GROUP

RISING WATERS

OWNER'S MANUAL

427 15th STREET • DAYTONA BEACH • FLORIDA • 32117

PHONE 386·677·0761 FAX 386·677·0794

WWW.BOBSSPACERACERS.COM

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply within the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate 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/her own expense.

* * *

W A R N I N G :

ALL OF 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.

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 8:30 am - 5:00 pm, EST, Monday through Friday, 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 Service telephone lines are manned 8:30 am - 5:00 pm, EST, Monday through Friday, excluding holidays. Customer Service staff can be reached at (386) 677-0761 they will also 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.

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 the 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 or 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.

BOB'S SPACE RACERS®, INC.'S ONE-YEAR NEW EQUIPMENT WARRANTY

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 COST(S) 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. or 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 386-677-0794

ADVANCED REPLACEMENT POLICY

After speaking with our Technical Department it may be necessary for Bob's Space Racers®, Inc. to ship an assembly item or part to repair your game. We will ship the item(s) according to your preference via United Parcel Service, Federal Express, US Postal Service, etceteras. Note: we will not ship anything to P.O. Boxes via the US Postal Service. You will be billed, per your account status, for the total cost of the shipment (which includes shipping charges).

Upon shipment of the new item(s) a Return Merchandise Authorization Number (RMA #) will be issued for you to use when returning the defective item(s) to Bob's Space Racers®, Inc., or you may use the order number. After the defective item(s) is received by Bob's Space Racers®, Inc. your account will be issued either a:

1. Warranty credit: if your game is under warranty. (See the Warranty Policy page.) Note: this credit does not include return shipping charges.

OR

2. Credit for the item(s). Note: this credit does not include return shipping charges, nor does it include the repair charges for the item(s).

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

ADVANCED REPLACEMENT ITEM(S) SHIPPING RULES

When you request an Advanced Replacement item from us, we have a few rules for you to follow:

1. **DO NOT** try to repair the defective item(s) on your own; **DO NOT** disassemble the defective item(s) prior to returning it to Bob's Space Racers®, Inc. – this could cause further damage and the possibility of you not receiving any credit at all on the item(s). There are not any user serviceable parts inside, and our vendors may void their warranty on disassembled parts. (Please review the last paragraph of the Advanced Replacement Policy.)
2. Wait for the Advanced Replacement item(s) to arrive prior to returning the defective item(s).
3. When the new item(s) arrive, verify that it is the correct part. If it is not, please note what the differences are and contact Bob's Space Racers®, Inc.
4. Return the defective item(s) in the exact same packaging the Advanced Replacement item(s) came in. This insures no more damage will be done to the item(s) during the return shipping.

Thank you for your cooperation.

OWNER'S MANUAL

CONGRATULATIONS!

Congratulations on your purchase of a Bob's Space Racers® Game! Bob's Space Racers® continues to lead the amusement industry in the manufacturing and the operation of amusement games and has operated these games at several of North America's largest expositions for the last 30 plus years. Some of these expositions include: The Canadian National Exhibition, Toronto, Ontario, Canada; The Calgary Stampede, Calgary, Alberta, Canada; The Minnesota State Fair, St. Paul, Minnesota, USA; The Ohio State Fair, Columbus, Ohio, USA; The Big E, Springfield, Massachusetts, USA; The South Carolina State Fair, Columbia, South Carolina, USA; and, The Dade County Youth Fair, Miami, Florida, USA. This experience has allowed us the opportunity to field test each piece of equipment that we manufacture, and helps us to stay in tune with the amusement industry with its ever-changing trends.

What you are about to read may appear a little overwhelming at first, but it will help you reach the high profits you seek. Keep in mind we are offering this only as a guide for you to get started. These tips have proved time and again to work successfully in our own operations over the last thirty years.

MANUAL INTRODUCTION

This owner's manual is divided into several sections beginning with Operator's Guide, Introduction and Set-up, and so on. We have provided direction on every aspect of the game from running and maintaining it to pertinent technical information and troubleshooting problems. We, also, cover accounting systems, compressors, lighting, and sound systems in the appendix section.

Each section has troubleshooting guides that 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 this manual and have tried the suggested repairs).

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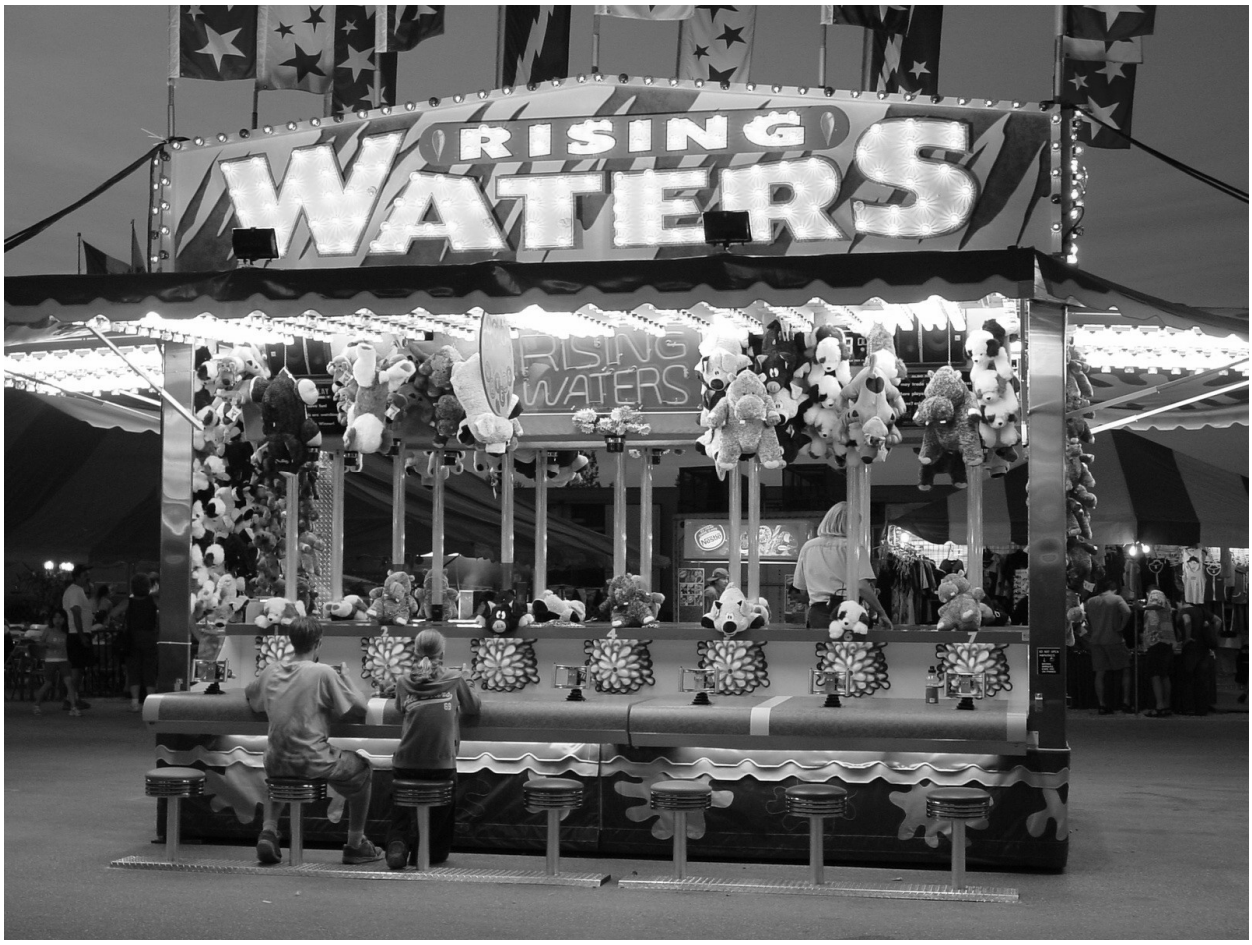
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INTRODUCTION AND SET-UP

INTRODUCTION

The most important thing to remember about the job you are about to begin is to be yourself! Your personality is what keeps you from sounding like a computer. As you are taught the basic procedures, you'll also learn how to adapt them to your own style. Working in the game can be a lot of fun, once you have mastered the proper technique.

ALWAYS REMEMBER THAT THE CUSTOMER IS THE MOST IMPORTANT PART OF THIS BUSINESS!

SMILE! A smile will do more for your business than anything else. It shows the customer that you are happy and they will have some fun.

LOOK PEOPLE IN THE EYE! Making eye contact with people lets them know that you are talking to them, and not just 'rambling on'. A simple, "Hi! How are you?" or, "Hi there! Are y'all having fun today?" will let them know you are talking to them. Follow up with, "Come over here and I'll show you how to play this game!"

USE YOUR FREE HAND to motion the people you're addressing to come over to your game.

ONCE THE CUSTOMER IS AT THE COUNTER, just be polite and explain the game in a simple manner.

WHEN THE GAME IS OVER, be certain to:

1. Acknowledge the winner.
2. Encourage the non-winners to play again, before they start to walk away.
3. Encourage the winner to play again and show him/her the next prize they could trade-up for if they won again.

If you keep these basic procedures in mind, everything else should come together.

GETTING STARTED

No matter what part of the world you may be operating your equipment in, customers are the most important part of making your operation successful. By keeping the customer happy, you will enjoy increased profits. When a customer leaves your game one of two things will have occurred: either you have a satisfied customer who will play that great new game the next time he goes by and will tell his/her friends about it; or, he/she will leave vowing that is the last time that game will ever get his/her money! Of course we all agree that a happy customer is what success is all about.

It is the operator's job to ensure that the customer can easily understand the game and what the prizes are for each win level. This task can only be achieved by the person who will actually be in the game working with the people. There are important features to look for when hiring a game attendant. Always look for a friendly, outgoing personality, someone who is honest, dependable, and is used to working with money. The attendant is the one who will be dealing with the customers on a one-on-one and day-to-day basis.

Although working with the public can be extremely trying at times, by insuring proper breaks for your employees you will eliminate most problems. It is recommended to give the attendant a 30 to 60 minute break every two (2) hours, this way you will always have a fast, outgoing, upbeat attendant running your game. If the attendant is polite and friendly, the public will respond the same way.

WHY BREAKS ARE SO IMPORTANT

Operating a game is physically and mentally demanding. We found it is best to have two (2) attendants for each game, or, three (3) attendants to rotate between two (2) games. This will keep them always at their peak performance and alertness levels. We also suggest you have a part-time employee who can work during the busy/peak times. This person is commonly referred to as the 'second' attendant. It's also important for higher profits. Having two (2) people collecting money can save time and allows the game operation to run much more quickly and efficiently.

GETTING READY FOR EACH DAY

We suggest you begin each day by checking the power. This procedure is done to insure that proper power is being supplied to the game to avoid electrical damage, and/or malfunctions. To check the power coming into your trailer look for the power checker with a toggle switch on it. This is mounted near the breaker panel. Toggle the switch to the left to test one leg of the power, then right for the other leg of the power. The needle should read approximately 120V AC on each leg.

If either leg does not read 120V AC you will need to locate the supply generator or the city power connections and check the voltage source there. This needs to be done every day because your trailer may have been hooked to a different circuit by a show electrician, from one day to the next, without your knowledge.

If both legs do read 120V AC you can start the game up and check your sound level for both the microphone and the sound track. We find it helpful to label the knobs on the amp so the operator/attendant can easily distinguish between each knob.

It is important to be aware of your merchandise inventory throughout the day, especially during peak times. This will ensure that your game doesn't run out of prizes.

GAME OPERATIONS

Okay, it's time to begin! As each customer passes by they need to by acknowledged, with a simple greeting. Such as:

"Hello!"
"Hi, there!"

Followed by:

"How are you?"
"Have you seen this game?"
"Would you like to try it?"
"Are you ready to try this one?"
"Let me show you how to play!"

Remember, make eye contact with the person you are speaking to when you are trying to persuade them to come over to play the game.

Getting the customer to the playing counter is half the battle. Once they are at the counter, quickly give a brief explanation of how to play the game. Then try to get a few more players to begin the race. Note: It's not necessary to have a group of players to begin a skill type game (i.e. Sidewinder®, Roll-A-Ball®, Whac-A-Mole®, etc). However, you do need at least two (2) players to start the game. After you have your desired amount of players, be certain that each player is at the correct player station and you have collected all of the money. Also, know which prize you will be giving out.

Next, go over to the push button station and begin the race. Putting labels on the push buttons during training will make it easier for the training operator to get started. During the race quickly check that all players are playing the game properly, and that they are at their correct play stations. Also, note how many players you have. If possible, note the bystanders and point out any empty positions for them to join in on the next race.

Once the race has ended, announce the winner, encourage non-winners to play again before giving the winner's prize out. Also, get at least one (1) player to pay for the next game before you give the winner his/her prize. For example:

> Player at station #5 won and players at #7 and #12 were a very close second and third. You might say, "Hey! #7, you were right there that time! #12 – you should've had it! You better try again! This could be your lucky chance! "How about another try?". Remember your winner, "Player #5, you were our lucky winner this time! Look at what you've won!" At this point you hand him/her the prize and continue by pointing to the next larger prize, "When you win again, you can trade this in for a larger prize!"

GAME OPERATIONS

We've found that by showing the winner the next prize they are easily tempted to play again. Always encourage a few more players with each new race. People are the key to attracting more people to the game.

However, there will be times when only a few customers will be in the playing area.

WHAT TO DO WHEN IT IS SLOW

How fast or slow the operator runs the game is referred to as the 'pace'. The operator try to get at least three (3) or four (4) players before beginning a game. This is commonly referred to as 'grinding'. Simply pay more attention to the players you have already, take more time to explain the rules of the game, explain the prize levels – remember the more people you have at your game the more people will come to your game. It's not uncommon to wait as long as five (5) minutes or more for players. There is no reason to run a race as soon as you have two (2) players, unless there is no one else in the playing area. If the operator runs the races too quickly when it is slow they will end up with no players. If the operator works the crowd as suggested they will find that two (2) players can easily turn into three (3) or four (4), or many more players.

WHAT TO DO WHEN IT IS BUSY

At some point, while grinding, the operator will become 'steady'. This simply means that there are at least five (5) or more players at each and every race. When players are steady, the operator should pick up the pace. The races should be running every three to five (3-5) minutes. (If the operator is really good he/she can try to run a race every one to two (1-2) minutes.) At the same time the operator should be trying to get at least ten or more players for each race – this would be considered busy.

It is important to make every step count. We recommend the operator go down the counter collecting money from each player while checking to see if there are enough players to begin the race. If there aren't enough players, then quickly make one more sweep up the counter for more before beginning the race. However, if you have enough players there is no need to go all the way back to station #1 to start the race. That is why we have two (2) push button stations in each game.

WHAT TO DO WHEN IT IS BUSY

When the game has ended the operator will follow the same steps as outlined above: acknowledge the winner, encourage the non-winners to play the next race, give the winner his/her prize while showing the trade-up prize if he/she wins the next race, and then get other players to the game. If you find the operator is not able to do all of this in a minute or so, then we suggest having another person in the game to help 'kick-change'. This is a slang term that means basically what it says. Another person is there to kick, or step on the foot pedals to re-set the individual games, and assist in taking money from the players. We normally have our second operator assist a game during peak times.

WHAT TO GIVE AWAY

We found in our operations that 28 to 30 cents on the dollar for give-away has proven the most profitable for us, and the customer. This works out to be 28 to 30 percent of the cost of play. This is achieved by dividing your cost of merchandise by your revenue for that race.

CHANGING ATTENDANTS/OPERATORS

When changing attendants/operators, it is important to do so with as few disruptions as possible. We at BSR have found that this can be done by following a few simple steps.

1. The new operator puts on his/her change apron.
2. The new operator obtains enough one (1) dollar bills from the current/old operator in order to be able to make change for fifty dollars.
3. During a race the old operator hands over the microphone system to the new operator. The new operator continues on with that same race.
4. The old operator checks the amount of stock in the game to ensure there will be enough to last until he/she returns from break.
5. The old operator cleans up any stray trash in or around the game area, and makes certain the game area is orderly.

INSTALLATION

TRAILER INSTALLATION, SET-UP AND HOOK-UP

Power Requirement: 220V, 60 Cycles, Single Phase

1. Locate trailer and drop Leveler Jacks. Level trailer front to back and right to left. Unwind lead line from hitch. Remove hitch and store out of the way.

2. Unlock awning doors. Raise the doors by use of key switch at the corner of the trailer.

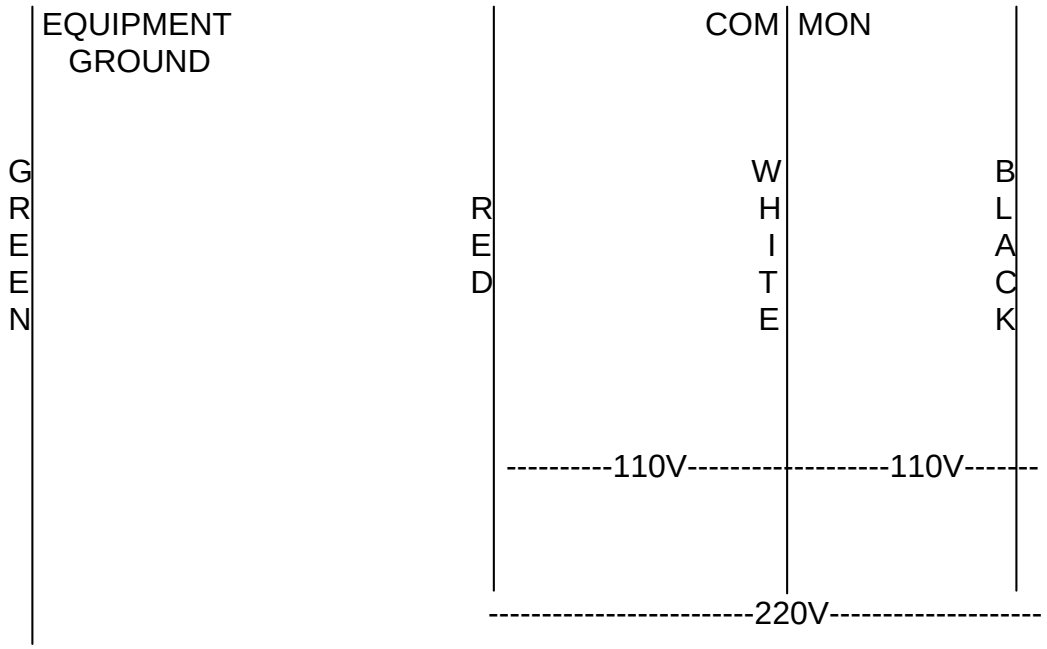
3. Put pins in awning prop rods; release pressure from Hydraulic Pump by turning the key the other direction. Remove key.

4. Hook-up White wire to the Neutral (Common). The Red and Black hook to opposite 110 volt phases. Green is Earth Ground. NOTE: Use power checker to check for 110 volts on both hot lines (see INTRODUCTION AND SET UP Figure #1).

   CAUTION! Be sure of correct voltage: 220V, 60 Cycle, Single Phase. NO MORE!

GREEN WIRE: Equipment Ground
BLACK WIRE: 110V AC

RED WIRE 110V AC
WHITE WIRE: Common/Neutral



TRAILER INSTALLATION, SET-UP AND HOOK-UP

Power Requirement: 220V, 60 Cycles, Single Phase

5. Raise marquee top and secure with prop rods. Unload ends of marquee from inside game and attach to marquee sides. The ends plug into the sides with a Black Amp plug. Check for bad or broken bulbs. NOTE: Make sure Safety Cables are used when raising the Marquee. Install the Bally curtains.

6. Install the Bally curtains. Drop counters and locate seats.

7. Fill water tank for unpressurized water system (guns), located under targets, with fresh water. Fill water tank for pressurized water systems (tubes), located under stool bases. Use water passed through the charcoal filter if you are not using Dynarods (see Dynarods in WATER SYSTEM section). Games with Dynarods require no charcoal filter. This is also where the Blue Fluid is added to the tube water. Depending on how many units in your game, will determine how much Blue Fluid to add. The Blue Fluid part number is MX012120; it will include 12 packet containers. Normally, for a 14 unit park/trailer game we use one (1) of the packet containers, half in each pressurized tube tank. *See WATER PUMP section #1). As a general rule, use one half bottle per pressurized tank.

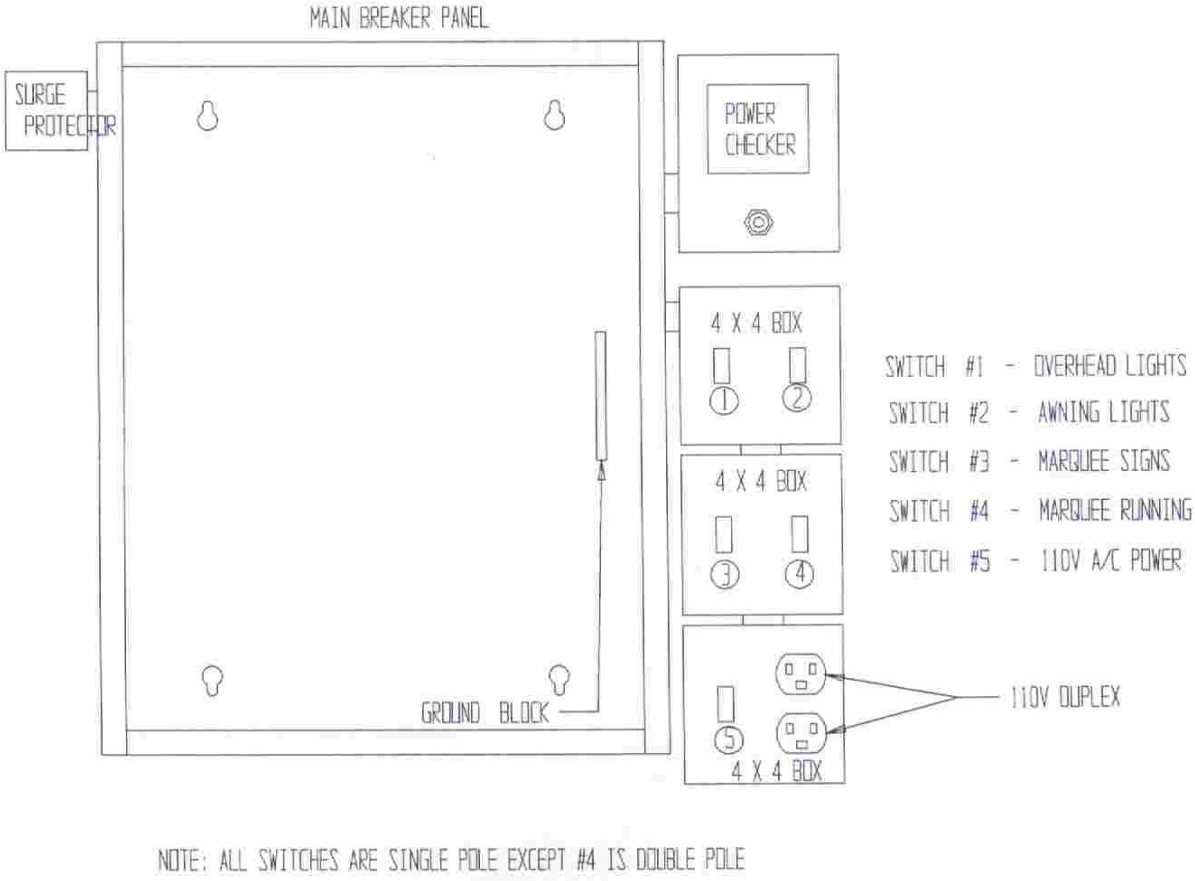
8. Check operation of game; check all bulbs for operation and flash game.

   NOTE: The Main Breaker Panel breakers will vary, depending on the options requested by the customer. See the panel in your game for the appropriate size breakers, each one is labeled for their specific use.

INSTALLATION OF PARK AND BUILDING MODELS

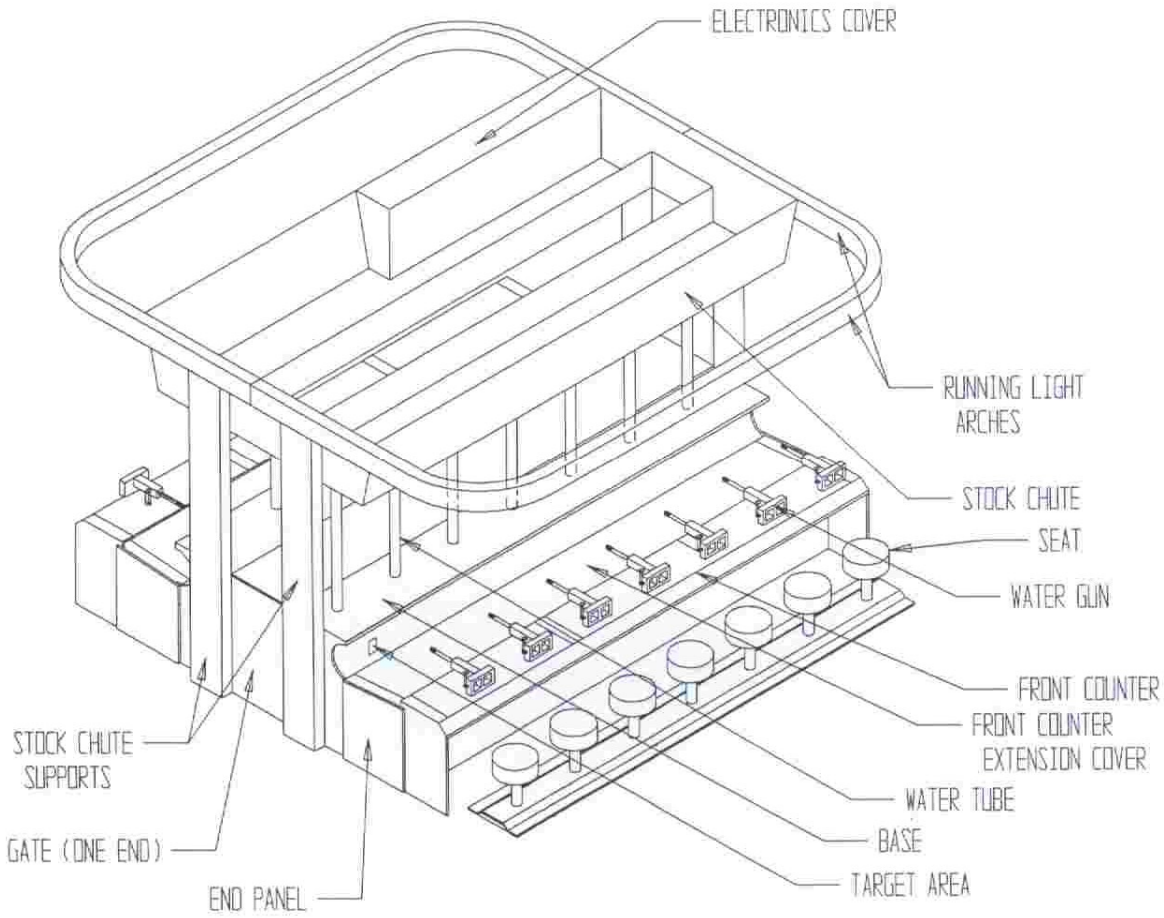
Bob's Space Racers® installs all Park and Building Model Games 95% of the time. If you desire to install your game by yourself, we can send separate instructions on how to do so.

MAIN BREAKER PANEL
(INTRODUCTION AND SET UP Figure #1)

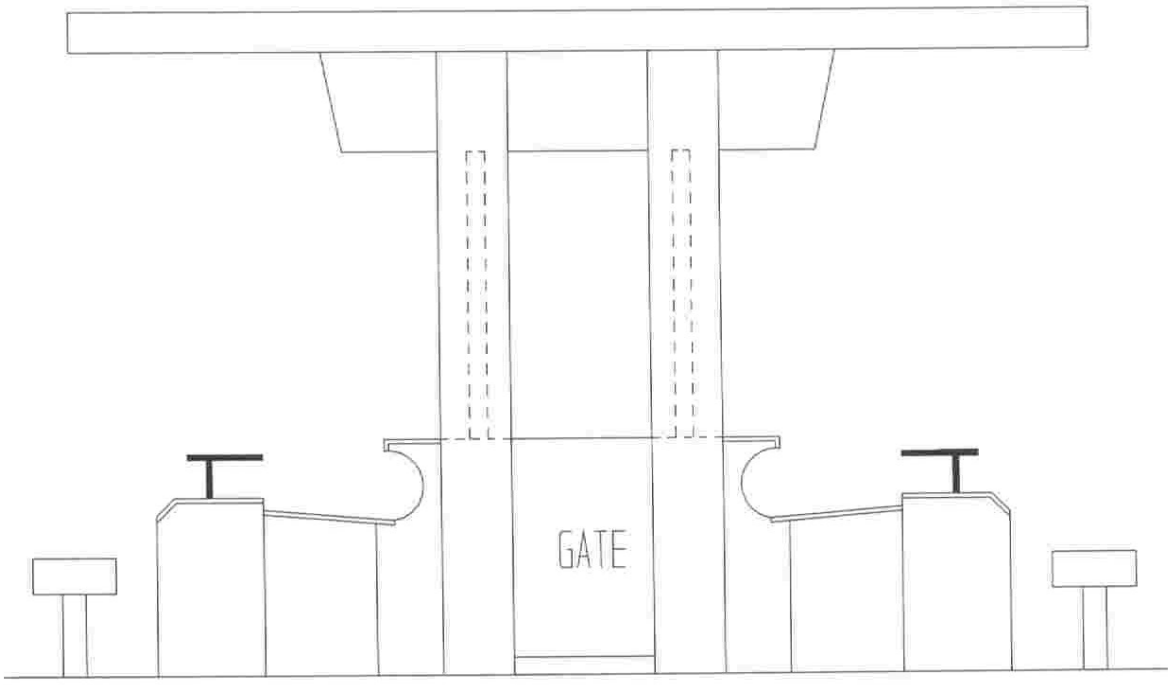


NOTE: ALL SWITCHES ARE SINGLE POLE EXCEPT #4 IS DOUBLE POLE

RISING WATERS® PARK MODEL



SIDE VIEW OF PARK MODEL



OPERATION

GAME OPERATION

1. Collect money.

2. Activate player position by kicking the footswitch at the base of the unit. Notice the small ID light turns on and stays on.

3. Repeat steps 1 and 2 for each participant.

4. Start game by first activating the sound system (if applicable) by pressing the bottom (plain) pushbutton on either end of the game. As soon as the sound starts, push the 'Forward' and 'Bell' buttons at the same time. The water pumps will immediately start pumping, and, as the target micro switches are depressed, the tubes will start filling.

5. The first player to fill their tube to the top will be the winner. The bell and beacon will ring for two seconds and the game will automatically drain all of the tubes, after a pre-determined time.

6. Hand out the prize to the winner; repeat entire procedure again.

2100 ELECTRONICS
OPTION REGISTER SETTING INSTRUCTIONS

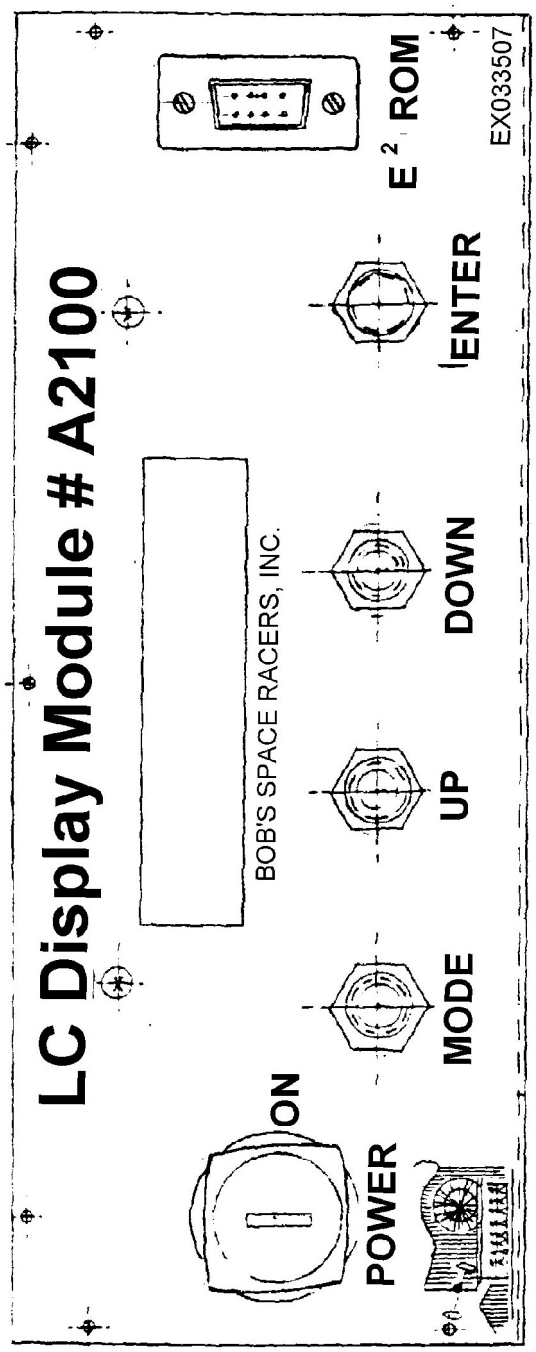
This game has options that can be set via a Liquid Crystal Display (LCD). The LCD is located in the stock chute. (Study figure on next page.) To change an option, insert the key and turn it on. Wait until the display reads:

REG #01 = ##

If this doesn't happen within about 3 seconds, the game must think a race is in progress. If the key on the display is turned to '**ON**' after the current race, the game will lock up until you are finished changing the option registers and have turned the key to the '**OFF**' position. To change an option, press the **MODE** button to get to the proper register. Press the **UP** or **DOWN** button to get the desired value for that register. Press the **ENTER** button to make the change permanent. The display will automatically go to the next register, indicating that the changes made 'took'. If a change is made, and you press the **MODE** button instead of the **ENTER** button, the new value (you just entered) will be ignored and the old value will remain. The options for this game are shown on the following pages.

REFER TO RACE GAME OPTIONS FOR REGISTER SETTINGS

LCD MODULE #A2100, FRONT PANEL



RACE GAME OPTIONS
Versions GM2101
(2100 Models)

Enter Options by turning the keyed switch on and wait until the message comes up as follows:

REG # 01 = ###

This means that the system is ready to accept changes in the Options. The **MODE** button sequences through each "**REG**" 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. This also advances to the next register. Pressing the **MODE** button before pressing **ENTER** leaves the register unchanged.

NOTE: The Registers CANNOT be changed in the middle of a race and if Register 00 is changed, the game MUST be powered down after register changes are complete and the key is turned to 'OFF'.

Reg #	Default	Definition
Reg 00	0	Rising Waters® Game
Reg 01	0	Reserved for Future Use
Reg 02	0	Reserved for Future Use
Reg 03	1	Number of Footswitch Inputs
Reg 04	1	Number of Plays per Game
Reg 05	50	Time Win Light Stays on (0.1 second increments)
Reg 06	0	Reserved for Future Use
Reg 07	0	Reserved for Future Use
Reg 08	0	Reserved for Future Use
Reg 09**	4	Course Motor Speed Adjustment
Reg 10**	80	Fine Motor Speed Adjustment
Reg 11	70	Time (seconds) Cylinders Dump After WIN
Reg 12	0	Reserved for Future Use
Reg 13	0	Reserved for Future Use
Reg 14	5	System Parameter – DO NOT CHANGE!
Reg 15	1	System Parameter – DO NOT CHANGE!
Reg 16	See Game	Number of Units in Game

RACE GAME OPTIONS
Versions GM2101
(2100 Models)

Reg #	Default	Definition
Reg 17	0	Reserved for Future Use
Reg 18	0	Reserved for Future Use
Reg 19	0	Reserved for Future Use
Reg 20	20	Time Bell stays on after WIN (0.1 second increments)
Reg 21	10	Time from End of Race until New Race Starts
Reg 22	0	Reserved for Future Use
Reg 23	0	Reserved for Future Use
Reg 24	0	Reserved for Future Use
Reg 25	0	Reserved for Future Use
Reg 26	0	Reserved for Future Use

RACE GAME OPTIONS
Versions 3.0a
(2300 Models)

***NOTE: In 2300 Models, Options cannot be changed from the Front Panel Board; instead, they are changed from the LC Display in the back of the game near the Master Board.

Enter Options by turning the keyed switch on and wait until the message comes up as follows:

REG # 01 = ###

This means that the system is ready to accept changes in the Options. The **MODE** button sequences through each "**REG**" 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. This also advances to the next register. Pressing the **MODE** button before pressing **ENTER** leaves the register unchanged.

NOTE: The Registers CANNOT be changed in the middle of a race and if Register 00 is changed, the game MUST be powered down after register changes are complete and the key is turned to 'OFF".

Reg #	Default	Definition
Reg 00	0	Rising Waters® Game
Reg 01	0	Reserved for Future Use
Reg 02	0	Reserved for Future Use
Reg 03	1	Number of Kicks of Footswitch for Credit
Reg 04	1	Reserved for Future Use
Reg 05	50(=5 seconds)	Time Win Light Stays On (0.1 second increments)
Reg 06	5	System Parameter – DO NOT CHANGE!
Reg 07	5	System Parameter – DO NOT CHANGE!
Reg 08	0	Reserved for Future Use
Reg 09**	0	Reserved for Future Use
Reg 10**	0	Reserved for Future Use
Reg 11	25	Time in Seconds the Cylinders Dump after a WIN
Reg 12	0	Reserved for Future Use
Reg 13	0	Reserved for Future Use
Reg 14	0	Reserved for Future Use
Reg 15	0	Reserved for Future Use
Reg 16	16	
Reg 17	0	Reserved for Future Use
Reg 18	0	Time to Autostart (0.1 second increments); 0=Autostart Disabled
Reg 19	0	Time from Start to Water Pump
Reg 20	20(=2 seconds)	time Bell Stays on After WIN (0.1 second increments)
Reg 21	0	Time from End of Race until New Race Starts
Reg 22	0	Reserved for Future Use
Reg 23	0	Time Between Sound Start and Game Begins
Reg 24	0	Reserved for Future Use
Reg 25	0	Reserved for Future Use
Reg 26	0	Reserved for Future Use
Reg 27	0	Reserved for Future Use

Reg 28	0	Reserved for Future Use
Reg 29	0	Reserved for Future Use
Reg 30	0	Reserved for Future Use
Reg 31	0	Reserved for Future Use
Reg 32	0	Reserved for Future Use
Reg 33	0	Reserved for Future Use
Reg 34	0	Reserved for Future Use
Reg 35	0	Reserved for Future Use
Reg 36	0	Reserved for Future Use
Reg 37	0	Reserved for Future Use
Reg 38	0	Reserved for Future Use
Reg 39	0	Reserved for Future Use
Reg 40	0	Reserved for Future Use

*If you have a Rising Waters® that was manufactured prior to 1994, call Bob's Space Racers® and order a newer EEROM Update.

MAINTENANCE

SCHEDULED MAINTENANCE INFORMATION

GENERAL MAINTENANCE: The Float Switches will get caught up on occasion; tap the affected tube to knock the float loose in order to free up the game. Sometimes it will stop the entire game from working if only one unit has a stuck float. (If that unit didn't win, it will only affect that one unit.) If the game appears locked up; look for a single footswitch light on. That is probably the unit with a stuck switch. A stuck float switch is a sign that the tubes need to be cleaned in the near future.

After the tube is empty, if the unit drains too slowly, then the drain valve needs to be cleaned. Unplug the Molex plug, remove the four 5/16 bolts, and clean the diaphragm on the valve. Be certain there isn't any trash inside the brass fitting where it bolts up. Coat the diaphragm with a thin coat of heatproof grease before re-assembling. (See the Detailed Pressurized System Layout Diagram.) Many times taking the valve apart allows the trash to fall out. Don't worry if you don't see the trash.

TO CLEAN GAMES:

You may use soapy water on Formica, Plexi-glass, regular glass, Stainless Steel, and other metals without causing any damage. The following list of cleaners can only be used on the materials they are listed with. If a cleaner is used on a material that it is not listed with it will cause damage to that material and Bob's Space Racers® will not be held responsible for repair and/or replacement of that damaged material.

Cleaner	**Material**
Lacquer Thinner	Formica; regular glass
Mineral Spirits	Formica; Plexi-glass; Stainless Steel; other metals
Clean-On-The-Go Glass and Hard Surface Cleaner™	Formica; regular glass; Stainless Steel; other metals
De-Solve-It®	Formica; Plexi-glass
Brillianize™	Plexi-glass; regular glass
Windex®	Regular glass
3812S Enamel Reducer	Plexi-glass
Soft Scrub®; CLR®;	Stainless Steel; other metals
Old English® Oil; Baby Oil	Formica; Stainless Steel; other metals

TO LUBRICATE:

Dynarods: wipe heat proof grease on them once every three (3) months; spray CRC® or WD-40® (or equivalent) on them every six (6) months.

GAMES WITHOUT DYNARODS (pre 1997)

A portable water softener system was shipped with the game. It consists of one or two tanks that are connected together with a manifold, a timer unit, and a large tank (looks like a trash can).Depending on the year of manufacture of your game determines whether or not you have a water softener system. (See the Charcoal Filter Rejuvenation Plumbing Diagram.) Once every two weeks, change the colored water that is used to fill the tubes. The water supply that is used to fill the tube tanks must be run through the water softener. If soft water is not used, the tubes will become dirty and look bad. It is important to rejuvenate the water softener after every third use. If the water softener is not rejuvenated, it will not sufficiently soften the water and the hard water will cause the tubes to get dirty.

WATER PUMP MAINTENANCE

Daily: change out water; clean out trash and other debris.
Weekly: change filter; switch pumps.

WATER MAINTENANCE SCHEDULE

Daily

- Clean all Formica.
- Run game in Bally Mode.
- Check all Footswitches.
- Check all ID Lights.
- Check that water rises properly in each tube.
- Check all Winning Lights.
- Check Accounting System
- Check Target Switch for activation.
- Check water level. Water should be to the bottom of the screens (approximately 4").
- Remove all debris from the screens and filter. (Check over pump intake – inside the tank – and over top of the tank.)
- Remove the screen on the end and check the suction and the tank pick-up screen.

Every 3 or 4 Days

- **Clean the gun tank filter**

Weekly

- Drain all water.
- Clean tank and all screens.
- Switch pumps (for both pressurized and unpressurized systems) and clean pump filter.
- Wipe the interior of the tank and Dynarod.
- Fill tank with clean water and add two ounces of factory recommended water conditioner.

Every 2 Weeks

- Change the Blue Water that fills the tubes

Monthly

- Clean Dynarod(s) in each tank with a 3M pad (Scotch Brite green). Wipe dry and re-submerse in tank.

Every Six Months

- Clean pre-filter screen in Watts Valve (for both systems). Make certain the pressurized system has no pressure when checking post filter screen in the Watts Valve.
- Lemon oil all Formica.

WATER MAINTENANCE PROCEDURES

Flush System as Needed

If system is extremely dirty or won't run clean after the normal weekly drain and clean:

- Hook hose to the bottom of the pump filter and partially open the valve on the bottom of the filter.

- Turn on all units, put clean water hose in tank and run game until water out of taps is clear. Refill water tank according to weekly procedure

NOTE: *Only* add Bob's Space Racers® recommended products. *Never* add Lime-Away, bleach, or any other corrosive products.

To prevent metal stains (made from iron, copper, manganese, or rust), scale or calcium deposits, and/or rusty clouds or discolored/green water from occurring in your water game. You will need to add one of the following recommended products to the water in your game.

USE ANY OF THE FOLLOWING PRODUCTS:

- SpaTime® Stain and Scale Control
- Proteam® Spa Metal Magic
- Jack's Magic® The Pink Stuff™
- Aqua Chem® Stain & Scale Inhibitor

Where to get the above products?

All of the above named products can be found at any Lowe's®, Home Depot®, or any pool supply store in your area.

When to apply to your water game:

1 Always add the product to your new water when you are changing out the old water in your game.
2 Always add a fresh supply of the product once each week to your game's water.

How much to add each time?

Add two (2) to three (3) ounces, or 30% more than what the directions on the bottle say, each time you add the product to your game water.

AIR COMPRESSOR MAINTENANCE

Daily: check for proper oil level (use SAE-30 non-detergent); drain and condensate from receiver and traps; listen for any unusual noises and check for vibrations.

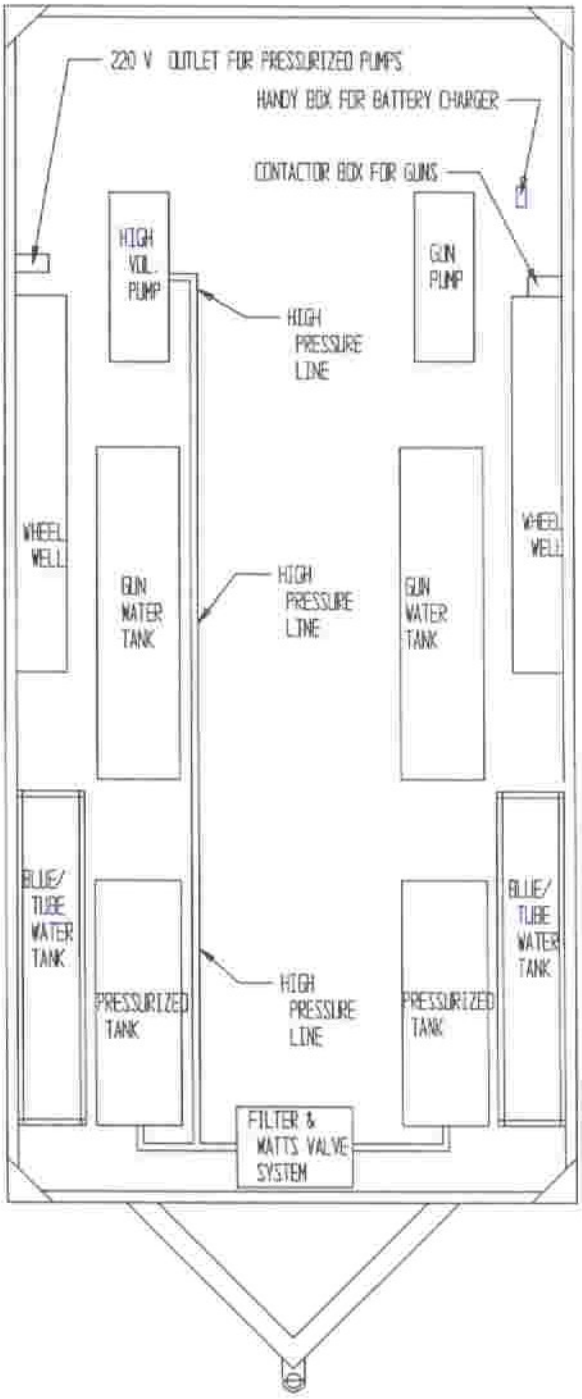
Weekly: visually check air filter for debris and dust; clean all external parts of compressor and driver; test safety valve manually to be certain it does not stick.

Monthly: inspect entire system for leaks; inspect oil for contamination and change if necessary; check belt tension and wear.

Three (3) Months: make a complete oil change; inspect valve assemblies.

WATER INFORMATION

WATER PUMP SYSTEMS OVERVIEW



WATER PUMP SYSTEMS

This game has a water pump system for the tubes (with blue water) and a separate system for the water guns (tap water). And there is a separate pump system for the air pump. Each system has a backup system. See diagram on previous page.

DEIONIZED DISTILLED WATER

The use of Deionized distilled water in Bob's Space Racers Water games has been determined by the Sta-rite Corporation to be highly detrimental to their pump's life and performance.

Since Deionized distilled water is ion deficient it attacks metal surfaces by pulling free ions from the surfaces that come in direct contact with it. The electro-chemical reaction that takes place results in rapid oxidation of the metal. This type of aggressive oxidation will result in premature pump failure.

The game needs to have all of its holding tank water drained and the filter cartridge replaced weekly. Any time you drain the water system and put new water in, (**we recommend using plain tap water**) you need to put in a new water filter. Any sediment, or anything, that is in that filter at the time the water is changed would be re-circulated into the new water – if you do not change the filter.

CLEAR VUE FILTERS

GUN TANK: This filter is re-useable. Remove this filter every 3 or 4 days by unscrewing the bowl. Take out the filter and clean it, then replace in original location. Keep the tank free of trash.

> **NOTE:** The gun tank may have a different filter in it. The different filter is tan with a dark brown top. This filter contains a disposable sediment filter cartridge. That cartridge needs to be replaced every time you change the water (for any reason).

BLUE FLUID TANK: The filters used for the blue colored water (in the tubes) are reusable. Once every 2 weeks, while changing the blue fluid, take the filter out. Clean it and return it to original location. Do this while the system is draining and there is no pressure on the system.

> **NOTE:** If the Water Pump System is clogged, water will not drain from the crossover tube, thus creating a flood.

CLEANING THE TUBES

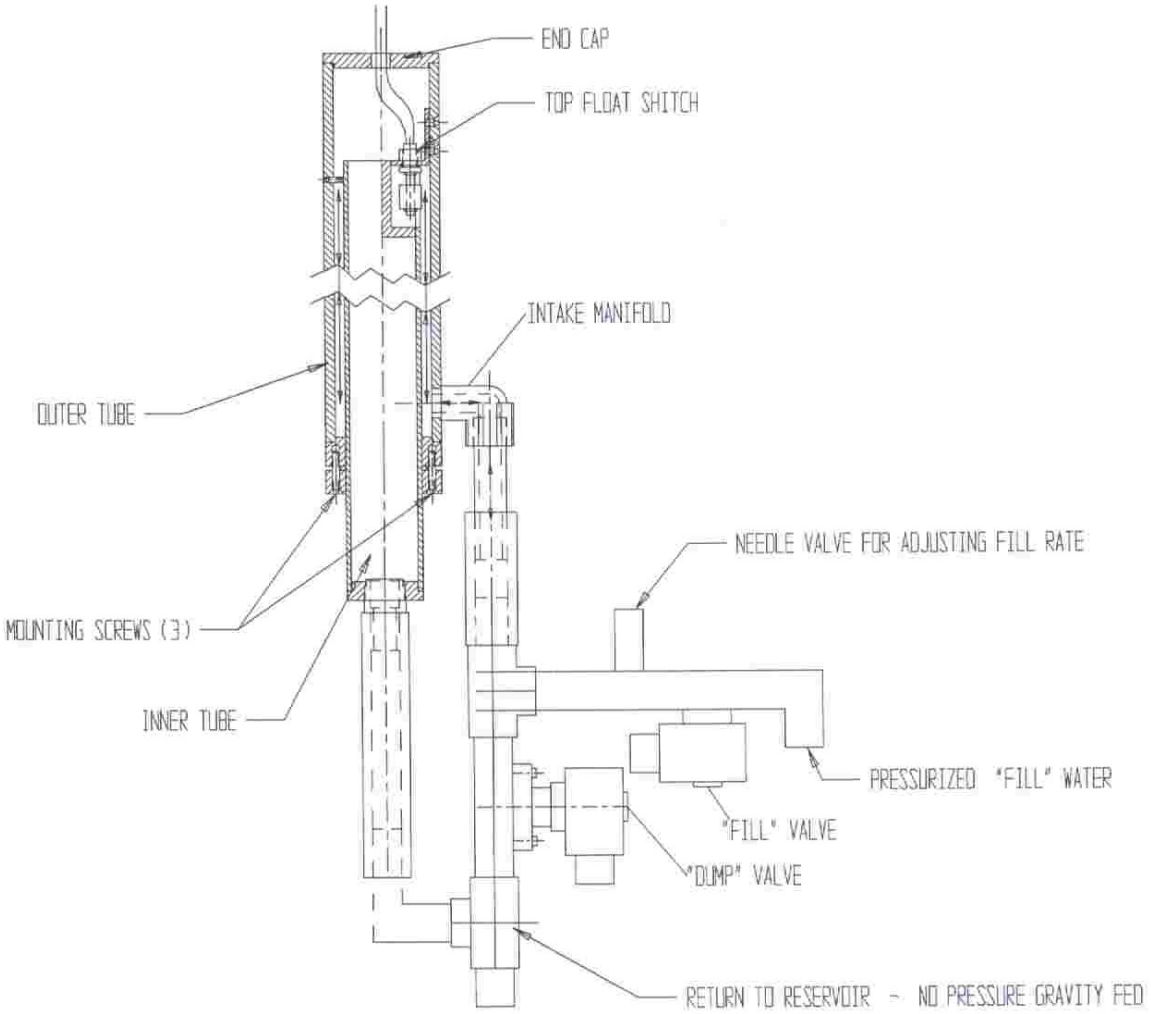
1. Turn game power and pumps to 'Off'.
2. Read all of the instructions before going any further.
3. Determine the type to Plexiglas you have:
   a. Pre 1995: This is the old style tube. Look at the base of the Plexiglas when it comes off, if it has hex screws holding the base in place, then it is the old style. (See Figure 1 in this section.)
   b. Post 1995: This is the new style tube. Look at the base of the Plexiglas when it comes off, if it has an aluminum piece on the bottom, then it is the new style. (See Figure 2 in this section.)
4. Go into the stock chute and remove the screws that hold the cover in place, over the top of the tubes.
5. Unplug the 3-pin Molex plug that is plugged into the switch at the top of each tube.
6. Remove back panels from each side of the game (These are the ones just below the top counter surface, on the lower part of the game, that the tubes go in. See the Pressurized Unit Layout Graphic, the Detail of the same Layout, the Detailed Pressurized Wiring Layout Graphic, and the Detailed Pressurized System Relay Board Wiring Graphic.)
7. Locate the two hoses leading to the Plexiglas cylinder and loosen the hose clamp closest to the tube on each hose.
8. Slide off the Plexiglas tube fitting. (Slide the tube up until the fittings clear the base of the counter, tipping the base of the tube toward the center of the game – toward the walkway. Then lower the tube down from the top.
9. Check float switches are clear and not tangled up. Do NOT rip the float switches out of the tube.
10. Place each tube that needs to be cleaned in a clean common work space to begin disassembly.
11. Remove Inner Tube:
    a. Loosen the float switch from tube by using a 1/8" Allen wrench on the 2 machine bolts located at the top of the tube, near the float switch assembly.
    b. Remove the 2 bolts.
    c. Slide float switch out of the top of the tube.
    d. Remove the inner tube from the Plexiglas cylinder.
12. Determine the year your game was built.
    a. Pre 1995: There are 3 machine screws holding the bottoms of the inner tube and the outer tube. Remove these machine screws. Slide the inside tube downward from the outside tube.
    b. Post 1995: Turn the base of the inside tube counter-clockwise and unthread if from the outside tube.
13. Keep the inner and outer tubes together for reassembly.
14. Locate the high pressure water tank; this is the tank that does not have the pick up to the pumps.

CLEANING THE TUBES

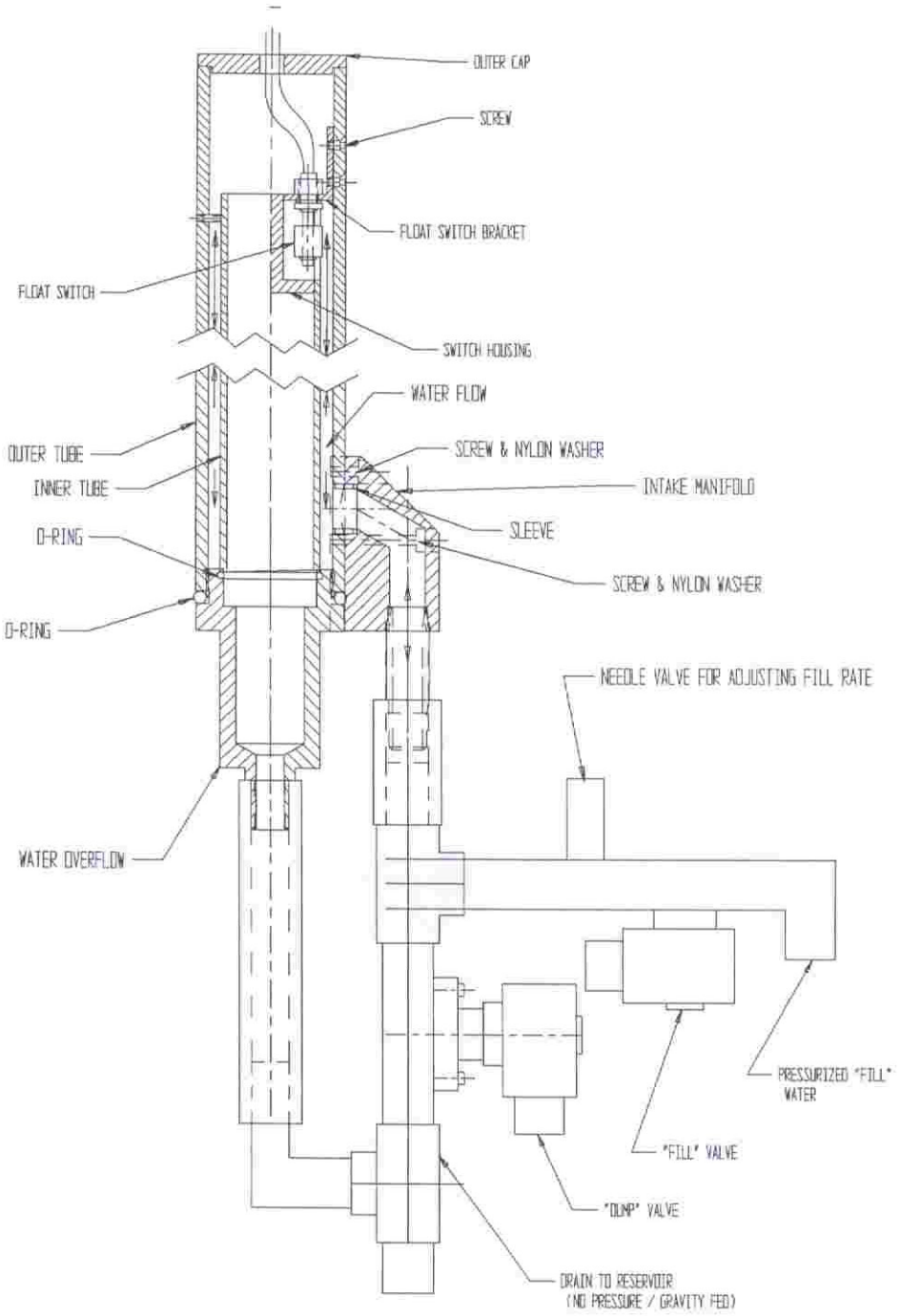
15. Plug the lower fitting in the front end of the tank (for the crossover tube which joins the two high pressure tanks).
16. Partially fill the plugged tank with water and a half gallon of vinegar. This tank is large enough to completely submerge the disassembled tubes.
17. Submerge the disassembled tubes.
18. Wash the inside of the tubes with the supplied brush by inserting it into either end.
19. Clean the outside of inner tube with a soft rag.
20. Rinse cleaned tubes with fresh water.
21. Re-assemble tubes (from step 12 backwards).
22. Install float assembly in the top of the tube.
23. Insert tube back into game by placing the top of the tube up through the stock bin (that the float switch wires go through) first, so you don't trap the float switches between the tube and the stock bin. Then lower the bottom end of the tube back down through the counter.
24. Slide the hoses back onto the corresponding fittings and tighten.
25. Plug float switches in and fasten down the wooden covers.
26. Drain the vinegar water from the tank.
27. Unplug the crossover tube.
28. Fill tank as you would normally and test each unit before replacing the inside covers over the plumbing of the game.
29. Run game and test for leakage (at the lower fittings).

If you experience any problems or have any questions, feel free to call the Technical Department.

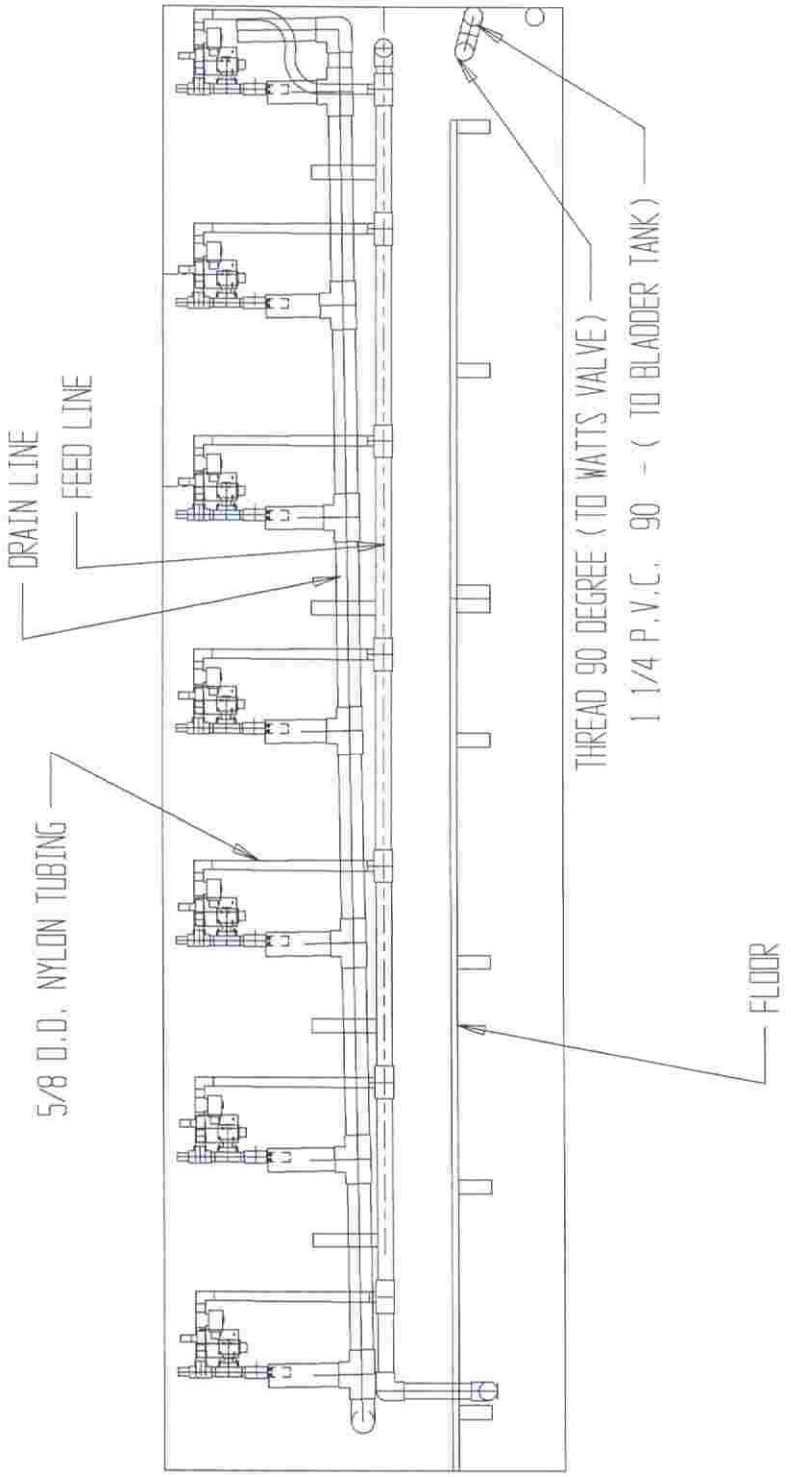
TUBE ASSEMBLY PRE 1995 (FIGURE #1)



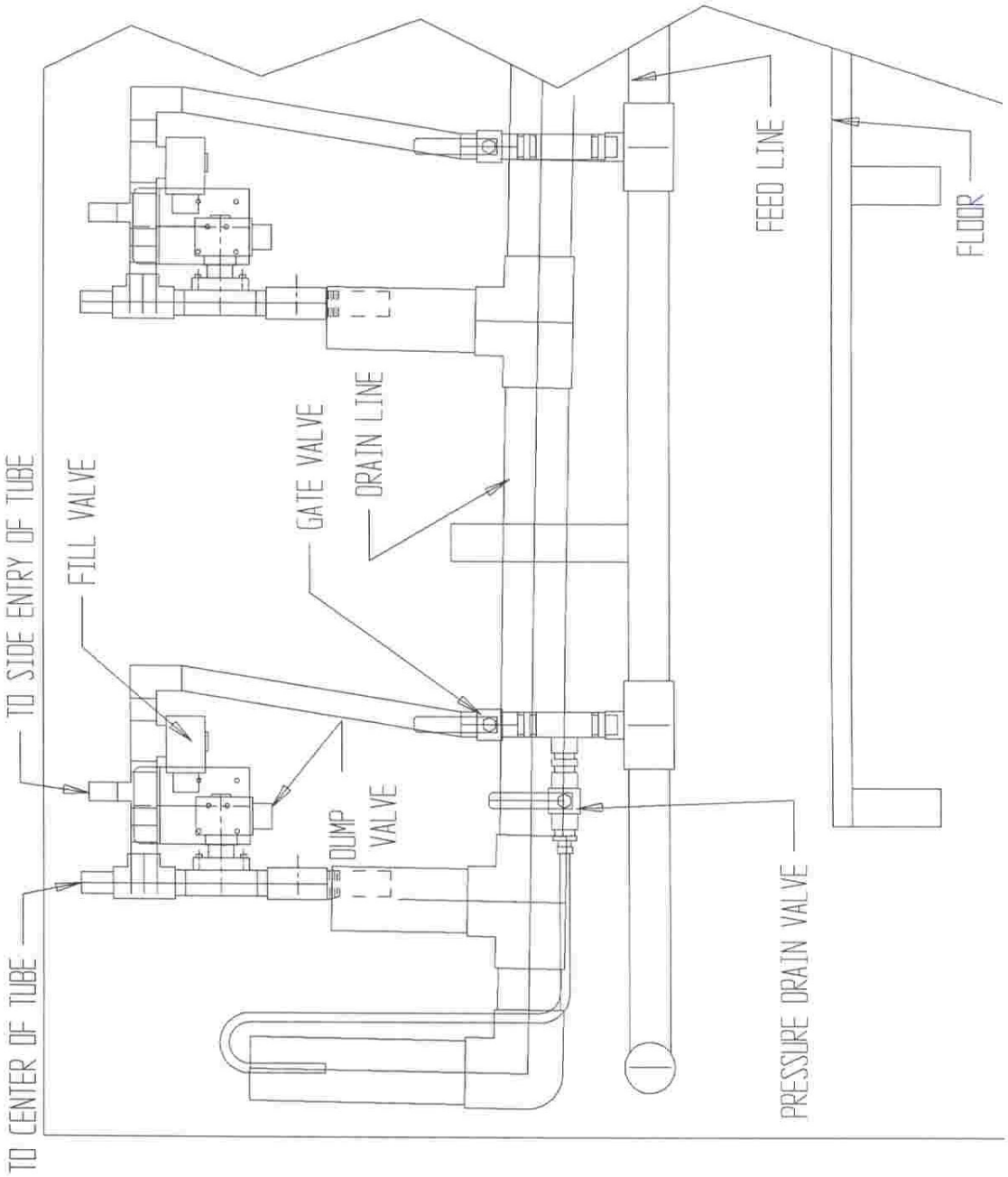
TUBE ASSEMBLY POST 1995 (FIGURE #2)



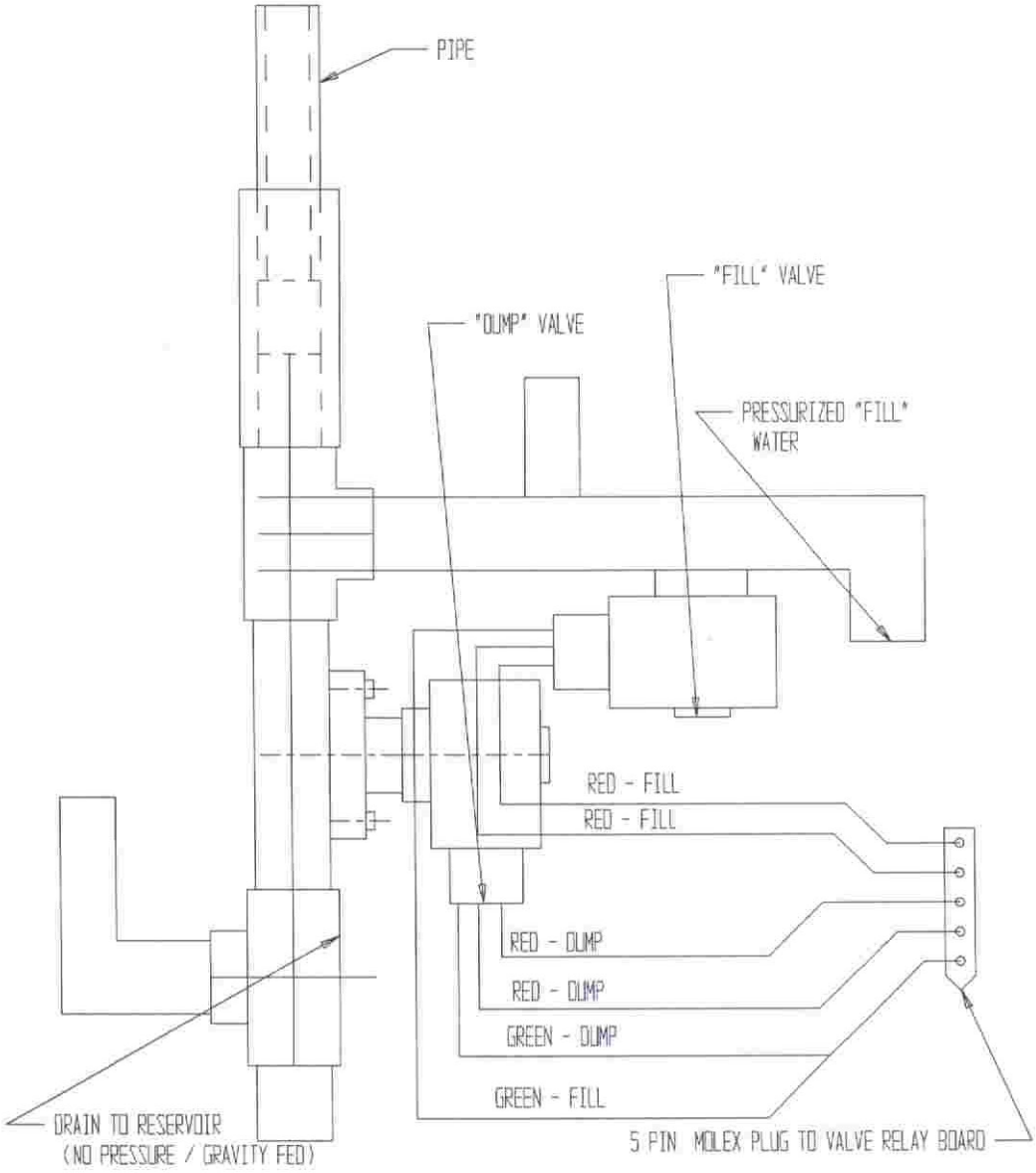
PRESSURIZED UNIT LAYOUT GRAPHIC



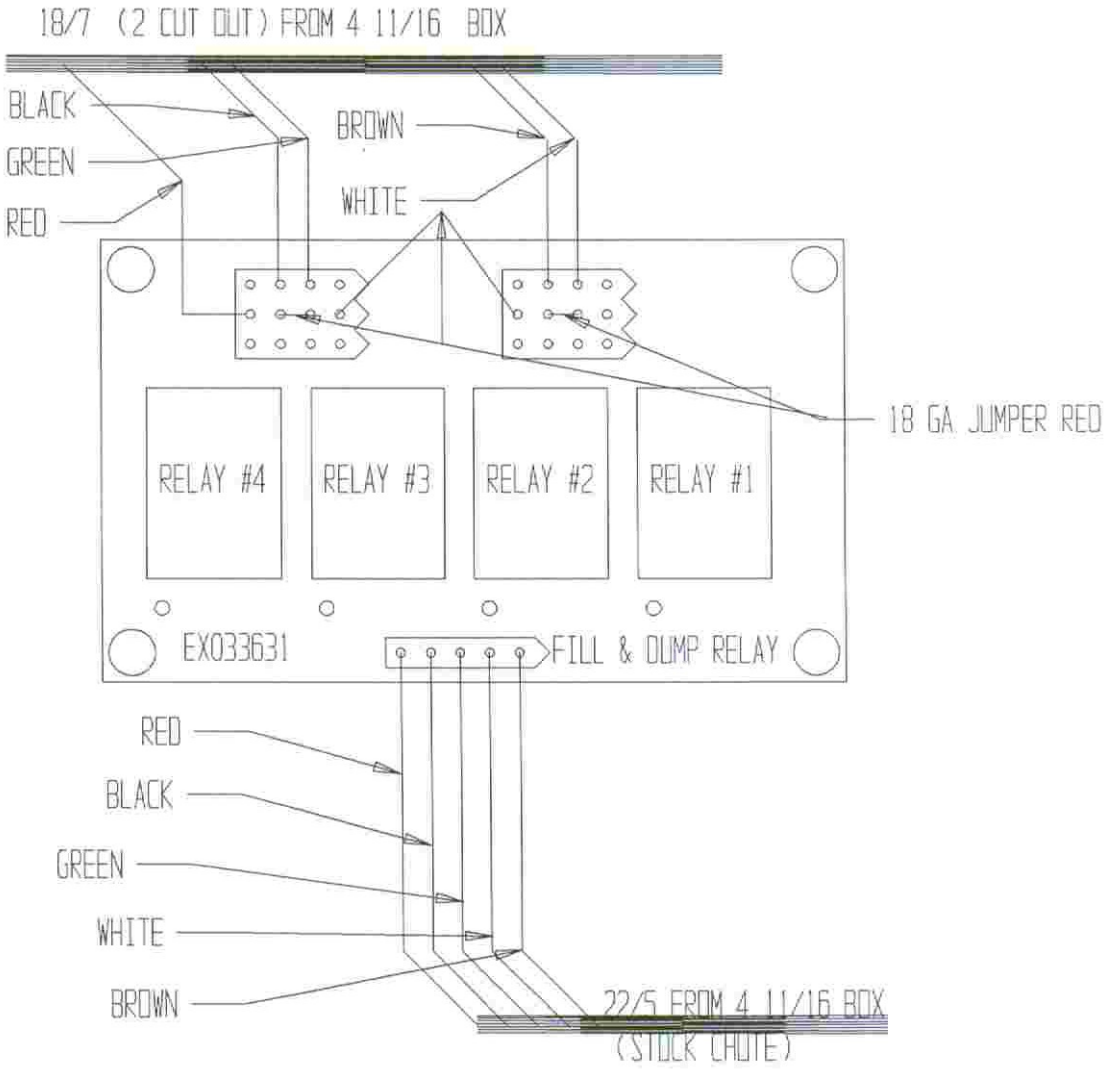
DETAILED PRESSURIZED UNIT LAYOUT



DETAILED PRESSURIZED SYSTEM WIRING LAYOUT GRAPHIC



DETAILED PRESSURIZED SYSTEM
RELAY BOARD WIRING GRAPHIC
(VALVE ASSEMBLY)



BACK-UP SYSTEMS

Most of our Rising Waters® games include a back-up system option, consisting of extra power supplies and extra water pump(s) for each system.

CHANGING QUICKLY FROM ONE POWER SUPPLY TO ANOTHER

1. Turn off the breaker to the power supply currently in use.
2. Swap wires from one power supply to the other.
3. Turn breaker back on.

CHANGING FROM ONE WATER PUMP TO ANOTHER

NOTE: If a pump is **NOT** used on a regular basis, it will go bad from simply sitting there. Water pumps need to be switched out on a regular basis (see Maintenance).

1. Unplug the first pump.
2. Plug in the second pump.
3. Open the valve on the output side of the second pump.
4. Close the valve on the output side of the first pump.

CRITICAL: Switch the valves so the water pumps are not damaged. If you are not certain about what needs to be done, call our Technical Department.

NEEDLE VALVE (GAME SPEED) ADJUSTMENT

1. Read all instructions before beginning procedure.
2. Reset all of the electronics in the game
    a. Turn game off.
    b. Turn game on.
3. Open each unit's needle valve all the way open (counter clockwise). (See Tube assembly Diagrams, this section Figures #1 and #2.)
4. Adjust the water flow into each tube to match the slowest filled tube. Do this by turning each knob clockwise until the water flow is the same in all tubes.
5. Place the game into 'test' mode.
    a. Pre 1993: Locate the Accounting LC Display. Turn the toggle switch to 'test'. Push and hold the 'CB Off' button until the bell rings (activating the test mode program).
    b. Post 1993: Locate the key switch found in the upper right hand corner of the electronics panel. Turn key to 'on' (bell rings briefly).
6. Fill tubes ¾ full.
    a. Pre 1993: Push 'up' or 'forward' to fill the tubes and push 'down' or 'stop' to drain.
    b. Post 1993: Push the 'forward' button to fill and the 'stop' button to drain the tubes.
7. Adjust the needle valves up or down, depending on how fast/slow the tube drains.
8. Repeat #6 and #7 for each tube until all are equal.
9. Place game into 'normal' mode:
    a. Pre 1993: Press and hold the 'CB Off' button until the bell rings.
    b. Post 1993: Turn the key to the 'off' position (bell rings briefly).

TO MAKE RISING WATER (BLUE WATER) FLUID:

1. Clear out the entire container of all remaining fluid.
2. Pour in 5 gallons of water. And add 1 quart of bleach for a 20 to 1 ratio on the bleach water.
3. Close the container. Severely agitate the container. So that any bacteria and or algae or molds will be killed
4. Pour out all fluid.
5. Add in 5 gallons of fresh water and agitate so as to remove the residual bleach water.
6. Pour out all fluid.
7. Add 8 gallons of glycerin.
8. Fill container full of tap water from the water softener up to the 52 gallon mark so you will be able to tip over the container when you are finished and get the fluid out.
9. Add 10 lbs. Of Ph balanced spa supreme (5 containers).
10. Add 2 ounces of Metal Magic.
11. Swirl the mixture together with the special air hose.
12. Check and balance the Ph on the system to between 7.0 to 7.4. Adding Ph as necessary if Ph is not balanced.
13. Add bluing after Ph is done.
14. Add 1 quart Protein Poly Magic Micro Flaw.

PRESSURIZED WATER SYSTEM-BLUE WATER

The pumps for the rising water tubes are completely different than the ones used by the guns. A 1-1/2 HP high-pressure well pump is used for the tubes. On either side of the game there is a holding tank, and a large bladder tank. The holding tanks, which are not pressurized, hold the main supply of water for the pressurized system. This is where the blue fluid is added for the tubes. The water is fed via gravity down to the intake of the water pumps. The pumps then send the water to the bladder tanks.

Bladders: The bladders maintain a certain pressure in the system so that the pump does not run all of the time during the race, and maintains equal pressure on all tube valves, regardless of which unit or number of units are being used. A crossover tube connects the two bladders. This pressure is maintained through an air bag (or bladder) inside the round tanks. There is a valve stem on one end of the bladder tank. This stem is under a black cap that just pulls off. The air pressure inside the tank should be 22psi. To check the air pressure, first remove all of the water pressure in the system. Then remove the black cap, and check the PSI of the air bladder using a tire gauge.

Pressure gauges: Under the power panel there is a cover that flips open. In here is your high-pressure gauge (telling you at what pressure the pump is turning off and on). The contactor for the high pressure pumps is also in this area.

PRESSURIZED WATER SYSTEM-BLUE WATER

A see through filter, which has a ball valve on the bottom for pressure release, a Watts valve for regulating the pressure to the tubes, a low pressure gauge telling you what pressure the watts valve is set at. An emergency Pop-off valve is set to open incase of over pressurization of system.

RELEASING AIR PRESSURE FROM THE BLADDERS

In order to prevent malfunction of the bladder operation during prolonged periods of inactivity, you must drain the blue water from the high pressure system and you must release the air pressure from the air bladders.

Remove the protective cap from the valve stem and press the Schrader Valve until all of the air is removed from the bladders. Using the appropriate tool, remove the Schrader Valve completely, and replace the protective cap.

Do not forget to replace the Schrader Valve, and replace the protective cap, when you have filled the bladder tanks. The bladder tanks must be at 48 psi before filling any water into the high pressure water system.

If you operate the game and the blue water pumps turn on and off every time blue water is being used, then you have the problem we are trying to prevent. If operating correctly, the blue water pumps will operate once every 1½ races, or less. The problem we are fixing is the air bag in the bladder tank is stuck to the walls of the bladder tank. Turn off the blue water pump breaker. Drain the air off of the bladder tanks. Remove the Schrader Valves. Turn the pressurized water pump breaker on, allowing the pressure to build. As the air bag is compressed, the water in the holding tank of the blue water system will be used up and more water will need to be added. When the pump builds to pressure and shuts off, allow the system to sit for ten minutes. If the pump turns on, wait another ten minutes after it quits again (you may need to add water to the holding tanks again). Turn the breaker off for the pressure pumps and open the bottom valve on the Clear Vue filter to drain the pressurized system. Fill all bladder tanks to 48 psi, wait one minute. Check the pressure, while keeping the drain on the Clear Vue filter open. If the pressure is less than 48 psi fill again and repeat the process of waiting one minute and check the tank pressure until you get 48 psi. This will take a while as all of the water in the bladder tanks needs to be squeezed out. Once the tanks are at a stable 48 psi, proceed filling the blue water system as normal.

UNPRESSURIZED WATER SYSTEM (FOR TAPS/GUNS)

On either side of the game, there is a tank that collects the water that runs out of the tap. The tanks are tied together with a crossover tube so that both tanks have the same amount of water in them. These tanks contain the main supply of water for the taps. The water is fed via gravity down to the intake of the water pump. (See Water Pump Diagram, next page.) The water pump then sends the water through the water filter cartridge, which removes any sediment from the water.

The filter is specifically to keep large mineral deposits, etc., from making their way out to the tips of the water guns where there is a very small hole. A mineral deposit could greatly restrict the amount of water passing through the guns. This is a sediment filter; we are only trying to get out the large particles and not to filter for drinking water. If a higher quality filter is used, i.e. a .02 Micron Filter, or any filter that would remove 99.9% of contaminants, that would take away from the water pressure needed to push the water through the guns, regardless of where the pressure regulator is set up.

From the water filter cartridge the water passes through to the Watts Valve, also called a pressure regulator. (Your game may not have a Watts Valve.) This allows for regulation of the water pressure to the front counter. On top of the Watts Valve there are two large bolt-looking caps, which are actually hollow bolts. The one closest to the water filter is the smallest. Upon removal of the cap, there is a cylindrical tube made out of a screen/mesh material. This is a free filter that keeps any large particles from going through the pressure regulator, as they would damage the diaphragm (a rubber disk that causes the pressure regulator to operate).

a. One important thing to note about the screen (the pre-filter screen) on the Watts Valve (the Pressure Regulator). Often, if there is not enough water pressure, the reason could be that the pre-filter screen has a build-up of algae or other debris on it, and the screen needs to be removed and cleaned. Make certain the pump is NOT running when you do this, as the bolt will be under pressure.

b. <u>Do</u> <u>not</u> remove the larger cap, which is directly above the adjustment screw. The reason for this is because it holds the spring that operates the diaphragm and if that cap is loosened, there is a chance the diaphragm could be damaged. Below that cap is the pressure adjustment screw. This allows for pressure adjustment if the Watts Valve is not putting out enough pressure.

c. There is a jam nut up near the casing of the pressure regulator. After that nut is loosened, adjust to the desired pressure and tighten the nut (closest to the body) tight up against the body, so that the adjustment screw cannot vibrate loose.

UNPRESSURIZED WATER SYSTEM (FOR TAPS/GUNS)

The water passes from the Watts Valve into a red rubber hose and out to the front counter. The hose is then attached to a check valve that allows water to go out to the front counter. The check valve will not allow the water to drain from the front counter back to the water pump when it is turned off. From the check valve the water goes up into a manifold where all of the valves are mounted for each of the individual unit stations.

These valves, when operated, allow water to pass from the manifold into the water tap where water runs out into the pitcher. Any water from the manifold that is not used passes through the manifold into a reducer coupling and comes back to the holding tank via a 1/2" return line, which is a piece of 1/2" copper tubing. It is important that this line is not clogged up or restricted in any way, as it will damage the seals in the pump.

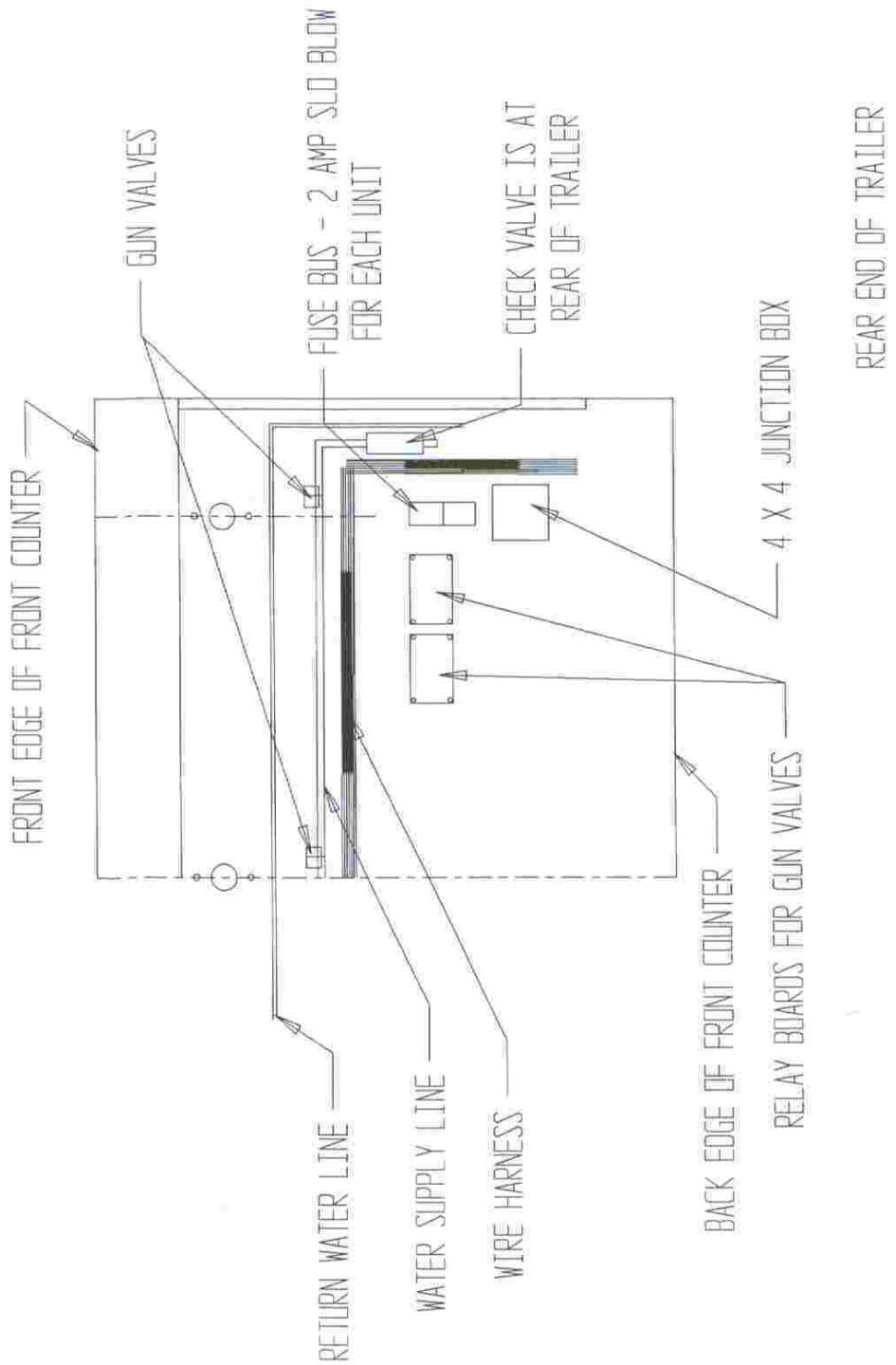
There is a stainless steel mesh screen in the holding tank in the bottom of the pan near the center. The screen is made out of stainless steel because it needs to be rigid enough so it cannot be compressed down into the water intake line. The reason for the screen is to prevent foreign objects thrown into the water tank from getting sucked up into the water pump where they could damage the impeller or any of the seals. This screen must be cleaned daily.

The water pump has an intake, which is the larger size fitting on the pump. The smaller fitting is the output of the water pump. The water pump we use is a 1 Hp well pump that operates off of 220V through a contactor that is turned on when the game goes into RACE MODE. The output of the water pump goes up into a water filter canister. On top of the water filter there is a red button that is used to allow air to bleed out of the water pump system whenever the pump is trying to 'prime'. Many times this is not needed, because gravity is feeding the water pump. If difficulties should occur in getting the pump to prime, just press the red button and it will allow air to escape out of the lines, thus reducing the pressure the pump is fighting against to push the water through. This action will bleed off any air pockets in the system between the pump and the fill side.

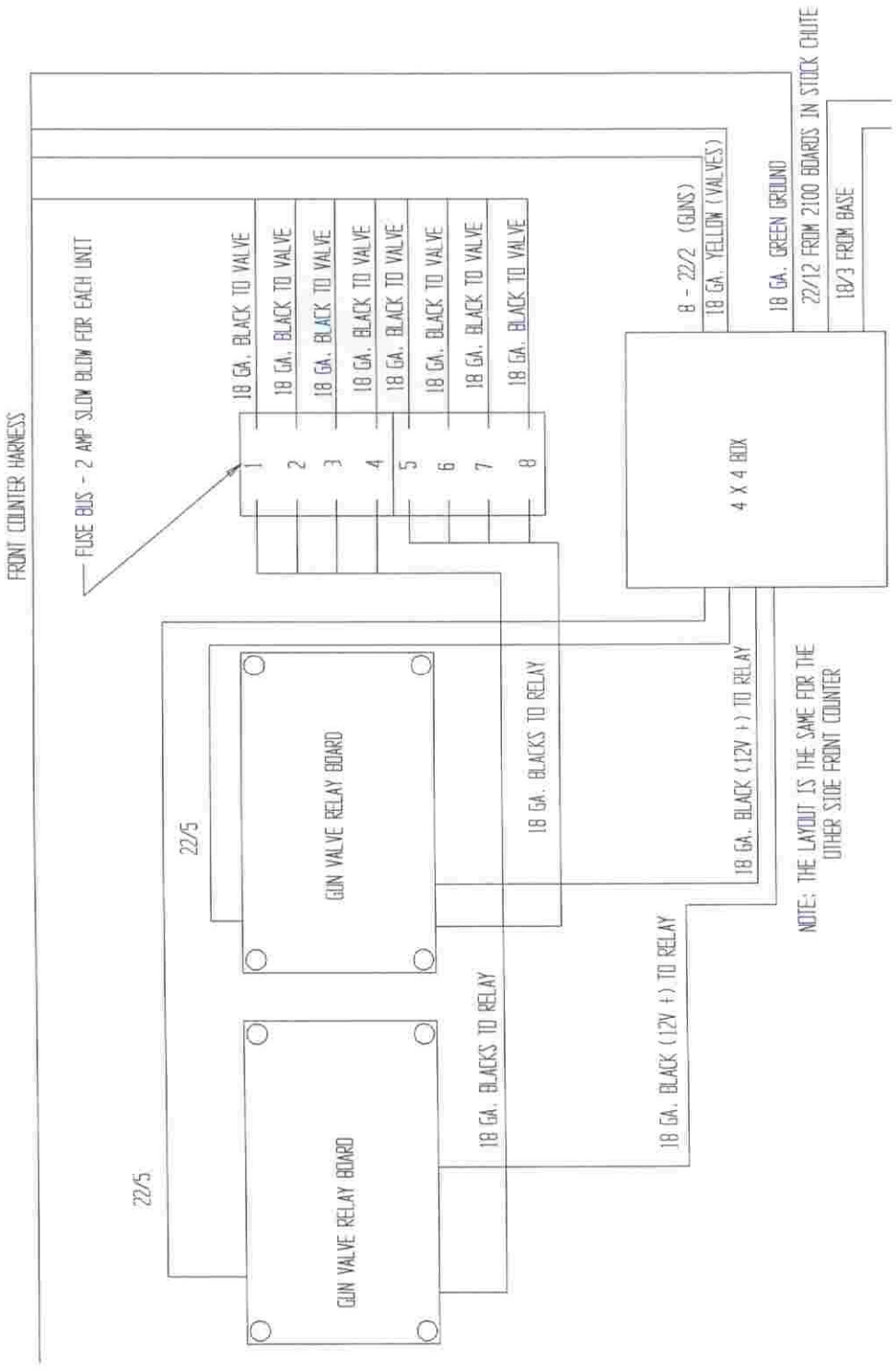
Priming water system: If you experience difficulties priming the gun water system, look for the following:

1. Check tank screen for debris.
2. Check gun filter to see if it is clean.
3. Make certain the valve is open on the pump you are running.
4. Open ball valve on bottom of filter with pump running.
5. When all of the above has been checked, try sticking a water hose into the pick-up hole to force water into the pump.
6. If the above does not work, you will need to remove a plug from the top of the pump, and fill the pump with water.
7. If the above hasn't worked, then re-check everything a second time. Pump may need to be sent in for repair.

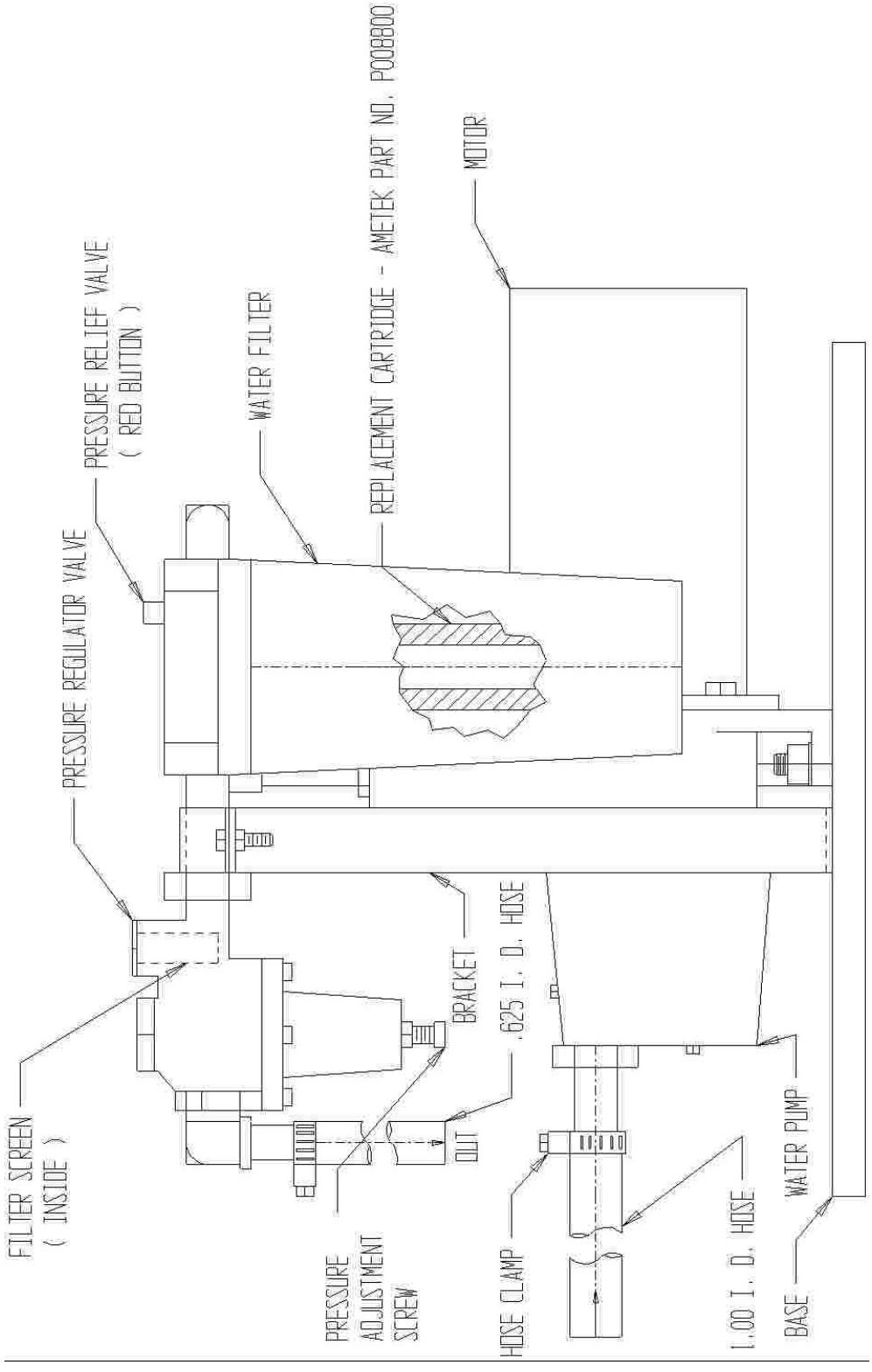
FRONT COUNTER LAYOUT GRAPHIC



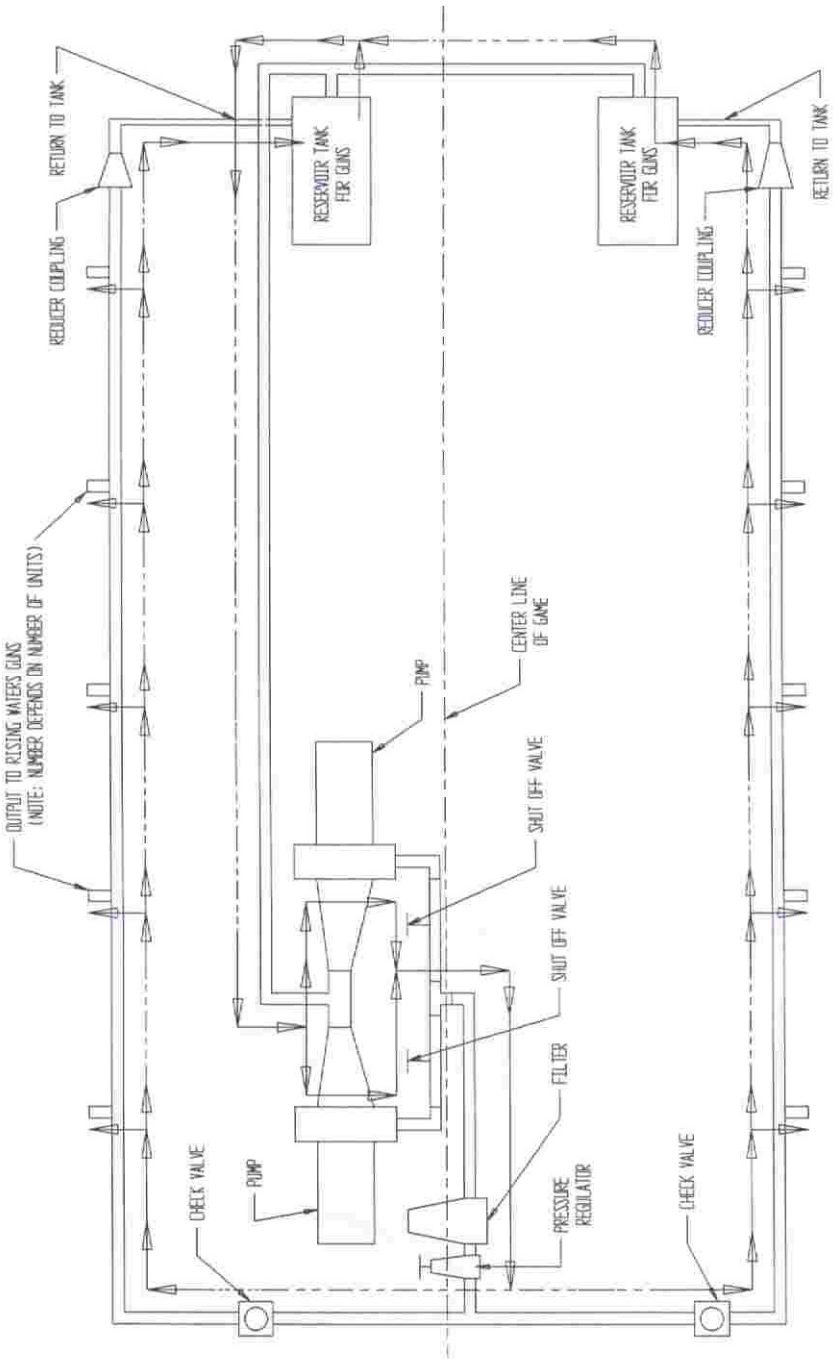
FRONT COUNTER WIRING LAYOUT GRAPHIC



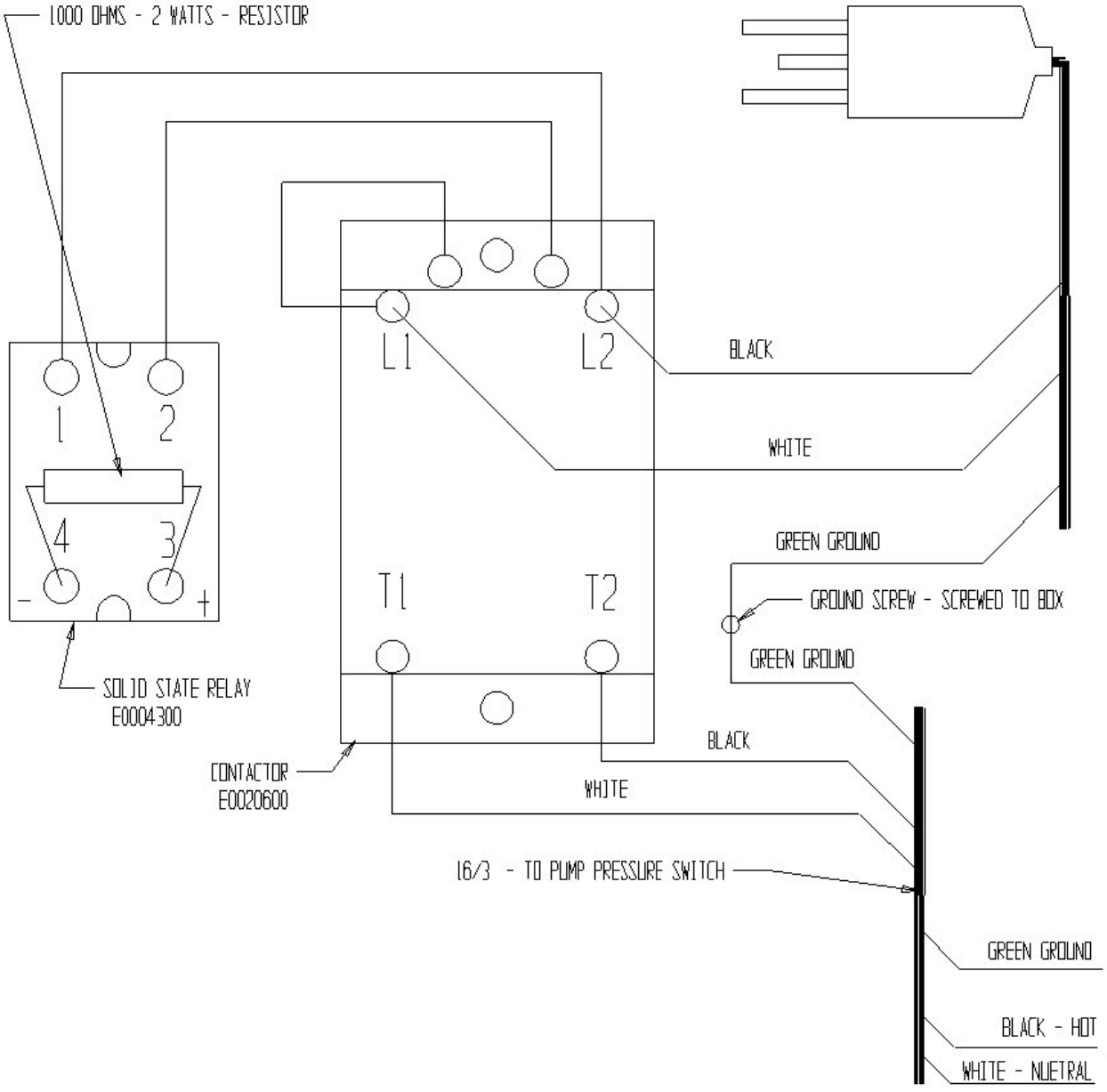
WATER PUMP DIAGRAM



GUN FLUID SCHEMATIC



CONTACTOR BOX WIRING DIAGRAM



WINTERIZING A WATER GAME

When water freezes it expands, thus causing anything that is holding it to crack. This means your frozen tubing, the water pumps, the filter casings, and the manifolds – anything that the frozen water is in where there is no room for expansion. All of this adds up to very expensive repairs and replacements during the spring thaw. To prevent such a costly project we at Bob's Space Racers® recommend that every game with water in it be 'winterized'.

Winterizing is an easy and relatively inexpensive process to go through to protect your money-making games. You will need at least six to ten (6 – 10) gallons of propylene glycol based antifreeze, one (1) hydrometer, and containers large enough to hold all of the fluid. The hydrometer is used to test the freeze point of antifreeze after it has been put into your game. You can obtain the proper type of antifreeze and hydrometer from a recreation vehicle (RV) supplier.

CAUTION: WHEN USING PROPYLENE GLYCOL ANTIFREEZE YOU MUST FOLLOW ALL INSTRUCTIONS ON THE LABEL OF THE CONTAINER THAT IT CAME IN!

When you are closing the game for the winter season, and you have the above supplies, follow the below procedures: READ ALL DIRECTIONS BEFORE STARTING!

1. Empty water tanks of all water to within (1") one inch above the top of the drain. Remember to clean out all of the debris just like you would normally do during regular maintenance on the water system. Repeat this process for the back-up pump.
   Note: These are the water tanks for the guns and/or taps, not the holding and bladder tanks for the Rising Water® tubes.
2. Close water drain.
3. Add approximately six (6) gallons of the propylene glycol based antifreeze to the water tanks. If this is not enough antifreeze to thoroughly circulate through the entire system and both pumps, then you will need to add more.
4. Turn game on and play each player-unit until you see the antifreeze come out of the gun, this will look foamy. If your game has target pans, **do not shoot the antifreeze at the target pan,** aim the guns to the side.
5. If this process has taken less than five (5) minutes, then allow the pump to run for a total of five minutes.
6. Use the hydrometer to check the freeze point of the antifreeze; it should read between -42° F and -26° F. If the temperature is not between -42° F and -26° F, then you need to add more antifreeze and repeat step four. If the temperature is between -42° F and -26° F, then continue on to step seven (7).
7. Switch pumps.
8. Let pump run for five (5) minutes.
9. Turn power off.

WINTERIZING A WATER GAME

10. Place the containers under the drain plugs at the front of the trailer and remove the plugs. Or, if you have a park model, place the container at the open end of the drain tube and open the drain valve. Remember this drain system is gravity-fed and you will want to catch as much of the propylene glycol antifreeze as possible in order to re-use it on the Rising Water® tubes.
11. Remove the filter cartridge housing, wash it and store near the filter unit. Discard the old filter.
12. Remove the guns from the hoses and store the guns inside. Let the hoses hang into the containers and allow for all of the antifreeze to drip out.
13. Remove all drain plugs, and use compressed air to blow out all of the lines and housings.
14. After all of the antifreeze is drained, you will need to wipe the entire game dry. This insures all water and antifreeze that can be removed from the game has been removed.
15. Block all open holes to prevent rodents from moving in during the winter.
16. If your game has relay electronics, you will need to wrap up the master control box to prevent it from being damaged during the cold weather.

17. Remove all batteries and store them inside. (Batteries may be used for the awning of a trailer).

Winterizing Rising Water® Tubes: READ ALL DIRECTIONS BEFORE STARTING!

1. Drain all of the water from the holding tanks and the bladder tanks for the Rising Water® tubes and close drain.
2. Add the used (saved from the above procedure) propylene glycol antifreeze to the holding tanks.
3. The antifreeze will need to be filled to two inches (2") above the intake line. You will most likely need to add more, fresh, antifreeze.
4. Pressurize the system. *Immediately shut off pump* as soon as antifreeze level reaches the intake line!
5. Put game into "TEST" mode.
6. Push the "FORWARD" button – for about ten (10) seconds – and "STOP" button (both found on the push-station). The "FORWARD" button is to fill the tube and the "STOP" button is to drain the tube. You will need enough antifreeze to **fill each tube up one to two inches (1" – 2") at the bottom**. DO NOT ALLOW THE ANTIFREEZE TO GO ALL THE WAY UP INTO THE TUBES! IT WILL LEAVE A RESIDUE ON THE TUBES THAT DOES NOT COME OFF.
7. Repeat steps three through six (3 – 6) until you see antifreeze foaming in the bottom (2") two inches of each tube.
8. Drain tubes.

Winterizing Rising Water® Tubes:

9. Use the hydrometer to check the freeze point of the antifreeze; it should read between -42° F and -26° F. If the temperature is not between -42° F and -26° F, then you need to add more antifreeze and repeat steps three through six (3 – 6) until you see antifreeze foaming in the bottom (2") two inches of each tube. If the temperature is between -42° F and -26° F, then continue to step ten (10).
10. Switch pump tanks.
11. Repeat steps three through six (3 - 6), to ensure the entire system has antifreeze run through it.
12. Turn off pumps. The air pressure will automatically go down.
13. Drain the antifreeze into your containers for proper disposal. Try to obtain as much of the antifreeze as possible.

CAUTION: WHEN USING PROPYLENE GLYCOL ANTIFREEZE YOU MUST FOLLOW ALL INSTRUCTIONS ON THE LABEL OF THE CONTAINER THAT IT CAME IN!

OPERATING A WATER GAME IN BELOW FREEZING TEMPERATURES

To operate your game in below freezing temperatures you must first winterize the game using the above procedures (Winterizing a Water Game and Winterizing Rising Waters® Tubes).

Note: you must circulate the water/antifreeze solution throughout the system and make certain the pump turns on and off at least twice. Switch pumps and circulate the solution throughout, with this pump turning on and off at least twice.

Using the hydrometer, measure the solution for the correct freeze temperatures (see step #9 above). You may not operate the game below these freeze temperatures because it will damage the game.

WHEN THE GAME IS DOWN LONGER THAN 30 DAYS

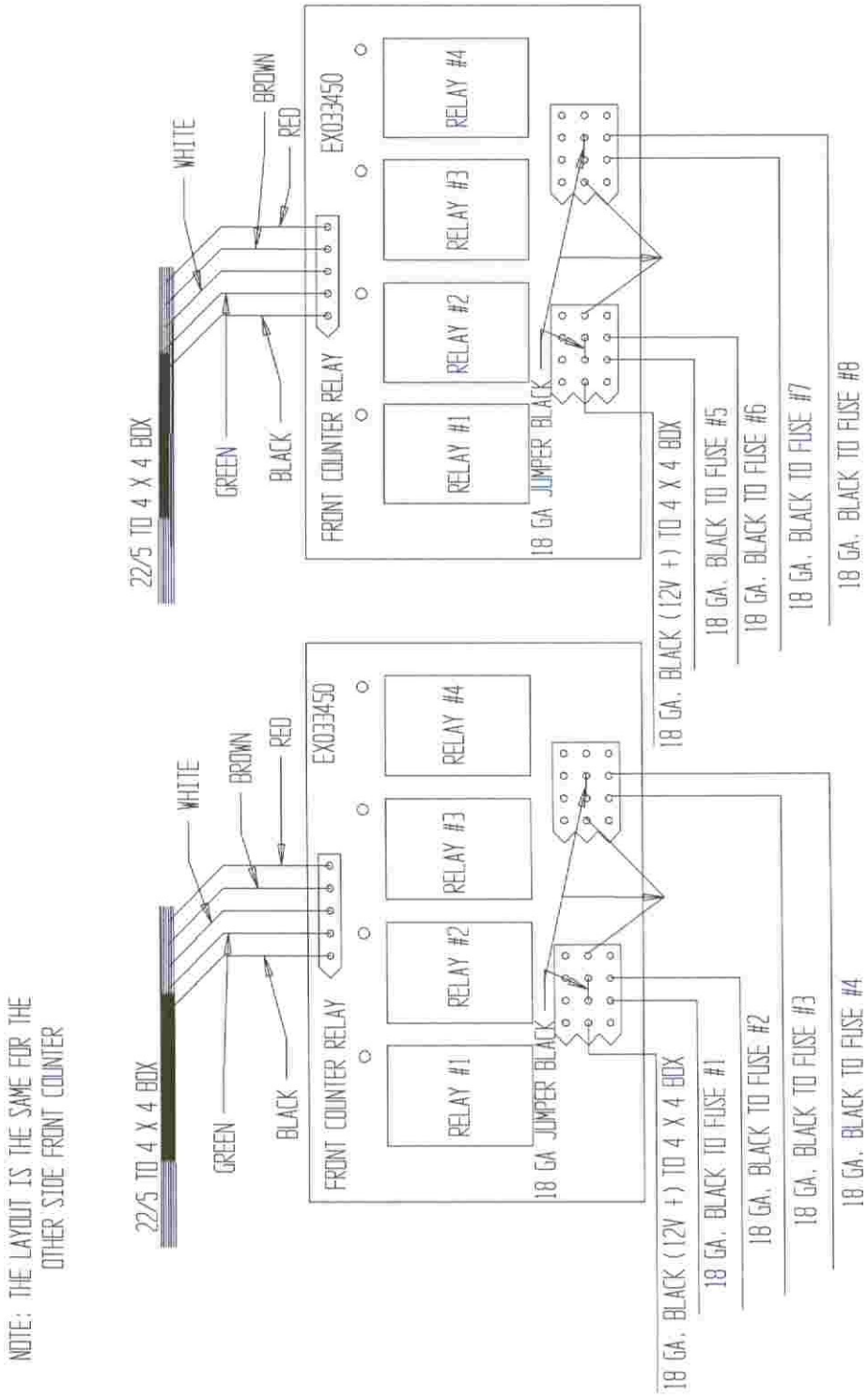
In order to prevent malfunction of the bladder operation during prolonged periods of inactivity, along with draining the blue water from the high pressure system, you must release the air pressure from the bladders!

Remove the protective cap from the valve stem and press the Schraeder Valve until all of the air is removed from the bladders. Using the appropriate tool remove the Schraeder Valve completely and replace the protective cap.

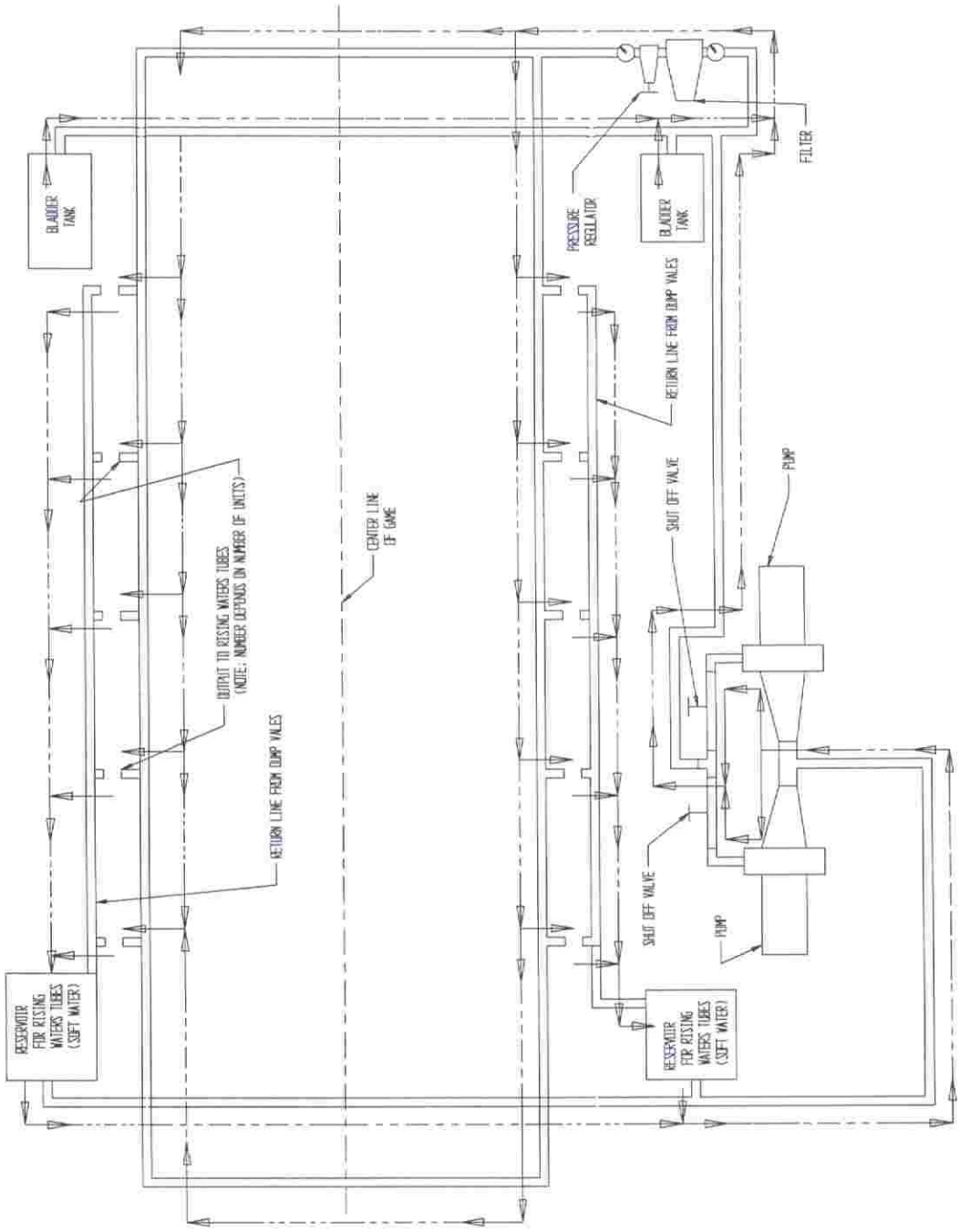
Remember: You must fill the bladder tanks to the recommended 22 psi before filling any water into the high pressure water system. To do this you must replace the Schraeder Valve and the protective cap.

If you operate the game and the blue water pumps turn on and off every time blue water is being used then you have the problem we are trying to prevent. If the water pump is operating correctly, the blue water pumps will operate once every 1 ½ races or less. The problem we are fixing is the air bag in the bladder tank is stuck to the walls of the bladder tank. Turn off the blue water pump breaker. Drain the air off of the bladder tanks. Remove the Schraeder Valves. Turn the pressurized water pump breaker on, allowing pressure to build. This is to 'squeeze' the air bag off of the tank wall. As the air bag is compressed, the water in the holding tank of the blue water system will be used up and more water will need to be added. When the pump builds to pressure and shuts off, allow the system to sit for 10 minutes. If the pump turns on, wait another 10 minutes after it quits again (you may need to add water to the holding tanks again). Turn the breaker off for the pressure pumps and open the bottom valve on the Clear Vue Filter to drain the pressurized system. Fill all bladder tanks to 22 psi, wait 1 minute. Check the pressure (the drain on the Clear Vue Filter needs to remain open). If the pressure is less than 22 psi, then fill again and repeat the process of waiting 1 minute and check the tank pressure (repeat until you get 22 psi). This will take a while as all of the water in the bladder tanks needs to be squeezed out. Once the tanks are at a stable 22 psi, proceed filling the blue water system as normal.

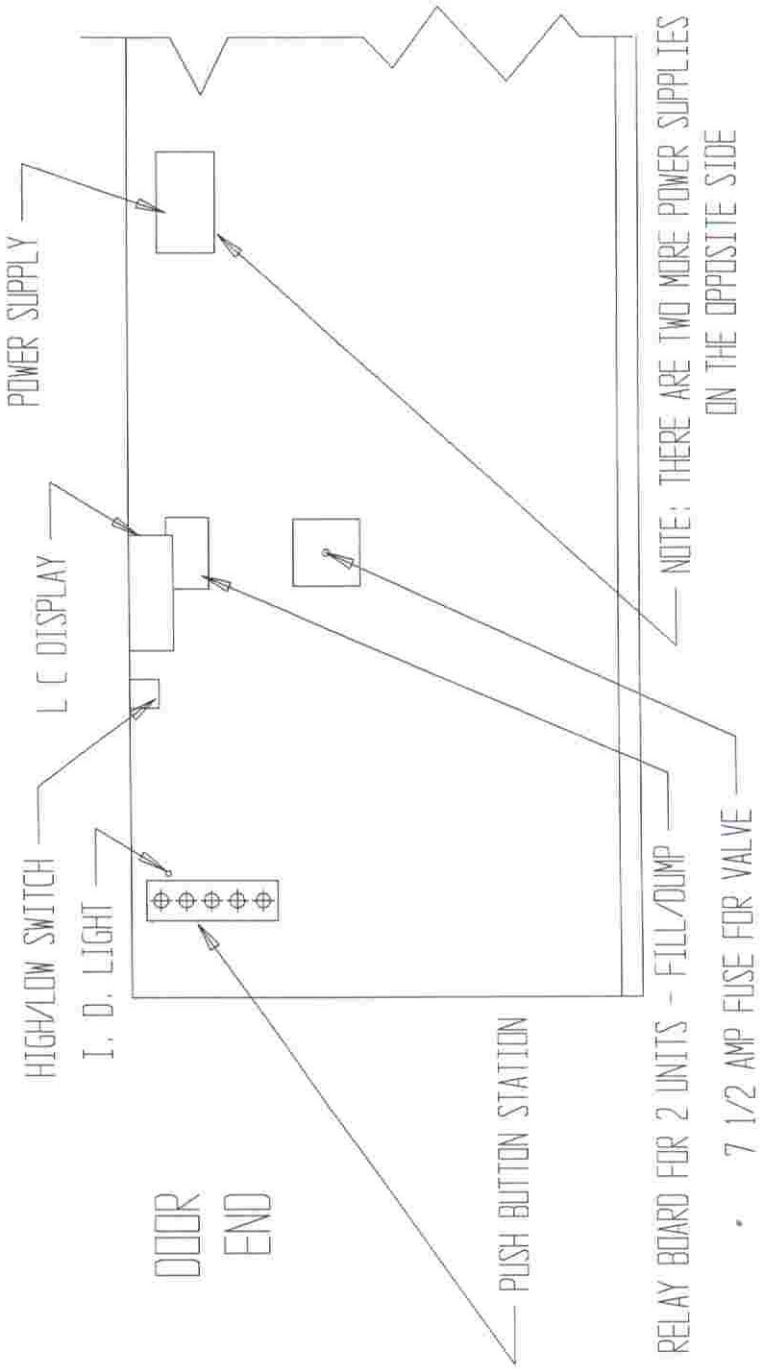
FRONT COUNTER RELAY BOARD LAYOUT



PRESSURIZED FLUID SCHEMATIC



TANK BACK PARTS LAYOUT



PUMP ADJUSTMENT
FOR THE PRESSURE TANK TUBE SYSTEM

It is not recommended that any adjustments be made unless absolutely necessary. However, from time to time, it may be noticeable that the water pump contactor is 'chattering'. This can cause the adjustment screws inside the pressure switch to move. The pressure should not waiver more than +/- 5% from the recommended setting. An accurate pressure gauge will be needed to make any adjustments.

When starting the system from scratch, and with all of the water pressure out of the tanks, the air pressure in the pressurized bladder tanks should be 22 psi. The cut-in pressure at the pump should be 50 psi. The cut-out pressure on the pumps should be 85 psi. The output side of the Watts Valve should be 30 psi. **Important: It will not be possible to check the air pressure in the pressurized bladder tanks unless the system is completely drained of water, and the drain valve on the bottom of the sediment filter is open.** If the pressure in the tanks is checked before draining the pressurized system, it would be completely inaccurate and would be of no benefit.

Again, the bladder tank pressure is checked with the system completely drained. There is a Schraeder Valve (valve stem on a tire) on the bladder tank on the opposite side from the plumbing. Use an accurate tire gauge to check the pressure inside the tanks (before any water is added, or after the water is drained – see Pressurized Water System). The pressure should be 48 psi +/- 1 or 2. The closer you are to 48 psi, the more accurate the pressure to the tubes will be.

To check the cut-in pressure, with the power ON, drain the pressure by running the tubes up and down until the pump comes on. Verify the pressure on the gauge by the pump that the cut-in pressure is 50 psi. The pump should run until the cut-out pressure is 85 psi. If this is not correct, it can be adjusted. The pressure switch requires very small adjustments. On systems before 1996 each pump of the pressurized system has its own pressure switch at the pump, which will require checking and adjustment. On systems front 1996 and beyond, a single pressure switch located near the Watts Valve (in the access below the circuit breaker panel in a trailer). Be very careful to adjust it properly, according to the instructions on the inside of the pressure switch cover.

CHARCOAL FILTER REJUVENATION (ONLY ON GAMES MADE PRIOR TO 1997)

A water softening system, for softening the water that goes into the tubes, is supplied on all Rising Waters® Trailers and Park Model games made prior to 1997. The reason for this is that if the water is hard water, it will eventually leave deposits on the inside of the tubes and will look unsightly. Deposits in the water lines will also make the game more difficult to 'balance' and will increase maintenance. We recommend that the water be changed every 2 weeks. The water softening system will need to be rejuvenated after every 3rd use.

Along with the game is a cart with 1 or 2 tanks on it (depending on the year of manufacture of your game). A common manifold joins the 2 tanks together. Attached to one end is a hose, and the other end of has a connection for a garden hose. Also, included is a large salt/brine tank (referred to as a 'trash can'), and a timer unit. To rejuvenate the tanks, they must be removed one at a time. Unscrew the top of the tank and install the timer (see the Charcoal Filter Rejuvenation Plumbing Diagram on the next page).

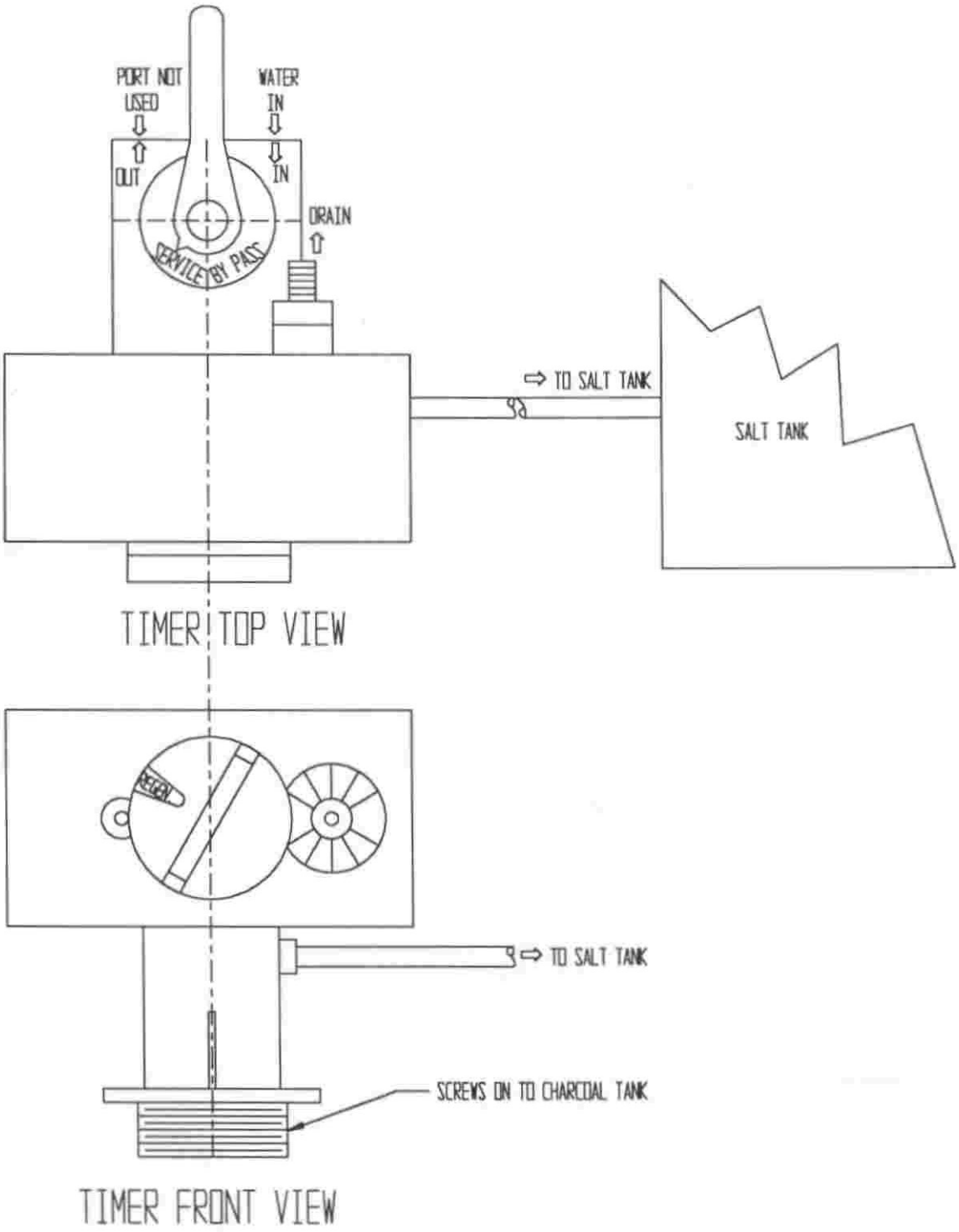
Fill the 'trash can' (Brine Tank) with a 20 lb bag of water softening system salt pellets, approximately 2-3" covering the bottom. Connect a garden hose to the timer (see Diagram on next page) and connect the pipe from the salt water solution to the timer. On the right hand side of the timer run the discharge hose over to a drain. Turn the water supply to the garden hose 'ON' and fill the 'trash can' with water, until the float inside the 'trash can' is activated. Also, plug the timer into a 110V power outlet. Turn the selector handle to the 'service' position, close the ball valve on the outgoing system (yellow handle in the 'up' position).

Turn the knob on the front of the timer to the 'REGEN' position. The timer is set for one cycle of 'clean and rinse', and lasts for about 2-3 hours. The unit may be left unattended after the cycle has started.

Once the cycle has finished, turn off the water supply. Remove the timer and replace the top of the tank.

Repeat this procedure for the other tank.

CHARCOAL FILTER REJUVENATION PLUMBING DIAGRAM



TROUBLESHOOTING – CLEAR WATER (GUN) SYSTEM

PROBLEMS/CAUSES	SUGGESTED FIX
Low Pressure/No Pressure	
Lost Prime	Run pump; press the RED button on the top of the water filter to relieve trapped air.
Clogged Filter Cartridge/Watts Valve Screen	Replace paper filter/ clean Watts Filter.
Clear Vue Filter Clogged	Remove inner screen, wash with soap and water, rinse, and replace.
Broken Impeller	Replace.
Trash In Pump	Open pump and clean inside.
Lint On Tank Screen	The tank screen is located in the bottom of the tank or on the side of the tank near the bottom. Remove and clean off lint, replace.
Water Supply Hoses to Front Counter Kinked Under Counter (Center Joint Games)	Lift counter and place hose in proper position.
Check The Valves at Front Counter to See if They Are Stuck Shut or Partially Closed	Tap the valve with a wrench handle to jar it loose; replace valve.
Motor Does Not Run	
No Power	Check circuit breaker.
Thermal Circuit Breaker	If motor is hot, let it cool.
Bad Pressure Switch on Pump	Check contacts for free movement (do this with pump unplugged from power).
Bad Solid State Relay	Check input and output voltages. If there is input voltage but no output voltage, then the solid state relay is bad. Replace it.
Insufficient Voltage at Pump Motors (Motors Hum and/or Run Very Hot). 110V AC at Pump Instead of 220V AC.	Be certain lead lines are connected to opposite phases.
Motor Does Not Run (continued)	
High Pressure Reading On Pressure Valve At Pump	Gate valve for that pump is closed – open valve, and close the valve for the pump that is not being used.
Pump Runs While Blue Water Fills and Shuts Off When Blue Water is Not Filling	See WHEN THE GAME IS DOWN LONGER THAN 30 DAYS section (above).

TROUBLESHOOTING – CLEAR WATER (GUN) SYSTEM

PROBLEMS/CAUSES	SUGGESTED FIX
Pump Runs Continuously	
Bad Contactors	Check contactors to see if they have welded shut or are just stuck. If they are welded shut, they need to be replaced.
Bad Board	Check the LED outputs for proper operation.
Bad Pressure Switch (Pressurized System)	Incorrect cut-off pressure; adjust switch.
Pressure Plate in Pressure Switch Jammed	Remove the cover of the pressure switch (with the power OFF). Examine the movement of the contact plate (that moves to open and close the contacts). Look for anything that might rub against the contact plate that may prevent it from moving (i.e. a mounting screw). Correct the problem.
No Water Shooting Out of Guns	
Check all of the above listed problems first. Solenoid Valve Not Operating	Check relay board. Is relay operating? Is LED on the board operating when you shoot the gun? If LED comes on, probably a bad relay.
Gun Tip Clogged	Clean gun tip with a #57 drill bit by hand. DO NOT USE AN ACTUAL DRILL – USING THE DRILL BIT IN A DRILL WILL DAMAGE THE TIPS! Shoot gun with brass tip removed.
No Pressure On One Unit	
Clogged Tip	Remove tip and see if gun operates.
Bad Relay	Is relay operating? Is LED on the board operating when you shoot the gun? If LED comes on, probably a bad relay.
Guns Shoot Over or Around the Counter	
Gun Not at Correct Height	Loosen set screws and adjust to correct height (when gun tips back, the lower part of the gun handle should be 1" above the counter top).
Y Yoke Loose	Loosen set screw or bolts. Position on gun aimed at center of target. Tighten set screws or bolts.

TROUBLESHOOTING – WATER SOFTENING SYSTEM

PROBLEMS/CAUSES	SUGGESTED FIX
Softener Fails to Regenerate	
Electrical Service has Been Interrupted	Check circuit breaker and/or power cord for secure fit.
Excessive Water in Brine Tank (Trash Can)	
Plugged Drain Line Flow Control	Clean Flow Control.
Softener Fails to Draw Brine Water	
Plugged Drain Line Flow Control	Clean Flow Control.
Line Pressure is Too Low	Incoming water pressure must be at least 20psi. Increase incoming water pressure as needed.

TECHNICAL DATA

2100 SERIES ELECTRONICS

2100 MICROPROCESSOR BOARD

The inputs on this board are on J1, the outputs are on J2 (see Pinout for corresponding LED's and their functions). The inputs (J1) are ground seeking which means to check an input you simply ground the input's corresponding front and back pins and the LED should light up – if it is good. These LED's are tied to Opto-couplers which convert the 12V circuit to TTL for the board.

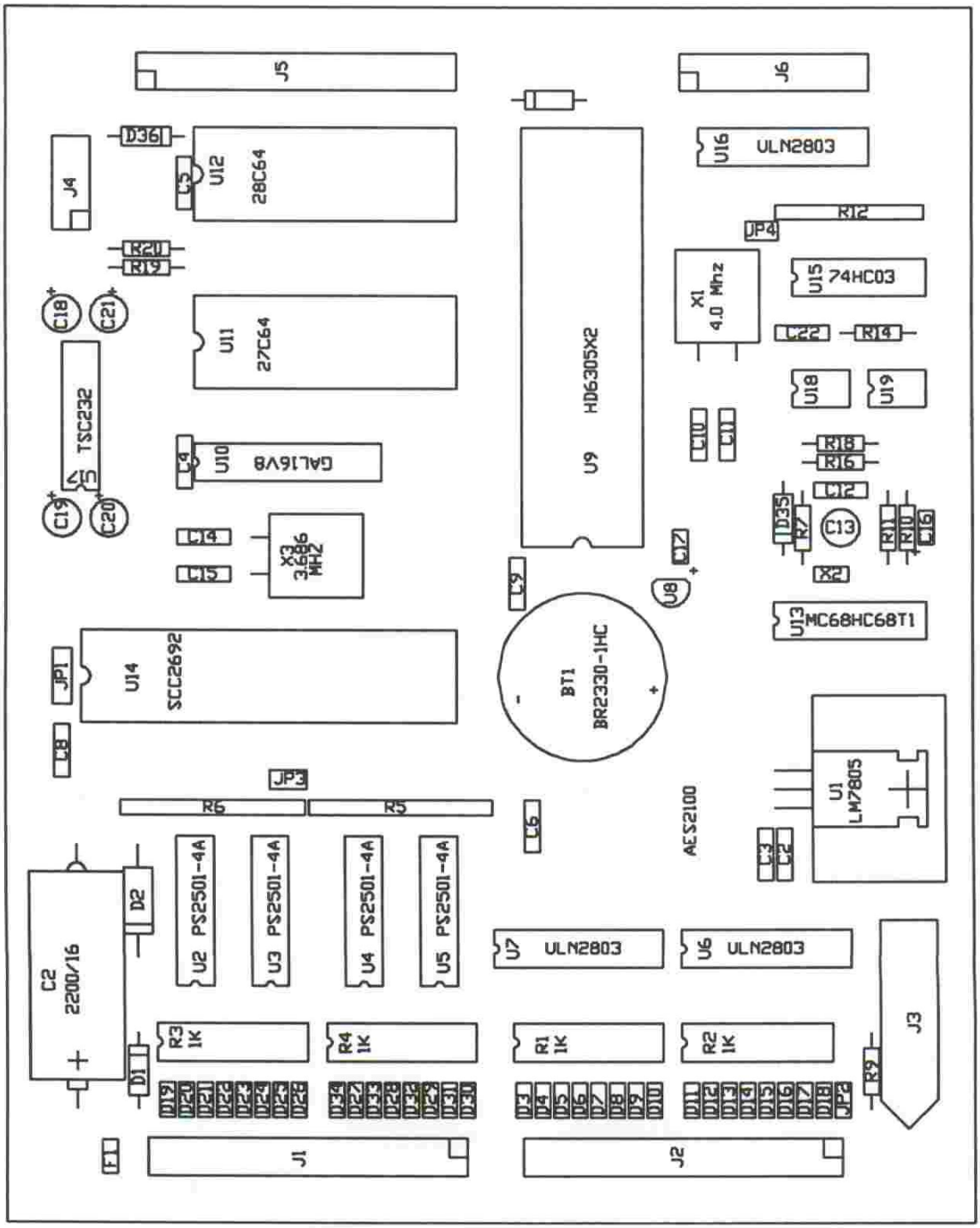
The output pins (J2) are open collector to ground (the bottom row of pins are +12V). If the LED is on, the output is working because the LED's are tied directly to the output pins. DO NOT ever short a front and back row pin on the output connector together. If the output was good, and you did that, then the output isn't good anymore.

Connector J3 is the +12V (pin 4) and ground (pins 2 and 3) power input plug. Connector J4 is an RS232 communications port. There are 2 full RS232 ports on this connector. One can be configured as an open collector serial communications, which is the typical application in this port. In this configuration, a single wire is used for serial communication.

Connector J5 is NEVER USED on the board. Connector J6 is a BSR Serial Communication Port. J6 is used to communicate with serial devices (if installed) such as sound boards and LCD's.

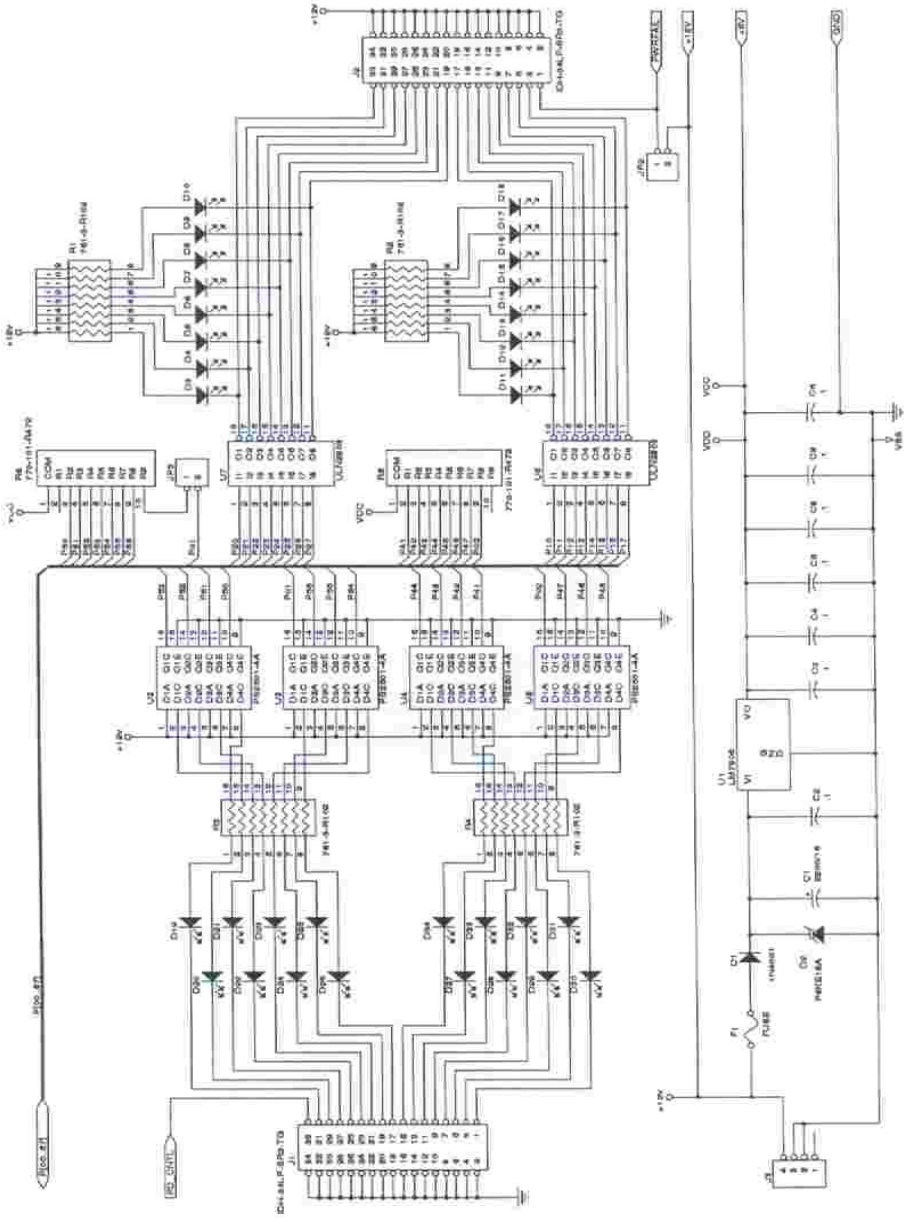
The microprocessor we use is a Hitachi 6305 (U9). This is a 1-chip mini-computer and contains several I/O ports. The EEPROM memory chip (U11) is a programmable chip that has been programmed for the game's application. The registers inside the chip can be changed by using an LCD and Option Register Sheet. Near the middle of the board is a Lithium Battery, optional, (BT1) which is used as a battery back-up for the RAM chip (U12). It is only used on games that require a memory backup.

2100 MICROPROCESSOR BOARD GRAPHIC

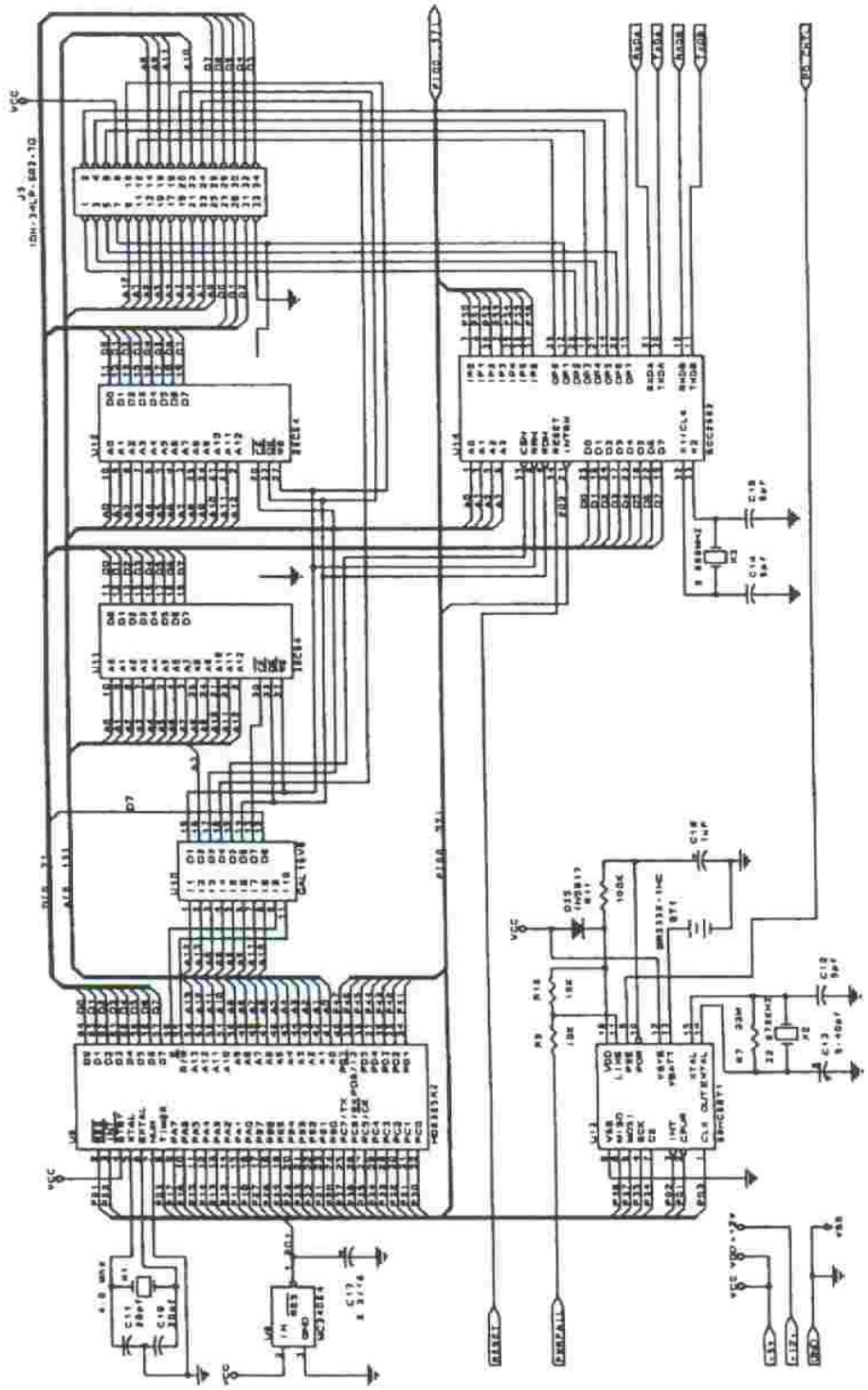


EX033629

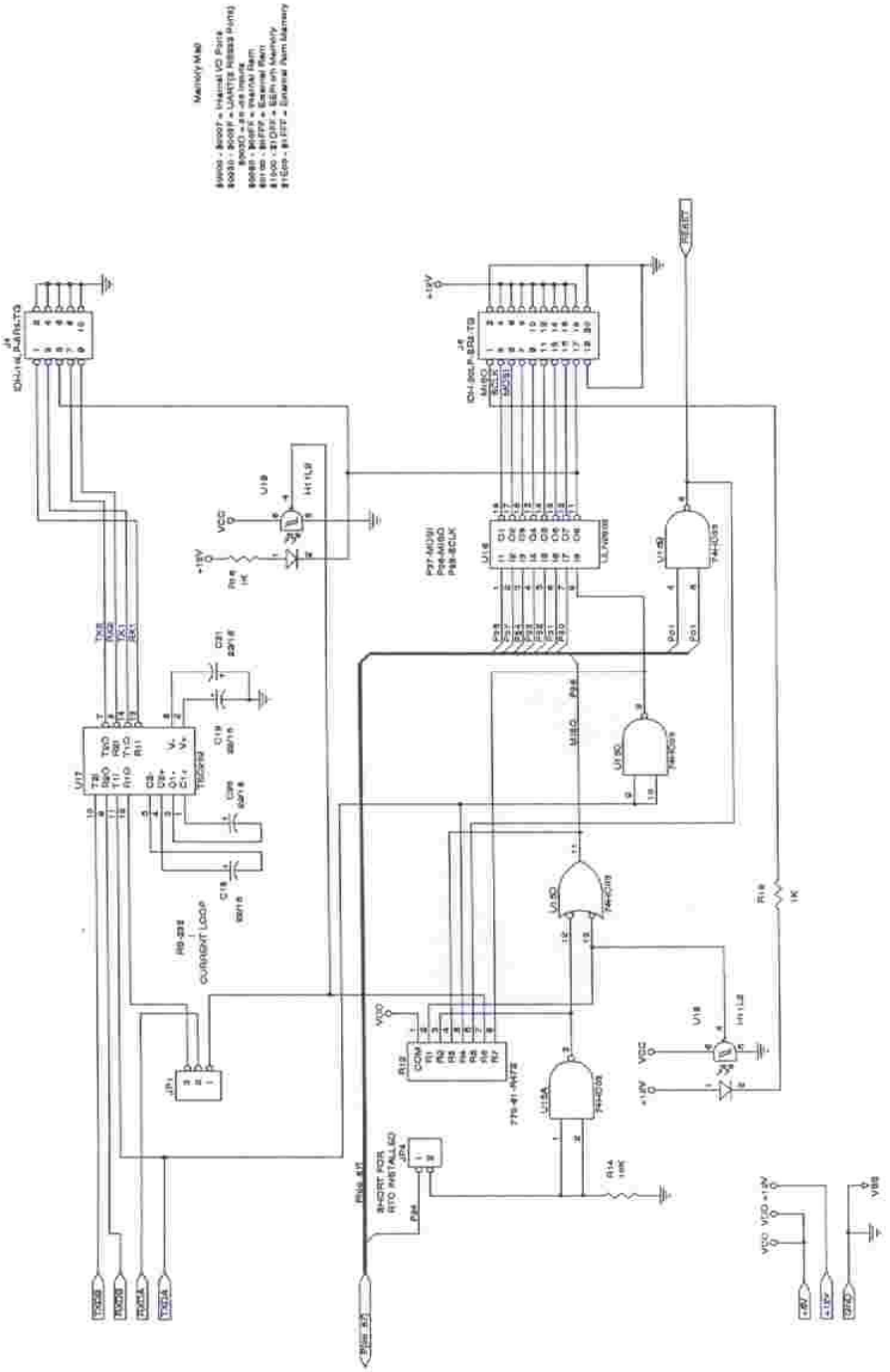
2100 MICROPROCESSOR BOARD SCHEMATIC #1



2100 MICROPROCESSOR BOARD SCHEMATIC #2



2100 MICROPROCESSOR BOARD SCHEMATIC #3



2100 MASTER CONTROLLER BOARD PIN-OUT DEFINITIONS

OUTPUTS

Port B D0 (J2 – J33): Not Used
Port B D1 (J2 – J31): Not Used
Port B D2 (J2 – J29): Not Used
Port B D3 (J2 – J27): Not Used
Port B D4 (J2 – J25): Sync Out
Port B D5 (J2 – J23): Not Used
Port B D6 (J2 – J21): Not Used
Port B D7 (J2 – J19): Not Used
Port A D0 (J2 – J17): Win Bell
Port A D1 (J2 – J15): Game On (water pump)
Port A D2 (J2 – J13): Not Used
Port A D3 (J2 – J11): Not Used
Port A D4 (J2 – J9): Not Used
Port A D5 (J2 – J7): Not Used
Port A D6 (J2 – J5): Not Used
Port A D7 (J2 – J3): Not Used

INPUTS

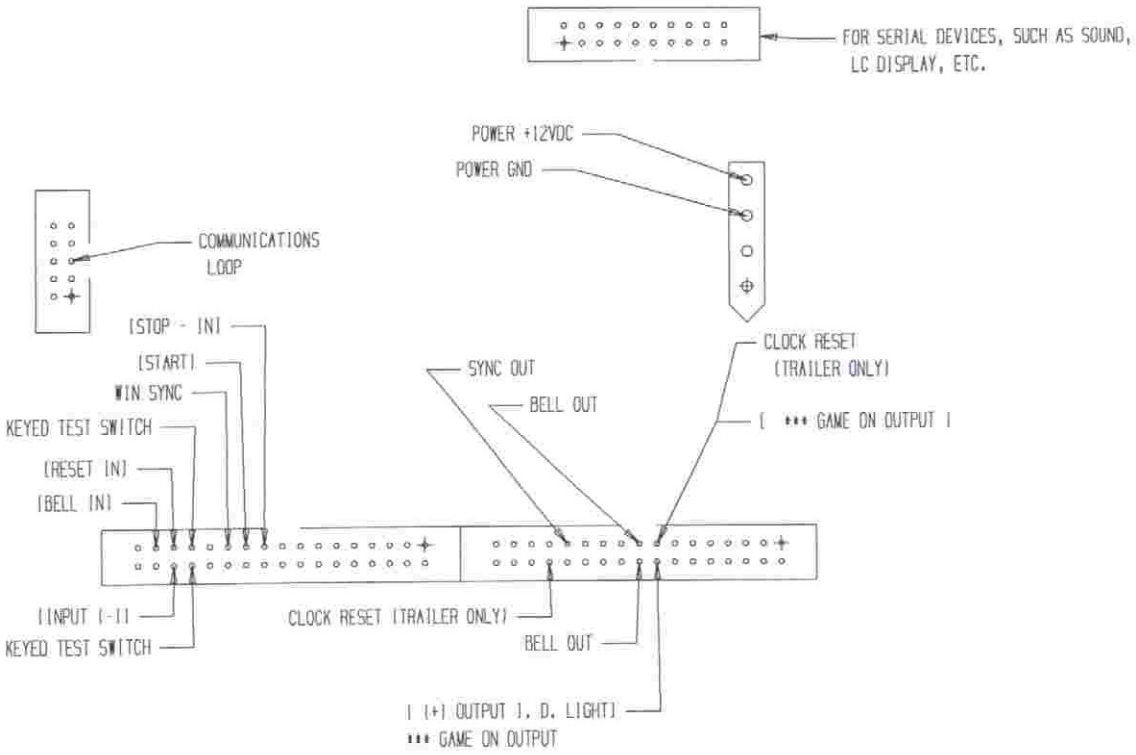
SCI Port D0 (J1 – J31): Bell In
SCI Port D1 (J1 – J29): Reset Game In
SCI Port D2 (J1 – J27): Test Switch
SCI Port D3 (J1 – J25): Not Used
SCI Port D4 (J1 – J23): Win Input Sync
SCI Port D5 (J1 – J21): Start In
SCI Port D6 (J1 – J19): Stop In

Port D D1 (J1 – J15): Not Used
Port D D2 (J1 – J13): Not Used
Port D D3 (J1 – J11): Not Used
Port D D4 (J1 – J9): Not Used
Port D D5 (J1 – J7): Not Used
Port D D6 (J1 – J5): Not Used
Port D D7 (J1 – J3): Not Used

SERIAL DEVICES

Ser Exp Buss #0: Not Used
Ser Exp Buss #1: Not Used
Ser Exp Buss #2 (EEROM): Not Used
Ser Exp Buss #3 (LCD): LCD Display/Controller
Ser Exp Buss #4 (RTC): Not Used

2100 MASTER CONTROLLER BOARD PIN-OUT



2100 UNIT CONTROLLER PIN-OUT DEFINITIONS

OUTPUTS

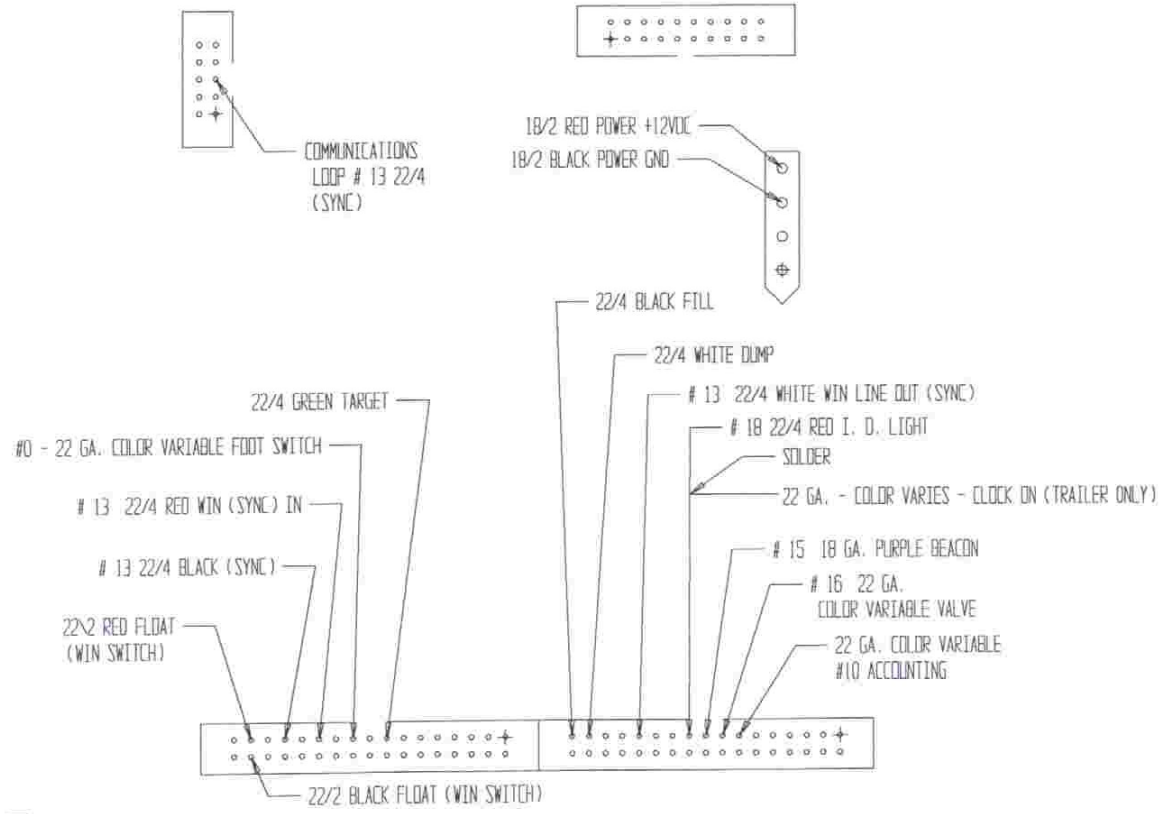
Port B D0 (J2 – J33): Fill
Port B D1 (J2 – J31): Dump
Port B D2 (J2 – J29): Not Used
Port B D3 (J2 – J27): Not Used
Port B D4 (J2 – J25): Win Light Out
Port B D5 (J2 – J23): Not Used
Port B D6 (J2 – J21): Not Used
Port B D7 (J2 – J19): ID Light (and Clock On – trailer only)
Port A D0 (J2 – J17): Win Indicator (Beacon)
Port A D1 (J2 – J15): Game On (Gun Valves)
Port A D2 (J2 – J13): Accounting Output
Port A D3 (J2 – J11): Not Used
Port A D4 (J2 – J9): Not Used
Port A D5 (J2 – J7): Not Used
Port A D6 (J2 – J5): Not Used
Port A D7 (J2 – J3): Not Used

INPUTS

SCI Port D0 (J1 – J31): Win Switch (Float)
SCI Port D1 (J1 – J29): Not Used
SCI Port D2 (J1 – J27): Sync Line
SCI Port D3 (J1 – J25): Not Used
SCI Port D4 (J1 – J23): Win Line In
SCI Port D5 (J1 – J21): Not Used
SCI Port D6 (J1 – J19): Footswitch

Port D D1 (J1 – J15): Target
Port D D2 (J1 – J13): Not Used
Port D D3 (J1 – J11): Not Used
Port D D4 (J1 – J9): Not Used
Port D D5 (J1 – J7): Not Used
Port D D6 (J1 – J5): Not Used
Port D D7 (J1 – J3): Not Used

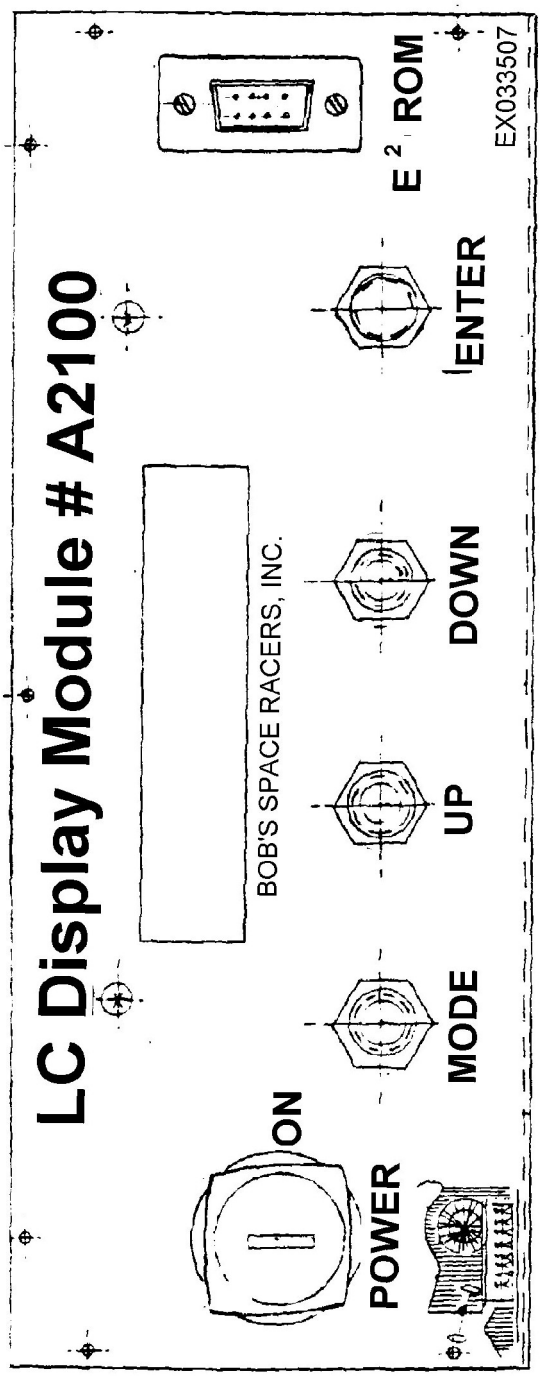
2100 UNIT CONTROLLER PIN-OUT



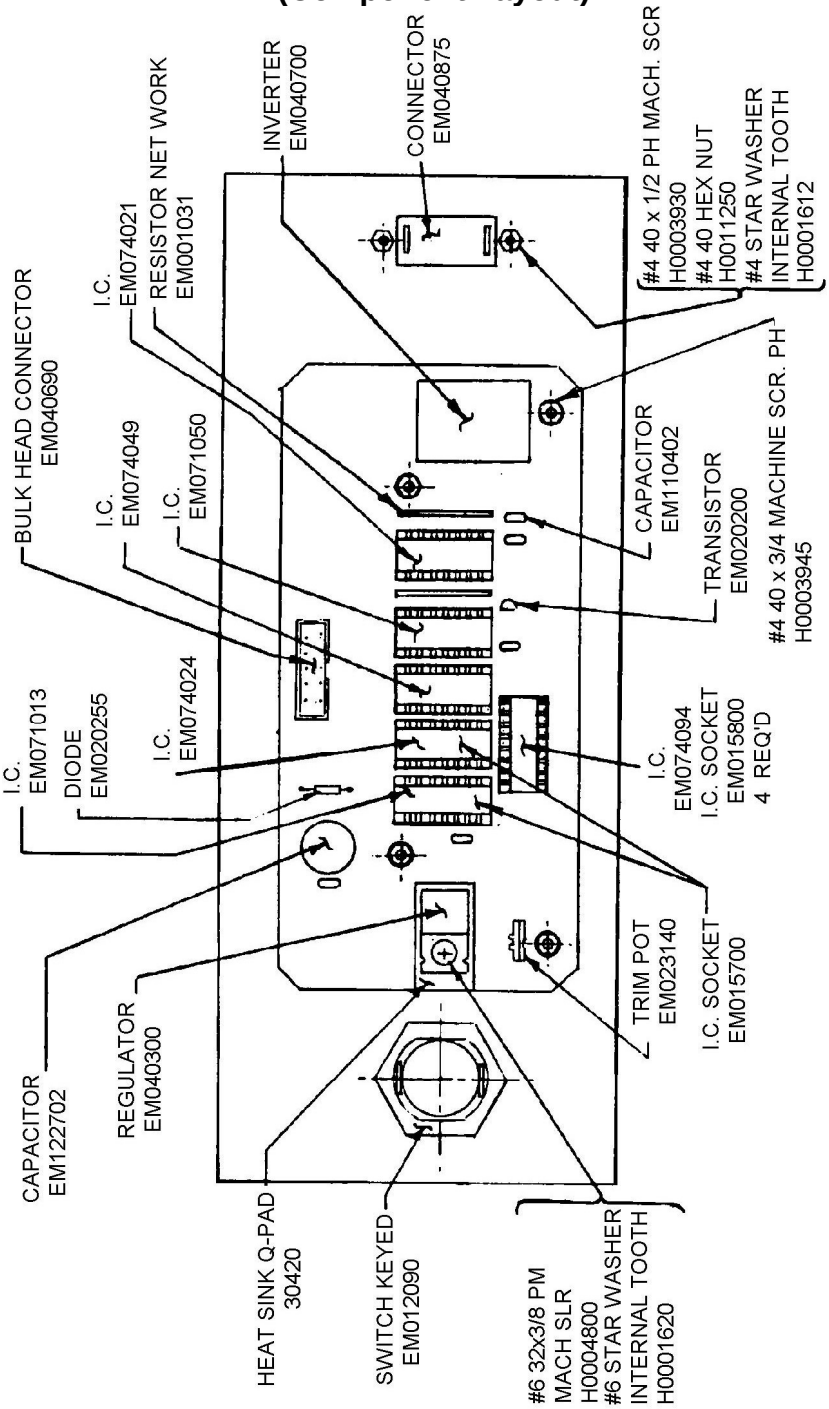
LIQUID CRYSTAL DISPLAY MODULE OVERVIEW

The Liquid Crystal Display (LC display or LCD) is permanently mounted inside the electronics enclosure. The LCD enables the operator to view how many games were run and how many players there have been. Also, it's used to monitor the number of high/low players, the number of high/low games, and the operator time (in minutes) – for up to two (2) operators – in your game. To read the contents of the LCD, turn the key to the 'on' position (this key is used for safety precautions so that unauthorized personnel cannot clear it). The LCD will reveal the data. Press 'mode' to sequence through the data; once completed, it will read 'erase data'. Press 'enter' to clear the contents, and turn the key to the 'off' position. Compare this information with the mechanical meters. (For other options available on the LCD, see the 2100 Accounting System Overview.) The circuitry inside the LCD module is a BSR serial-to-parallel interface for the actual LCD, which is an "intelligent" module (meaning it has it's own microprocessor).

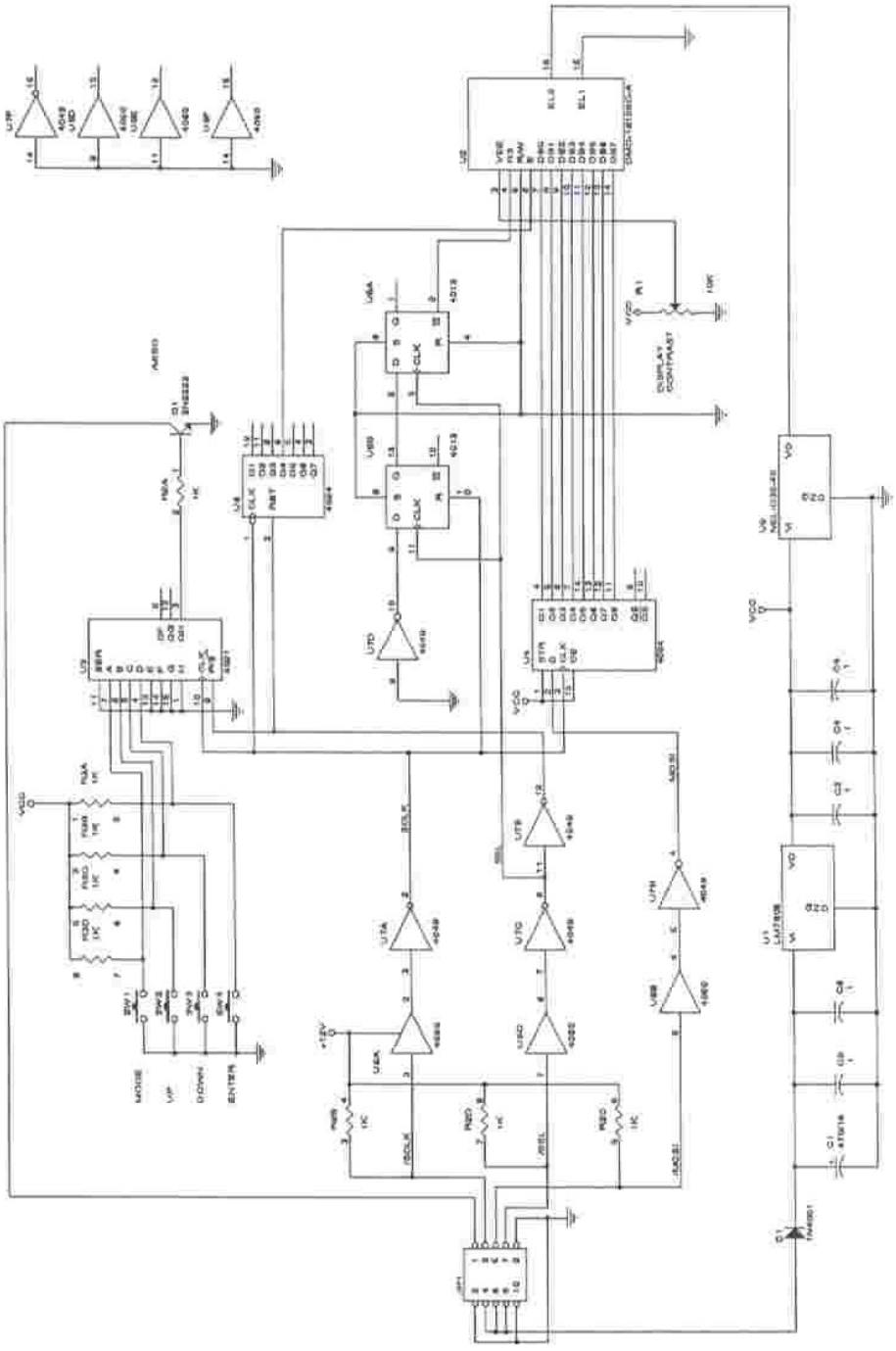
LCD MODULE #A2100, FRONT PANEL



LCD MODULE #A2100, REAR VIEW OF COVER
(Component Layout)

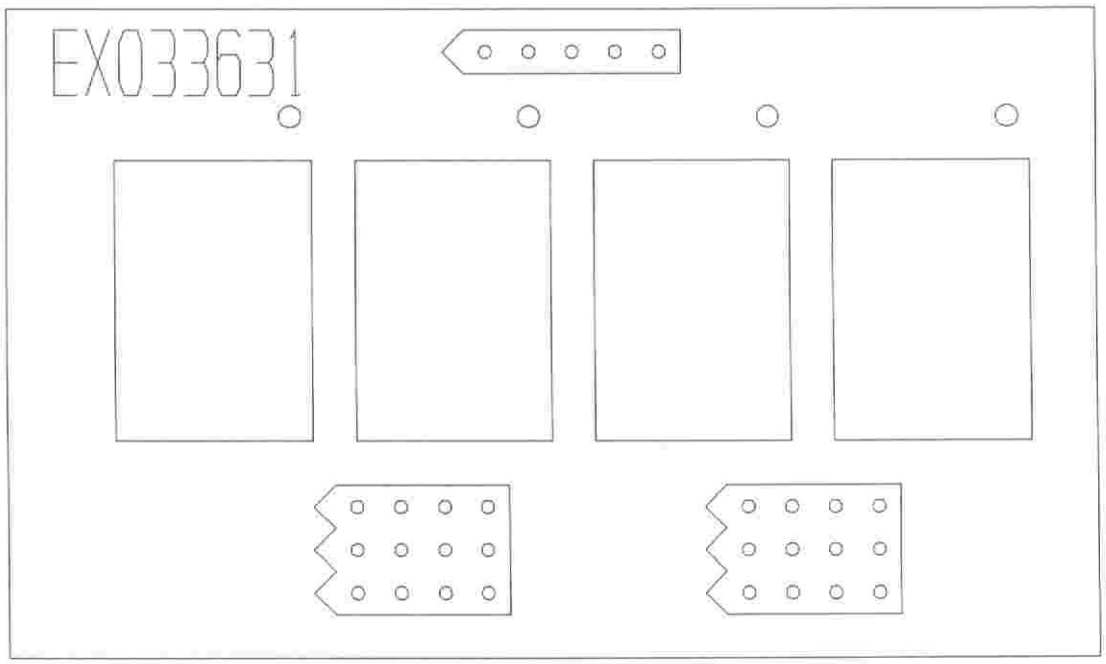


LCD SCHEMATIC

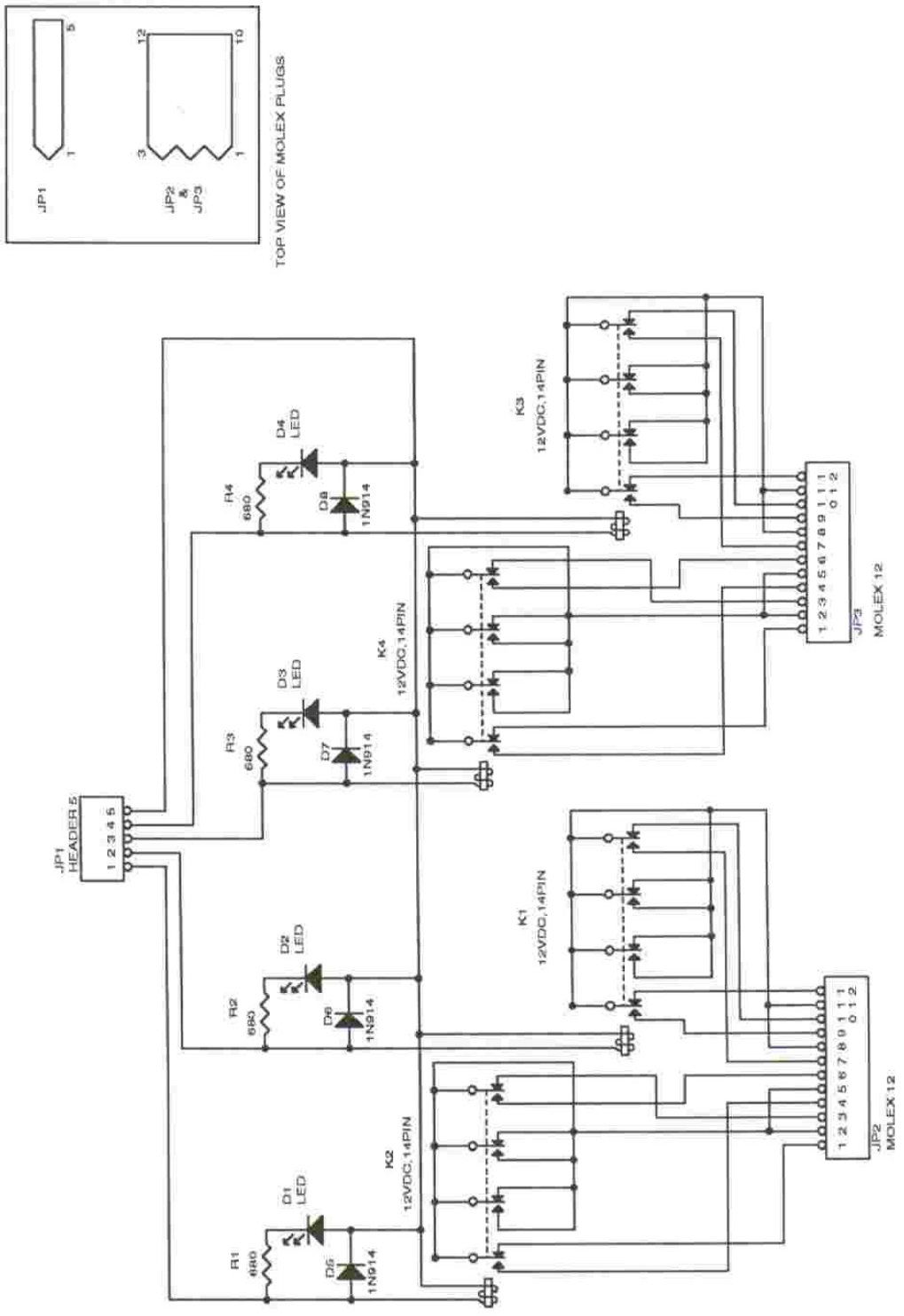


2100 RELAY BOARD DEFINITION AND DIAGRAM

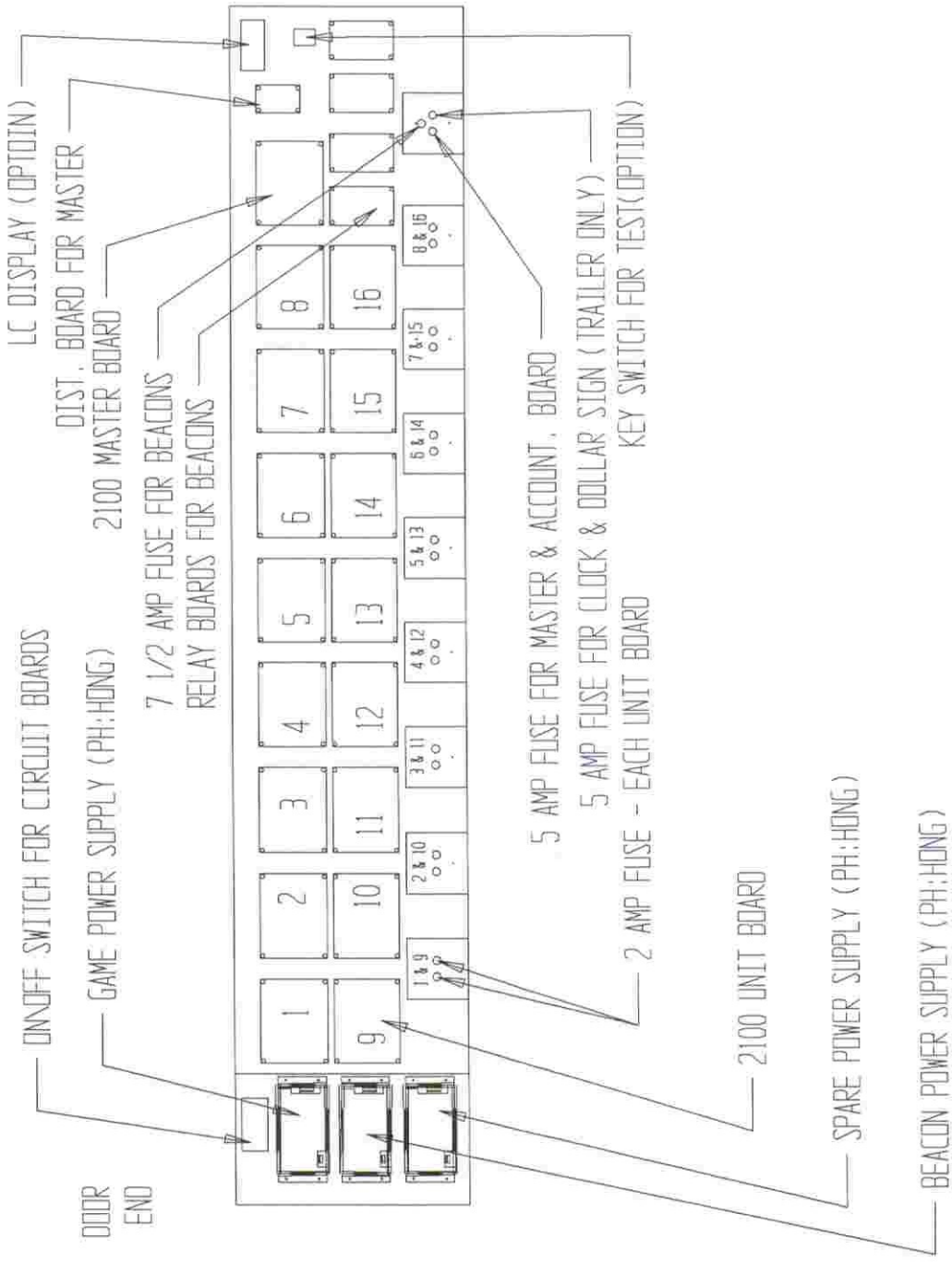
On the 2100 Relay Board, there are 2 12-pin Molex Plugs that are output connections for contacts on the relays, and a 5-pin Molex that is used to power the 4 relays (to turn the relays ON and OFF). The LED's on the boars signal when a relay in ON. The coil voltage of the relay is 12V DC.



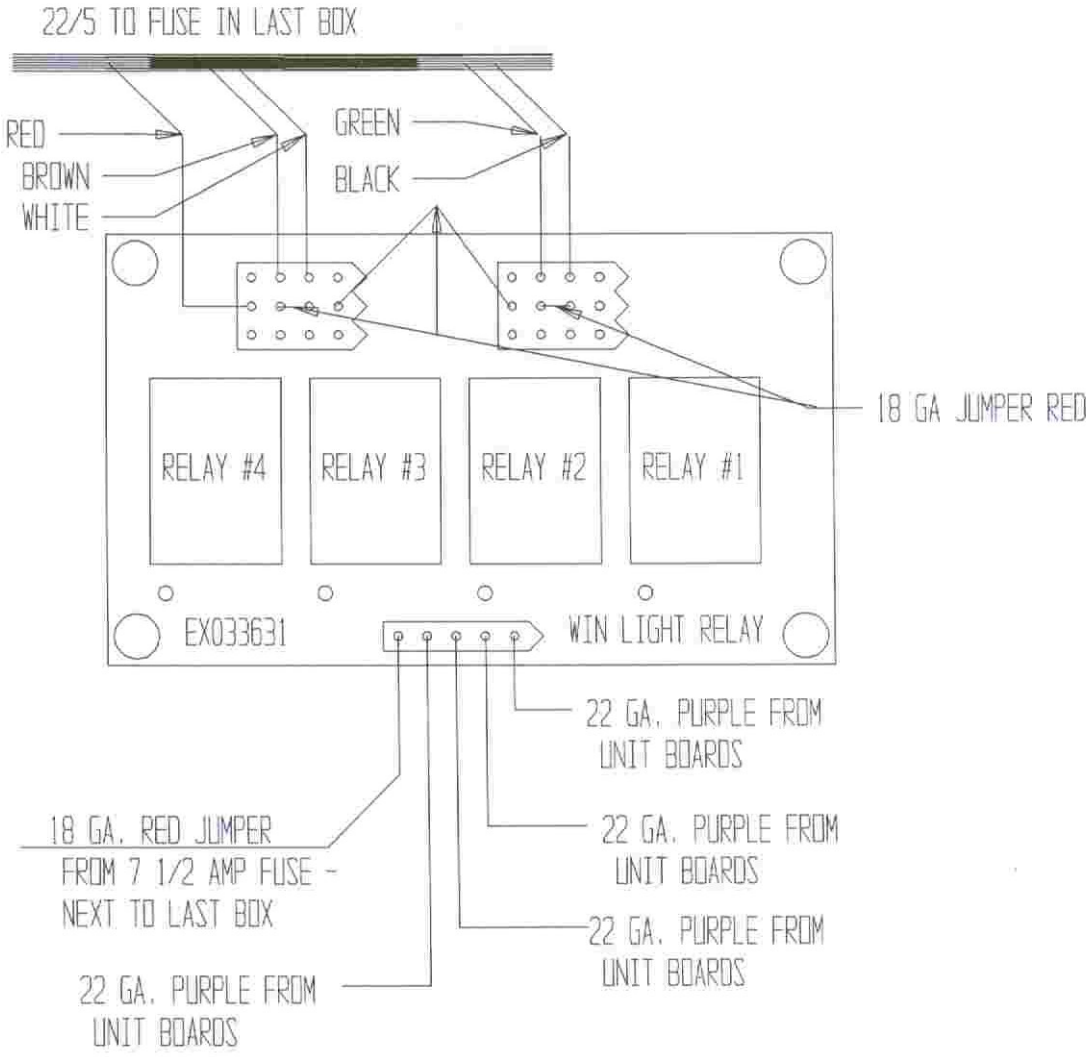
2100 RELAY BOARD SCHEMATIC



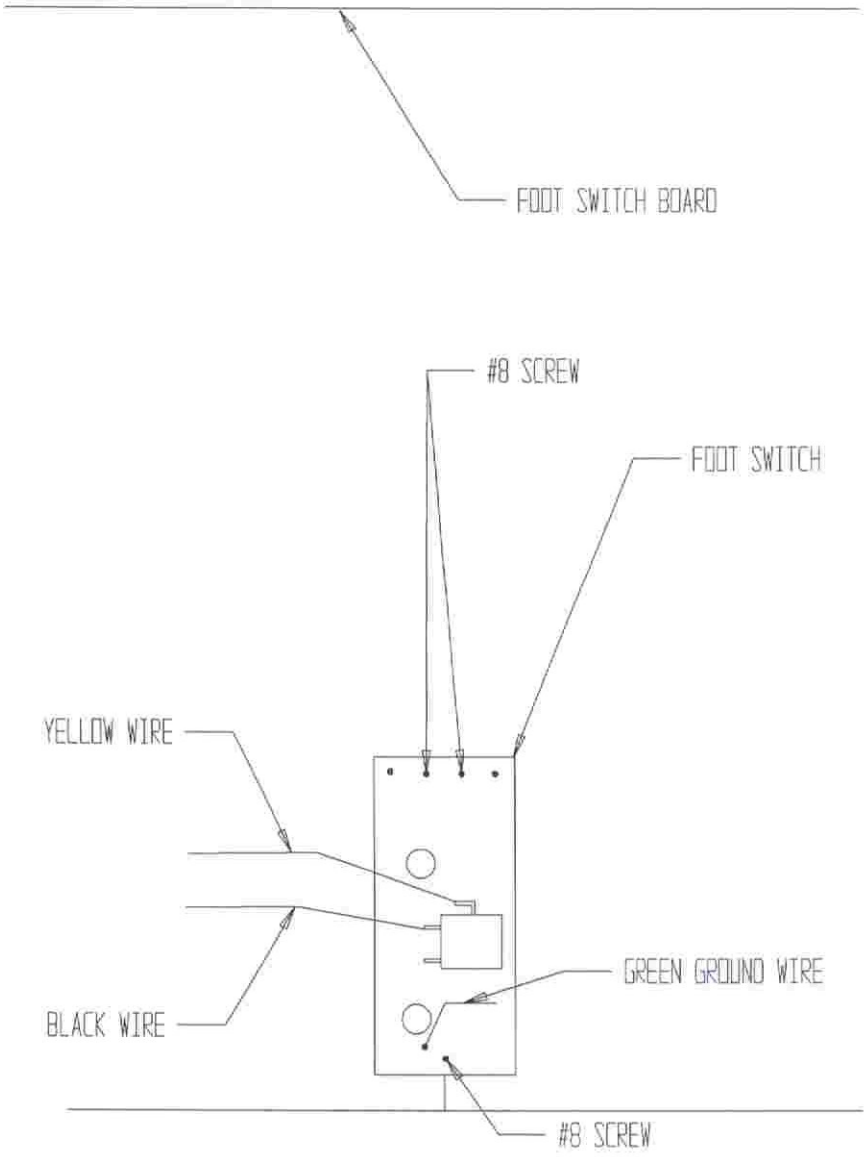
STOCK CHUTE COMPONENT LAYOUT



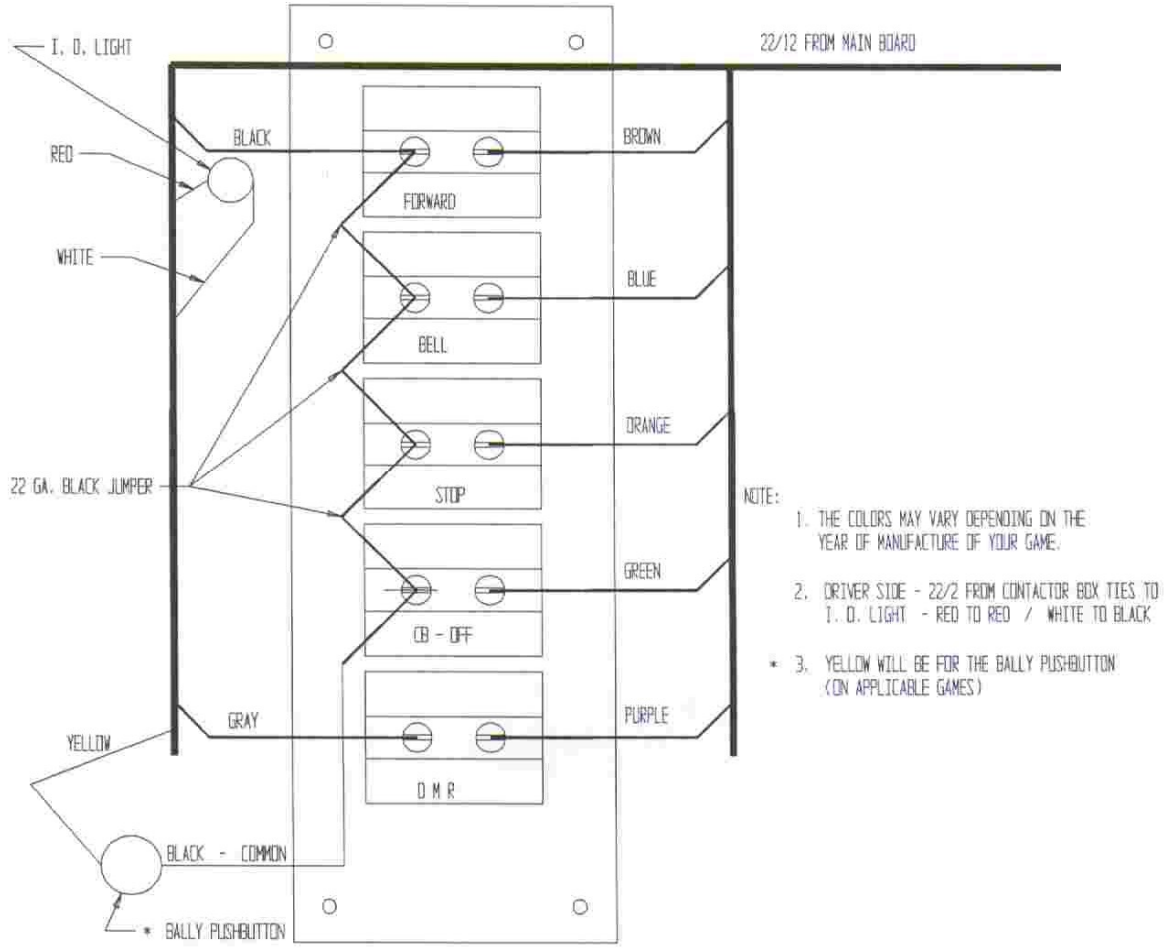
STOCK CHUTE WIN LIGHT
RELAY BOARD WIRING DIAGRAM



FOOTSWITCH WIRING



PUSHBUTTON STATION



TROUBLESHOOTING – 2100 ELECTRONICS

PROBLEMS/CAUSES	SUGGESTED FIX
Game Locks Up	
Stuck WIN Switch	Compare unit board LED's with a properly functioning unit to determine if WIN switch is stuck. Tap on the WIN switch tube that seems to be stuck.
Lose/Broken Wire Connection on Winner Molex Plug	Check for a secure fit and repair if necessary.
More Than One Winner at a Time	This is a coincidence. Timing is done through the processor. It is not likely to happen very often.
Unit Won't Win	
Bad or Stuck WIN Switch	Check Switch and replace if necessary.
One Unit Runs Without Hitting Target Switch	
Bad IC on 2100 Unit Board	Swap unit board, but leave the EEPROM with that unit. Each EEPROM is programmed for that unit. See if problem follows the board. If so, swap 2803 IC's on output side of board. If not, see Bad Target Switch.
Shorted/Bad Target Switch or Silicon Missing From Wiring (to keep out moisture)	Disconnect one wire to target switch. Does tube still fill on its own? If not, replace target switch. If so, swap 2100 unit boards (see above).
Unit Won't Work Except in Test Mode	
Bad 2100 Board	Swap unit board, but leave the EEPROM with that unit. Each EEPROM is programmed for that unit. See if problem follows the board. **Contact BSR Technical Department if you are not certain.**

TROUBLESHOOTING – 2100 ELECTRONICS

PROBLEMS/CAUSES	SUGGESTED FIX
Unit Won't Work Except in Test Mode (continued)	
Bad IC on 2100 Unit Board	Swap 2803 IC's on output side of board.
Blown Fuse	Check fuse with a meter; should be 2amp fast acting.
Shorted/Bad Target Switch	Disconnect one wire from target switch and short together. Does tube fill now? YES – replace switch. Check switch input LED on 2100 board.
Tube Doesn't Drain Completely	
Dump Valve is Dirty	Remove valve and clean it with hot soapy water. When putting it back together use heatproof grease.
Unit Comes On By Itself	
Bad Footswitch	Check footswitch cover for proper alignment, OHM switch with a meter. Replace if necessary.
Carpet Under Footswitch Holding Switch On	Check for something interfering with the footswitch cover plate from moving in and out freely. Remove any obstacles.
Tubes Won't Fill	
Pressure Lock in System (Low Pressure Side of Blue Water is 40 psi or More)	Use pressure release valve to relieve pressure on the tube side of the Watts Valve.
Both pressure gauges at Watts Valve Equal or Near Equal	Lower Watts Valve pressure to 39 psi.
Air Trapped In Bladder Tanks During Set-Up	Lower trailer as low as possible at hitch end; drain all tube water from game. Use a tire pressure gauge and check both tanks (equal to 48 psi with drain valve open). Level trailer, refill game leaving pressure release valve open for the first 2 minutes the pumps are run to bleed off any trapped air.

MISCELLANEOUS

PARTS LIST

PART #	DESCRIPTIONDESCRIPTION
CX000090	Tube Assembly
E0003800	Relay 12V DC KHAU-17D12
EX012770	Switch, Liquid Level N/C M3326
E0012900	Switch, Pushbutton N/O
E0013600	Switch, Micro, Water Game YZ
E0022680	Power Supply, 12V, 9amp Phi Hong
E0023375	Transformer, Neon Allanson
E0023600	Fuse, 2amp
E0023625	Fuse, 2amp, S.B. MDL-2
E0024000	Fuse, 7 ½ amp, AGC
E0028600	Bulb, 23W, RS, for Target 120V
E0029105	Bulb, Blue Beacon, 14V-27W-1A
E0029800	ID Light 14V Amber
E0012400	Footswitch Assembly
EX033629	Board Assy BSR 2100 Controller
EX033631	Small Relay Board
M0002200	Decal SHOOT HERE w/Clear
M0005300	CRC Spray, 20oz can
M0006103	Bras Nozzle Tips
M0006104	Gun Tip Cleaner with #57 Drill Bit
M0006500	Heat Proof Grease
M0010900	Screwlox Driver #2
P0007705	Valve, Electric, 12V DC 1/8" RW
P0007708	Valve, Electric, 12V DC RW Fill
P0007720	Valve, Electric, 12V DC RW Drain
P0008050	Valve, Needle 3/8
P0008700	Water Filter
P0009985	Dynarod, 18"
WX040000	Arcade Water Gun Assembly
P0007825	Pressurized System Watts Valve (1 ¼")

APPENDIX

ACCOUNTING SYSTEMS

2100 SERIES ACCOUNTING SYSTEM OVERVIEW
(Used in Games Manufactured From 1991 Through 1999)

The 2100 Accounting System consists of a microprocessor board, a distribution board, two (2) mechanical meters (non-resetable), an LCD Module, and a reed-relay board(s). Also, connected to the 2100 System are the accounting meters, a win line, the low/high game ($1.00/$2.00), and game I.D. information. The accounting meters are connected to the output via a 34-pin connector. The accounting outputs come from the circuit board directly to the input board. The win line, low/high game, and game I.D. information are connected to the input via another 34-pin connector.

To determine if you have reed-relay boards in your game you will need to identify what controls each unit of your game. The reed-relay boards, as described on page XYZ, will have a relay bracket – a long "L" shaped piece of metal with four (4) relays on the long side of the "L". If you have a circuit board for each unit, the reed-relay boards will not be used.

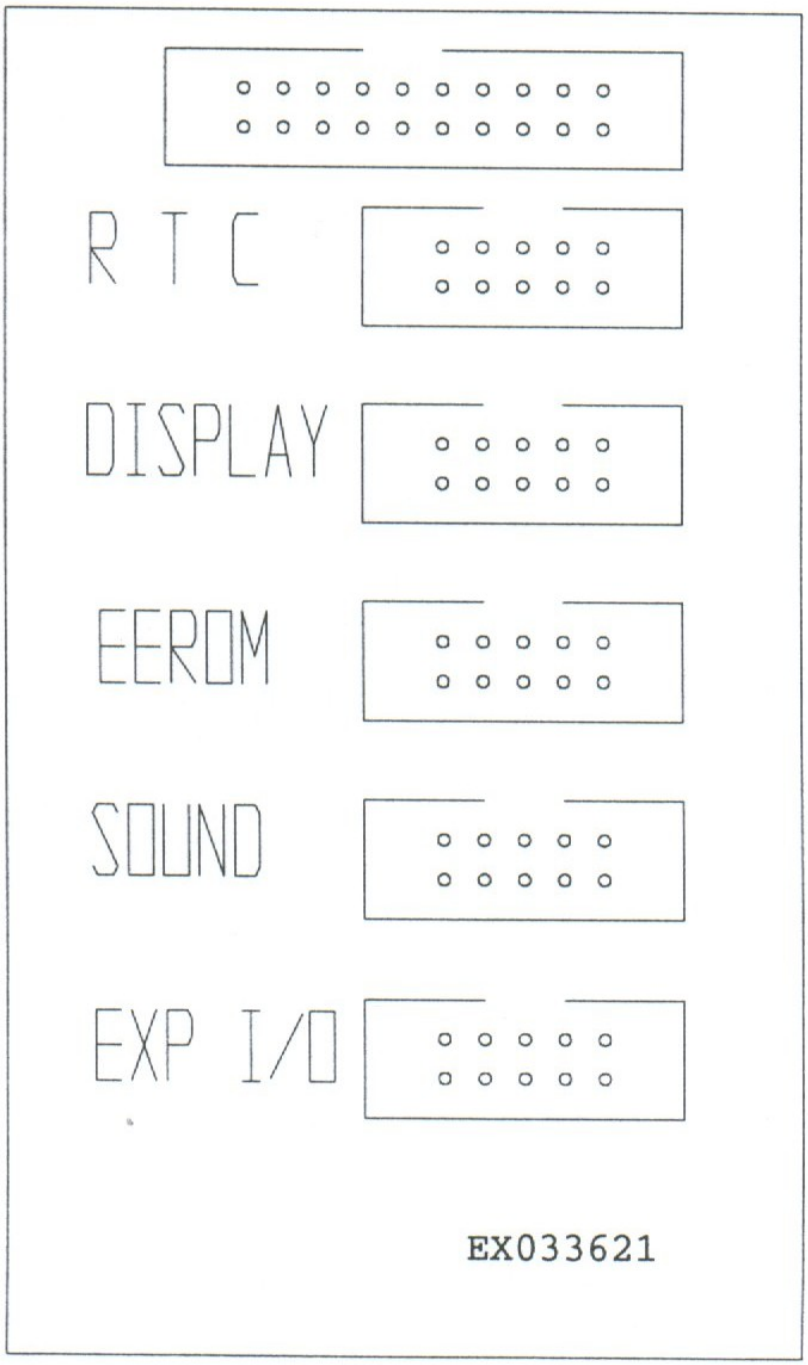
The input board supports up to three relay boards for a total of up to 24 inputs. The input board is connected to the serial distribution board via one (1) 10-pin cable connector. The serial distribution board connects to the microprocessor board via one (1) 20-pin cable connector; also, the distribution board is where the LCD and the EE Accounting Module (if applicable) plug into.

The EE Accounting Module is inside some LCD's and can be utilized via the 9-pin connector on the face of the LCD. This option will allow the accountant and/or owner to determine the unit number (or trailer number), the number of games for each unit that was played, operator time (in minutes) for up to two (2) operators, and the total time the game was on for that day (in minutes). You will need an EE Accounting Module to read this data and a special printer. Both may be purchased from Bob's Space Racers® for your Park or Trailer Model Games.

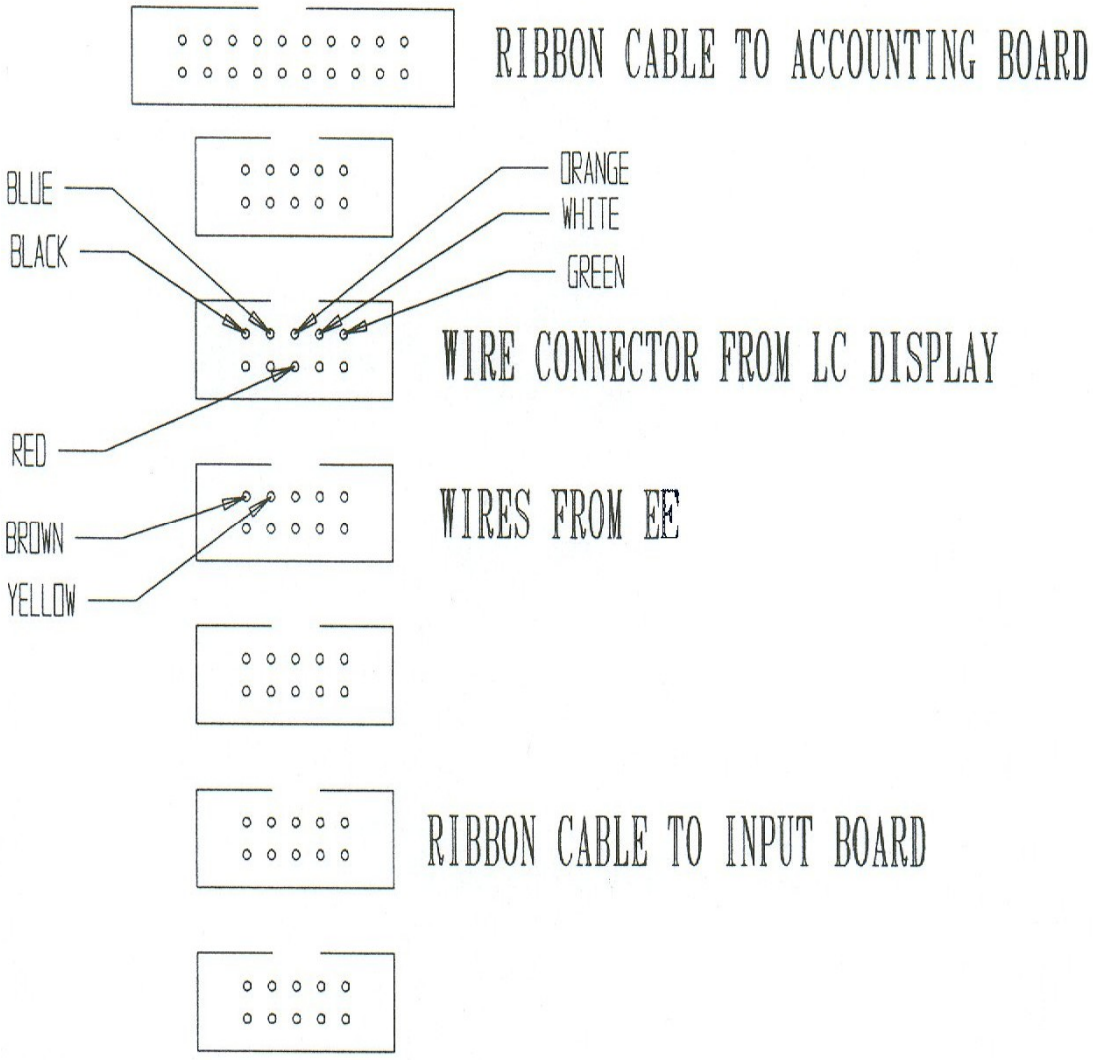
DISTRIBUTION BOARD

The Distribution Board is used to distribute serial information from the main processor board to various peripheral items including the sound board, LCD, etc. It is connected between the input board and your game's accounting system board.

DISTRIBUTION BOARD DIAGRAM



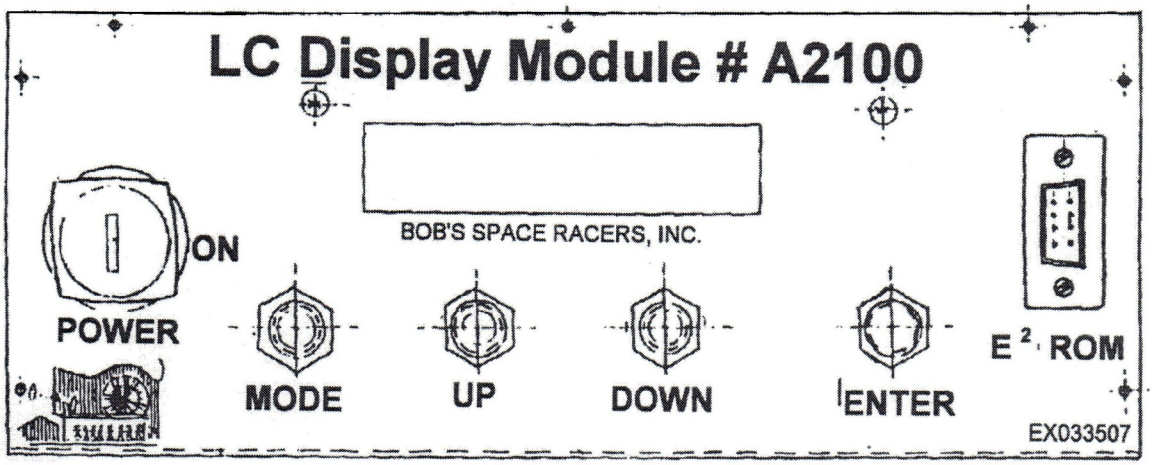
DISTRIBUTION BOARD PIN-OUT
(With Marked Wire Locations)

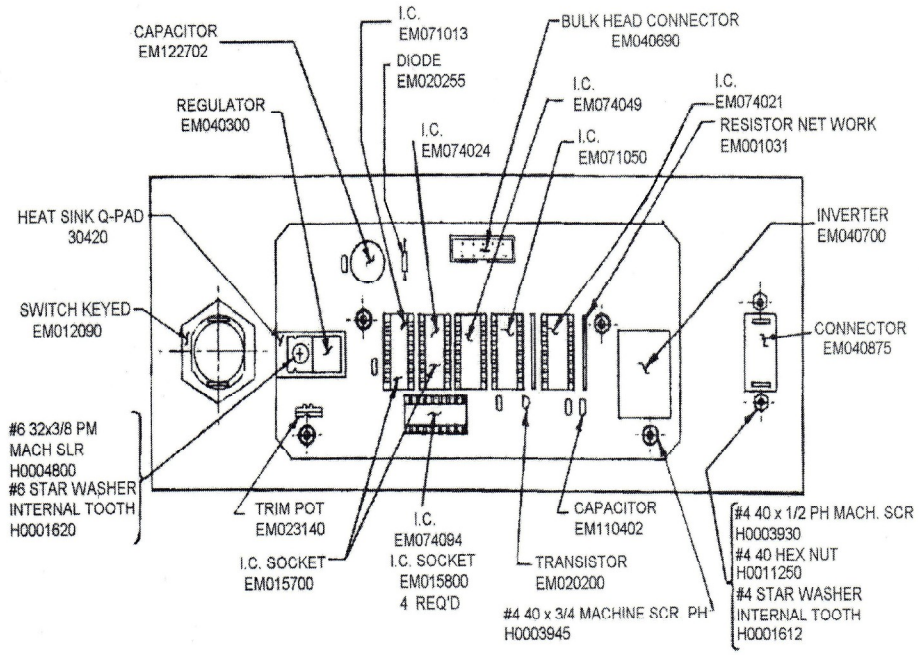


LIQUID CRYSTAL DISPLAY MODULE OVERVIEW

The Liquid Crystal Display (LC display or LCD) is permanently mounted inside the electronics enclosure. The LCD enables the operator to view how many games were run and how many players there have been. Also, it's used to monitor the number of high/low players, the number of high/low games, and the operator time (in minutes) – for up to two (2) operators – in your game. To read the contents of the LCD, turn the key to the 'on' position (this key is used for safety precautions so that unauthorized personnel cannot clear it). The LCD will reveal the data. Press 'mode' to sequence through the data; once completed, it will read 'erase data'. Press 'enter' to clear the contents, and turn the key to the 'off' position. Compare this information with the mechanical meters. (For other options available on the LCD, see the 2100 Accounting System Overview.) The circuitry inside the LCD module is a BSR serial-to-parallel interface for the actual LCD, which is an "intelligent" module (meaning it has it's own microprocessor).

(FRONT VIEW)

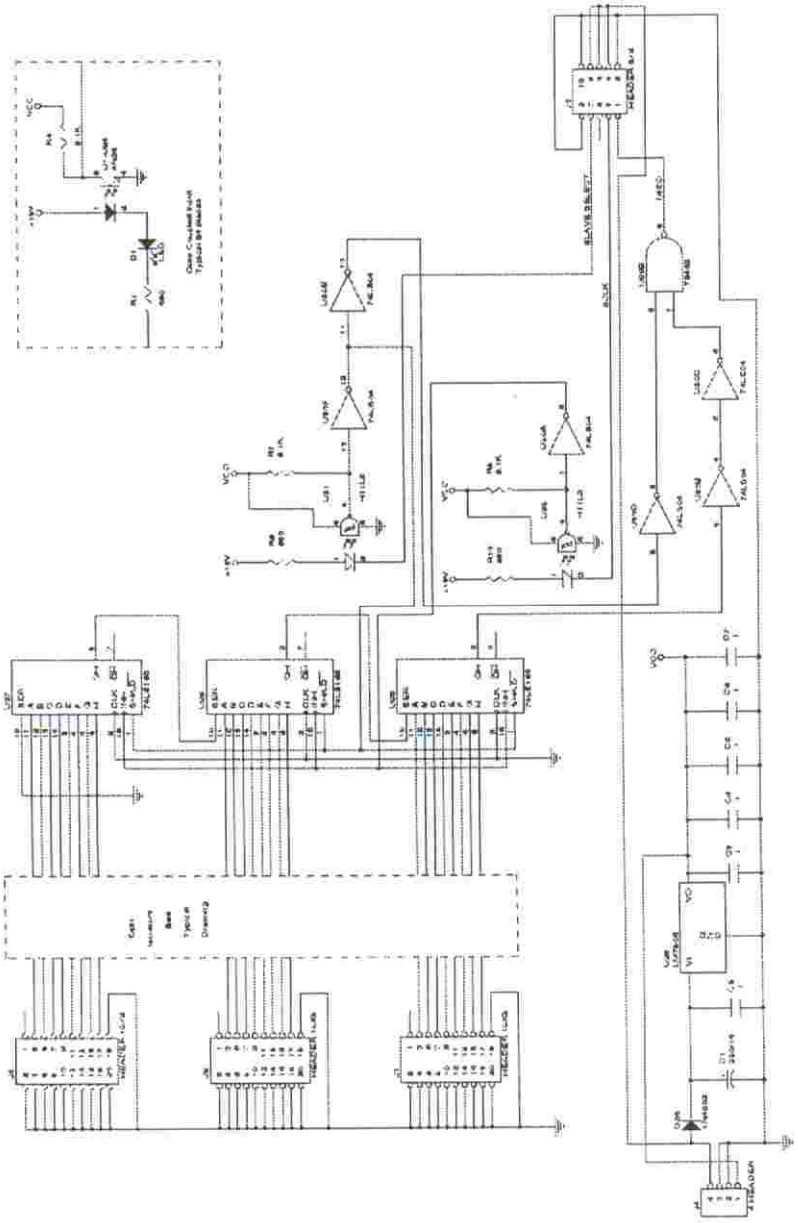




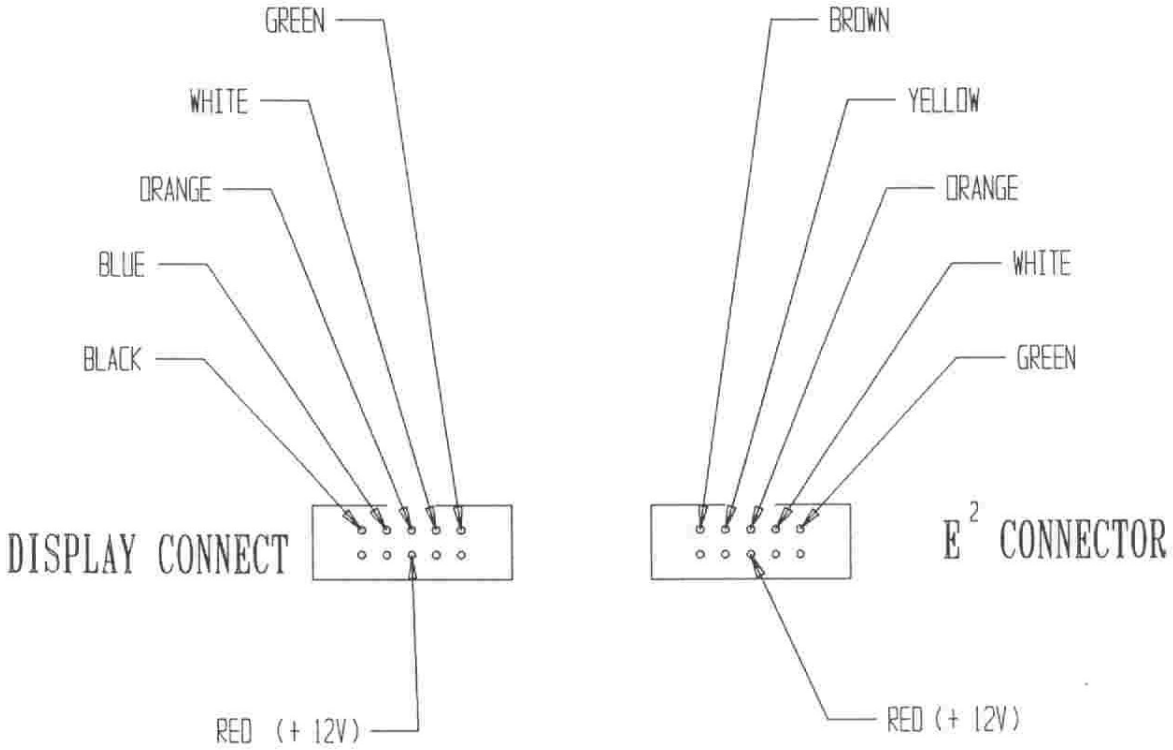
LC DISPLAY MODULE #A2100
REAR VIEW OF COVER
SHOWING COMPONENTS

(REAR VIEW)

LCD SCHEMATIC



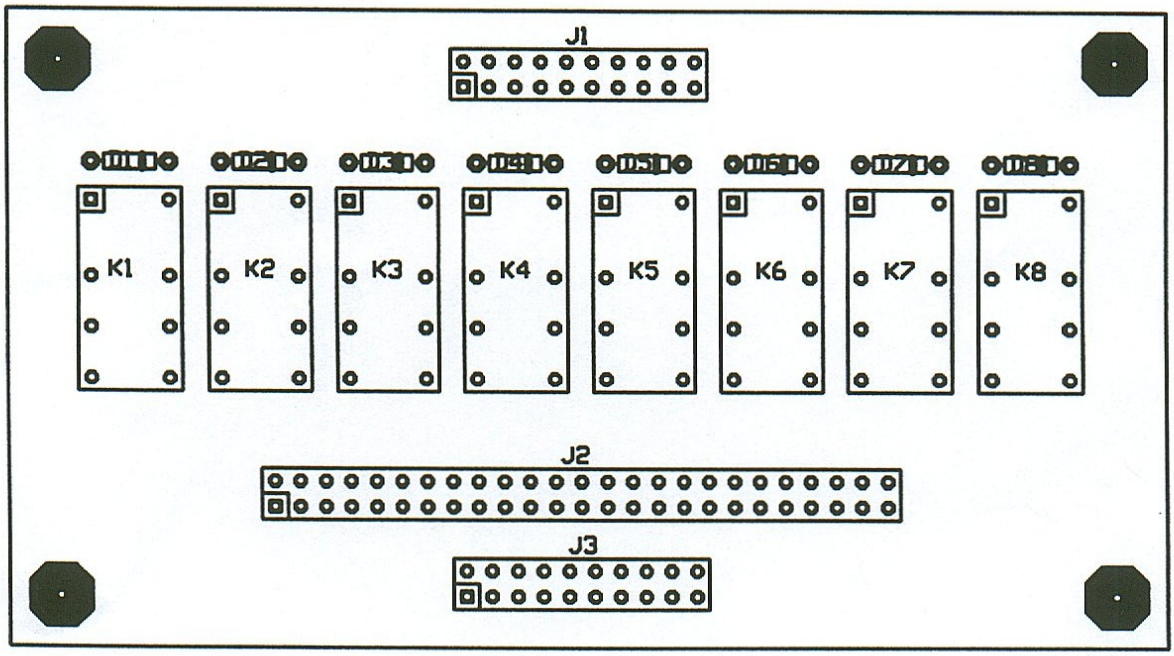
LCD BOX WIRING PINOUT



REED-RELAY BOARD OVERVIEW

The Reed-Relay Board is used in conjunction with a relay bracket for each unit. The board consists of two (2) 20-pin connectors: one is the input from the unit(s) – labeled J1 – and the other is the output from the reed-relay board – labeled J2 – to the input board. The relays are, basically, an open/close switch for each unit. Note: J2 and D1 through D8 are not used, and not installed. The number of reed-relay boards you have depends on how many units, and the type of control electronics, you have in your game.

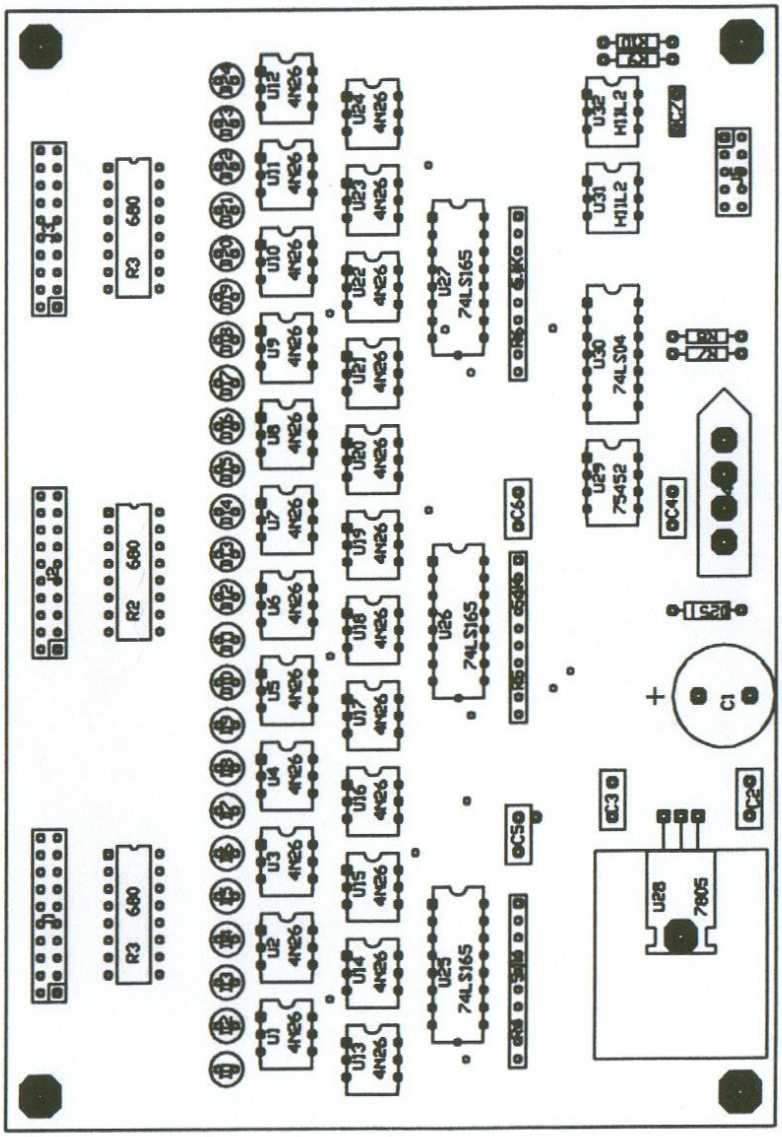
REED-RELAY BOARD DIAGRAM



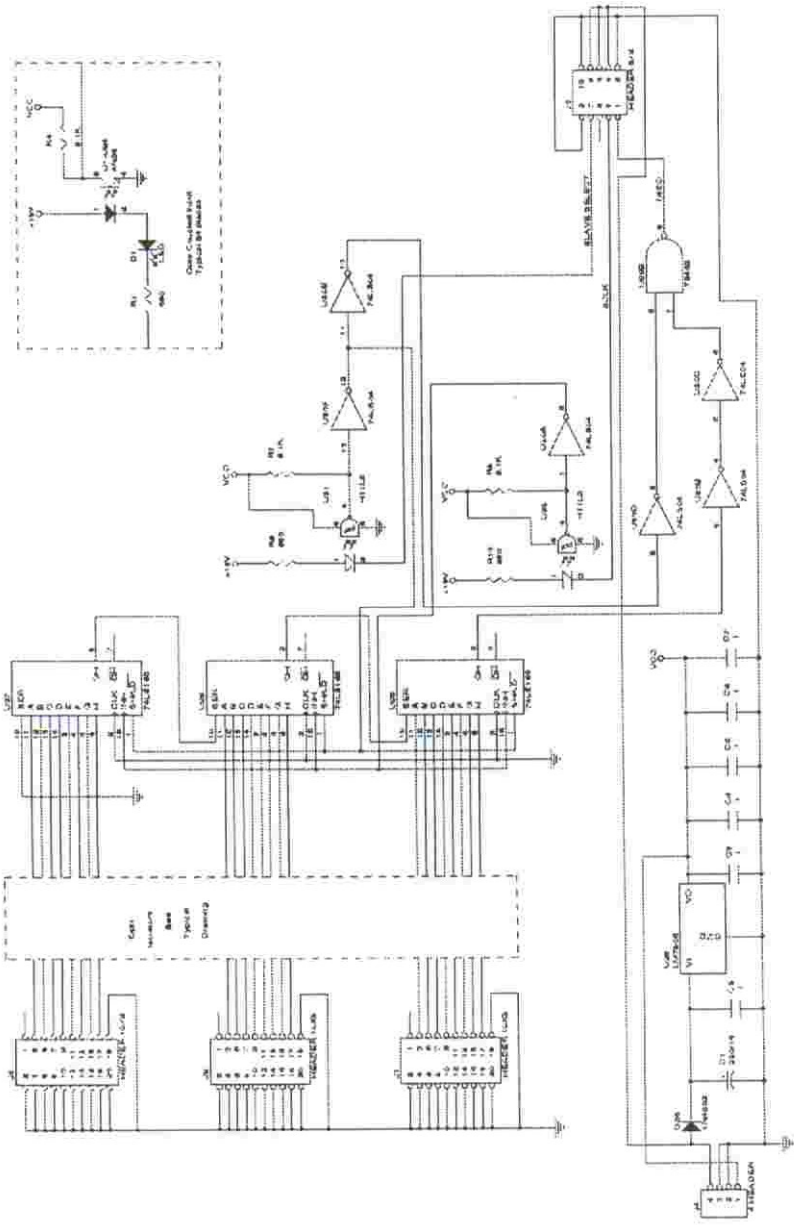
INPUT BOARD OVERVIEW

The Input Board is exactly what the name implies; it accepts input from each unit. The information is parallel-loaded into the board through opto-couplers (4N26 IC's), and then serial-shifted out through the XYZ's (74LS165 IC's) to the distribution board via the cable connector. There is an LED corresponding to each input; we are not concerned with the order the inputs are connected in, simply how many there are. You will need to 'short' the front and back pin together to check each input, and note how many are 'on'.

INPUT BOARD DIAGRAM



INPUT BOARD SCHEMATIC



EE ACCOUNTING MODULE
OVERVIEW AND INSTRUCTIONS

The EE Accounting Module is a small black box with a 9-pin D-plug on one end of it. It plugs into the LCD Box at a port labeled 'EE Rom' (the module will only fit one way). After plugging in the module, turn the key to the 'on' position. The module's display will read "BSR Accounting System #". Sequence through using the <mode> pushbutton until you reach the readout, 'WRITE EEROM'; then, press the <enter> pushbutton. If the EE module accepts the data from the LCD box, then the module will display "COMPLETE". If any connections were incomplete, or the EE module is not in place, when you do this the display will show "BAD EEROM". If you get the "BAD EEROM" message check all of your connections making certain your module is securely seated into the plug, and try again. If you still get that message (after checking all of your connections) try a different EE module – you have one for each unit. If the error message remains, please call Bob's Space Racers®, and ask to speak with a technician.

NOTE: Do not continue beyond this point unless you are certain you have completed the above process correctly! The instructions below will enable you to erase all data on the LCD. Once the data has been erased, it is gone forever!

Once the EE Rom displays "COMPLETE" you can turn on the LC Display. Now you will sequence through the LCD's data (using its <mode> pushbutton) until you see "ERASE DATA"; press the <enter> pushbutton. At this point the LCD readout should show "COMPLETE". Remember, the data in the LCD is now gone; the information in the EE Accounting Module will be there until new information is downloaded to it.

If you have an EE Rom printer you will now want to set it up to printout the day's data. If this is the first time you are doing this, please see the Printer Manual. First, power up the unit, then insert the paper – it will auto load. Next, press the <on line> pushbutton on the face of the printer, this will cause the green LED to light up – the printer will then be ready to print. Place the EE module onto the connector, which is on the face of the printer and press the <momentary> pushbutton. Data will begin printing. As soon as the printer begins printing, you may remove the EE module and start the same process on the next EE module, if applicable. For a sample printout, see the next page. Should you need any assistance, please call Bob's Space Racers® and ask to speak with a technician.

SAMPLE EE PRINTOUT

```
************** Group Game Totalizer Report ************ Unit # ?


NUMBER OF PLAYERS:1    2    3    4    5    6    7    8    9   10
NUMBER OF GAMES:00000 00000 00000 00000 00000 00000 00000 00000 00000 00000


NUMBER OF PLAYERS:   11   12   13   14   15   16   17   18   19

NUMBER OF GAMES:    00000 00000 00000 00000 00000 00000 00000 00000 00000


TOTAL NUMBER OF LOW GAMES:     00000

TOTAL NUMBER OF LOW PLAYERS:   00000

TOTAL NUMBER OF HIGH GAMES:    00000

TOTAL NUMBER OF HIGH PLAYERS:  00000

OPERATOR #1 TIME(min):         00000

OPERATOR #2 TIME(min):         00000

TOTAL TIME TODAY(min):         00000
```

LIGHTING

LIGHTING OVERVIEW

ELECTRONIC FLASHERS:

Electronic Solid State Flasher Unit(s) are based on a Microprocessor and have been placed in some games as early as 1996. They consist of a Series Microcontroller that drives either four (4) or eight (8) 25Amp Solid State Relays, depending on the lighting application. Each unit, also, has a self-contained 12V DC power supply. See Figure #3.

FLUORESCENT LIGHTING

Fluorescent lighting is used on all trailer models, and on some park models, to light up parts of the game. We use standard light fixtures that can be sourced from a local hardware or building supply store. Most of the fixtures use replaceable ballasts that can be obtained from local home repair stores or sourced from Bob's Space Racers, Inc®.

MISCELLANEOUS FIXTURES

Water Games use 25 watt Rough Service bulbs behind the Target Pans to illuminate the target area. The Rough Service bulb is used due to the potential for vibration during travel and water during play. Games that have Win Globes use a standard 40 watt bulb for the 'Win' and 'Running' lights.

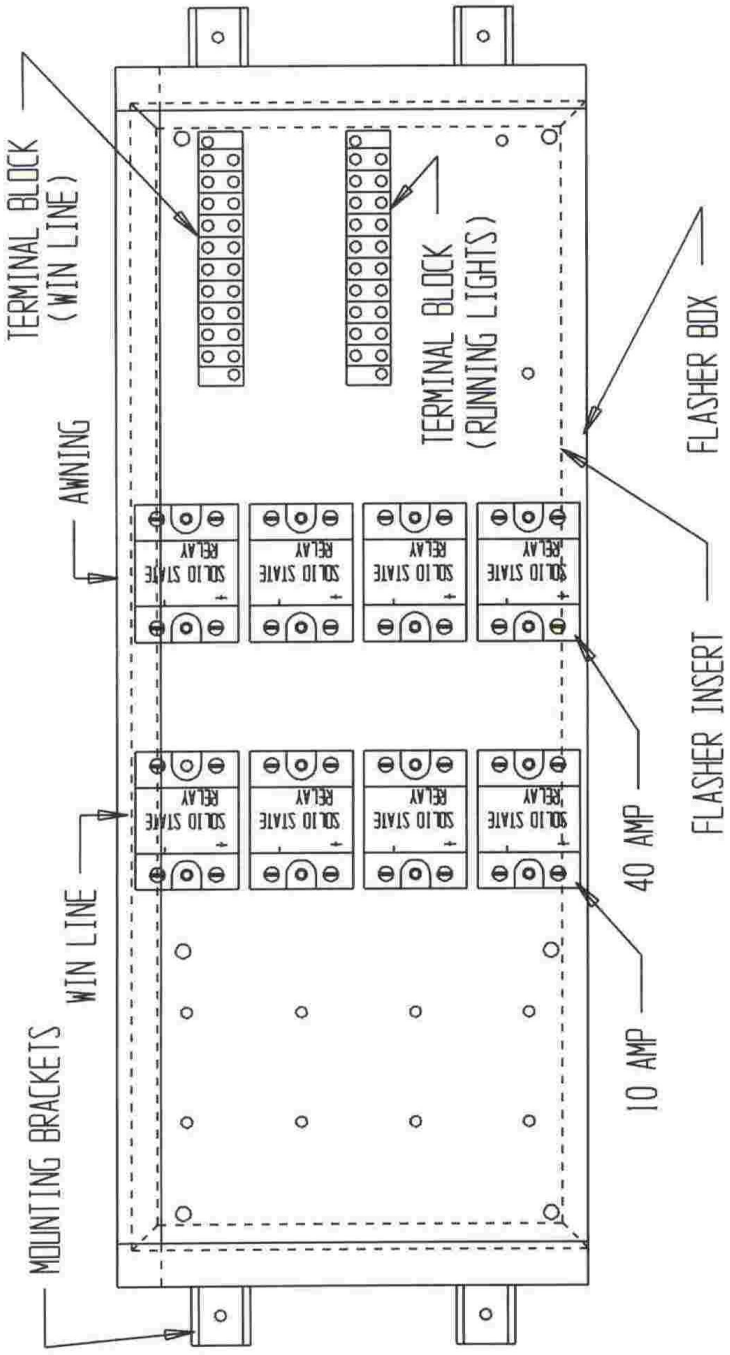
NEON LIGHTING

Caution should be taken on games with neon lighting due to the fact there is approximately 30MA on the output of the Neon Transformer. If one Neon Tube goes out, then unplug the transformer for that entire color. These needs to be done because the blown tube draws more current and can cause the transformer to overheat, thus posing a fire hazard!

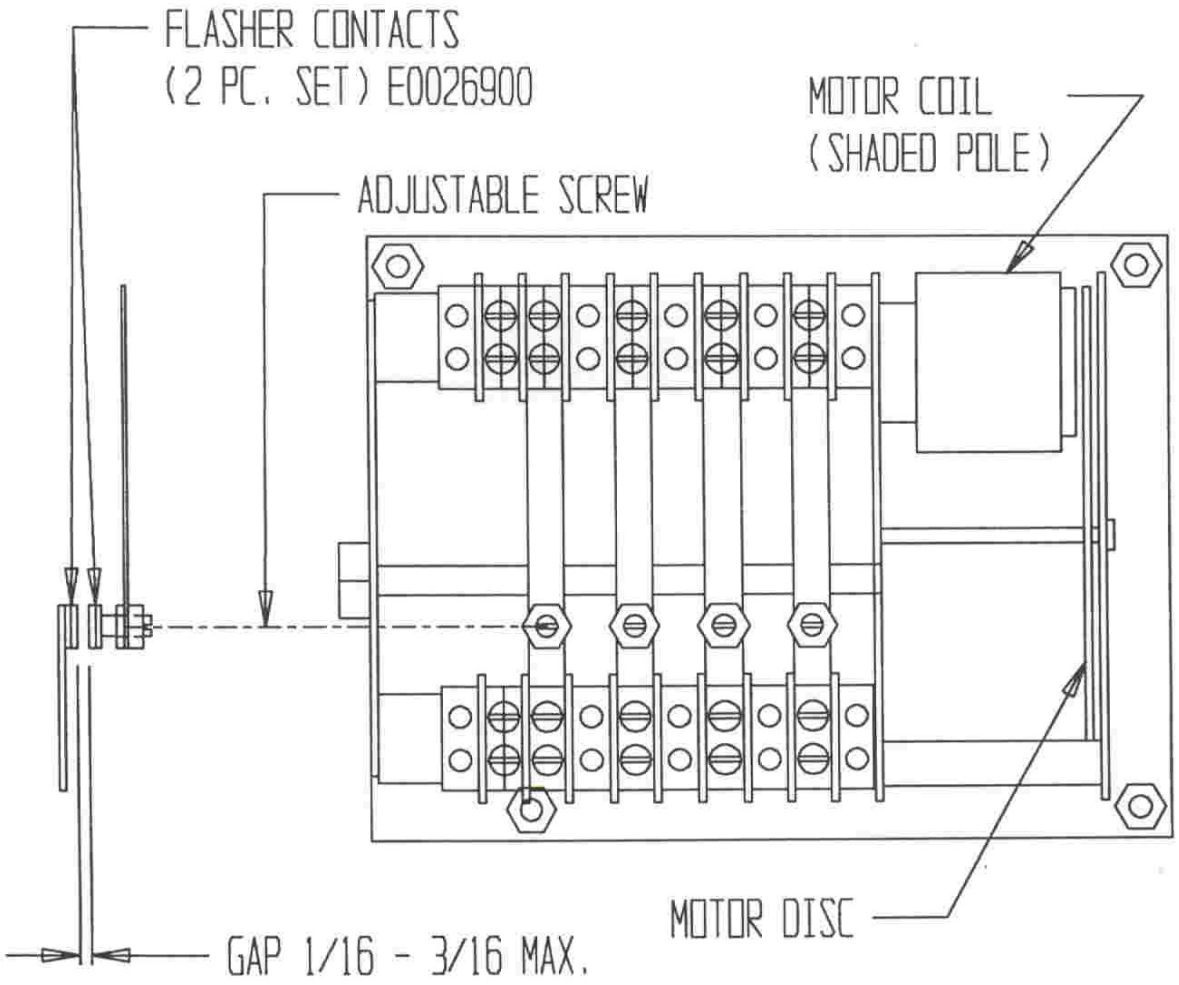
Note: If you experience any problems at all with your Neon Lights, immediately unplug the transformer(s), then consult your "TROUBLESHOOTING – LIGHTING" guide or call Bob's Space Racers' Technical Support.

Figure #1: FLASHER BOX FOR TERMINAL BLOCK AND SOLID STATE RELAY

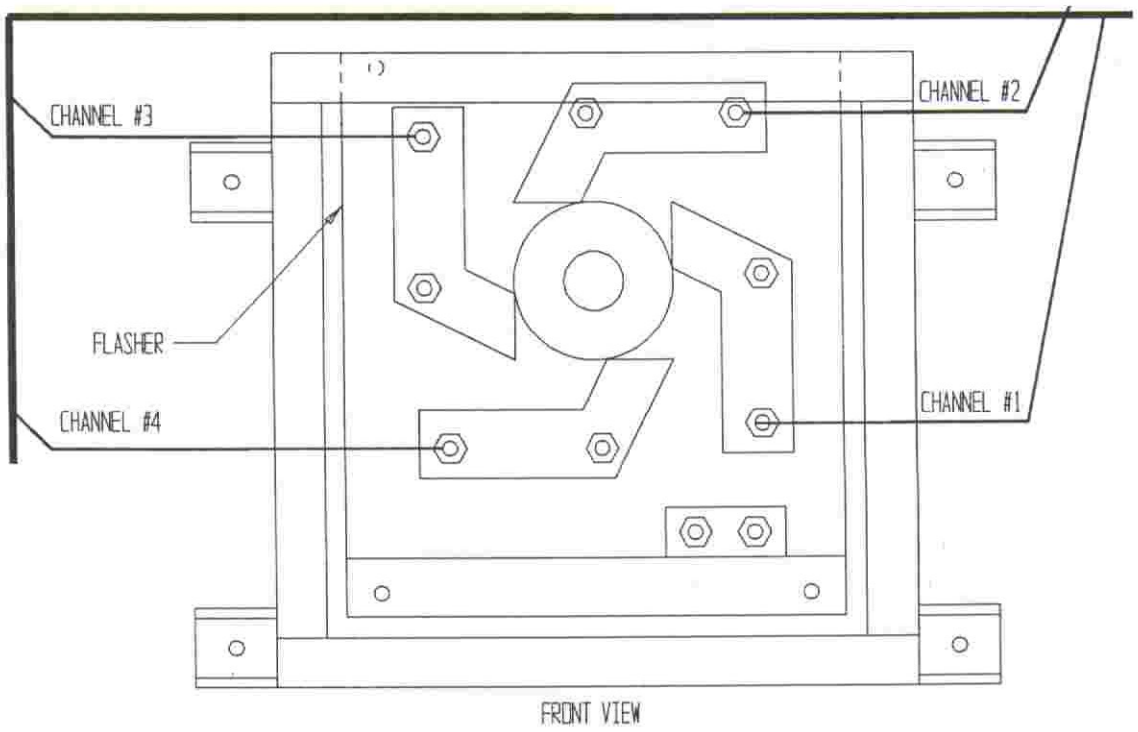
This type is used in the following Group Games: Vertical Waters®, Roll-A-Ball®, and all building models that are line-ups.



33C4 FLASHER UNIT



66C4 FLASHER UNIT

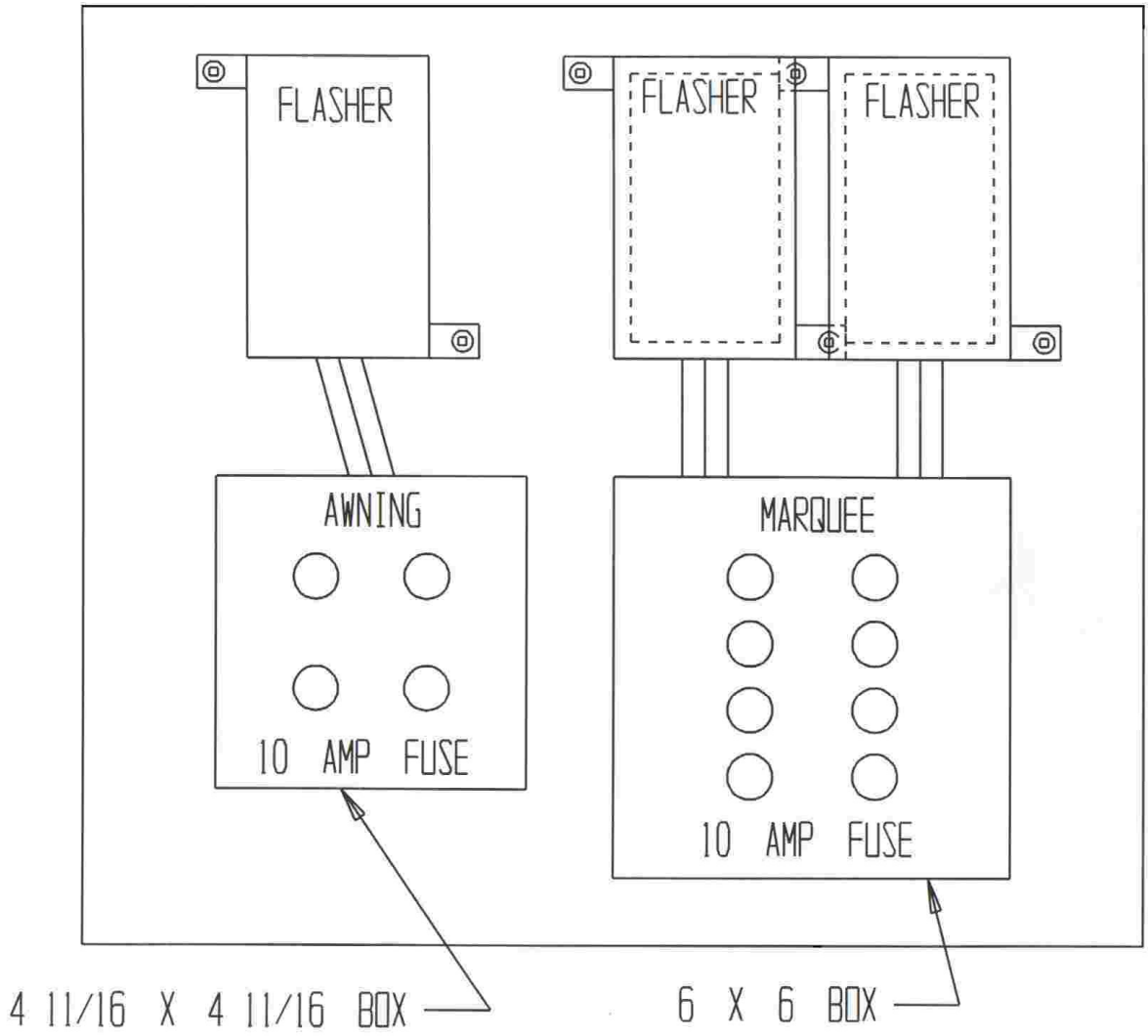


FRONT VIEW

NOTE: SOME ARE WIRED 120V A/C OR 220V A/C

Figure #3: FLASHER ASSEMBLY

This type is used in the following Group Games: Top Glo® trailer model (14 unit), center joint models and others.



TROUBLESHOOTING - LIGHTING

PROBLEMS/CAUSES	SUGGESTED FIX
Overhead Lights Don't Work At All	
No Connection	Check amp connector and all Molex plugs for each track of lights for a secure fit.
No 110V AC 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 110V AC at the motor and it still doesn't work, it's probably a bad motor.
Bad Motor	Replace flasher unit, if necessary.
Some Lights Don't Work	
Bad Connection	Check bulbs to make certain there is a secure fit into the socket.
Contacts Misaligned or Dirty	Check flasher contacts inside the flasher unit. **CAUTION:** 110V AC – unplug the game power. Carefully clean each contact with contact cleaner and realign contact posts, if necessary, to its 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.
Bad Socket	Retwist light socket connection and replace socket, if necessary.

TROUBLESHOOTING - LIGHTING

PROBLEMS/CAUSES	SUGGESTED FIX
Fluorescent Lights Do Not Light	
Bad Light	Change light.
Bad Ground	Make sure fixture has an earth ground properly connected. (Very Important!)
Bad Ballast	Replace ballast.
Fluorescent Lights Will Not Light Until Someone is Standing Next to Them	
Bad Ground	Make sure fixture is properly grounded and check the ground on the game.
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 a working transformer to check if the bulb is bad or if the transformer is bad.
One Tube or One Color Doesn't Work	Replace or swap the transformer with a working transformer. If one tube still doesn't light up, unplug transformer and replace the tube.

LIGHTING PARTS LIST

Part Number	Description
E0028700-TR	Red Philips Bulb
E0028700-BL	Blue Philips Bulb
E0028700-TG	Green Philips Bulb
E0028700-TY	Yellow Philips Bulb
E0028710-TR	Red Import Bulb
E0028810-TR	Transparent Red Import Bulb
E0028810-TB	Transparent Blue Import Bulb
E0028810-TY	Transparent Yellow Bulb
E0028700	Clear Philips Bulb
E0028800	Clear Philips Bulb
E0028303	Turbo Light Bulb
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
E0028500	40 Watt Bulb 120V AC
E0028600	25 Watt RS Bulb 120V AC
E0029390	Fixture 18", 15 Watt
E0029130	15 Watt Fluorescent Tube
E0028140	Bulb G.E. 15T6/145V
E0028200	Bulb, Floodlight White 150 Watt
E0028700-TB	G.E. Blue Bulb
E0028700-TO	G.E. Orange Bulb
E0028710-TG	Sival Green Bulb
E028710-TB	Sival Blue Bulb
E0028710-TY	Sival Yellow Bulb
E0028710-TO	Sival Orange Bulb

SOUND SYSTEMS

SOUND SYSTEM OVERVIEW

Over the years, Bob's Space Racers® has updated the sound systems to accommodate the needs of our customers. The original sound system was a MacKenzie Cartridge, which was a small silver tape cartridge. Next was a Leer Cartridge, which was an 8-track tape. Then a DMR MacKenzie Sound, which was in a gold case with a slide-in cartridge. Presently we use one of two sound systems, either the DMR-PX Mackenzie Player or the Clever Device Sound Sequencer. The DMR-PX Mackenzie Player can play only a single sound. The Clever Device Sound Sequencer has the capacity to play from two to eight (2-8) sounds.

AMPLIFIERS

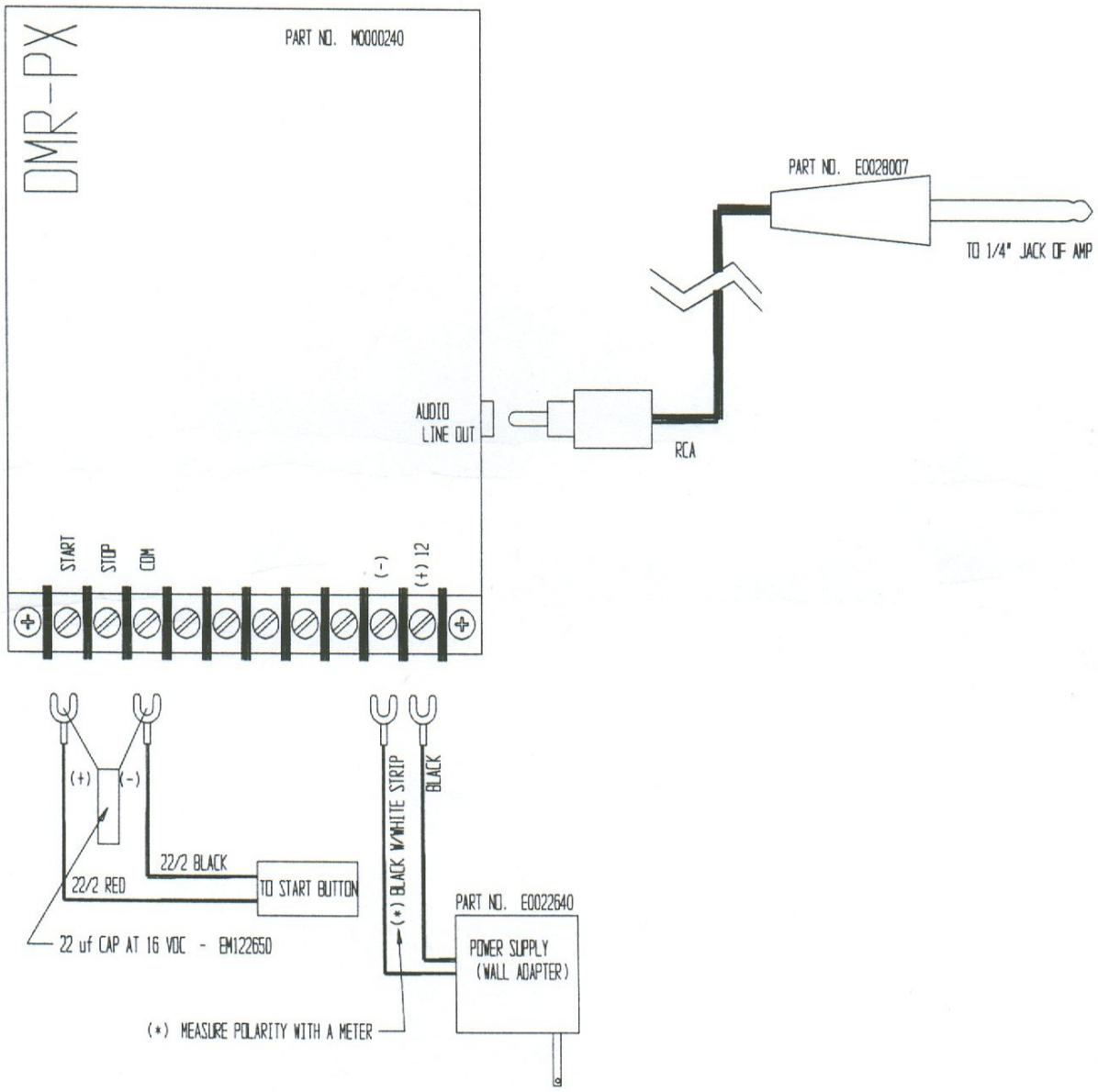
The amplifiers we have used over the years have, also, changed. Originally we used a Bogen Amplifier which had a 70V speaker system. The Yorkville Sound 4200 and KMD 4200 Amplifiers were the next ones used beginning in the early 1980's. They are similar in operations with only a cosmetic difference on their face units. The Yorkville Sound 6400 Amplifier was used after that. This was used in some Whac-A-Mole® trailers because they have more speakers than other games. Presently we use a Yorkville Sound MM4, or MP4, Amplifier System. This unit has more power and is more user-friendly. The hook-up of all of the above amplifiers is pretty much the same: power, speaker, et cetera.

The current sound system comes equipped with overhead microphone cables and includes a hand-held microphone and wireless microphone system. These kits are designed to operate at different frequencies for the various games Bob's Space Racers® manufactures. The transmitter and receiver are set for the same frequency of operation. We have selected different channels for each of the games to minimize interference of signals from other sound systems.

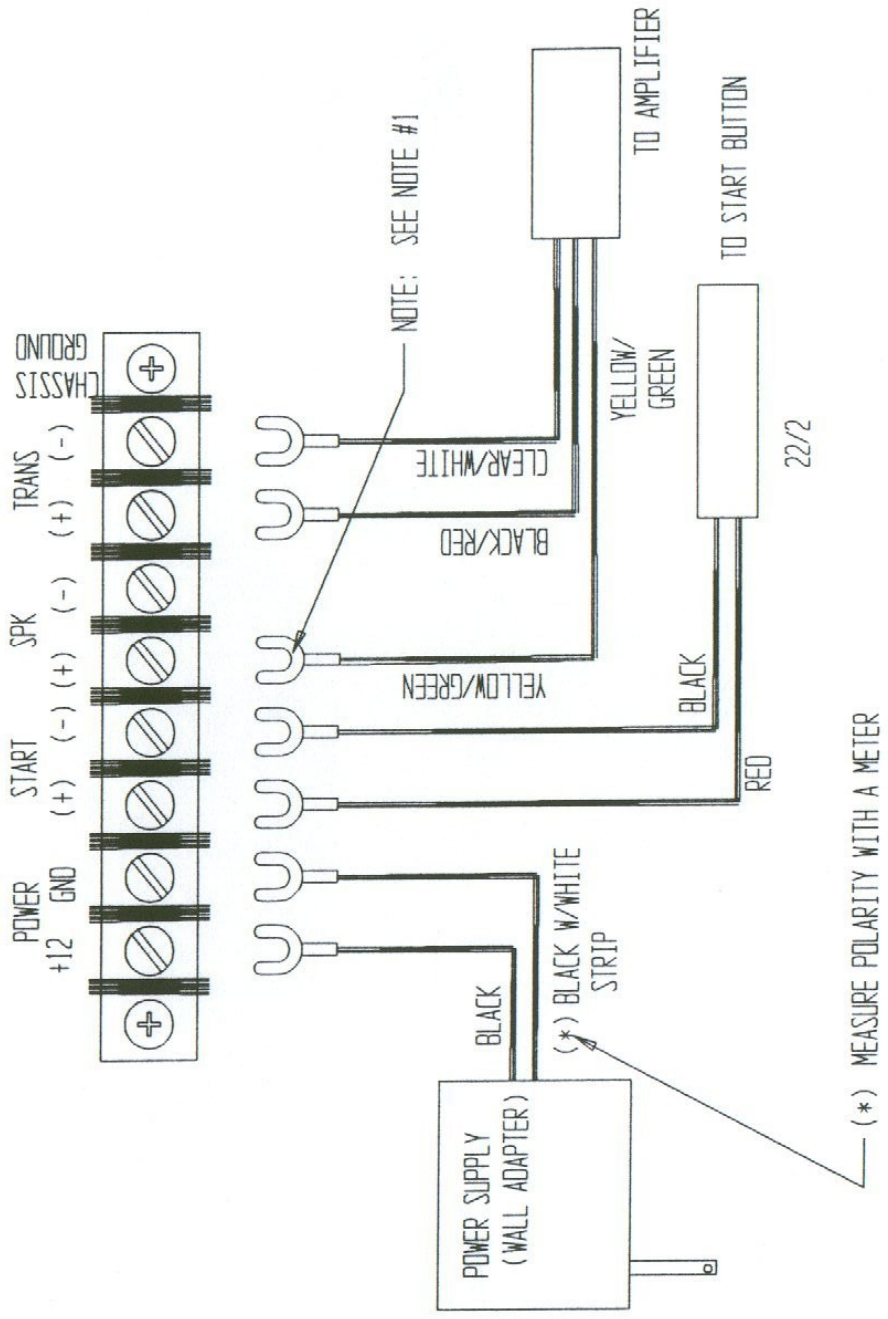
We also have CD Players available. We originally used a Pioneer 6-disk player, but have switched to a Sony single-disk player. This switch was done to reduce the maintenance and to simplify the operation.

If you are interested in updating your sound system to one of the newer systems available, please call us at 386-677-0761 and ask to speak with a technician. The technician will help you determine exactly what is needed for your system to be updated.

DMR-PX MACKENZIE PLAYER DIAGRAM

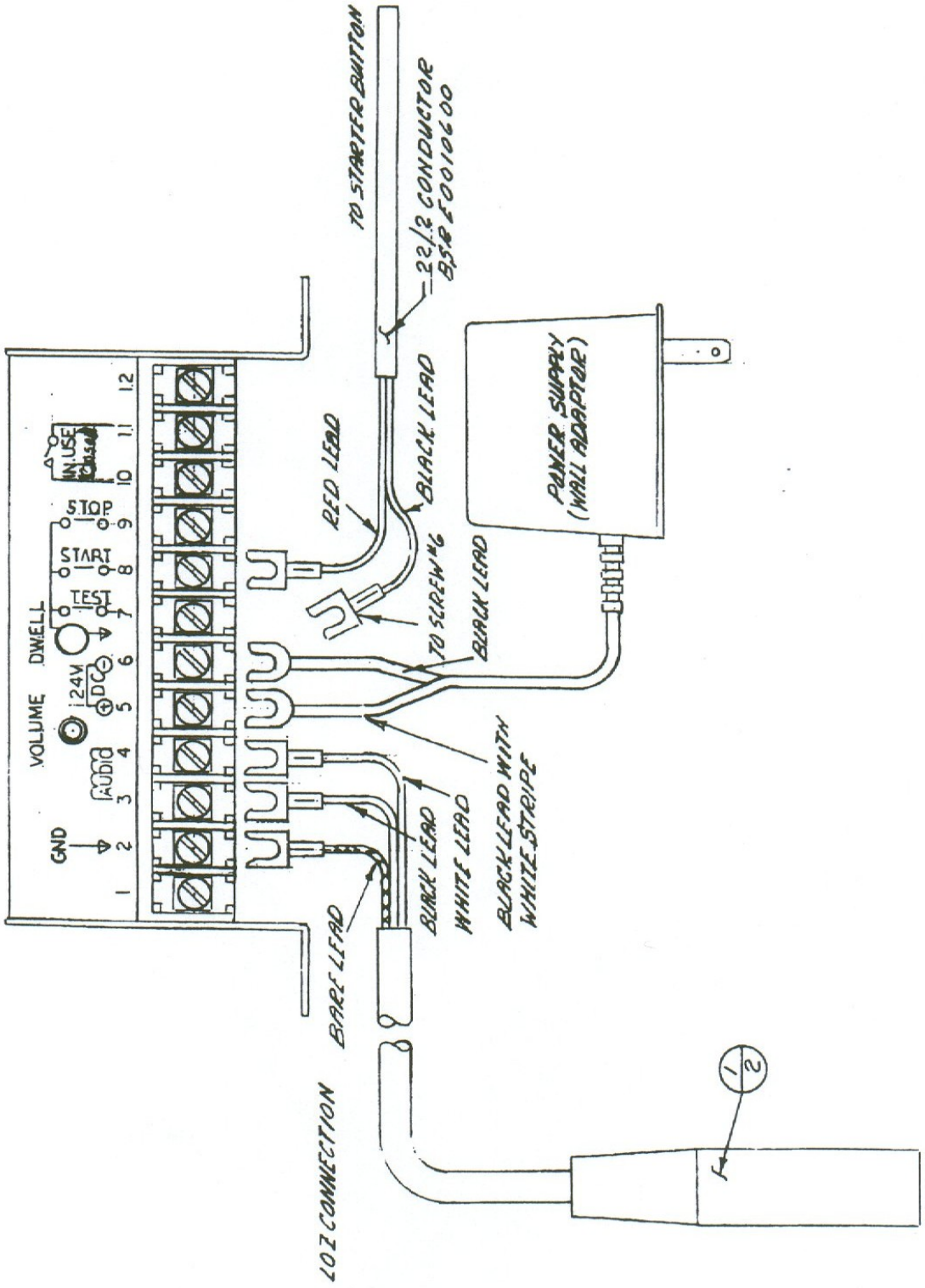


CLEVER DEVICE SOUND SEQUENCER DIAGRAM



Note #1: Test with the lead disconnected. If there is no 'buzz' in the amplifier, then cut the lead off. In the current version of the sound sequencer, the speaker's positive (+) and negative (-) are no longer used. They are labeled "N/C". If your sequencer is showing such a label, then the yellow/green lead will connect to the Trans negative (-), or chassis ground.

STD DMR CONNECTION DIAGRAM



TROUBLESHOOTING – SOUND SYSTEMS

PROBLEMS/CAUSES	SUGGESTED FIX
No Sound from Mini-Mac	
Bad power amplifier	Talk into microphone. If microphone doesn't work, then check amplifier.
Tape in player	Check tape in player and make certain the tape isn't broken. Replace tape as needed.
Bad push button	Check and make certain the power switch is on, then press the small "start" button next to the "on" button on the unit. If the tape plays, then replace the push button at the push button station.
Sound from Mini-Mac Skips or Drags	
Dirty tape	Call Bob's Space Racers® for instructions on how to clean the tape.
No Sound From Amplifier	
Switch	Make certain amplifier is turned on and red indicator light is lit.
Settings	Check volume setting and master volume setting.
Bad amplifier	Call Bob's Space Racers® to arrange for a replacement amplifier to be sent to you while your amplifier is being repaired.

ADDENDUM
RISING WATERS
GROUP GAME
(Fill Valve Maintenance)

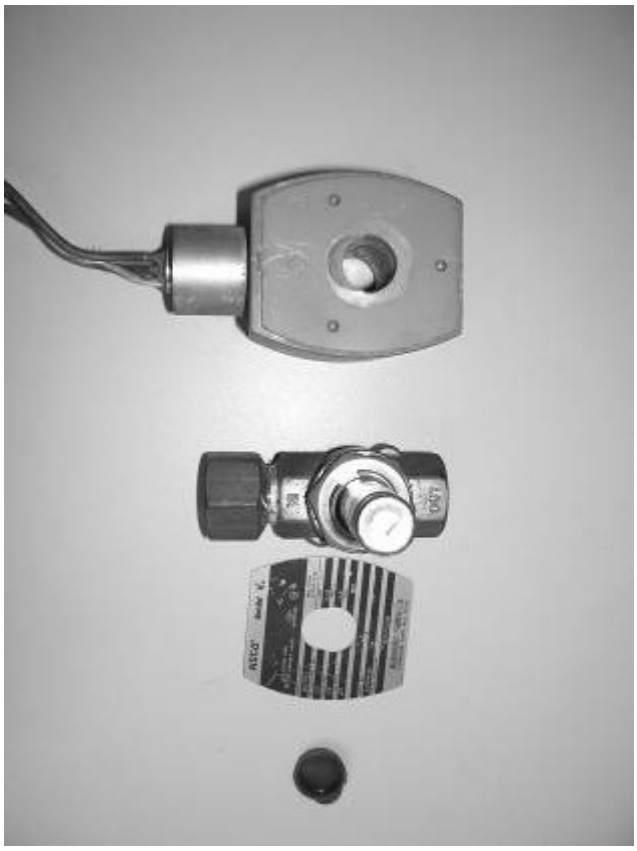
RISING WATER GROUP GAME

Fill Valve Maintenance Procedure

(2/6/08)

1. Using a small flat screwdriver pry the red cap free.

2. Insert screwdriver between the metal cover and the valve coil and twist. This will remove the cover.

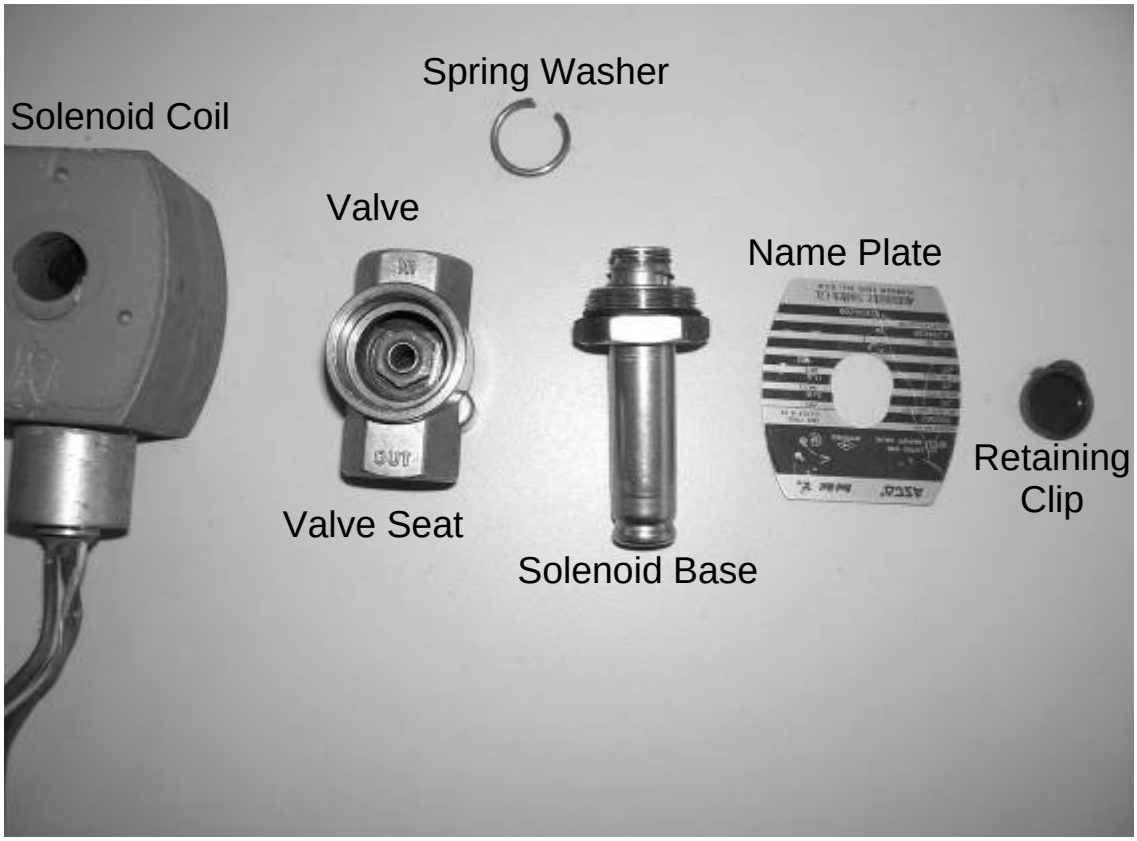


3. Slide valve cover off valve body.

4. Using a 1 1/16" wrench remove solenoid base.

RISING WATER GROUP GAME

5. You should now see seven things.



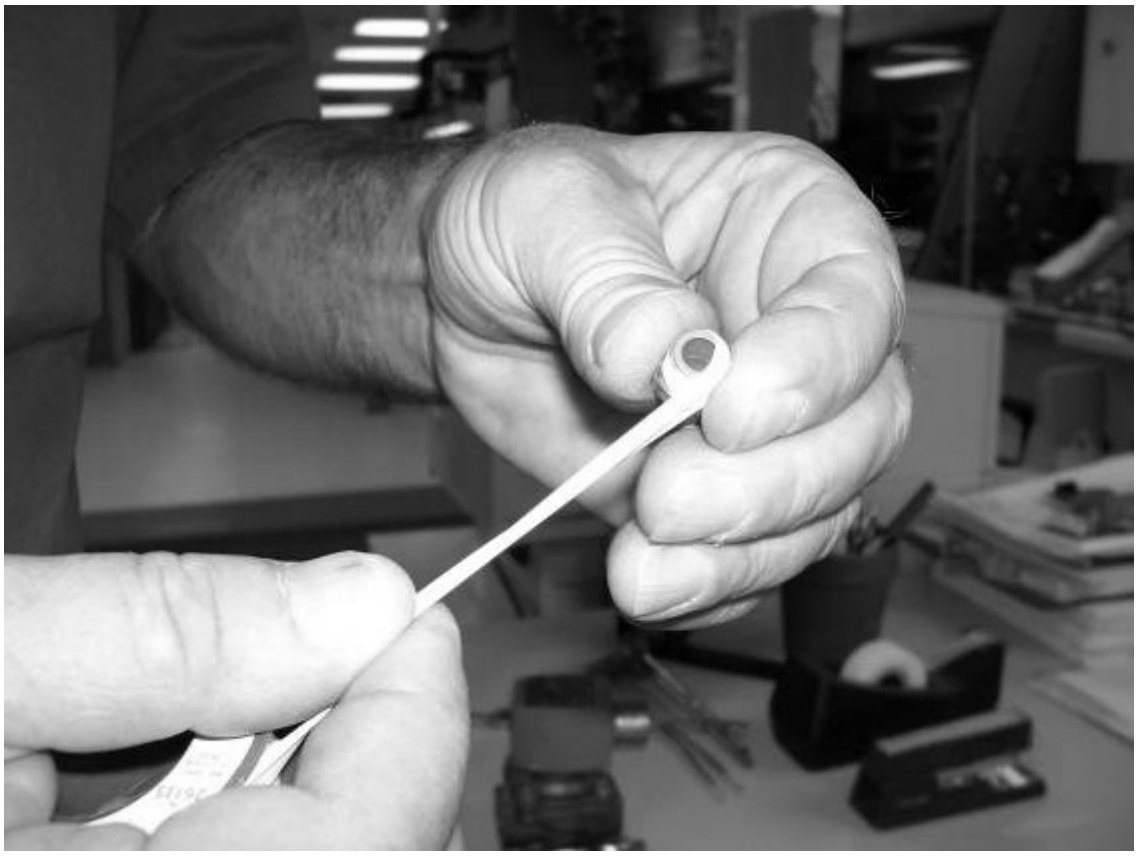
6. Using a 7/16" deep well socket remove the valve seat

RISING WATER GROUP GAME

7. Using fine sand paper or emery cloth on a flat surface to refinish the seat surface. Use a figure 8 pattern to keep seat flat.

RISING WATER GROUP GAME

8. Wrap the valve seat threads with plumber tape



9. Reinstall valve seat in the valve body

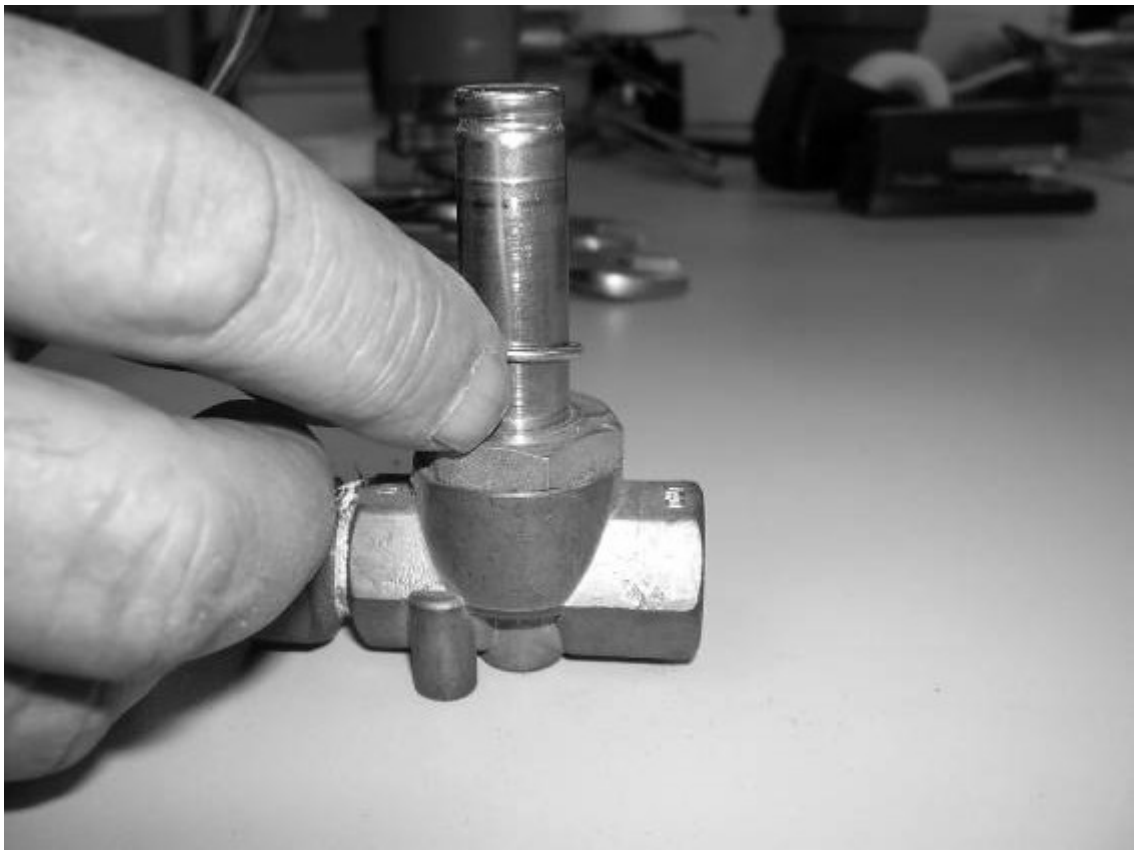
RISING WATER GROUP GAME

10. Remove core assembly from solenoid base. Clean both parts in water. Apply a light coat of Vaseline to rubber seal and O-ring.

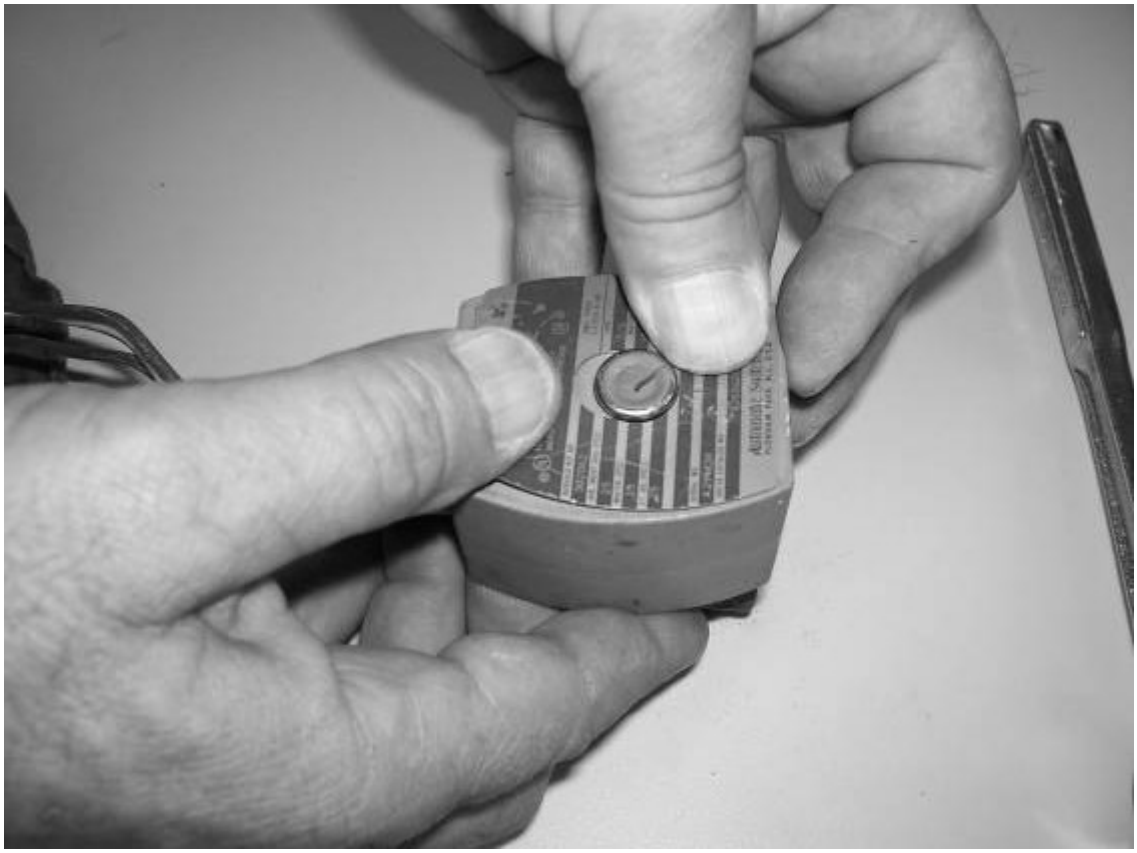
11. Install solenoid base assembly into valve body.

RISING WATER GROUP GAME

12. Slide spring washer on solenoid base assembly.



12. Reassemble by installing valve coil, nameplate and red cap.



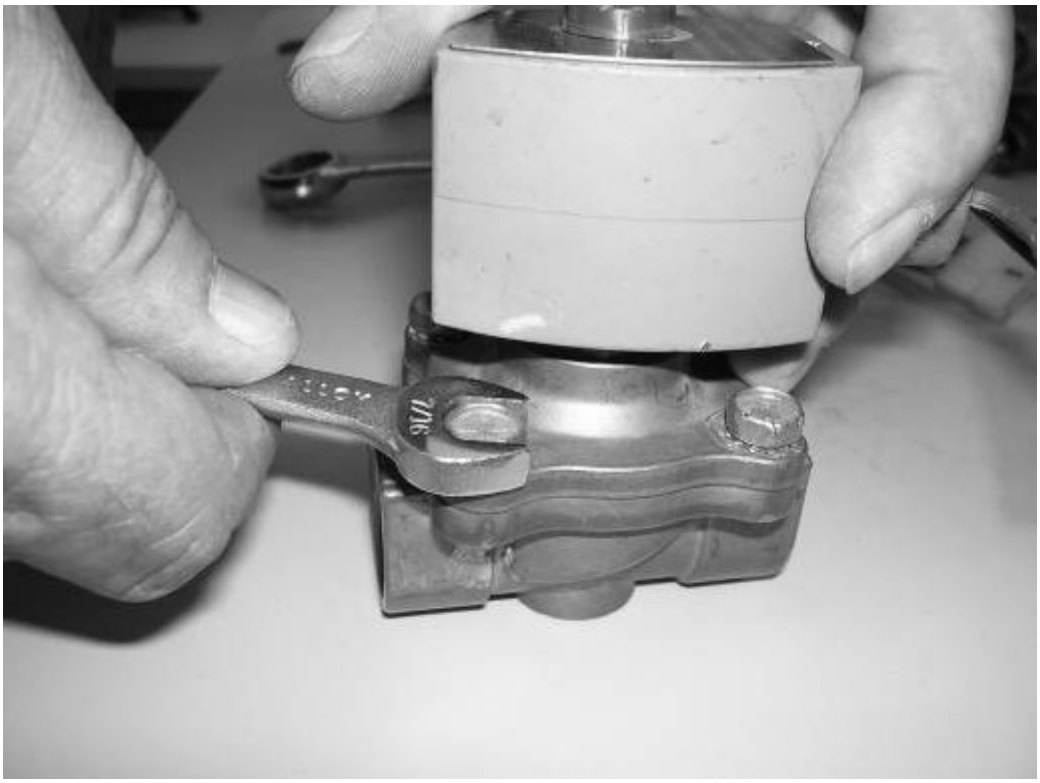
ADDENDUM
RISING WATERS
GROUP GAME
(Dump Valve Maintenance)

RISING WATER GROUP GAME

Dump Valve Maintenance Procedure

(2/6/08)

1. Remove the (4) 7/16" bolts.



2. Separate valve bonnet from valve body.

RISING WATER GROUP GAME

3. Clean and apply a light coat of Vaseline to core seal and O-ring.

4. Clean valve body seat with sand paper.

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5. Bolt valve bonnet back to the valve body. Tighten bolts in crisscross pattern.

IF YOU HAVE ANY QUESTIONS OR COMMENTS, PLEASE CALL OUR SERVICE DEPARTMENT AT

1-386-677-0761

(or)

EMAIL QUESTIONS TO: Tech@BobsSpaceRacers.com