



**WorldRide**  
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## Incident Report

WE06272011

Wood Entertainment  
Techno Power

**Date:** June 27, 2011

**Ride:** Techno Power (ReMix 6 arm)

**Owner:** Wood Entertainment.

**Date of incident:** June 21, 2011

**Ride Ser.** 48127120

**Hour Meter:** 4208.64

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**Description if Incident:** On June 21, 2011 during normal operating hours an incident occurred on the Techno Power, injuring one patron and one operator. From information received from ride owner and Fair authorities the following is a description of the incident.

During normal operation of the ride: The ride had completed a normal ride cycle and had come to a complete stop. The operator released the lap bars to allow unloading of the passengers. All passengers with the exception of one female exited the ride. The last female needed assistance to exit the seat so the operator went to help. At some time prior to the female exiting the seat the ride started to move and pick up speed without any operational controls being executed. The following is unclear as to exact circumstances. The Female was ejected from the ride and fell against the outside fence of the ride. The operator after depressing both the ride abort and the power off buttons located on the operators console entered the center of the ride while it was still rotating. The operator than attempted to exit from the center and was struck by the ride. The female sustained minor injuries (treated and released from the hospital). The operator was treated for a head injury requiring an overnight stay in the hospital and was released.

**Ride Drive systems description.** The rotation of the ride is accomplished through an electric motor driving a variable displacement pump with an electronic displacement control (EDC). This EDC is controlled by the rides programmable logic controller (PLC). The PLC sends a signal to the pump EDC through an Analog unit followed by a Voltage amplifier and ramp generator to direct the pump to increase or decrease pump output. When no signal is received from the PLC the pump remains in Neutral.

**Initial inspection:** Upon arrival I was informed that the ride had remained closed with power off (never reinstated after the initial shut off by the operator) for approximately 24 hrs. At the end of this time power was reestablished to the ride under the supervision of the ride owner, fair safety officials, and State ride inspectors. When the hydraulic pump was started the ride remained still without rotating. After through testing of the ride controls, the ride was found to be working correctly with all safety interlocks functioning properly.

**Further Inspection:** In order to assure all control systems were correct, I did a comparison of all drive associated wiring, comparing wiring with the original electrical schematics. Comparisons were done on the operator's console, Main lower enclosure, and main disconnect enclosure. All wiring matched original schematics with the exception of wire 350 which was incorrectly marked as wire # 360 on the ride. The wire was followed and matched identically to the wire 350 in the schematics. This indicated just a type error in the schematics.

Using the PLC manufacture software a comparison was conducted between the original program installed in the ride and the program currently in the PLC. The program was compared and found to be identical with no corruption or alterations from the original.

The EDC was removed from the main variable displacement pump for inspection. Small amounts of contamination were found in the stage 1 section of the EDC. The pump manufacture was consulted concerning the EDC. All possibilities for malfunction were reviewed and the pump manufacture representative believed that contamination in stage 1 flapper valve portion of the EDC valve most likely caused the incident.

**Conclusion and resulting repairs and modifications:** In order to insure that this malfunction can not reoccur, it was decided through consultation with the manufacture (Tivoli Mfg. Ltd.), the electrical design contractor (Bryant Electrical Ltd.) Ride owner and myself to make the following changes and repairs. The drive system is equipped with a drive circuit that incorporates a dump valve or loop valve. When in the case of a power failure this valve opens a circuit between the pressure side of the pump and the return, bypassing the drive hydraulic motor. This allows the pump to loop back to itself removing drive pressure to the motor protecting the pump. Tests in the presence of state inspectors showed that with the dump valve de energized and a run signal given to the pump the ride did not rotate. It was decided to change the programming so that this dump valve would be de energized whenever the ride was in the lowered loading position, removing any chance the drive motor will receive drive pressure from the pump. The following was completed

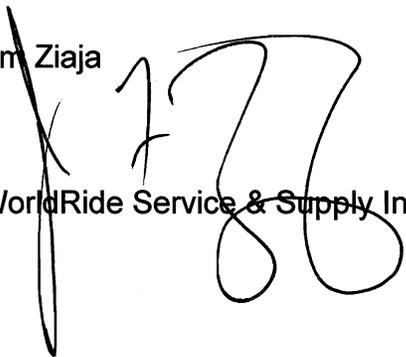
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- The complete EDC control was replaced with a new unit.
- Changes were made in the electrical control programming software and circuits under the direction of the system designer to include additional controls to open (de energize) the drive systems Dump Valve (loop valve) whenever the ride is in the lowered and loading position. The dump valve was set to de energize 11 seconds after the ride meets the bottom (completely lowered) limit switch. To incorporate an additional safety margin the lap bar open control was integrated into the program circuit to additionally command the valve to de energize whenever the lap bar control is opened after the ride has met the lower limit and / or the ride drive is at zero or neutral. The lap bar control is electrically blocked from use when the ride is in operation.

Jim Ziaja

WorldRide Service & Supply Inc.

A handwritten signature in black ink, appearing to read 'Jim Ziaja', is written over the printed name and company name.