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## S&S Worldwide service bulletin – restraint upgrade

NAFLIC has received a service bulletin from US manufacturer S&S Worldwide relating to a restraint upgrade on tower rides (see attached bulletin and appendix A).

We know there are a large number of such devices in operation around the world and would remind controllers and IBs that the recommended action to be taken would constitute a safety critical modification so would be subject to a design review. Controllers and IBs are also reminded that any such modification, being a safety critical modification, would be subject to a safety critical review under HSG 175 (paragraphs 202 – 207).

*The information contained within is that of the manufacturer and not NAFLIC. When following the advice from the manufacturer, you are reminded of your duties and responsibilities under HSG175 regarding modifications.*

Committee Members: Mr. D Dadswell (Chairman), Mr. A Mellor (Secretary), Mr. P Smith, Mr. J Green, Mr. D Cox, Mr. I Davies, Mr. J Shilling & Mr. D Inman

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Supported By:



|   |   |                                  |
|---|---|----------------------------------|
|  | <b>Issuing Entity:</b><br>S&S Worldwide<br>350 West 2500 North<br>Logan, UT 84341<br>United States<br><br>P: +1-435-752-1987   F: +1-435-752-1948<br><a href="http://www.engineeringexcitement.com">www.engineeringexcitement.com</a> | <b>Bulletin No.:</b> 200117      |
|   |   | <b>Release Date:</b> 1/22/2018   |
|   |   | <b>Effective Date:</b> 1/22/2018 |
|   |   | <b>Supersedes:</b>               |
|   |   | <b>Completion Date:</b>          |

## Service Bulletin

|   |   |
|---|---|
| <b>Ride Manufacturer:</b> S&S Worldwide | <b>Affected Production Dates:</b> 1996 - 2004 |
| <b>Ride Type:</b> DS, SS, TD, TSC       | <b>Affected Serial Nos.:</b> 007 - 200        |

**Model Nos.:** ALL

**Abstract Of Issue:** Tower Restraint Upgrade

Per current ASTM F2291 and EN 13814 amusement ride design standards, for Class 5 rides with negative vertical accelerations, redundancy shall be provided for the locking function. Tower rides built with a single hydraulic restraint mechanism are not redundant. If the single restraint fails for any reason the restraint bar can open to the minimum closed position as determined by the non adjustable center seat belt. Due to known issues related to hydraulic restraints an update to the tower restraints is required to provide redundancy.

**Reason For Release:** Hydraulic restraint locking failures have been reported to S&S. The failure mode affects all brands of cylinders used in the amusement industry. If the hydraulic restraint is not locked and the restraint bar opens the passenger may not be securely restrained.

**Action To Be Taken:** Restraint redundancy is to be added to the tower ride via one of three methods.

**1 - New Seat** - Replace the existing seat assembly with new sleeker looking seat assemblies which are approved to meet current code requirements by TUV, CSEI, and other review agencies.

**2 - Redundant Restraint Mechanism** - Replacing the single hydraulic restraint with a redundant mechanical restraint.

**3 - Lap Seat Belt** - A lap seat belt assembly can be added to each tower seat as a secondary restraining device.

See Appendix A attachment and contact S&S Service department for details at 435-752-1987.

**Details Of Issue:** Towers rides were originally designed with a single hydraulic restraint which is connected to the shoulder restraint bars. The shoulder bar with the lap bar pad properly restrain the passenger during ride operation. There is also a non adjustable safety belt installed on most tower rides which keeps the shoulder bar from opening beyond the minimum closed position.

Hydraulic restraints can fail usually if one of two things occur. 1 - The solenoid valve fails. 2 - Particulate matter in dirty hydraulic fluid prevents the valve from closing. In the event there is a failure of the restraint system the lap bar is allowed to open to the point that the safety belt is fully extended and the passenger may not be securely restrained. Due to restraint potentially failing with no redundant backup it is necessary to add redundancy to the restraint system.

|                              |                           |
|------------------------------|---------------------------|
| <b>Administrative Review</b> | <b>Engineering Review</b> |
| Preston Perkes 1/26/2018     | Todd Snyder 1/29/2018     |



**S&S WORLDWIDE**

Engineering Excitement

*This is Appendix A to supplementary Service Bulletin number 200117.*

**Option 1** - Replace the existing seat assembly with new sleeker looking seat assemblies.

Benefits:

- Opportunity to renew ride look and theming with newer, sleeker seats.
- Proven redundant mechanical bumpy rod system replaces hydraulic system with redundant mounting.
- Reviewed and approved by TUV and CSEI.
- Ability to measure minimum closed position and locking of restraint pawl.

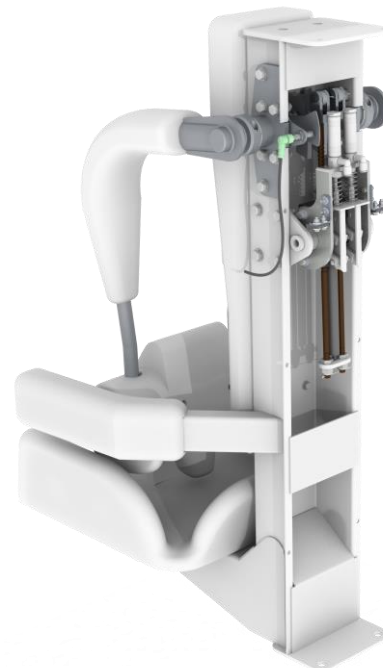
Note: Ride experience may be affected due to the use of a heavier cart assembly. S&S also recommends replacing the cart assembly with this option. Will require onsite supervision and adjustment to control system by Service Technician.



**Option 2** - Remove single hydraulic restraint and replace with dual mechanical bumpy rod restraint.

Benefits:

- Second restraint mechanism for redundancy.
- Proven mechanical bumpy rod system replaces hydraulic system.
- Ability to measure minimum closed position locking of restraint pawl.
- Rework tower components as lower cost option.
- Keeps floating ride experience for passengers.



**Option 3** - Addition of a lap belt.

## Benefits:

- Lowest cost option to add secondary restraining device.

