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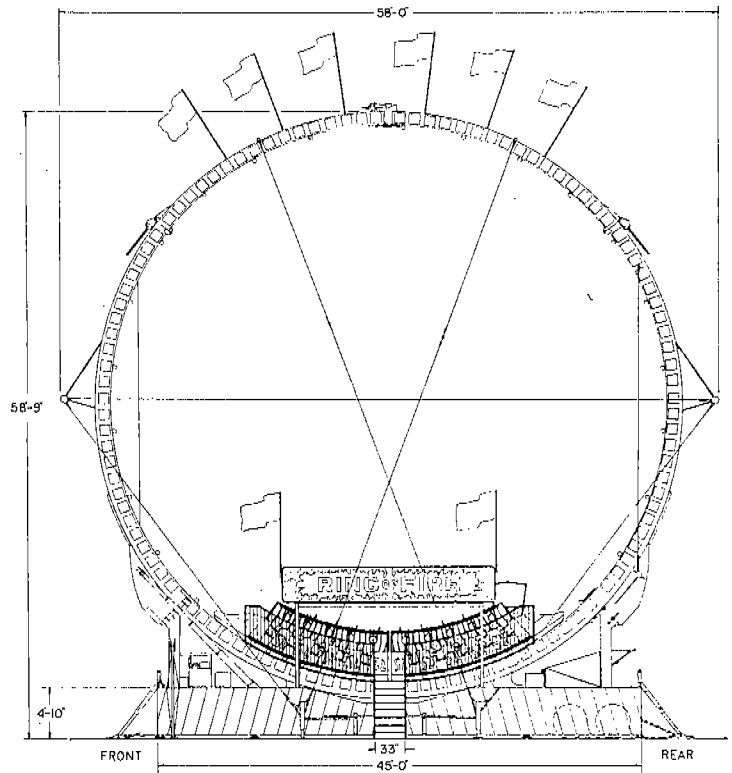
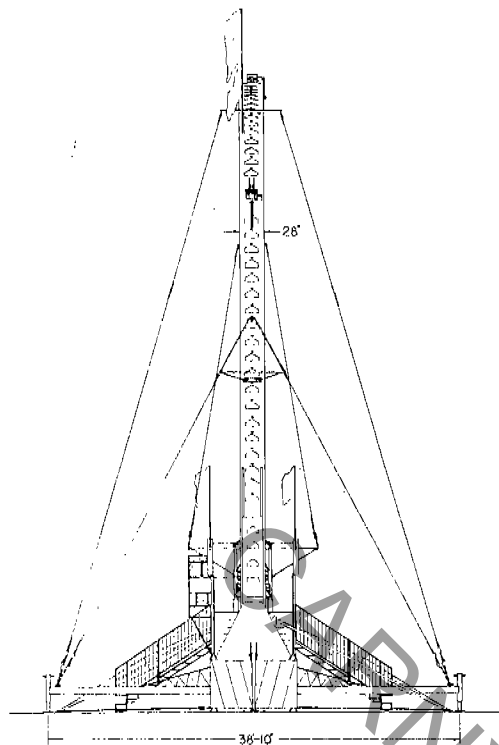
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MADE IN AMERICA

MFG: LARSON INTERNATIONAL
INC.
NAME: RING OF FIRE
TYPE: NON-KIDDIE

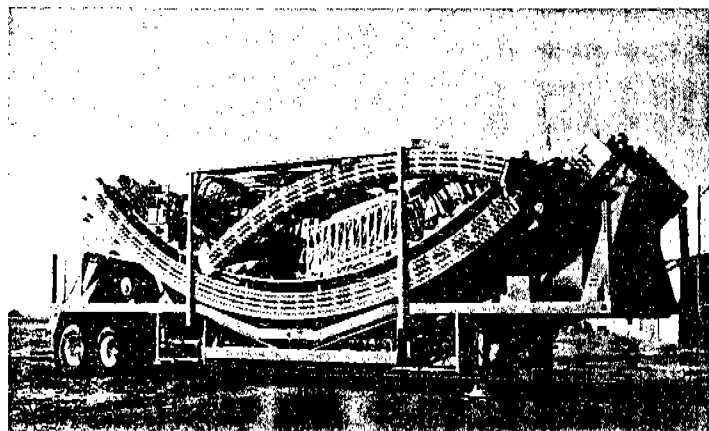


RING OF FIRE



THE NEW "RING OF FIRE" SUPER LOOPS

The RING OF FIRE Super Loop is the culmination of twenty years experience building Super Loops. We have over 70 Super Loops in service around the world today. And the RING OF FIRE has many improvements, some obvious and some that are not. The entire circle is built out of Corten Steel* which is stronger but more importantly, resists rusting. The most obvious is: The NEW TURBO LITES, with approximately 4000 TURBO-LITES computer controlled, that go completely around the ring including under the loading platform. It adds a new dimension to the word "LIGHT SHOW." It provides a 60-foot diameter shower of lights for your Midway. All of the perimeter and guard rail fencing is aluminum. There are no ramps and all steps and platforms are covered with aluminum tread plate. The RING OF FIRE incorporates the latest safety devices. The hydraulic system will not engage unless the operator is seated in the operator's cage, and the new electronic stroke control is equipped with a safety switch. The RING OF FIRE is highway legal including weight and remains, as all Super Loops have been, the fastest to move spectacular available on the market today.



Specifications subject to change without notice

Passengers are positioned in a cushioned seat and held in place by a cushioned lap roller that is locked in place by tripped locked cage sides which can only be released by the operator from the outside. The trains have fixed tops for added safety.

The train is powered by one hydrostatic drive system driven by a 75 HP electric motor. A 7 1/2 HP hydraulic system handles the erection functions.

*TM United States Steel.

TECHNICAL DATA:

Trailer-Tandem Axle	Width - 102 Inches
	Length - 45 Feet
	Height - 13 1/2 Feet
Outriggers Fold Out	Width - 39 Feet
	Length - 17 Feet
Space Required	Width - 39 Feet
	Length - 58 Feet
	Height - 59 Feet
Capacity: 10 persons per train - 2 trains	
20 people, 2 persons per seat - 10 seats	
Hourly Capacity	600-900
Power Required - Drive	90 HP
Power Required - Lights	30 HP

SHIPPING DATA:

Complete Ride - 1 Trailer	59,000 lbs
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LARSON INTERNATIONAL, INC.

MANUFACTURERS OF SUPER LOOPS • STAR DANCER • GALACTICA • PARATON
 (806) 293-1353 • BOX 638 • PLAINVIEW, TEXAS 79073-0638
 FAX (806) 293-5215

INTRODUCTION

This Operation Manual and Numerical Parts Book has been prepared for the ride owner and operator. Larson International, Inc. advises all ride operators and owners to read this book. We especially wish to call to your attention the many cautions listed in this manual. This ride has been designed with safety of operation as a major goal, however accidents cannot be prevented unless the operator understands and practices all safety precautions.

Information for daily and seasonal maintenance are included. Section I details erection and dismantling procedures. Section II explains operation.

PLEASE READ AND ASK ANY QUESTIONS

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THIS IS TO CERTIFY

Ring of Fire Serial No.:

Sold To:

Date:

WHEREAS the amusement ride commonly known as Ring of Fire Mark VI Series, manufactured by Larson International, Inc. of Plainview, Texas, has been manufactured in accordance with known standards as recommended by ASTM, ASME, AWS, ANSI, NFPA, NEC, and other national and state standards in effect at time of manufacture.

Load testing conforms to the sand bag, 300 pounds per passenger seat, during prolonged operating cycles.

Field modification or lack of maintenance may alter above conditions.

LARSON INTERNATIONAL, INC.

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LIMITED WARRANTY

Larson International, Inc. warrants to owners of new products manufactured by Larson International, Inc. that Larson International, Inc. will make any repairs on any part of the equipment, except trailer wheels and tires, made necessary because of defects in material or workmanship for a period of one year from the date of sale. Warranty repairs will be performed without charge to the owner by Larson International, Inc. at Larson International, Inc.'s factory at Plainview, Texas, within a reasonable time after delivery of the new product to Larson International, Inc.'s factory.

All parts to be considered for warranty must be returned to the factory at Plainview, Texas, freight prepaid. The warranty department of Larson International, Inc. will inspect and evaluate said parts, and it shall be at the option of Larson International, Inc. to repair, replace or credit owner's account should the matter not be covered by the warranty.

NOT COVERED BY THIS WARRANTY are repairs or replacement of parts required because of misuse, negligence, alteration, accident or a lack of normal maintenance. ALSO NOT COVERED BY THIS WARRANTY are the repair or replacement of items such as filter, brake lining pads, wheels, tires or other similar items required in normal maintenance.

NOT COVERED BY THIS WARRANTY are the loss of time, inconvenience, loss of the use of the product or other matters not specifically included herein.

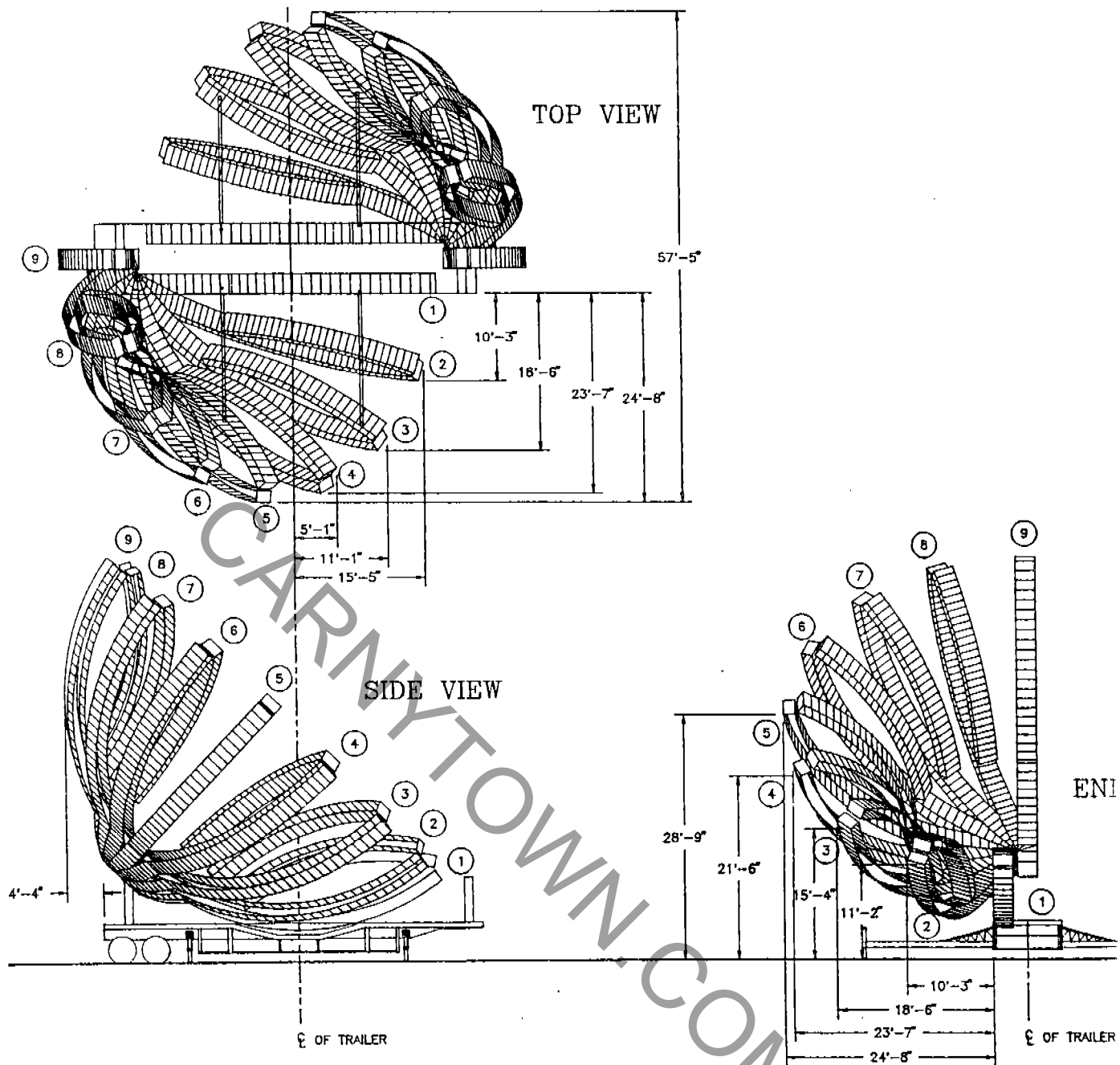
Larson International, Inc. does not authorize any person to create for it any other obligation or liability in connection with this product.

THIS WARRANTY IS GIVEN EXPRESSLY AND IN PLACE OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE AND THIS WARRANTY IS THE ONLY WARRANTY OF ANY KIND MADE BY LARSON INTERNATIONAL, INC. LARSON INTERNATIONAL, INC. SHALL NOT BE LIABLE FOR CONSEQUENTIAL COMMERCIAL DAMAGES RESULTING FROM BREACH OF WARRANTY.

WARRANTY OF ALL PARTS OF THE PRODUCT NOT MANUFACTURED BY LARSON INTERNATIONAL, INC. SHALL BE COVERED ONLY BY THE WARRANTY, WHETHER EXPRESS OR IMPLIED, OF THE MANUFACTURER OF SAID PARTS AND ARE NOT COVERED BY THIS LARSON INTERNATIONAL, INC. WARRANTY.

ALL SALES OF PRODUCTS BY LARSON INTERNATIONAL, INC. ARE MADE AT THE FACTORY IN PLAINVIEW, TEXAS, AND ALL CONTRACTS RELATING THERETO, AND THIS WARRANTY, SHALL BE DETERMINED AND CONSTRUED UNDER THE LAWS OF THE STATE OF TEXAS.

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Minimum area required for Ring of Fire track erection

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SECTION I

ERECTION PROCEDURES

1. Locate trailer on firm level site.
CAUTION: Footings must be suitable for 10,000 pound load at each of the four main landing gear pads and 5,000 pound load at each of the eight outrigger pads.
2. Remove tractor.
3. Lower all pads except end pads and level.
CAUTION: Ride must be level in order for ring to be vertical.
4. Fold out all outriggers and connect all braces, lower pads.
5. Install erection outriggers, braces and tension up.
6. Connect to power source.
CAUTION: 240/208 Volt 3 Phase 5 Wire System
240/208 Volt to ground on Line #3 only.
7. Start erection hydraulic motor.
CAUTION: CHECK ROTATION.
8. Raise sign faces.
9. Remove cross braces between signs.
10. Lower sign frames, put flag poles in place and put extension brace on top track sections for wind brace cables.
11. Connect track ramp to left side of trailer and level.
12. Install erection bridle assembly and tension cables.
CAUTION: Check tension on top cables. One is loose because of the sign face cylinder. Main cylinder valve must be in down position at the same time you are using the push off.
13. Actuate front push out cylinder valve to push track section out.
14. Actuate front main cylinder valve and move track section beyond sign and hold.
CAUTION: Be sure track will clear sign.

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15. Raise left sign to upright position.
16. Lower track to working height and install horizontal cable support assembly and horizontal cables. Grease track dowels at main hinge locations. Grease jactuators screws. Grease main hinges (keep cavities full of grease).
17. Raise front section at a smooth and steady rate.

CAUTION: Do not jockey control valve.
Check for clearance of arc.
Watch cables for hang up.

18. As track section reaches vertical position, contact with break-over cylinder will prevent slam. After contact build pressure to 1000 psi. This will allow you to lower push off cylinder slowly as main cylinder continues to erect section.
19. Make sure you still have 300-500 psi on main cylinder before you release ratchet jacks/turnbuckles that hold top cables and connect across track lugs.

CAUTION: Tighten securely and be sure handles are turned down to prevent engagement with train.
20. Repeat steps 10 through 19 for rear section.
21. Remove lock pins that hold small section to large section. Place pins in the corners of the rail spacers of large section. Then climb up to wind brace cable extension and move cables from lugs on side of section out to the lugs on the extension.
22. Connect wind brace cables with pins and snaps.
23. Extend top hook until red section appears.

CAUTION: HOOK CAN BE EXTENDED OUT OF THREADS OF JACTUATOR AND WILL DROP.
24. Raise FRONT top section to full up position.
25. Repeat steps 21 through 24 for rear section.

CAUTION: As rear TOP section is raised it may be necessary to adjust proper landing gear jack to assist hook engagement.
26. After proper hook engagement tighten hook until motor stalls.
27. Lower end pads, install chains and ratchet load binders and tension up.

28. Position all wind brace cables, chains and boomers to proper points.

CAUTION: Leave slack until horizontal cables are attached.

29. Tension up horizontal cables by ratchet jack/turnbuckle at rear.
30. Go to center top and install track safety locks. REMOVE ERECTION BRIDLE CALBES. .

CAUTION: Turn handles to clear train.

31. Tension up all wind brace cables.

CAUTION: Excessive tension will cause excessive load on horizontal cables.

CAUTION: Do not remove erection bridle steel frame.

32. Connect inertia ring with bolts, nuts, cotter pins and safety cables provided for each end, on Models through Serial #56. Serial #57 and up use rubber bushings and safety bolt.

33. Remove inertia lock pins, turnbuckle and special tube, remove train lock pin.

34. Fold out operator seat and controls. Install support legs and pin.

35. Install operator cage and pin.

36. Start drive system.

CAUTION: CHECK ROTATION. Incorrect rotation will cause extreme damage to Sundstrand pump.

37. Move train and check for free movement.

38. Rotate train to top and install connector link turnbuckle in inertia ring and tension up. Bring train back down.

CAUTION: Excessive tension will cause inside wheel wear.

39. Install all canvas.

CAUTION: Connect all snaps along bottom.

40. Install all stairways, ramps, handrails, etc.

41. Check train for proper operation.

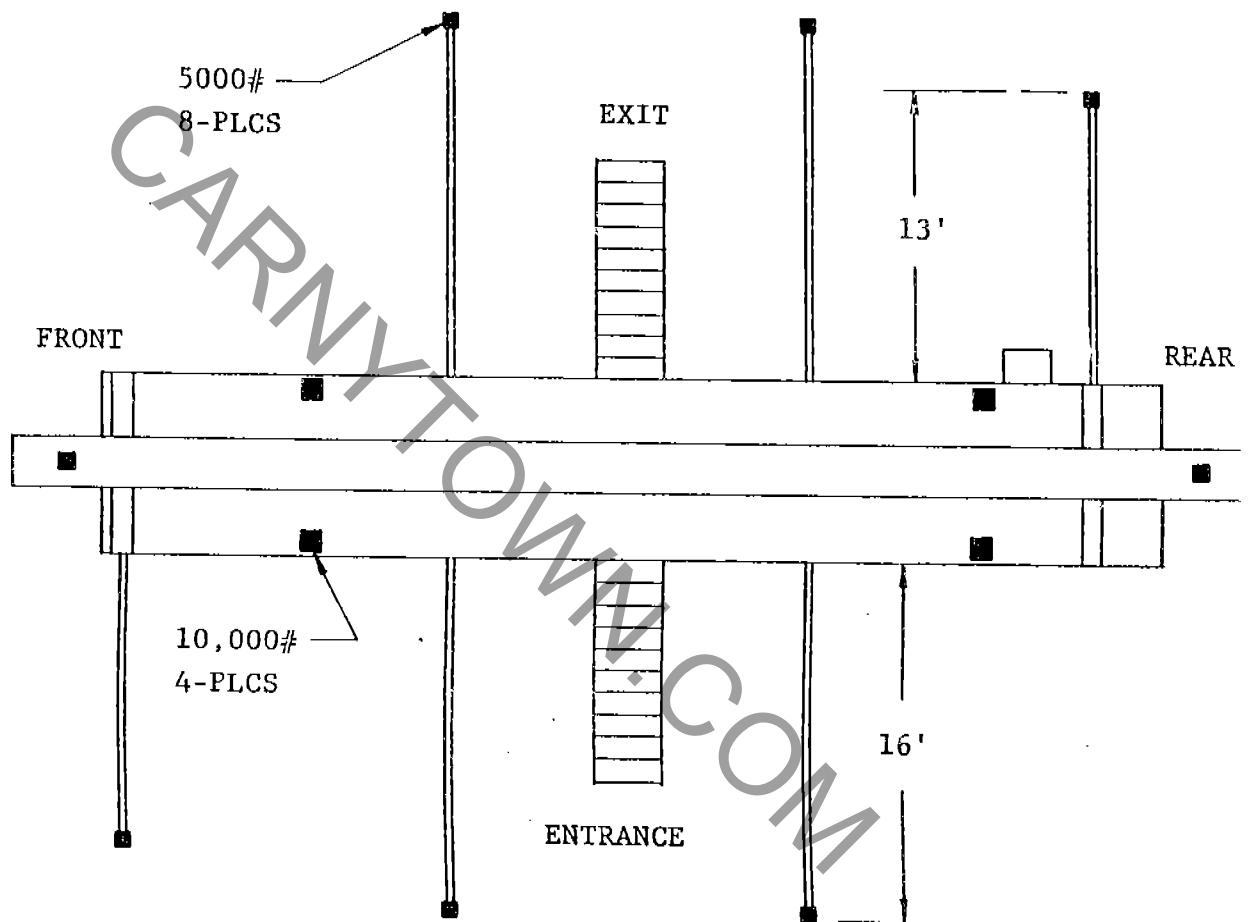
CAUTION

CAUTION

CAUTION

NEVER step across track while train is in motion.

NEVER allow anyone on walkways while train is in motion.



LOAD DIAGRAM

SECTION I

DISMANTLING PROCEDURES

1. Remove all canvas and fold.
2. Check all footings, especially erection pads.
3. Rotate train to center top, hold, shut motor off after centering, remove connector link from inertia ring.
4. Lower train to center position and pin.
5. Pin inertia ring with turnbuckle and related tube.
6. Disconnect bolts in inertia ring at main hinges. Locate inertia ring in proper position for fold up.
CAUTION: Damage to jactuators may occur if inertia ring is not in proper position.
7. Remove all handrails, ramps and stairs.
8. Go to center top and disconnect track safety locks.
9. Install erection cable to erection bridle and tension up.
10. Slack wind brace cables.
11. Disconnect horizontal cables.
12. Slack chains on front and rear supports.
13. Open top center hook until guide rollers will allow rear top section to follow vertical section of guide plates.
CAUTION: Guide rollers must follow guide plates for proper operation.
CAUTION: Excessive extension of top hook may cause hook to fall from housing.
14. Lower rear top section and pin.
15. Close center top hook.
CAUTION: Hook must be retracted to clear walkway step.
16. Lower front top section and pin to side track section.
17. Remove lower cables from top cables. Move top wind brace cables from extension tubes and connect to lugs on the side of top track section.

18. Apply 500 psi to main cylinder. If pressure drops, bleed air from cylinder.
19. Remove ratchet jacks/turnbuckles from bottom section and connect to top section cables and tighten.
20. Check erection bridle cables, they should have tension, if not, tighten.
21. Remove sign connector bars between sign backs and sign frames.
22. Lower sign frame and sign face to allow side section to fold on to trailer.

CAUTION: All horizontal cable braces must be removed before side section can be folded on to trailer.

23. Lower "rear" section first - be sure push out cylinder is extended and track ramp in place.
24. Raise sign to lock in place.
25. Lower front section - be sure push out cylinder is extended and ramp in place.

CAUTION: Hook must be retracted to clear walkway step.

26. Fold up signs and replace cross braces.
27. Lower sign faces.
28. Remove erection outriggers and braces.
29. Remove outrigger braces and fold in outriggers and secure.
30. Remove chains on front and rear supports, fold up and pin.
31. Raise legs at each front corner of trailer and pin.
32. Load fence sections, ramps, stairways, handrails, etc. in possum belly and secure.
33. Connect tractor to trailer and secure. Check air lines and lights.
34. Raise remaining landing gear.

REMEMBER IT IS THE DRIVER'S RESPONSIBILITY TO SEE THAT LOAD IS SECURE AND TRAILER IS PROPERLY CONNECTED.

THINK SAFETY

THINK SAFETY

THINK SAFETY

SECTION II

OPERATION

This ride is powered by a 75 hp electric motor driven hydrostatic transmission. This provides a smooth variable speed drive which is controlled by the operator. Starting at Serial Number 48, this control is an electronic displacement control, which senses the horsepower being used by sensing the electric motor current. This will prevent motor overload and provide a more uniform electric load for the rest of the ride.

A. Theory of Operation

A current transformer is placed around one of the conductors providing power to the electric motor driving the hydraulic pump. This transformer converts the high current to a proportional lower current. This current is directed into a current voltage transducer which converts the varying current to a proportional varying voltage, which is transmitted to a load controller.

This load controller receives its main control power¹ from a 12 volt D.C. power supply. This 12 volt D.C. power is transmitted to the operator's control handle after it has been modulated or changed by the voltage from the current to voltage transducer. In effect, the voltage that has been modified by the amount of electric current or horsepower being supplied to the drive motor. Therefore the more power supplied by the motor the less voltage available to the operator control, thereby limiting the horsepower.

The operator's control handle is a spring centered, forward-reverse handle with a lock in the center position. This lock is in the form of a collar directly under the knob. This collar must be lifted toward the knob to release the handle for operation. This is a safety to prevent accidental operation of the ride. Forward and reverse are on opposite sides of center and if handle is released it will go to the center position and lock.

The control voltage from the operator's control is transmitted to the electronic displacement control which senses the position of the "swash" or "wobble plate" and supplies or removes control hydraulics to the swash plate servos, which controls the speed and direction of the ride.

B. Ride Operation

1. Turn the 250 amp motor disconnect on.
2. At the operator's position, turn the key lock switch on and start motor.
3. With the operator seated, lift the lock collar on the control handle and move control in either the forward or reverse position. Train should move in direction handle is moved.

CAUTION

CAUTION

CAUTION

DO NOT OPERATE TRAIN IF ANYONE OR ANY
OBSTRUCTION IS ON THE WALKWAY.

Note: Operator must be seated to operate train.

4. Rock train in forward and reverse several times. With a full load, train will not go over the top without rocking the train to gather momentum.
5. After rotating in one direction three (3) to six (6) times, stop train at or near top and reverse direction. Rotate about three (3) to six (6) times and discontinue ride. It may be necessary to rock several times to stop, decreasing the momentum each time.

Note: Do not extend ride beyond three (3) to six (6) loops in each direction, and do not hold in an inverted position for more than 5 seconds. If length of ride is extended or inverted too long, the passengers will not repeat the ride, and if sick, that passenger may not ride anything else that day.

C. Adjustment of Control

The Super Loops ride is designed to operate at 13 rpm or 1 rotation every 4.6 seconds. Speeds in excess of this do not provide any greater thrill to the rider, but reduce the life of the wheels, axles, and ball joints.

To adjust the speed, remove the small inspection cover on the operator control box. This cover faces the walkway. This exposes the load controller which has two switches and a knob control between the switches. One switch is labeled Auto-Manual. This switch should always be in Auto. The Manual position bypasses all electronic circuits and is used for trouble-shooting only.

The other switch reads Med-Hi-Low. This switch may be in either Med or Hi. On initial installations, place switch in Hi. Remove hex countersunk plug next to Auto-Manual switch. Behind this plug is a 25 turn infinite adjustment control which can be adjusted using an instrument type screw driver. Start the ride and time the ride. Time should be 4 1/2 to 5 seconds per loop. Adjust this 25 turn adjustment to obtain that speed.

Listen to the hydraulic system. If it appears to be "hunting" (going from load to no load) adjust the sensitivity knob to a lower setting. If hunting does not stop even with sensitivity in "Min" position, stop the ride, place the switch in Med position, sensitivity in maximum position. Start ride and set speed using the 25 turn adjustment to obtain proper speed. When proper speed is

obtained, re-adjust sensitivity to stop "hunting." System is now e
Replace plug and control box cover. Ride is ready for operation.

D. Personnel Requirements

The Ring of Fire is designed to operate with a minimum of two (persons. One person is at the controls at all times during ride operation and one opposite the operator's station to monitor gates platforms. It may become necessary to add an additional person dur high traffic periods.

E. Passenger Restrictions

The following restrictions are for the safety of all patrons. sign should be posted in full view of all potential riders listing minimum following information:

1. No riders under 48" tall allowed on the ride.
2. Persons under the influence of drugs or alcohol are not allowed to ride.
3. No pregnant women are allowed to ride.
4. No food, drink or smoking on the ride.
5. If rider is too large for restraint system to latch proper they will not be allowed to ride.
6. Passengers must keep hands and feet inside train at all times.
7. Patrons with prior neck or back injuries are not allowed to ride.
8. Mentally or physically handicapped patrons may not find the ride suitable.

F. Weather Restrictions

1. Do not operate the Ring of Fire with passengers if the wind exceeds 35 mph.
2. If lightning is present in the area, all patrons and personnel must evacuate the ride immediately.

SECTION II

DAILY OPERATIONAL PROCEDURES

Inspect Daily:

1. All wheels.
2. Inertia ring section connector bolts.
3. Cage latches.
4. Safety pins and etc.
5. Observe train and inertia ring alignment.
Adjust when necessary.
6. Inspect ride in general, especially for vandalism.
7. Check hydraulic system oil level.
8. Check drive tires, air pressure 28 psi.
9. Check stairways, ramps and handrails.
10. Check turnbuckle holding inertia ring together.

Remember a ride is only as safe
as the operator wants it to be.

THINK SAFETY

THINK SAFETY

THINK SAFETY

SECTION II

SEASONAL PROCEDURES

1. Ride appearance and overall condition will be improved if protected from elements while in winter storage.
2. Oil filter on Sundstrand System should be changed each 500 hours of operation. Oil should be changed each 2000 hours of operation or at any time if water or contamination occurs. Texaco "Rando HD 46" or equivalent.

CAUTION: DO NOT MIX TEXACO "RANDO HD 46" AND AUTOMATIC TRANSMISSION FLUID.
3. Oil filter on erection system should be changed each season or replaced any time water or contamination occurs. Texaco "Rando HD 46".
4. Oil level in chain drive housing should be maintained at check plug. Gulf Multipurpose 90 or equivalent.
5. Tire pressure on drive housing tires should be maintained at 28 psi. Pressure on the trailer tires should be maintained at 85-90 psi.
6. Lubricate all grease zerts.
7. Check oil in trailer wheel bearings. Add Gulf Multi-purpose 90 to indicator line.
8. Check all gear boxes and grease jactuators.
9. Check all hinge and pivot pins, nuts, and set screws.
10. Inspect and replace wheels as required.
11. Check chain tension in drive housing and adjust as required.
12. Lubricate "U" joints and spline on 75 hp motor.
13. Adjust trailer brakes as required.
14. Check all lights and replace as required.
15. Tighten nuts on train and inertia ring axles.
16. Inspect jactuator gear boxes annually. Inspect the internal brass gear for wear and replace if internal thread width is 3/16" or less.

A good operator checks and maintains his equipment properly and enjoys the results.

PREOPENING INSPECTION PROCEDURES

The following items are recommended to be inspected prior to approving the Ring of Fire ride for operation:

1. All outriggers and braces should be in position, properly secured, refer to diagram in operation manual.
2. Footings - Determine that all load points are acceptable as shown on the load diagram in the operation manual.
3. Check to see that all cables, chains, and boomers are in place, secure and slack removed. CAUTION: Do not over-tighten windbrace cables.
4. Ride should be level and plumb. If the ride is not visibly leaning, it is of no real concern. It should be as near to plumb as can be determined by a visual inspection. Plus or minus one foot as determined by a plumb bob, top to bottom, is acceptable. The operator will experience considerable wheel wear before it becomes a safety factor.
5. Erection riggers on the left front and right rear corners should be slackened during operation. They can be removed or left in place, but should not be tight.
6. All tension screws should be in place (particularly across the main hinge points on each side of the track sections and both tension screws at the center top and center top inertia ring). They should be secure. CAUTION: All tension screws should be in position, properly tensioned and locked with nut for ride operation and in a tension mode not compression. Specifically the two on each end at the main hinge can appear loaded under compression or tension, but definitely should be tension.
7. All pins should have safety devices. Ex: Snap pins or hair pins.
8. Check condition of bolts, nuts, cotter pins and safety bolts in the inertia ring at the main hinge location of both ends of the trailer.
9. Check stairways and handrails.
10. Check oil level on hydraulic system
11. Check passenger cage latches.

General Machine Structure

1. Inspect the area of the main hinge for visible cracks, particularly at the joint end and where channels join the main structure.
2. The track joints - Look for cross cracks appearing one inch back from the break line.

3. Check the area around where the bottom track section enters the trailer deck both front and rear.

Inertia Ring

1. Inspect as much as is possible the joints in the inertia ring, particularly the outside perimeter at the joint itself. Later model machines have a 1/8" pipe plug on the inside of the inertia ring opposite the wheel trucks. If this plug is present, the ring will have oil in it and any cracks will be evidenced by leakage.

2. Inspect any ring wheels in the following manner:

If the wheel has small cracks that do not go all the way across the face of the wheel it is acceptable for continued and safe operation. If they have cracks completely across the face, chunks broken out, or flat spots, they are not acceptable for operation.

Note: All wheels from the factory are machined to 4-7/8" O.D. The guide wheels (horizontal orientation) should be replaced if diameter is less than 4-3/4". The running wheels (vertical orientation) should be replaced if diameter is less than 4-5/8". This applies to all wheels on inertia ring and train.

3. Wheel bearings may appear loose, but if cotter keys and nuts are in both ends of axle, they are acceptable, but nuts should be tightened.
4. All joints in the inertia ring should have cotter keys in the bolts and nuts (safety cables across them, and two cable clamps through S/N 56). Starting with S/N 57, the inertia ring is equipped with safety bolt, cotter key and nut.

Train Inspection

1. The train undercarriage should not have any missing wheels either top or bottom. These wheels will wear down after a long period of time.
2. Guide Wheels - There should be eight guide wheels on each of the two sections of the train. The train will not rub the inside of the track if the guide wheels are properly in place and the guide wheel is between 4-7/8" O.D. and 4-3/4" O.D.
3. Between the two trains there should be a safety cable tying them together (through S/N 56). Starting with S/N 57, the inertia ring is equipped with safety bolt, cotter key and nut.

Passenger Compartments

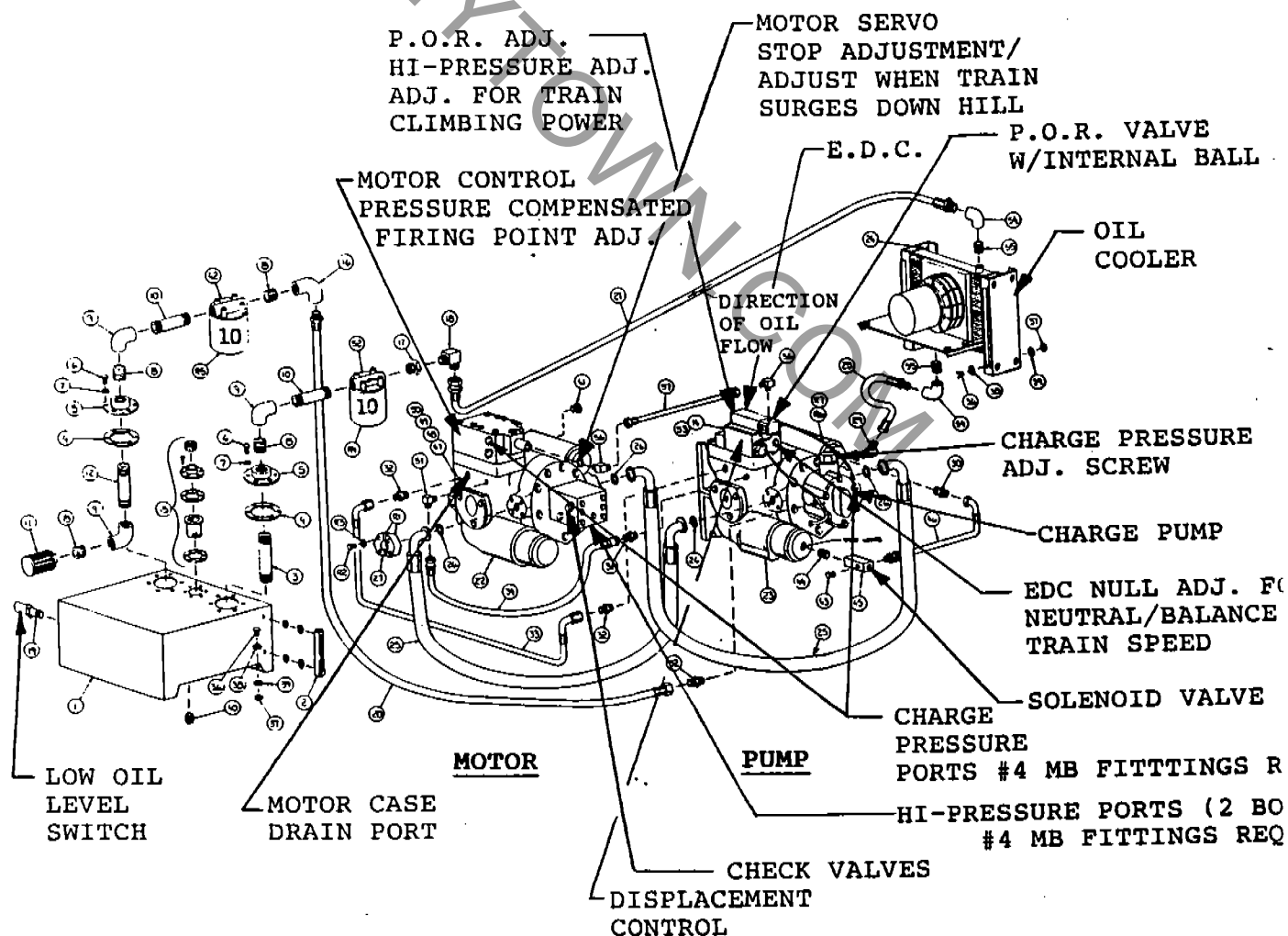
1. The seat backs, seat bottoms and knee pads should be in place.
2. The bolster pads must have adequate foam rubber in them to hold passengers firmly in their seats.
3. Torn bolster covers are not much concern if the foam rubber is still in place.
4. Attached to the outer edge of each bolster frame there should be a plate approximately 3" X 12" hinged at two points to prevent the passenger from putting his foot outside the car while the lid is closed. This item must be in place before the ride can operate with passengers.
5. The lids and latches should have all bolts and nuts in place.
6. There should be a safety key in each individual cage lid lock.

If you, as an inspector, have any questions concerning the ride and what is acceptable or not or if cracks are observed, please call us at the factory.

Larson International, Inc.
P. O. Box 638
Plainview, TX 79073-0638
Phone 806-293-1353

HYDRAULIC SYSTEM ADJUSTMENT PROCEDURE

1. Check Voltage: 208 - 240 No Load
Range: Minimum 200 - 220 Full Load
2. Check Pump Rotation - Must be clockwise as viewed from pump shaft end.
3. Connect a 600 PSI gauge to Charge Pump port - Connect 7500 psi gauges to the bottom of the motor manifold.
 - a. With System operating and control handle in neutral, charge pressure should read 250-300 PSI on gauge.
 - b. Shift control lever forward - train should move - charge pressure should maintain at least 150 PSI on gauge.
4. Hi-pressure gauge should fluctuate between 1000 PSI and 4500 PSI when ride is operating.



HYDRAULIC SYSTEM ADJUSTMENTS

CAUTION: ALL ADJUSTMENTS MUST BE MADE WITHOUT PASSENGERS.

1. Switch load controller, located in joystick box, to manual.
2. Start system. Move train up track until train stalls.
Note: Reading on 7500 psi gauge should approach 4500-5000 psi and, after 1-2 seconds, shift to 3200-3400 psi. To adjust, remove cap on end of pressure override valve (P.O.R.) located on top of hydraulic pump, loosen lock nut, adjust with hex wrench (clockwise increases pressure, counter-clockwise decreases pressure), adjust as required, tighten locknut, replace cap.
3. Rotate train at continuous speed and check r.p.m. - Should be 13-13 1/2. Check in each direction. To adjust, remove cap on end of pressure compensator valve on hydraulic motor, loosen locknut, turn screw with hex wrench. Clockwise increases speed, counter-clockwise decreases speed. Adjust as required. Tighten locknut and replace cap.

ELECTRONIC SYSTEM ADJUSTMENTS

4. Switch load controller to automatic position.
5. Switch load controller to HIGH position.
6. Set sensitivity resistor pot to mid-range.
7. Remove hex plug to access 25 turn pot with small screw driver.
8. Place ampmeter on any one of power lines.
9. Start ride. Pull train up track to stall position and adjust 25 turn pot until 230-235 amp reaching on amp meter (clockwise increases amperage, counter-clockwise decreases amperage). Replace plug.
10. Check train speed again (should be 13 to 13-1/2 rpm).

NOTE: Above adjustments should be made after system has been warmed up, minimum of 30 minutes.
Voltage from power source should not drop below 208 volts with a minimum of 300 amps available.
Above adjustments require the following tools:

- | | |
|---|------------------------------|
| 1 - 300 amp meter w/300 volt meter | 1 - Hex (Allen) wrench 5/32" |
| 2 - 7500 psi gauge w/18" hose & adapter | 1 - Hex (Allen) wrench 3/16" |
| 1 - Screw driver 1/8" wide x 4" blade | 1 - Hex (Allen) wrench 5/16" |
| 1 - Screw driver 1/4" wide x 4" blade | 1 - Channel Lock Pliers 10" |
| 1 - Combination wrench 1/2" & 9/16" | 1 - Pair Safety Glasses |
| 1 - 600 psi gauge w/18" hose & adapter | |

PROCEDURES FOR ADJUSTING CHAINS IN DRIVE LEG HOUSING

- I. On automobile tire side of chain housing, remove the four inspection plates (9/16" wrench).
- II. Note amount of slack in chains.
 - A. If slack is in the large chain (80H)
 1. Remove drive tires from the two axles on the same end of chain housing (3/4" socket)
 2. Loosen six nuts holding the axle housing just enough to let the axle housing to be moved. Do not take off. (3/4" socket)
 3. Loosen lock nut on the long square head set screw. (3/4" wrench)
 4. Screw in on set screws until desired tension. (No slack but still able to be moved 1/4" to 1/2" by hand, 1/2" wrench)
 5. Tighten lock nut and six nuts tight.
 6. Check tension on chain again.
 7. Do this to one or both axles depending on amount of slack.
 - B. If slack is in the smaller chain (60H)
 1. Go around to other side of chain housing to the input housing where the Sundstrand unit is connected.
 2. Loosen off six nuts holding the housing just enough to let the housing be moved. Do not remove. (3/4" socket)
 3. Loosen set screw lock nut. (3/4" wrench)
 4. Screw in on set screw until desired tension. (No slack but still able to be moved 1/4" to 1/2" by hand)
 5. This will adjust both small chains.
 6. Check both chains for equal tension. There should be enough slack in axle housing where the six nuts are to move the axle housing around enough to get the equal tension.
 7. After obtaining equal tension, tighten the set screw lock nut and the six nuts tight.
 8. Check tension on small chains again.

CAUTION: Oil level must be maintained to prevent excessive wear to sprockets, chains and bearings. Use 90 W Gear Oil. Check daily - Watch for leaks.

TROUBLESHOOTING LIGHTING CIRCUITS

1. Troubleshoot this system by sections. Section 1 is the logic, or sequence, or pattern section. Section 2 is the A.C., Solid State relay or output section. Section 3 is the 5 volt bias power supply, which provides 5 volts to both Section 1 and 2.
2. Most problems will be in the section with the most power flowing through it (power = volts x amps) or Section 2 including ceramic fuses and breakers. TO ISOLATE SECTION 1 FROM SECTION 2 AND TO TURN ON ALL LIGHT CIRCUITS, REMOVE THE 2 PHONE CABLES FROM MAIN BOARD. When unplugged, they should turn on solid state relays and all lights. Did they all light up? If yes, look at Logic Troubleshooting. If none of them at all came on, look in two places -- power input to system and 5 volt supply.

Some came on, some stayed off, tells me that you have at least one good circuit. There are 6 or 8 identical circuits. Each circuit output will measure 240/208 volts A.C. on the pair going to the ride. You can locate these wire on terminal strips on the bottom left of panel on Ring of Fire. Wire colors are #1=Blue, #2=Black, #3=Orange, #4=Gray, #5=Red, #6=Purple, #7=Green and #8=Yellow.

The solid state relays will measure less than 10 volts A.C. between terminal #1 and #2 turned on and in the off state 240/208 volts A.C. across the same terminals. Control voltage is applied to terminals #3 and #4. The on state = 3 to 5 volts D.C. The off state is less than 1 volt D.C. across the same terminals.

If terminals #1 to #2 measure 240/208 volts A.C. with phone plugs pulled, measure control voltage on terminals #3 to #4 - if over 3 volts D. C. relay is bad. No 3 volts, check 5 volt supply and bias resistor on power supply board and the small wires from relays to bias power supply.

3. Is the problem in the control panel or in the ride wiring? This Quick Check will determine if it is or not. Unplug phone plugs (which turn circuits on), measure each circuit pair leaving panel going to ride (colors=1-6 or 8). If they all read 240/208 volts A.C. between each color pair, problem is in the ride, not in the panel or box. Note terminal strips are location of wire pairs, (left=rear section, right=front section) on Ring of Fire panel.

If all color pairs did not measure 240/208 volts A.C., troubleshoot that color or colors circuit in panel. Check solid state relay, ceramic fuse, breakers.

4. Trouble shooting ride wiring - Lights flash, some don't turn completely off, check wire pairs leaving panel as in 3 above.

Remove fuse on 5 volt supply. This removes 5 volts from control wires on S.S. relays which turns them off. Terminals #1 to #2 will read 240/208 volts A.C. Light should not be on. If lights are on dim, you have a short to case ground in the ride or panels.

Work one circuit at a time until you clean them up. Break it in half and in half again until you find the short. Relay may not read all of the 240/208 volts on the circuit that has the short to ground.

5. Logic Troubleshooting - Does the LED flash or stay out? It indicates clock circuit is working and 5 volt supply is also working. Does any circuit flash? If yes, pull phone plugs. Did all circuits work? If yes, switch the phone plugs and plug back in. Does the problem move? If yes, switch them back. No change IC chips, IC chip U4a and U4b. Does the problem move? If yes, one of them is bad, U4a controls circuits #1-4, U4b controls circuits #5-8. If no was the answer to any of the above questions, check phone plugs and connectors.

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