

Tivoli
“Spin Out”
Non-Kiddie

SPIN OUT

Serial No. and Above
(THE CLAW)

**OPERATION AND MAINTENANCE
MANUAL**

This Manual has been prepared by Tivoli Manufacturing Ltd. for use by Owners and Operators of the SPIN OUT Amusement Ride. It is our recommendation that this manual be read and understood by the Owner and Operator so the Spin Out can be operated in a safe and economical manner.

The information in this manual is to be used as a guide in the daily inspection and maintenance procedures. Since it is the intent of Tivoli to always upgrade and improve their product, some specifications may be different from previous equipment. If this situation arises, please contact the Manufacturer for additional information and / or upgrade.

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SECTION 1

**Ride
Specifications**

Operating Specifications

MANUFACTURE:

Tivoli Manufacturing Ltd.
Howfield Lane
Chartham NR, Canterbury Kent
CT4 7HG England

U.S. REPRESENTATIVE:

Amusement Technologies International Inc.
3306 N. Main St.
Cleburne, Texas 76031

Date of Inception and Completion of First Unit:	1997
Number of Rides Operating in U.S.A.	1 ²
Number of rides Operating Worldwide	4

OPERATING SPECIFICATIONS

All Dimensions Approximate

<u>Static</u>		<u>Dynamic</u>
Height:	15 Ft. 25 ft. with scenery	32 Ft.
Width:	45 Ft.	45 Ft.
Depth:	55 Ft.	55 Ft.

Total Static Weight:	63,500 Pounds (Approximately)
Ride Speed:	Base 6 RPM, Arm 4 RPM, Car Arms 16 RPM
Passenger Capacity:	24 Adults
Number of Vehicles:	6 - Four Passenger Vehicles
Estimated Capacity / Hour	700

OPERATING RESTRICTIONS

Passenger Height Restriction	50"
Minimum Age	7 Years
Recommended Ride Duration	60 seconds
Passenger Load Balancing Required	Yes
Maximum Wind Speed for Operation	35 MPH
Minimum Temperature for Operation	32 degrees F

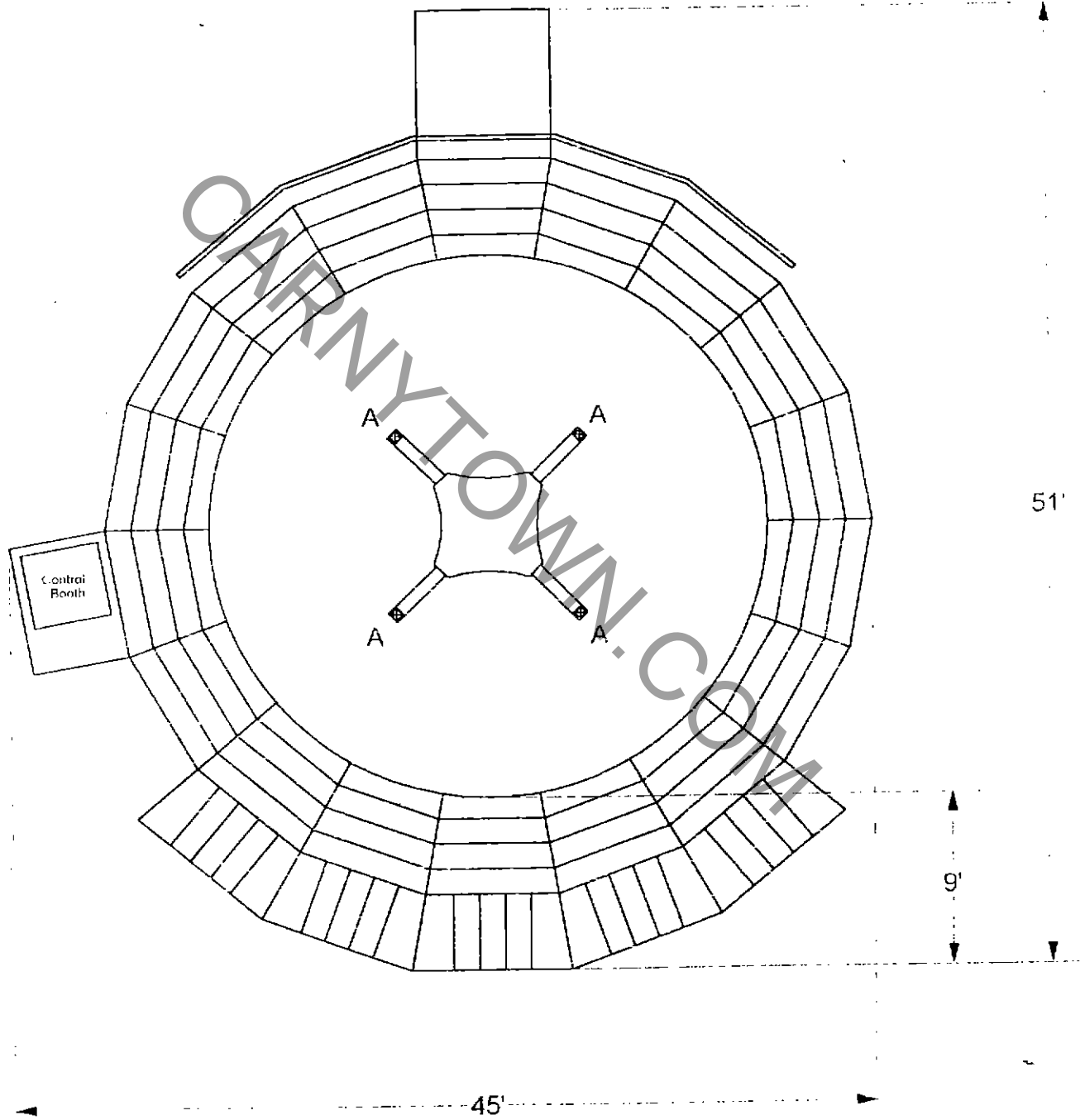
ELECTRICAL REQUIREMENTS

Voltage	208 VAC Minimum / 230 VAC Maximum	
Type	3 Phase, 60 hz	
Motive Power	75 Kw	250 Amps
² Maximum Lighting Power	25 Kw	75 Amps
Total power	100 Kw	325 Amps

¹ Number at date of Manual Publication.

² Actual Lighting Power will vary according to the package supplied.

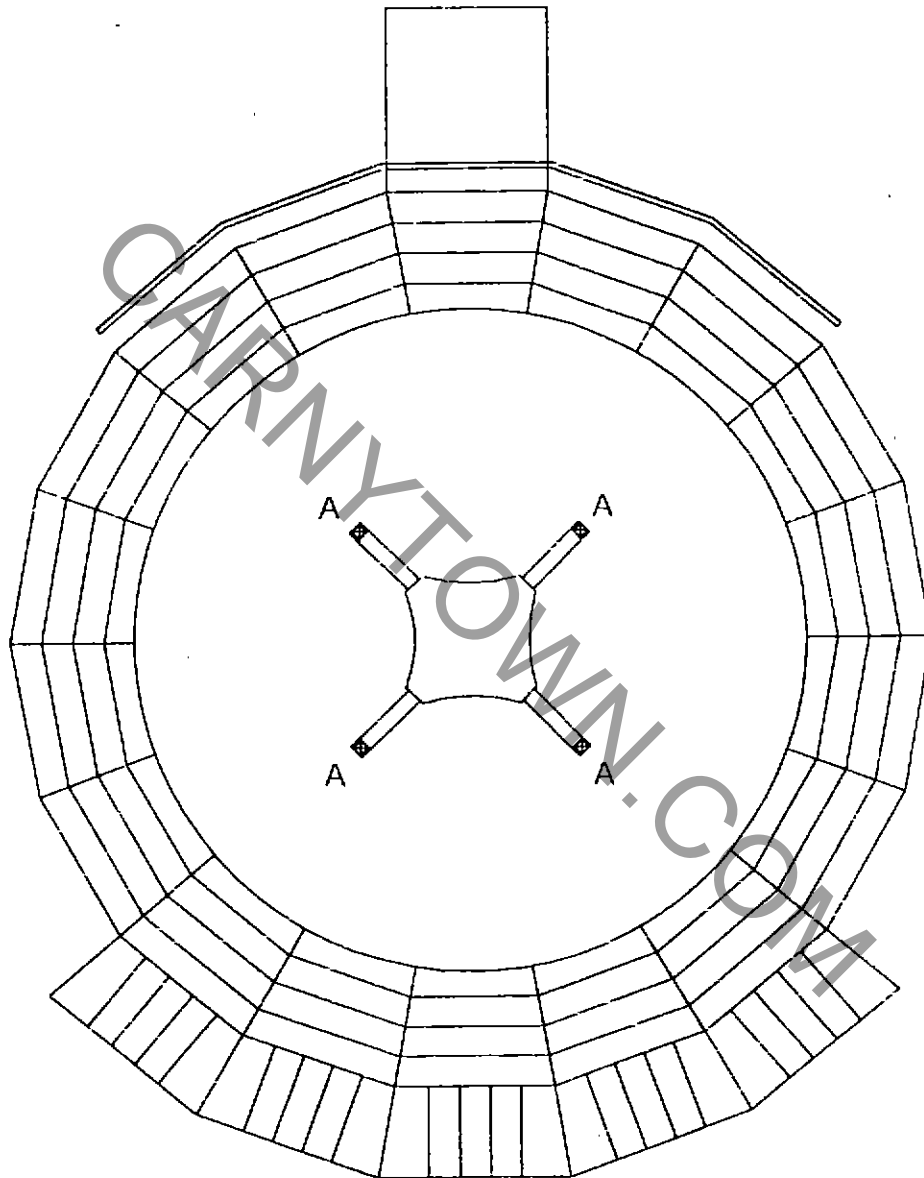
Operating Dimentions



Height 35 Ft.

Figure 1

Static and Dynamic Loads On Jack Points



Static A

14,000 Lbs.

Dynamic A

30,000 Lbs.

Trailer Specifications

Road Dimensions:

Length:	43 Feet
Height:	13 Feet 6 Inches
Width:	8 Feet 6 Inches

Trailer Weight: (approximate)

King Pin:	27,500 Pounds
Back Axles:	36,000 Pounds
Total:	63,500 Pounds

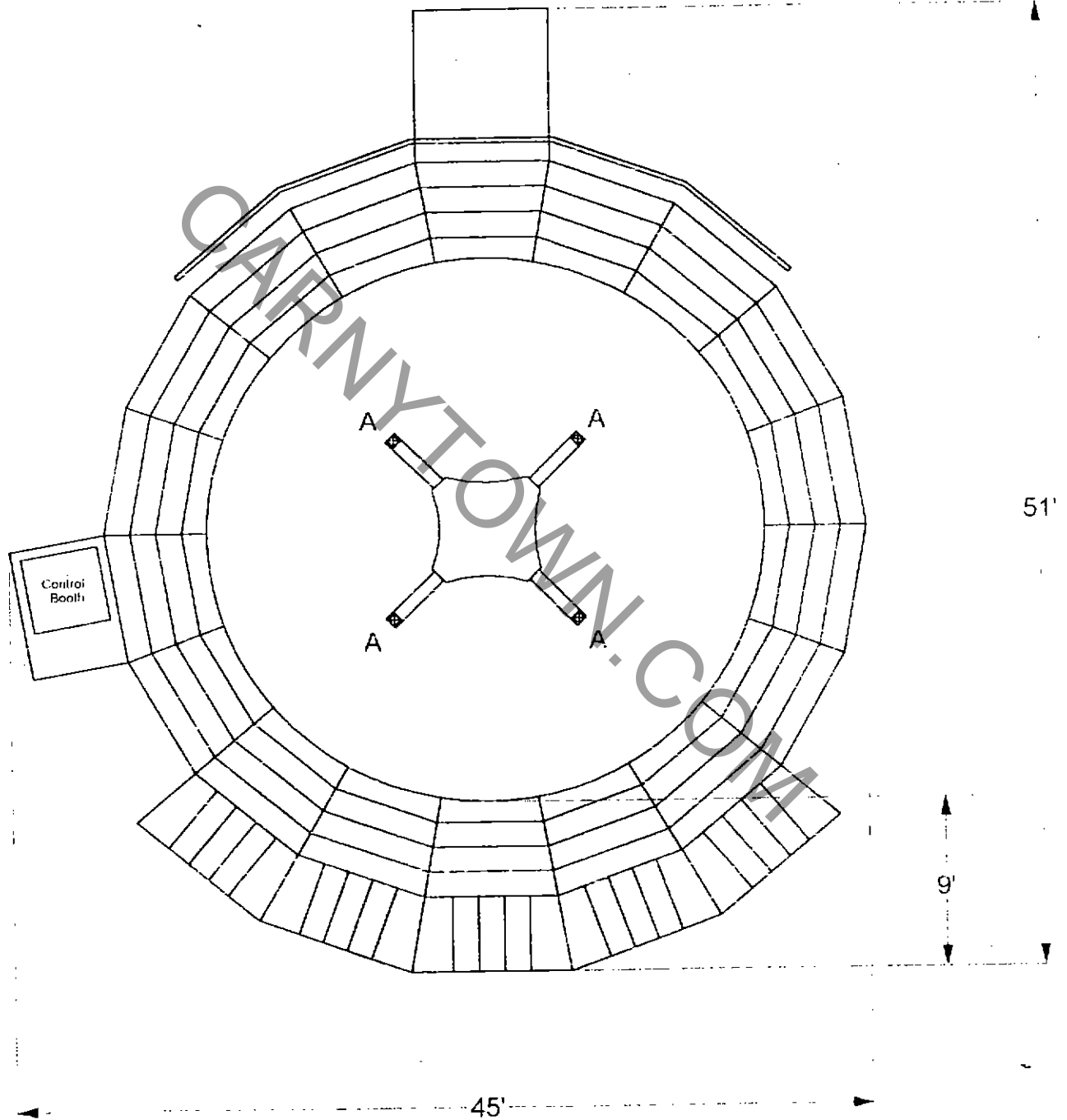
Axle Specification:

Quantity:	2 axles on 10 ft. Between Axle Centers
Tires:	235 / 75R / 17.5
Wheels:	17.5 x 6.75
Suspension:	Air
Brakes:	Air with Spring Parking Brakes

SECTION 2
Set Up Procedures

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Operating Dimentions



Height 35 Ft.

Figure 1

SET UP INSTRUCTIONS

STEP 1: Position trailer on as level an area as possible. Front of trailer should be located approximately 9 feet from midway edge. (See FIGURE 1, Clearance Specifications)

Note: At start of set up install "dummy plug" in control cable receptacle on electrical enclosure on fixed base.

Important

Size of wood blocking used for support under jack pads is determined by the soil or surface conditions. Make sure the blocking has enough surface area to support loads indicated on figure 1 in this section. Loose or wet soils require a larger surface area to support weight. If after ride is operating blocking sinks excessively, reblock with larger surface area blocking.

STEP 2: While tractor is still attached to the trailer, extend the two front Base Support Outriggers and secure them with the pins provided. Place the flat jack pad supporting plates and wood blocking under the hydraulic cylinders. Connect the pressure and return line hydraulic hoses via the quick disconnects provided. (Refer to Section 5 for more details on the Leveling Pump System). Turn **ON** Set Up Pump by holding in the pump button while operating the leveling levers. Lower the two (2) front cylinders so to relieve the trailer weight from the tractor. Unhook and remove tractor. Release the pump button when not operating the jack cylinders in order to conserve battery power.

STEP 3: Extend the two rear Base Support Outriggers and secure them with pins provided. Place the two Pyramid shaped supports under the jack cylinder ends and install proper blocking under the pad. Apply pressure to rear leveling cylinders until they support the weight of the rotating platform. Set leveling jacks so rotating platform is approximately level with ground. Stop any further leveling at this time.

STEP 4: Locate and unlock four (4) latches that hold the axle frame to the trailer. Disconnect the trailer air lines and trailer lighting electrical plug. Using the Airbag control lever, deflate the axle airbags until the trailer axle frame separates and clears the rotating platform frame.

STEP 5: Unlatch and swing out rotating platform support outriggers, 6 on each side of trailer, into approximately the position indicated in figure 2 in this section. They will be moved into exact position later.

STEP 6: Locate the platform hydraulic control levers located near the main hydraulic pump. Start set up pump and operate valve levers to assure platforms are completely up.

Caution

Platform raise and lower hydraulic cylinders can loose oil during transport. Before lowering platforms operate control levers to assure platforms are completely up prior to removing platform lock up brackets.

STEP 7: Remove platform spreader bar located at top back end of platform and lie on ground. Using the wrench supplied remove the platform locking brackets **for the side you are lowering only**, which are located on the center sweep hub for each side of platform. Keep brackets up on ride until platforms are completely lowered.

Caution

UNDER NO CIRCUMSTANCES SHOULD ANY PERSON BE UNDERNEATH THE PLATFORMS WHEN THE PLATFORM LOCKS ARE OUT OR THE PLATFORMS ARE UNDER THE SUPPORT OF THE HYDRAULIC CYLINDERS. KEEP CLEAR WHEN PLATFORM ARE BEING LOWERED.

STEP 8: To lower the platforms: Turn Set Up Pump ON by holding in the pump button located by the hydraulic controls. Operate the valve handles to lower the two platforms one at a time until the secondary platform can be reached from the ground. While pulling out on the secondary platform, lower the platform until it is slightly above the platform support outriggers. Align the supports with the pin tubes welded on the bottom of the platforms and lower platforms completely. Pin in place.

Sweep and Vehicle Assy.

STEP 9: Remove the long scenery wind braces used for the back wall which are loaded across the backs of the vehicle racks. Set them on the ground at the rear of the ride..

STEP 10: Using the pallet jack, move the six (6) vehicles to the outer perimeter of the platform so the sweeps can then be opened.

Note

For set up without 3 phase power refer to "24 VDC set up procedure" in this section

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STEP 11: Remove sweep racking brackets to allow sweeps to be folded out. Using wrench slightly loosen sweep pivot pin and unfold sweeps until mounting holes in sweep and hub are aligned. Insert locking pin from same direction as the pivot pin. With wrench provided thread into place. Using wrench tighten both pins snugly. Follow same procedure for remaining 3 sweeps.

STEP 12: (For details see *REMOTE RIDE CONTROL CONSOLE* in Section 3). Using the remote control panel located on the main electrical enclosure Turn selector switch to "**Build**" to activate controls. Start drives by pressing the "**Start Drives**" button. Raise the arm by

pressing the "Raise Arm" Button. Arm will raise to its top limit automatically. (For more details, see *MANUAL OPERATION* in Section 3) By pressing the "Jog Arm" button rotate the arm 180 degrees until the arm proximity switch lines up with trigger bar. Press the button Labeled "lock Arm" to reset the Safety Cylinder. (See *RESETTING THE SAFETY CYLINDER* in Section 3). Lower the arm completely by pressing the "Lower Arm" button until sweeps are in the loading position. Letting off of the button will stop the arm from lowering.

STEP 13: Using the pallet jack / crane, mount each vehicle using the bolts, nuts, and washers provided to its respectively numbered sweep. Use the "Jog Spinner" button to rotate sweeps to ease installation. For each of the cars, use the wrenches provided and tighten all eight (10) bolts securing the sweep flange to the down arm flange on each car. These bolts must be tightened to 100 ft. lbs torque. Connect two electrical plugs from the vehicle down arm to the top of the sweep.

IMPORTANT

Always inspect bolts, nuts, and washers before installing. Replace any that appear to be damaged, stretched or worn.

STEP 14: Once all the vehicles are mounted and all racks and other tools are stowed under the trailer, The ride base is ready to be tilted to the 5 degree position. To tilt the ride: Turn ON Set Up Pump by holding in on button located near leveling jack controls. Lower the two (2) front cylinders first as equally as possible. When cylinders are within one inch of being completely down, use bubble level to level front of base crosswise. Raise or lower rear cylinders until the distance between the top of the fixed platform step located above the trailer axles is 8 inches from the top of the rotating base. Bring front jacks up until 5 degree level bubble is at center mark. Level crosswise rear of base platform. Keep base platform in this position until all secondary walkway frames are in place. Further adjustments will be made after the walkway is installed.

STEP 15: Locate two leveling jacks at rear of trailer near back axle. Add appropriate blocking and adjust jacks so that jacks support the weight of the axle frame. It is not necessary to level the axle frame.

STEP 16: Starting from the rear of the ride, assemble walkway platform jackstand frames from the fixed walkway frame. Install and Level each jackstand on the bottom rail keeping the top step frame 8 inches from the top of the rotating base. Under normal conditions the screw jacks do not require additional blocking. If soil conditions warrant it, add blocking as needed. Place jack stand frame spreaders and platform support bars between each jack stand. Follow this procedure from each side of the fixed platform until the frames meet at the front of the ride. Install jack stand alignment bars from leveling cylinder to jackstand and pin in place.

IMPORTANT

After all jack stands are installed it may be necessary to readjust the rotating base in order to keep the minimum clearance of 8 inches from the top of the step to the top of the base.

Adjustments can be made using the main leveling jacks.

STEP 17: Install all deck supports and braces for walkway. Install top aluminum step and secure with special Flip Over Latches that lock panels in place. Install all aluminum platforms between jackstands.

WARNING

After base is at proper level and adjustment of hydraulic jacks are no longer required, disconnect pressure and return line quick connects at center of trailer and store out of way of rotating base.

STEP 18: Roll control booth off support stand on fixed platform at back of ride. Roll near place where booth will be installed. Install control booth support in fence sockets at edge of platform and support and level outside with jackstands provided. Roll control booth into wheel access holes on support platform. Install control lead from bottom of operators control console to receptacle on electrical box on the fixed base in center of ride.

STEP 19: Remove and set in place all the fence. Mount two (2) quartz light poles. Connect electrical plugs from Lighting junction box.

STEP 20: To unfold back wall scenery, remove security pins at bottom of scenery panels. Swing out both sides (one at a time) until the holes align and replace pins. Raise top sections and pin in place. Using the hydraulic cylinder and valve handle, raise the scenery until the support pins can be installed. Install all the wind braces.

STEP 21: Install the bally cloth around the walkway.

STEP 22: Remove control key from remote control panel. Insert control key in key switch of operators control console and turn on to activate ride controls.

Caution

Before operating rotating base, assure that the area where base rotates is clear and free of any obstacles such as racks, hoses, or electrical lines.

Always Test Run The Ride And Make All Safety Checks Prior To Opening To Public.

Important Tear Down Information

After vehicles are removed from sweeps during tear down fold and lock sweeps. Do not raise arm. If the arm is raised and sweeps are rotated in the raised position the arm will not be able to be lowered due to the safety system.

First fold and lock sweeps, then rotate arm while the ride is in the lowered position. lock in place for transport.

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24 VDC Set Up Procedure.

For set up where three phase power is not available the ride may be erected using the 24VDC system. Complete Steps 1 through 10 in the set up section, then follow the steps below to turn the arm in order to fold out sweeps.

STEP 10A: Make certain that all sweep racking brackets are secure and sweeps remain folded up and tied together.

STEP 10B: When platform is clear and vehicles are moved to outer edge of platform the arm can be turned in the lowered position. Switch the selector switch on the remote console to "Emergency". Press the "Emergency Arm" button and turn the arm 180 degrees to the loading position. Turn selector switch back to "Build".

STEP 10C: Follow step 11 to spread and install sweeps. **Note:** After rotating arm the hub will be higher above the platform and it may be necessary to use a ladder to attach sweeps.

SECTION 3

**Operating Requirements
and Procedures**

Operational Requirements

Personnel Requirements

The Spin Out Amusement Ride requires a minimum of two (2) persons to operate and monitor the ride during operation. One (1) operator must be at the Control Console at all times with the controls situated so that he / she has full viewing access of the ride and of the second operator. The second operator must be located at the entrance and has the duties of controlling the entrance, exits, assisting patrons, and monitoring the ride. **All operators must remain off the rotating platform during operation of the ride.** Extra personnel could be added during high traffic times.

Passenger Restrictions

The Spin Out Amusement Ride is designed to accommodate 24 patrons, four (4) patrons per vehicle. This number should not be exceeded for any reason. The vehicle is equipped with one shoulder bar for each passenger. Severe injury could occur if a person is allowed to ride on the outside of the shoulder bar.

All patrons and potential passengers should be notified of the following rules of operation. A sign should be posted in clear view for all persons to read. It should include a minimum of the following:

This is a High Speed Thrill Ride. Riders will experience in excess of 2 G's during the operation of the ride.

1. No riders under 7 years of age.
2. No riders under 50" tall.
3. No food or drink allowed on the ride.
4. Remove all loose articles before riding.
5. Pregnant women are not allowed on ride.
6. Only four (4) passengers per vehicle, 1 per seat.
7. Anyone under medical care, with back and / or neck trouble should not ride.
8. No one under the influence of drugs or alcohol are permitted.

It is the Responsibility of the Operator to evict any rider acting in an unsafe manner.

Operating procedure per ride cycle

When operating the Spin Out Amusement Ride for patrons, the operator must see that the following steps are followed before, during and after each ride cycle.

1. Allow a maximum of 24 passengers (one per seat) to enter ride.
2. Assure all passengers meet minimum requirements to ride.
3. Close and secure entrance gate.
4. Assist any passengers needing help in entering their seat.
5. Instruct all passengers to sit back in their seats with heads up
6. When passengers are sitting straight up, Turn shoulder bar lock switch to allow bars to automatically lower and lock into position.
7. Monitor all indicator lights above inside seats. Illuminated green light indicates both shoulder bars are secure. (each light indicates for the two seats next to each other on each side of the center arm support).
8. If green indicator light is not illuminated check both shoulder bars and push in until green light is illuminated. If light will still not illuminate, one or both passengers are too large and will have to exit the ride.
9. When all green indicators are illuminated, Operator will see a green light on the operator console which allows the ride to be started.
10. When platform attendant signals operator that platforms are clear and gates are secure, operator may start ride. **NO PERSONS ARE ALLOWED ON THE ROTATING PLATFORM WHILE RIDE IS OPERATING.**
11. Both operator and platform attendant must monitor the ride through it's complete cycle.
12. When the ride comes to a complete stop and arm is completely down the platform attendant can release the shoulder bars by turning the unlock switch in center. Instruct passengers to push shoulder bars completely up and exit ride.
13. After passengers have exited ride, begin to load new group of passengers.

Emergency Stop and Power Failure Procedures

Important

All operators must be trained in the following Emergency procedures before being allowed to operate the ride for the public.

Emergency Stop (Ride Abort)

The operators control console is fitted with an emergency stop (**Ride Abort**) button. This button is to be used in cases of emergency only. When the button is depressed the sweeps will slow to a stop and arm will rotate until the passengers are in an upright position. The main arm will **NOT** lower. The ride will come to a complete stop. It is designed to bring passengers to the quickest upright stop possible and not to lower in case there is an obstruction on the platform. Always report the use of the emergency button to proper authorities. Never restart ride or lower arm until reason for use of emergency stop is determined and situation rectified.

Lowering the Ride after an Emergency Stop

After the use of the emergency stop, it will be necessary to lower the arm manually in order to unload the passengers. Before doing so, make sure it is safe to do so. Platforms should be clear and reason for use of emergency corrected.

Step 1: The Emergency Button must be reset. Twist to unlock, button should pop out. Check to assure all drives are still operating. If not restart drives.

Step 2: Turn the Control Key switch to the off position on the operator's console. Turn the selector switch on the remote console to the "Build" position.

Step 3: Press "Lock Arm" button until the arm safety piston have locked the arm.

Step 4: Press the "Lower Arm" button until the arm lowers completely

Step 5: When the ride is lowered completely, unload passengers in the normal way.

Restarting after an Emergency Stop

Investigate and rectify the cause of the Emergency Stop.

Remove any tools or objects that may have been brought onto the platform. Reinstall any guards or covers that may have been removed. Open the Main Electrical Box and check that all Circuit Breakers are ON.

Without loading passengers, lock shoulder bars.

Insert the Control Key into the Operator's Control Console key switch and turn it ON. Check for illuminated GREEN start lamp.

Run the ride through a Test Cycle to ensure proper operation of the Drive Systems and the Shoulder Bars.

Power Failure

There are two ways for the ride to experience a power failure. The first is a loss of power at its source (ie. Generator, Transformer etc.). The second is by pressing the power shut off button located on the operators control console.

In the case of a complete **power failure** or the pressing of the **power shut off switch** the following will happen. When the Power Failure occurs, the ride will stop in the position where it lost power. This means that if the power is lost, while the arm has the vehicles in the inverted position it will stop with the passengers upside down. **All passenger restraint devices will remain locked and secure.**

Important

Power shut off should not be used as an emergency stop ride, unless operator deems it necessary that all power to ride must be severed (ie; Fire, Short Circuit, etc.).

Passenger unloading after power failure.

If main power is quickly regained. (This does not apply if power shut off button was used)

In a case where the power failure was momentary and Electrical power is regained quickly, the ride can be brought down to the loading position using the remote manual controls and the main hydraulic pump. Use the following procedure.

Step 1: Restart the main electric pump and drives

Step 2: Turn the control key from the operators console off. Turn the selector switch on the remote console to "Build". Start Drives.

Step 3: Press "Jog Arm" and rotate the arm until the Trigger bar lines up with the proximity switch.

Step 4: Press the "Lock Arm " button to lock arm in position.

Step 5: Lower arm by holding in "Lower Arm" button, until arm has lowered completely.

Step 6: Turn Selector switch on remote console to "Ride" and unload passengers in normal way.

Total power failure or use of power shut off switch.

In the case of a total power failure, a 24 VDC backup system has been installed. This system uses a 24 vdc motor to rotate the arm in case of a power failure. This system is powered by the same batteries used for leveling the trailer and lowering the platform.

It is absolutely necessary that these batteries are kept charged and in good operating condition at all times. A special automatic battery charger is installed in order to keep these batteries charged. Check batteries prior to opening ride to public. In case the battery system fails, there has also been installed a hand-crank that can be manually operated to bring the passengers to an upright position. To operate the 24 VDC backup system follow the procedure below:

Turn the selector switch on the remote operators console to the "Emergency" position.

Step 1: Remove key from operators console.

Step 2: Press the " Emergency Arm" button on the remote console and rotate arm to upright position.

Step 3: Connect mini hoses between the quick disconnect at the base of each lift cylinder and the tank return quick disconnect. Ride will start to lower slowly when hoses are connected.

Step 4: Proceed to un load passengers.

Passenger unloading procedure:

The Spin Out is equipped with a battery powered AC power source. This system is powered by the same 24VDC power supply used by the leveling jacks. This system is required in order to unlock the Shoulder bars to unload passengers. To unload passengers follow the procedure below.

Step 1: Locate emergency power cord and install into receptacle on main electrical box on rotating platform.

Step 2: One vehicle at a time unplug control wire from top of sweep and plug into receptacle at end of emergency power cord.

Step 3: Using the control switch on the emergency power cord switch either left or right to unlock two seats at a time. Lift shoulder bar and unload passenger. Keep switch turned until passenger is completely out of seat. Shoulder bar will lower when switch is released.

Step 4: After all passengers are unloaded disconnect emergency power cord and return it to it's storage area.

Important!!

If the Shoulder bar release system does not work. Shoulder bars can be released by removing back lighting panels from each seat and removing the bottom cylinder attachment bolt, followed by manually shifting the secondary locking bar.

IT IS EXTREMELY IMPORTANT THAT THESE EMERGENCY AND BATTERY BACK-UP SYSTEMS CONSTANTLY BE MAINTAINED AND CHECKED FOR PROPER OPERATION.

The following describes the procedures to follow to safely operate the ride after an Emergency Stop or Power Failure situation. Please report to proper personnel anytime the Emergency System is used. The ride should **NOT** be operated again until the condition responsible is investigated and rectified.

Restarting after a Power Failure

After cause of power failure is determined, check power supply to assure Voltage and Hertz are correct. Check power at ride prior to switching power back on. Restart ride as normal, complete all safety checks and test run prior to opening to public.

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Start Up & Shut Down Procedures

Start Up

After the Spin Out is shut down at the end of an operating day or after a Power Failure, you must follow this Start Up Procedure.

Always ensure the proper incoming voltage is at the ride.

Reset any Ground Faults. Reset the Emergency Stop Button if it is pressed in. Reset the Main Disconnect if tripped.

The Power ON indicator lamp should be lit.

Press the Drives Start button. Allow 30 seconds for the Motor Starting Sequence to engage. You should also wait for the oil temperature to warm up before operating the ride if you are in a cooler climate.

Check the Safety Bars Locked indicator lamp. It should be ON. If not check all shoulder bar latches for proper operation and adjustment.

Perform the required Daily Inspection and Lubrication Procedures if this is the Initial Start Up for the day.

Run a Test Cycle before operating the ride for the public.

Shut Down Procedures

When it is time to shut the ride down at the end of the day, follow these procedures.

Turn off all lighting switches and drives.

Turn OFF the Control Key on the Operator's Control Console.

Turn off power at main disconnect.

Emergency Evacuation Procedure **In Case of Power Failure**

To Rotate Arm

Turn the selector switch on the remote console to the "Emergency" position.

Press Emergency Arm on the remote console and rotate arm until trigger bar aligns with proximity switches on arm.

To Lower Arm

Connect two (2) mini hydraulic hose between base of lift cylinders and return tank quick disconnects. When hoses are connected arm will start to lower slowly

To Unload Passengers

Locate emergency power cord and install into receptacle on main electrical box on rotating platform.

One vehicle at a time unplug control wire from top of sweep and plug into receptacle at end of emergency power cord.

Using the control switch on the emergency power cord switch either left or right to unlock two seats at a time.

Lift shoulder bar and unload passenger. Keep switch turned until passenger is completely out of seat. Shoulder bar will lower when switch is released.

After all passengers are unloaded disconnect emergency power cord and return it to it's storage area.

These Instruction Sheets Should Be Mounted Near Remote Control Panel or in Emergency Box

Ride Operational and Control Descriptions

Passenger Restraint System

The Spin Out is equipped with one (1) Over the Shoulder Safety Bar for each seat. These bars are padded, which makes for a very comfortable and safe restraint. Passenger seats are equipped with a molded crotch hump that helps to secure passenger in seat by greatly reducing the open space between the seat bottom and the shoulder bar.

The shoulder bars are locked with two (2) independent systems. The Primary system is a special hydraulic cylinder with an electro-valve mounted on the inlet port and also on the outlet port. With these two (2) valves, the cylinder has infinite locking positions. This means that the bar will fit close to the passenger. The Secondary device is a steel bar that locks behind a groove which is cut into the shoulder bar frame. This steel bar is spring loaded and locks once the shoulder bar is past a certain point. To release the secondary latch, an electric solenoid can be activated, which overrides the force of the spring and allows the shoulder bar to open. The shoulder bar will open ONLY when the Primary latching device AND the Secondary latching device is activated.

During normal passenger loading and unloading of the Spin Out, the Shoulder Bars are controlled from a switch located under the center hub of the sweeps. This switch is positioned so the operator standing under the switch can physically see all the passengers and make sure their heads are back against the headrest BEFORE closing the bars. The operator should always check the position of the passengers before closing the bars.

The Control Switch for the Shoulder Bars is a three (3) position switch. The positions are: OPEN, CLOSE BARS, and BARS LOCKED.

OPEN Position: This position activates the opening of the Primary and Secondary latching mechanisms. The passengers must push the bars away from themselves to get out of the seat. Bars will stay in the up position until the switch is turned to close bars.

CLOSE BARS Position: This allows the hydraulic cylinder to extend which in turn lowers the Shoulder Bar. It will continue to lower until it is against the passenger or it reaches the end of the stroke of the cylinder.

BARS LOCKED Position: Once all the Shoulder Bars are down, moving the switch to this position engages the locking devices on the Primary and Secondary mechanisms. At this point, if all of the Shoulder Bars are locked beyond the Secondary Latch, a GREEN indicator light located on the top of the two seats closest to center attachment arm will illuminate. When all seats are latched, a GREEN indicator light located on the Operators Control Console will illuminate steady. If the light is flashing, all shoulder bars are not latched. Check all shoulder bars. When light is steady the ride can be started.

Operator Controls

The Spin Out is designed to operate with the Remote Console, which is located on the main control enclosure on the rotating platform, or, with the Operators console located in the control booth. Each of these Control consoles require that the drives be on and operational. The Remote Console System should only be used during the Set Up, Tear Down and Testing procedures. These two (2) Control Systems are described in the following paragraphs.

Remote Manual Control System (see figure 1)

This System is activated by turning the Selector Switch switch located on the main Electrical enclosure from "Ride" (where it should be during normal operating) to "Build". The switch in this position allows use of the console buttons. When this is done, a RED indicator light will illuminate(Power On) on the remote panel.

The Remote Manual Control Console (See Figure 1) has the following controls.

Selector Switch - This selector switch activates the remote console for build up or power failure emergency.

Power On Indicator light - When illuminated Remote console is operational.

Aux. Pump -

Drives; Start & Stop - These two buttons start and stop the main hydraulic motor and Inverters

Reset Inverters - Pressing this button resets the inverters after they are shut down by a fault (refer to Inverter manual for fault descriptions).

Jog Base - Pressing this button allows the base to rotate at a reduced speed to be used for lining up base with wheel frame during tear down.

Jog Arm - Pressing this button allows the Arm to rotate at a reduced speed to be used inverting arm during set up and tear down.

Jog Spinner - Press this button to activate the Inverter which turns the sweeps. Using this button, the sweeps will turn at a maximum speed of 1 RPM. The sweeps will rotate in only one direction.

Lock Arm - This operates the arm safety pin inserting it into the arm to prevent accidental rotation.

Unlock Arm - This activates arm lock cylinder unlocking arm to allow it to rotate.

Raise Arm - This will raise arm to it's top limit.

Lower Arm - Push this button to lower arm cylinders. Letting off of button will stop ride from lowering.

Lamp Test - This button illuminates all fault buttons to assure bulbs are in good condition.

Battery Test - Pressing this button activates battery condition indicator to check condition of batteries.

Ride lights override - This switch will allow ride lights to remain on during set up and tear down.

Indicator Lights

Fault lights 1 through 5 - These lights will light to indicate a fault. Refer to electrical section for fault light explanation.

Charge OK - This light indicates that battery charger is working properly.

Battery condition indicator - This shows present battery condition. Battery test button must be pressed to activate this indicator.

Ride Control Console (See Figure 2)

For Automatic Operation of the Spin Out, the operator must use the console in the Operator's Booth. The Spin Out is designed to make the operation of the ride very simple and easy to understand. All functions of the ride are automatic and require no manual control. To simplify operation, the ride has a single Start and Stop button. The ride duration is controlled by an adjustable ride timer on control console. Listed below are the controls, along with a brief description.

Power ON - Indicates that the electrical power is supplied to the ride.

Fault - Indicates that there is a Motor overload, Ground Fault or Control Circuit Fault. When this light is illuminated check fault finder indicator lights on main control box on rotating platform. (see auto fault finding in this section.) and repair fault.

Reset - Push this button to reset the fault after the cause of the fault is rectified.

Ride Timer - Adjustable Timer sets the length of time the ride will run. It is recommended to be set at 60 seconds for the Spin Out. The timer starts when the Start Button is pushed. The ride will run its normal operations until the desired time has elapsed. When the timer elapses, arm will rotate into upright position and lower into loading position and stop.

Start Forward - Push this button to start ride in forward operation.

Start Reverse - Push this button to start ride in reverse operation.

Start Drives - This button starts the main hydraulic motor and powers up the inverter.

Stop Drives - This button stops the operation of the main hydraulic pump and inverter.

Abort ride - In the case of an emergency, pressing this button will bring the ride to the Safest stop possible. The arm will turn until the riders are in the upright position with the arm raised, sweeps and base stopped. This is intended to keep the platform clear and the ride stopped until the reason for the emergency can be determined and corrected.

Start Ride - When this indicator is illuminated steady, the ride is ready to start. The steady light indicates all Shoulder bars are latched. This indicator will Flash if any of the shoulder bars are not properly secured. **Forward and reverse start can only be used if this indicator light is steady.**

Stop ride - Pressing this button at any time during a ride cycle will automatically put the ride into its stop sequence. This will cancel the timer and ride can be restarted at any time after it comes to a complete stop. **This button activates a normal stop sequence.**

Ride lights - Turning this switch, turns on all decorative lights including sweeps, cars and arms.

Flood Lights - This switch will turn on platform flood lights.

Scenery Lights - This switch turns on lights for back wall scenery.

Strobe Lights - Pressing this button engages strobe lights. Releasing button turns strobe lights off. **Strobe lights should be engaged for only a few seconds at a time to avoid any possible injury to riders.**

Smoke Machine - This button is used for optional smoke machine.

Control - This key switch activates or deactivates the operators control console. Console control key must be turned ON for ride to operate. When leaving the console unattended or doing maintenance under the ride, the key must be turned off and removed.

Power OFF - This button is located to one side of the operators control console. Pressing this button will sever all electrical power to the ride by triggering the Low voltage trip of the main disconnect. If this button is pushed while the ride is in operation, ride will stop immediately with riders in whatever position they

were when power was cut off. In order to upright and lower passengers, either power has to be restored (if reason for switching power is determined and corrected), or emergency unloading procedure is used (see Emergency stop and power failure procedures, this section).

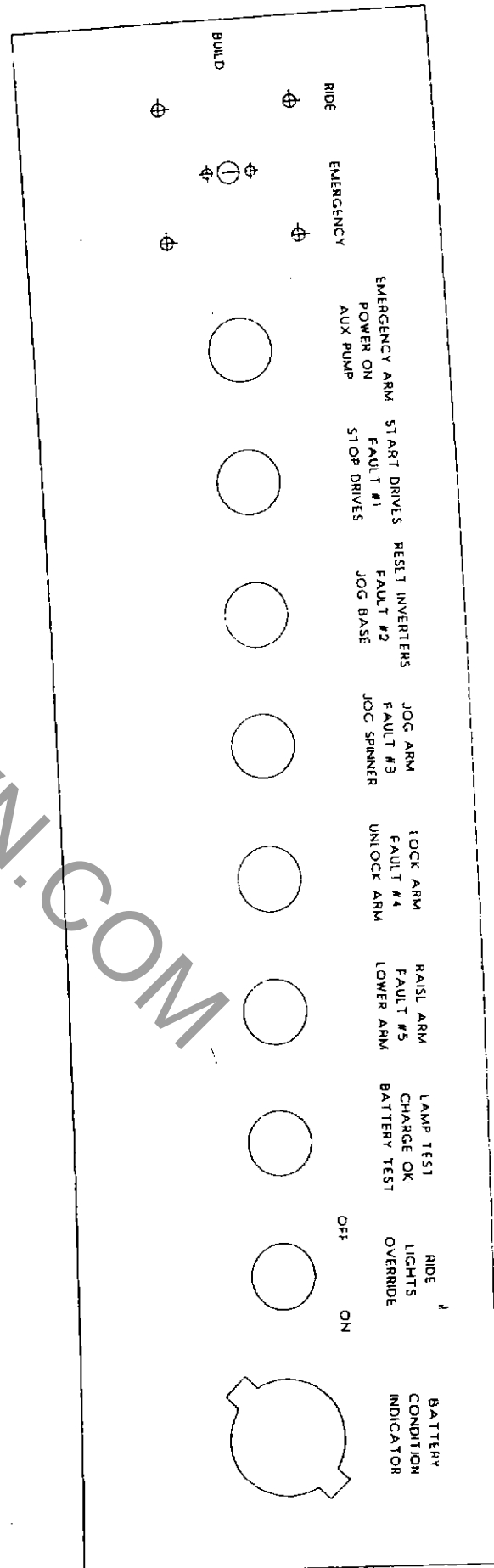
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Safety Checks and Daily Inspections

This section deals with Daily and Bi-Weekly Visual Inspections and Safety Checks for the Spin Out Amusement Ride. They are designed to assist the operator in the control of the operation of the ride. These checks and inspections should be performed by a qualified technician capable of understanding the functions of the components and their operations. This equipment has been designed and built to handle normal wear and tear of every day operation. It is always necessary to inspect all components and structures on a regular basis and to note and investigate any irregular conditions. In the event that any abnormal condition, which is capable of causing a future failure of any component, is found, it should be reported to the necessary personnel and if necessary to the factory.

DAILY INSPECTION BEFORE OPERATING FOR THE PUBLIC

1. Inspect all blocking under the four Main Support Base Cylinders. Repair, reassemble or re-level if necessary.
2. Check for uniform clearance all the way around the rotating platform to be 8 inches from the top of the walkway to the top of the rotating platform.
3. Check all fencing for security and condition and function of gates.
4. Check for proper signs and warning posters.
5. Inspect platform for obstructions, loose floor panels, and / or tripping hazards.
6. Inspect each seat and shoulder bar for proper operation. Check for proper operation of all indicator lights for the shoulder and safety systems.
7. Check all connections between shoulder bar and locking cylinders.
8. Inspect padding on shoulder bars.
9. Check attachment bolts on vehicle arm for tightness.
10. Check for tightness of the sweep bolts and pin clamps.
11. Assure that daily maintenance and lubrication procedures have been completed.
12. Check all wiring on sweep and center. Repair any loose or hanging wires.
13. Check hydraulic fluid levels. Repair any leaks in hydraulic system.
14. Test operation of Ground Fault Detectors.
15. Operate ride and check for any abnormal noises or actions.
16. Test the Emergency Systems and procedures including the condition of 24 volt Battery.
17. Report any problems or concerns to the proper personnel.
18. Look under rotating base and check for any obstructions before rotating base.

All the above checks should be completed along with normal Daily Maintenance and Lubrication Procedures as outlined in this Operator's Manual.

Bi-Weekly or Pre-Opening Inspections

1. Complete all Daily Checks and Inspections.
2. Check condition of commutators between:
 - A. Main Base Support and Rotating Platform
 - B. Arm Hinge Base and Arm
 - C. Arm and Sweeps
3. Check for tightness of all mounting bolts on Drive Motors and Slewing Ring Bearings.
4. Check RPM of ride. (See *OPERATING SPECIFICATIONS* in this Section).
5. Check operation of holding brakes for Rotating Base, Arm and Sweeps.
6. Check operation of cooling fan. Check oil filters. If a RED indicator has popped up on filter housing, the filter is NOT filtering, and is bypassing. Change it immediately.
7. Inspect Main Electrical Panel Box. Assure all connections are tight and relays are functioning properly and all indicator lamps are working as they should.
8. Check to see if adequate and proper lubrication procedures were followed as outlined in this manual. (See *LUBRICATION PROCEDURES*, Section 7)

SECTION 4

**Mechanical and Structural
Components**

Mechanical and Structural Components Inspections, Descriptions and Maintenance

Daily visual inspection of the Spin Out is a necessary part of normal maintenance procedures. It is recommended that the ride be continually monitored for unusual sounds or actions. If any abnormalities are detected, they should be identified and rectified. The normal practice of solving minor problems usually prevents the development of major problems. Below is a list of the more important areas of the Spin Out that must be inspected before the ride is operated for the public. It is essential that all portions of the ride undergo a continual inspection.

Blocking and Support Jack

Blocking is an important structural component of the Spin Out Amusement Ride. Poor or inadequate blocking on the main jack points can cause unwanted stresses on the framework of the ride resulting in future structural problems. It is extremely important that all support jacks have adequate blocking to support the ride. The size of this support blocking is determined by the ground or soil condition, which varies with each location. Using common sense and an understanding of the equipment, provide a solid base for all jackstands. If during operational inspections blocking is found to be sinking, increase size to provide a larger foot print. This will increase the surface area and spread out the load on the blocking and ground.

Under normal ground conditions the Spin Out requires blocking on only the four (4) Main base leveling jacks, and the two (2) Axle / scenery jacks. All other jacks around walking platforms need only the jack plate provided. In the case of unusually soft soil conditions it may be necessary to add blocking to these jacks.

The best form of blocking to be used on the ride is a crib type block. This is a group of treated 2 x 6 or 2 x 8 boards cross laid and screwed together in three layers to form a block approximately 24" x 24" x 4-1/2" thick. Always check the condition of all the blocking under the four (4) Main leveling jack cylinders, and scenery support. Re-block or replace any loose blocks. It is extremely important that the Spin Out be solidly supported by these blocks.

Check the condition of the Hydraulic Cylinders supporting the ride. Each of these cylinders are fitted with a Pressure Operated Blocking Valve. This special valve locks the cylinder and prevents the cylinders from leaking down when the ride is resting on them. Each Cylinder requires pressure from the pump in order for the cylinder to extend or retract.

If the ride settles into the ground slightly and the blocking still appears to be solid and square re-leveling can be accomplished by using the leveling jack controls. In the case where the blocking has broken or sunk into the ground over 4", the blocking must be

replaced with a larger pad or repaired. The ride must then be re-leveled and rechecked for clearance between the top of the rotating platform and the top of the first step on the fixed walkway clearance should be no less than 8 inches. This distance should be constant all the way around the deck.

Since the ride platform rotates during operation, it is important that there are no obstructions or racks stored under the platform that could be touched by the rotating platform. It is recommended that no racks be stored under the rotating platform. They can be stored under the walkway only.

Walkways are fitted with adjustable screw jacks. These jacks can be adjusted at any time to assure platforms are level and solid. Each screw jack comes with a metal base plate. These plates do not require any additional wood blocking under normal conditions. Take note of ground conditions prior to set up and add blocking if soft soil condition require a larger base for the jackstand.

Scenery and Wind Braces

The Back Wall Scenery is designed to withstand gusting winds of up to 50 miles per hour provided that all the wind braces are properly installed and the axle frame is properly blocked. The condition of these wind braces and blocking should be checked daily, especially before and after a storm.

In the case of severe storm or high wind warnings it is recommended that the scenery be folded and locked down to prevent any damage from unexpected weather conditions. The ride can be operated with the scenery folded up and will not cause any problems with ride operation.

Shoulder Bars

Primary hydraulic locking cylinder

It is essential that the Shoulder Bars and their locking devices are in good working condition. It is important to open and close each Shoulder Bar daily and check that the cylinder is functioning properly.

The cylinder should be checked monthly for leaks or damage. Each cylinder has two solenoid coils, one is 120VDC and the other is 120VAC. The DC coil has a rectifier DIN plug which converts the AC voltage to DC to energize the coil. **DO NOT MIX UP THE TWO COILS.** If replacing a bad coil make sure it is replaced with same value coil. The connection point between the locking cylinder and the Shoulder Bar is a rod end bearing secured by two clamping screws. This rod end must be camped tight to the cylinder rod. Make a mental note of the position of the shoulder bars when they are in the raised position. **All shoulder bars should lift to relatively the same height.** If one seems to not lift as high as the rest there is a possibility that the rod end bearing on the end of the shoulder bar cylinder can be loose. In this case you will need to remove the back light panel and inspect the shoulder bar cylinder.

Secondary Solenoid Operated Lock

The Spin Out shoulder bar is equipped with a secondary spring lock - solenoid release backup latching system. The solenoid operates a steel bar which blocks the shoulder bar from raising past a specified safety point. The bar can be viewed from the front of the seat at the head rest area. Check the operation of the bar and solenoid on a daily bases. It is important that the bar be lubricated with a light oil weekly to assure easy operation. Once per month remove the rear light panel from the 2 seats closest to the center of each seat set and inspect the solenoid, spring, and linkages.

Vehicle Attachments

Each of the six vehicles are attached to their respective sweep via flange plates and 8 mounting bolts. The application of these bolts allow their re-use from set up to set up. Assure that when installing these bolts there is a hardened flat washer under both the head of the bolt and the nut. These bolts and nuts are NOT required to be torqued. They should be tightened snugly with a standard 1/2' ratchet and end wrench. However, they must be checked for tightness DAILY and replaced annually. When installing these bolts during set up, check them carefully and replace any that may be damaged, stretched, or stripped. Check fastener replacement schedule in this section for proper replacement type and frequency.

Sweep Attachments

Pin on type (Units 2 and above)

Each sweep is attached to the center hub with two removable pins. Removing one pin allows sweep to swing around for disassembly. These pins fit through bushings on the hub and sweep. Each pin has a threaded end which is used for pulling the pin into the bushings when installing in the sweep. Check during installation that these pins have a film of grease on the areas which contact the bushings. Keeping these pins lubricated will extend the life of both the pins and bushings. Four of the six sweeps pivot on one of their attachment pins when ride is dissembled, requiring one pin to remain in the sweeps at all times. Since the sweeps turn on these pins, it is necessary that at least once a month the pins be removed and a film of grease be applied to the bushing surfaces. Always check pins for any damage and quality of pin surface. Two of the sweeps do not fold for transport. Its not necessary for their mounting pins to be removed for lubrication. However they should be removed annually and inspected for wear or damage.

Slewing Ring Bearings

There are three slewing ring bearings on the Spin Out ride. All have inside ring gears which are used to drive the components.

Sweep rotation bearing, This bearing is bolted between the arm and the rotating sweep hub. The gear is lubricated and inspected by dropping down the center sweep light fixture and gaining access through the center of the hub. Always monitor condition of ring and pinion gear teeth for excessive wear. If excessive wear is found, check lubrication procedures. Always consult factory representative if any unusual conditions are found. The lubrication points are on the outside diameter of the bearing. Grease according to instructions in the lubrication section of this manual. These procedures must be followed for each of the three (3) fittings on the bearing.

Arm Rotation Bearing, This bearing is located between the lifting frame and the rotating arm. The internal gear drive cannot be inspected without removing the drive gearbox. Therefore it is necessary to assure that proper lubrication procedures are being followed to insure adequate lubrication. **An annual removal of the drive gearbox is suggested to insure that the ring and pinion gears are in good condition.** Report any unusual conditions to a factory representative to receive repair or replacement procedures. Grease according to instructions in the lubrication section of this manual. To insure proper lubrication, apply grease while the arm is rotated manually via remote control console. **Warning;** Arm must be completely up before it can be rotated.

Base Rotating Bearing, This bearing is located between the rotating base and the fixed leveling base. There are two (2) gearboxes which drive the ring gear. Access to gears is accomplished through a center inspection hole located on the underside center of the fixed leveling base. Lubrication of the gear and pinions are done through a grease zerk located on the deck, through a small hole which is connected to the rotating base bearing attachment plate. See lubrication section for proper lubrication procedures. It is necessary to make a weekly inspection of the ring gear and pinions through the access hole to assure the gears are getting proper lubrication.

Drive Motors and Gearboxes.

The Drive Motors are found in three (3) locations on the Spin Out. Each motor has a different function. It is necessary in the first few months of operation to check all mounting bolts for tightness regularly to assure that they are properly seated.

Platform Drive Motors and Gearbox, are located in the center of the rotating platform above the Platform Bearing. They are accessible by removing a small square of deck plate above each one. By removing the deck plate, you can inspect Electric drive motor and connections, and mounting bolts. See lubrication section for oil care information.

Arm Drive Motor and Gearbox, is located under the Arm Pivot Frame below the arm commutator. All oil level, and mounting bolts are easily accessible from the rotating platform. It is necessary that the motor and gearbox be removed annually to inspect ring and pinion gears. See Lubrication section for oil care information. Make sure all connections are tight and leak free. This is a right angle gearbox with a 20 KW 3 phase motor as the drive. On the end of the motor is located an electric brake and emergency 24vdc drive motor.

Sweep Drive Motor and Gearbox is mounted in the end of the Arm. An electric three phase motor drives the gearbox which drives the sweeps via the slewing ring bearing. Access to oil level and attachment bolts are made from end of arm above sweep hub. The electric motor is equipped with an electric brake. This brake is used to hold sweeps in position when loading and unloading passengers. With time the brake will lose its ability to hold sweeps in place. The brake can be adjusted using procedure outlined in motor / brake manual in the supplemental section of this manual.

Platform Hinges, Outriggers, and Cylinder Attachments

Over time, platform, outrigger, and cylinder hinges will become dry and corroded, this will cause them not to work easily. If they are not properly maintained, they will cause excessive delays in set up and tear down. Once a month lubricate all hinges with a good quality penetrating oil. This will insure many years of trouble free use. In the case of a seized or sticking pivot pin, remove pin, clean out hole and sand pin clean and smooth. Apply grease to pin and hole prior to re-installing pin.

Wear Tolerances
of Spin Out Critical Pins and bushings.

DESCRIPTION	SIZE	ALLOWABLE WEAR MAXIMUM
Sweep attachment Pins (units 2 and above)		
Head end diameter	55 mm /OD	1 mm /OD
Thread end diameter	50 mm /OD	1 mm /OD
Sweep Attachment Bushing (units 2 and above)		
Large Diameter Top	55 mm / ID	1 mm / ID
Small Diameter Bottom	50 mm / ID	1 mm / ID

Bolt Torque Requirements

Sweep Vehicle attachment bolts.

Bolt Size

Torque Requirements

16 m m

100 Ft. Lbs

Replacement required annually

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Annual Inspection

The Spin Out Ride is designed to provide years of safe, reliable operation provided it is taken care of in a professional manner. An essential part of the proper operation and function of this ride, is the Annual Inspection. It is to be carried out by a qualified technician capable of understanding each component and how it functions on the ride. It is the Owner/Operator's responsibility to identify and determine if the ride is being cared for in a professional manner and in a way that would prevent any potential failure of any component that could jeopardize the safe operation of this ride. Always request assistance from the factory if an explanation is needed.

The Daily and Weekly Inspections listed in this Section, as well as *Safety Checks and Daily Inspections* in Section 3, are integral parts of this Annual Inspection and should be carried out at the time of your Annual Inspection. We recommend that the ride NOT be operated for the public if these Inspections are NOT completed.

Mechanical and Structural

1. A visual inspection of all the weld points indicated in the following drawings (figure 1 in this section) is required.
2. Replace all Vehicle Attachment Bolts, nuts and washers.(see fastener replacement schedule this section)
3. Replace Sweep Bolts and Nuts (Ser. # 4898230 only)

Electrical System

1. Clean Electrical motors, Cooling Fan Motor, Electrical connections and Commutators.
2. Check condition of all Operator Switches, Control Relays, Circuit Breakers, Ground Fault Detectors, and Micro Switches.
3. Check all Indicator Lamps.
4. Inspect all wiring for damage.
5. Check for brake pad wear on sweep electrical motor.

Hydraulic System

1. Change Hydraulic Oil and Filters.

Gearboxes

1. Check oil quality and change if necessary.
2. Inspect pinion and ring gears for excessive wear.
3. Remove arm drive gearbox and inspect pinion and ring gear.

Bearings

Inspect all slewing ring bearings for wear or excessive play.

Fastener Replacement Schedule

There are fasteners on the spin out ride that are required to be replaced on an annual basis. It should be understood that this replacement requirement is based on the ride having normal operating (wear and tear) and maintenance. **Fasteners that are removed and reinstalled during set up and tear down should be inspected each time they are used.** Check for stretching, damaged threads on both nut and bolt, or unusual wear. If any of these conditions are found, replace the fastener immediately. All **permanent fasteners** should be inspected on a regular basis to insure they are in good condition and tightened properly.

Whenever replacing any component that uses fasteners, which are torqued to their rated tightness, discard old Bolts. Always install new fasteners when reinstalling the new or repaired components.

Fasteners	Qty.	Size	Replace
Vehicle / Sweep Attachment Bolts, Washers, And Nuts.	8 Per Sweep 48 Per Ride	16 mm 70 mm long	Annually
*Sweep / Hub Attachment Bolts, Nuts**, And Washers	8 Per Sweep 48 Per Ride	20 mm 110 mm Long	Annually

** A special " T " nut is required to replace this nut. Please contact manufacture for specific type.

* Sweep attachment bolts , nuts, and washers replacement is required for ride serial number 4898230 only. All rides manufactured after this serial number use a different system to attach the sweeps and all information as to their inspection are covered in this section.

NON-DESTRUCTIVE TESTING AND SAFETY MODIFICATIONS
POLICY FOR TIVOLI MANUFACTURING LTD.

All Tivoli manufactured Amusement Rides are designed to the highest degree of safety and quality. In depth engineering and design analysis has been incorporated into all equipment produced. TIVOLI Manufacturing Ltd., therefore requires no scheduled testing by Non-Destructive means for the engineered life of the components, unless listed below, issued to a customer in the form of a Service or Safety Bulletin, or indicated in this Operation Manual.

It should also be understood that this policy is based on the Owner / Operator exercising proper maintenance and care procedures of all components according to the manufacturers' specifications and / or recommendations, along with routine visual inspection of all structural components for any unusual conditions. Any unusual conditions must be reported to the owner of the equipment and then to the manufacture.

Listed below are all the current Safety or Service Bulletins or Equipment Modification Bulletins.

<u>BULLETIN NUMBER</u>	<u>RIDE</u>	<u>SUBJECT</u>	<u>EFFECTIVE DATE</u>
------------------------	-------------	----------------	-----------------------

None	as of	7 / 1 / 1998	
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SPIN OUT

Daily Inspection Checklist

(This Inspector shall include but not be limited to the following)

Date: _____
Location: _____
Serial Number: _____

Hour meter reading: _____
Inspected By: _____
Operator: _____

Inspection Point	X	Note
Level and blocking		
Main four leveling cylinders		
Axle frame and scenery support jacks		
Walking platform jackstand screw jacks		
8 " clearance between rotating platform and step		
Rider Security systems		
Fence Security		
Operation of Entrance and Exit Gates		
Warning and Caution Signs		
Height Signs		
Sholder Bar and Seat Operation		
Sholder Bar Control Switch		
Primary Hydraulic Latch		
Secondary Solonoid Latch		
Locked Sholder Bar Indicator Light		
Condition of Sholder Bar Padding		
Side Bars and Seat Saddle Horn		
Back Padding		
Seat Side Railings		
Passenger Vehicles		
Vehicle to Sweep Attachment Bolts		
Electrical Connectors and Cord Condition		
Back Light Panel Condition		
Sweeps and Arm		
Sweep to Hub Bolts (Pins)		
Security of Light Fixtures and Wiring		
Center Light Decoration Security		
Sweep Brake Operation & Security		
Lighting wiring and connections		
Rotating Base		
Check Platform for Obstructions or Spillage		
Clearance Under Platform for Rotating Frame (Base)		
Hydraulic Guards and Electrical Boxes Secure		
Cooling Fan Guards Secure		
Proximity Switches Free of Obstructions / Wiring Secure		

Fixed Platform

Alluminum Deck Plates Secure
Platform Aligned with Rotating Base

Scenery

Wind Braces Pinned and Secure
Top Fold Up Scenery Pinned and Secure
Lighting Wircing and connections

Safety Back Up Systems

Battery Condition
24VDC Motor Operation

Operational Test

Operation of all Operator Controls
Buttons
Indicator Lights
Timer

Test Run / Check Operation

Sweep Rotation
Arm Rotation
Arm Lift
Safety Arm Locking Cylinder Operation
Base Rotation

Electrical

Operation of Ground faults
Incomming Power
Wiring Security

Hydraulic

Hoses and Connections
Oil Level

Note #1

Note #2

Note # 3

Note # 4

For Additional Comments or Notes Use Back Side of This Form

Signature Operator

Signature, Manager

Date

Date

SECTION 5
Hydraulic System

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Hydraulic Drive System Component

Descriptions

The following is a list of the hydraulic components and their functions which are used on the Spin Out ride. The number indicates location on schematic found in this section. Refer to Schematic HS 9824-0609 A in the back of this Section.

1. **Hydraulic Pump** - This pump supplies the lift cylinders only. It is a 70.3 cc displacement pump.
2. **Electric Motor** - Connected to the lift pump by a mechanical coupling. 22kw, 220 volt, 60 Hz, 1750 RPM.
3. **Lift Circuit Relief Valve** - This relief valve adjust the operating pressure for the lifting system. It should be adjusted to 180 bar (2600 psi).
4. **Lift / Lower Directional Valve** - This valve allows for the operation of the lift and lower cylinders.
5. **Quick Connection Port** - This port is used in a power off situation to lower the ride. Connect the mini hose from this port to the tank port. Refer to Emergency Procedures and Power Failure Procedures.
6. **Pilot Operated Check Valve** - These check valves ensure that the ride can NOT descend without oil pressure from the safety cylinder circuit.
7. **Lift / Lower Cylinders** - These large cylinders lift and lower the ride.
- 8.
16. **Decent limit Valve** - These two (2) valves open to allow the descent of the ride lift cylinders. They protect the cylinders from lowering unless a direct action is taken to allow them to lower and to protect from accidental lowering of cylinders in the event of a hose rupture.
17. **Raise / Lower Cylinders** - These large cylinders raise and lower the Arm lifting frame.
24. **Lock Cylinder (Arm Rotation)** - This small cylinder inserts a pin in the rotating arm to prevent rotation while the arm is lowering or the arm is down.

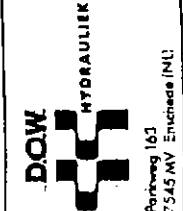
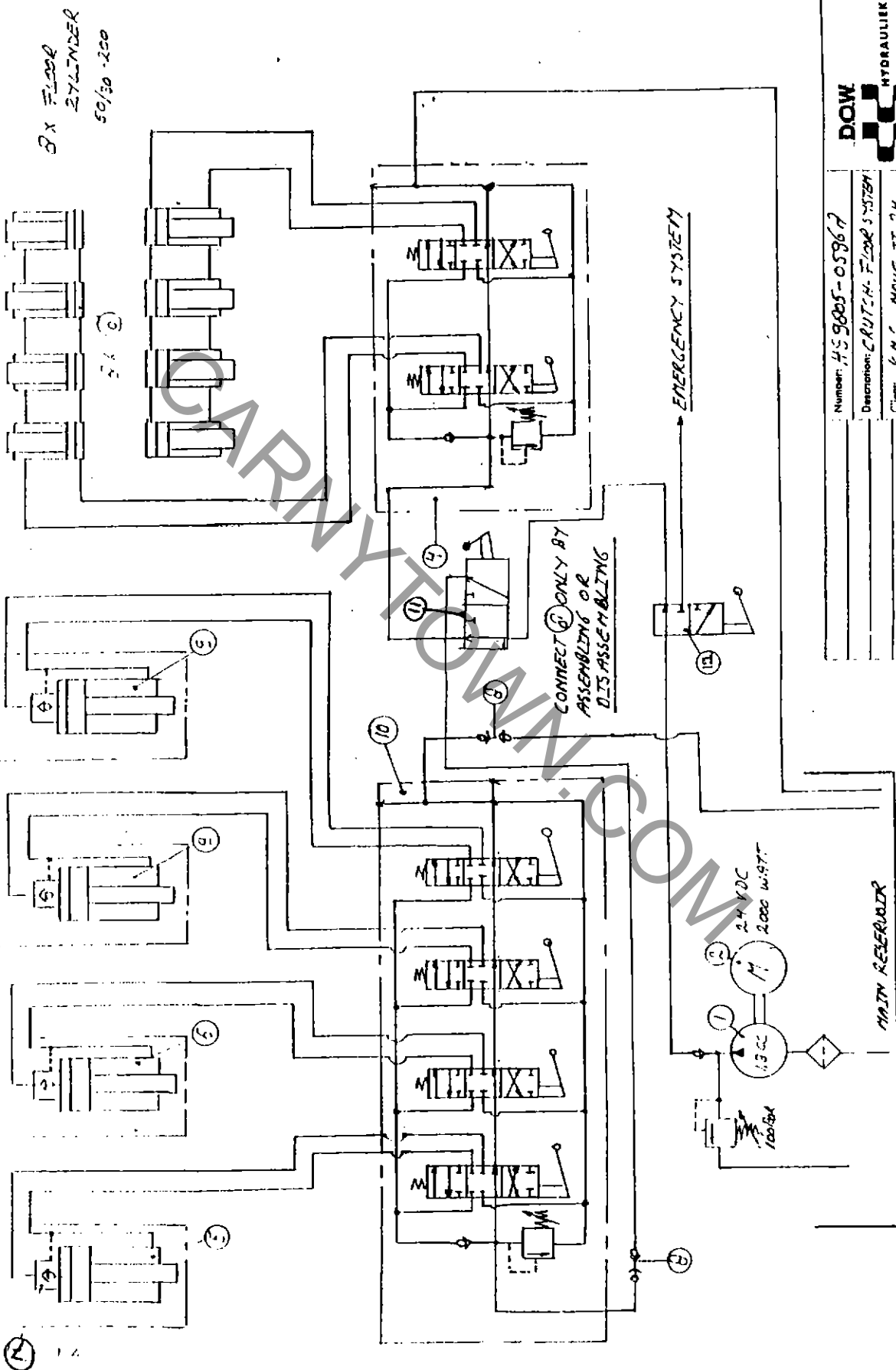
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Trailer Leveling System

The Spin Out is equipped with a 24VDC powered hydraulic leveling system. This allows the ride to be set up without 3 phase power. The 24VDC driven hydraulic pump is supplied fluid from the main hydraulic reservoir. Each component of this system is represented on the schematic HS9805-0596A located in this section. Each component is described below and is identified by its number on the schematic.

1. **Leveling and Emergency Pump** - This pump supplies oil pressure to the leveling system and also is used to power the emergency power failure system. This pump is a critical component of the ride and needs to be checked regularly to assure proper operation. Since this pump is used for set up also, it can be checked for proper operation each set up.
2. **24VDC Electric Motor** - This motor powers the hydraulic pump for set up and emergency. It is important to note that only turn on motor when operating the hydraulic systems, motor should not be running when not in use. Extensive running of motor will cause a large drain of power from batteries, will shorten their life and lengthen their charge time. **Only Run Motor When Necessary.**
4. **Platform Control Valves** - These two (2) valves located just below the main hydraulic pump control the raising and lowering of the platform sides during set up and tear down procedures.
5. **Rear Leveling Cylinders** - These two (2) cylinders are mounted on the two rear extending support legs. Because the ride tilts 5 degrees to the front, these two cylinders require the pyramid shaped pads.
6. **Platform Cylinders** - 8 cylinders, 4 each side. Used to raise and lower the two side platforms.
7. **Pilot Operated Blocking Valve** - These valves block the flow of fluid out of the cylinder piston unless pressure is applied to the rod. This valve keeps the cylinder locked so they support the weight of the ride during operation. This eliminates the need for an additional screw jack.
8. **Quick Connections** - Since the pump is mounted on the rotating platform, it is necessary to use these connections to supply pressure to the Leveling System. **It is very important to disconnect the lines before operating the ride (rotating the base). Damage to hoses will occur if they are not disconnected and stored properly.**
9. **Front Leveling Cylinders** - These two (2) cylinders are mounted on the two front extending support legs. Because the ride tilts 5 degrees to the front, these two cylinders require the flat pads.
10. **Leveling Control Valves** - These four (4) valves control the movement of the leveling cylinders.
11. **Platform / Jack Change over Valve** - This valve located below the main hydraulic pump allows pump pressure to go either to the ride leveling system or the platform folding system.

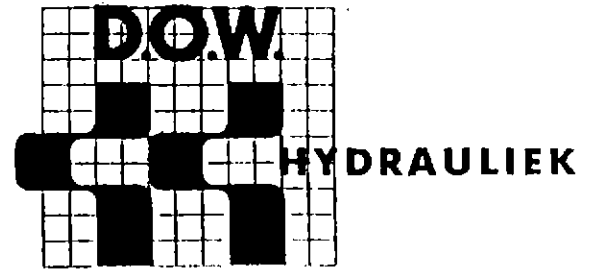
8 X FLOOR CYLINDER 100/100



Number: HS 9805-0596A
Description: CRUT-H-FLOOR SYSTEM
Client: K.M.S. MOVE-IT 24
Date: 26-1-98 Drawn: T.C.
All rights reserved, acc. to the law
Specifications

Partweg 163
7545 MV Erande (NL)

D.O.W. Hydrauliek B.V.
 Postbus 3432
 7500 DK Enschede
 Parkweg 163
 7545 MV Enschede
 Tel.: 053 - 4326972
 Fax: 053 - 4326973
 K.v.K. Enschede nr. 61472
 BTW nr.: NL805973102B01



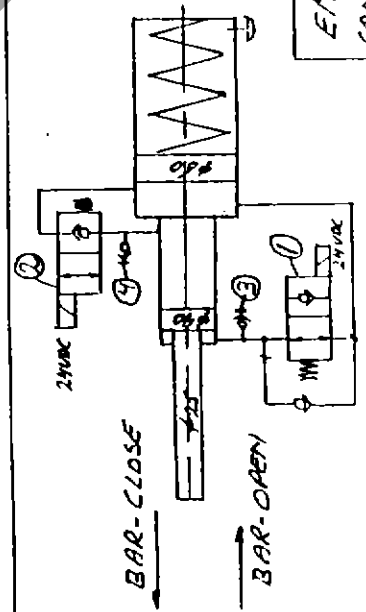
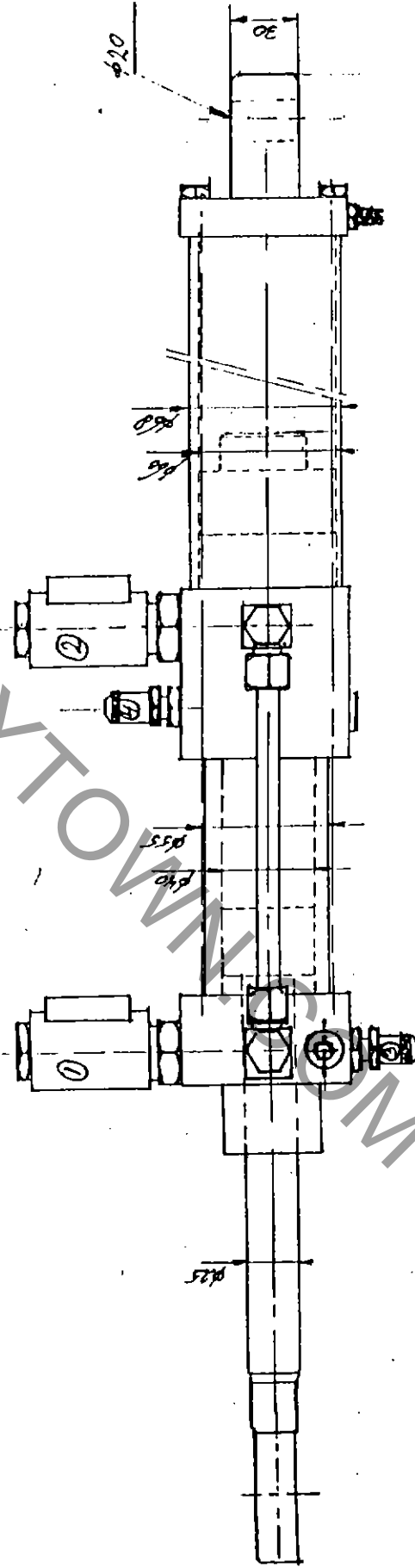
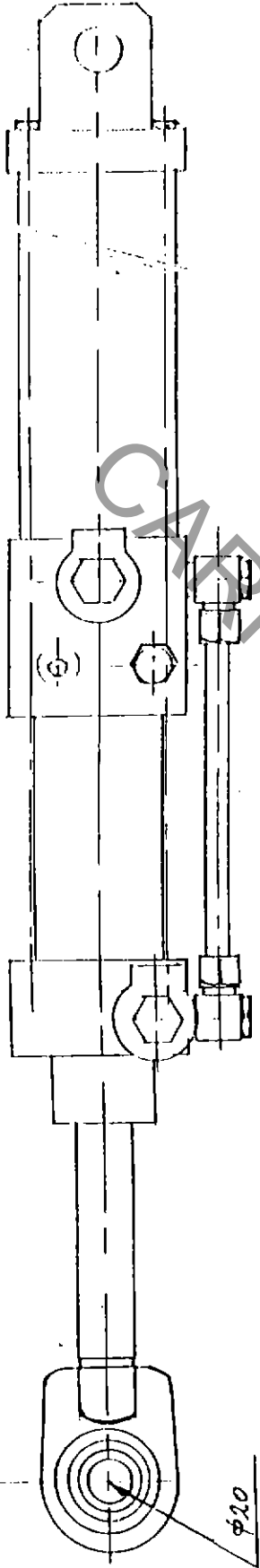
D.O.W. HYDRAULIEK ENSCHEDE		ORDERNUMMER:
CLIENT: TIVOLI		ARTIKELCODE: HS9805-0596A
ORDER/REF. CLIENT:		SERIENUMMER:
AANTAL:	LEVERDATUM:	OLIESOORT:
WERK/PROEFDruk:	LAKBEHANDELING:	
OMSCHRIJVING: CRUTCH-FLOOR SYSTEM MOVE IT 24 PEOPLE		
TESTPROCEDURE:		

STUKLIJST

POS	HOEV	ARTIKELNR.	OMSCHRIJVING	OPMERKINGEN
1	1	KL1PS2G	PUMP 1,3CC	MARZOCCHI
2	1	SKRA+80	ELEKTR. MOTOR 2000WATT-24VDC	OIL-SYSTEM
3	1	BK3G1/4 08 1123	3-WAY BALL VALVE R 1/4 L-BORE	PISTER
4	1	BM40/2-GU-2XA1	HAND LEVER CONTROL VALVE	BLB HYDRAULIC
5	2	CI9735-0575A	HYDRAULIC CRUTHCIL.100/80-250	D.O.W.
6	8	702.2	FLOOR-CILINDER 50/30-200	D.O.W.
7	4	VSO-SE-FCA-G-38-MP	PILOT OPERATED CHECK VALVE	OIL CONTROL
8	2	VV14GASF-7A	FEMALE QUICK COUPLING	FASTER
	2	VV14GASM-6B	MALE QUICK COUPLING	FASTER
9	2	CI9735-0576A	HYDRAULIC CRUTHCIL.100/80-450	D.O.W.
10	1	BM40/4-GU-4XA1	HAND LEVER CONTROL VALVE	BLB HYDRAULIC

Tenzij schriftelijk anders is overeengkomen, zijn op onze aanbiedingen en op alle door ons te sluiten overeenkomsten van koop en verkoop van toepassing de algemene leveringsvoorwaarden van D.O.W. Hydrauliek, gedeponeerd ter griffie van de arrondissementsrechtbank te Almelo. Om nu verzoek zenden wil li deze graag toe. Reclames binnen 8 daaien na ontvanast goederen. Levering voor rekening en risico koper.

710
ø10



CLOSED : P=3 BAR
 OPEN : P=4 BAR

EMERGENCY BAR-OPEN
 CONNECT 3-4 WITH MINI-ROSE

DOW
 HYDRAULIK

Number: CI 9724-0563A
 Description: BAR - CYLINDER
 Client: KING MOVE IT-24
 Date: 23-6-97
 Drawn:

Paravoo 103
 TSL E MV Entscheldung

Interchangeable

SECTION 6
Electrical System

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Electrical Inspection and Maintenance

General Wiring and Housekeeping

It is a good practice to perform a daily inspection of all electrical wiring on the ride. This is done to detect any wires that appear to be damaged or loose. 90% of all electrical problems are caused by loose or broken wires. In the first couple of months of operation check all terminals and wire lugs in the control box for tightness. During regular inspections quickly tugging on the wires where they make their connection easily locates any loose wires. Vibration during transport can cause wires to loosen and heat up, eventually causing component damage. Keeping the electrical boxes and components clean and dry is probably the single most important preventative maintenance tip on the Spin Out Ride. Keep the inside of the boxes free from debris and always replace wire duct covers when you are finished servicing. As a rule, the Main Electrical box should be locked when it is not being serviced.

The Spin out electrical system is composed of the following parts. Power distribution, Control, lighting and motors.

Power Distribution

Power Supply:

The Spin Out electrical system operates on a five Wire system. 220 volt, 3 phase, 60 Hz, neutral and ground. It uses approximately 85 KW of power. Electrical connection to the ride is made through five (5) cam-loc connectors attached to the main supply electrical box located on the fixed leveling base. Assure that these connections are tight prior to establishing power to the ride.

Main Disconnect (IMS):

Located in the main distribution electrical box where electrical power is connected to the ride are a main disconnect switch. This supplies power for motive, control and for ride lighting. This two switch severs all power to the ride. The switches can be operated with the electrical enclosure closed, through the handle mounted on the face of the box. This disconnect must be shut off when the ride is left unattended. The disconnect is installed with a Low voltage trip device that allows the operator to disconnect power from ride at the operators control console. (see elec. dwg. 429-1 / 429-2)

Phase relay (1PPR);

This relay monitors voltage and phase sequence. If the three phases are not in proper order or voltage is too low, the phase relay will prevent the two main disconnect switches from being turned ON. When phase sequence is correct, a white light mounted on the main

disconnect enclosure will illuminate. Circuit breaker 1RCD must be ON for phase relay to work.
(Refer to elec. dwgs. 429-1, 429-2 for details.)

Circuit protection;

Ground Faults:

Each circuit is protected by a ground fault detector. The ground faults function is to sense and shut down a circuit instantly if there is any type of short to ground (more than .03 Amp.). These GFD's are very sensitive and can trip if there is too much moisture around a component (i.e. water in a light socket). However, they are essential to the safety of the equipment because they will trip immediately if a live circuit comes in contact with a person. Each ground fault has a test button which when pressed trips the circuit to test itself for proper operation. In the case of a trip, before resetting any GFD, investigate the circuit completely and correct any problems. Ground fault and Ground fault /breaker combinations are indicated on the schematic by the following identifications.

Ground Fault Only	1RCD through 6RCD
Ground Fault/ Circuit breaker	1RCBO through 7RCBO

Circuit breakers;

Each distribution circuit has over current protection through a circuit breaker. These devices protect the wiring in the case of a sever or constant over load. In the event of an overload, these circuit breakers will trip. In the case of a circuit breaker trip investigate cause of trip before resetting. Breakers are reset by first shutting off then turning back on. Circuit breakers are indicated on the schematics by the following identifications

Circuit breakers	1CB through 25 CB
------------------	-------------------

Some circuit breakers have additional contacts. These contacts send a signal to the PLC if the circuit breaker is tripped. The circuit breakers with additional contacts are;

5CB	Pump Trip
6CB	Locking and Filter Pump Trip
7CB	Base Mains Tripped
8CB	Base Brake Trip.
9CB	Arm Mains Trip.
10CB	Arm Brake Trip.
11CB	Spinner Mains Trip
12CB	Vent Fans Fault.

Contactors:

Contactors are solenoid operated switches designed to quickly apply power to a component under a full load condition. They can be remotely controlled allowing the operator to control them from a switch on the control console. Contactors need no maintenance and only need to be replaced if outside problems cause contacts or solenoid coils to burn. To prevent damage always assure connections are tight. Most problems are caused by loose wires. Below is listed the contactors used on the Spin Out, their function and Identification.

- 1M Scenery lights, turns on and off lighting for rear scenery. (dwgs. 429-3)
- 2M Flood Lights, Operates platform quartz lights. (dwgs. 429-3)
- 3M Strobe Lights, Supplies power to activate Strobe Lights.(dwgs. 429-3)
- 4M1-2-3 Main Hydraulic Motor Starter, engages main hydraulic electric motor.
(dwg.429-5)
- 5M Locking pump and filter (dwg. 429-5)
- 6M Base Drive, powers up inverter for base drive.(dwg. 429-6)
- 7M Base Brake, energizes sweep motor holding brake. (dwg. 429-6)
- 8M Arm Drive, powers up Arm drive inverter (dwg. 429-6)
- 9M Arm Brake, energizes arm electric brake (dwg. 429-6)
- 10M Spinner drive, powers up inverter for spinner drive. (dwg. 429- 6)
- 11M Spinner brake, energizes spinner brake. (dwg.429-6)
- 12M Shoulder Bar Power supply. (dwg.429-7)
- 13M Running lights (dwg. 429-7)
- 14M Arm Static Lights (dwg. 429-7)
- 15M Arm Emergency Motor (dwg. 429-17)
- 16M Aux. 24VDC Pump (dwg. 429- 17)
- 17M Power Supply Shoulder Bars. Secondary Solenoid (dwg. 429-22)
- 18M Power Supply Shoulder Bars. Shoulder Bar Cylinders. (dwg. 429-22)

Overloads:

Overloads are designed to protect motors in the case of an overload. Overloads are caused by a motor being overworked, loosing a phase , or damage in the motor. Motor overloads have two adjustments. The Auto / Manual switch allows the overload to reset automatically or by pressing the reset button when it cools. If an overload trips, investigate problems before resetting. Each overload also has a trip adjustment. This trip adjustment is set at the factory and should never needs additional adjustment. Below is listed the Overloads used on the Spin Out, there function and Identification.

- 1OL Main Hydraulic Electric motor (dwg. 429-5)
- 2OL Locking pump and filter (dwg. 429-5)

Control

Control of the ride is accomplished through a Programmable Logic Controller (PLC) and an array of operator switches and sensors. Inputs from switches, buttons, sensors etc., are sent to the PLC which interprets them through its factory installed program. This results in a programmed set of outputs that operate Contactors, relays, Hydraulic control coils and electric solenoid which cause the ride to operate in the proper sequence.

Programmable Logic Controller (PLC)

The PLC used on the Spin Out is a simple and easy to understand unit. Basically, the unit is programmed to receive inputs (incoming signals) from certain control relays, Sensors, Switches, and contacts. When the unit receives these inputs in the correct sequence, it will send an output (outgoing signal) to a valve or control relay which in turn causes an action on the ride. Each input and output on the PLC is represented by a small LED light mounted on the face of the unit.

Each LED light also has a identification number which is indicated on the electrical schematics. This system offers the ability to check for proper operation of each input such as a button or sensor. If the PLC is not receiving a particular input signal, that circuit can be checked out and repaired. This allows fault finding to be simple and quick.

The PLC is composed of 2 separate units, one factory programmed master unit and 1 slave input / output unit. The input / output units are controlled by the programmable unit. The programing of the master unit can not be changed in the field with out specialized equipment. Listed below are the Identification numbers and purpose of each of the LEDs.

1PLC1

	Input	Output
0	Main Pump Contactor	on Main Pump Contactor 4M1 On
1	Drive enabled	Main Pump Delta Contactor 4M2 On
2	Pump trip	Main Pump Star Contactor 4M3 On
3	Locking pump trip	Locking Pump and Filter 5M On
4	Base mains trip	Base Inverter 6M On
5	Base brake trip	Arm Inverter 8M On
6	Base inverter trip	
7	Arm Mains Trip	

1PLC2

Inputs

0	Arm Brake trip
1	Arm Inverter Trip
2	Spinner Mains Trip
3	Spinner Brake Trip
4	Spinner Inverter Trip
5	Humidity Trip
6	Vent Fans Trip
7	Ride Abort

Remote Console

8	Build switch
9	Start Drives
10	Stop Drives
11	Jog Base
12	Jog Arm
13	Jog Spinners
14	Unlock Arm
15	Lock Arm

1PLC3

Inputs

Remote Console

0	Raise Arm
1	Lower Arm
2	Lamp Test

Limit Switches

3	Arm Locked
4	Arm Unlocked
5	Arm Pre Bottom
6	Arm at Bottom
7	Arm Pre Top
8	Arm at Top
9	Arm Rotate
10	Base Rotate
11	Shoulder Bars Closed
12	Ride Control
13	Ride Stop
14	Base Voltage /sensing Relay
15	Spinner Run (brake released)

1PLC4

Outputs

0	Spinners Inverter Contactor 10M
1	Lap Bars 12M
2	Hour Meter
3	Arm Static Lights 14M
4	Smoke Machine 10CR
5	Unlock Arm Solenoid 1SOL
6	Lock Arm Solenoid 2SOL
7	Raise Arm Solenoid 3SOL

1PLC5

Outputs

0	Lift Proportional Valve command signal 11CR
1	Lift Proportional Valve Enable signal
2	Base Forward (Jog)
3	Base Reverse
4	Base Max Speed
5	Arm Forward (Jog)
6	Arm Reverse
7	Arm Max Speed

1PLC6

Outputs

0	Spinner Forward (Jog)
1	Spinner Reverse
2	Spinner Max Speed
3	Fault Light 1
4	Fault Light 2
5	Fault Light 3
6	Fault Light 4
7	Fault Light 5

2PLC

Located at Operators Control Console

Inputs

0	Reset
1	Start Drives
2	Stop Drives
3	Start Ride Forward
4	Start Ride Reverse
5	Ride Lights
6	Smoke Machine

Outputs

Fault Light
Reset Light
Start Ride Light
Ride Timer

24 VDC Power supply. 1PSU

The PLC operates off a 24VDC power supply (1PSU). This allows for a more controlled and safer current to operator controls. Input power is supplied by circuit breaker 17CB at 120 VAC. In the case where the PLC is not receiving power first check 17CB then the on / off switch on the face of the power supply.

Emergency Relay (1SR)

This is a redundant relay which insures the tripping of the main switch in case of use of the power shut off button on the control console. (Dwg. 429-1)

Phase Relay (1PPR)

This relay prevents the main switch from engaging if the incoming power is not phased correctly or there is insufficient power. (Dwg.429.1)

Control Relays

The Spin Out has 11 control relays. These relays perform different functions which enable or disable circuits. Listed below are each relay and its specific purpose.

1CR	Activates Scenery Lights Contactor 1M (429-4)
2CR	Activates Platform Floodlight Contactor 2M (429-4)
3CR	Activates Strobe Light Contactor 3M (429-4)
4CR	Interlock for Shoulder Bars, Shoulder Bars Locked. (429-7)
5CR	Control Power On, Supplies 24VDC Power For Control (429-9)
6CR	Base run signal to release motor brake (429-9)
7CR	Arm Run Signal to release motor brake (429-9)
8CR	Spinner Run Signal to release motor brake (429-9)
9CR	Supplies power for ride light and brake Contactors (429-14)
10CR	Activates Smoke Machine (429-15)
11CR	Activates Lift Proportional Valve (429-16)

Limit Switches

The Spin Out uses magnetically (Inductive) operated proximity switches to indicate the different positions of the ride. All Proximity (limit) switches are the same type. These switches tell the PLC through inputs where the exact position of the ride is to which the PLC will initiate an output.

1LS	Arm Locked N/O	7LS	Arm Rotate N/O
2LS	Arm Unlocked N/O	8LS	Base Rotate N/O
3LS	Arm Pre Bottom Limit N/O	9LS	Arm Rotation Locked
4LS	Arm Bottom Limit N/C		
5LS	Arm Pre Top N/O		
6LS	Arm at Top N/C		

Humidity High Indicator (dwg. 429-12, 20)

Located in the Inverter enclosure is a High Humidity detector. This detector sends a signal to the PLC when the humidity in the inverter enclosure is too high. In turn the PLC does not allow the inverter to be turned on. If this case arises, allow the ventilator fans to run for about 1/2 to 1 hour until the humidity has a chance to reduce. This sensor is installed to protect Inverter processors from damage due to water accumulation.

Hour Meter (dwg. 429-15)

The Spin Out has installed on the main control enclosure an hour meter. This meter is controlled by the PLC. The hour meter is set to record operational time from the moment the start ride button is pushed, through the ride cycle until the arm reaches the bottom limit sensor at the end of the ride. This hour meter is installed to help time maintenance schedules and used as a reference for making repair logs.

Proportional Hydraulic Valve Control (1 PVC) (dwg. 429-10)

The Lift, is controlled by hydraulic proportional valve which offer the ability to control Ramp times and speeds This Proportional valve is activated by the PLC . This allows a smooth operation of the lift cylinders.

Main Hydraulic Pump Motor

This pump is designed to be turned on when the arm lifts and shut off when the arm reaches the top limit. The motor is started through a set of three contactors 4M1, 4M2, and 4M3. It is protected by a circuit breaker 5CB and overload 1OL. When the ride cycle starts the motor is activated, contactors 4M1 and 4M3 close bringing the motor up to full speed. After a short period of time (6 to 15 seconds) 4M3 will disengage and 4M2 will engage this brings the motor up to full power. The control of these contactors is done through the PLC. The purpose for this type of starting system is to reduce the starting load of the motor thus reducing the surge load on the generator or utility supply.

Spinners, Base, and Arm Motor

These motors are standard 3phase motors with an electric holding brake attached. Control of this motor is accomplished through the PLC and a Frequency Inverter.

Voltage Sensing Relay (1,2VSR)

These voltage sensing relays monitor the voltage of the two base motors through the two current transformers (1,2CT). These are in place to assure both motors are working equally together. If one motor was to fail the sensors would pick up the other motor being over worked and shut down the base.

Frequency Inverters.

The Frequency Inverter controls the ramp and maximum speed of the sweeps. It is accomplished by varying the frequency to the motor. This unit requires no maintenance with the exception of the ventilator fan mounted in its enclosure, which need to have its filters cleaned periodically. The operation of the inverter is controlled by the PLC and a set of values pre-programmed into the inverters processor. In the case of a trip of the inverter the digital

display will show a fault code which can be interpreted through list located in the Inverter Manual located in the supplemental section of this manual. All other information concerning settings, operation, and maintenance can be found in this manual.

Brake Chopper. (1,2,3 BC)

Operating along with the Inverter is a brake chopper. This chopper takes excess current which is caused by deceleration and unbalanced loads of the sweeps and sends it to a bank of resistors which dissipate the current in the form of heat. This unit is factory set and requires no field adjustments. A manual for this unit is located in the supplemental information section of this manual.

Battery Charger (ICHR)

A battery charger is installed to keep set up and emergency batteries in top condition. The battery charger is fully automatic and requires no maintenance. The charger is supplied through Ground Fault / Circuit Breaker 5RCBO. Condition of battery can be checked by battery condition indicator located on the main enclosure. If indicator shows bad or poor battery conditions, check operation of battery charger. Refer to Dwg. 429-8

DC / AC converter (IEPS)

A DC / AC converter is installed to be used in the case of emergency to release the Shoulder bars when there is complete power failure. Using the set up batteries this unit converts 24VDC to 120 VAC which operates the Shoulder Bar Solenoids through the emergency cord described in the emergency procedures section of this manual. Refer to Dwg. 429-17

24VDC Pump Motor

The emergency and set up pump is a 2000 watt 24VDC motor with a 1.3 cc pump attached. It is absolutely necessary that this pump be checked for proper operation on a daily basis to insure proper operation in case of an emergency.

2 - 12 Volt Batteries

These two 12 volt batteries are connected in series to provide 24VDC for operation of the emergency and set up hydraulic pump. Care should be taken to insure batteries are maintained. Keep terminals clean and tight. Check water level regularly.

Trouble Shooting

The Spin Out is equipped with a set of five Indicator lights mounted on the main electrical inclosure on the rotating platform #1 Red, #2 Yellow, #3 Blue, #4 Green, and #5 Clear. The sequence in which these lights are illuminated, indicates a particular fault. These faults can be determined by the chart below:

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SPINNER 1.2

(2) Extension function mode

- Each function name and settable range to the extension function mode are shown below.
- Set the extension function code to be changed by **F14**.

Display screen	Extension function name	Screen display				Remarks
		Code display	Initial setting	Setting range	Initial value European USA JPN	
1	Control method setting	A0	—	0-5	0 0 0	4
2	Motor capacity setting	A1	—	1.7 to 75		NOTE 1 5
3	Motor poles setting	A2	—	2/4/6/8	4 4 4	4
4	Speed control response constant setting	A3	—	0.00-9.99/0.0-9.9/0.0	2.00 2.00 2.00	2
5	Start frequency adjustment	A4	—	0.10-9.99	0.50 0.50 0.50	—
6	Maximum frequency limiter setting	A5	—	0-120 (400)	0 0 0	54
7	Minimum frequency limiter setting	A6	—	0-120 (400)	0 0 0	2
8	Jump frequency setting 1	A7	—	0-200	0 0 0	—
9	Jump frequency setting 2	A8	—	0-200	0 0 0	—
10	Jump frequency setting 3	A9	—	0-200	0 0 0	—
11	Cutter frequency setting	A10	—	2.0-16.0	(16.0) (16.0) (16.0)	See 7-19 2
12	Frequency command sampling frequency	A11	—	1-8	8 — —	NOTE 3 8
13	Multispeed first speed setting	A12	—	0-120 (400)	0 0 0	54 0
14	Multispeed second speed setting	A13	—	0-120 (400)	0 0 0	2 0
15	Multispeed third speed setting	A14	—	0-120 (400)	0 0 0	54
16	Electronic thermal level adjustment	A23	—	20-120	100 100 100	120
17	Electronic thermal characteristic selection	A24	—	0-2	0 1 1	1
18	External frequency setting start	A26	—	0-120 (400)	0 0 0	0.0
19	External frequency setting end	A27	—	0-120 (400)	0 0 0	0.0
20	Instantaneous restart selection	A24	—	0-3	0 0 0	0
21	Dynamic braking usage ratio	A38	—	0.0-99.9/100	(1.5) (1.5) (1.5)	See 7-21 0
22	Optional arrival frequency for acceleration	A39	—	0-200	0 0 0	0
23	Optional arrival frequency for deceleration	A40	—	0-200	0 0 0	0
24	Monitor signal selection	A44	—	0-3	0 0 0	0
25	Analog input selection	A48	—	0-3	1 1 1	1
26	Frequency arrival signal output method	A49	—	0-3	0 0 0	0
27	Autotuning setting	A54	—	00-07	00 00 00	0
28	Reduced voltage soft start setting	A58	—	0-6	6 — —	NOTE 3 6
29	Running mode selection	A59	—	0-2	0 0 0	0
30	Logging frequency setting	A61	—	0-4.99	1.00 1.00 1.00	Frequency below the start frequency cannot be set. 0
31	Base frequency setting	A62	—	30-120 (400)	50 60 60	60
32	Maximum frequency setting	A63	—	30-120 (400)	50 60 60	60
33	Preset data program	A65	—	0-18	0 0 0	—
34	Frequency command/output frequency signal (O/L terminal)	A80	—	0-255	— — —	NOTE 2 5
35	Frequency command/output frequency signal (O/L terminal)	A-81	—	0-255	— — —	NOTE 2 1
36	Input terminal setting 1	C0	—	0-28	18 18 18	18
37	Input terminal setting 2	C1	—	0-28	16 16 16	12
38	Input terminal setting 3	C2	—	0-28	5 5 5	15
39	Input terminal setting 4	C3	—	0-28	11 11 11	1
40	Input terminal setting 5	C4	—	0-28	9 9 9	2
41	Input terminal setting 6	C5	—	0-28	2 13 2	13
42	Input terminal setting 7	C6	—	0-28	1 1 1	6
43	Input terminal setting 8	C7	—	0-28	0 0 0	0
44	Output terminal setting 11	C10	—	0-2	0 0 0	0
45	Output terminal setting 12	C11	—	0-2	1 1 1	1
46	Input terminal a and b contact setting	C20	—	00-FF	08 00 00	00
47	Output terminal a and b contact setting	C21	—	00-FF	04 04 04	00

125=04

47=10

64=120

786=0

790=10

791=10

792=0

144=0

145=0

90=0

147=0

148=0

149=0

NOTE 1: The most applicable motor capacity of the inverter is set.

NOTE 2: The initial setting of each inverter is adjusted when shipping from the works.

NOTE 3: European version only.

7.6 Digital Operator Initialization List

(1) Monitor mode, function mode

- The standard set value of each code number is displayed.
- The extension functions shown on page 7-6 can be set by the **F14** extension function setting function.

Display order	Function name	Type	Screen display			Initial value			Settable for 2nd function
			Code display	Settable during running	Monitor/set value	Europe	USA	JPN	
1	Output frequency monitor	Monitor	d 0	-	0.00-9.99/10.0-99.9/100-400	-	-	-	-
2	Motor revolution speed monitor	Monitor	d 1	-	0.00-9.99/10.0-99.9/100-600	-	-	-	-
3	Output current monitor	Monitor	d 2	-	0.0-999	-	-	-	-
4	Trip Monitor	Monitor	d10	-	-	-	-	-	-
5	Trip history monitor	Monitor	d11	-	-	-	-	-	-
6	Output frequency setting	Set value	F 2	√	0.00-9.99/10.0-99.9/100-400	0.00	0.00	0.00	√
7	Running direction setting	Set value	F 4	Not possible	F/r (forward run/reverse run)	F	F	F	-
8	V/f pattern setting	Set value	F 5	Not possible	00-05	00	02	02	-
9	Acceleration time setting 1	Set value	F 6	√	0.01-9.99/10.0-99.9/100-999	30.0	30.0	30.0	√
10	Deceleration time setting 1	Set value	F 7	√	0.01-9.99/10.0-99.9/100-999	30.0	30.0	30.0	√
11	Manual torque boost setting	Set value	F 8	√	00-99	11	11	11	√
12	Runn command, frequency command setting	Set value	F 9	Not possible	00-15 NOTE 1	03	03	00	-
13	Analog meter adjustment	Set value	F10	√	00-100	72	72	72	-
14	Motor receiving voltage	Set value	F11	Not possible	200-230/380-460 NOTE 2	380	230/460	200/400	-
15	Extension function setting	Set value	F14	Not possible	A 0-A65/C 0-21 NOTE 3	A 0	A 0	A 0	-

NOTE 1: In the standard configuration, four values from 0 to 3 can be selected. When an optional PC board is mounted, 16 values from 0 to 15 can be selected. Refer to F-9.

NOTE 2: For the 200 V class, one of 200, 215, 220, and 230 can be selected. For the 400 V class, one of 380, 400, 415, 440, and 460 can be selected.

NOTE 3: No extension function can be set during running, though the set value of each function can be monitored.

(2) Extension function mode

- Each function name and settable range to the extension function mode are shown below.
- Set the extension function code to be changed by **F114**.

Display order	Extension function name	Screen display					Settable for the function	Remarks
		Code display	Initial setting	Setting range	Initial value			
					EUROPEAN	CSA	JPN	
1	Control method setting	A0	—	0-5	0	0	0	√ 4
2	Motor capacity setting	A1	—	3.7 to 75				√ NOTE 1 15.0
3	Motor poles setting	A2	—	2/4/6/8	4	4	4	√ 4
4	Speed control response constant setting	A3	—	0.00-1.99/0.00-9.9/0.00	2.00	2.00	2.00	— 2.00
5	Start frequency adjustment	A4	—	0.10-9.99	0.50	0.50	0.50	—
6	Maximum frequency limiter setting	A5	—	0-120 (400)	0	0	0	— 50.0
7	Minimum frequency limiter setting	A6	—	0-120 (400)	0	0	0	— 6.0
8	Jump frequency setting 1	A7	—	0-400	0	0	0	—
9	Jump frequency setting 2	A8	—	0-400	0	0	0	—
10	Jump frequency setting 3	A9	—	0-400	0	0	0	—
11	Carrier frequency setting	A10	—	2.0-16.0	(16.0)	(16.0)	(16.0)	— See 7-19 12
12	Frequency command sampling frequency	A11	—	1-8	8	—	—	— NOTE 3
13	Multispeed first speed setting	A12	—	0-120 (400)	0	0	0	— 50.0
14	Multispeed second speed setting	A13	—	0-120 (400)	0	0	0	— 6.0
15	Multispeed third speed setting	A14	—	0-120 (400)	0	0	0	— 6.0
16	Electronic thermal level adjustment	A23	—	20-120	100	100	100	√ 120
17	Electronic thermal characteristic selection	A24	—	0-2	0	1	1	√ 1
18	External frequency setting start	A26	—	0-120 (400)	0	0	0	—
19	External frequency setting end	A27	—	0-120 (400)	0	0	0	—
20	Instantaneous restart selection	A34	—	0-3	0	0	0	—
21	Dynamic braking usage ratio	A38	—	0.0-99.9/100	(1.5)	(1.5)	(1.5)	— See 7-21 0.0
22	Optional arrival frequency for acceleration	A39	—	0-400	0	0	0	— 3.0
23	Optional arrival frequency for deceleration	A40	—	0-400	0	0	0	—
24	Monitor signal selection	A46	—	0-3	0	0	0	—
25	Analog input selection	A48	—	0-1	1	1	1	—
26	Frequency arrival signal output method	A49	—	0-2	0	0	0	— 1
27	Autotuning setting	A54	—	00-07	00	00	00	— 1
28	Reduced voltage soft start setting	A58	—	0-6	6	—	—	— NOTE 3 6
29	Running mode selection	A59	—	0-2	0	0	0	—
30	Jogging frequency setting	A61	—	0-9.99	1.00	1.00	1.00	— Parameters below the start frequency cannot be set. 0.00
31	Base frequency setting	A62	—	30-120 (400)	50	60	60	√ 60
32	Maximum frequency setting	A63	—	30-120 (400)	50	60	60	√ 60
33	Preset data program	A65	—	0-18	0	0	0	— USED
34	Frequency command/output frequency input (O/L terminal)	A80	—	0-255	—	—	—	— NOTE 3 63
35	Frequency command/output frequency input (O/L terminal)	A-81	—	0-255	—	—	—	— NOTE 3 81
36	Input terminal setting 1	C9	—	0-28	18	18	18	— 18
37	Input terminal setting 2	C11	—	0-28	16	16	16	— 12
38	Input terminal setting 3	C2	—	0-28	5	5	5	— 15
39	Input terminal setting 4	C3	—	0-28	11	11	11	— 1
40	Input terminal setting 5	C4	—	0-28	9	9	9	— 2
41	Input terminal setting 6	C5	—	0-28	2	13	2	— 5
42	Input terminal setting 7	C6	—	0-28	1	1	1	— 6
43	Input terminal setting 8	C7	—	0-28	0	0	0	— 0
44	Output terminal setting 11	C10	—	0-2	0	0	0	— 2
45	Output terminal setting 12	C11	—	0-2	1	1	1	— 0
46	Input terminal a and b contact setting	C20	—	00-FF	08	00	00	— 00
47	Output terminal a and b contact setting	C21	—	00-FF	04	04	04	— 00

225 = 04

47 = 10

64 = 120

86 = 0

90 = 1

91 = 1

192 = 00

14 = 0

45 = 0

10 = 0

47 = 0

48 = 0

49 = 0

NOTE 1: The most applicable motor capacity of the inverter is set.

NOTE 2: The initial setting of each inverter is adjusted when shipping from the works.

NOTE 3: European version only.

7.6 Digital Operator Initialization List

(1) Monitor mode, function mode

- The standard set value of each code number is displayed.
- The extension functions shown on page 7-6 can be set by the **F14** extension function setting function.

Display order	Function name	Type	Screen display			Initial value			Settable for 2nd function	
			Code display	Settable during running	Monitor/set value	Europe	USA	JPN		
1	Output frequency monitor	Monitor	d0	-	0.00-9.99/10.0-99.9/100-400	-	-	-	-	
2	Motor revolution speed monitor	Monitor	d1	-	0.00-9.99/10.0-99.9/100-600	-	-	-	-	
3	Output current monitor	Monitor	d2	-	0.0-999	-	-	-	-	
4	Trip Monitor	Monitor	d10	-	-	-	-	-	-	
5	Trip history monitor	Monitor	d11	-	-	-	-	-	-	
6	Output frequency setting	Set value	F2	√	0.00-9.99/10.0-99.9/100-400	0.00	0.00	0.00	√	6.00
7	Running direction setting	Set value	F4	Not possible	F/r (forward run/reverse run)	F	F	F	-	50.00
8	V/f pattern setting	Set value	F5	Not possible	00-05	00	02	02	-	
9	Acceleration time setting 1	Set value	F6	√	0.01-9.99/10.0-99.9/100-999	30.0	30.0	30.0	√	22.0
10	Deceleration time setting 1	Set value	F7	√	0.01-9.99/10.0-99.9/100-999	30.0	30.0	30.0	√	10.8
11	Manual torque boost setting	Set value	F8	√	00-99	11	11	11	√	
12	Runn command, frequency command setting	Set value	F9	Not possible	00-15 NOTE 1	03	03	00	-	02
13	Analog meter adjustment	Set value	F10	√	00-100	72	72	72	-	172
14	Motor receiving voltage	Set value	F11	Not possible	200-230/380-460 NOTE 2	380	230/460	200/400	-	230
15	Extension function setting	Set value	F14	Not possible	A 0-A65/C 0-21 NOTE 3	A 0	A 0	A 0	-	

NOTE 1: In the standard configuration, four values from 0 to 3 can be selected. When an optional PC board is mounted, 16 values from 0 to 15 can be selected. Refer to F-9.

NOTE 2: For the 200 V class, one of 200, 215, 220, and 230 can be selected. For the 400 V class, one of 380, 400, 415, 440, and 460 can be selected.

NOTE 3: No extension function can be set during running, though the set value of each function can be monitored.

7.6 Digital Operator Initialization List

(1) Monitor mode, function mode

- The standard set value of each code number is displayed.
- The extension functions shown on page 7-6 can be set by the **F14** extension function setting function.

Display order	Function name	Type	Screen display			Initial value			Settable for 2nd function	
			Code display	Settable during running	Monitor/set value	Europe	USA	JPN		
1	Output frequency monitor	Monitor	d0	-	0.00-9.99/10.0-99.9/100-400	-	-	-	-	
2	Motor revolution speed monitor	Monitor	d1	-	0.00-9.99/10.0-99.9/100-600	-	-	-	-	
3	Output current monitor	Monitor	d2	-	0.0-999	-	-	-	-	
4	Trip Monitor	Monitor	d10	-	-	-	-	-	-	
5	Trip history monitor	Monitor	d11	-	-	-	-	-	-	
6	Output frequency setting	Set value	F2	√	0.00-9.99/10.0-99.9/100-400	0.00	0.00	0.00	√	2.0 42.0
7	Running direction setting	Set value	F4	Not possible	F/r (forward run/reverse run)	F	F	F	-	
8	V/f pattern setting	Set value	F5	Not possible	00-05	00	02	02	-	
9	Acceleration time setting 1	Set value	F6	√	0.01-9.99/10.0-99.9/100-999	30.0	30.0	30.0	√	18
10	Deceleration time setting 1	Set value	F7	√	0.01-9.99/10.0-99.9/100-999	30.0	30.0	30.0	√	13
11	Manual torque boost setting	Set value	F8	√	00-99	11	11	11	√	
12	Run command, frequency command setting	Set value	F9	Not possible	00-15 NOTE 1	03	03	00	-	02
13	Analog meter adjustment	Set value	F10	√	00-100	72	72	72	-	172
14	Motor receiving voltage	Set value	F11	Not possible	200-230/380-460 NOTE 2	380	230/460	200/400	-	230
15	Extension function setting	Set value	F14	Not possible	A 0-A65/C 0-21 NOTE 3	A 0	A 0	A 0	-	

NOTE 1: In the standard configuration, four values from 0 to 3 can be selected. When an optional PC board is mounted, 16 values from 0 to 15 can be selected. Refer to F-9.

NOTE 2: For the 200 V class, one of 200, 215, 220, and 230 can be selected. For the 400 V class, one of 380, 400, 415, 440, and 460 can be selected.

NOTE 3: No extension function can be set during running, though the set value of each function can be monitored.

(2) Extension function mode

- Each function name and settable range to the extension function mode are shown below.
- Set the extension function code to be changed by **F14**.

Display order	Extension function name	Screen display						Settable range	Remarks
		Code display	Initial setting	Setting range	Initial value				
					Europe	USA	JPN		
1	Control method setting	A0	—	0-5	0	0	0	√	4
2	Motor capacity setting	A1	—	1.7 to 75				√	NOTE 1 22-0
3	Motor poles setting	A2	—	2/4/6/8	4	4	4	√	4
4	Speed control response constant setting	A3	—	0.00-9.99/0.00-99.9/0.00	2.00	2.00	2.00	—	
5	Start frequency adjustment	A4	—	0.10-9.99	0.50	0.50	0.50	—	
6	Maximum frequency limiter setting	A5	—	0-120 (400)	0	0	0	—	50-0
7	Minimum frequency limiter setting	A6	—	0-120 (400)	0	0	0	—	2-0
8	Jump frequency setting 1	A7	—	0-400	0	0	0	—	0-0
9	Jump frequency setting 2	A8	—	0-400	0	0	0	—	0-0
10	Jump frequency setting 3	A9	—	0-400	0	0	0	—	
11	Carrier frequency setting	A10	—	2.0-16.0	(16.0)	(16.0)	(16.0)	—	See 7-19 12
12	Frequency command sampling frequency	A11	—	1-8	8	—	—	—	NOTE 3 8
13	Multispeed first speed setting	A12	—	0-120 (400)	0	0	0	—	42-0
14	Multispeed second speed setting	A13	—	0-120 (400)	0	0	0	—	2-0
15	Multispeed third speed setting	A14	—	0-120 (400)	0	0	0	—	2-0
16	Electronic thermal level adjustment	A23	—	20-120	100	100	100	√	120
17	Electronic thermal characteristic selection	A24	—	0-2	0	1	1	√	1
18	External frequency setting start	A26	—	0-120 (400)	0	0	0	—	
19	External frequency setting end	A27	—	0-120 (400)	0	0	0	—	
20	Instantaneous restart selection	A34	—	0-3	0	0	0	—	
21	Dynamic braking usage ratio	A38	—	0.0-99.9/100	(1.5)	(1.5)	(1.5)	—	See 7-21 0
22	Optional arrival frequency for acceleration	A39	—	0-400	0	0	0	—	1
23	Optional arrival frequency for deceleration	A40	—	0-400	0	0	0	—	
24	Monitor signal selection	A44	—	0-3	0	0	0	—	
25	Analog input selection	A48	—	0-1	1	1	1	—	
26	Frequency arrival signal output method	A49	—	0-2	0	0	0	—	1
27	Autotuning setting	A54	—	00-07	00	00	00	—	1
28	Reduced voltage soft start setting	A55	—	0-6	6	—	—	—	NOTE 3 6
29	Running mode selection	A59	—	0-2	0	0	0	—	
30	Jogging frequency setting	A61	—	0-9.99	1.00	1.00	1.00	—	Precautions below the next frequency cannot be set. 0
31	Base frequency setting	A62	—	30-120 (400)	50	60	60	√	60
32	Maximum frequency setting	A63	—	30-120 (400)	50	60	60	√	60
33	Preset data program	A65	—	0-18	0	0	0	—	60 0-18 0-18
34	Frequency command/output frequency adjust (C1, terminal)	A80	—	0-255	—	—	—	—	NOTE 2:64
35	Frequency command/output frequency adjust (C1, terminal)	A81	—	0-255	—	—	—	—	NOTE 2:81
36	Input terminal setting 1	C0	—	0-28	18	18	18	—	18
37	Input terminal setting 2	C1	—	0-28	16	16	16	—	12
38	Input terminal setting 3	C2	—	0-28	5	5	5	—	15
39	Input terminal setting 4	C3	—	0-28	11	11	11	—	1
40	Input terminal setting 5	C4	—	0-28	9	9	9	—	2
41	Input terminal setting 6	C5	—	0-28	2	13	2	—	7
42	Input terminal setting 7	C6	—	0-28	1	1	1	—	6
43	Input terminal setting 8	C7	—	0-28	0	0	0	—	0
44	Output terminal setting 11	C10	—	0-2	0	0	0	—	2
45	Output terminal setting 12	C11	—	0-2	1	1	1	—	0
46	Input terminal a and b contact setting	C20	—	00-FF	08	00	00	—	00
47	Output terminal a and b contact setting	C21	—	00-FF	04	04	04	—	00

225=04

247=1

264=120

286=0

290=10

291=10

292=0

294=0

295=0

296=000

297=0

298=0

299=0