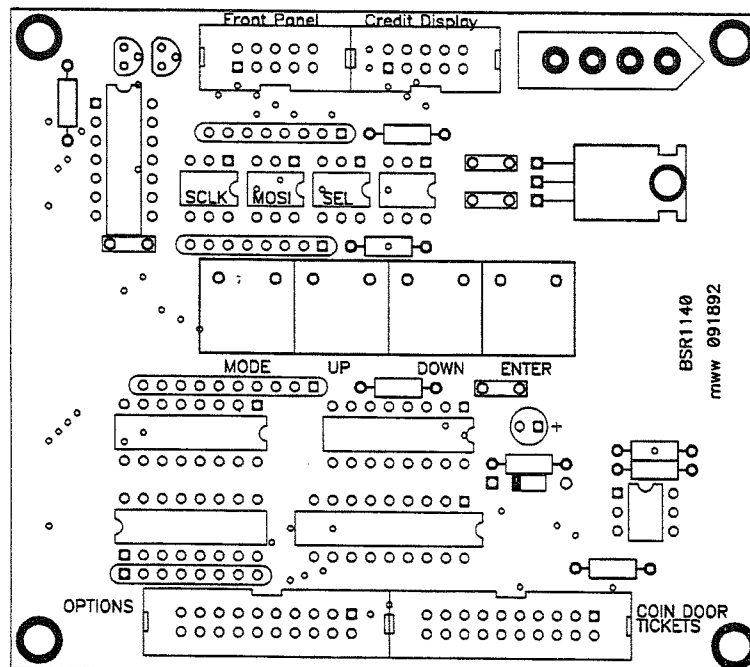
The basic operation of the Front Panel Board is as follows.

The Front Panel Board is used as a distribution point for the Credit Display Board and gives the customer the ability to change the Option Registers via the four (4) pushbutton switches.

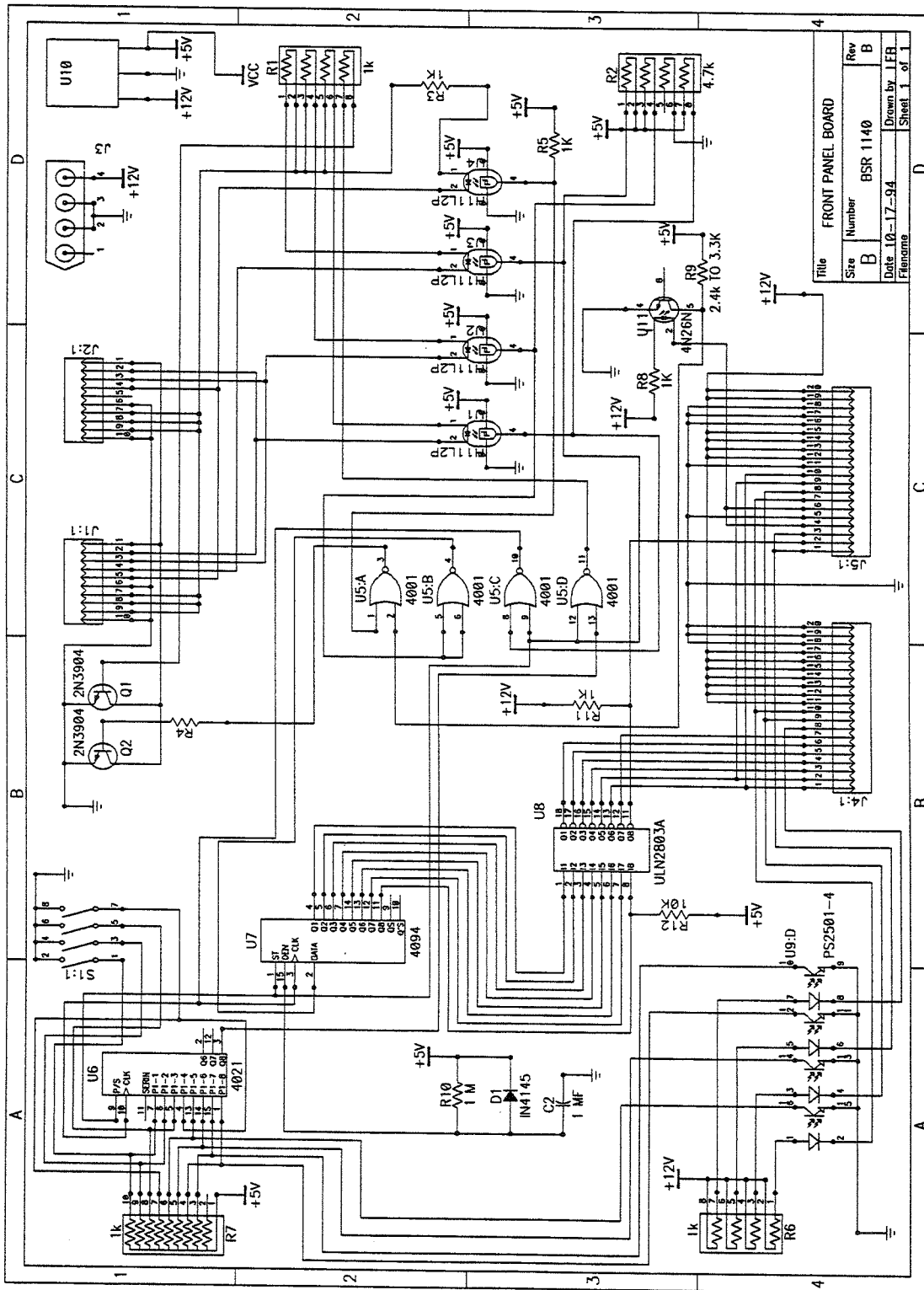
The two 20-Pin Connectors (J4 and J5) are Inputs and Outputs via the Main Processor. One of the 20-Pin Connectors is the Coin Door and Ticket Dispenser Connections. The other 20-Pin Connector is labeled 'options' and will be used at a later date.

The 4-Pin Molex Connector (J3) supplies +12VDC (Pin 4) and Ground (Pins 2 & 3) to the Board.

The top two 10-Pin Ribbon Cable Connectors (J1 and J2) are Input/Output Connectors--one from the 2300 Board and one from the Credit Display.



EX033660



2300 CREDIT DISPLAY BOARD

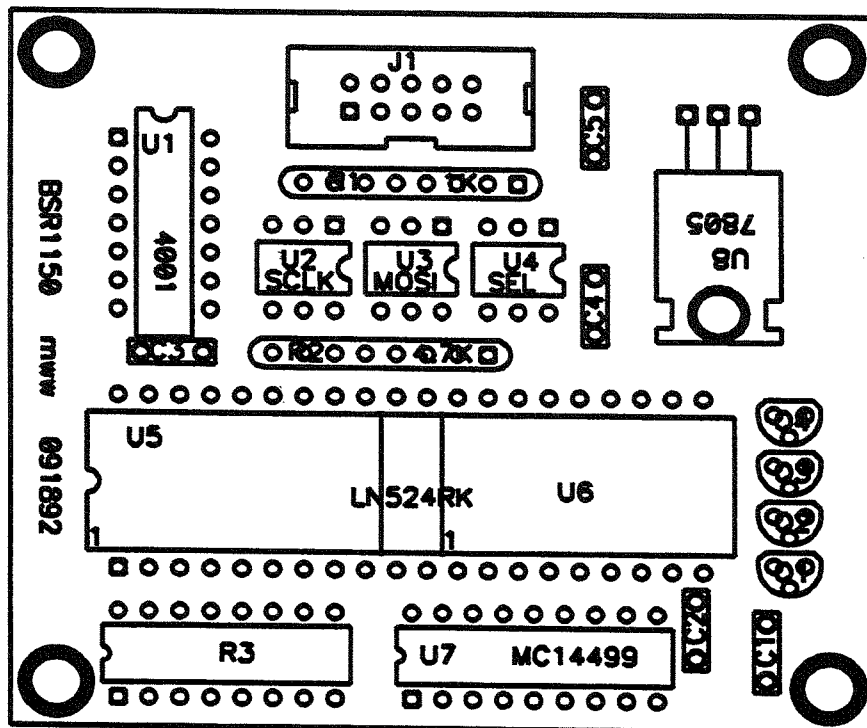
Overview/Drawing

The basic operation of the Credit Display Board is as follows.

The Credit Display Board is used to show the Player how many coins or tokens are required for a play and how many credits are remaining. The Credit Display Board, when used in conjunction with the Front Panel Board, will display the Option Registers and the contents of that register, when needed.

The only connector on the Board is a 10-Pin Ribbon Cable Connector that connects the Credit Display to the Front Panel Board or directly to the 2300 Microprocessor Board.

- * The Credit Display Board is not used to set Options on multi-player games. See OPTION REGISTERS - 2300 SERIES on how to change Registers and the contents thereof.



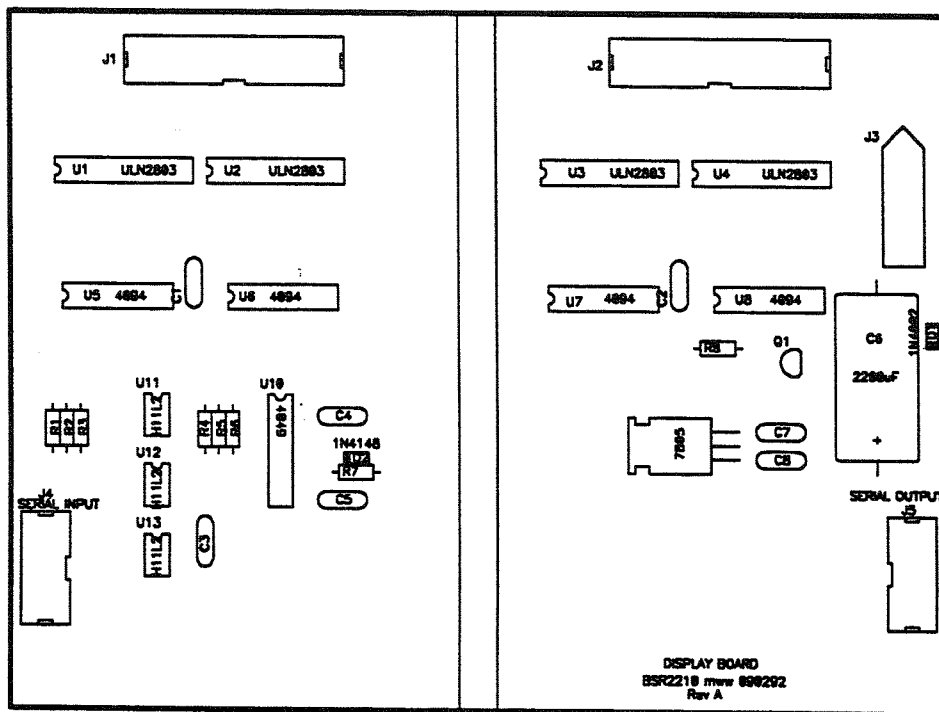
EX033455

2300 DISPLAY BOARD
Overview

The basic operation of the Display Board is as follows:

The data Input to the Board is through a 10-Pin Ribbon Cable Connector (J4) which is labeled Serial Input. The data comes in to the (3) H11L2s (U11-U13) which are opto-isolators. It then goes through the inverter 4049 Chip (U10). The data is then serial shifted through the 4094 Chips (U5-U8) cascaded to the Serial Output Connector (J5) through Q1. The Output of the 4094s are sent to the driver 2803 ICs (U1-U4) which convert TTL to high current open collector Output (0.5 Amp). That signal then goes to the two 26-Pin connectors (J1 & J2) which are Outputs to the 7-Segment Displays. The signal tells which of the coils should be ON or OFF. The 4-Pin Molex Connector (J3) is the +12VDC (Pin 4) and Ground (Pins 2 & 3) Power Input to the Board.

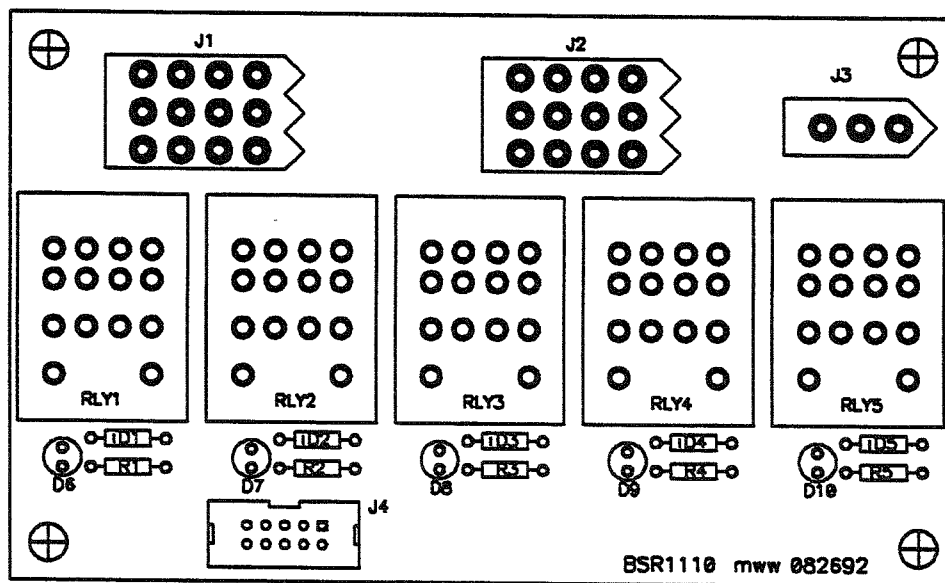
CONTROL BOARD FOR DISPLAY



LARGE - EX033490

2300 RELAY BOARD OVERVIEW

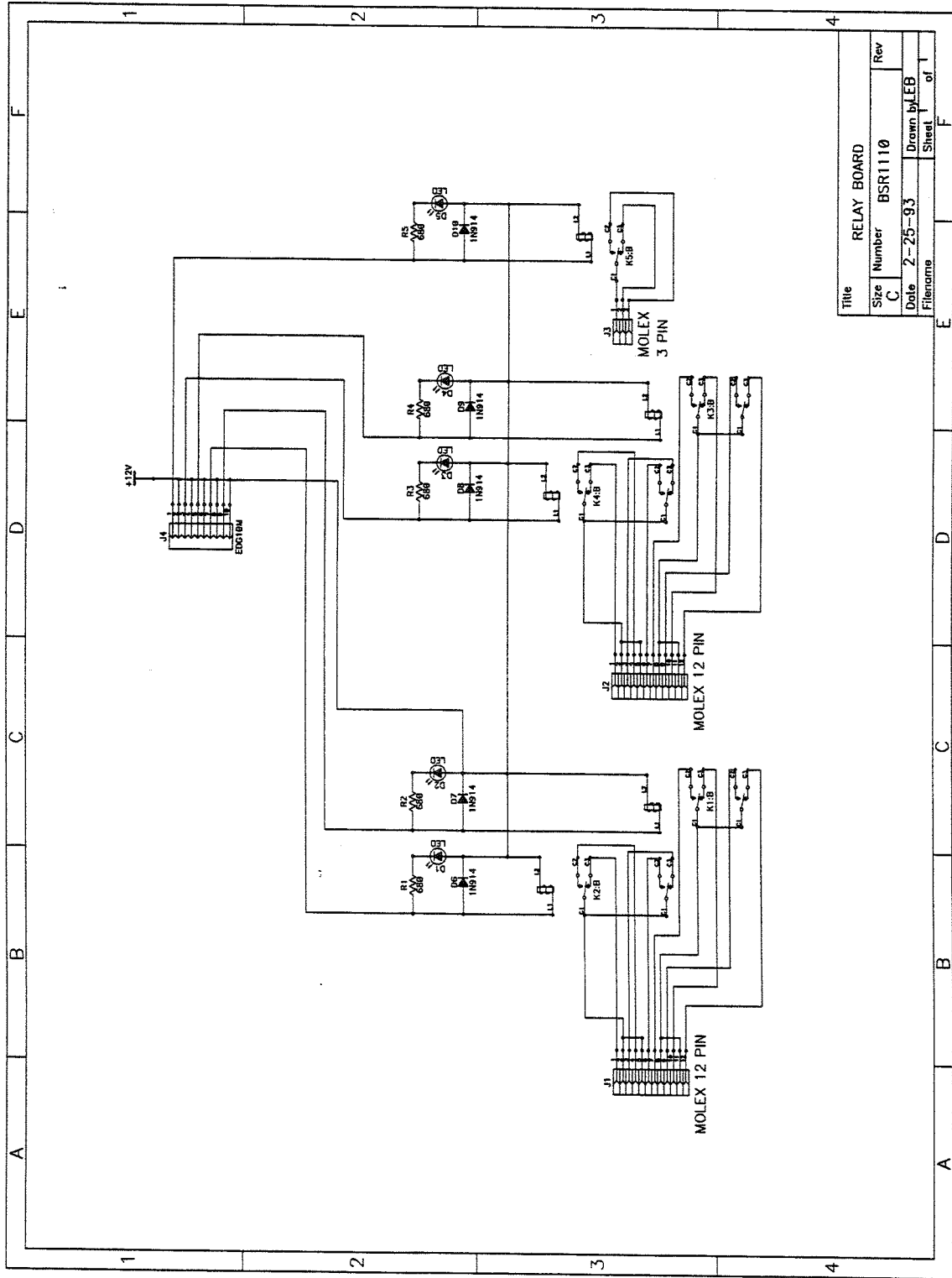
There are three (3) styles of Relay Boards used with the 2300 Series of Electronics. The style of Relay Board used depends on the application. In this application of Whac-A-Mole® Arcade games, Style 1 - BSR1110 is the only one currently in use. The coil voltage comes in on a 10-Pin Ribbon Cable connection to turn the Relay(s) ON or OFF. The LEDs on the Board signal when a Relay is ON or OFF



EX033435

Style 1 - BSR1110

On this Relay Board there are two 12-Pin Molex Plugs and one 3-Pin Molex Plug. The Molex Plugs bring out the contacts of the Relay(s), (Common, N/O & N/C). These are used for any voltage level or general application.

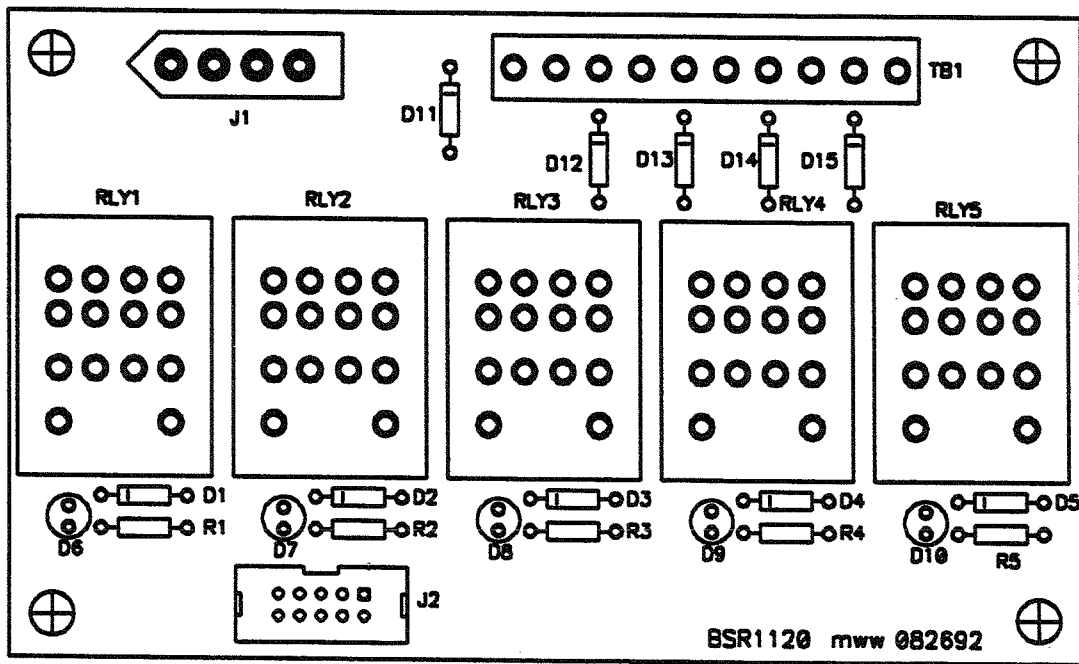


Title		RELAY BOARD	
Size	Number	BSR1110	Rev
C			
Date	2-25-93		Drawn by
Filename			LEB
Sheet	1		of
			F

2300 RELAY BOARDS - Continued

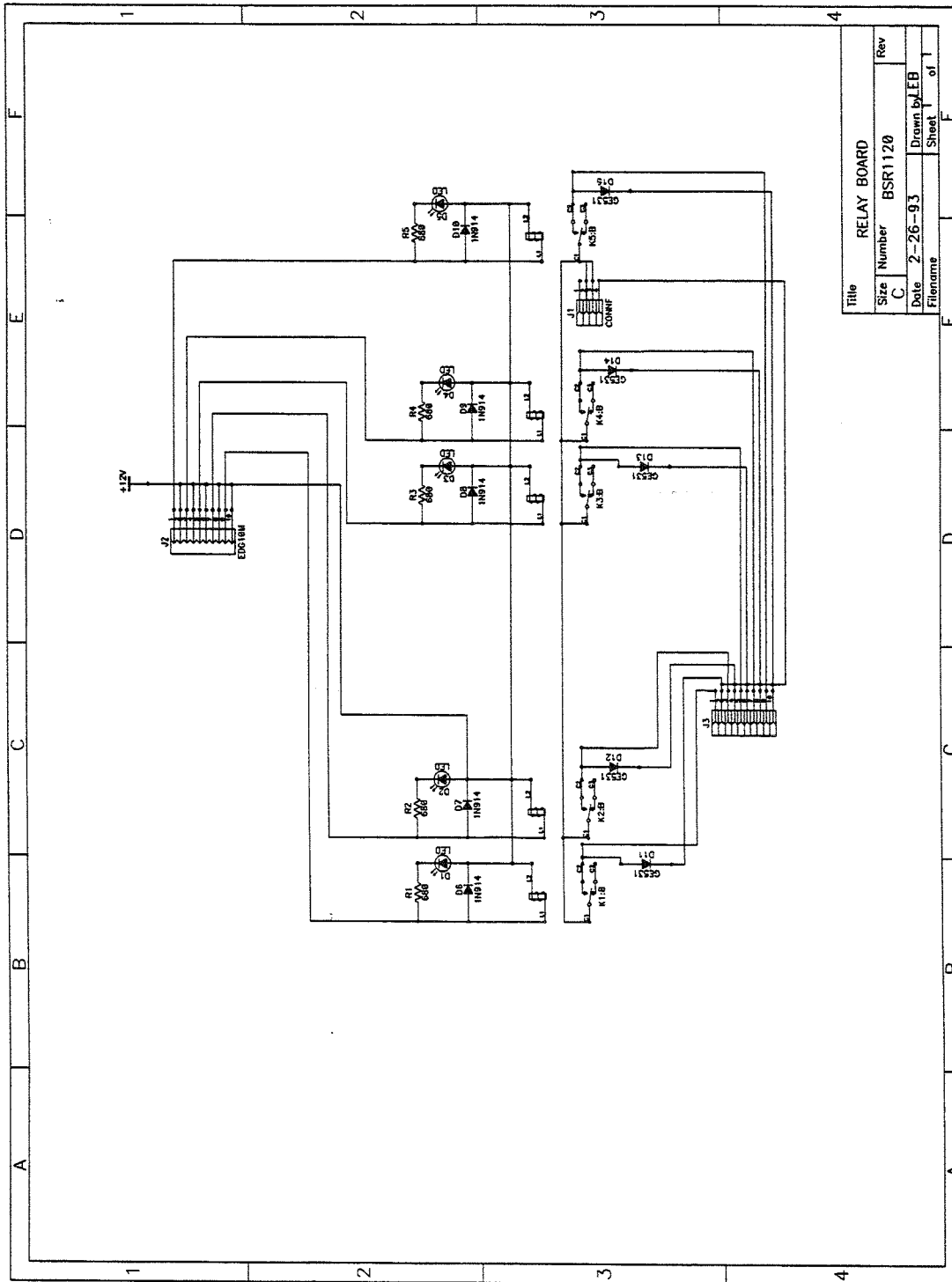
Style 2 - BSR1120

This style of Relay Board is used mainly to power 12VDC valves. There is a 4-Pin Molex Plug on this board, which is the +12VDC power and ground to the loads from the Board. There is also a 10-position terminal block, 2 positions for each Relay. One side of the Terminal Block is ground and the other side is the N/O contact to the +12VDC power. There is a dampening diode on each Output so it can only be used with DC voltages and loads.



EX033440

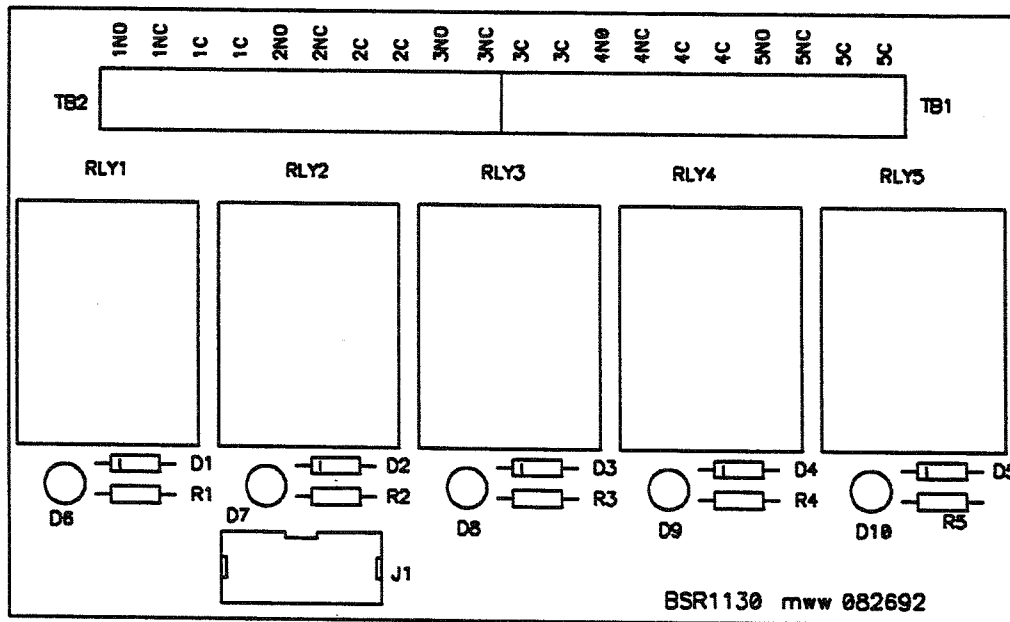
BSR1120 mww 082692



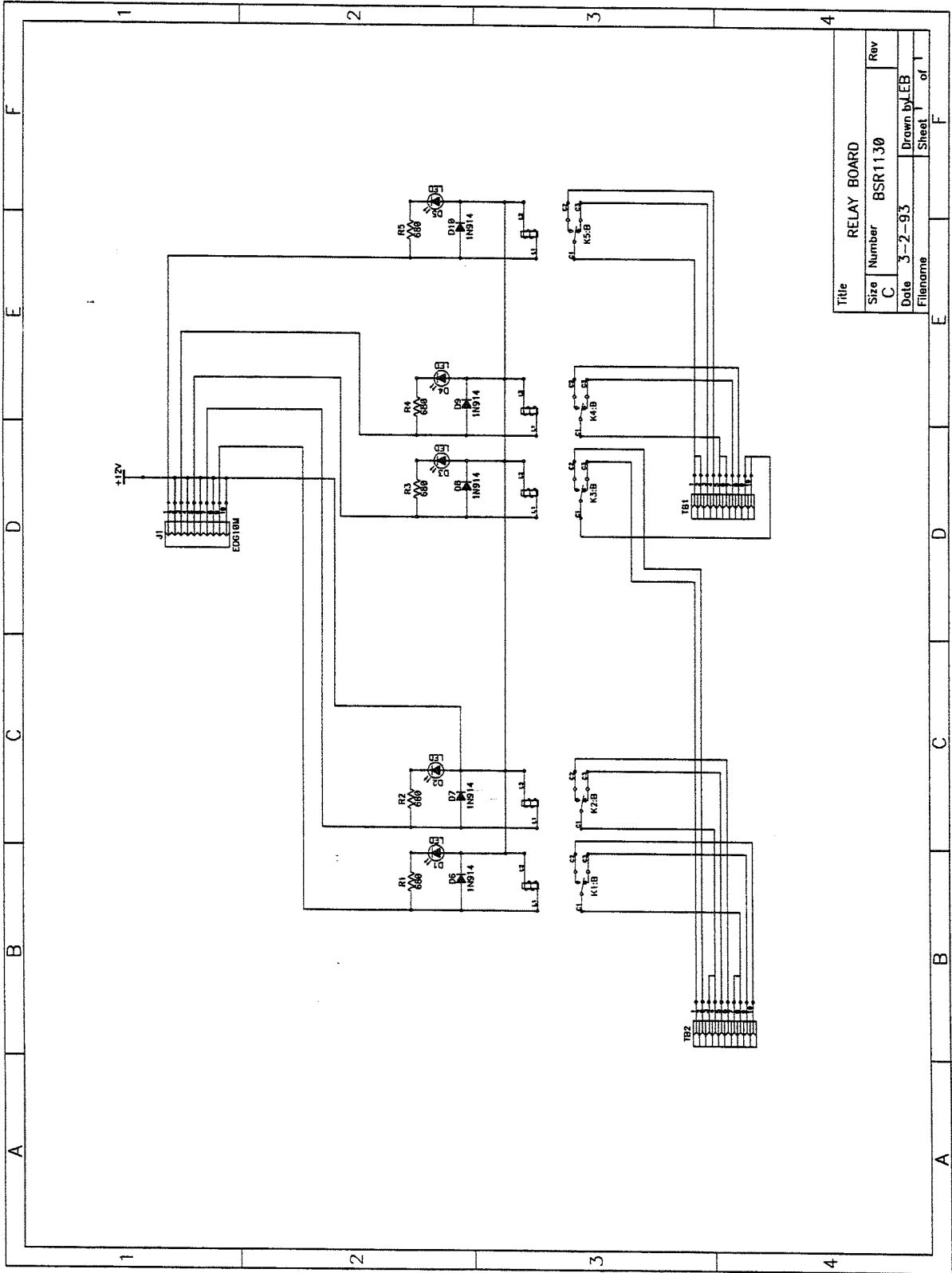
2300 RELAY BOARDS - Continued

Style 3 - BSR 1130

This style of Relay Board is currently not used. There is a 20-position Terminal Block (to replace the style with the Molex Plugs). By using the Terminal Block, it brings out the form C Switch contacts for each Relay. There are four (4) Terminal Block positions for each Relay. Two (2) are common, one (1) is N/O, and the other is N/C. There are two (2) common positions for each Relay so that we can daisy-chain the power to all the commons, if necessary.



EX033445



TROUBLESHOOTING

2300 Series Electronics

<u>PROBLEM/CAUSE</u>	<u>FIX</u>
PROBLEMS WITH THE BEACON	
<u>Beacon Light Works But The Disk Doesn't Revolve</u>	
Reflector is Slipping	Check the Motor to see if it is slipping. There is an O-ring around the disk; also, there is a tension wheel that pushes the O-ring tight to the Motor shaft. Adjust if it isn't pushing down hard enough on the O-ring--adjust if necessary.
<u>Beacon Light Doesn't Work, But the Disk is Revolving</u>	
Bad Bulb	Check the bulb and/or replace it with a #1195 bulb.
<u>Beacon Doesn't Work At All</u>	
No Power	The Bell probably isn't working either, which means it is a Board problem. Check voltage to Relay Board: should be 12VDC.
Bad Wire Connection(s)	If the Bell is working--check all wiring to and from the Beacon.
Bad Relay	Check Relay on Relay Board for proper operation.

TROUBLESHOOTING - 2300 Series Electronics

<u>PROBLEM/CAUSE</u>	<u>FIX</u>
PROBLEMS WITH THE BELL	
<u>Bell Doesn't Work At All</u>	
No Power	Check voltage to Relay Board; should be 12VDC. Check wiring.
Bad Relay	Swap Relay with another one; replace, if necessary.
PROBLEMS WITH THE SCORE DISPLAY	
<u>Score Display and/or Best Score of The Day Doesn't Work at All</u>	
Loose Wire Connections	Check all Ribbon Cable connections from the Display to the 2300 Control Board. Labeled Score Board; also, Ribbon Cables from one Display to the other.
No Power	Check for 12VDC from the Red wire to the Black wire on the 4-Pin Molex connector on the Board.
<u>Display Doesn't Advance Correctly</u>	
"Head Hit" Input on Control Board Doesn't Work	Check input LEDs on 2300 Controller Board for proper operation.

TROUBLESHOOTING - 2300 Series Electronics

<u>PROBLEM/CAUSE</u>	<u>FIX</u>
<u>Score Display and/or Best Score of The Day Doesn't Work at All</u>	
Sensor For a Particular Head Doesn't Work	Check Sensor Switch and/or Air Hose. See "Heads Not Scoring".
PROBLEMS WITH THE GAME	
<u>Game Will Not Coin Up</u>	
Bad Coin Switch	Ohm out the Coin Switch; if necessary, replace.
Loose Connection	Check 20-Pin connector on Front Panel Board for good connection; also, check Ribbon Cable back to 2300 Controller Board.
Bad IC/Board	Swap Front Panel Board with another unit.
<u>Unit Coins Up by Itself</u>	
Bad Coin Switch	Ohm out Coin Switch; replace, if necessary.
Wire In The Wrong Place	Check wiring to the 20-Pin connector on the Front Panel Board for their proper locations.
Wrong Register Setting	Check appropriate Register for Number of Tries Per Credit.

TROUBLESHOOTING - 2300 Series Electronics

<u>PROBLEM/CAUSE</u>	<u>FIX</u>
<u>Credit Display Board Won't Accept Changes From the Front Panel Board</u>	
Bad Connection	Check Ribbon Cables from Credit Display Board back to the Main Board.
Bad Board	Swap Board with another known good one.
Bad IC	Change 2803 IC next to Front Panel Connector on the 2300 Board.
<u>Front Panel Board Will Not Allow You to Change Registers</u>	
No Power	Check voltage on the 4-Pin Molex Plug for 12VDC.
No Connection	Check Ribbon Cable on the left side of Board back to 2300 Board.
Bad Board	Swap Front Panel Board with a known good one.
<u>No Sound</u>	
No Connection	Check wiring from the speaker to the 2300 Board.
Volume POT Too Low	Adjust POT on the Sound Board (located near largest heat sink).
Bad Sound Board	Swap Sound Boards.

TROUBLESHOOTING - 2300 Series Electronics

PROBLEM/CAUSE	FIX
<u>Blows 7-1/2 Fuse</u>	
Wrong Value Fuse	Should be a 7.5 Amp Fast-Acting.
Short In The Wiring	Unplug all 12VDC power connections. Plug in one at a time to determine Board with the short.
<u>No Power To The 2300 Board</u>	
No Connection	Check wiring from 2300 Board to the 12V power supply.
Bad Power Supply	Check to the 12V output from the 12V power supply make sure game power is on. Also, check the 120VAC input and replace if necessary.

N O T E S

PROBLEM/CAUSE

FIX

Should you encounter a particular problem not covered in this or any other Troubleshooting Section of your Owners Manual, please contact the Technical Support Staff at BOB'S SPACE RACERS® by telephoning them at (386) 677-0761, or by FAX at (386) 677-0794.

**WHAC-A-MOLE® BOX
ELECTRONICS**

WHAC-A-MOLE® BOX

Over the years there have been improvements made to the Mole Box and its parts to improve reliability and longevity.

The original versions used two switches wired in series, one under the Mole (a normally open switch) which would close when the Mole was hit, and a switch under the Guide Pin (a normally closed switch) which would open when the Air Cylinder was down. The circuit for the two switches was fairly simple. The only time a Player could score was when the air had filled the cylinder (the bottom microswitch is now closed) and the Player hit the raised Mole (closing the top microswitch which completed the circuit through both switches).

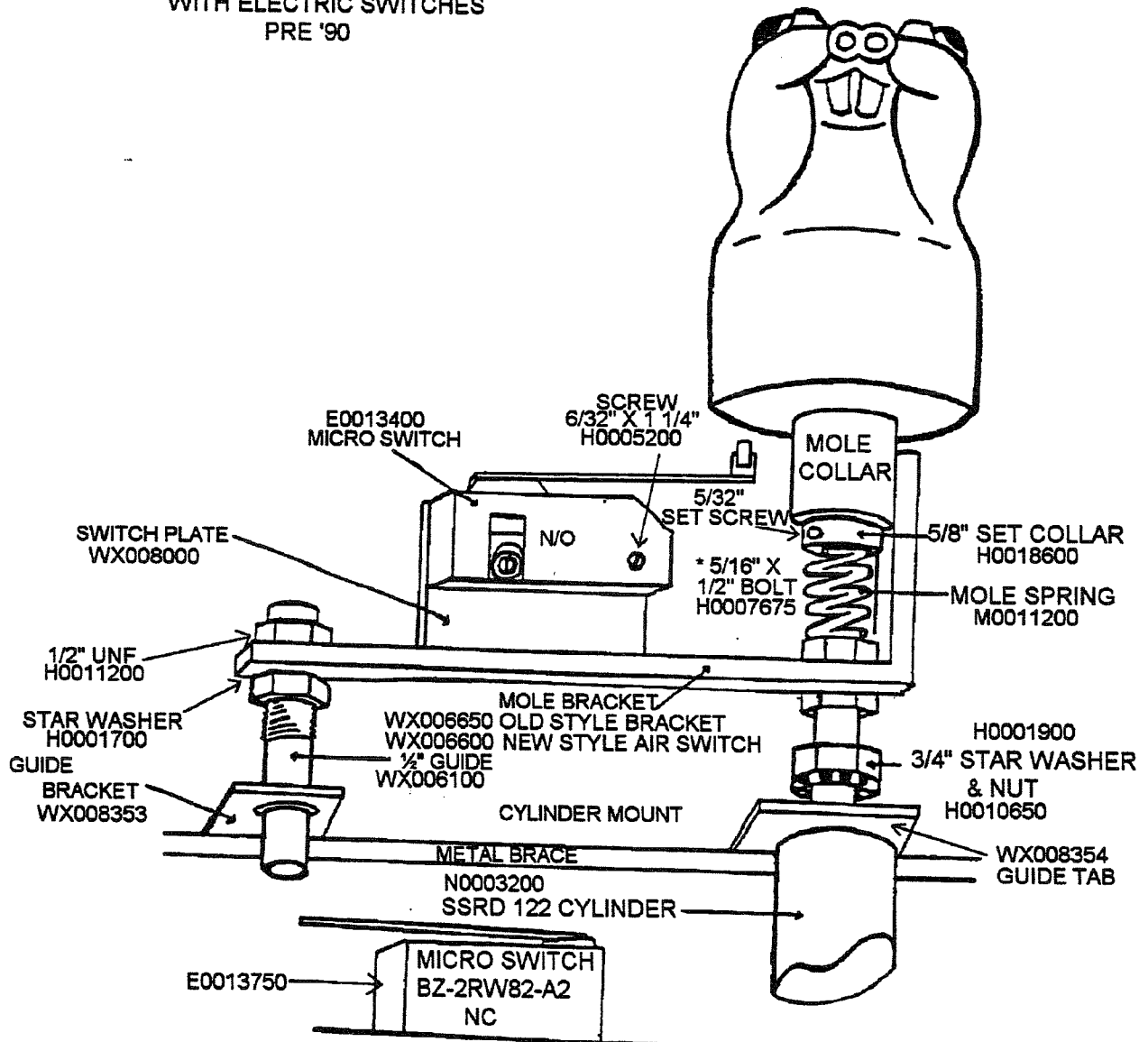
The main problem with this design was that there are many parts associated with mounting a switch and often, when a repair is done, parts were left off. The wires going to the switches had a tendency to break, which caused the Mole to score all the time or not score at all. The parts that prevent this are crimp terminals with a strain relief on the wire and a cable clamp to strain Relief the wire by attaching the wire to the Switch Housing.

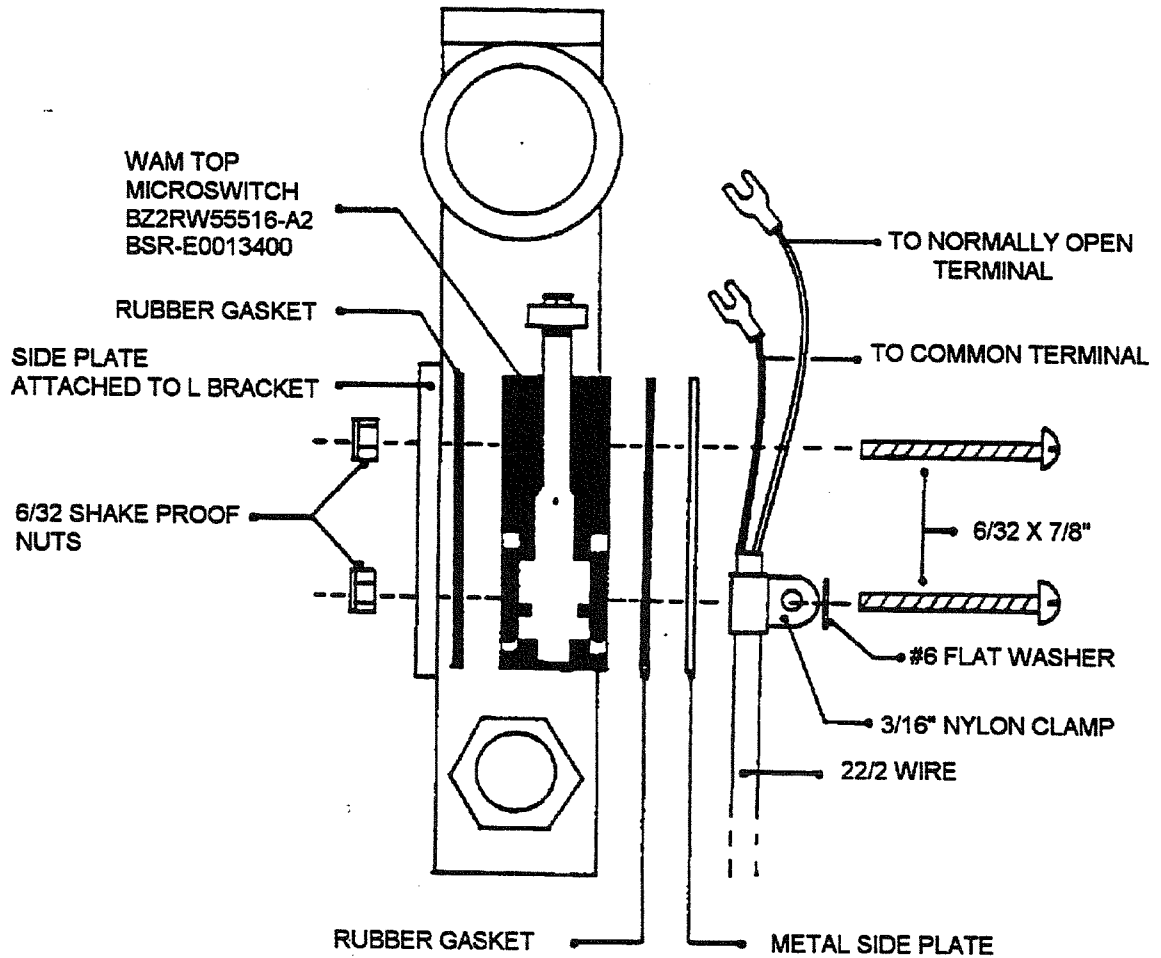
The current version looks very similar, but the operation is quite different. Instead of two microswitches we are now using an air switch under the Mole Heads and an air pressure sensing switch that senses a Mole hit. The current system uses the air that fills the Air Cylinder and we plumb it into an air switch that is located under the Mole body. With the cylinder up there is air pressure on one side of the switch. When the Mole is hit the switch will open and allow air to pass through the switch and down to a manifold. All of the switches are connected to this manifold which, in turn, is connected to the air Pressure Sensing Switch. The air pressure pulse will pass down from the Manifold to the Sensing Switch. The Switch, once it has an air pressure pulse, will make an internal switch closure and will cause an input to activate on the Processor Board.

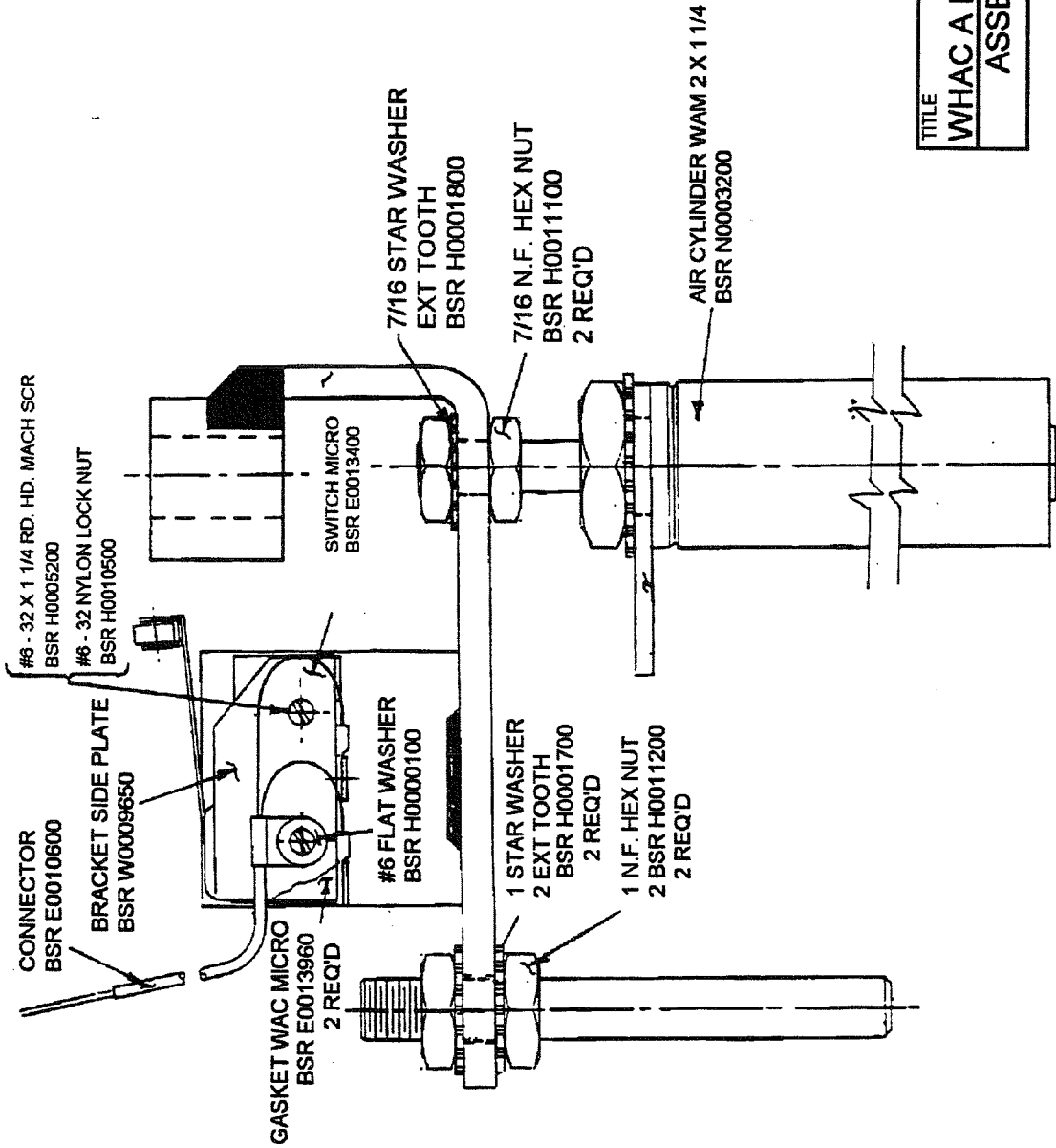
With either set-up, there is a rubber gasket on both sides of the switch under the head and these parts are sandwiched between a metal plate on the outside and the Mole Bracket on the other side. The fastening nuts are 6/32 shake-proof nuts. This allows you to only snug the nuts instead of pressurizing the Switch thus providing a shock mount for the Switch.

MOLE BRACKET
WITH ELECTRIC SWITCHES
PRE '90

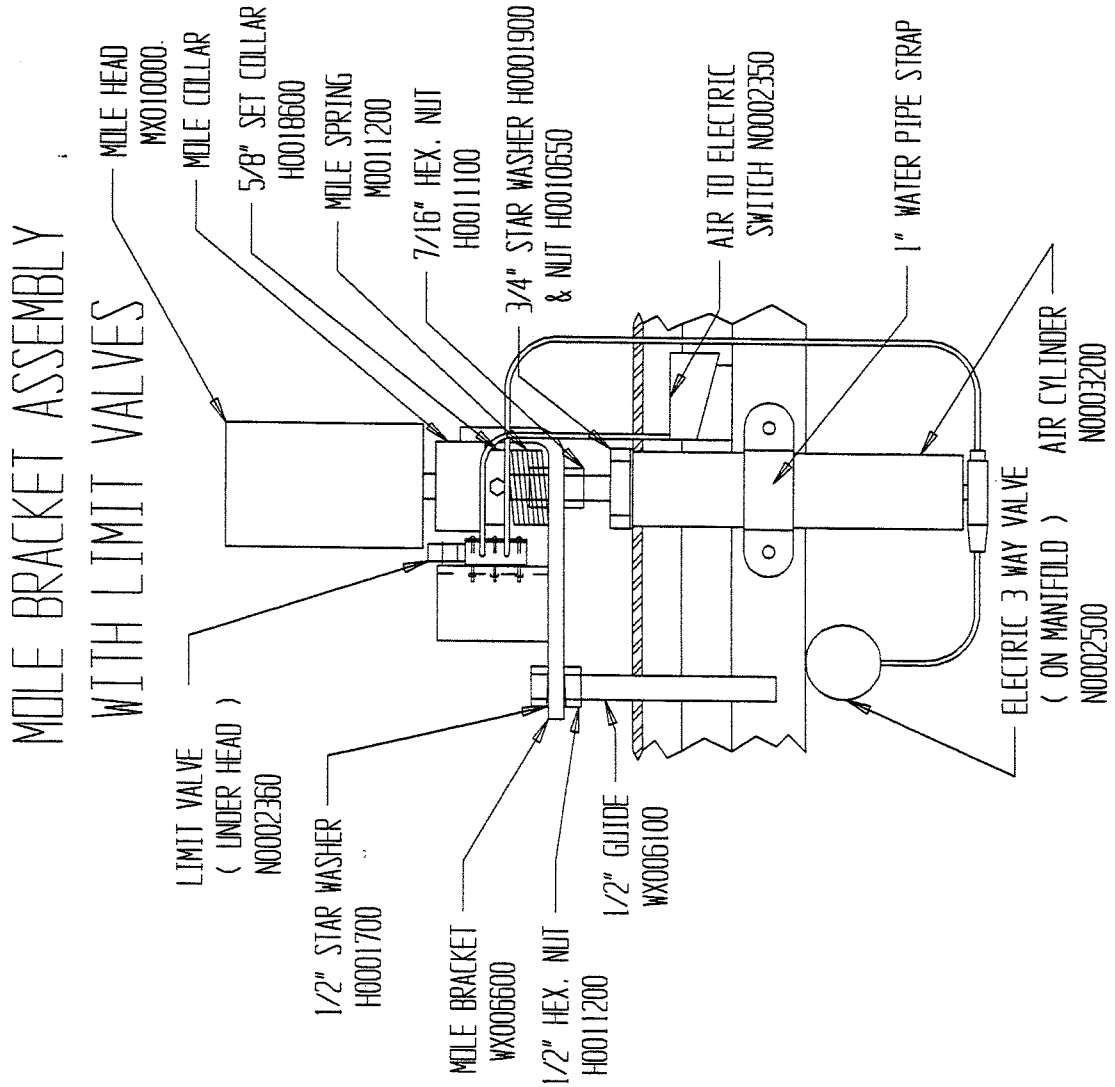
MUNCH HEAD MX010003



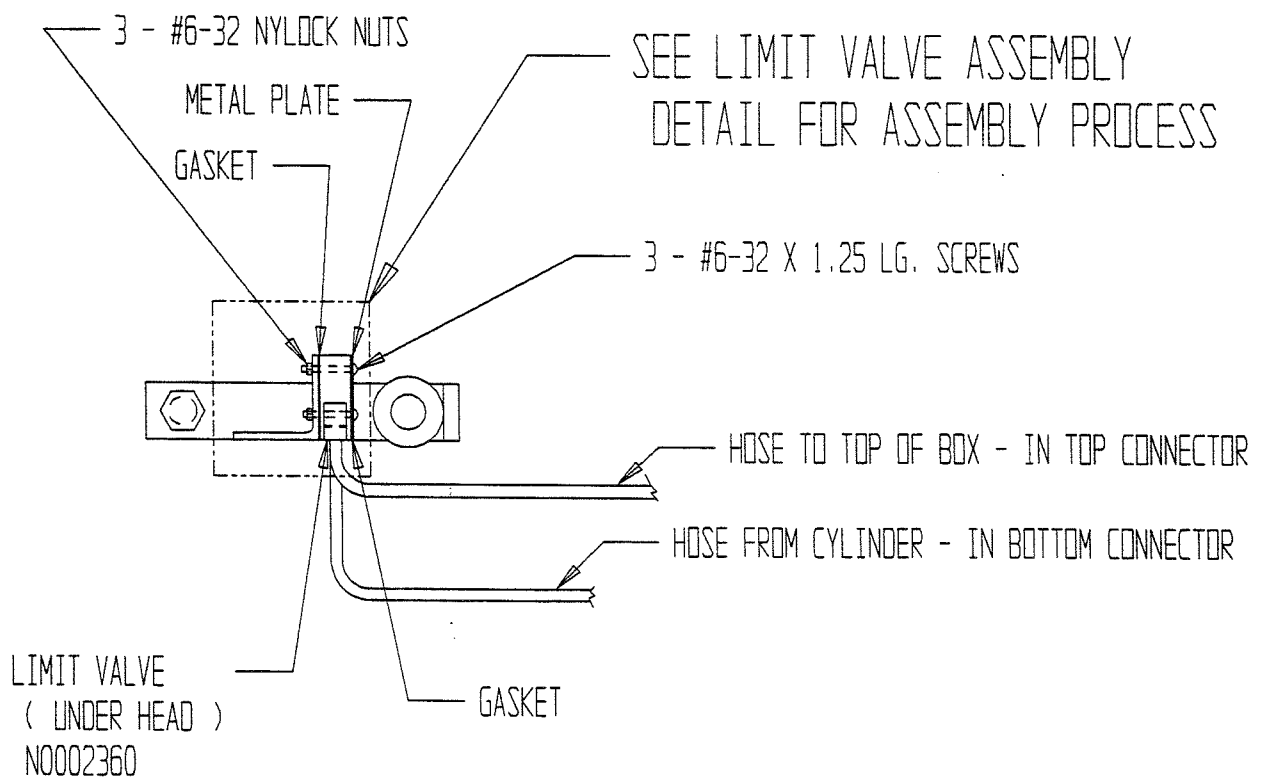




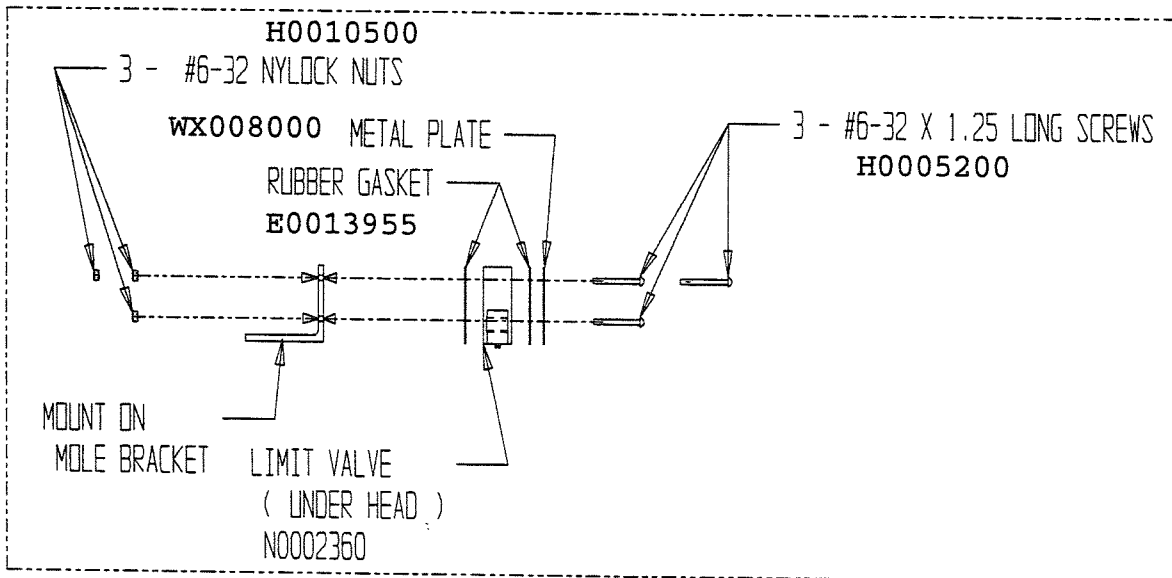
TITLE
WHAC A MOLE BRACKET ASSEMBLY



TOP LIMIT VALVE ASSEMBLY

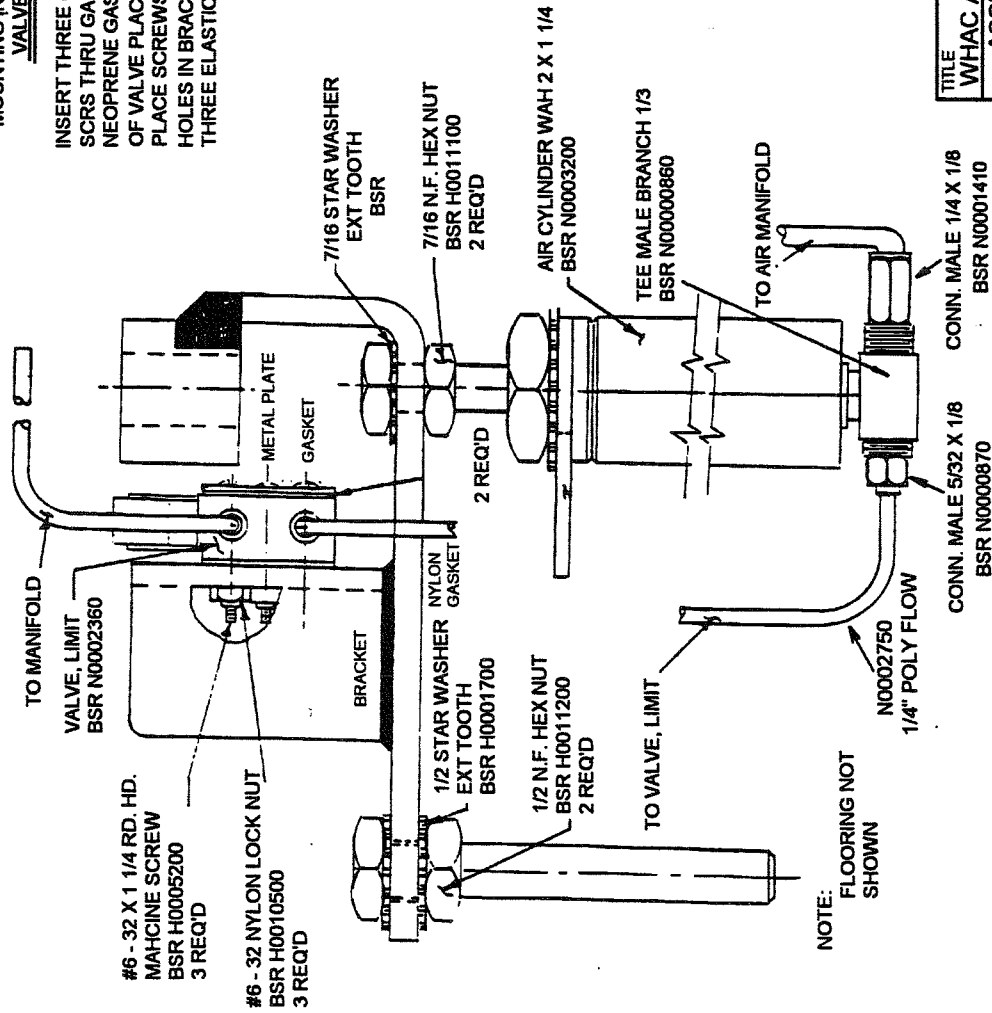


LIMIT VALVE ASSEMBLY DETAIL

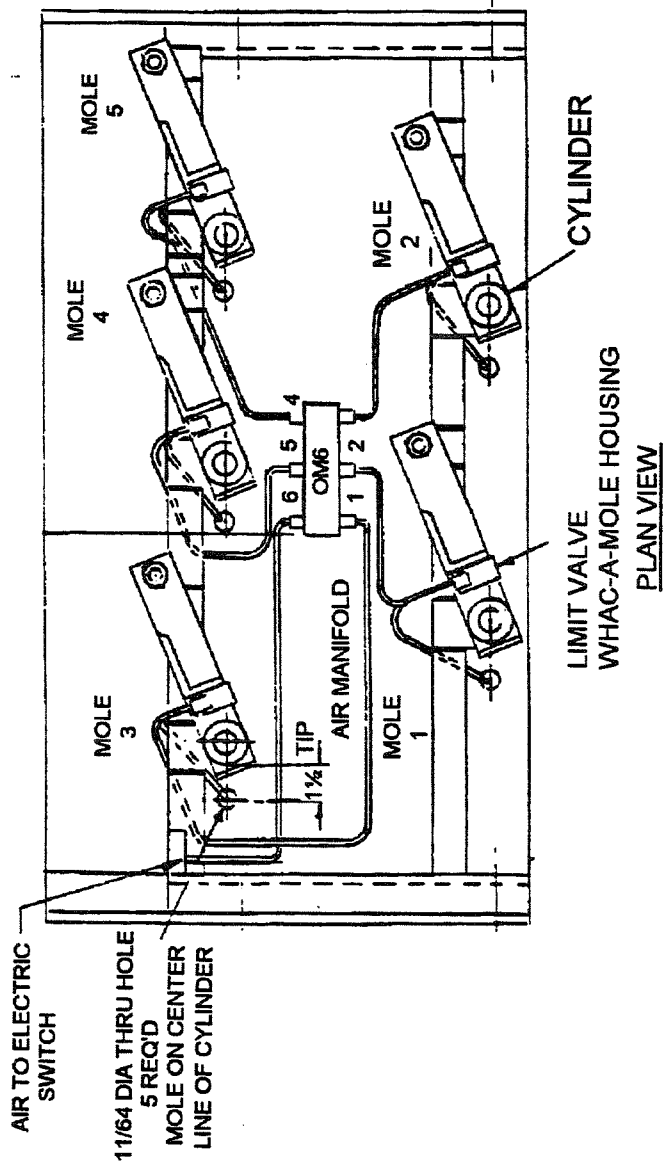


MOUNTING INSTRUCTIONS FOR
VALVE LIMIT

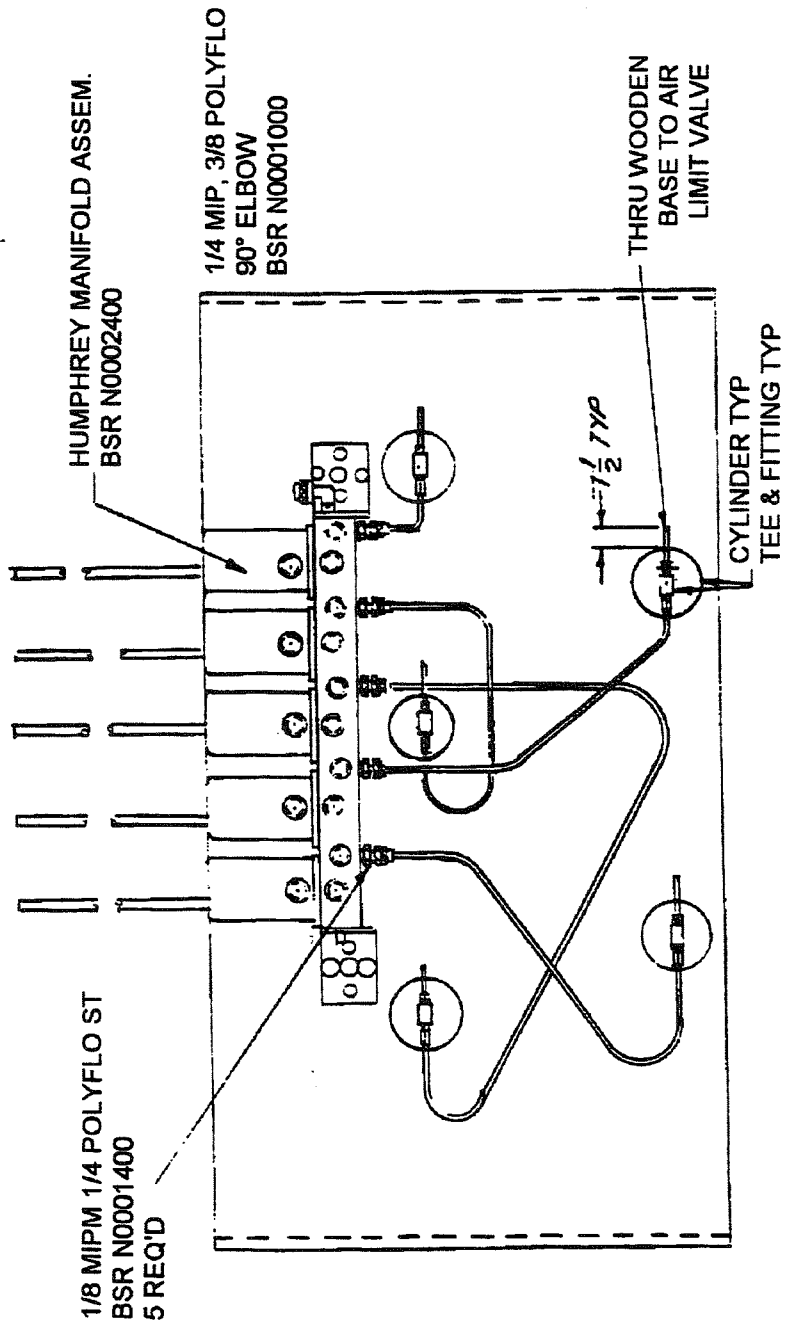
INSERT THREE #6 - 32 X 1 1/4 RD. HD. SCRS THRU GALV. SPACER & NEOPRENE GASKET, ON OPPOSITE OF VALVE PLACE SECOND GASKET. PLACE SCREWS IN VALVE THRU HOLES IN BRACKET & SECURE WITH THREE ELASTIC STOP NUTS



TITLE
WHAC-A-MOLE BRACKET
ASSEMBLY NEW

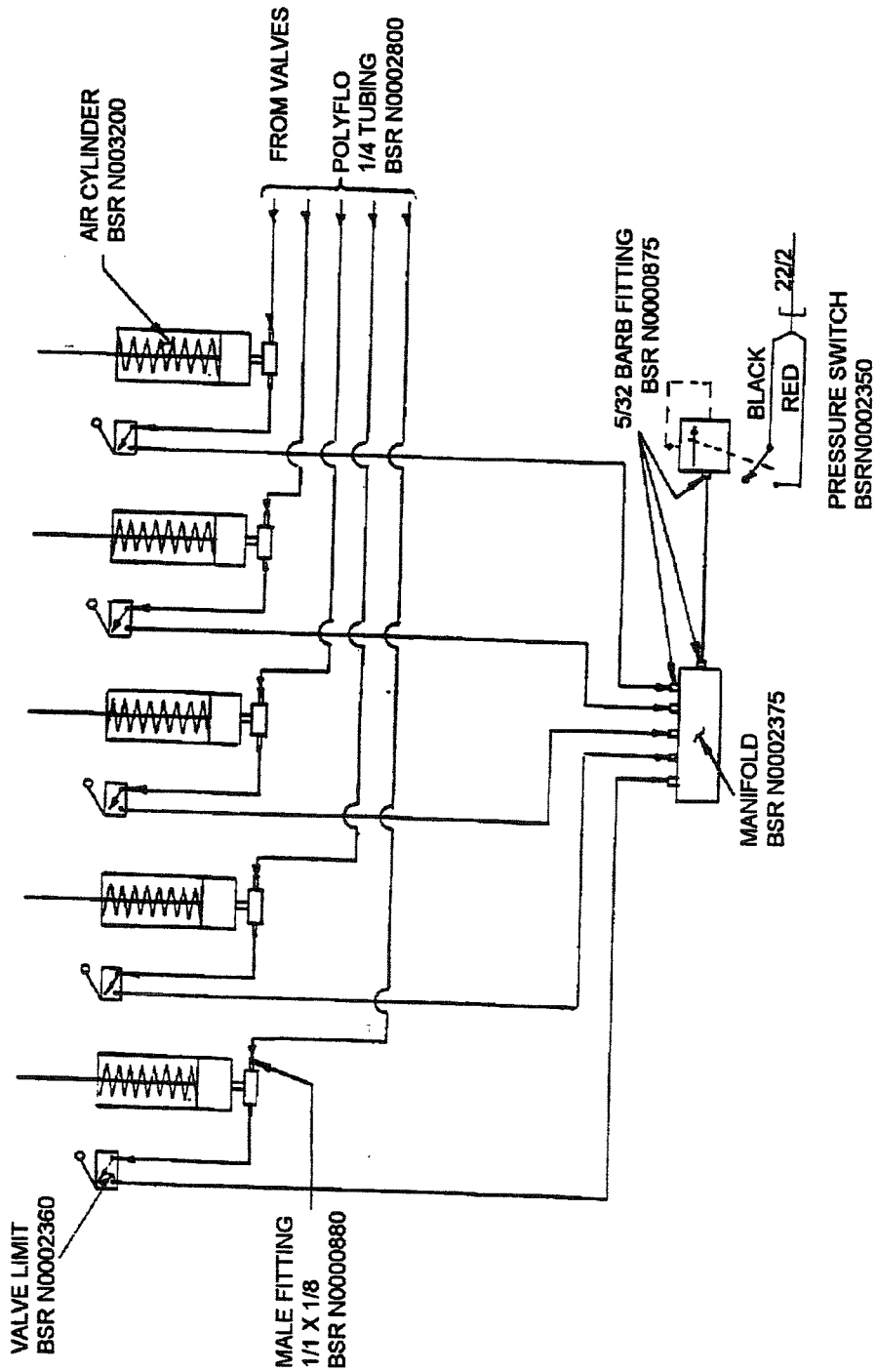


TITLE
WHAC A MOLE HOUSING ASSEMBLY
NEW DESIGN



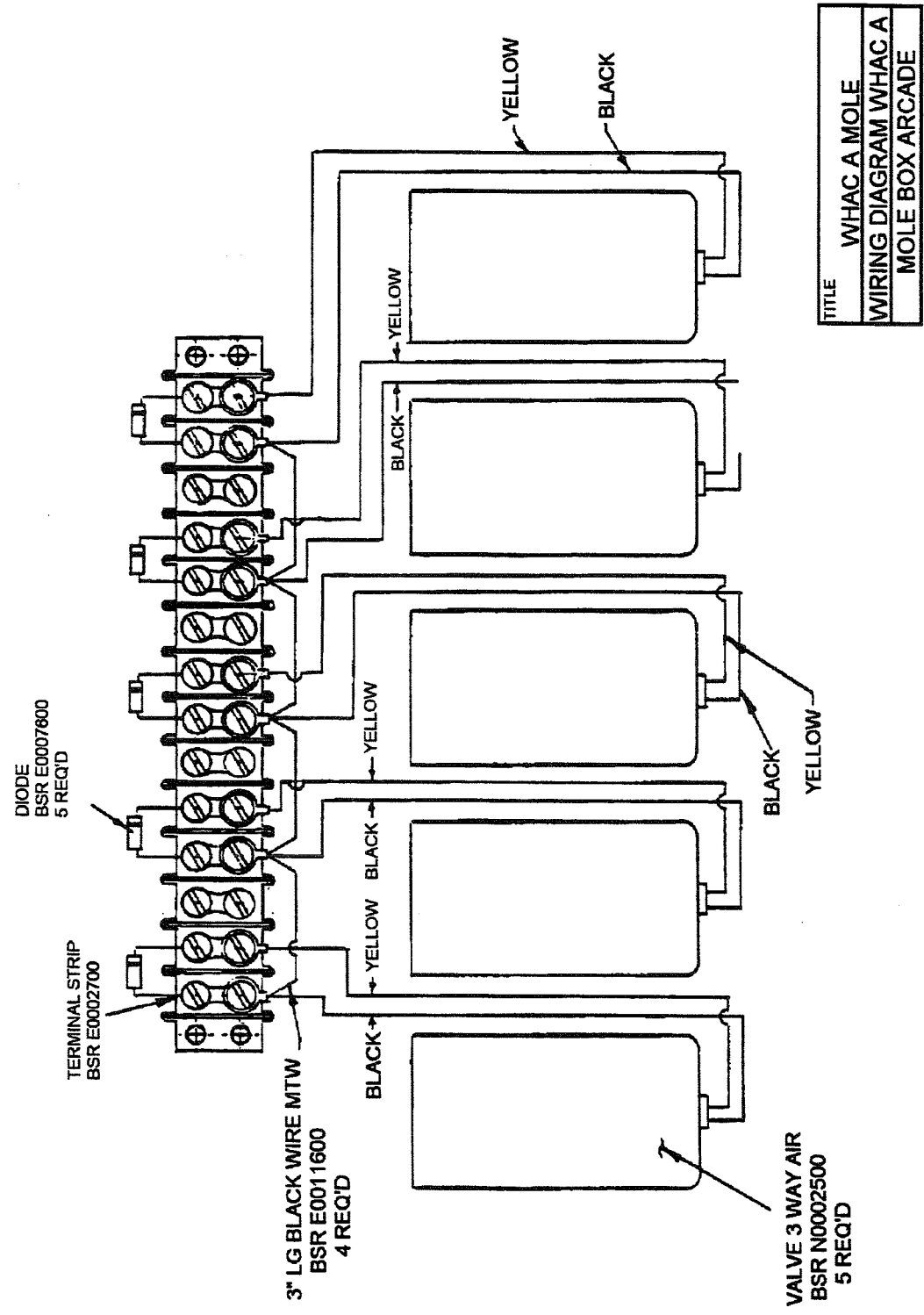
WHAC A MOLE HOUSING ASSEMBLY
BOTTOM VIEW

TITLE
WHAC A MOLE HOUSING ASSEMBLY NEW DESIGN



NOTE:
ALL TUBING 5/32 NYLON BSR N0002750
UNLESS OTHERWISE SPECIFIED

TITLE
WHAC A MOLE PNEUMATIC SCHEMATIC



TITLE
WHAC A MOLE
WIRING DIAGRAM WHAC A
MOLE BOX ARCADE

TROUBLESHOOTING - Mole Boxes

<u>PROBLEM/CAUSE</u>	<u>FIX</u>
<u>Wires on Score Switches Breaking</u>	
No Strain Relief	Use terminals with strain relief and secure wire to side of switch.
<u>Heads Do Not Remain Up Long Enough</u>	
Bad Valve or Cylinder	Move air hose from good valve to bad head and visa versa to determine if either the valve or cylinder are bad.
<u>One Head Will Not Score</u>	
Bad Switch or Kinked Air Line	Check for air out of Head Switch when it is depressed.
<u>Game Scores On Its' Own</u>	
Shorted Wire or Bad Switch	Check for short on Score Wire or Terminal Strip. If it's a Bad Switch, replace.
Pressure Set Too High	Adjust pressure to 20 p.s.i.
<u>One Head Stays Up Continuously</u>	
Valve Stuck Open	Check for short circuit in one of the valves that makes the heads pop up.

TROUBLESHOOTING - Mole Boxes

<u>PROBLEM/CAUSE</u>	FIX
<u>Only One Head Pops Up</u>	
Bad Relay	Check Relay Board under the countertop; a Relay may be stuck on.
<u>Air Switches Breaking</u>	
Screws That Hold Switch In Place Too Tight; No Rubber Gasket	Adjust switch so when mole head is down there still is a little movement left in the Switch. Make sure you use rubber gaskets.
<u>One Head Will Not Come Up</u>	
No Power On Terminal Block	Check voltage on terminal block. If no voltage, swap wires from bad solenoid with a good solenoid. Could also be a bad trace on relay boards.
Power at Relay Board Okay, but head still will not come up.	Bad valve or cylinder. Pull air line out of the cylinder to see if any air comes out of the line. If it has air - bad cylinder, no air - bad valve.

BOB'S SPACE RACERS®

WHAC-A-MOLE® ARCADE

N O T E S

PROBLEM/CAUSE

FIX

Should you encounter a particular problem not covered in this or any other Troubleshooting Section of your Owners Manual, please contact the Technical Support Staff at BOB'S SPACE RACERS® by telephoning them at (386) 677-0761, or by FAX at (386) 677-0794.

PARTS LIST

<u>PART #</u>	<u>DESCRIPTION</u>
CX003000	Tabletop - planed, unplaned
E0003800	Relay, 12VDC, KHAU-17D12
E0004300	Solid State Relay AC Rssd 10 Amp
E0013400	Switch, Micro, Whac-A-Mole® 516 (Before '91)
E0013750	Bottom Microswitch WAC
E0013950	Switch, Pattie Cakes®, White
E0013950-Amb	Switch, Pattie Cakes®, Amber
E0013950-B1	Switch, Pattie Cakes®, Blue
E0013950-Grn	Switch, Pattie Cakes®, Green
E0013950-Red	Switch, Pattie Cakes®, Red
E0013950-Yel	Switch, Pattie Cakes®, Yellow
E0020200	Ticket Dispenser, PC Board
E0020300	Ticket Dispenser
E0024100	Fuse, 10AMP
E0022670	12V, 7.5 Amp Power Supply (<u>Requires</u> Power Supply Cover E0022671)
E0022710	12V, 15 Amp Power Supply
E0025100	Meter 12VDC Eaton-Durant
E0028800	Bulb, 10S11N Whac-A-Mole®
E0029100	Bulb, 1195 for Beacon
E0029105	Bulb, Blue, Beacon 14V-27W-1A
E0029785-60	Rope Light WAC Insert Short
E0029785-66	Rope Light WAC Insert Long
E0030500	Beacon, 12V Amber
E0030630	Beacon, Blue, 12V Low Profile
H0001200	#14 Finish Washer, Whac Top
H0015050	1/4"x20x2" Tabletop Allen Screw
M0005300	CRC Spray
M0010500	Lubriplate Tube
M0010900	Screwlox, Driver #2
M0010910	T-Handle Allen Wrench 5/32
MX010000	Mole w/Shaft Assembly (Adult)
MX010100	Hammer, Whac-A-Mole® Assembly
MX010150	Hammer, Kiddie Whac-A-Mole® Assembly
N0002350	Switch, Air-to-Electric
N0002360	Switch, Air Under Head (after '91)
N0002500	Valve, 3-Way Air WAM (Adult)
N0002650	Manifold - Kiddie 3 Head
N0002700	FRL-1/2 Filter Regulator Lubricator
N0003200	Air Cylinder WAM 2 x 1-1/4
N0002400	Manifold (Adult)

APPENDICES

COIN MECHANISM



OVERVIEW

In all of our Arcade Games, we use a Coin Mechanisms, Inc., brand of coin mechanism, unless a different unit is requested by the customer.

Mechanical (Standard) Coin Mechanisms

When a Player inserts a coin or token, it travels through a chute to the Coin Mechanism. The coin travels down onto a weighted lever that slows the coin down and flips it over in front of a magnet.

If the coin used is too light, it will get stuck on the weighted lever. If it is too heavy, the coin will be shot straight past the magnet and out the Coin Return Slot.

As the coin passes the magnet, the magnetic field slows the coin down enough to change its path and pass the coin by the Coin Switch.

The Coin Mechanisms are replaceable and are available for a variety of coin sizes and tokens.

Coin Comparitor (Electronic Mechanisms)

Also available is an Electronic Coin Comparitor that is used if you need high security or have an unusual token or coin size.

The Coin Comparitor uses a good coin to "compare" the coin to the one being inserted. A coin must first pass the "comparing" circuit and register as a good coin, then travel past both optical sensors, in the correct direction, within a pre-determined time. If a coin is passed by the optical Sensor backwards, as if on a string, the Comparitor will detect it and cause an "inhibit". The Inhibit will cause a complete rejection of any coin, good or bad, for 16 seconds. After that time, the unit resets itself.

COMPRESSORS

BSR MEDIUM COMPRESSOR

Read carefully before attempting to assemble, install, operate, or maintain the BSR Air Compressor. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage!

When unpacking the unit, inspect carefully for any damage that may have occurred during transit. Make sure any loose fittings, bolts, etc., are tightened before putting unit into service.

GENERAL INFORMATION

The air compressor is a fairly basic, but very important, piece of equipment. Make certain you understand this information before any adjustments are made on the machine.

Electricity comes to the motor from the plug in the wall through the pressure switch. As long as the pre-set pressure is not developed in the holding tank, the motor will run. When the proper pressure is developed, the pressure switch turns off, turning off the motor.

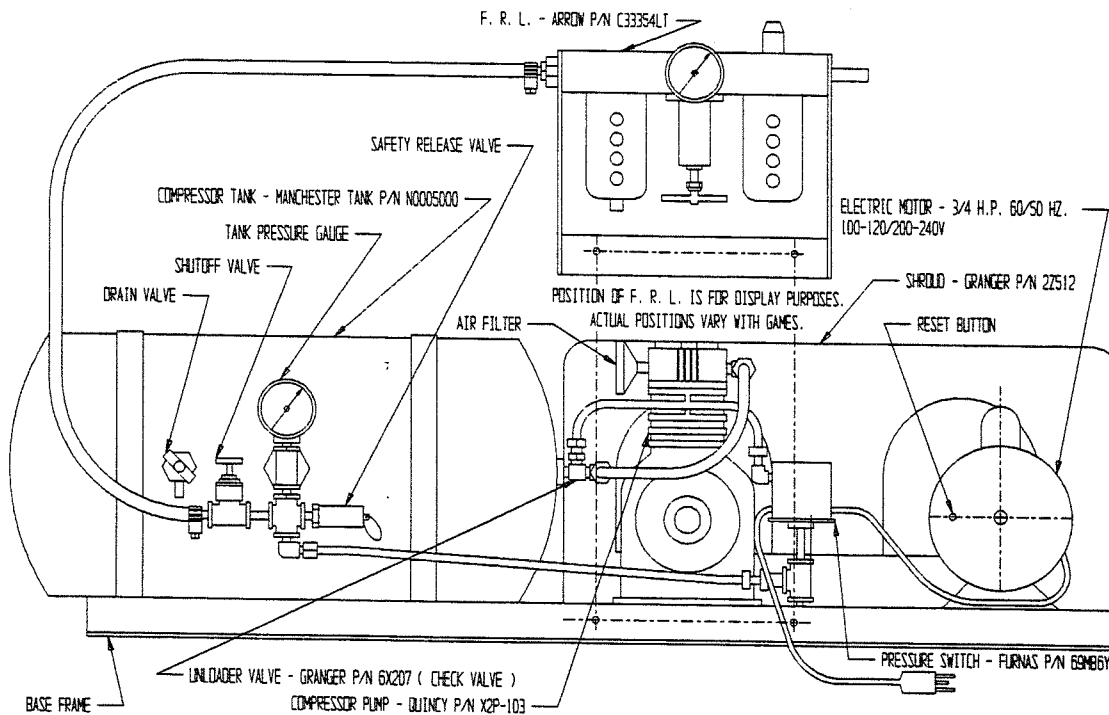
When the pressure switch shuts off, a small lever on the side of it pushes on the needle valve bolted to the side of the pressure switch. When this happens, all the air between the compressor head and the check valve escapes through the needle valve. The reason that the holding tank shouldn't empty through the needle valve while its open is the check valve. The check valve allows air to go in the holding tank but won't let air come out of the holding tank. The reason that the needle valve lets the air out of the compressor head is so that when the motor turns on again, there won't be pressure on the compressor head, stopping the electric motor from spinning around. After the motor starts, the lever comes off of the needle valve. Pressure can now develop in the compressor head. This pressure will go through the check valve into the holding tank.

On the side of the holding tank is a pipe fitting. On this fitting is a pressure gauge, safety valve, and drain valve. The Pressure Gauge shows you how much pressure is remaining in the holding tank. The safety valve has a small metal ring on it. If you pull out on this ring, air drains from the holding tank. The most important reason it is there is that if an unsafe amount of pressure develops in the holding tank, this valve drains off the excess pressure so the holding tank doesn't overfill and cause a serious explosion. **NEVER REPLACE THE SAFETY VALVE WITH A PLUG!**

The drain valve is for an easy method of draining the holding tank and removing water from the holding tank. Water develops in the holding tank from condensation. For your compressor to function well, the holding tank needs to be drained regularly (about once a week).

There is a pushbutton on the back of the compressor motor. This button resets the motor, should it overheat. On newer models, there is no Reset Button; instead there is an "auto" reset when the temperature of the motor cools down.

The air then goes from the compressor (or house supply) to the F.R.L. (Filter, Regulator, Lubricator) and manifold assembly. The filter collects any water that is in the air and deposits it in the first glass bowl. This should be drained routinely by means of the petcock on the bottom of the bowl. The regulator then allows only a preset amount of air pressure into the manifold. The lubricator automatically puts oil into the air to keep all valves and cylinders in good working condition. The lubricator bowl should always be kept full with 10 weight, non-detergent oil.



BSR COMPRESSOR FOR 3 OR MORE UNITS

GENERAL SAFETY INFORMATION

! WARNING !

ALL ELECTRICAL WORK SHOULD BE DONE BY A QUALIFIED (LICENSED OR CERTIFIED) ELECTRICIAN. ON A PROPERTY WIRED CIRCUIT, THE BLACK WIRES CARRY CURRENT.

1. Read instruction manuals for each component carefully, before attempting to assemble, disassemble or operate your particular system.
2. Do not exceed pressure rating of any component in system.
3. Protect material lines and air lines from damage or puncture. Keep hose and power cable away from sharp objects, chemical spills, oil, solvents, and wet floors.
4. Never point a spray gun at oneself or any other person. Accidental discharge may result in serious injury.
5. Check hoses for weak or worn condition, before each use, making certain all connections are secure; do not use if deficiency is found.
6. Release all pressures within system slowly; dust and debris may be harmful.

! WARNING !

DISCONNECT POWER AND DEPRESSURIZE SYSTEM BEFORE SERVICING AIR COMPRESSOR! (TURN PRESSURE REGULATOR KNOB FULLY CLOCKWISE AFTER SHUTTING OFF COMPRESSOR.)

7. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
8. Wiring and fuses should follow electrical codes, current capacity, and be properly grounded.
9. Electric motors must be securely and adequately grounded. See grounding instruction in this manual.
10. Always disconnect power source before working on or near a motor, or its connected load.

11. Guard all moving parts; keep visitors away. Never allow children in work areas.
12. Use only a properly grounded outlet that will accept a three pronged plug, and wear shoes to prevent shock hazards.
13. Be careful when touching exterior or operating motor; it may be hot enough to cause injury.
14. Protect power cable from coming in contact with sharp objects.
15. Clean electrical or electronic equipment with an approved cleaning agent, such as dry, nonflammable cleaning solvent.
16. To avoid spontaneous combustion, discard waste rags into approved metal waste cans.
17. Never store flammable liquids or gases in vicinity of compressor.
18. When spraying with solvent or toxic chemicals, follow instructions provided by the chemical manufacturer.
19. NEVER reset safety valve or pressure switch. Keep safety valve free from paint and other accumulations. This provides safety against overpressure.
20. Do regular maintenance; keep all nuts, bolts, and screws tight, to be sure equipment is in safe working condition.

MAINTENANCE

Daily

1. Check oil (for compressor, use 30 weight non-detergent; for lubricator [if supplied], use 10 weight non-detergent).
2. Check dryer and drain, if necessary.

Weekly

1. Drain Air Tank.
2. Clean cooling surfaces of compressor.

Monthly

1. Operate safety valves on compressor or tank.
2. Replace or clean air filter.
3. Check belt tension on compressor.
4. Check pulley clamp bolt and set screws.
5. Inspect air lines, rubber, and PVC.

Semi-Annually

1. Inspect valve assemblies.
2. Check pressure hoses from compressor to tank.
3. Check discharge line for carbon build-up.
4. Check contact points in pressure switch.

WIRING

1. Local electrical wiring codes differ from area to area. Source wiring, plug and protector must be rated for at least the amperage and voltage indicated on motor nameplate, and meet all electrical codes for this minimum.
2. Use a slow blow fuse type T or a circuit breaker.

CAUTION: Overheating, short circuiting and fire damage will result from inadequate wiring, etc.

NOTE: 115 volt, 15 amp units can be operated on a 115 volt, 15 amp circuit under the following conditions:

- a. No other electrical appliances or lights are connected to the same branch circuit.
 - b. Voltage supply is normal.
 - c. Extension cords are of the minimum gauge specified in this instruction manual.
 - d. Circuit is equipped with a 15 amp circuit breaker or a 15 amp slow blow fuse.
3. If above conditions cannot be met or if nuisance tripping of current protection device occurs, it may be necessary to operate compressor from a 115 volt, 20 amp circuit.

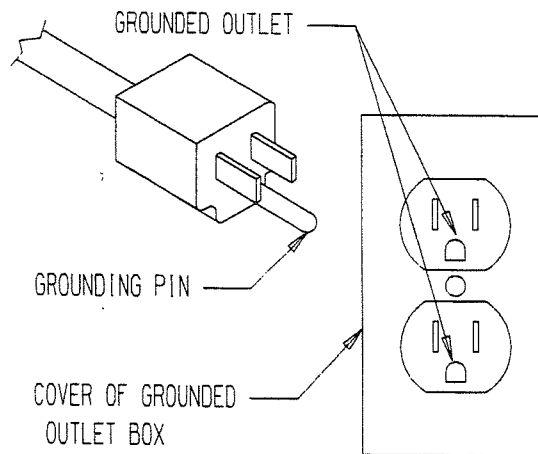
GROUNDING INSTRUCTION

1. The compressor should be grounded. In the event of an electrical short circuit, grounding reduces risk of electrical shock by providing an escape wire for electric current. The compressor is equipped with a cord having a grounding wire with an appropriate grounding plug. Plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances. **NOTE:** Do not use grounding adapter.

*** DANGER ***

IMPROPER USE OF GROUNDING PLUG CAN RESULT IN A RISK OF ELECTRICAL SHOCK!

2. If repair or replacement of cord or plug is necessary, do not connect grounding wire to either flat blade terminal. The wire with insulation having an outlet surface that is green, with or without yellow stripes, is the grounding wire.
3. Check with a qualified electrician or serviceman if grounding instructions are not completely understood, or if in doubt as to whether product is properly grounded. Do not modify plug provided; if it will not fit outlet, have proper outlet installed by a qualified electrician.



GROUNDING METHOD

*** WARNING ***

NEVER CONNECT GREEN (OR GREEN & YELLOW) WIRE TO A LIVE TERMINAL!

TROUBLESHOOTING

<u>PROBLEM/CAUSE</u>	<u>SUGGESTED FIX</u>
<u>Air Leaking</u>	
Loose Fittings	Check fittings for leaks. If leaks are at fittings, drain tank. Then disconnect fitting and reconnect properly.
Needle Valve (While Running)	Check needle valve for leak. If needle valve is leaking while the game is running, then unplug the compressor. Remove needle valve with wrench. Clean out needle valve (with hot soapy water). Spray light lubricant into needle valve (WD-40). Replace. If problem continues, replace with new needle valve.
Needle Valve (While Shut Off)	If needle valve starts leaking when the compressor shuts off, the problem is the check valve (NOT NEEDLE VALVE). Unplug compressor and drain tank. Remove check valve with wrench. Carefully take apart check valve. Clean with hot soapy water. Spray light lubricant on parts (WD-40), then re-assemble valve. Replace check valve. If problem continues, replace check valve with a new one.
<u>Runs Continuously</u>	
Pressure Switch	If unit runs continuously, and there isn't a constant leak, your pressure switch needs adjusted or replaced.

TROUBLESHOOTING - Continued

<u>PROBLEM/CAUSE</u>	<u>SUGGESTED FIX</u>
<u>Compressor Won't Start</u>	
Pressure Switch	See "Runs Continuously", page C3.
Circuit Breaker	Check breaker box (fuse box) or Fuse for blown breaker/fuse. Correct problem.
Thermal Breaker On Compressor	This is a push button switch on the back of the electric motor that turns on the compressor. Just push in on the button to reset the motor. Some motors are painted and have the switch painted too. In order to push in these buttons (since they were painted over), use the butt side of a screwdriver handle and rap the button relatively hard to get it to reset.
Needle Valve	If the needle valve doesn't remove back pressure properly, then the motor won't be able to turn over the compressor. It may even cause smoke. If the needle valve is the problem, treat it the same as if the problem were air leaking and the cause was needle valve while running.
<u>No Air Pressure</u>	
Line Kinked; Compressor Not On	Check air line for kinks; Check Power.

N O T E S

PROBLEM/CAUSE

SUGGESTED FIX

Should you encounter a particular problem not covered in this or any other Troubleshooting Section of your Owners Manual, please contact the Technical Support Staff at **BOB'S SPACE RACERS** by telephoning them at (386) 677-0761, or by FAX at (386) 677-0794.

LIGHTING

LIGHTING OVERVIEW

Flashers and Bally Lights

An Option on many BSR games is Running Lights. Each game will have a Flasher Unit, multiple Light Tracks and Overhead Mounting Braces. Currently, we use a Four Pole Flasher Unit, 33-C4, but in the past we have used a Three Pole Unit, 33-C3.

Each of the poles attach to a certain amount of sockets on the Light Bars. As the Motor turns, the Cam that is attached to the Motor Shaft will open and close the contacts, turning the lights ON and OFF.

After years of use, you may experience a problem where only a couple sets of lights are working. Usually a good cleaning of the contacts cures this problem. If not, replace the contact posts.

The model number of the Flasher is on a decal on the Flasher. When ordering parts, we will need this number to determine what contacts you need. If you don't know or cannot locate the number, count how many contacts the Flasher has (3 or 4) and whether the contacts are in a row (like fingers on a hand) or a circular pattern.

After awhile, the contact posts may need to be adjusted. To do this, simply turn the Cam so as the middle of the gear is under the contact wheel. The teeth of the gear should be on either side of the contact wheel. Loosen the nut on the contactor post. Using a screwdriver, lower the contactor by tightening the screw adjustment. The contact pads should be approximately 1/16" to 3/16" max. gap apart. If they touch, the light will be on all the time. After the contactor arm has been adjusted to the proper position, replace the nut and tighten. NOTE: Flashers should only be mounted on 3 corners (not 4) so as to prevent binding.

Fluorescent Lighting

Fluorescent Lighting is used on some Arcade games to light certain portions of the game. The fixtures are standard lighting fixtures that can be sourced from a local hardware store or building supply. Most of the fixtures use replaceable ballasts that can also be obtained from local stores or ordered from Bob's Space Racers®.

Miscellaneous Fixtures

A 25 Watt Rough Service bulb is used behind the Target Pans in Water Games to illuminate the target area. A Rough Service bulb is used due to the adverse location of the bulb.

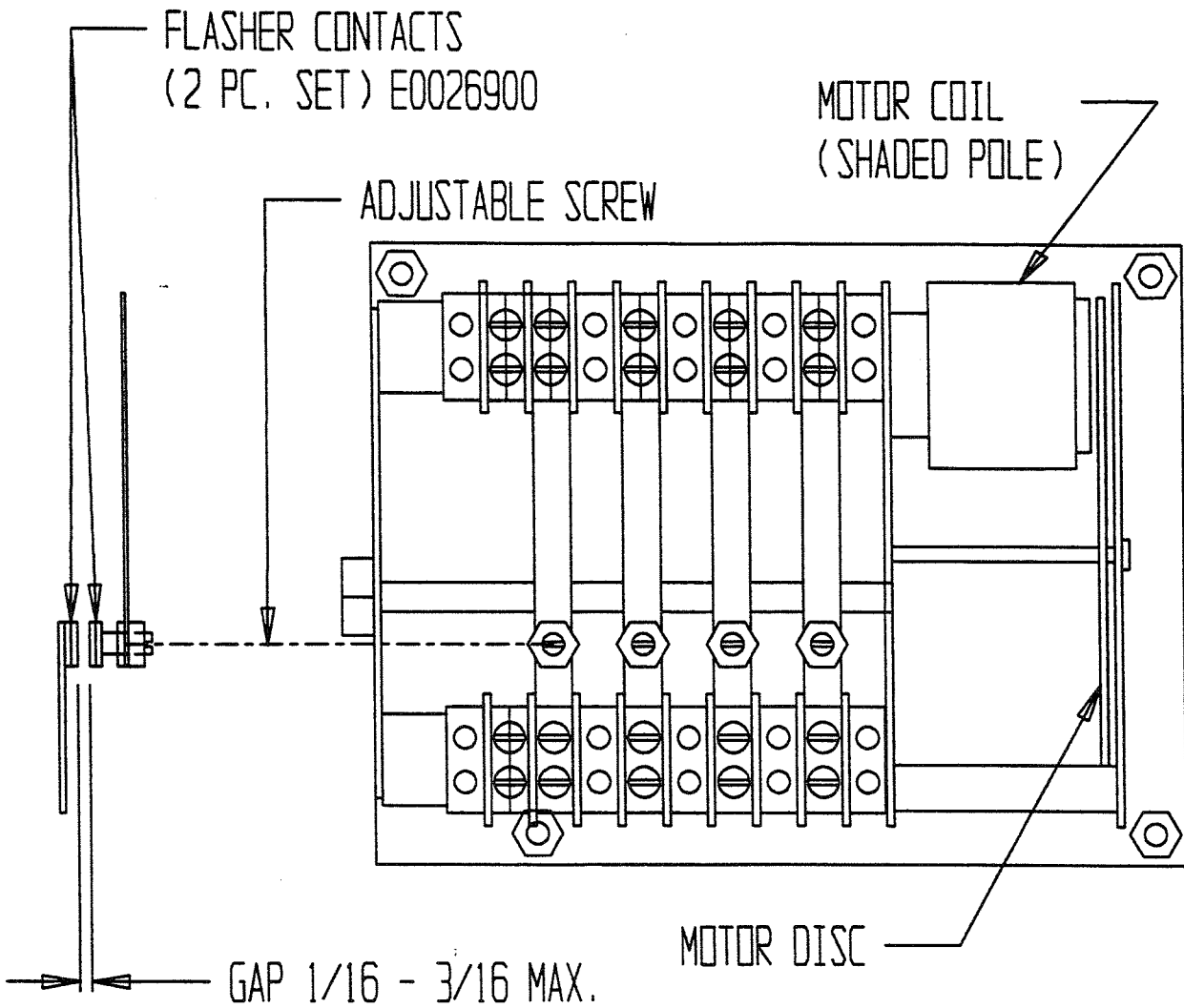
On games with Win Globes, a standard 40 Watt bulb is used for the Win and Running Lights.

NEON LIGHTING OVERVIEW

Games with neon lighting require special care. Caution should be exercised, there is approximately 3,000 volts AC on the output of the neon transformer.

If one tube or one whole color of neon lights go out, unplug the transformer for that entire color. The transformer poses a fire hazard without **ALL** the tubes of a particular color being lit. The unlit tube draws more current and can overheat the transformer.

If you are experiencing any problems at all with your neon lights, unplug the transformer. Consult your **LIGHTING** Troubleshooting Guide or call Bob's Space Racers, Technical Support.



33C4 FLASHER UNIT E0026500

TROUBLESHOOTING

<u>PROBLEM/CAUSE</u>	<u>SUGGESTED FIX</u>
<u>Overhead Lights Don't Work at All</u>	
No Connection	Check Amp connector and all Molex plugs for each track of lights for a secure fit.
No 110VAC Supply	Check voltage at the Motor. If no voltage, follow wiring back to 4x4 Box and check the fuse and/or wiring inside. If you have 110VAC at the Motor and it still doesn't work, it's probably a bad Motor.
Bad Motor	Replace Flasher Unit, if necessary.
<u>Some Lights Don't Work</u>	
Bad Connection	Check bulbs to make certain there is a secure fit into socket.
Contacts Misaligned or Dirty	Check Flasher contacts inside the Flasher Unit. CAUTION: 110VAC - Unplug the game power. Carefully clean each contact with contact cleaner and realign contact posts, if necessary, to it's mating contact.
	DO NOT sand contacts! Check MAX gap between contacts 1/16 = 3/16 inch.
Bad Bulb	Swap bulb with a known good one and replace, if necessary.

TROUBLESHOOTING - Continued

<u>PROBLEM/CAUSE</u>	<u>SUGGESTED FIX</u>
<u>Some Lights Do Not Work</u> (continued)	
Bad Socket	Retwist light socket connection and replace socket, if necessary.
<u>Fluorescent Lights Will Not Light</u>	
Bad Light	Change light.
Bad Ground	Make sure fixture has an earth ground properly connected (<u>very important!</u>)
Bad Ballast	Replace ballast.
<u>Fluorescent Lights Will Not Light Until You Are Right Next to Them</u>	
Bad Ground	Make sure fixture is properly grounded and check the Ground on the game.

TROUBLESHOOTING - Continued

PROBLEM/CAUSE

SUGGESTED FIX

NEON TROUBLESHOOTING

Neon is on but doesn't flash.

Bad output from Controller Board

Check output LEDs for proper sequencing. If not flashing. Replace Controller Board.

Controller Board LED's Flashing but not neon

Check for proper signal to neon transformer (should go from ≈ 0 to 12V DC when LED flashes). Trace wire if no signal.

Neon doesn't light at all.

Transformer or tube bad

Check for 12V DC at the transformer. If 12V DC is present, disconnect transformer. Replace or swap with working transformer to check if bulb is bad or transformer is bad.

One tube or one color doesn't work

Replace or swap transformer with working transformer. If one tube still doesn't light, unplug transformer and replace tube.

N O T E S

PROBLEM/CAUSE

SUGGESTED FIX

Should you encounter a particular problem not covered in this or any other Troubleshooting Section of your Owners Manual, please contact the Technical Support Staff at **BOB'S SPACE RACERS** by telephoning them at (386) 677-0761, or by FAX at (386) 677-0794.

FLASHERS AND BALLY LIGHTS

Parts List

<u>Part Number</u>	<u>Description</u>
E0026400	33C3 Flasher Unit
E0026500	33C4 Flasher Unit
E0026600	66C3 Flasher Unit
E0026700	66C4 Flasher Unit
E0026800	66C Flasher Contacts/Pair
E0026900	33C Flasher Contacts/Pair
E0028140	Bulb G.E. 15T6/145V
E0028200	Bulb Floodlight White 150 Watt
E0028700	Bulb R.L. 11S14-BL/TG/TO/TR/TY
E0028710	Bulb R.L. Sival 11S14-BL/GN/RD/YE
E0028720	Bulb R.L. Case Lot 11S14, Colored
E0028723	Bulb R.L. Case Lot 11S14, Clear
E0028730	Bulb R.L. Case Lot Sival 11S14
E0028800	Bulb 10S11N Whac-A-Mole
E0028810	Bulb 10S11N Whac-A-Mole Sobyco
E0029130	Fluorescent Tube 18", 15 Watt
E0029390	Fixture, 18", 15 Watt

MATERIAL SAFETY DATA

DESCRIPTION AND EXPLANATION OF TERMS
MATERIAL SAFETY DATA SHEETS
EXXON COMPANY, U.S.A.

The following information is intended to assist the reader in understanding the format and the material included in Exxon's Material Safety Data Sheets (MSDS).

A. IDENTIFICATION AND EMERGENCY INFORMATION

This section includes the product name and category. Additional information about components and CAS numbers is shown in Section B. The "Product Code" is Exxon's internal product identification number. "Product Appearance and Odor" includes a physical description of the product.

MEDICAL EMERGENCY TELEPHONE NUMBER - Exxon's 24-hour telephone number is intended only for medical-related emergencies. After normal business hours the caller should leave a short description of the emergency and the call back number. The Exxon medical staff person on duty will respond as soon as possible, normally within a few minutes. Routine MSDS questions should be directed to Marketing Technical Services (713) 656-5949 during normal business hours.

B. COMPONENTS AND HAZARD INFORMATION

COMPONENTS - The chemical or common names of the major constituents are listed along with names of any ingredients believed to be health or physical hazards and which are present in the product at a concentration of 1% or more. Health effects and presence of carcinogens (at 0.1% or greater) are discussed in Section E. The major constituents of most petroleum products are refined petroleum fractions as defined in the Inventory of Chemical Substances under the Toxic Substances Control Act. A statement of U.S. TSCA inventory listing of components may be found in this section.

CAS NUMBERS OF COMPONENTS - These are the Chemical Abstracts Service Registry Numbers (CAS identification numbers) which are assigned to individual component chemicals by the Chemical Abstracts Service, when applicable. Some ingredients, particularly additives, are complex mixtures to which single CAS numbers may not apply or for which detailed composition information may not be available.

APPROXIMATE CONCENTRATION - This is the approximate concentration of the component(s) in the product. In some cases, particularly where details are proprietary, the total amount of several components is shown.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS) - These recommendations are for those organizations utilizing this system.

EXPOSURE LIMIT FOR TOTAL PRODUCT - The Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL), the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), or Exxon's recommended Occupational Exposure Limit (OEL) is shown. In some cases where carcinogens are present, a recommended limit has not been established. For vapors, exposure limits are expressed in parts per million (ppm) and in milligrams per

cubic meter (mg/m³) of vapor in air. For mists and fumes the limit is given in mg/m³. As noted in the preface to published values adopted by the ACGIH, TLVs represent "conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect. Because of wide variation in individual susceptibility, however, a small percentage of workers may experience discomfort from some substances at concentrations at or below the threshold limit; a smaller percentage may be affected more seriously by aggravation of a preexisting condition or by development of an occupational illness".

C. PRIMARY ROUTES OF ENTRY AND EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT - SKIN - INHALATION - INGESTION - These are primary routes of entry along with recommended emergency and first aid procedures if an individual is overexposed to the product.

D. FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (MINIMUM) - This is the temperature at which a liquid or solid gives off enough flammable vapors, under conditions of the test, that a source of ignition can ignite the vapor. The American Society for Testing and Materials (ASTM) test method is also given.

AUTOIGNITION TEMPERATURE - This is the temperature at which a liquid or solid may ignite spontaneously without the presence of a spark or other source of ignition. Tests for autoignition temperature are not routinely performed, so approximate or "greater than" values may be shown.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) System - These recommendations are included for those organizations utilizing this system.

HANDLING PRECAUTIONS - These provide guidance for use of product around sources of ignition.

FLAMMABLE OR EXPLOSIVE LIMITS - These are the range of vapor concentrations in air that may ignite or explode if an ignition source is present; approximate or estimated values are shown.

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES - These include information recommended by the National Fire Protection Association.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS - These are by-products of burning.

EMPTY PRODUCT CONTAINER WARNING - This is an important warning about potential hazards associated with "empty" product containers.

E. HEALTH AND HAZARD INFORMATION - This information refers to the most common biological effects that could be anticipated from a direct overexposure to or contact with the product.

F. PHYSICAL DATA - Physical and chemical characteristics of the product are presented in this section. The data are approximate or are typical values and should not be used for precise design purposes.

G. REACTIVITY - This is the general chemical stability of the product and some examples of conditions that should be avoided to prevent an

unwanted reaction.

- H. ENVIRONMENTAL INFORMATION - This is information on product composition and characteristics which may be required to be submitted under a variety of local, state and federal regulations.
- I. PROTECTION AND PRECAUTIONS - These are generally applicable precautions recommended for the safe handling and use of the product, including appropriate engineering controls, work practices, protective equipment, and personal hygiene practices.
- J. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION - This is emergency response information pertaining to transportation-related spills. In addition, a Department of Transportation (DOT) Identification Number has been assigned for reference, if applicable. This section also contains the hazard language that would be incorporated onto the label, bill of lading or shipping papers.

ADDENDUM - This includes a disclaimer, along with contacts and telephone numbers for additional information, if needed.

EXXON COMPANY, U.S.A.
A DIVISION OF EXXON CORPORATION

DATE ISSUED: 09/26/94
SUPERSEDES DATE: 09/15/93

MATERIAL SAFETY DATA SHEET

EXXON COMPANY, U.S.A. P.O. BOX 2180 HOUSTON, TX 77252-2180

A. IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME
TERESSTIC 68

PRODUCT CODE
376010 - 01176

PRODUCT CATEGORY
Petroleum Lubricating Oil

PRODUCT APPEARANCE AND ODOR
Clear liquid, light orange color
Faint petroleum hydrocarbon odor

MEDICAL EMERGENCY TELEPHONE NUMBER
(713) 656-3424

B. COMPONENTS AND HAZARD INFORMATION

COMPONENTS	CAS NO. OF COMPONENTS	APPROXIMATE CONCENTRATION
Distillates (petroleum), hydrotreated heavy paraffinic	64742-54-7	Greater than 99%
or Distillates (petroleum), solvent-dewaxed heavy paraffinic	64742-65-0	
Proprietary additives	Mixture	Less than 1%

All components of this product are listed on the U.S. TSCA inventory.

See Section E for Health and Hazard Information.

See Section H for additional Environmental Information.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

Health Flammability Reactivity

1 1 0

BASIS

Recommended by Exxon

EXPOSURE LIMIT FOR TOTAL PRODUCT
5 mg/m³ for oil mist (aerosol) for an 8-hour workday

BASIS

OSHA Regulation 29 CFR 1910.1000 and recommended by the American Conference of Governmental Industrial Hygienists (ACGIH). ACGIH states that the air is to be sampled by a method that does not collect vapor; in addition, it lists a 10 mg/m³ STEL.

C. PRIMARY ROUTES OF ENTRY AND EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT

If splashed into the eyes, flush with clear water for 15 minutes or until irritation subsides. If irritation persists, call a physician.

SKIN

In case of skin contact, remove any contaminated clothing and wash skin with soap and water. Launder or dry-clean clothing before reuse. If product is

injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

INHALATION

Vapor pressure is very low. Vapor inhalation under ambient conditions is normally not a problem. If overcome by vapor from hot product, immediately remove from exposure and call a physician. If breathing is irregular or has stopped, start resuscitation; administer oxygen, if available. If overexposed to oil mist, remove from further exposure until excessive oil mist condition subsides.

INGESTION

If ingested, DO NOT induce vomiting; call a physician immediately.

D. FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (MINIMUM)

220°C (428°F)
ASTM D 92, Cleveland Open Cup

AUTOIGNITION TEMPERATURE

Greater than 260°C (500°F)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION

Health	Flammability	Reactivity	BASIS
1	1	0	Recommended by Exxon

HANDLING PRECAUTIONS

Use product with caution around heat, sparks, pilot lights, static electricity, and open flame.

FLAMMABLE OR EXPLOSIVE LIMITS (APPROXIMATE PERCENT BY VOLUME IN AIR)

Estimated values: Lower Flammable Limit 0.9% Upper Flammable Limit 7%

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES

Foam, water spray (fog), dry chemical, carbon dioxide and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires involving this type of product, depending on size or potential size of fire and circumstances related to the situation. Plan fire protection and response strategy through consultation with local fire protection authorities or appropriate specialists.

The following procedures for this type of product are based on the recommendations in the National Fire Protection Association's "Fire Protection Guide on Hazardous Materials", Tenth Edition (1991):

Use water spray, dry chemical, foam or carbon dioxide to extinguish the fire. Use water to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to provide protection for men attempting to stop a leak. Water spray may be used to flush spills away from exposures. Minimize breathing of gases, vapor, fumes or decomposition products. Use supplied-air breathing equipment for enclosed or confined spaces or as otherwise needed.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS

Fumes, smoke, carbon monoxide, sulfur oxides, nitrogen oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

"EMPTY" CONTAINER WARNING

"Empty" containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. For work on tanks refer to Occupational Safety and Health Administration regulations, ANSI Z49.1, and other governmental and industrial references pertaining to cleaning, repairing, welding, or other contemplated operations.

E. HEALTH AND HAZARD INFORMATION

VARIABILITY AMONG INDIVIDUALS

Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes should be minimized.

EFFECTS OF OVEREXPOSURE (Signs and symptoms of exposure)

Prolonged or repeated skin contact may cause skin irritation.

NATURE OF HAZARD AND TOXICITY INFORMATION

Repeated and prolonged overexposure to oil mists may result in droplet deposition, oil granuloma formation, inflammation and increased incidence of infection.

In accordance with the current OSHA Hazard Communication Standard criteria, this product does not require a cancer hazard warning. This is because the product is formulated from base stocks which are severely hydrotreated, severely solvent extracted, and/or processed by mild hydrotreatment and extraction. Alternatively, it may consist of components not otherwise affected by IARC criteria, such as atmospheric distillates or synthetically derived materials, and as such is not characterized by current IARC classification criteria.

Prolonged or repeated skin contact with this product tends to remove skin oils, possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Product contacting the eyes may cause eye irritation.

Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

This product is judged to have an acute oral LD50 (rat) greater than 5 g/kg of body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE

None recognized

F. PHYSICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE

IBP Approximately 293°C (560°F)
by ASTM D 2887

VAPOR PRESSURE

Less than 0.01 mm Hg @ 20°C

SPECIFIC GRAVITY (15.6°C/15.6°C)

0.88

VAPOR DENSITY (AIR = 1)

Greater than 5

MOLECULAR WEIGHT

Not determined

PERCENT VOLATILE BY VOLUME

Negligible from open container
in 4 hours @ 38°C (100°F)

pH

Essentially neutral

EVAPORATION RATE @ 1 ATM. AND 25°C

(77°F) (n-BUTYL ACETATE = 1)
Less than 0.01

POUR, CONGEALING OR MELTING POINT

-21°C (-5°F)
Pour Point by ASTM D 97

SOLUBILITY IN WATER @ 1 ATM. AND 25°C (77°F)

Negligible; less than 0.1%

VISCOSITY
65 cSt @ 40°C

G. REACTIVITY

This product is stable and will not react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc., as this presents a serious explosion hazard.

H. ENVIRONMENTAL INFORMATION

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Recover free product. Add sand, earth or other suitable absorbent to spill area. Minimize breathing vapors. Minimize skin contact. Open all windows and doors. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses, or extensive land areas.

Assure conformity with applicable governmental regulations.

THE FOLLOWING INFORMATION MAY BE USEFUL IN COMPLYING WITH VARIOUS STATE AND FEDERAL LAWS AND REGULATIONS UNDER VARIOUS ENVIRONMENTAL STATUTES:

REPORTABLE QUANTITY (RQ), EPA REGULATION 40 CFR 302 (CERCLA Section 102)

This Exxon product contains the RQ substance Ethyl Acrylate and a release of 125,000 pounds of this Exxon product exceeds the CERCLA RQ and must be reported to the National Spill Response Center (1-800-424-8802).

THRESHOLD PLANNING QUANTITY (TPQ), EPA REGULATION 40 CFR 355 (SARA Sections 301-304)

No TPQ for product or any constituent greater than 1% or 0.1% (carcinogen).

TOXIC CHEMICAL RELEASE REPORTING, EPA REGULATION 40 CFR 372 (SARA Section 313)

No toxic chemical is present greater than 1% or 0.1% (carcinogen).

HAZARDOUS CHEMICAL REPORTING, EPA REGULATION 40 CFR 370 (SARA Sections 311-312)

EPA HAZARD CLASSIFICATION CODE:	Acute Hazard	Chronic Hazard	Fire Hazard	Pressure Hazard	Reactive Hazard	Not Applicable XXX
---------------------------------	--------------	----------------	-------------	-----------------	-----------------	-----------------------

I. PROTECTION AND PRECAUTIONS

VENTILATION

Use local exhaust to capture vapor, mists or fumes, if necessary. Provide ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air. No smoking, or use of flame or other ignition sources.

RESPIRATORY PROTECTION

Use supplied-air respiratory protection in confined or enclosed spaces, if needed.

PROTECTIVE GLOVES

Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

EYE PROTECTION

Use splash goggles or face shield when eye contact may occur.

OTHER PROTECTIVE EQUIPMENT

Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular clothing, which could result in prolonged or repeated skin contact.

WORK PRACTICES / ENGINEERING CONTROLS

Keep containers closed when not in use. Do not store near heat, sparks, flame or strong oxidants.

In order to prevent fire or explosion hazards, use appropriate equipment.

Information on electrical equipment appropriate for use with this product may be found in the latest edition of the National Electrical Code (NFPA-70). This document is available from the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

PERSONAL HYGIENE

Minimize breathing vapor, mist or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before re-use. Remove contaminated shoes and thoroughly clean before re-use; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

J. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION**TRANSPORTATION INCIDENT INFORMATION**

For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents.

U.S. DOT HAZARDOUS MATERIALS SHIPPING DESCRIPTION

Not regulated

OSHA REQUIRED LABEL INFORMATION

In compliance with hazard and right-to-know requirements, where applicable OSHA Hazard Warnings may be found on the label, bill of lading or invoice accompanying this shipment.

Note: Product label may contain non-OSHA related information also.

The information and recommendations contained herein are, to the best of Exxon's knowledge and belief, accurate and reliable as of the date issued. Exxon does not warrant or guarantee their accuracy or reliability, and Exxon shall not be liable for any loss or damage arising out of the use thereof.

The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use. If buyer repackages this product, legal counsel should be consulted to insure proper health, safety and other necessary information is included on the container.

The Environmental Information included under Section H hereof as well as the Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) ratings have been included by Exxon Company, U.S.A. in order to provide additional health and hazard classification information. The ratings recommended are based upon the criteria supplied by the developers of these rating systems, together with Exxon's interpretation of the available data.

FOR LUBRICANTS TECHNICAL ASSISTANCE CALL: 1-800-443-9966

FOR FUELS TECHNICAL ASSISTANCE CALL: 713-656-4955

FOR AN MSDS OR ASSISTANCE WITH AN MSDS, DIRECT INQUIRIES TO THE ADDRESS BELOW OR CALL:

TERESSTIC 100

EXXON COMPANY, U.S.A.
A DIVISION OF EXXON CORPORATION

DATE ISSUED: 09/15/93
SUPERSEDES DATE: 11/13/92

MATERIAL SAFETY DATA SHEET

EXXON COMPANY, U.S.A. P.O. BOX 2180 HOUSTON, TX 77252-2180

A. IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME
TERESSTIC 100

PRODUCT CODE
376045 - 01180

PRODUCT CATEGORY
Petroleum Lubricating Oil

PRODUCT APPEARANCE AND ODOR
Clear liquid, light orange color
Faint petroleum hydrocarbon odor

MEDICAL EMERGENCY TELEPHONE NUMBER
(713) 656-3424

B. COMPONENTS AND HAZARD INFORMATION

COMPONENTS	CAS NO. OF COMPONENTS	APPROXIMATE CONCENTRATION
Distillates (petroleum), hydrotreated heavy paraffinic	64742-54-7	Greater than 99%
or	or	
Distillates (petroleum), solvent-dewaxed heavy paraffinic	64742-65-0	
Proprietary additives	Mixture	Less than 1%

All components of this product are listed on the U.S. TSCA inventory.

See Section E for Health and Hazard Information.

See Section H for additional Environmental Information.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

Health	Flammability	Reactivity	BASIS
1	1	0	Recommended by Exxon

EXPOSURE LIMIT FOR TOTAL PRODUCT
5 mg/m³ for oil mist (aerosol) for an 8-hour workday

BASIS
OSHA Regulation 29 CFR 1910.1000 and recommended by the American Conference of Governmental Industrial Hygienists (ACGIH). ACGIH states that the air is to be sampled by a method that does not collect vapor; in addition, it lists a 10 mg/m³ STEL.

C. PRIMARY ROUTES OF ENTRY AND EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT

If splashed into the eyes, flush with clear water for 15 minutes or until irritation subsides. If irritation persists, call a physician.

SKIN

In case of skin contact, remove any contaminated clothing and wash skin with soap and water. Launder or dry-clean clothing before reuse. If product is

injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

INHALATION

Vapor pressure is very low. Vapor inhalation under ambient conditions is normally not a problem. If overcome by vapor from hot product, immediately remove from exposure and call a physician. If breathing is irregular or has stopped, start resuscitation; administer oxygen, if available. If overexposed to oil mist, remove from further exposure until excessive oil mist condition subsides.

INGESTION

If ingested, DO NOT induce vomiting; call a physician immediately.

D. FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (MINIMUM)

244°C (471°F)
ASTM D 92, Cleveland Open Cup

AUTOIGNITION TEMPERATURE

Greater than 260°C (500°F)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION

Health	Flammability	Reactivity	BASIS
1	1	0	Recommended by Exxon

HANDLING PRECAUTIONS

Use product with caution around heat, sparks, pilot lights, static electricity, and open flame.

FLAMMABLE OR EXPLOSIVE LIMITS (APPROXIMATE PERCENT BY VOLUME IN AIR)

Estimated values: Lower Flammable Limit 0.9% Upper Flammable Limit 7%

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES

Foam, water spray (fog), dry chemical, carbon dioxide and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires involving this type of product, depending on size or potential size of fire and circumstances related to the situation. Plan fire protection and response strategy through consultation with local fire protection authorities or appropriate specialists.

The following procedures for this type of product are based on the recommendations in the National Fire Protection Association's "Fire Protection Guide on Hazardous Materials", Tenth Edition (1991):

Use water spray, dry chemical, foam or carbon dioxide to extinguish the fire. Use water to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to provide protection for men attempting to stop a leak. Water spray may be used to flush spills away from exposures. Minimize breathing of gases, vapor, fumes or decomposition products. Use supplied-air breathing equipment for enclosed or confined spaces or as otherwise needed.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS

Fumes, smoke, carbon monoxide, sulfur oxides, nitrogen oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

"EMPTY" CONTAINER WARNING

"Empty" containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. For work on tanks refer to Occupational Safety and Health Administration regulations, ANSI Z49.1, and other governmental and industrial references pertaining to cleaning, repairing, welding, or other contemplated operations.

E. HEALTH AND HAZARD INFORMATION

VARIABILITY AMONG INDIVIDUALS

Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes should be minimized.

EFFECTS OF OVEREXPOSURE (Signs and symptoms of exposure)

Prolonged or repeated skin contact may cause skin irritation.

NATURE OF HAZARD AND TOXICITY INFORMATION

Repeated and prolonged overexposure to oil mists may result in droplet deposition, oil granuloma formation, inflammation and increased incidence of infection.

In accordance with the current OSHA Hazard Communication Standard criteria, this product does not require a cancer hazard warning. This is because the product is formulated from base stocks which are severely hydrotreated, severely solvent extracted, and/or processed by mild hydrotreatment and extraction. Alternatively, it may consist of components not otherwise affected by IARC criteria, such as atmospheric distillates or synthetically derived materials, and as such is not characterized by current IARC classification criteria.

Prolonged or repeated skin contact with this product tends to remove skin oils, possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Product contacting the eyes may cause eye irritation.

Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

This product is judged to have an acute oral LD50 (rat) greater than 5 g/kg of body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE

None recognized

F. PHYSICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE

IBP Approximately 291°C (555°F)
by ASTM D 2887

VAPOR PRESSURE

Less than 0.01 mm Hg @ 20°C

SPECIFIC GRAVITY (15.6°C/15.6°C)

0.89

VAPOR DENSITY (AIR = 1)

Greater than 5

MOLECULAR WEIGHT

Not determined

PERCENT VOLATILE BY VOLUME

Negligible from open container
in 4 hours @ 38°C (100°F)

pH

Essentially neutral

EVAPORATION RATE @ 1 ATM. AND 25°C (77°F) (n-BUTYL ACETATE = 1)

Less than 0.01

POUR, CONGEALING OR MELTING POINT

-18°C (0°F)
Pour Point by ASTM D 97

SOLUBILITY IN WATER @ 1 ATM. AND 25°C (77°F)

Negligible; less than 0.1%

VISCOSITY
105 cSt @ 40°C

G. REACTIVITY

This product is stable and will not react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc., as this presents a serious explosion hazard.

H. ENVIRONMENTAL INFORMATION

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Recover free product. Add sand, earth or other suitable absorbent to spill area. Minimize breathing vapors. Minimize skin contact. Open all windows and doors. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses, or extensive land areas. Assure conformity with applicable governmental regulations.

THE FOLLOWING INFORMATION MAY BE USEFUL IN COMPLYING WITH VARIOUS STATE AND FEDERAL LAWS AND REGULATIONS UNDER VARIOUS ENVIRONMENTAL STATUTES:

REPORTABLE QUANTITY (RQ), EPA REGULATION 40 CFR 302 (CERCLA Section 102)

No RQ for product or any constituent greater than 1% or 0.1% (carcinogen):

THRESHOLD PLANNING QUANTITY (TPQ), EPA REGULATION 40 CFR 355 (SARA Sections 301-304)

No TPQ for product or any constituent greater than 1% or 0.1% (carcinogen).

TOXIC CHEMICAL RELEASE REPORTING, EPA REGULATION 40 CFR 372 (SARA Section 313)

No toxic chemical is present greater than 1% or 0.1% (carcinogen).

HAZARDOUS CHEMICAL REPORTING, EPA REGULATION 40 CFR 370 (SARA Sections 311-312)

EPA HAZARD CLASSIFICATION CODE:	Acute Hazard	Chronic Hazard	Fire Hazard	Pressure Hazard	Reactive Hazard	Not Applicable XXX
---------------------------------	--------------	----------------	-------------	-----------------	-----------------	-----------------------

I. PROTECTION AND PRECAUTIONS

VENTILATION

Use local exhaust to capture vapor, mists or fumes, if necessary. Provide ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air. No smoking, or use of flame or other ignition sources.

RESPIRATORY PROTECTION

Use supplied-air respiratory protection in confined or enclosed spaces, if needed.

PROTECTIVE GLOVES

Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

EYE PROTECTION

Use splash goggles or face shield when eye contact may occur.

OTHER PROTECTIVE EQUIPMENT

Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular clothing, which could result in prolonged or repeated skin contact.

WORK PRACTICES / ENGINEERING CONTROLS

Keep containers closed when not in use. Do not store near heat, sparks, flame or strong oxidants.

In order to prevent fire or explosion hazards, use appropriate equipment.

Information on electrical equipment appropriate for use with this product may be found in the latest edition of the National Electrical Code (NFPA-70). This document is available from the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

PERSONAL HYGIENE

Minimize breathing vapor, mist or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before re-use. Remove contaminated shoes and thoroughly clean before re-use; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

J. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION**TRANSPORTATION INCIDENT INFORMATION**

For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents.

U.S. DOT HAZARDOUS MATERIALS SHIPPING DESCRIPTION

Not regulated

OSHA REQUIRED LABEL INFORMATION

In compliance with hazard and right-to-know requirements, where applicable OSHA Hazard Warnings may be found on the label, bill of lading or invoice accompanying this shipment.

Note: Product label may contain non-OSHA related information also.

The information and recommendations contained herein are, to the best of Exxon's knowledge and belief, accurate and reliable as of the date issued. Exxon does not warrant or guarantee their accuracy or reliability, and Exxon shall not be liable for any loss or damage arising out of the use thereof.

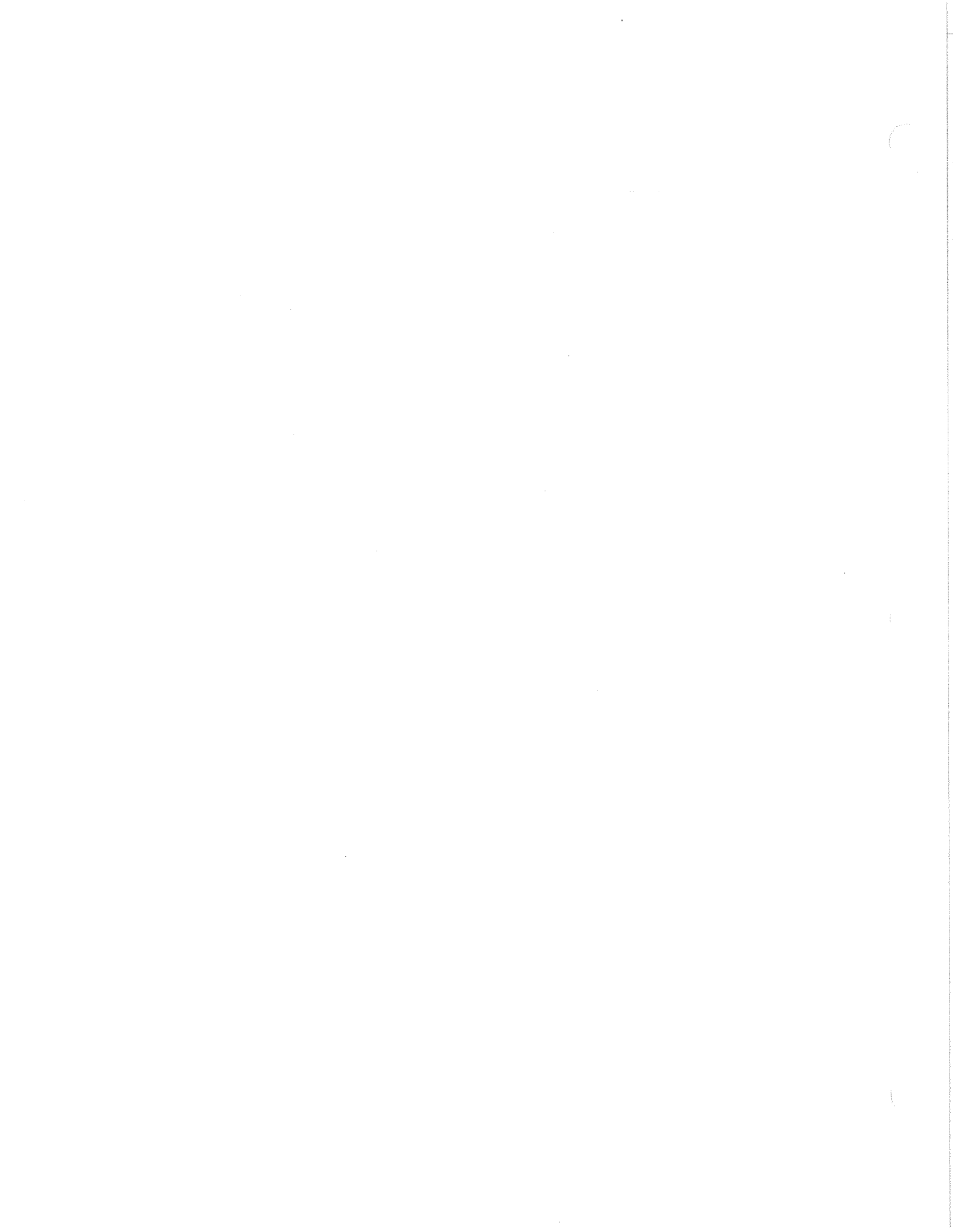
The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use. If buyer repackages this product, legal counsel should be consulted to insure proper health, safety and other necessary information is included on the container.

The Environmental Information included under Section H hereof as well as the Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) ratings have been included by Exxon Company, U.S.A. in order to provide additional health and hazard classification information. The ratings recommended are based upon the criteria supplied by the developers of these rating systems, together with Exxon's interpretation of the available data.

FOR LUBRICANTS TECHNICAL ASSISTANCE CALL: 1-800-443-9966

FOR FUELS TECHNICAL ASSISTANCE CALL: 713-656-4955

FOR AN MSDS OR ASSISTANCE WITH AN MSDS, DIRECT INQUIRIES TO THE ADDRESS BELOW OR CALL:



REDEMPTION

REDEMPTION

INTRODUCTION

This explanation of Redemption procedures is not meant to be an all inclusive document or a "Cast in Stone" Rule Book. It is designed to outline basic concepts of what Redemption is, how it works, and why it is both popular and profitable. For further discussion on planning, design, game selection, and operation of Redemption Centers, please contact our Sales Office.

WHAT IS REDEMPTION?

Redemption games are any games in which a Player has an opportunity to win tickets, tokens, prizes, bubble gum cards, baseball cards, or any other type of award for playing the game. Usually the amount of the prize is based upon the performance of the Player. Example: it may be based on how many players the person beats in a race, or how many points are scored.

WHAT IS A PERCENTAGE?

The concept of Redemption is to give Players an incentive to play the game other than just for the entertainment value. The way this is usually done, as stated earlier, is to give some type of award based on the Player's score or performance.

Fixed (Race) Payout

Standard BOB'S SPACE RACERS® games give tickets as the award. Some of our games are Race Games and will give out so many tickets per player to the Winner. You will need to determine what percentage you want to use. A Percentage is how many cents, on average, you are giving back for every dollar taken in. When you see the [%] from here on it means cents on a dollar awarded. The percentage we find to be most successful for most people is right at thirty percent (30%). Normally, we suggest placing a 1-penny value on each ticket. You then need to figure out how many tickets you will give out on average for the amount of money that is coming in. The number of tickets going out should be thirty percent (30%) of how many cents are brought into the game. Maintaining a percentage is something that needs to be checked from time to time. On our Race Games, it's quite simple: figure how many tickets you want to give per Player to the Winner so the payout will always be a fixed constant percentage and, therefore, less attention has to be paid after it is set.

Tickets Based on Score

Whenever there is a payout of tickets on a game based upon a Player's skill, you need to estimate what the average score of a Player will be and figure a payout set at approximately 30%. Let's assume that a Player is going to pay \$.25 to play the game, and that the average score Players can attain is about 300 points. That means that you would want to give out 7-½ tickets for 300 points.

Some Players will score a little on the high side, some a little on the low side. If you figure about 7 tickets at 300 points you should average out at about 30%. Set your ticket options in such a way that 300 points would pay out either 7 or 8 tickets. In a week or so, check to see how many tickets the game has paid out versus how much money was taken in. Calculate the percentage of tickets being paid out per cents coming in (ideally, it should be about 30%). If it is too high or too low, you need to adjust the ticket payout based upon score to keep the percentage at the level you want it to be. This process, (where tickets are being paid out based on score), is going to require constant supervision and modification in order to keep your payout where you need it to be. Many patrons like to see the payout based upon their performance, so these type of machines, which require more monitoring, will help initially get this type of customer into your location.

It is important to note that having a variety of different types of games is helpful in maintaining a good flow of customers. If all your games are just race games or just skill games, etc., you are limiting your market. Although people that prefer to play race games might be interested in games based upon score, they are not going to be coming in to your location in the first place if the race games are not there. Again, what we are trying to impress upon you is that you do not want to lock yourself into just one type of redemption game, as this will limit your market.

Progressive Build-Up

Another ticket dispensing concept that BOB'S SPACE RACERS® has developed is a Progressive Build-Up of tickets. This is used for games of skill where you Win or Lose -- there is no opportunity to accumulate points. With this method, you can make your payout more consistent by having the games start out giving some amount of tickets. Usually the starting number of tickets is set slightly greater than 30% (i.e., 10 or 15 tickets) to get people to try the game. Whenever a person plays and loses, it causes the amount of tickets that the Winner would receive to increase by some amount, normally by 30% (7 or 8 tickets). That way, you can maintain your percent payout because even though people are

losing, it adds more tickets on to the amount of tickets that are given to the next Winner. This concept also helps so that when Players get more proficient at these difficult games, they don't go over and play and win every time. What will happen is if a Player becomes proficient at playing a game, they won't play unless the number of tickets is high. If they walk right over and Win right away and get a lot of tickets, then other people watching will see this happen and think that it is a relatively easy game and go over and play hoping to get a lot of tickets.

This can actually help increase interest in the game. As the ticket amount builds, it also makes it more difficult for a person to walk away from the game because they feel they can win with one more try and they see how high the tickets have been built up. Skill games (where a Player can only Win or Lose), that do not use a Progressive Build-up of tickets, pay out a fixed number of tickets to a Winner. A drawback to this method is that if a Player is very good at playing the game, they will keep playing and winning, making the payout more than 30% for whatever percentage is set. If the payout is lower, those Players who aren't as good at playing the game will not play because there isn't enough incentive in playing a difficult game.

WHY DOES REDEMPTION WORK?

One reason that Redemption works is because Family Fun Centers are becoming more popular and families can spend "quality" time together. The video game industry was pretty much reliant upon teenagers as their main clientele. With the advent of the Family Fun Center, video games are still there for the teenagers, although they have lost some of their popularity (possibly due to the home game industry). Redemption games are usually targeted for general audiences and, with the kiddie models that are available from different manufacturers for the younger members of the family, provide entertainment for the entire family in one location. Redemption is popular in this family group due to the fact that the parents are usually paying for the entertainment and, generally, they like to see that they are getting something for their money.

With a payout of tickets, they are more willing to let their children play the various games when they are going to actually win some type of award for what they have done. For example, if a younger child has a small prize (i.e., a novelty pencil eraser) they would like to win, the parents will probably will continue to allow the child to play until they have won enough tickets to exchange for that particular prize; whereas older children, such as teenagers, may want to save up their tickets to redeem them for a larger prize (i.e., a portable radio) that will encourage them to visit the establishment more frequently.

It is important to note that the most successful redemption operations do have some video games. They are a good means of entertainment, but the redemption allows a draw from a larger variety of patrons for your market. Also, because redemption games are played for the ticket payout as much as they are for the entertainment value, they typically do as well as the years go by, versus a video game only lasting for several months before a significant drop-off in game play is seen.

MERCHANDISING

Redemption is yet another method of selling merchandise. Your customer is the family that comes into your Fun Center. Your merchandise selection should include items of interest to all age groups. It is very difficult to entice people to play the games if there is no merchandise they wish to win. A well-stocked, properly displayed and brightly lit Redemption Counter is essential. Your pricing should be competitive, as well. Your customers are aware of retail pricing on most items you will have in stock; if they see items marked at exorbitant prices, they will not play your games. A good rule of thumb is to mark your merchandise up only ten percent (10%). Thus, an item you bought for \$1.00 should sell for \$1.10 (110 tickets). You have already made a fair profit on the play of the game, so mark the merchandise up enough to handle freight and handling (10%). It might seem as though you are losing an opportunity to increase your profits, but the word-of-mouth comments on your operation will pay off much more in the long run.

TICKET DISPENSER

TICKET DISPENSER**BASIC ELECTRONIC OPERATION**

When the control unit calls for a ticket to be issued, 12VDC is applied to the ticket enable wire. At this time the motor turns on. When a ticket is dispensed, the sensor senses a notch in a ticket and sends back a signal to the control unit. If no more tickets are called for, the enable voltage is turned off and the motor stops.

MECHANICAL DESCRIPTION OF OPERATION

The tickets are moved through the ticket chute by means of a power driven roller which is spring loaded against an idler roller. The power driven roller has two neoprene "O" rings installed, and under normal operating conditions are the only contact with the tickets.

The power driven roller is mounted on the output shaft of the motor gear train assembly. The motor assembly is mounted to the pivot bracket assembly in two oilite bearings. The motor assembly has a limited free swing, limited by a single pin engaged in the brake sprag. The brake sprag engages the power roller as an anti-theft device. With the free swing of the motor assembly, the direction of torque when electric power is applied, is in a direction so as to release the brake sprag. When an attempt is made to pull tickets from the machine with the power off, the torque is reversed and the brake sprag is engaged. Also, the pulling of tickets will cause the pivot bracket assembly to apply a pressure to the power driven roller against the ticket and idler roller greater than the pre-set spring load. This will cause the "O" rings to depress and the coarse knurled surface of the roller will then grip the tickets. One ounce of pull on the tickets will apply 20 lbs. of pressure on the rollers.

During 1992, Deltronic Labs made enhancements to their Ticket Dispensers. These included a push-to-feed Ticket Button on the main Ticket Dispenser Board for ease of feeding tickets and the removable top on the Ticket Guide to allow ease of access to removing jammed tickets.

TROUBLESHOOTING

<u>PROBLEM/CAUSE</u>	<u>FIX</u>
<u>Dispenses Tickets Continuously</u> (Not The Same As "Too Many Tickets")	
Bad Driver IC	Replace the IC that has the ticket enable line - see the Output Definitions for your Controller Board.
Bad Darlington on Ticket Dispenser Board	Put a jumper between the White wire and Black wire on Ticket Dispenser Plug. If Motor stops, problem is in the game. If problem continues: bad Ticket Dispenser Board. (Replace Driver Transistor or Ticket Dispenser Board).
Shorted Pull Up Resistor	Locate the Pull Up Resistor (1K 1/4W); make sure the leads are not shorted. Replace if necessary.
White and Red Wire Shorted	Examine the wire terminations from the game to the Ticket Dispenser. The wire may have been closed in the Ticket Dispenser Door causing a short.
<u>Dispenses No Tickets</u>	
No Power To Ticket Board	Check the voltage between the Red and Black wires on the Ticket Dispenser Molex Plug-- should be 12VDC.
Bad Darlington Transistor(s)	Replace Darlington Transistor(s) or Ticket Dispenser Board.

<u>PROBLEM/CAUSE</u>	<u>FIX</u>
<u>Dispenses No Tickets</u> (Continued)	
Bad Motor	Try swapping Ticket Dispenser with another unit.
Wrong Option Setting(s)	Check the Option Setting(s) for this game (see information on your Controller Board).
Bad Driver IC	Replace the IC that has the Ticket Enable Line - See the Output Definitions for your Controller Board.
Bad Connection	Check connections between Front Panel Board and Ticket Dispenser.
Bad Ticket Dispenser	When tickets are to be dispensed, check between White (enable) and Black wire; should be 12VDC. If voltage is okay, probably Bad Ticket Dispenser.
<u>Doesn't Dispense Enough Tickets or Dispenses Too Many Tickets</u>	
Wrong Option Setting(s)	Check the Options Setting(s) for this game (see information on your Controller Board).
Ticket Guide Spring Missing Needs Adjustment	Read the Ticket Dispenser Manual under "Ticket Guide Spring".
Bad/Dirty Optic Sensor	Try blowing paper dust out of the Optic Sensor or swap Ticket Board with another unit.
Bad Ticket Count Input On Controller Board	Check Ticket Count LED on your Controller Board (see info on the Controller Board).

PROBLEM/CAUSE

FIX

Doesn't Dispense Enough Tickets
or Dispenses Too Many Tickets
(Continued)

Bad Ticket Notch Output
Transistor On The Ticket
Dispenser Board

Swap Board with another unit
to verify this, then replace
bad Board or Ticket Notch
Output Transistor (see Ticket
Dispenser Manual) Blue Wire
goes to Ground when no tickets
are under the Sensor Eye.

Bad Board

Check between Green (Ticket
Sensor) and Black wires on
Ticket Dispenser. Should be a
pulsing 12VDC for each ticket.
If okay, probably bad Front
Panel Board.

Bad Connection

Check connections between
Front Panel Board and Ticket
Dispenser.

Bad Front Panel Board

Check voltage between Green
(ticket sensor) and Black
wires. Should be pulsing
12VDC for each ticket. If
okay, probably a Bad Front
Panel Board.

BOB'S SPACE RACERS®

TICKET DISPENSER

N O T E S

PROBLEM/CAUSE

FIX

Should you encounter a particular problem not covered in this or any other Troubleshooting Section of your Owners Manual, please contact the Technical Support Staff at **BOB'S SPACE RACERS®** by telephoning them at (386) 677-0761, or by FAX at (386) 677-0794.

