

~~FARRON~~ AMUSEMENT

# SUPERBOWL / TWISTER MANUAL

MFG: K. T. Enterprises  
NAME: Super Bowl / Twister  
Type: Non-Kid

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# **SECTION 1**

## **RIDE INFORMATION**

### **CONTENTS**

Certificate Of Origin

Introduction

Intended Use

Specifications

Ground Layout

Warnings

Field Testing

## CERTIFICATE OF ORIGIN

We certify that the Amusement ride delivered in America for Farrow Amusement Co.

Type	Superbowl / Twister
Model	Mark II
Date of construction	August 1998
Number of construction	3
Serial Number	KT003SB

Has been built in our factory in Milton Keynes, England, and meets or exceeds the following standards:

Health and Safety Executive Code of Practice

ASTM Amusement Rides and Devices F24

T. U. V. Approved Design

## **INTRODUCTION**

This manual has been written for the benefit of the ride operator and owner.

K.T. Enterprises advises all ride operators and owners to read and become familiar with all parts of this book.

### **INTENDED USE**

The equipment herein described is intended to be used by a commercial operator, to provide a service to the buyer's customers. As a commercial operator, the buyer agrees to operate and maintain the equipment for its intended use in a professional and competent manner as per the manufacturer's recommendations and instructions, industry and governmental standards and good commercial practices using professional and competent mechanics and operators. If at any time and for any reason, the equipment cannot be adequately and safely operated for its intended use, buyer agrees not to operate the equipment until proper repairs or corrections are made.

# SPECIFICATIONS

## RIDE

Superbowl / Twister

## MANUFACTURER

K.T. Enterprises  
76 High Street, Stony Stratford  
Milton Keynes, MK11 1AH

## SEATING

Maximum number of passengers	40
Maximum passenger weight	170 lbs.
Total passenger weight	6800 lbs.
Minimum passenger height	48"
Loading	4 passengers per car Balance to within 3 cars

## PERFORMANCE

Direction of Travel	CW/CCW
Ride Speed	15 rpm maximum
Ride Duration	3 minutes maximum
Maximum wind speed	
Angle of Lift	56.7° maximum

## POWER REQUIREMENTS

Table Drive Motor	75 KW
Hydraulic Pump Motor	75 KW
Lighting and Auxillaries	120 KW
Total Power	270 KW

## MOTORS

Hydraulic Pump Motor	Type	Fimet
	HP	75 KW
Drive Motor	Type	Beaumullar
	HP	75 KW
Jack Motor	Type	Fimet

Max. Wind Speed

## TRAILERING

Height	13' 6"
Width	8' 6"
Length	53'
Total weight	95,000 LBS
Rear axle weight	61,000 LBS
King pin weight	34,000 LBS
Tire size	265 70R 19.5

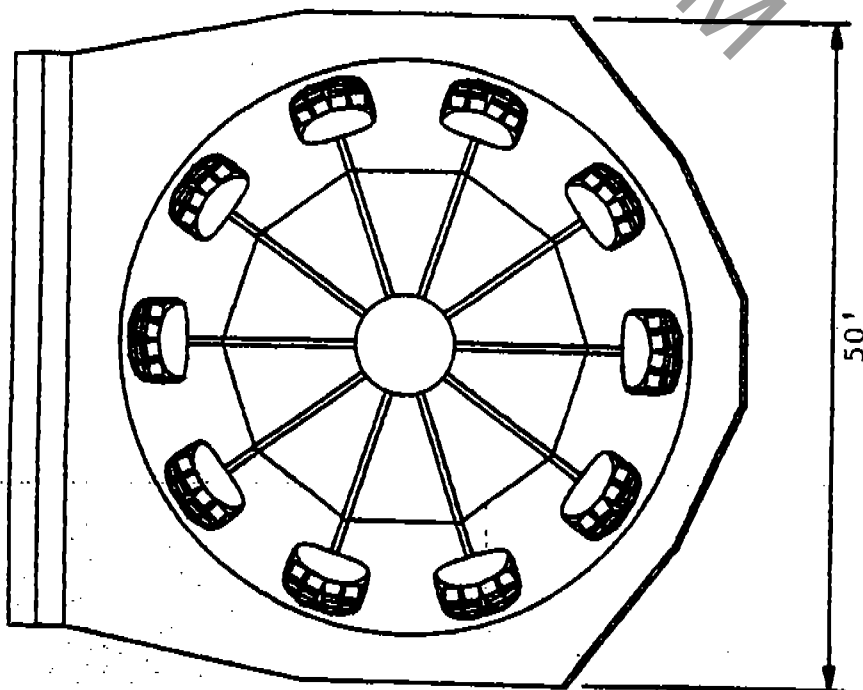
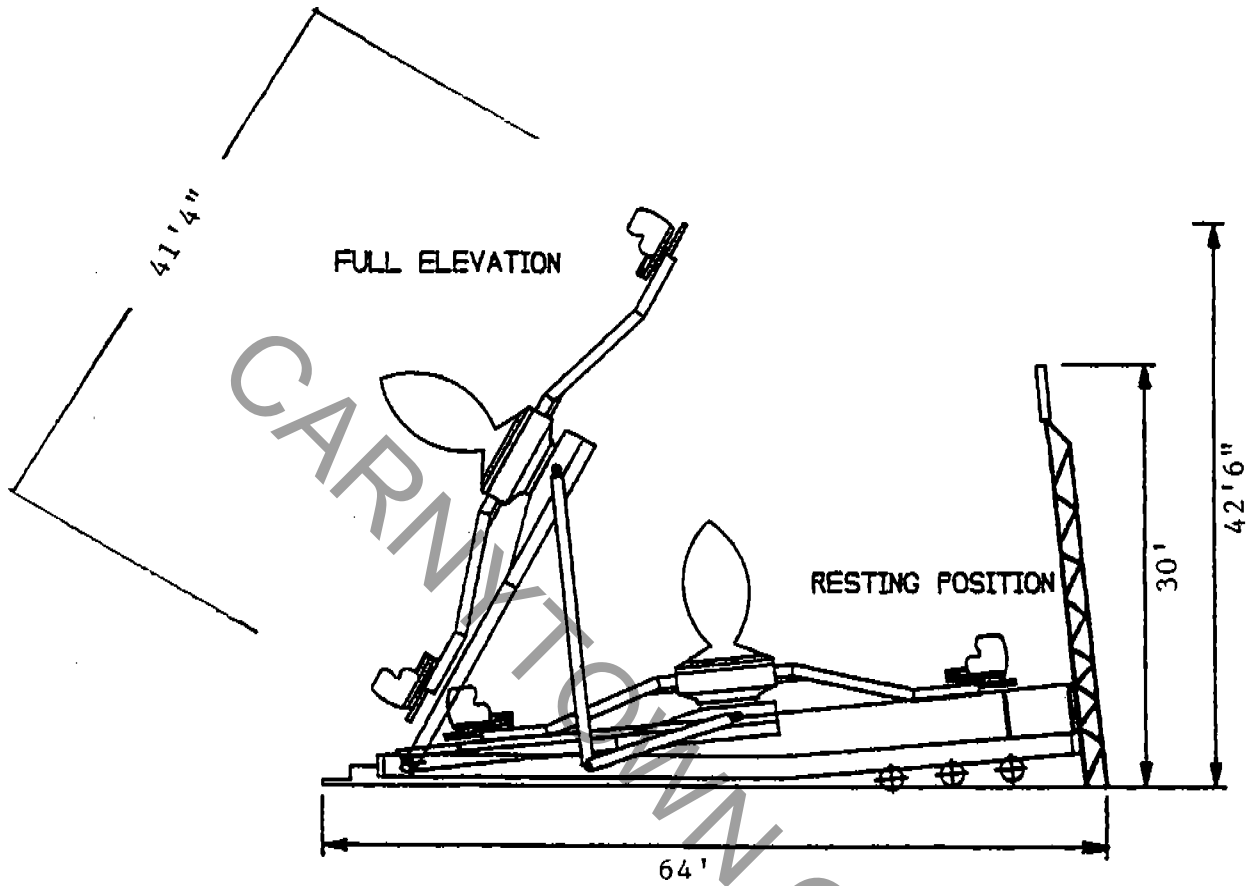
## ADDITIONAL TRAILER FOR CARS

Width	8' 6"
Length	52'

## CONSTRUCTION

Steel, Fiberglass, Aluminum, Stainless Steel, Makralon

# Area Required For Operation of Superbowl / Twister



## WARNINGS

Ride must be erected, operated, maintained and dismantled to manufacturer specifications, taking into consideration all federal, state and local codes.

All bolts, pins, keys and auxiliary hardware must be to manufacturer specification.

Daily inspections, maintenance and operator training must be documented.

Inspections, maintenance and operation must be performed by qualified personnel.

Field repairs should not be undertaken without the approval and proper instruction from the manufacturer and should only be performed by qualified personnel. These persons should have a complete understanding of both the components function and manufacturer instructions.

If a car has lap bar indicator lights that do not light and that car has been disconnected and is out of service, **patrons must not be put into that car** until it has been repaired and indicator lights are operational. The out of service cars should be tagged out of service.

## FIELD PERFORMANCE TESTING

The following specifications conform with ASTM F846 standard guide for Testing Performance of Amusement Rides and Devices, in effect on date of ride manufacture.

1. **ERECTION OR INSTALLATION TESTING** - Each erection or installation of a ride shall be given an inspection prior to carrying passengers that shall include but not be limited to the following:
  - a. Determine that the ride has been erected according to set-up procedures included in the operations manual.
  - b. Points noted in the after set up inspection checklist located in the Inspection section of the Manual.
  - c. Operate ride to determine that direction of travel conforms to the information plate, ride manual, field inspection guide or specification sheet.
  - d. Operate the ride for a minimum of three ride cycles to determine that the ride speed does not exceed the speed specified in the information plate, ride manual, field inspection guide or specification sheet.
2. **DAILY PRE-OPENING INSPECTION** - This inspection shall include a daily inspection of all items as specified in the Daily Inspection Guide located in the Inspection Section of the manual. Plus any other points that the owner feels necessary for his operation.
3. **DOCUMENTED FIELD PERFORMANCE & OPERATIONAL TESTINGS** - Documentation and certification shall be performed by a person who by demonstrated education and field experience is knowledgeable with the construction, erection, operation, maintenance and repair of amusement rides.
4. **OPERATIONAL LOAD TESTINGS** - Any operational test including load testing performed on a ride shall be completely nondestructive in nature. Overload testing exceeding the rated limits listed on the information plate, operation manual, field inspection guide or specifications sheet shall be deemed inappropriate. Where maximum total passenger weight is not readily available passenger capacity multiplied by 170 pounds per adult and/or 90 pounds per child may be used.

Nondestructive testing with inert loads can be accomplished only with special care as to placement of the load so that it is centered both vertically and horizontally as would be the load of the passenger it replaces. Extra seat reinforcement must be used to offset any load concentration created. Such tests shall be documented and certified as nondestructive by the person making the test and agency requiring it. Results of all load tests shall be communicated to the factory upon completion by the Certifying Agency.

Conducting a nondestructive operational load test assures the testing agency only that it will carry a given load in a given way at a given moment and in no way assures future safety of the ride.

Conducting a destructive load or overload test also assures the testing agency that it will carry a given load in a given way at a given moment and in no way assures future safety of the ride. However, it also introduces the probability of inflicting serious irreparable damage to the ride that may or may not be apparent at the time of the test.

We consider inert load testing of any nature appropriate only for situations requiring experimental development of stress-strain testing during prototype development. A certificate of load test on the prototype and certification that each production ride met the design criteria when it was manufactured is available from the factory upon request.

**Non Destructive Testing (NDT) requirements are outlined  
in the maintenance section of this manual.**

# SECTION 2

## ERECTION PROCEDURES

### CONTENTS

Description

Erection Procedures

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## DESCRIPTION

The K. T. Enterprises Superbowl/Twister is a quality built mobile amusement ride designed to T. U. V. standards, and is easily and quickly erected and dismantled.

Hydraulic rams and winches are used to level the trailer, lower the floors and raise the sign and rear scenery.

The ride is capable of seating 40 passengers in 10 cars. There are a series of interlocks that will not allow the ride to run unless the lap bars are locked and secure.

The ride rotates on a plane until it gets up to speed and then the boom is lifted to an angle of  $56.7^{\circ}$ . The cars will spin on their own axis. The ride may be run clockwise or counter clockwise.

A second trailer is used for the cars, control booth and some scenery panels.

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## ERECTION PROCEDURES

To commence erection of the ride, it must first be positioned into the area which it will be operated.

Connect to electric supply.

Level the trailer by using the hydraulic jack legs at the front and center of the ride and by blocking under the 6 jacks as per the attached screen blocking plan. The center jacks are the area which the most weight is located and special care must be taken as to size and placement of blocking.

The trailer needs to be level front to center and side to side.

Lower the rear scenery support gate and fit braces.

Fit 2 front platform support outriggers and center platform support outrigger with winch. (This center platform support outrigger with winch must be moved to the opposite side of the ride after one side platform has been lowered).

Lower the side platforms using hydraulic rams and winches provided and fit legs and screen jacks to platforms.

Fit front steps and ramps to ride.

Fit rear scenery bows and supports to platforms.

Unfold scenery panels and fit to bows.

Fit pillar lights and handrails.

Spread sweeps fitting intermediate braces and squaring braces. Unfold floor section and fit center scenery panel and center fence to each section. Fit all pins and keys as you go. Continue until the circle is complete.

Unfold and pin sign. Use back hydraulic ram to raise sign and pin and key. Continue raising hydraulic ram along with the 2 winches on bows to lift the top scenery into position. When top scenery is in position, pin and key.

Fit bottom scenery panels and key.

Fit platform side scenery panels and back canvas.

Pull car trailer along the side of the ride and fit the cars (move platform around by hand to position cars). As each car is fitted, pin and key and connect car electric cord.

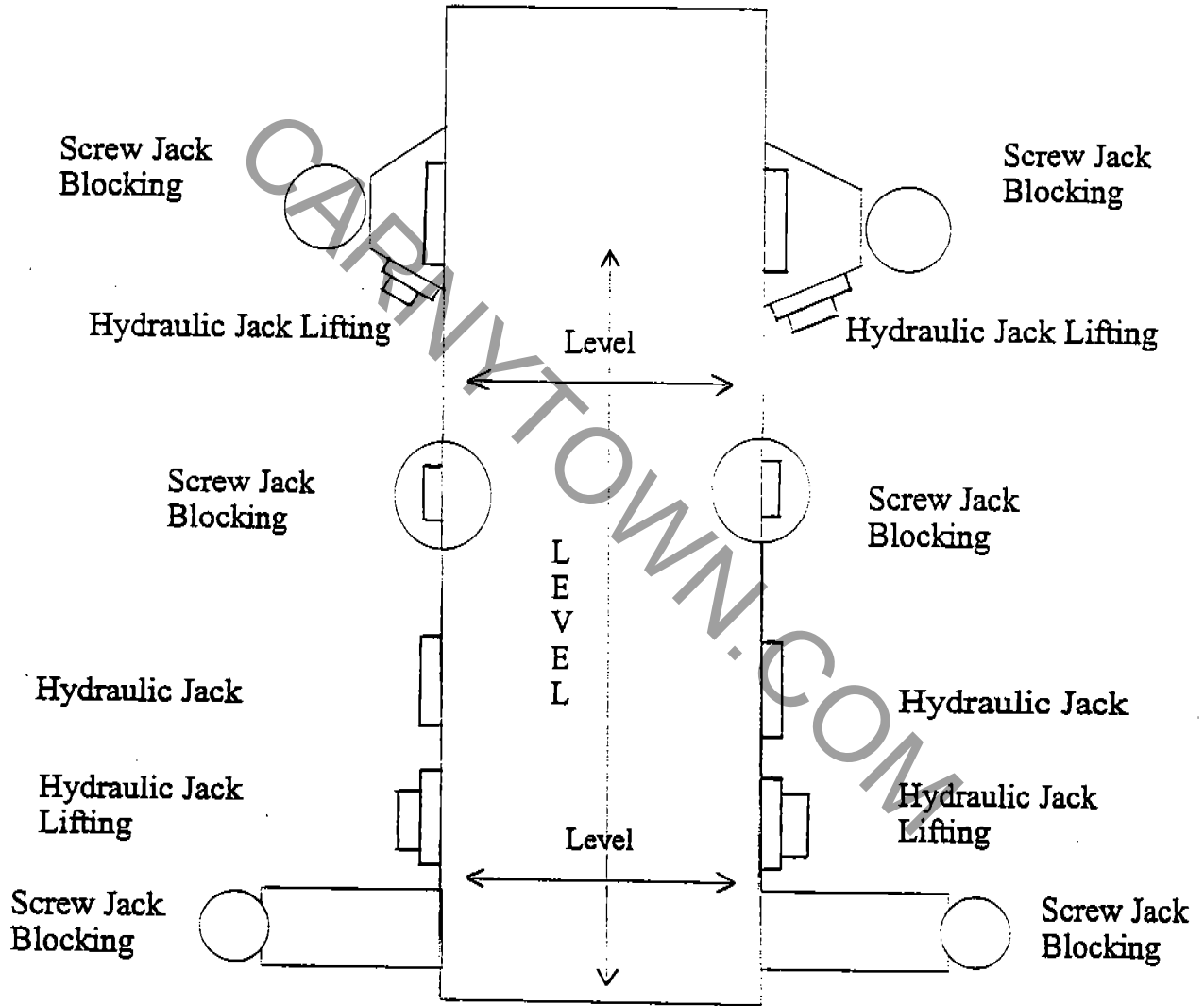
Fit control box, control panel and control lead.

Double check that all pins and keys are in and secure.

Complete the "After Set Up" inspection checklist in the Inspection Section of this manual.

To tear down ride reverse procedure.

# Blocking Diagram



# **SECTION 3**

## **INSPECTION**

### **CONTENTS**

Daily Inspection

Set Up Inspection

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## DAILY INSPECTION

Check the following each day before opening:

### Structural:

- Bolts, pins and keys
- Steps, walkways and platforms
- Welds and structures
- Fencing
- Blocking and supports
- Rear canvas secure

### Cars:

- Padding
- Fiberglass
- Trim
- Protrusions
- Pins and keys
- Brake pads and operation

### Lap Bars:

- Padding
- Catches
- Operation
- Indicator lights

### Lighting

### Safety decals

### Hydraulics:

- Valves
- Seals
- Leaks
- Pressures
- Oil levels

### Pneumatics:

- Drain tank
- Hoses
- Pressure
- Compressor oil level

### Electrical:

- Plugs / sockets
- Connections
- Ground

Lighting  
Boxes  
Cable and wiring

**Signage:**

Car decals  
Height and physical limitation

**General:**

Fire extinguisher  
Lubrication

**Drive:**

Motor  
Gearbox  
'E' Stop

**Run ride one full cycle (in both clockwise and counter clockwise motions) checking all functions and indicator lights on control panel.**

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# GENERAL SET-UP INSPECTION GUIDE

To be completed after each set-up and before operation.

## LOCATION & INSTALLATION:

1. Free from adjacent hazards & interferences
2. In level position on solid ground or pavement
3. Properly blocked and jacked
4. Properly anchored, braced and guyed
5. Motors, belts & cables guarded from public
6. Stairs & walkways in safe & secure condition
7. Proper fencing & railings
8. Fuels properly stored & free of spills
9. Fire extinguishers, number, size & location
10. Free of unguarded pinch points

## STRUCTURAL INTEGRITY:

11. Assembled in correct manner
12. Free of cracks & excessive wear
13. Properly bolted with correct grade of bolts
14. Properly pinned & secured with retainers
15. Properly aligned including sheaves & cables
16. Cables, chains, belts & gearing in safe condition
17. Motors, clutches, & controls working properly
18. Brakes & stops in good condition
19. Hydraulic systems in good condition
20. Air systems in good condition

## VEHICLE INTEGRITY:

21. Latches operate properly
22. Properly attached & secured
23. Safety Restraints safely anchored & buckled
24. Skin-free of Unrepaired cracks & damage
25. Seat coverings in safe condition
26. Back up latches present & functional

## **ELECTRICAL SAFETY:**

27. Equipment properly grounded
28. Transformers & generators guarded from public
29. Proper insulation on wires & cables
30. Cables properly connected at plugs & boxes
31. Electrical boxes have covers, latches & signs
32. Switches & controls operate properly
33. Lighting securely attached, connected & guarded

## **OPERATION:**

34. Operating at safe speed (RPM)
35. Operating at safe load (people)
36. Proper loading, unloading & operating practices

## **MISCELLANEOUS SAFETY ITEMS:**

37. Rides free of loose items
38. Rides free of hazardous projections
39. Proper warning signs (including entrance & exit)
40. Maintenance log
41. Tubs/sweeps individually numbered
42. Records
43. Consistency
44. Housekeeping

# **SECTION 3**

## **OPERATION**

### **CONTENTS**

1. Operator Selection & Instruction
2. Operation Personnel Training Log
3. Operation Fact Sheet Information
  - A. General Information
  - B. Operators Position & Responsibilities
  - C. Operating Procedures
  - D. Platform Operation Procedures
  - E. Emergency Procedures
4. Control Panel

## OPERATOR SELECTION & INSTRUCTION

1. Select competent mature operators, capable of understanding the function and use of amusement rides and their control.
2. Instruct each operator fully in the proper use and function of the ride he is to supervise, including:
  - a. Controls and procedures for normal and emergency operation.
  - b. Manufacturer's recommended maximum speed and load.
  - c. Manufacturer's recommended length of ride time and frequency of repeat rides.
  - d. Any foreseeable misuse of the ride as determined by the manufacturer or owner, or by special conditions such as weather, location or crowds.
  - e. Each operator must have immediate availability of a manufacturer's operator's manual for the ride he supervises.
3. Require each operator to inspect the ride he supervises, each day of operation.
  - a. Determine that no portion of the ride is damaged, omitted, or worn in such a manner that it is unsafe or that may develop into an unsafe condition.
  - b. Report any irregularities to superintendent or owner.
  - c. Do not operate ride if any irregularities are found until such condition is corrected.
4. Instruct the operator to allow no passenger to ride who is visibly ill, or under the influence of drugs or alcohol.
5. Instruct operators and attendants on the proper methods of securing passengers in the ride. Do not allow a passenger in the ride that cannot be properly secured due to passenger size or malfunction of the securing device. Stop the ride immediately if any passenger is observed tampering with any restraining device or behaving dangerously, such as standing up.
6. Advise the operator against starting or operating the ride while any person (passenger, spectator, or employee), is in an endangered or unsafe position on the ride or within the ride area.
7. Insist that each operator remain in full control of the operating controls during operation of the ride, and have his full attention to the ride and its passengers.
8. Instruct operator to allow no other person, other than another trained operator, to operate the controls of the ride, excepting portions of the ride that are designed to be controlled by the passenger.

9. Instruct operator and attendants fully as to the proper method of assembly and disassembly of portable rides and supply adequate personnel and equipment to do it safely.

**RESTRICT SPECTATORS FROM THE AREA**

10. Instruct operator to inspect and correct or replace damaged, lost or worn parts that are unsafe or that may develop into unsafe parts simultaneously with assembly or disassembly.
11. Advise operator that factory-installed safety devices are not to be tampered with or removed.
12. An operator training sheet should be completed and kept on record for each operator.
13. Operator instructions are posted in the control box.

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# MAINTENANCE & OPERATIONS PERSONNEL TRAINING RECORD

Amusement Company \_\_\_\_\_ Owner \_\_\_\_\_

Name of Employee \_\_\_\_\_ Social Security # \_\_\_\_\_

THE PERSON LISTED ABOVE HAVE SUCCESSFULLY COMPLETED THE TRAINING AS INDICATED BY THE DATE OF COMPLETION AND TRAINER'S INITIAL IN THE APPROPRIATE COLUMN, AS REQUIRED FOR COMPLIANCE WITH ASTM-F24 COMMITTEE STANDARD. THE TRAINERS WHO CONDUCT THE TRAINING ALSO MEET THE REQUIREMENTS OF ASTM-F24 COMMITTEE STANDARDS AND ARE CERTIFIED BY THIS COMPANY TO CONDUCT TRAINING, SUPERVISE, AND OBSERVE THE INSPECTIONS AND OPERATIONS OF THE DEVICES/ATTRACTIONS LISTED BELOW.

SIGNATURE OF OWNER/OPERATOR \_\_\_\_\_ DATE \_\_\_\_\_

NAME OF DEVICE OR ATTRACTION	Personnel have been instructed and trained in the duties and procedures listed below.				Personnel have been supervised and observed successfully performing the duties listed below.	
	Inspection & Preventive Maintenance Procedures	Specific Duties for Assigned Position(s)	General Safety & Emergency Procedures	Demonstration of Performance of Assigned Duties and Inspections	Demonstration of Performance Inspection & Maintenance Duties of Assigned Position	COMMENTS
DEVICE/ATTRACTION	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	
MANUFACTURER						
DEVICE/ATTRACTION	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	
MANUFACTURER						
DEVICE/ATTRACTION	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	DATE TRAINED NAME OF TRAINER	
MANUFACTURER						

# OPERATION FACT SHEET

## GENERAL

Persons less than 48" height are not allowed to ride.

Persons who are visibly ill or under the influence of alcohol or drugs are not allowed to ride.

Instruct passengers that for their own safety they are to remain seated with lap bar closed and hands and feet inside the vehicle until the ride comes to a complete stop and lap bars are down and released.

Never operate the ride unless all systems are working properly. A seat may NOT be used if its lap bar or the vehicle gate is not functioning properly.

When determining the location and required number of operators, crowd size should be taken into consideration. It is recommended to have one control operator and between two and three platform attendants.

The control operator is responsible for all aspects of the control of the ride, including the functions of the platform attendants.

## CONTROL OPERATIONS

The control operator is responsible for all functions of the ride including but not limited to:

1. Carry out daily inspection.
2. Carry out daily maintenance.
3. Ensure ride has completed one full cycle and all controls and control lights are functional.
4. Press fault reset to set up controls.
5. Control the platform attendants ensuring they understand their positions and functions.

## TO OPERATE RIDE

1. Instruct patrons to watch their step while entering and exiting ride and do not run.
2. Load patrons.
3. Close gates.
4. When patrons are loaded in cars, instruct patron to pull lap bars towards them, keeping their hands away from the ends.

5. Turn switch to lock lap bars (ride will not run until all lap bars are locked and lap bar indicator lights illuminate). **ANY CAR THAT THE INDICATOR LIGHTS DO NOT ILLUMINATE MUST BE UNLOADED. MANUALLY SWITCH OFF CAR AND TAG "OUT OF SERVICE"**.
6. Creep key: By turning the creep key to the "on" position, the ride may be turned slowly by moving the joystick to move empty cars to the front of the ride. **DO NOT ALLOW CHILDREN TO RIDE ALONE IN A CAR.**
7. Platform operator must physically check each lap bar.
8. Start the ride by moving the joystick left or right. **START RIDE SLOWLY AND CHECK THAT ALL PASSENGERS ARE PROPERLY SEATED. MAKE ANNOUNCEMENT TO KEEP ARMS AND LEGS INSIDE THE CAR AND REMAIN SEATED AT ALL TIMES.**
9. Move joystick until ride gets up to speed.
10. Release car brakes.
11. Press button to raise table. **THE RIDE MAY BE SLOWED DOWN AND SPED UP BY MOVING THE JOYSTICK SLIGHTLY. THIS WILL HELP THE CARS TO SPIN. THE RIDE MAY BE STOPPED AND REVERSED WITHOUT LOWERING THE TABLE.**
12. After the cycle is completed, lower the table. At the same time, start to reduce the speed by moving the joystick. When the table is approximately ½ way down and the ride has slowed down, apply the car brakes. By the time the ride is completely lowered, the cars should be facing outward and locked.
13. When the ride comes to a complete stop, release the lap bars and unload the passengers. **MAKE ANNOUNCEMENT TO PUSH THE BARS AWAY FROM THEM AND WATCH THEIR STEP WHEN EXITING AND DO NOT RUN.**

## Platform Operation

Allow passengers on to the platform to load into cars.

Check height of passengers (Minimum height to ride is 48").

Load cars (Maximum persons per car is 4).

Larger persons will be more comfortable in the two seats closest to the center of the car.

Instruct passengers to pull the lap bar towards them, keeping their hands away from the catches.

Physically check lap bars to insure they are locked.

Any passenger that the lap bar will not properly close on must not be allowed to ride.

Once the control operator locks the bars, signal the control operator that all bars are secure.

When the ride starts, operators should be stationed at the front of the ride and away from the moving platform.

Operators must not attempt to stand on the platform of the moving ride, nor must they attempt to ride the ride in any other than the prescribed manner (sitting properly in the seat with the lap bar properly closed).

If a lap bar is not properly closed, the ready light on the car will not illuminate and the ride will not run.

Check the lights and attempt to close the lap bar. If the light still does not come on, unlock the bars, unload that particular car and turn the override switch on the sweep to the "on" position.

When the override switch is in this position, **passengers must not be put in that car.** This car then needs to be checked and repaired at a convenient time before being returned to service.

When the ride comes to a stop, and the lap bars have been opened by the control operator assist the passengers from the cars and off the platform.

Close the exit gate.

Open entrance gate and allow new passengers onto ride.

## **EMERGENCY PROCEDURES**

In the event of an emergency, use the emergency stop button. This will lower the ride, stop the turntable and apply the brakes to the cars. The lap bars must then be opened by inserting the tool supplied into the lap bar catches (one on each side) and releasing the bars. Clear the platform of patrons.

In the event of an emergency, the ride must not be re-loaded until the emergency has been cleared and the ride has run a test cycle.

Control Panel  
Left Hand Side

Control  
Off On



Control  
On



Fault  
Reset



Creep Speed  
Off On



Table  
Turning



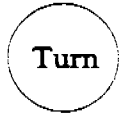
Lift Pump  
Stop



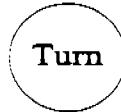
Lift Pump  
Start



Oil Cooler  
Auto Hand



Lap Bars  
Lock Unlock



Lap Bars  
Locked



Table  
Raise



Table  
Stop

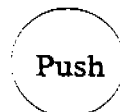
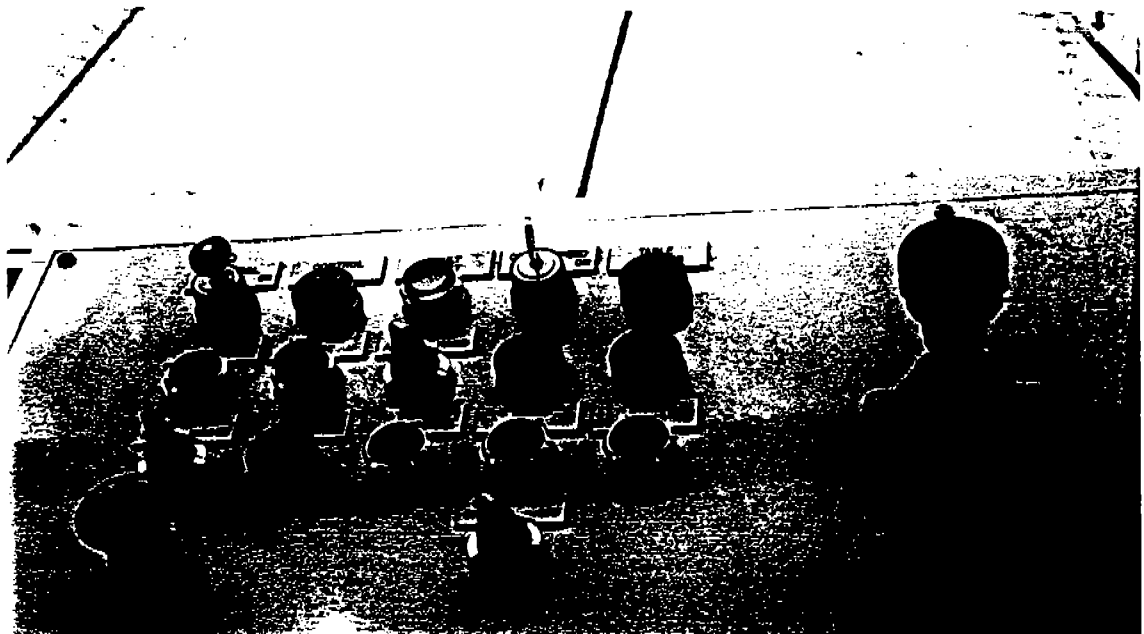


Table  
Lower



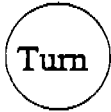
EMERGENCY  
STOP

Car Brakes  
On Off

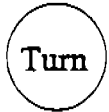


Control Panel  
Right Hand Side

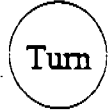
Century Lights  
Off On



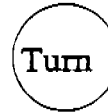
Pillar Lights  
Off On



Car Lights  
Off On



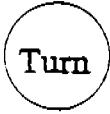
Arm Lights  
Off On



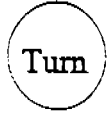
Strobe Lights  
Off On



Floor Lights  
Off On



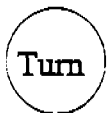
Top Spin  
Off On



Back Flash  
Off On



Front Spots  
Off On





# **SECTION 4**

## **MAINTENANCE**

### **CONTENTS**

Daily/Weekly/Monthly

Annual

NDT Requirements

Lubrication

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## DAILY / WEEKLY / MONTHLY MAINTENANCE

### Pneumatic:

Drain air tank on compressor	DAILY
Check pressure	DAILY
Check cars and brakes receiving pressure	DAILY
Check compressor oil	WEEKLY

### Hydraulic:

Check motors for wear and noisy operation	MONTHLY
Check all hoses for damage and security	
Check oil level and system for leaks	
Check filters and replace as noted	← Replace as noted Where ?

### Lubrication:

Lubricate per lubrication schedule	WEEKLY
------------------------------------	--------

### After first month:

Check car locking nut	
Check car brakes and ← How often ?	MONTHLY
Check lap bar mechanical solenoids for unusual	MONTHLY
Check all car and structural welds that can be visually inspected	MONTHLY

## ANNUAL MAINTENANCE CHECKS

The following are the major areas of the machine to be examined using the appropriate procedure and working to the relevant checklist in a methodical manner.

**Structural Examination**  
**Mechanical Examination**  
**Electrical Examination**  
**Hydraulic Examination**  
**Pneumatic Examination**

Any defects found, to be noted, and the implications for the structural the machines safe operation to be noted. Any serious structural defects must be communicated to the manufacturer opportunity so that suitable rectification methods may be incorporated in future modifications may be incorporated in future ma

### Structu

1. Check all structures for gross de
2. Check all connecting pins and bu material grade. If in doubt, disca
3. Check slewing ring securing bolts grade. Must be grade 10.9.
4. Check structure for corrosion and cracking of parent metal or weldment especially in highly stressed regions in the vicinity of securing and retaining bolts or pins. If in doubt, use N.D.T. such as dye penetrant test to corroborate findings.
5. Check deck plates for damage and cracks.
6. Check any superficial covers for security.
7. Check general level of upkeep and comment in writing.
8. Check general condition of paint finish and corrosion i.e. superficial or deep corrosion.
9. Check for general correctness of assembly, with particular attention to securing pins, i.e. positioned correctly or incorrectly.

Does 1st sentence make sense?

### Mechanical Examination

1. Check slewing ring for roughness in operation, also check for play between races.
2. Check slewing rings for adequate greasing and any corrosion.
3. Check slewing ring drive gears for pitting, flaking and backlash.
4. Check slewing ring bolts for correct grade and torque.
5. Check drive motor pinion for lubrication and corrosion.
6. Check drive motor pinion for pitting, flaking, corrosion and correct backlash.
7. Check all bearings for lubrication and corrosion.
8. Check all bearings for pitting and movement between races.
9. Check all bolted connections for correct torque and grade.
10. Check all friction drives for wear, splits and resident material.
11. Check all stabilizer legs for correct operation and security.
12. Check all passenger restraint devices for lubrication and corrosion.
13. Check all passenger restraint devices for wear and operation.
14. Check all passenger restraint devices locking mechanism for security and correct operation. Check any back up systems and interlocks for security and operation.
15. Check all "R" clips or securing pins for correct material specification and damage. If in doubt, discard.

## Electrical Examination

1. Check all generator terminals. Single or three phase are enclosed.
2. Check all sockets and connectors are of industrial type.
3. Check all terminals are tight in all components in main panel.
4. Check residual current circuit breakers are installed in the conductors between earth reference point and the distribution equipment.
5. Check all metallic parts of the ride carrying electrical equipment should be bonded and connected to the protective conductors.
6. Check where the ride is on hard standing it may not be possible to earth. It is imperative that protective bonding is checked regularly.
7. Check all cables are flexible multi-core with correct rating.
8. Check any flexible armoring is connected to system protective ductors.
9. Check all cable joints and terminations are mechanically protected and provided with the appropriate strain relief.
10. Check that any 13 amp domestic fitting is weatherproofed and properly supported.
11. Check that all motor starters are provided with overload and short-circuit protection and where restarting after power loss may cause danger ensure the starter is fitted with a device which opens the starter switch on loss of power.
12. Check all motors are fully enclosed.
13. Check all fuses and circuit breakers are correctly rated.
14. Check all cables, couplers or plugs and sockets are connected so that live pins cannot be exposed.
15. Check all parts of the system for ground leakage and remedy faults.
16. Check all electrical enclosures are properly secured to prevent unauthorized access. Check where such enclosures are accessible to the public, they should be fitted with lockable handles so a tool is necessary to gain access.
17. Check interlocking control systems with wiring diagram to ensure system integrity is maintained after any modification. The devices should be examined for mechanical wear and deterioration of insulation resistance between conductors and also checked for correct operation.
18. Check all cable terminations, starters and motors are shrouded with robust covers.
19. Check all terminations under rides are shrouded and enclosed.
20. Check fuses are fitted in each pole at the starter to protect from overloads.
21. Check lighting circuits are fused against overloads.
22. Check flashing light fittings are enclosed.

- Oil Filler Cap  
← or oil filter cap?
1. Check hydraulic pump for vibration, noise or leakage.
  2. Check for hoses cracked or damaged.
  3. Check any indicators for correct operation.
  4. Check oil filler cap is not damaged and is correctly fitted. Check for oil sludging.
  5. Check oil is not heavily contaminated, sludged or carburised. Check for correct pressure.
  6. Check any tubing is not pitted or corroded.
  7. Check drive motor for jerky running or loss of power (leakage).
  8. Check settings of any relief or cross over relief valves.
  9. Listen for squealing noises from valves.
  10. Check control linkage for smooth consistent operation.

## **Pneumatic Examination**

1. Check for leaks in cylinders or pipework.
2. Check cylinder stems for pitting or corrosion.
3. Check cylinders for retention of fluid.
4. Check main filter for sludge and water retention.
5. Check cylinders for jerky or intermittent operation.
6. Check cylinders for bent rods.
7. Check main reservoir for leaks and retention of water.
8. Check all valves for function, especially the exhaust section.
9. Check pressure is within design specification.

## NDT Requirements

All welds were ultra sound tested at the factory.

Car Shafts	Annually	UT
Main Sweep Pins	2 Years	UT
Boom And Sweep Welds	2 Years	Visual

To be completed by Level II or Level III NDT technician.

The appointed person must distinguish between original manufacturing flaws and ones developed during use. Also, the technician must distinguish between significant and insignificant flaws.

## Lubrication

Boom pivots	Grease	Weekly
Car shafts at set up	Grease	Weekly
Boom lifting rams (top and bottom)	Grease	Weekly
Drive gear	Grease	Daily (As needed)
Slew ring	Grease	Daily (As needed)
Motor	Grease	Weekly
Platform hinges	Oil (SAE 30)	Monthly
Lap bar latches (center)	Grease	Weekly
Hydraulic oil level	(See attached)	Daily
Gear box oil level	(See attached (EP90))	Daily
Oil filters		First lubrication at 100 hours, thereafter, 500 hours