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CONFIDENTIAL ANALYSIS FOR THE MINISTER OF MUNICIPAL AFFAIRS

**NORTH AMERICAN MIDWAY ENTERTAINMENT
SCORPION RIDE ENGINEERING ASSESSMENT
DATE OF LOSS: JULY 16, 2010**

To

Al Griffin
Administrator / Chief Inspector Elevators
Alberta Municipal Affairs
16th Floor, Commerce Place
10155 – 102 Street
Edmonton, Alberta
T5J 4L4

By

ANDERSON ASSOCIATES CONSULTING ENGINEERS INC.
APEGGA Permit Number P 2205



Susan McFarland, P. Eng.



Dennis Romanyk, P. Eng.



Reviewed for content by Brian R. Thicke, P. Eng.

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1.0 SUMMARY

Examination of the Scorpion amusement ride after the July 16, 2010 incident in Calgary, Alberta and detailed evaluation of the fracture surface revealed that at the time of the incident the green spinner hub flange was connected to the barrel with minimal weld material. The final failure of the welded joint occurred suddenly in a single event tensile overload mode as the remaining weld material could no longer withstand the normal operating load. The reason that there was minimal weld material holding the parts together is that fatigue cracks had extended through most of the weld material prior to its installation in Calgary.

Review of the available background information revealed that fatigue cracks had previously been found at the failure location. Normal industry practice would be to completely grind out the crack and re-weld the joint. However, these cracks had been improperly repaired by simply welding over the crack. The repair was so poorly done that original crack still remained and portions of the crack extended beyond the end of the repair. As a result, the repair welds failed and the fatigue cracks continued to extend further into the welded flange-to-barrel joint.

Manufacturer recommended inspections of amusement rides are to be carried out by the owner to discover fatigue cracks before they grow to the extent that sudden catastrophic failures occur. Once there was a known incidence of cracking at a spinner hub flange-to-barrel joint, it was important for the owner to instruct their inspectors to carefully examine this area on all subsequent inspections. These particular inspections were not performed on this Scorpion ride. Apparently, the

owner's inspections subsequent to the weld repair did not look at the failure area very closely, if at all. Otherwise, the owner's inspectors would have found at least portions of the original crack that extended beyond the weld repair. By the time the incident occurred, almost two years after the repair, a crack had extended almost completely around the barrel. This crack could have been seen had the owner performed a visual inspection of the joint.

In performing repairs, the owner of the Scorpion ride did not consult with the manufacturer as recommended in the operation and maintenance manual nor did he consult with a knowledgeable engineer/technologist. After a faulty repair was complete, it appears that the owner never made any attempt to direct any inspector's attention to the repair area in order to check the adequacy of the repair or if other cracks were developing. As a result, cracks developed and grew undetected to the point of joint failure.

Failures of this nature could have been prevented if the owner followed the manufacturer's recommended inspection criteria. When cracks were found during the owner's routine inspection, repair procedures and verification should have been developed and approved by a professional engineer or suitably qualified individual. Their instructions would normally include the owner to carry out additional inspections to ensure that cracks were no longer a threat to the integrity of the ride. Henceforth, the owner would be obliged to carry out these additional inspections along with those recommended by the manufacturer.

2.0 CONCLUSIONS

- 2.1 The weld failure that occurred between the barrel and top flange of the hub assembly was initiated by fatigue cracking in close proximity to the location where a fixed secondary sweep arm was pinned to the top flange plate. Specifically, the initiation site(s) were identified at corner weld repairs.
- 2.2 The failure sequence of events was as follows:
- 2.2.1 One-way bending fatigue cracking occurred at multiple locations, over some period of time, in the original manufacturer's welds connecting the spinner hub barrel to the spinner hub flange.
 - 2.2.2 Incomplete repairs of these fatigue cracks at the notched corners of the weldment section described in 2.1 were carried out in August 2008.
 - 2.2.3 Fatigue cracking restarted at the corner weld repairs and continued in the manufacturer's original welds at other locations.
 - 2.2.4 Once the corner repair welds were completely fractured, the corner weld cracks jumped to the inner diameter circumferential weld on the barrel.
 - 2.2.5 The cracking direction was from the outer diameter toward the barrel's inner diameter near the corner repair welds.
 - 2.2.6 On the day of the incident, the spinner hub barrel was weld connected to the spinner hub flange with a minimal amount

of material. The final failure or separation of the spinner hub from the barrel occurred primarily in the single event tensile overload mode as the remaining weld metal could no longer withstand the applied loading.

2.3 Contributing factors to the development of fatigue cracks include:

2.3.1 The weld joint design did not give consideration for minimizing weld fatigue problems.

2.3.2 The design of the hub weldment assembly did not give consideration to accessibility for inspection and repairs.

2.3.3 High stress concentrators were imposed on the structure by the addition of square cutouts to facilitate folding for transportation.

2.3.4 Cyclic loading imposed by operating and transportation modes.

2.3.5 Residual stress in the original welds at the time of manufacture.

2.4 An Amusement Devices Inspection Report issued by the Technical Standards and Safety Authority of Ontario (TSSA) indicate cracks were noted along the underside of the blue and green center hub flanges on July 31, 2008.

2.5 Circumferential cracks on the original manufacturer's welds were only partially repaired on all three spinner sweep arm assemblies. Generally accepted industry standards require that all cracks on critical components be completely gouged out prior to repair welding.

- 2.6 Following repairs, critical components should be inspected prior to return to service. There was no indication that a post-repair inspection was ever completed by the owner although the repairs were considered resolved by TSSA on August 15, 2008.
- 2.7 Our visual examination also determined that traces of fatigue cracks were evident in the other spinner hub assemblies. These cracks would have been visible on the day of the incident and could have been seen had the owner performed a visual examination of these assemblies.
- 2.8 A fatigue crack on the green spinner hub assembly could have been detected by a thorough visual, magnetic particle or dye penetrant examination at any time since they were first discovered in July 2008.
- 2.9 It should be noted that the fracture surface analysis is based on a visual examination of the spinner parts. If necessary, a more complete metallurgical examination including scanning electron microscopy could be conducted in order confirm our results.
- 2.10 This incident would not have occurred if the original crack was assessed by a qualified engineer who would have recognized it as a fatigue crack. Once recognized as a fatigue crack, steps could have been taken to combat the effects of fatigue. The owner's inspection requirements would necessarily increase and include non-destructive testing so that the cracked component could be repaired or replaced before reaching a critical state.

3.0 BACKGROUND

On July 16, 2010, at approximately 8:30 PM, a mechanical arm of an amusement ride identified as the "Scorpion" tore loose and injured 10 riders. The incident occurred at the Stampede fairgrounds in Calgary, Alberta. The ride was owned and was being operated by North American Midway Entertainment of Ridgeland, Mississippi at the time of the incident.

The Scorpion was described as a device consisting of three inverted V shaped arms, each of which has seven individual cars or pods attached in a circular array using links pinned to a central hub located at the end of each arm. The arms are connected to a central tower that rotates clockwise and each circular array rotates counterclockwise.

The ride starts with only the center tower rotating causing the circular pod array, or wheels, to slowly revolve around the platform. After a set time, the wheels begin to rotate counterclockwise which introduces a centrifugal force that allows each pod to swing out sideways. As the ride continues, each arm begins to lift which causes the spinning wheels to tilt at about 30 degrees. At the end of the ride, the main arms begin to lower and the pod arrays return to their original horizontal position and all rotating motion is slowed to a stop.

Anderson Associates Consulting Engineers Inc. was retained by Alberta Municipal Affairs to perform an engineering assessment and failure analysis relating to the amusement ride incident. To that end, information and documentation was gathered for review and selected components were submitted to Anderson Associates for examination and analysis. This analysis documents our findings to date.

4.0 RESULTS

4.1 On Site Examination

- 4.1.1 Anderson Associates attended the Calgary Stampede fairgrounds in the company of the representative for Alberta Municipal Affairs on July 23, 2010 to examine the scene as it remained after the incident of July 16, 2010.
- 4.1.2 During this visit, a meeting among representatives from Alberta Municipal Affairs, AEDARSA, Calgary Police Service, Calgary Stampede and North American Midway Entertainment was attended to define the levels of authority and procedures for the investigation.
- 4.1.3 The ride was trailer mounted and consisted of a central tower to which three primary linkage (sweep) arms were attached forming an inverted V to the horizon and where each incorporated a hydraulic rod and cylinder arrangement that when extended, would raise the external link. At the end of each arm were hubs that provided a means to attach a circular array of secondary sweep arms to seven passenger carrying units (PCU). Each array (spinner sweep) was distinguishable by red, blue and green colours (Photograph A1).
- 4.1.4 A control booth, which provided a view of the ride as it operated, was situated on the trailer gooseneck on the driver's side and faced toward the central tower. Assuming the tower as a centre point, the green, blue and red primary

arms were located at 30, 150 and 270 degrees while the booth was located at 180 degrees (Photograph A1, Appendix A).

4.1.5 At the time of our inspection, all of the primary arms were at their lowest level such that the secondary spinner sweeps would rotate in a plane parallel to the horizon. It was noted that the green spinner sweep assembly had detached from its respective primary arm and was lying on the ground approximately 10.25 meters away from the centre tower at 225 degrees (Photographs A1 to A5, Appendix A).

4.1.6 It was noted that the top plate of the green spinner hub assembly was still attached to its respective primary arm and that a weld failure had occurred (Photographs A6 to A12).

4.1.7 A visual inspection of the blue spinner sweep arm assembly revealed a significant crack in the weld located between the top flange and barrel of the spinner hub assembly in close proximity to the location where the fixed secondary sweep arm was pinned to the top flange plate. It was also noted that a weld repair was evident on the opposite symmetrical side of the fixed sweep arm (Photographs A13, A14 and A16).

4.2 Document Review

4.2.1 Records indicate the Scorpion was manufactured in June of 1993, completed a non-destructive inspection by Howson Inspection Services Ltd. of Wokingham, UK on July 12, 1993, and was commissioned on August 23, 1994 (Appendix B).

- 4.2.2 Various drawings of the Scorpion were received by Anderson Associates; however, most of them did not indicate any date of issue, revision level or title information. In general, the drawings appeared to be consistent with the equipment as measured. Of particular interest were spinner hub fabrication drawings specifying 10 mm fillet welds on both sides of the spinner hub top flange to barrel section (Appendix C).
- 4.2.3 Included in documentation submitted to Anderson Associates was a Fairmatt Tristar Design Report prepared by Dr. Garry Fawcett of Wilson Consultants dated April 1992. The report was a detailed account of the way in which the motion, forces and stresses were analyzed and how the various structural and mechanical components were assessed for the normal operation mode of the amusement ride (Appendix D).
- 4.2.4 The purpose of the Fairmatt Tristar Design Report was to provide an awareness of design life and the formulation of guidelines for inspection and NDT based on fatigue analysis for many components.
- 4.2.5 The Fairmatt Tristar Design Report did not address any motion, forces or stresses pertaining to the transportation mode of the amusement ride.
- 4.2.6 The Fairmatt Tristar Design Report identified potential fatigue issues with the car pivot balls, vehicle frames, vehicle spinner sweeps and sweep spreaders.

- 4.2.7 The manufacturer's NDT requirements included car pivot balls, vehicle frames, vehicle spinner sweeps, vehicle sweep spreaders and main sweep arms. A thorough and detailed visual inspection was the only inspection requirement for all structure weldments. (Appendix E).
- 4.2.8 A technical dossier regarding the Scorpion ride was submitted to the Amusement Devices Division of the Technical Standards and Safety Authority of Ontario (TSSA) on June 18, 2006, certifying the amusement device had been manufactured in accordance with the Amusement Devices Act, O.Reg 221/01 and CSA Z267. This dossier also indicates the Scorpion, serial number 4870230, was manufactured in the UK to British standards and also in accordance with ASTM F-24 by Tivoli Manufacturing Ltd. of Canterbury, England (Appendix F).
- 4.2.9 An Amusement Devices Inspection Report issued by TSSA on July 31, 2008 indicates repairs were required for cracks noted at the underside of the blue and green center hub flanges. A subsequent follow up issued by TSSA on August 15, 2008 indicates repairs were completed; however, there was evidence of crack repairs attempted on all three hub assemblies (blue, green and red) (Appendix G).
- 4.2.10 No records of repairs or repair procedures were submitted.
- 4.2.11 According to submitted maintenance transaction reports, the most recent annual inspection occurred on March 10, 2010 and an NDT inspection was dated March 22, 2010

(Appendix H). There is no mention of visible cracks in either of these reports.

4.2.12 The Tivoli Operations and Maintenance Manual provided adequate set up and operating instructions for the Scorpion ride. NDT requirements were included with this document (Appendix I).

4.3 Visual Examination of the Blue Spinner Hub

4.3.1 The blue spinner sweep arm assembly is depicted in Photographs A3 and A4 when it was still installed on the amusement ride. These views also indicate the location of the fixed spinner sweep arm. Photographs B1 and B2 depict the blue spinner hub received by Anderson Associates. The individual sweep arms had been torch cut from the assembly in this view.

4.3.2 Photograph B3 is a close-up view depicting what is a cracked weld at the top-flange-to-barrel weld near location 1 (locations are presented in Photographs C1 and C2). Photograph B4 is a close-up view showing a weld repair between locations 18 and 19 on the blue spinner hub top-flange-to-barrel weld. Photograph B3 can be compared with Photographs A13 and A14; Photograph B4 can be compared with Photograph A16.

4.4 Visual Examination of Green Spinner Hub

4.4.1 An overview of the green spinner sweep arm assembly is depicted in Photograph A2 after it came to rest following the incident. The fractured spinner hub is depicted in Photographs A11 and A12. The fracture occurred at a double fillet weld joining the spinner hub top flange to the spinner hub barrel.

4.4.2 The top flange was a circular shaped steel plate with a diameter of approximately 820 mm and a thickness of 20 mm (Photographs A6 and A10). The barrel was manufactured from a 10 mm thick steel plate that was rolled into a 400 mm diameter cylinder and welded at the seam. Corners were cut out of the cylinder and thin steel plates were welded in place. These cutouts accommodated folding of the spinner arms for transport.

4.5 Fracture Surface Examination of the Green Spinner Hub

4.5.1 The green spinner barrel fracture is shown in Photograph C1 and the mating flange fracture is shown in Photograph C2. To provide a reference, the flange and barrel were numbered 0 through 19.

4.5.2 The approximate crack propagation paths, shown on both views, depict a pattern of one way bending fatigue (fatigue crack propagation from one direction) in some areas, locations 1 through 16, and two-way bending fatigue in others, locations 9 through 11. Extensive post-fracture

mechanical damage was evident in locations 0, 1, 2, 3, 4, 5, 15, 16, 17, 18 and 19.

- 4.5.3 A close-up view the barrel fracture in locations 18, 19, and 0 is depicted in Photograph C3. This view depicts the barrel side fracture at one of the longitudinal or vertical welds. This area also represents one of the two weld repair locations. In this general area, cracking initiated at the outer diameter and propagated toward the inner diameter. In most locations, the crack propagation mode is cyclical; that is, in the bending fatigue fracture mode.
- 4.5.4 A weld repair is clearly evident near location 18. The intent of this weld repair was to fix a pre-existing fatigue crack. The weld repair itself is also cracked. The pre-existing fatigue crack is heat tinted from the effects of the repair weld; therefore, this crack was present at the time of the weld repair and was not effectively repaired. Further along toward location 19, this same fatigue crack (labeled in Photograph C3 as pre-existing) ultimately propagated toward the barrel's outer wall where it ended then restarted at the original manufacturer's weld/inner barrel interface and then became a through-wall crack. The fracture mode in the manufacturer's weld is primarily in the bending fatigue fracture mode.
- 4.5.5 A close-up view of location 19 is shown in Photographs C4 and C5. These views are close ups of the weld repair/original manufacturer's weld interface. These views depict high temperature oxidization or heat tinting on the crack fracture

surface. This heat tinting gives us some indication that a fatigue crack (marked in white as pre-existing crack) was present in the manufacturer's weld and that a weld repair was attempted over top of the crack. There is no indication that this fatigue crack was gouged out completely before welding. The heat tinting on this pre-existing crack surface also indicates that the crack was present and extending beyond the weld repair.

4.5.6 Photograph C6 is a view depicting the mating flange fracture in locations 0, 18 and 19. This view also clearly depicts a fatigue crack that existed prior to the weld repair crack and extended beyond the weld repair. It is also clear in this view that the weld repair placed a covering layer over this crack and that this pre-existing fatigue crack in the manufacturer's weld was not gouged clean and replaced with weld metal.

4.6 Fatigue

4.6.1 The American Society for Testing of Materials, or ASTM, (Standard E1823) defines fatigue as, "*the process of progressive localized permanent structural change occurring in a material subjected to conditions that produce fluctuating stresses and strains at some point or points that may culminate in crack or complete fracture after a sufficient number of fluctuations.*"

4.6.2 In other words, fatigue occurs over time; the time required can be quite varied and depends on the applied stress level

and pre-existing defects. Cracking typically occurs at stress levels lower than ultimate or breaking stress.

- 4.6.3 Fatigue generally occurs in three stages; crack initiation, progressive crack propagation and final sudden overload fracture of the remaining cross section.

5.0 ANALYSIS

- 5.1 The green spinner hub assembly fractured primarily in the bending fatigue fracture mode. Cracking originated in multiple locations around the circumference of the spinner hub barrel where it was weld connected to the spinner hub flange.
- 5.2 The failure sequence of events was as follows:
- 5.2.1 Complete cracking of both repair welds occurred near locations 18 and 2 in one way bending fatigue fracture. The exact timing of these weld fractures could not be determined precisely, however, they would have initiated and propagated some time after August 15, 2008, when it was reported in the Technical Standards and Safety Authority - Amusement Devices Inspection Report Number AD-08-2501, "All previous directions resolved".
 - 5.2.2 Once both repair welds were cracked, there would have been no weld metal left along the outer diameter of the barrel in these locations because the crack in the original manufacturer's weld underneath was not fully repaired.
 - 5.2.3 The original manufacturer's weld was not a full penetration weld; therefore fatigue cracking was able to start along the inner diameter of the circumferential weld on the barrel's inner diameter.
 - 5.2.4 At some point during the above-described cracking sequence, fatigue cracking was likely beginning in the manufacturer's welds on the opposing side of the barrel. This occurred

because the amount of weld metal holding the spinner hub barrel and the spinner hub flange together was significantly reduced.

- 5.3 Fatigue cracking, as discussed earlier, occurs over time as a result of fluctuating or repetitive tensile stresses. Therefore, the majority of these fatigue cracks described in 5.2 were present for some period of time prior to the final failure at the Calgary Stampede grounds.
- 5.4 On the day of the incident, the spinner hub barrel would have been connected to the spinner hub flange with a minimal amount of material. The final failure or separation of the spinner hub from the barrel would have occurred primarily in the single event tensile overload mode as the remaining weld metal could no longer withstand the applied loading.
- 5.5 As discussed earlier, the original manufacturer's weld connection between the barrel and the flange was cracked in the fatigue fracture mode in numerous locations. The two weld repairs, near locations 18 and 2, were an attempt to repair these cracks. Our fracture surface examination revealed that these weld repairs were incomplete. The earlier fatigue cracks were not gouged out in either the through wall direction or circumferentially. This is evidenced by the presence of a high temperature oxide on the fracture surface.
- 5.6 It is possible that a portion of the initial crack in the original manufacturer's weld could not be seen with a simple visual inspection due to sweep arms pinned in the notched out areas. It would have been necessary to remove these sweep arms to inspect areas hidden behind them.

- 5.7 The shape of the welded section was circular for the most part, however, two square cutouts introduced elevated localized stress concentrations where fatigue cracks were able to initiate. The double fillet weld design is inferior to a full penetration weld for fatigue resistance. Welder technique is also important to reduce residual stress by not stopping or starting welds at corner locations.
- 5.8 Fatigue cracking initiated at a location on the top flange plate approximately 65 mm above another plate welded to the barrel exterior. The top flange diameter was 820 mm and the barrel outside diameter was approximately 400 mm. The 205 mm radial difference made it difficult to inspect and repair cracks located here, even if the spinner sweep arms were removed. Attempts to repair cracks at this location appear to have been made with the spinner sweep arms in place.
- 5.9 The manufacturer identified numerous NDT requirements; however, the spinner hub weldment was not identified as one of them. Only a visual inspection of the welds was required on an annual basis and, if inspection failures occurred, the manufacturer was to be notified for consultation. Inspection and repair is the primary means of preventing fatigue failures. If proper repair was not practical, replacement of the spinner hub weldment would be required.
- 5.10 Once a crack was noted on the spinner hub assembly weldment, normal practice would be to carefully inspect this area on all subsequent inspections. Furthermore, normal practice would include careful inspection of similar areas on typical components. This was apparently never communicated to inspectors. A portion of the original crack was present on the green spinner hub assembly weldment after

the August 15, 2008 TSSA resolution. Subsequent inspection reports did not identify this crack even though it likely grew longer after the ride was transported and operated at each venue.

- 5.11 No objective evidence was provided to indicate the manufacturer or other qualified resource was notified that a weld failed inspection due to the presence of fatigue cracks. There was no documentation provided to indicate qualified repair procedures or inspection of repairs to the blue and green spinner hub assembly weldments. There was no documentation provided to indicate weld failures or qualified repairs to the red spinner hub assembly weldment. Once a fatigue crack of this nature was identified, good common practices would dictate careful documentation of the failure, qualified repair procedures, qualified repair inspections, and a qualified review of inspection procedures. This review would increase the frequency and thoroughness of the annual inspections and would include additional non-destructive testing so that the cracked component could be repaired or replaced before reaching a critical state.



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PHOTOGRAPHS A1 THROUGH A20

ON SITE EXAMINATION



A1

An elevated view of the Scorpion ride on the left as seen from the control booth.

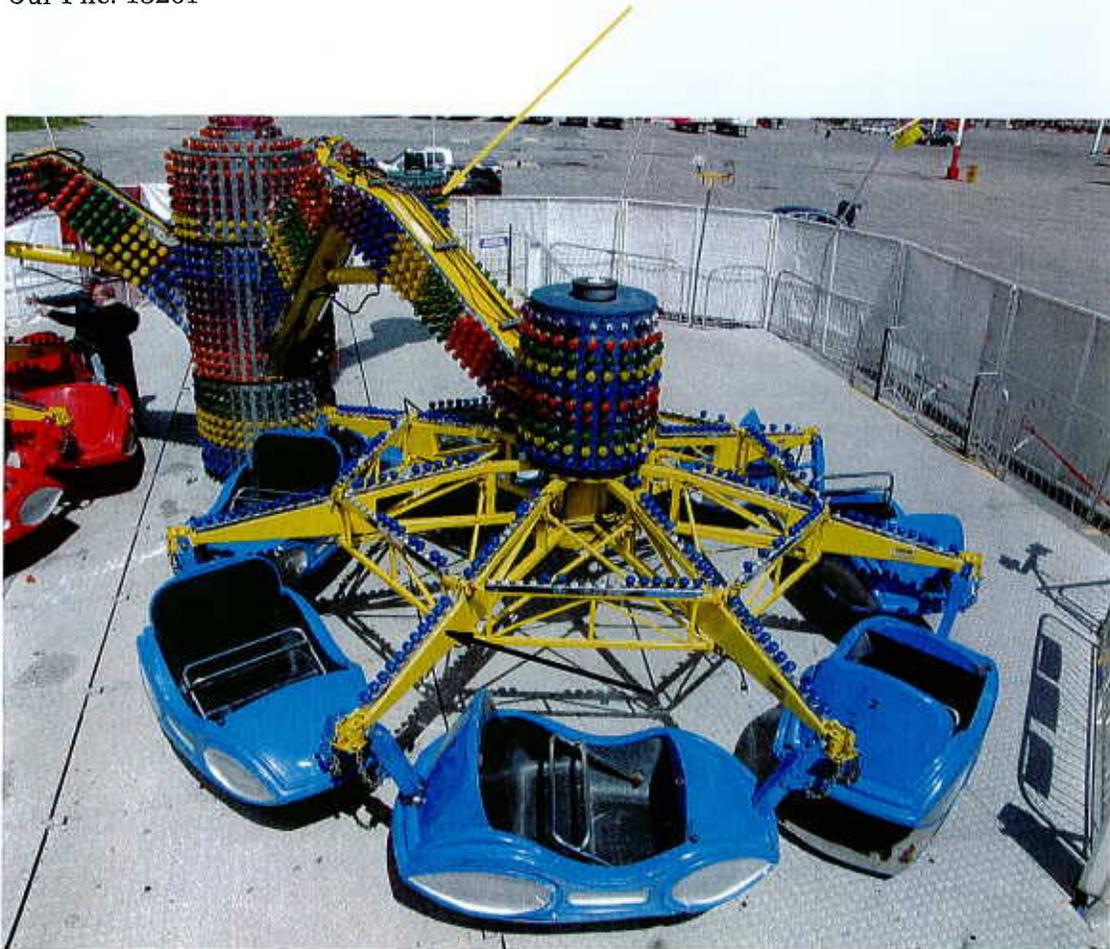
Note the detached green pods hanging on the edge of the platform in the lower left corner of the photograph (arrow).



A2

A view of the green spinner sweep assembly that came apart at the top flange face weld.

Note the large rock to the left where it came to rest (arrow).



A3

An elevated view of the blue spinner sweep assembly attached to its respective hub. Note the fixed sweep arm of the assembly that has been identified by the black arrow.

Also note the yellow arrow pointing at the green spinner hub.



A4

A view of the blue spinner sweep assembly from deck level. The black arrow identifies the fixed sweep arm attached to the rear of pod 3.

A close inspection of the barrel to top flange weld in close proximity to this arm connection is shown in Photographs A13 through A16.



A5

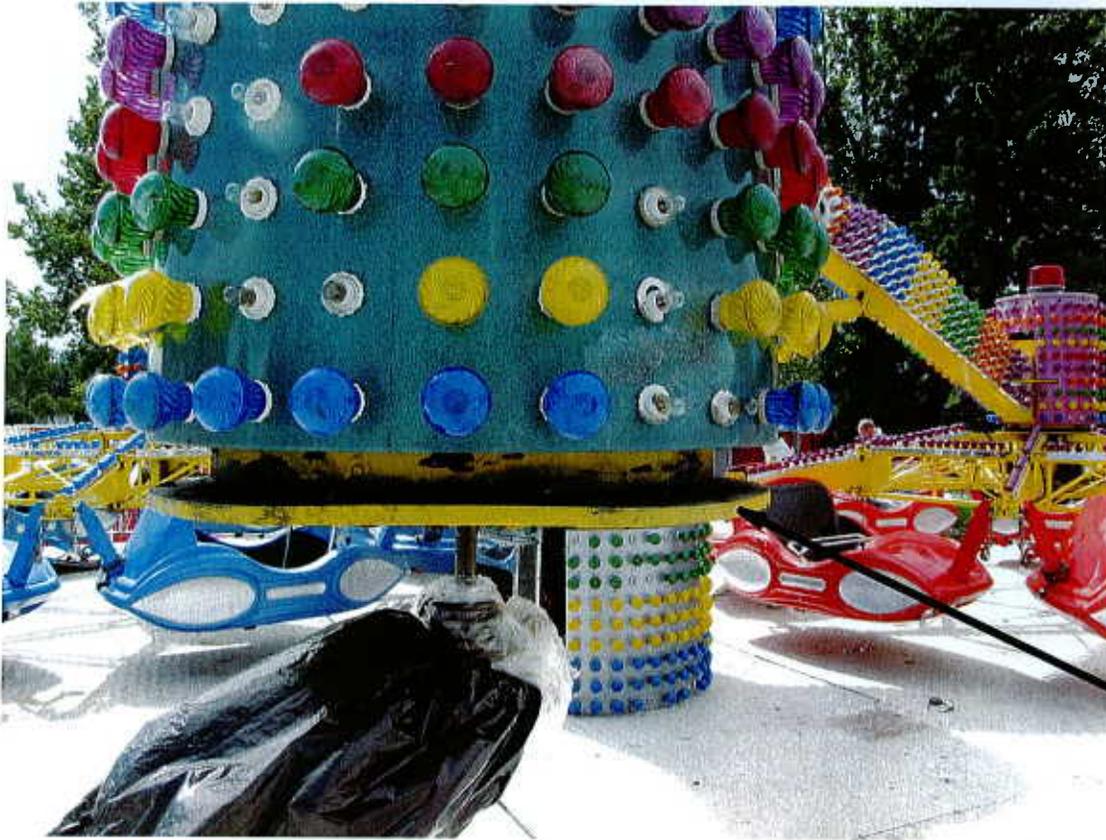
A view of the red spinner sweep assembly from deck level.



A6

A view of the green hub on the end of the primary sweep arm.

Note the top flange from the detached spinner sweep assembly attached to the hub (arrow).



A7

A close view of the green spinner sweep assembly top flange plate attached to its respective hub (arrow).



A8

A view showing the weld fracture surface on the top flange plate (arrows).



A9

A view showing the driving pinion gear (black arrow) meshed with its respective driven gear (red arrow).



A10

A view showing the entire face of the top flange and weld fracture surface.



A11

A closer view of the green spinner sweep assembly that came apart at the top flange face weld.

Note the red arrow pointing to the sweep arm that was once fixed by the missing top flange.



A12

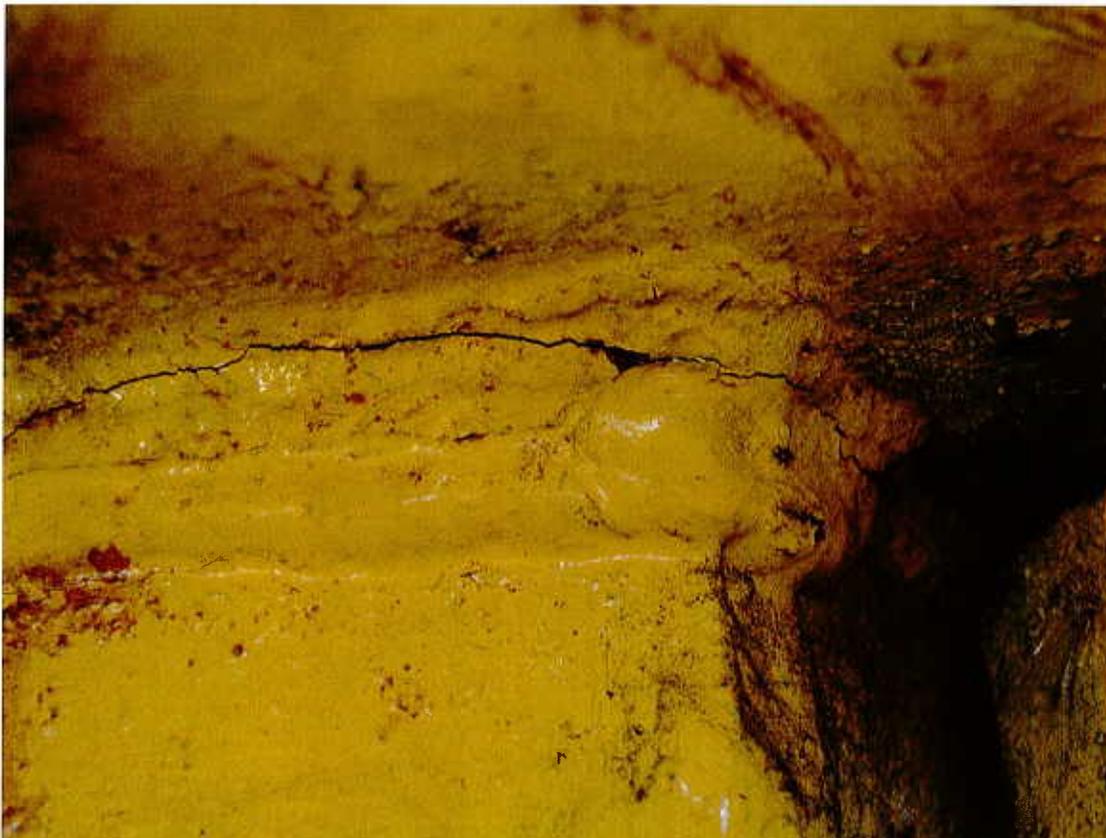
A closer view of the failed weld section (arrows).



A13

A view of the barrel to top flange weld on the blue spinner sweep assembly at a location just right of the fixed sweep arm. The blue arrow identifies the adjacent sweep arm to the right of the fixed sweep arm.

Note the visible crack that can be seen in this view (black arrows).



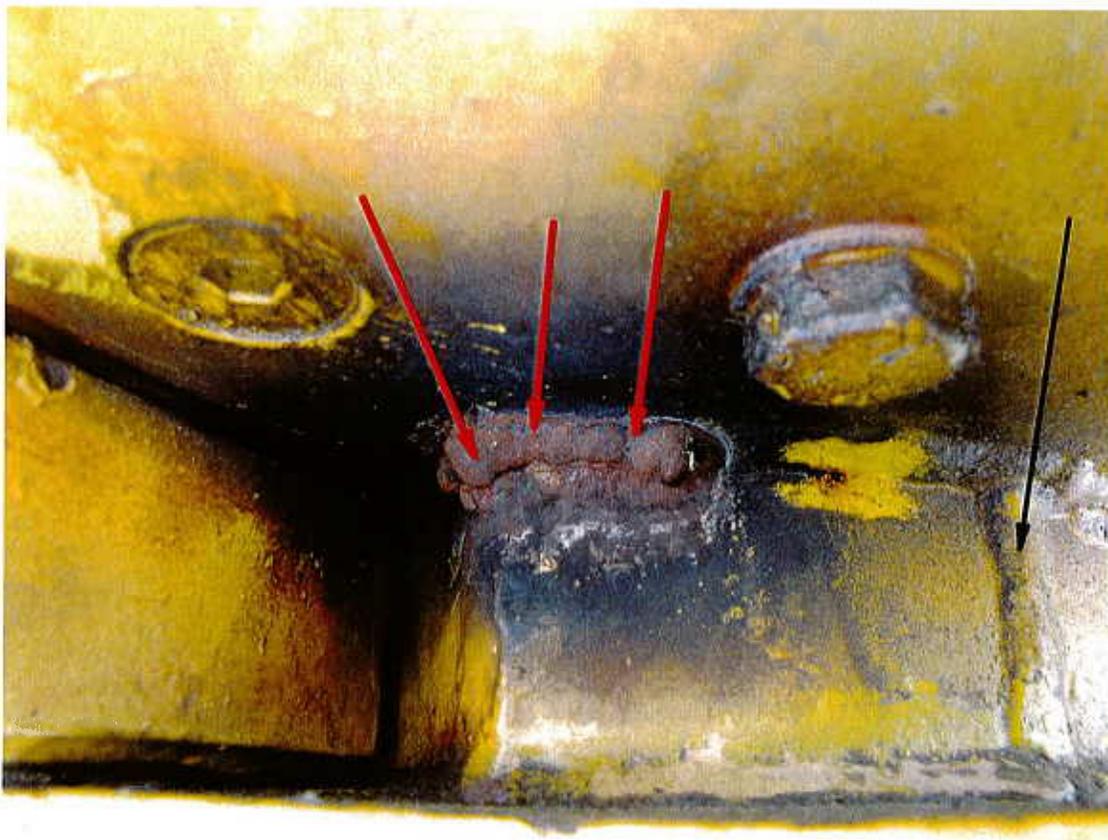
A14

A closer view of the crack referenced in the photo above. This corner location is a definite stress concentration riser.



A15

A view of the barrel to top flange weld on the blue spinner sweep assembly at a location just right of the adjacent sweep arm identified in photo A13.



A16

A view of the barrel to top flange weld on the blue spinner sweep assembly at a location just left of the fixed sweep arm.

Note the weld repair that was attempted at this high stress concentration location (red arrows).

The black arrow indicates the longitudinal seam weld in the spinner assembly barrel which also defines a plane of symmetry that passes through the barrel centre.



A17

A view looking out over the platform from the control booth.



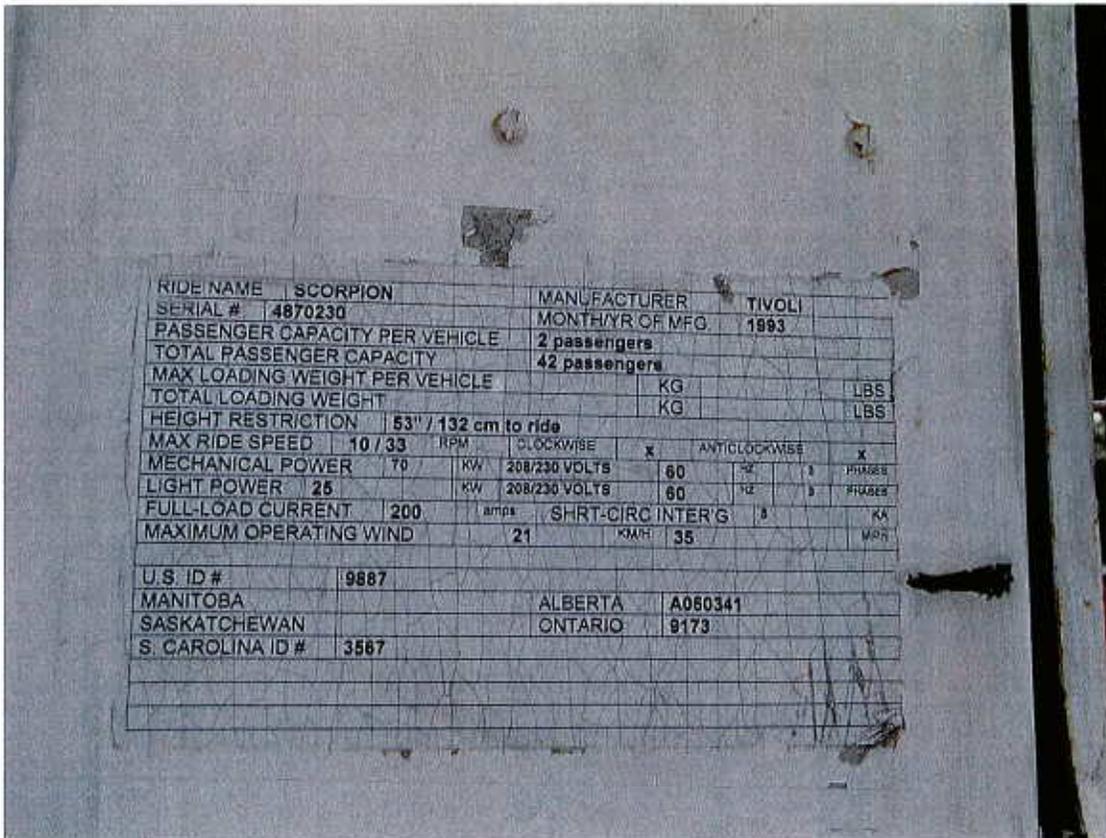
A18

A view showing the Scorpion ride controls.



A19

A view showing various ride information and acquired permits .



A20

A view of an applied Scorpion ride information sticker indicating the name, manufacturer, date of manufacture, serial number and applicable ride specifications.



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PHOTOGRAPHS B1 THROUGH B4

RECEIVED EXHIBITS



B1

View showing the blue spinner hub "as received".

Note the spinner sweep arms have been torch cut for shipping. The red arrow identifies the fixed spinner sweep arm.

Photo B3 Location



B2

Alternate view showing the blue spinner hub "as received".

Note the spinner sweep arms have been torch cut for shipping. The red arrow identifies the fixed spinner sweep arm.

Photo B1 Location



B3

View showing the blue spinner hub top flange to barrel outer weld near location 1.

Note a crack is visible in the weld (white arrow).sp



B4

View showing the blue spinner hub top flange to barrel outer weld near locations 18 and 19.

Note a weld repair is visible (arrow).



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PHOTOGRAPHS C1 THROUGH C6

FRACTURE SURFACE EXAMINATION



C1

View showing the green spinner hub barrel fracture.

The blue arrows indicate the direction of crack propagation.

Areas where bending fatigue was clearly identifiable are depicted by red arrows.

The fracture surface was mechanically damaged in zones 15, 4, 3, 2, 1, 0, 19, 18, 17, 16.

The white dashed boxes indicate the weld repair locations.

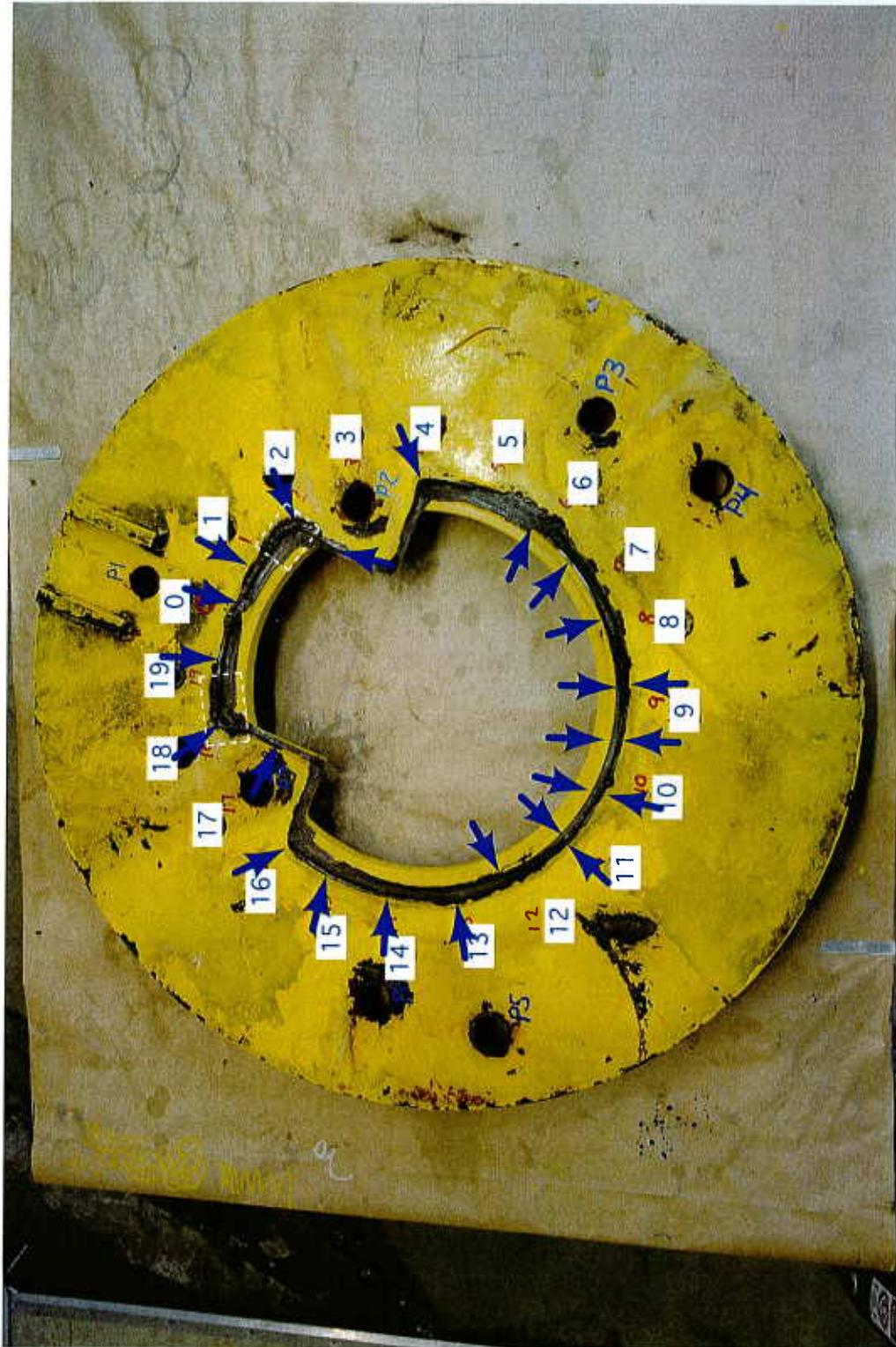
C2

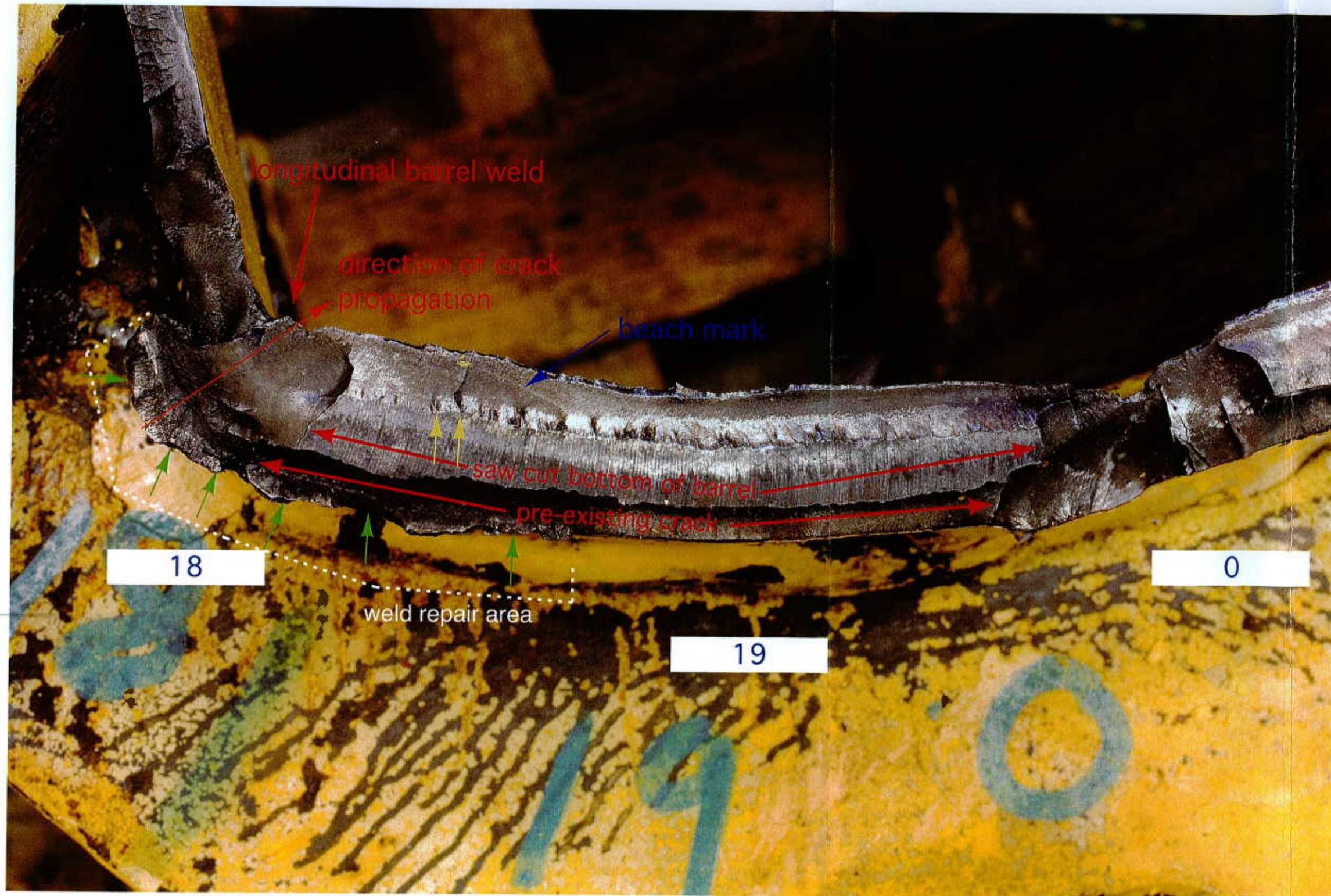
View showing the green spinner hub flange fracture.

The blue arrows indicate the direction of crack propagation.

The fracture surface was mechanically damaged in zones 15, 4, 3, 2, 1, 0, 19, 18, 17, 16.

The weld repair locations are indicated by the white dashed boxes.





C3

Close-up view of the barrel fracture in zones 18, 19, and 0. This view depicts the barrel side fracture at one of the longitudinal welds. This area also represents one of the weld repair locations (white dashed line). Although difficult to see in this view, cracking initiates around area 18 in this weld repair and propagates toward the barrel's inner diameter wall (green arrows). Near the longitudinal weld this crack propagates through what appears to be the corner where three welds intersect and continues to the inner diameter of the barrel (orange arrow).

Moving toward the right in this view, this weld crack propagates to the edge of a pre-existing crack then jumps over this crack and the barrel material. From this location to just slightly left of zone 0, the sawcut bottom of the barrel is visible. Cracking re-starts in an obvious cyclical manner as evidenced by the beach or clamshell marks at the inner diameter weld metal/barrel interface (blue arrow). Numerous ratchet marks or multiple crack initiations were visible in this location. The yellow arrows shown in this view depict two of the more prominent ratchet marks. This fatigue crack also propagates from the outer diameter towards the inner diameter in this location.

Moving toward the right, away from the weld repair area or circumferentially along the outer diameter, a crack originating at the fusion line of the original manufacturing weld propagates radially toward the barrel material. This crack is visible almost all the way to location 0. This crack clearly existed prior to the weld repair crack as it is visible in the original weld behind the area of weld repair (pre-existing crack area).

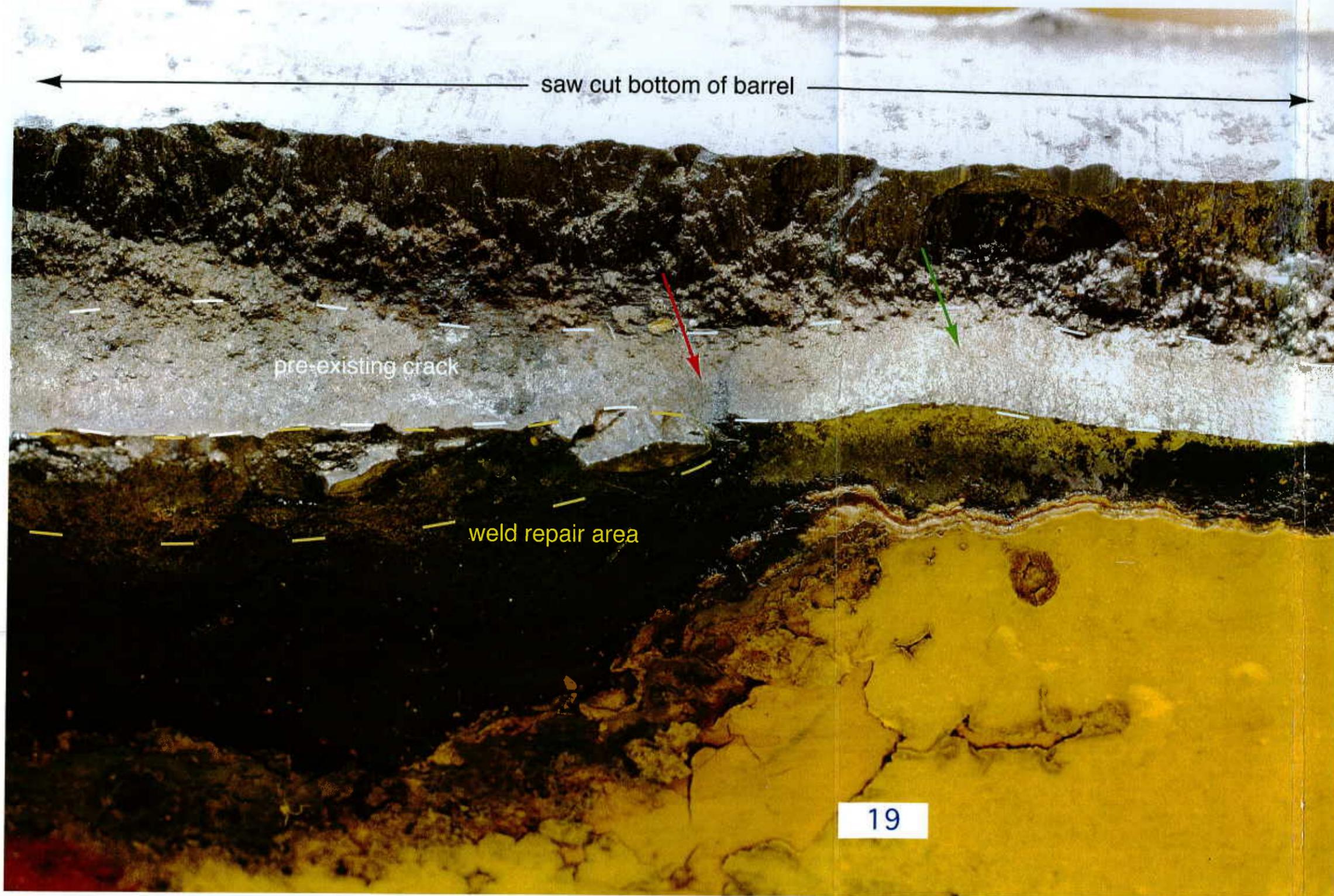
Note the post fracture mechanical damage appearing as shiny areas on this fracture surface.



C4

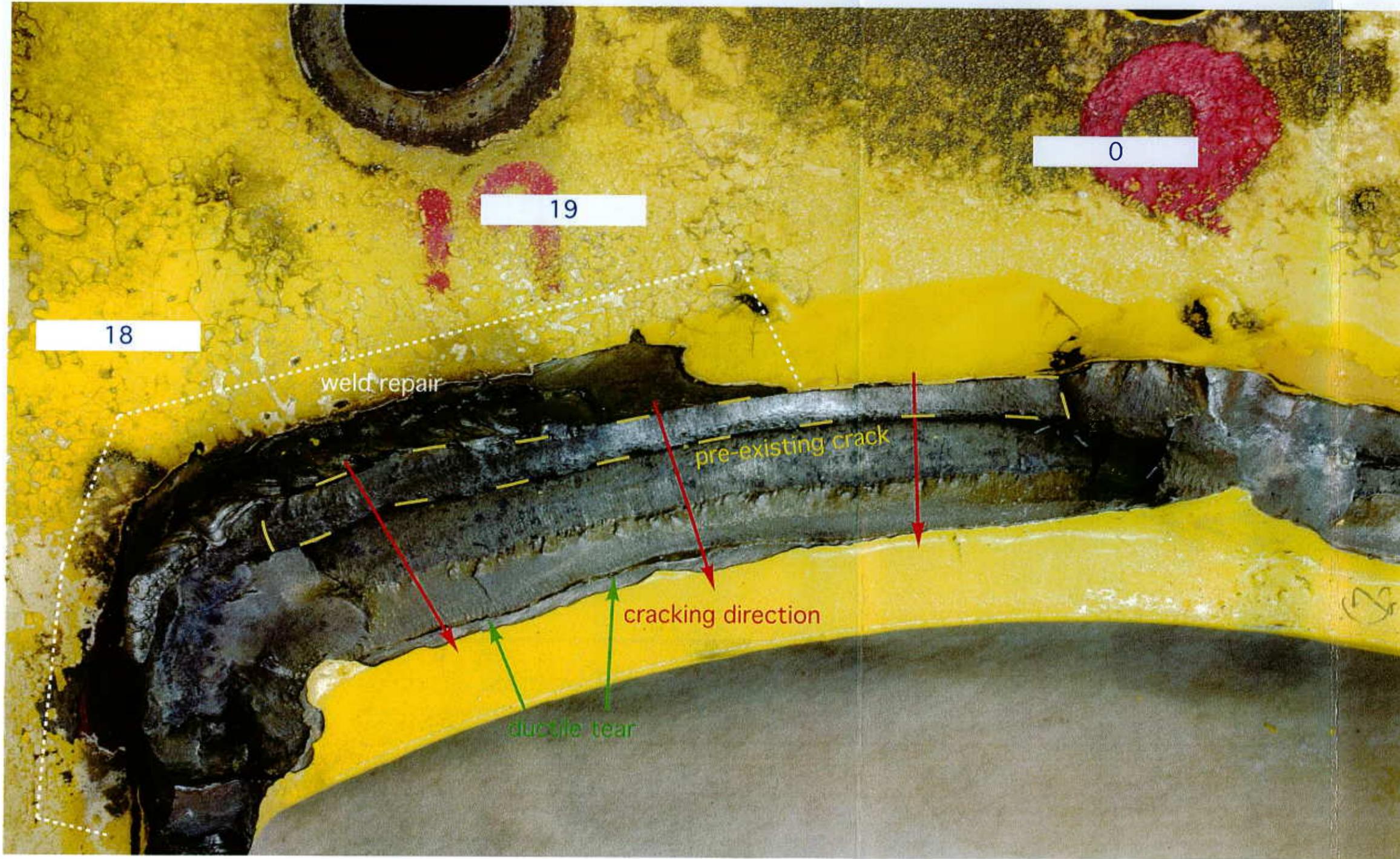
Oblique view of the barrel fracture between zones 18 and 19. This view depicts the end of the weld repair (red arrow) and also shows an area where it appears that the side of the barrel has been wire brushed in preparation for welding but was not welded (blue arrow).

Heat tinting was clearly visible (green arrows) indicating that the crack existed prior to the weld repair (white dashed lines).



C5

Oblique view of the flange fracture near 19. This view depicts the end of the weld repair (yellow dashed lines), as identified by the heat tinting on the fracture surface (red arrow - brown coloured high temperature oxide). Note the cleaner looking fracture to the right of the oxide coated surface (green arrow). This fracture to the right is clearly part of the same crack which existed prior to the weld repair (white dashed lines).



C6

Close-up view of the flange fracture in zones 18, 19, and 0. The overall cracking direction is indicated by the red arrows. This is the mating fracture surface to Photograph C3. Once again, at the edge of the weld repair (white dashed line), location 19, a pre-existing crack is visible which was clearly not repaired by the weld (yellow dashed lines).

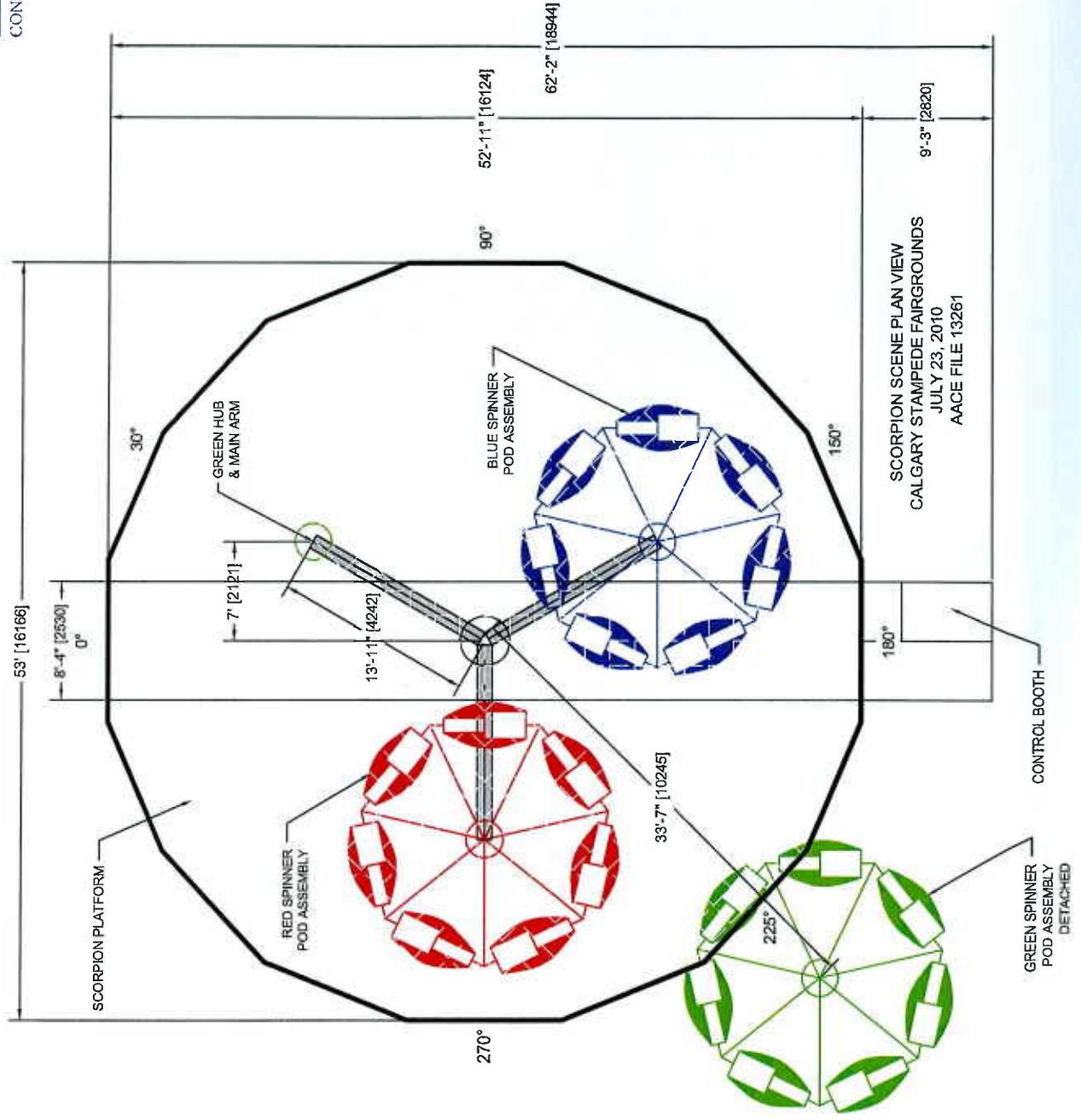
A small ductile tear was also observed at the inner diameter between zones 18 and 19 (green arrows).

APPENDIX 'A'

**SCORPION SCENE PLAN VIEW
CALGARY STAMPEDE FAIRGROUNDS**

JULY 23, 2010

APPENDIX 'A'



APPENDIX 'B'

**COMMISSIONING AND FIRST AMUSEMENT
DEVICE CERTIFICATES**

TIVOLI ENTERPRISES LTD COMMISSIONING CERTIFICATE

Page 1 of 10

DATE 23/08/94

CERT. No. 1010

ELECTRICAL REF. 2226

MACHINE MANUFACTURER

Tivoli Enterprises

MACHINE TYPE

Tri-Star (Star Force)
(Scorpion)

TS02-73-58

SERIAL No.

4870230

TEST CONDITIONS:-

Fully assembled ride.

Cars fully weighted.

COMMENTS:-



HOWSON INSPECTION SERVICES LTD.

(NON DESTRUCTIVE TESTING SPECIALISTS)
CONSULTANTS TO INDUSTRY NON DESTRUCTIVE TESTING APPARATUS

Stokes Farm, Binfield Road,
Wokingham, Berkshire. RG11 5PR
Telephone: (0734) 894677
Fax: (0734) 894603

AMUSEMENT DEVICE SAFETY CERTIFICATE No. 90/ A01658

Name of Device SCORPION
Identification number TS 01/65/50 S/N 4861230
Manufactured by TIVOLI ENTERPRISES
Name of owner TIVOLI ENTERPRISES
Name of operator (if different) ✓

I certify that on 12-7-93 I/We carried out a Thorough Examination
of this amusement device at CHARHAM MATCH with due regard to:-

- *1 Structural safety Yes/No ✓
- *2 Mechanical safety Yes/No ✓
- *3 Electrical Safety Yes/No ✓

and am/are of the opinion that at the date of certificate this device, so far as ascertainable and accessible, is in a condition such as not to present a danger to the public when maintained and operated in a proper and safe manner.

A test was carried out during this examination Yes/No ✓

Name I. G. GRANT Qualifications ONC REC CSE

Signature [Signature] Date 12-7-93

Subject to the provisions of paragraph 8 of the Code of Safe Practice at Fairs this certificate signifies that this amusement device was satisfactory at the time of inspection.
Certificate valid for 14 months.

*Delete as applicable.

TRISTAR RIDE MACHINE
MAY 1993

C. Lockyer Inspection Service

"Belcroute", 6 The Poles, Upchurch, Sittingbourne, Kent, ME9 7EX
Telephone (0634) 366033

CONTENTS OF REPORT

- I Front sheet
- II Introduction
- III Reported components
- IV Welders certificates (1)
- V Welders certificates (2)

C. Lockyer Inspection Service

"Belcrouse", 6 The Poles, Upchurch, Sittingbourne, Kent, ME9 7EX
Telephone (0634) 366033

INTRODUCTION

This report contains a list of components that were Non Destructive Tested, for the ride TRISTAR.

A visual examination plus magnetic particle test to B.S. 5135 cat C, Any imperfections or defects found were repaired by grinding and rewelding a visual or M.P.I Test followed this repair.

THE ESAB GROUP Training Centre

Welding Approval Certificate

In accordance with ASME IX/BS 4871 Ptl

1. Type of test Butt 2. Date of test 30-1-92
 3. Welder's Full Name J Brain
 4. Location of Test ESAB Group Training Centre, Plume Street, Aston, Birmingham 6
 5. Welder's Identity No. 2593G/11
 6. Material Specification BS 4360 50D
 7. Welding Process Metal Active Gas 8. Welding Current DC+ VE Electrode

9. Pipe/Plate Position 4G (45° Fixed) 10. Welding Technique Vertical Down (Root)
 11. Electrodes - Make and Specification Vertical Up (Fill + Cap)

(a) Root Run: Murex Bostrand LW1 BS 2901 Ptl A18

(b) Fill and Cap: Murex Bostrand LW1 BS 2901 Ptl A18

12. Electrode Sizes

(a) Root Run: 0.8mm

(b) Fill and Cap: 0.8mm

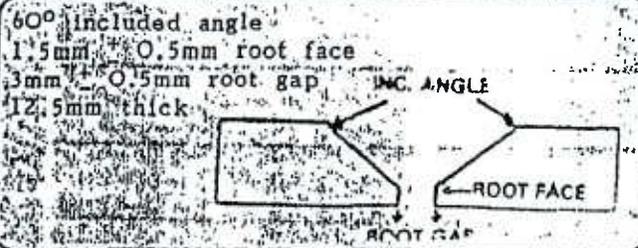
13. Current Range (amps)

(a) Root: 20 - 21v 150 - 165 amps

(b) Fill: 18 - 19v 130 - 150 amps

(c) Cap: _____

14. Sketch of Joint Preparation



Argosfield 20 80% Argon 20% Co-17-21 ltrs/l

Range:
 Materials P.No.1 Group 1 W1
 Thickness:
 4.8mm to 25mm
 All Positions

15. Result of Test

Visual Examination Satisfactory

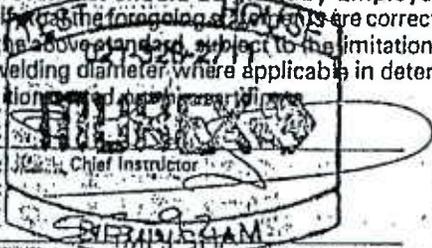
16. Remarks (if any)

Radiography and Mechanicals Satisfactory to ASME IX/BS 4871 Ptl

Re-approval Test should be given by Employer/Prospective Employer

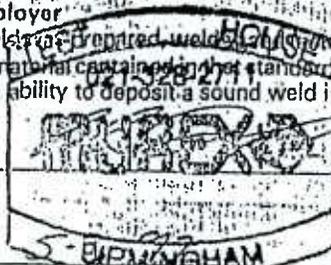
17. We certify that the foregoing details are correct and that the test welder prepared welds in accordance with the above standard, subject to the limitations on thickness and material contained in that standard, and to the pipe welding diameter where applicable in determining the welder's ability to deposit a sound weld in the welding position specified.

Signed



Date

Endorsed by



Date

THE ESAB GROUP

The ESAB Group (UK) Ltd
 Hertford Road, Waltham Cross
 Herts EN8 7RP England
 Telephone Lea Valley (0992) 710000
 Telex 25743

Note: This certificate does not
 relieve an employer of any responsibility
 whatsoever, contractual or otherwise.

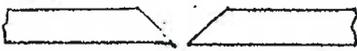
THE ESAB GROUP Training Centre

Welding Approval Certificate

In accordance with ASME 1X/BS 4871

1. Type of test Butt (pipe to pipe) 2. Date of test 1. 11. 91
 3. Welder's Full Name J Brain
 4. Location of Test ESAB Group Training Centre, Plume Street, Aston, Birmingham 6
 5. Welder's Identity No. 2539G/12
 6. Material Specification s/s 316
 7. Welding Process Tungsten Inert Gas 8. Welding Current DC - VE Electrode
 9. Pipe/Plate Position 6G 10. Welding Technique Conventional
 11. Electrodes - Make and Specification
 (a) Root Run: Murex Saffire 18/8/3 MO-316L BS 2901 Pt2 316S92
 (b) Fill and Cap: Murex Saffire 18/8/3 MO-316L BS 2901 Pt2 316S92
 12. Electrode Sizes
 (a) Root Run: 2.4mm
 (b) Fill and Cap: 1.6mm
 13. Current Range (amps)
 (a) Root: 65-85 amps
 (b) Fill: 50-60 amps
 (c) Cap: Argon 99.97% Pure 6-8 ltrs/min Backpurge 7-9 ltrs/min
 14. Sketch of Joint Preparation

75° Inc angle
 Feather Edge
 3mm ± 0.5mm root gap
 88mm o/d
 3.2mm thick



Range
 Material W1 P.No.8 and
 Group 1
 Diameter 0.5D to 2D
 Thickness 1.6mm to 2t
 All positions except Vertical
 Down

15. Result of Test
 Visual Examination Satisfactory
 16. Remarks (if any) Radiographics Satisfactory to ASME 1X/BS 4871

Re-approval Test should be given by Employer/Prospective Employer
 17. We certify that the foregoing statements are correct and that the test was prepared, witnessed and tested on the basis of the above standard, subject to the limitations on thickness and material contained in that standard, and to the pipe welding procedure where applicable in determining the welder's ability to deposit a sound weld in the welding position stated on this certificate.

Signed [Signature]
 Date 1. 11. 91
 BIRMINGHAM

Endorsed by [Signature]
 Date 1. 11. 91
 BIRMINGHAM

THE ESAB GROUP

The ESAB Group (UK) Ltd
 Hertford Road, Weltham Cross
 Herts EN8 7RP England
 Telephone Lea Valley (0992) 710000
 Telex 25743

Note: This certificate does not
 relieve an employer of any responsibility
 whatsoever, contractual or otherwise.

C. LOCKYER INSPECTION SERVICE

SHEET 3 OF 5

N.D.T. REPORT No. CL/93/93.

CUSTOMER Tivoli Enterprise Ltd	TEST METHOD Visual/magnetic partical
DATE 2/1/93	TEST PROCEDURE B.S. 6072
DESCRIPTION Welding	MATERIAL Carbon Steel
ACCEPTANCE LEVEL B.s 5135 cat C"	SURFACE As welded
TEST PROCEDURE DETAILS	
As per B.S. 6072 (1981) Magnaflux permante magnet Magnaflux 7HF Black ink Magnaflux W.C.P.	

TEST RESULTS

IDENTIFICATION	ACCEPT	REJECT	FINAL REMARKS
			<u>RIDE : TRISTAR (1)</u>
Inner hinged arms, 3 OFF, Drg No 224	✓		M.P.I and Visual inspection was carried out on main load bearing welds only, with no significant defects found.
Lifting hinged arms, 3 OFF Drg No B220	✓		Main load bearing welds tested only, with no significant defects found at time of testing.
Center column, Drg No 223	✓		Main welds tested only, with no significant defects found at time of testing.
Spinner Turrets 3 OFF, Drg No 226	✓		Main load bearing welds tested only, with no significant defects found at time of testing.
Car frames, 21 OFF, Drg No 225	✓		Main welds inspected only, with no significant defects found at time of test.
Spinner Arms, 21 OFF Drg No 221	✓		Main welds tested only, with no significant defects found at time of test.
Gates, item 7, 21 OFF Drg No 221	✓		Only the main welds were tested with no significant defects found at time of test.
			<u>Conclusion</u>
			All above listed components were considered to be within specification at time of inspection.
			END OF REPORT
TECHNICIAN C.Lockyer			DATE OF TEST May 1993



NEW EQUIPMENT
REPORT ON THOROUGH EXAMINATION OF AN AMUSEMENT DEVICE

1. Type and Name of Device: SCORPION	
2. Identification No. and Date of Manufacture: TS 01/65/60. JUNE 1993. S/N 4861230.	
3. a. Name of Owner: TIVOLI ENTERPRISES.	4. a. Name of Operator:
b. Membership No. / Section:	b. Membership No./Section:
5. Are all parts of the device, so far as ascertainable:	
a. Of good mechanical construction, sound material and adequate strength?	Yes/ No
b. Properly maintained and in good working order?	Yes/ No (Delete as applicable. If 'No' see 7 below)
6. What parts (if any) were inaccessible? <p align="center">NONE.</p>	
7. Repairs, renewals or alterations required to enable the device to continue to be used with safety:	
a. Immediately:*	<p align="center">NONE.</p>
b. Within a specified time (time to be stated):*	<p align="center">NONE.</p>
8. Other defects which require attention and their remedies:*	
<p align="center">NONE.</p>	
9. Maximum safe working speed of Device (if applicable): 10 RPM CENTRE, 30 RPM. CAPSTANS.	
10. Other observations: * 230V 3PH 60HZ. LTT. 400 LB PER CAR UNIFORMLY LOADED. 1 CAPSTAN LOADED OTHER CAPSTANS PART LOADED UNBALANCED.	
11. Was the Device tested during this examination: Yes/ No (Delete as applicable)	

I certify that on **12-7-93** I/We thoroughly examined this Amusement Device at **GUARDIAN MATCH.**

and that the foregoing is a correct report of the result. I/We have issued Pass/Fail Certificate No. **A01658.**

Signature **[Signature]** Date **12-7-93**

Qualification **ONE TEC C&E**



HOWSON INSPECTION SERVICES LTD.
 QUALITY ASSURANCE, MECHANICAL ELECTRICAL,
 EXPEDITING, INSPECTION DESIGN VERIFICATION, N.D.T.
 STOKES FARM, BINFIELD ROAD,
 WOKINGHAM, BERKSHIRE RG11 5PR
 TELEPHONE: (0734) 894677
 FAX: (0734) 894603

APPENDIX 'C'

DRAWING COLLECTION (SELECTED PAGES)

Please note:

The drawing collection in Appendix "C", although part of the original report, is severed from this release due to proprietary information contained within the drawings.

APPENDIX 'D'

FAIRMATT TRISTAR DESIGN REPORT

APRIL 1992 (SELECTED PAGES)

Please note:

The Fairmatt Tristar Design Report of April 1992 (Selected Pages) in Appendix "D", although part of the original report, is severed from this release due to proprietary information contained within the report.

APPENDIX 'E'

NDT REQUIREMENTS

TIVOLI MANUFACTURING MANUAL AND BULLETIN

NDT Requirements

In Conjunction with the annual thorough daily and weekly examination of the Star Force Amusement ride the following Non Destructive testing should be carried out.

After the first two years of operation and then every year after that;

Vehicle Frame:

A sample of four cars at random should be N.D. Tested by using Magnetic Partical inspection to monitor weld attachments at the upper and lower end of the vertical attachment posts. Should any signs of cracking occur in any of these samples then 100% examination of fault areas should be carried out. If cracks or any other irregularities are discovered the manufacture must be notified immediately so proper repair procedures can be determined.

Car Pivot Ball: A random sample of seven car ball connectors should be checked by Magnetic Partical Testing. All car ball connectors must be visually checked for wear and signs of damage to the neck of the ball. Any test failures must be reported to the manufacture immediately.

Vehicle Spinners:

Vehicle Sweeps: The inner end of the seven sweep arms where the pivot pin is located along with "L" shaped sweep sections must be tested by M.P.T.

Two sweeps at random from each spinner should be removed and all welds should be tested with particular attention to the pin holes and hollow tube sections.

Sweep Spreaders: A random sample of 3 spreaders should be tested to monitor the weld attachments between the main hollow section and the cross bracing. Pin holes should also be included.

Main Sweep Arms:

Inner Fixed Arms: The outer end of the inner fixed arm should be tested to include the pivot shaft bosses and gussets, special attention should be given to the welds around the outer ends of the boss gusset plates.

NON-DESTRUCTIVE TESTING AND SAFETY MODIFICATIONS POLICY FOR TIVOLI ENTERPRISES 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 Enterprises Ltd., therefore, requires no scheduled testing by non-destructive means for the engineered life of the components, unless listed below and issued to the operators in the form of a safety bulletin, or indicated in the operations manual.

It should also be understood that this policy is based on the operator / owner exercising proper maintenance and care procedures of all components according to the manufacture's specifications, along with routine visual inspection of all structural components for any unusual circumstances.

Any unusual circumstances must be reported to the manufacturer immediately.

In the event that a fault or potential safety problem is discovered through our own testing or field experience requiring an annual test or modification, information concerning these tests or modifications will be made available immediately to the owner of the equipment.

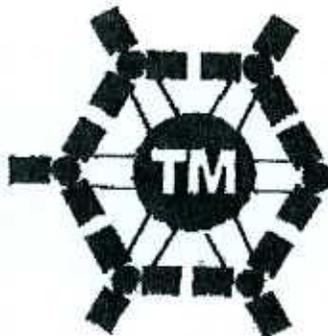
Below are listed current safety bulletins or equipment modification bulletin.

BULLETIN NUMBER

RIDE

CONCERNING

EFFECTIVE



Tivoli Manufacturing Ltd.

Howfield Lane, Chartham, Canterbury, Kent CT4 7HG England.
Telephone: 0227 731166

Bulletin # Scorpion 001

NDT Requirements For Scorpion Amusement Rides

This bulletin supersedes all previous requirements for the serial numbers listed

Ride Serial Numbers Affected: 4870230, 4871230, 4886230

Mag Particle, or Ultra Sound.

Vehicle Pivot Balls:

A random sample of seven (7) Balls must be tested two years from time of delivery and every two years after. If any of the 7 balls fail this test all must be removed and tested. Report any test failures to the manufacture immediately. Any failed balls must be replaced.

Main Sweep Flange Bolts (Hinged Sweep Only)

All bolts used in the assembly and disassembly of the hinged sweeps must be tested or replaced every two years. If one bolt fails the test all bolts must be replaced.

Ride structure weldments inspection and testing

The Scorpion has no requirements for testing of ride structure weldments. A thorough and detailed Visual inspection of all weldments including, Center, Sweeps, Spinner Sweeps, Center/ Trailer attachment areas, and vehicle frames is required every two years. Report to manufacture any components which fail this inspection before any repair is made.

"Jim"

(817) 641-5045

APPENDIX 'F'

SCORPION TECHNICAL DOSSIER

SUBMISSIONS TO TSSA

(TECHNICAL STANDARDS AND SAFETY AUTHORITY OF ONTARIO)

**TECHNICAL STANDARDS &
SAFETY AUTHORITY**

14th Floor, Centre Tower
3300 Bloor Street West
Toronto, Ontario
Canada M8X 2X4

Amusement Devices Division

Notice of Filing of Technical Dossier

Regarding:

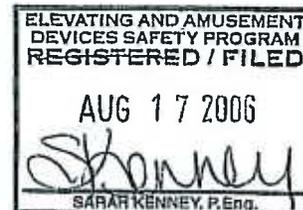
File Number: 2006-00227
Submitter: NORTH AMERICAN MIDWAY ENTERTAINMENT/THE CANADIAN MIDWAY CO
TD Type: New
Licensee Dev Name Scorpion
AD Type: Horizontally Revolving Ride
Licensee: NORTH AMERICAN MIDWAY ENTERTAINMENT/THE CANADIAN MIDWAY CO
Licensee Number: ADL2572
AD Location:

Engineer: RICHARD SAWYER
Mfr Device Name: Scorpion/Star Force
Applicant: WILLIAM KANE
Signed On: June 18, 2006

File Number	Registration Number
2006-00227	AD009173

Any future correspondence must refer to the file number.

1. THIS DEVICE MUST BE INSPECTED PRIOR TO OPERATION. The licensee must verify that this AD is operational before requesting its initial inspection.
2. RECOMMENDATION: The licensee is responsible to ensure inspection and approval of the electrical portion of this device by the Electrical Safety Authority prior to its use by the public.
3. The manufacturer shall provide independent means to monitor the speed of the central column within 30 days of filing of this technical dossier.



2006 - 00 2 2 7



Technical Standards and Safety Authority

4th Floor - West Tower
3300 Bloor Street West
Etobicoke ON M8X 2X4
Tel: (416) 325-2161



APPLICATION
For Filing of a Technical Dossier
under Ontario's Amusement Devices Act

DEMANDE
de dépôt d'un dossier technique
en vertu de la Loi sur les attractions de l'Ontario

Guidelines are on the reverse side of this form
Les directives apparaissent au verso de la présente formule

Technical Dossier Dossier technique	10	Submitter (name and address) Auteur de la demande (Nom et adresse)	The Canadian Midway Company (N.A.M.E.) 17 Corporate Place, Unit C, Brantford, ON N3R 8A6	Telephone Téléphone	519 756-2111	11	License Number N° de licence	ADL 2572
	12	Type of Technical Dossier Type de dossier technique	New Amusement Device	13	Device Registration Number N° d'enregistrement de l'attraction			
	14	Amusement Device Type Type d'attraction	Horizontally Revolving	17	Amusement Device Class Catégorie de l'attraction	N/A		
	16	Licensee's Name for this Device Nom donné à l'attraction par le titulaire de la licence	Scorpion	19	Any Variations Requested Dérivation demandée	No		
18	Amusement Device Address Adresse de l'attraction	Various						

Preparer Ingénieur (ingénieur)	24	Name of Engineer (with valid Speculation) Nom de l'ingénieur (ayant une licence valide)	Richard Sawyer	25	Engineer's Address (with valid Speculation) Adresse de l'ingénieur (ayant une licence valide)	Sawyer, Duncan & Associates	Telephone Téléphone	(905) 564-3127
	26	Engineer's Address (with valid Speculation) Adresse de l'ingénieur (ayant une licence valide)	6770 Davand Drive, #38 Mississauga, Ontario. L5T 2G3	27	Engineer's Telephone Téléphone de l'ingénieur		Facsimile Téléfax	(905) 564-3109

Filing Fee Droits de dépôt	31	The fee for filing of the technical dossier payable to The Technical Standards and Safety Authority is attached (see guidelines) Le paiement en joint des droits de dépôt du dossier technique à l'ordre du Technical Standards and Safety Authority (voir directives)	\$ _____
-------------------------------	----	---	----------

Submitter's Statement Déclaration de l'auteur de la demande	33	I/We undertake on behalf of the company that bears responsibility that the amusement device will be erected, dismantled, operated and maintained in accordance with the technical dossier and Ontario's Amusement Devices Act. Je/Nous engageons au nom de la compagnie que je/serons responsable de l'érection, le démontage, l'opération et l'entretien de l'attraction en respectant les conditions du dossier technique et de la Loi sur les attractions de l'Ontario.			
	34	Official Capacity in Company Titre au sein de l'entreprise	SENIOR ADMINISTRATOR		
	35	Name Nom	WILLIAM R. KANE		
36	Date Date	18 June 2006	37	Signature Signature	<i>[Signature]</i>

▼ For Office Use Only ▼
▼ Réservé au bureau ▼

Notice of Filing
Avis de dépôt

40	This technical dossier has been filed under number allocated in item 41 subject to the following conditions: Le dossier technique a été déposé sous le numéro indiqué à la case 41 en sous réserve des conditions suivantes:	41	Filed Number N° de dépôt 2006 - 00 2 27
		42	Filed Stamp Sceau de dépôt



Technical Standards and Safety Authority
 4th floor - West Tower
 3300 Bloor Street West
 Etobicoke ON M8X 2X4
 (416) 325-2130

Specification Sheet
 For Amusement Devices Under Ontario's
 Amusement Devices Act and Regulation

TECHNICAL STANDARDS
 & SAFETY AUTHORITY

For Office Use Only			
Filed Number	2006 - 00227		District Number
Inspector's Name			Number
Inspection Date(s)	D	M	Y

Guidelines are on the reverse side of forms

General	10 Submitter name and address	The Canadian Midway Company (N.A.M.E) 17 Corporate Place, Unit C, Brantford, ON N3R 8A6		11 Licence number	ADL2572		
	12 Type of technical dossier	New Amusement Device		13 Device registration number			
	14 Amusement device type	Horizontally Revolving		17 Amusement device class	N/A		
	16 Licensee's name for this device	Scorpion					
	18 Amusement device address	Various					
Manufacturer	21 Manufacturer's (brand) name for this AD model	Scorpion (Star Force)	22 Model designation	None	23 Serial number (Z10.1.4.2c)	4886230	
	24 Manufacturer's (Z10.1.4.2c)	1. Name Tivoli Enterprises Ltd. 2. Address Howfield Lane, Chartham, Canterbury CT7 7HG		25 This AD made this year (Z10.1.4.2c)	1998		
Description of Amusement Device	31 Brief description of the amusement device	Three secondary sweep arm assemblies with 7 cars attached to the primary sweep arms. Secondary sweeps rotate about the end of the primaries, and the primaries rotate and lift the secondary assemblies. Cars are free to swing from their suspension points.					
	32 Maximum lift and height of Passenger Carrying Unit (PCU)	<p>1. α max <u>90</u> °</p> <p>2. β max <u><30</u> °</p> <p>3. h max <u>5.5</u> m</p>					
	33 Designated as fixed or portable	Portable	34 If portable, it is trailer mounted	Yes	35 To be used as fixed or portable	Portable	
	37 Supporting structure made of	<input type="checkbox"/> 1. Wood <input checked="" type="checkbox"/> 2. Steel <input type="checkbox"/> 3. Specify if other		36 1. Path Circular	No	2. Max. length of path travelled by PCU	N/A m
	38 Darkness is a feature?	No		42 Type of passenger carrying unit	Car	43 1. Capacity # of children	42
Capacity and Speed	41 Type of passengers	<input checked="" type="checkbox"/> 1. Adult & children <input type="checkbox"/> 2. Adults only <input type="checkbox"/> 3. Children only <input type="checkbox"/> 4. Passenger's height restrictions <input checked="" type="checkbox"/> more than 1219 mm <input type="checkbox"/> less		42 Type of passenger carrying unit	Car		
	43 1. Persons per PCU maximum	2	43 2. Capacity # of adults	42	46 Number of trains	1. Maximum N/A 2. Rated N/A	
	44 Number of passenger carrying units	1. Maximum 21 2. Rated 21	45 Operation of passenger carrying units	<input type="checkbox"/> 1. Operated individually <input type="checkbox"/> 3. Fixed in trains <input checked="" type="checkbox"/> 2. Fixed part of AD <input type="checkbox"/> 4. Number of PCU per train	47 Maximum speed of passenger carrying unit	1. Designed 10 Centre } rpm/kmh 2. Rated 33 Spinners } rpm/kmh	
	47 Maximum speed of passenger carrying unit	1. Designed 10 Centre } rpm/kmh 2. Rated 33 Spinners } rpm/kmh	48 Maximum accelerated measured in gravity (g forces)	1. Accel. 3.5 g 2. Duration varies s	49 Maximum rate of change of acceleration	Not known g/s	

AD 08071 (09/00)

Drive	51 Main Motor	1. Power source voltage 208/240 V, 3-Ph 4. Method of motor speed control Inverter control	2. Open bus bars? No	3. Motor output (nameplate) 15 kW
	52 Power transmission from main motor to passenger carrying unit	Gearbox		
	53 Auxiliary motors	1. Function Hydraulic Pump Spinner Motors (3) Oil Cooler	2. Voltage (V) 208/240 208/240 208/240	3. Output (kW) 22 3@ 7.5 0.37

Safety and Clearances	61 Passenger maintained in PCU by	1. Containing device <input checked="" type="checkbox"/>	2. Restraining device <input type="checkbox"/>	3. Deep Well <input type="checkbox"/>	4. Enclosure <input type="checkbox"/>	5. None <input type="checkbox"/>
	62 Type of device checked in: 61.1 or 61.2 or 61.4	1. Shoulder harness <input type="checkbox"/> 2. Safety belt <input type="checkbox"/> 3. Lap bar <input checked="" type="checkbox"/> 4. Lap rope/chain <input type="checkbox"/> 5. Low gate <input type="checkbox"/> 6. Full height gate <input type="checkbox"/>	63 Locking of device checked in 62 is controlled by	1. Attendant visually <input type="checkbox"/> 2. Attendant mechanically <input checked="" type="checkbox"/> 3. Operator visually <input type="checkbox"/> 4. Passenger <input type="checkbox"/> 5. Other <input type="checkbox"/>	64 Device checked in 62 is released by	1. Passenger <input type="checkbox"/> 2. Attendant <input checked="" type="checkbox"/> 3. Automatically <input type="checkbox"/> 4. Operator <input type="checkbox"/> 5. Other <input type="checkbox"/>
	65 Is device in 62 interlocked with drive	No				
	66 Life Preservers (Z6.4.4.2)	N/A				
	67 Fencing (R.23)	1. To be provided Yes	2. Height ≥ 1.1 m	3. Location All Around		

69 Clearance from Passenger Carrying Unit (PCU)

a = (Z10.7.2/4) N/A mm

b = (R.23.6) >750 mm

c = (Z10.7.2) N/A mm

d = (Z10.7.2) N/A mm

e = (R.27) <500 mm

Operation	71 Operating restrictions	1. Maximum wind speed (R7(2)) 54 km/h	2. Minimum water depth (R67(7)) N/A m
	72 Minimum number of (R9 & E9)	1. Operators 1	2. Attendants 1

Standards Applied	61 Safety Code for Amusement Rides CSA Z267-M1983 (R.26)	<input checked="" type="checkbox"/> 1. Applied fully <input type="checkbox"/> 2. N/A to this AD	<input type="checkbox"/> 3. Applied with variances described in 91	62 Any other AD code or standard applied? ASTM F-24 & HSE, Cof P		
	63 Additional applied standards (for other than existing AD)	1 Yes/No N/A	2	3 Alternate Standard	4 Recognized by Director	<p>64 STATEMENT Re: Alternate Standards Not Recognized by Director</p> <p>1. Statement</p> <p>I certify that alternate standards, listed in column 3 of item 63 and identified in column 4 as not having been recognized by the Director, contain requirements for material properties, design procedures, quality control, overall strength and features that are similar to the requirements of the corresponding standards listed in column 1, as applicable to safety.</p> <p>2. The statement not applicable <input type="checkbox"/></p> <p>P. ENG's stamp and signature</p>
	a Welded Steel Construction CSA W59-M1984 (R.15)	No		BS5135		
	b Certification of Companies for Fusion Welding CSA W47.1-1983 (R.15)	No		BS639		
	c Boiler, Pressure Vessel and Pressure Piping Code CSA B51-M1986 (R.15)	N/A				
	d Structural Loads & Procedures OBC Section 4.1 (R.16.1)	No		DIN 4112		
	e Foundations OBC Section 4.2 (R.16.2)	N/A				
	f Engineering Design in Wood CAN3-D86-M84	N/A				
	g Steel Structures for Buildings CAN3-S16.1-M84	No		BS2573		
	h Cold Formed Steel Structural Members CAN3-S136-M84	No		BS4360		
i Strength Design in Aluminum CAN3-S157-M83	N/A					
j Hydraulic Hose SAE J517 JUN85 (R.18(b))	Yes					
k Canadian Electrical Code Part 1 CSA C22.1-1982 (Z.8.1)	Yes					

AD 09071(05/97)

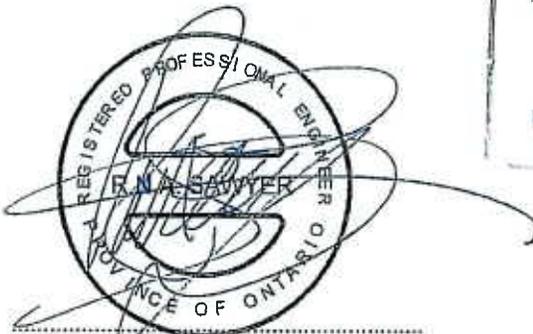
2006 - 00 2 2-7

SCORPION TECHNICAL DOSSIER

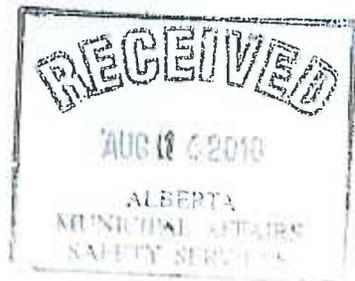
Introduction and Summary

This Technical Dossier is produced by Sawyer, Duncan & Associates for The Canadian Midway Company in respect of the Amusement Device "Scorpion", manufactured by Tivoli manufacturing of Canterbury, England.

I hereby certify that this AD has been manufactured in accordance with the Amusement Devices Act, O.Reg 221/01 and CSA Z267.



Richard N.A. Sawyer, P.Eng



2006 - 00227

Description of Unit



The Scorpion consists of a central column rotating at 10 rpm to which three sweep arms are attached. At the ends of the sweeps are secondary spinner sweeps rotating in the opposite sense at 33 rpm. The cars are suspended front and rear and are allowed to swing freely. The main sweep arms raise and tilt as can be seen in the photo above.



Detail Showing Cars

Compliance

Any paragraph not referenced below is either considered to be not applicable to this AD, or is covered elsewhere in this Technical Dossier.

O.Reg 221/01, Part II, General Technical Requirements

- 3. **Welding** This ride was manufactured in the UK to British Standards and also in accordance with ASTM F-24.
- 4. **Structural** This AD is designed to British Standards and ASTM F-24.
- 5. **Pipe & Fittings** SAE Standard
- 6. **Flexible Hose & Couplings** SAE Standard
- 8, 9 **Wire Rope** N/A
- 12. **Fencing, Guards and Clearances**

Fencing and guarding is provided in accordance with this regulation.

12.8. Space Between Rides

This is the responsibility of the Licensee and Park Management.

- 13. **Point of Entry** Loading platform provides safe step up into PCU

14. Support & Blocking

Support and blocking requirements are covered in the erection manual

- 19. **Operation and Use** Weather restrictions contained in the Specification Sheet

CSA Z267-00

4.1.3 Information Plate

A manufacturer's data plate in accordance with ASTM F-24 is provided. This plate is in English only.

4.1.4 Information Requirements/ 4.1.5 Elements and Structures

Provided in the Technical dossier

- 4.2 **Manufacturer's Q.A. Program** Manufacturer's responsibility.

2006 - 00227

4.3 Foundations O.Reg 221/01 governs

5.1/5.2 Design Ride is designed in accordance with British Standards and ASTM F-24.

5.3.1 Seats Seats give adequate support and maintain the rider in place during operation of the ride.

5.3.2 Restraint Passengers are restrained by means of a locking lap bar

5.3.3 Clearances N/A

5.4.1 Metal Structures Designed in accordance with British Standards

5.4.3 Welding performed by qualified welders

5.4.4 Bolting Industry Standard Bolt grades and torques are used.

5.4.5 Wire Rope N/A

5.5 Electrical

5.5.1 Compliance with Standard

This AD is subject to Ontario Hydro Special Inspection

5.5.2 Emergency Controls

Stop circuits are fail-safe and resetting the mushroom switch will not restart the ride.

There is a master disconnect switch at the operator's station.

5.5.3 Grounding To be covered by the OH Special Inspection

5.6.1 Hydraulic Components SAE Standard

5.6.1 Pneumatic Components SAE Standard

5.7 Operator Controls The control panel is typical of this type of ride. The mode of operation is timed, with a 'dead-man' foot switch.

5.8 Brakes Brakes are normally on and are released electrically. Brakes are on both centre and spinner motors.

5.9 Guards see O.Reg. s.12,

5.10 Fencing Fencing complies with this standard.

8.2.5 Signs Signage is provided.

Applicable Drawings

The following drawings form part of this Technical Dossier:

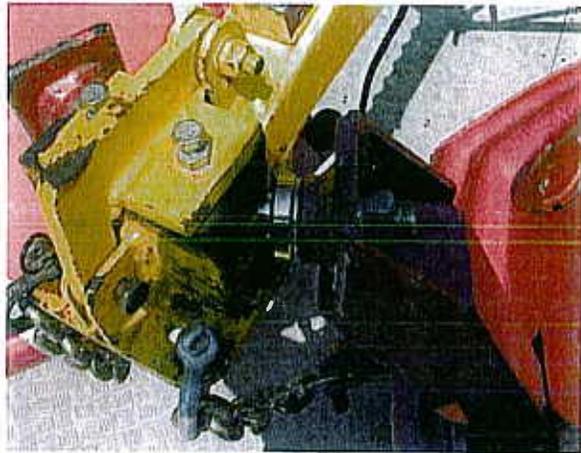
- GA of the Ride
- Electrical Schematic
- Hydraulic Schematic

Test Report

I inspected this ride at the Red River Exhibition in Winnipeg, June 19, 20. It was fully operational at the time.

The inspection mainly consisted of understanding the operation of the ride and checking the supplied data for accuracy. I paid special attention to the car design and lap bar operation in order to be satisfied that the passengers are properly protected. I noted that the right-hand (outer) passenger can easily release the lap bar by reaching forward and grabbing the release knob. Consequently I directed that a shield be placed between the rider and release knob to make access more difficult, and to remove the knob from line of sight.

This ride has been extensively refurbished, with many components replaced. The suspension bolts and safety back-up chains are all new (see photo, right) and the electrical panel has been completely overhauled



Conclusions

From the review of the documentation, and the field inspection, I have concluded that this AD satisfies the requirements of the Amusement Devices Act, O.Reg 221/01 and CSA Z267-00.

APPENDIX 'G'

AMUSEMENT DEVICES INSPECTION REPORTS

ISSUED BY TSSA

(TECHNICAL STANDARDS AND SAFETY AUTHORITY OF ONTARIO)



TECHNICAL STANDARDS
and SAFETY AUTHORITY

14th Floor, Centre Tower
3300 Bloor Street West
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Toll free 1-877-682-8772
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www.tssa.org

AD Inspection Report

Service Request #	174932
Inspection Report #	2388581

Inspection Address: 17 CORPORATE PLACE Suite C BRANTFORD;ON CA N3R 8A6	Reference Number(s): AD009173	Inspection Completion Date: AUG 28, 2009
	Facility Type:	Item Type: OTHER AMUSEMENT RIDES
Customer Name and Address: NORTH AMERICAN MIDWAY ENTERTAINMENT/THE CANADIAN M 17 CORPORATE PLACE Suite C BRANTFORD;ON CA N3R 8A6	Task Type: AD-Unscheduled Inspection	Total Billable Hours: 1
	The facility/equipment is inspected in accordance with Ontario's Technical Standards & Safety Act and the appropriate regulations and codes. When an Inspector's order is issued, time limits for compliance reflect the severity of the violation and serve to avoid disruption of service.	

Line	Reference and Order(s)	Compliance Date
42916 1-1	PCU inspection- other: MAKE THE LAP BAR ON PCU # 5 RED LOCKABLE IN ALL POSITIONS.	AUG 28, 2009

Task Notes
RIDE NAME SCORPION

Customer Signature & Position / Date:		Inspector Name: Tevyaw, Marcus	Inspector Contact Number: 905-633-7859
Report Received By:	Customer Contact Number:	Inspector Email: MTevyaw@tssa.org	Inspector Fax: 905-633-7993

As a not-for-profit regulatory authority, TSSA operates on a cost recovery basis. An Invoice will be issued for the Total Charges Incurred.
(Note: This is not an invoice)

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Amusement Devices Inspection Report

Report Number: AD-08-02501

File Number: ADINSJ-0708-01948

Ontario's Technical Standards and Safety Act, 2000 Amusement Devices Regulation

1. Amusement Device Location at Time of Inspection Exhibition Place TORONTO, Ontario Canada	2. Registration Number AD009173	3. Inspection Type Follow-Up	4. Inspection Date Aug 15, 2008
	5. AD Class Horizontally Revolving Ride		6. Travelling or Fixed Portable
7. Licensee Name NORTH AMERICAN MIDWAY ENTERTAINMENT/THE CANADIAN MIDWAY SQITE C 17 CORPORATE PLACE BRANTFORD, ONTARIO CA N3R 8A6	8. Licensee's Device Name Scorpion		9. Number Of PCU's 21
	10. Licensee Number ADL2572	11. Capacity 42 Adults, Or 42 Children	
The Amusement Device is inspected in accordance with Ontario's Technical Standards and Safety Act, 2000 and Amusement Devices Regulation. Time limits for compliance reflect the severity of the violation and serve to avoid disruption of service. In the interim period, the Licence Holder must ensure that additional precautions for safe usage are taken. An entry of '0' indicates that device is shut down until the direction has been complied with.			Non-compliance with a direction may result in shutdown of the device or in charges being laid under the Act.

Inspection Note: AS PER ONTARIO REGULATION 221-01, SECTION 11 (3)(A), IT IS THE RESPONSIBILITY OF THE OWNER OF THIS DEVICE TO ENSURE THAT ALL SAFETY RELATED RECOMMENDATIONS ISSUED BY THE MANUFACTURER HAVE BEEN CARRIED OUT. FAILURE TO ENSURE THAT THESE CHANGES ARE CARRIED OUT MAY RESULT IN PROSECUTION AND OR REVOCATION OF THE LICENCE TO OPERATE THE DEVICE.

Inspection Note: ALL PREVIOUS DIRECTIONS RESOLVED

16. Field Inspected Y	17. Billable Hours	18. Additional Charges N	19. Before Inspection AD Status Active	20. After Inspection AD Status Active	21. Shut Down Type
Voluntary Compliance Option* - Eligible? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No *Please, refer to guidelines I hereby confirm that all the Inspector's orders (directions) appearing on this inspection report have been completed.					
Print Name _____			Print Client Name and Position _____		
Representing _____			Client Signature _____		
Licensee/Owner or AD Contractor			Client Signature		

I ACKNOWLEDGE RECEIPT OF THIS REPORT CONSISTING OF 1 PAGE(S)

Client Signature _____ Date _____

Vic Ramcharan (905) 671-1971
 Inspector Inspector Fax Number

Other Inspector(s) _____

(Note: This is not an invoice)





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Amusement Devices Inspection Report

Report Number: AD-08-02349
 File Number: ADINSJ-0708-01948

Ontario's Technical Standards and Safety Act, 2000 Amusement Devices Regulation

1. Amusement Device Location at Time of Inspection BUFFALO DAYS REGINA, Ontario Canada	2. Registration Number AD009173	3. Inspection Type Periodic	4. Inspection Date Jul 31, 2008
	5. AD Class Horizontally Revolving Ride		6. Travelling or Fixed Portable
7. Licensee Name NORTH AMERICAN MIDWAY ENTERTAINMENT/THE CANADIAN MIDWAY SITE C 17 CORPORATE PLACE BRANTFORD, ONTARIO CA N3R 8A6	8. Licensee's Device Name Scorpion		9. Number Of PCU's 21
	10. Licensee Number ADL2572	11. Capacity 42 Adults, Or 42 Children	

The Amusement Device is inspected in accordance with Ontario's Technical Standards and Safety Act, 2000 and Amusement Devices Regulation.

Time limits for compliance reflect the severity of the violation and serve to avoid disruption of service. In the interim period, the Licence Holder must ensure that additional precautions for safe usage are taken. An entry of '0' indicates that device is shut down until the direction has been complied with.

Non-compliance with a direction may result in shutdown of the device or in charges being laid under the Act.

12. Direction No.	13. Reference	14. Directions	15. Target Date for Compliance
1		INVESTIGATE AND ELIMINATE EXCESSIVE GAP BETWEEN LAP BAR AND SEAT WHEN LAP BAR IS IN THE CLOSED POSITION. (GREEN PCU #'S 7,5 AND 3. RED PCU # 1)	Aug 15, 2008
2		PROVIDE MISSING BLOCKING UNDER THE RIDE STRUCTURE.	Aug 15, 2008
3		REPAIR HEIR LINE CRACK AT THE UNDERSIDE OF THE BLUE AND GREEN CENTRE HUB FLANGE.	Aug 15, 2008

Inspection Note: AS PER ONTARIO REGULATION 221-01, SECTION 11 (3)(A), IT IS THE RESPONSIBILITY OF THE OWNER OF THIS DEVICE TO ENSURE THAT ALL SAFETY RELATED RECOMMENDATIONS ISSUED BY THE MANUFACTURER HAVE BEEN CARRIED OUT. FAILURE TO ENSURE THAT THESE CHANGES ARE CARRIED OUT MAY RESULT IN PROSECUTION AND OR REVOCATION OF THE LICENCE TO OPERATE THE DEVICE.

16. Field Inspected Y	17. Billable Hours 4	18. Additional Charges N	19. Before Inspection AD Status Active	20. After Inspection AD Status Active	21. Shut Down Type
Voluntary Compliance Option* - Eligible? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No *Please, refer to guidelines					
I hereby confirm that all the Inspector's orders (directions) appearing on this inspection report have been completed.					
Print Name _____			Print Client Name and Position _____		
Representing _____			Client Signature _____		
Licensee/Owner or AD Contractor			Client Signature		

I ACKNOWLEDGE RECEIPT OF THIS REPORT CONSISTING OF 1 PAGE(S)

Client Signature _____ Date _____

Francis Fosu (519) 473-0611
 Inspector Inspector Fax Number
Joe Baronowsky
 Other Inspector(s)

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Amusement Devices Inspection Report

Report Number: AD-07-04860

File Number: ADINSJ-0607-04149

Ontario's Technical Standards and Safety Act, 2000 Amusement Devices Regulation

1. Amusement Device Location at Time of Inspection CNE TORONTO, Ontario Canada	2. Registration Number AD009173	3. Inspection Type Follow-Up	4. Inspection Date Aug 28, 2007
	5. AD Class Horizontally Revolving Ride		6. Travelling or Fixed Portable
7. Licensee Name NORTH AMERICAN MIDWAY ENTERTAINMENT/THE CANADIAN MIDWAY SITE C 17 CORPORATE PLACE BRANTFORD, ONTARIO CA N3R 8A6	8. Licensee's Device Name Scorpion		9. Number Of PCU's 21
	10. Licensee Number ADL2572	11. Capacity 42 Adults, Or 42 Children	
The Amusement Device is inspected in accordance with Ontario's Technical Standards and Safety Act, 2000 and Amusement Devices Regulation. Time limits for compliance reflect the severity of the violation and serve to avoid disruption of service. In the Interim period, the Licence Holder must ensure that additional precautions for safe usage are taken. An entry of '0' indicates that device is shut down until the direction has been complied with.			Non-compliance with a direction may result in shutdown of the device or in charges being laid under the Act.

Inspection Note: AS PER ONTARIO REGULATION 221-01, SECTION 11 (3)(A), IT IS THE RESPONSIBILITY OF THE OWNER OF THIS DEVICE TO ENSURE THAT ALL SAFETY RELATED RECOMMENDATIONS ISSUED BY THE MANUFACTURER HAVE BEEN CARRIED OUT. FAILURE TO ENSURE THAT THESE CHANGES ARE CARRIED OUT MAY RESULT IN PROSECUTION AND OR REVOCATION OF THE LICENCE TO OPERATE THE DEVICE.

Inspection Note: FEE IS ASENT ON REPORT FOR INST. # 8914

Inspection Note: REPORT GIVEN TO TONY DIAZ

16. Field Inspected Y	17. Billable Hours	18. Additional Charges N	19. Before Inspection AD Status Active	20. After Inspection AD Status Active	21. Shut Down Type
Voluntary Compliance Option* - Eligible? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No *Please, refer to guidelines					
I hereby confirm that all the Inspector's orders (directions) appearing on this inspection report have been completed.					
Print Name _____			Print Client Name and Position _____		
Representing _____			Client Signature _____		
Licensee/Owner or AD Contractor			Client Signature		

I ACKNOWLEDGE RECEIPT OF THIS REPORT CONSISTING OF 1 PAGE(S)

Client Signature _____ Date _____

John Steele

(519) 927-3527

Inspector

Inspector Fax Number

Other Inspector(s)

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Amusement Devices Inspection Report

Report Number: AD-07-04836

File Number: ADINSJ-0607-04149

Ontario's Technical Standards and Safety Act, 2000 Amusement Devices Regulation

1. Amusement Device Location at Time of Inspection CNE TORONTO, Ontario Canada	2. Registration Number AD009173	3. Inspection Type Follow-Up	4. Inspection Date Aug 17, 2007
	5. AD Class Horizontally Revolving Ride		6. Travelling or Fixed Portable
7. Licensee Name NORTH AMERICAN MIDWAY ENTERTAINMENT/THE CANADIAN MIDWAY SITE C 17 CORPORATE PLACE BRANTFORD, ONTARIO CA N3R 8A6	8. Licensee's Device Name Scorpion		9. Number Of PCU's 21
	10. Licensee Number ADL2572	11. Capacity 42 Adults, Or 42 Children	
The Amusement Device is inspected in accordance with Ontario's Technical Standards and Safety Act, 2000 and Amusement Devices Regulation. Time limits for compliance reflect the severity of the violation and serve to avoid disruption of service. In the interim period, the Licence Holder must ensure that additional precautions for safe usage are taken. An entry of '0' indicates that device is shut down until the direction has been complied with.			Non-compliance with a direction may result in shutdown of the device or in charges being laid under the Act.

12. Direction No.	13. Reference	14. Directions	15. Target Date for Compliance
1		REPAIR OR REPLACE THE FENCING AS REQUIRED.	Aug 24, 2007
2		REPAIR OR REPLACE THE DAMAGED PLATFORM SUPPORT ARMS.	Aug 24, 2007
3		SECURE THE GUARD ON THE LAP BAR RELEASE ON PCU # 5	Aug 24, 2007
Inspection Note: AS PER ONTARIO REGULATION 221-01, SECTION 11 (3)(A), IT IS THE RESPONSIBILITY OF THE OWNER OF THIS DEVICE TO ENSURE THAT ALL SAFETY RELATED RECOMMENDATIONS ISSUED BY THE MANUFACTURER HAVE BEEN CARRIED OUT. FAILURE TO ENSURE THAT THESE CHANGES ARE CARRIED OUT MAY RESULT IN PROSECUTION AND OR REVOCATION OF THE LICENCE TO OPERATE THE DEVICE.			

16. Field Inspected Y	17. Billable Hours 1	18. Additional Charges N	19. Before Inspection AD Status Active	20. After Inspection AD Status Active	21. Shut Down Type
Voluntary Compliance Option* - Eligible? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No *Please, refer to guidelines					
I hereby confirm that all the Inspector's orders (directions) appearing on this inspection report have been completed.					
Print Name _____			Print Client Name and Position _____		
Representing _____			Client Signature _____		
Licensee/Owner or AD Contractor _____			Client Signature _____		

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Ralf-Werner Sabs (905) 894-9827
Inspector Inspector Fax Number

Other Inspector(s) _____

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Amusement Devices Inspection Report

Report Number: AD-07-04488

File Number: ADINSJ-0607-04149

Ontario's Technical Standards and Safety Act, 2000 Amusement Devices Regulation

1. Amusement Device Location at Time of Inspection Buffalo Days Regina, Saskatchewan Canada	2. Registration Number AD009173	3. Inspection Type Periodic	4. Inspection Date Aug 01, 2007
	5. AD Class Horizontally Revolving Ride		6. Travelling or Fixed Portable
7. Licensee Name NORTH AMERICAN MIDWAY ENTERTAINMENT/THE CANADIAN MIDWAY SITE C 17 CORPORATE PLACE BRANTFORD, ONTARIO CA N3R 8A6	8. Licensee's Device Name Scorpion		9. Number Of PCU's 21
	10. Licensee Number ADL2572	11. Capacity 42 Adults, Or 42 Children	

The Amusement Device is inspected in accordance with Ontario's Technical Standards and Safety Act, 2000 and Amusement Devices Regulation.

Time limits for compliance reflect the severity of the violation and serve to avoid disruption of service. In the interim period, the Licence Holder must ensure that additional precautions for safe usage are taken. An entry of '0' indicates that device is shut down until the direction has been complied with.

Non-compliance with a direction may result in shutdown of the device or in charges being laid under the Act.

12. Direction No.	13. Reference	14. Directions	15. Target Date for Compliance
1		REPAIR OR REPLACE THE FENCING AS REQUIRED.	Aug 15, 2007
2		REPAIR OR REPLACE THE DAMAGED PLATFORM SUPPORT ARMS.	Aug 15, 2007
3		SECURE THE GUARD ON THE LAP BAR RELEASE ON PCU # 5	Aug 15, 2007
4		INSTALL THE MISSING RING GEAR COVER.	Aug 15, 2007

Inspection Note: AS PER ONTARIO REGULATION 221-01, SECTION 11 (3)(A), IT IS THE RESPONSIBILITY OF THE OWNER OF THIS DEVICE TO ENSURE THAT ALL SAFETY RELATED RECOMMENDATIONS ISSUED BY THE MANUFACTURER HAVE BEEN CARRIED OUT. FAILURE TO ENSURE THAT THESE CHANGES ARE CARRIED OUT MAY RESULT IN PROSECUTION AND OR REVOCATION OF THE LICENCE TO OPERATE THE DEVICE.

Voluntary Compliance Guidelines : This report is eligible for the Voluntary Compliance Option. Should you choose to exercise it, please adhere to the following procedure:

- All Inspectors orders (directions) appearing on the inspection report must be complied with.
- A person who has legal signing authority on behalf of the ED Contractor must complete the voluntary compliance option box. After complying with the above two conditions, this inspection report must be returned directly to the inspector via fax by the last compliance date appearing on the inspection report, or to the TSSA head office via fax or mail. For more information please contact TSSA at the number above or toll-free at 1-877-682-8772. It is an offence to knowingly make a false statement or to furnish false information under the Act, the Regulations or a Ministers order; Technical Standards and Safety Act, 2000; Sect. 37. Voluntary Compliance is subject to an audit process which may result in additional inspection fees.

16. Field Inspected Y	17. Billable Hours 3	18. Additional Charges N	19. Before Inspection AD Status Active	20. After Inspection AD Status Active	21. Shut Down Type
Voluntary Compliance Option* - Eligible? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No *Please, refer to guidelines					
I hereby confirm that all the Inspector's orders (directions) appearing on this inspection report have been completed.					
Print Name _____			Print Client Name and Position _____		
Representing _____			Client Signature _____		
Licensee/Owner or AD Contractor			Client Signature		

I ACKNOWLEDGE RECEIPT OF THIS REPORT CONSISTING OF 1 PAGE(S)

Client Signature _____ Date _____

Ralf-Werner Sahs (905) 894-9827

Inspector Inspector Fax Number

Gary Edey

Other Inspector(s)

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Amusement Devices Initial Inspection Report

Report Number: ADINIT06-01815

File Number: ADINITJ-0806-01270

Ontario's Technical Standards and Safety Act, 2000 Amusement Devices Regulation

1. Amusement Device Location at Time of Inspection EXHIBITION PLACE TORONTO, Ontario Canada		2. Registration Number AD009173	3. Inspection Type Subsequent	4. Inspection Date Aug 23, 2006
7. Licensee Name NORTH AMERICAN MIDWAY ENTERTAINMENT/THE CANADIAN MIDWAY C SUITE C 17 CORPORATE PLACE BRANTFORD, ONTARIO CA M8B 6A5		5. AD Class GENERAL AMUSEMENT DEVICE		6. Travelling or Fixed Portable
8. Licensee's Device Name Scorpion		9. Number Of PCU's 21		10. Licensee Number ADL2572
11. Capacity 42 Adults, Or 42 Children		<input checked="" type="checkbox"/> Permit will be issued, and the Amusement Device may be put into service, provided an application for an Initial AD permit has been submitted. <input type="checkbox"/> Permit cannot be issued until conformance with Ontario's Technical Standards and Safety Act, 2000 and Amusement Devices Regulations is demonstrated. When your preliminary examination reveals that the Amusement Device conforms, contact TSSA to arrange a Subsequent inspection.		

The licence holder must ensure compliance within the specified time limits. Non-compliance with a direction may result in shutdown of the device or in charges being laid under the Act.

Inspection Note: AS PER ONTARIO REGULATION 221-01, SECTION 11 (3)(A), IT IS THE RESPONSIBILITY OF THE OWNER OF THIS DEVICE TO ENSURE THAT ALL SAFETY RELATED RECOMMENDATIONS ISSUED BY THE MANUFACTURER HAVE BEEN CARRIED OUT. FAILURE TO ENSURE THAT THESE CHANGES ARE CARRIED OUT MAY RESULT IN PROSECUTION AND OR REVOCATION OF THE LICENCE TO OPERATE THE DEVICE.

Inspection Note: REPORT LEFT WITH TONY DIAZ

Inspection Note: ALL PREVIOUS DIRECTIONS ARE COMPLETED

16. Field Inspected Y	17. Billable Hours 1	18. Additional Charges N	19. Before Inspection AD Status Active	20. After Inspection AD Status Active	21. Shut Down Type
---------------------------------	--------------------------------	------------------------------------	--	---	--------------------

I ACKNOWLEDGE RECEIPT OF THIS REPORT CONSISTING OF 1 PAGE(S)

John Steele

Inspector

(519) 927-3527

Inspector Fax Number

Print Client Name and Position

Marc Tevyaw

Other Inspector(s)

Client Signature

Date

Page 1 of 1

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Amusement Devices Initial Inspection Report

Report Number: ADINIT06-01796

File Number: ADINITJ-0806-01270

Ontario's Technical Standards and Safety Act, 2000 Amusement Devices Regulation

1. Amusement Device Location at Time of Inspection EXHIBITION PLACE TORONTO, Ontario Canada	2. Registration Number AD009173	3. Inspection Type Initial	4. Inspection Date Aug 17, 2006
	5. AD Class GENERAL AMUSEMENT DEVICE		6. Travelling or Fixed Portable
7. Licensee Name NORTH AMERICAN MIDWAY ENTERTAINMENT/THE CANADIAN MIDWAY C	8. Licensee's Device Name Scorpion		9. Number Of PCU's 21
	10. Licensee Number ADL2672	11. Capacity 42 Adults, Or 42 Children	

Permit will be issued, and the Amusement Device may be put into service, provided an application for an initial AD permit has been submitted.

Permit cannot be issued until conformance with Ontario's Technical Standards and Safety Act, 2000 and Amusement Devices Regulations is demonstrated. When your preliminary examination reveals that the Amusement Device conforms, contact TSSA to arrange a Subsequent inspection.

The licence holder must ensure compliance within the specified time limits. Non-compliance with a direction may result in shutdown of the device or in charges being laid under the Act.

12. Direction No.	13. Reference	14. Directions	15. Target Date for Compliance
-------------------	---------------	----------------	--------------------------------

1		THE ELECTRICAL SCHEMATIC SHALL BE REVISED TO REFLECT THE ADDITION OF A DEAD MAN SWITCH	Nov 15, 2006
---	--	--	--------------

2		INSTALL A DEAD MAN SWITCH IN ACCORDANCE WITH THE TECHNICAL DOSSIER	Aug 24, 2006
---	--	--	--------------

Inspection Note: AS PER ONTARIO REGULATION 221-01, SECTION 11 (3)(A), IT IS THE RESPONSIBILITY OF THE OWNER OF THIS DEVICE TO ENSURE THAT ALL SAFETY RELATED RECOMMENDATIONS ISSUED BY THE MANUFACTURER HAVE BEEN CARRIED OUT. FAILURE TO ENSURE THAT THESE CHANGES ARE CARRIED OUT MAY RESULT IN PROSECUTION AND OR REVOCATION OF THE LICENCE TO OPERATE THE DEVICE.

Inspection Note: LEFT REPORT WITH TONY DIAZ

16. Field Inspected Y	17. Billable Hours 2.5	18. Additional Charges N	19. Before Inspection AD Status	20. After Inspection AD Status Active	21. Shut Down Type
---------------------------------	----------------------------------	------------------------------------	---------------------------------	---	--------------------

I ACKNOWLEDGE RECEIPT OF THIS REPORT
CONSISTING OF 1 PAGE(S)

Marc Tevyaw

Inspector

Inspector Fax Number

Print Client Name and Position

John Steele

Other Inspector(s)

Client Signature

Date

Page 1 of 1

(Note: This is not an invoice)

Putting Public Safety First

APPENDIX 'H'

2010 NDT INSPECTION REPORT / MAINTENANCE

TRANSACTION REPORT

SCORPION

Tivoli

4870230

1993

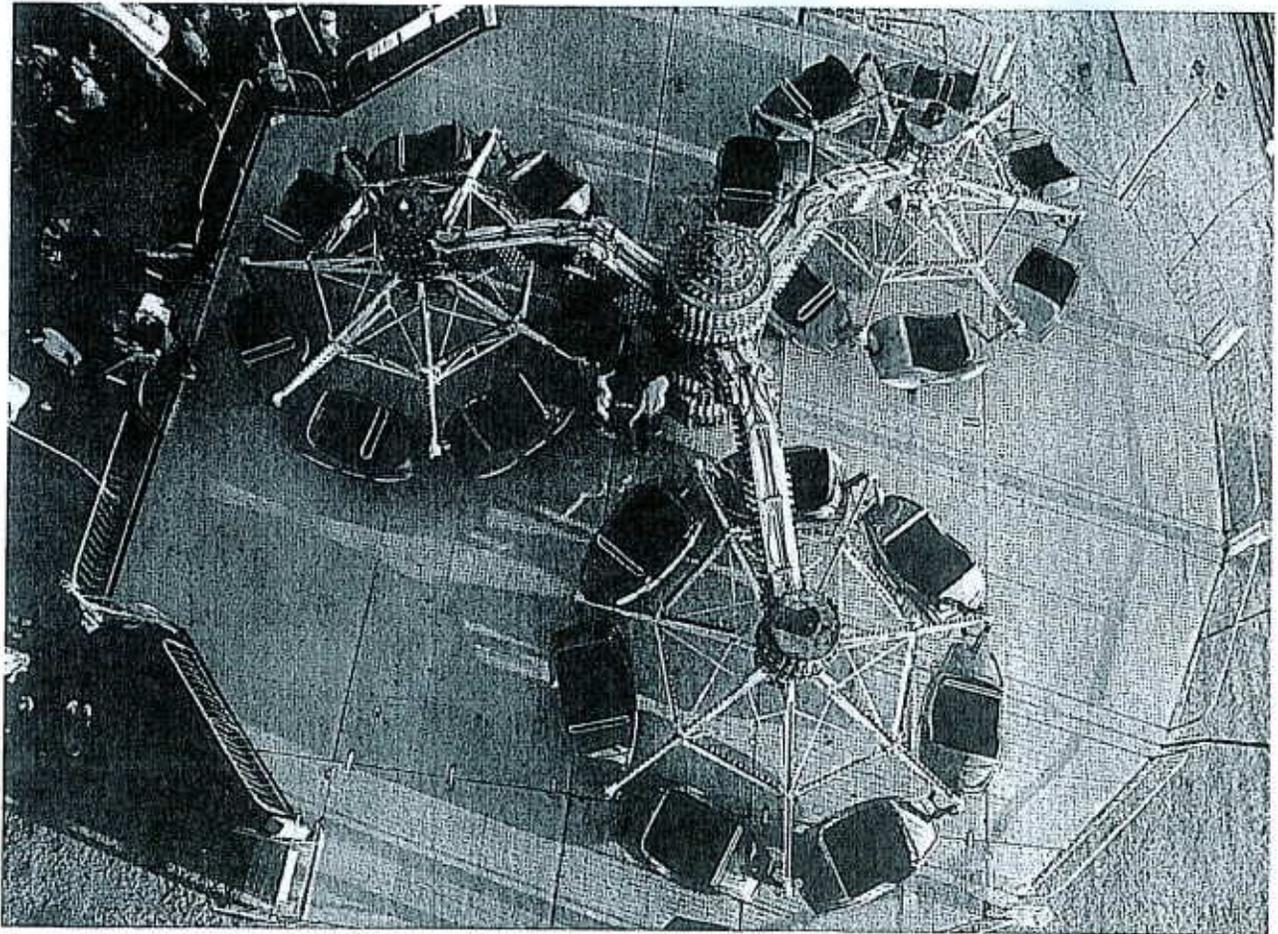
Owner: North American Midway Entertainment

SPECIFICATIONS

CAPACITY	42
HEIGHT REQUIREMENT	42" or More
ROTATION	Center 10 RPM, Spinners 33 RPM
WEIGHT LOADED	62,000 lbs
MOTOR POWER	Drive 70 KW Lights 25 KW
TRAILER SIZE	13' 6" height, 8' 6" width, 53' length

Mfg ADDRESS: Howfield Lane
Chartham, Canterbury
Kent CT47HG
England

Original Owner	Southeast Amusement Co
US ID Number	09887
South Carolina ID Number	3567
TSSA AD Number	9173
AEDARSA	A060341



NORTH AMERICAN MIDWAY ENTERTAINMENT

Tivoli SCORPION

Speed: Center - 10 rpm, Spinners - 33 rpm **Duration:** 1.5 min

Direction: Center - Clockwise, Spinners - CounterClockwise

Height Requirement: 42" Or More. **Passenger Capacity:** 42

DAILY PRE-OPENING INSPECTION

Refer to this ride's daily pre-opening inspection sheet.

OPERATION OF RIDE

1. Allow a maximum of 42 passengers to enter ride.
2. Check all patrons to assure they meet passenger restrictions.
3. Check all seats to assure passengers are seated and lap bars are closed and securely locked.
4. Make sure that all entrance and exit gates, or chains are closed and all non-riding patrons are behind the fence.
5. Start ride in slow speed first. During one revolution check all passengers to assure they are properly seated and lap bars are down and locked.
6. Start ride in fast speed.
7. Monitor ride during operation.
8. After ride cycle is over and vehicles come to a complete stop, assist passengers in exiting the ride. Only when passengers have exited, allow new patrons to enter.

RIDE OPERATOR'S POSITION AND FUNCTION

1. Read the service/operational manual and be aware of proper operation, maintenance and safety procedures.
2. Before operating ride a safety checkout should be completed.
3. All warnings in the service manual should be adhered to.
4. Ride operator is to remain at the ride controls at all times that the ride is in operation.
5. A minimum of two persons to operate and monitor the ride during operation are required.
One operator must be at the controls at all times, and be in constant view of the ride operation. The second operator must be located at the entrance with the duty of controlling the entrance, the exit and assisting patrons.
NOTE: During high traffic times additional personnel should be added to assist in the more efficient flow of patrons
9. Remember: Smoking is not permitted on, in front of or under any ride at any time.

SCORPION SAFETY PROCEDURES

1. No food or drink allowed on ride.
2. Remove all loose articles before entering ride.
3. Only TWO passengers per vehicle. Maximum weight per vehicle 400 lbs.
4. DO NOT SWING THE VEHICLES.
5. No patrons or operators are allowed on platform during operation
6. Turn off and lock out electrical power before inspecting or attempting any repairs.

GENERAL SAFETY PROCEDURES

1. Remain at the control of the ride at all times. Never allow unauthorized persons to operate the ride.
2. Controls that have lids are to be closed when ride is not in motion.
3. Stop the ride when any unusual noise or condition develops. Do not operate the ride until your supervisor has inspected and repaired the ride.
4. Do not operate the ride at unsafe speeds or load it beyond its rated capacity.
5. Be alert when the ride is operating for an emergency stop.
6. Be aware of changing weather conditions. Do not operate the ride during high winds or electrical storms.
7. Persons that appear to be ill or under the influence of alcohol or drugs should not be allowed on the ride.
8. Be sure the riders fit the ride. Children should meet minimum size requirements. Adults must fit safely and comfortably into the seat.
9. Safety belts, lap chains or safety bars must be properly secured before starting the ride.
10. Patrons waiting for the next ride must be kept outside of fence or away from the moving ride.
11. Ensure patrons remain seated until the ride comes to a complete stop.
12. Know the location of the closest First Aid Station and fire extinguisher.

EMERGENCY PROCEDURES

1. Shut down the ride.
2. Evacuate riders as quickly and safely as possible.
3. Contact your supervisor immediately.
Note: If you lose the power on your ride, pay special attention that your ride controls are in the off position before leaving your control panel. There is a possibility that your ride could start up while you or your guests are in a dangerous location if the show generator is restarted and your ride regains power.
4. Before you or a supervisor checks the ride make sure the ride is electrically locked out/tagged out.

PROCEDURE FOR AN INCIDENT

1. All injuries/incidents are to be reported promptly to the Office/Guest Relations
2. **DO NOT MOVE THE INJURED PERSON.**
3. Assist in crowd control to make way for emergency vehicles.
4. Direct any inquiries to the show's office/guest relations and/or management staff.

PROCEDURE FOR PERSONS WITH DISABILITIES

Persons may ride if:

1. They meet the height requirement and safety requirements for the ride.
2. They are able to be restrained by the lap bar or seat belt.
3. They can get into the seat by themselves or with the assistance of someone with them.

MEDIA POLICY

Remember: NO ONE is to answer any question or be photographed by TV, RADIO, NEWSPAPER, or PRESS without management approval. Please direct all inquires to the Office/Guest Relations

Comspeq Consulting Inc.
PO Box 1737
Brandon, FL 33509-1737
(813)685-8792 FAX (813)685-5117

NON DESTRUCTIVE TESTING REPORT

Visual per AWS D1.1-06
Magnetic Particle per ASTM E 1444 AC Yoke s/n 1038 Dry Powder Color: Grey/Red

Client Name: NAME (Southeast) Date: 03/22/10
Address: 6346 Broad Street Contact: Roger Thompson
City: Brooksville State: FL Zip Code: _____
Office Phone: _____ Cell Phone: 561-373-1320
Ride Name: Scorpion Serial # 4870230
Manufacturer: Tivoli Enterprises Year: _____
USA ID # 09887

Requirement: MT/VT per manual, bulletin Scorpion 001

NDT Test Location: Vehicle Frame: MT 4 random cars weld attachments at the upper and lower end of the vertical attachment post. MT Sample of seven car ball connectors. VT all car ball connectors for wear and signs of damage to the neck of the ball.

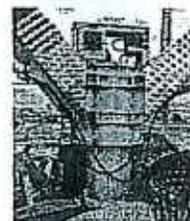
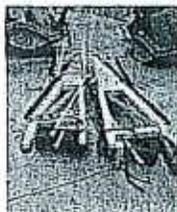
Vehicle Spinners: Vehicle Sweeps MT inner end of the seven sweeps arms where the pivot pin is located along with "L" shaped sweep sections. MT two sweeps at random from each spinner all welds, pin holes and hollow sections. **Sweep Spreaders:** MT a random sample of 3 spreaders at the weld attachment between the main hollow section and the cross bracing including the pin holes
Main Sweep Arms: Inner Fixed Arms outer end of the inner fixed arm to include the pivot shaft bosses and gussets and welds around the outer ends of the boss gusset plates.

Visual inspection of all welds including, center, sweeps, spinner sweeps, center/trailer attachment areas, and vehicle frames.

Comments: All areas tested were found satisfactory at the time of this inspection

Inspected by: John Pierce

Level: II MT



SOUTHEAST AMUSEMENT

06/27/10

Page # 1

Maintenance Transaction Report

- Scorpion

TRANS #	DATE	EQUIP #	PROCEDURE	EMPLOYEE
913	3/10/2010	# 18 - Scorpion	Monthly Inspection Checked tightness of fixed sweep flange bolts, main center bearing bolts and spinner drive bolts. Checked tightness of spinner drive gear and center drive gear. Checked pressure guages for proper settings, cleaned and checked spring tension on center brushes and commentator. Sprayed lap bar latching mechanism.	R Thompson
938	3/10/2010	# 18 - Scorpion	Annual Inspection Checked hydraulic system for contamination. Changed oil and filter as needed. Inspected car ball connectors for wear and damage.	R Thompson
95	3/18/2010	# 18 - Scorpion	Replaced 14 car ball hangers. Replaced 4 sweep bushings on cars. Replaced all sweep pin retaining fasteners. Performed NDT - see log book.	R Thompson
221	3/18/2010	# 18 - Scorpion	Replaced lapbar lock in #3 red and # 5 blue car.	R Thompson
22	3/24/2010	# 18 - Scorpion	Replaced six buhsings on car attachment points. Replaced fourteen balls.	W Kunz
130	3/25/2010	# 18 - Scorpion	Florida Inspection Tightened tub bolts and bottom plates for sweeps.	M Hupalo
222	3/28/2010	# 18 - Scorpion	Replaced plastic shield on red car #7. Greased ride.	R De Beer
248	3/30/2010	# 18 - Scorpion	Replaced lapbar lock on tub #7.	R De Beer
279	3/30/2010	# 18 - Scorpion	Replaced tub # 7 and lapbar lock (Green)	R de Beer, R Pretorius
278	4/1/2010	# 18 - Scorpion	Replaced lapbar lock for car #7.	R Pretorius
344	4/3/2010	# 18 - Scorpion	Replaced locking device for lapbar # 5 (blue). Greased ride.	R De Beer, R Pretorius
361	4/5/2010	# 18 - Scorpion	Greased ride.	R De Beer, R Pretorius
366	4/6/2010	# 18 - Scorpion	Greased ride.	R Pretorius
419	4/10/2010	# 18 - Scorpion	Greased Ride.	R Pretorius
1021	6/8/2010	# 18 - Scorpion	Riveted plates on holes in floor. Replaced new sockets on bulbs and replaced old and broken bulbs. Reinforced bottom part of tub #7. Greased ride. Replaced broken light fuses. Repaired wires for lights on tub #2.	R Pretorius, R Prinsloo
1024	6/8/2010	# 18 - Scorpion	Monthly Inspection Checked tightness of fixed sweep flange bolts, main center bearing bolts and spinner drive bolts. Checked tightness of spinner drive gear and center drive gear. Checked pressure guages for proper settings, cleaned and checked spring tension on center brushes and commentator. Sprayed lap bar latching mechanism.	G Allan
1059	6/11/2010	# 18 - Scorpion	Repaired lapbar locking mechanism for tub # 7. Greased ride.	R Pretorius, R Prinsloo
1103	6/12/2010	# 18 - Scorpion	Manitoba Inspection Adjusted door.	M Hupalo
1106	6/13/2010	# 18 - Scorpion	Replaced red camlock on main lead.	R Pretorius, R Prinsloo

Maintenance Transaction Report

18 - Scorpion

TRANS #	DATE	EQUIP #	PROCEDURE	EMPLOYEE
1163	6/18/2010	# 18 - Scorpion	Repaired bottom on green tub # 2. Greased ride. Reajusted flood light.	R Pretorius, R Prinsloo
1164	6/19/2010	# 18 - Scorpion	Repaired bottom part of tub #1. Greased ride.	R Pretorius, R Prinsloo
1251	6/22/2010	# 18 - Scorpion	Greased ride.	R Pretorius, R Prinsloo
1308	6/23/2010	# 18 - Scorpion	Replaced protection covers.	R Prinsloo
1309	6/24/2010	# 18 - Scorpion	Replaced protection covers for locking mechanism on cars # 5, 7, 1, 2. Greased ride.	R Pretorius
1351	6/25/2010	# 18 - Scorpion	Repaired bottom of tub # 7 (blue). Replaced main dump valve for hydraulics.	R Pretorius, R Prinsloo
1370	6/26/2010	# 18 - Scorpion	Greased ride.	R Pretorius

N.A.M.E. - SOUTHEAST AMUSEMENTS

07/16/10

Page # 1

Maintenance Transaction Report

18 - Scorpion

TRANS #	DATE	EQUIP #	PROCEDURE	EMPLOYEE
913	3/10/2010	# 18 - Scorpion	Monthly Inspection Checked tightness of fixed sweep flange bolts, main center bearing bolts and spinner drive bolts. Checked tightness of spinner drive gear and center drive gear. Checked pressure guages for proper settings, cleaned and checked spring tension on center brushes and commentator. Sprayed lap bar latching mechanism.	R Thompson
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22	3/24/2010	# 18 - Scorpion	Replaced six buhsings on car attachment points. Replaced fourteen balls.	W Kunz
130	3/25/2010	# 18 - Scorpion	Florida Inspection Tightened tub bolts and bottom plates for sweeps.	M Hupalo
222	3/28/2010	# 18 - Scorpion	Replaced plastic shield on red car #7. Greased ride.	R De Beer
248	3/30/2010	# 18 - Scorpion	Replaced lapbar lock on tub #7.	R De Beer
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278	4/1/2010	# 18 - Scorpion	Replaced lapbar lock for car #7.	R Pretorius
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361	4/5/2010	# 18 - Scorpion	Greased ride.	R De Beer, R Pretorius
366	4/6/2010	# 18 - Scorpion	Greased ride.	R Pretorius
419	4/10/2010	# 18 - Scorpion	Greased Ride.	R Pretorius
1021	6/8/2010	# 18 - Scorpion	Riveted plates on holes in floor. Replaced new sockets on bulbs and replaced old and broken bulbs. Reinforced bottom part of tub #7. Greased ride. Replaced broken light fuses. Repaired wires for lights on tub #2.	R Pretorius, R Prinsloo
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Maintenance Transaction Report

18 - Scorpion

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1309	6/24/2010	# 18 - Scorpion	Greased ride.	R Pretorius
1351	6/25/2010	# 18 - Scorpion	Repaired bottom of tub # 7 (blue). Replaced main dump valve for hydraulics.	R Pretorius, R Prinsloo
1370	6/26/2010	# 18 - Scorpion	Greased ride.	R Pretorius
1435	7/8/2010	# 18 - Scorpion	Greased ride.	R Pretorius
1460	7/10/2010	# 18 - Scorpion	Repaired stop rubber on blue tub # 4. Tightened scenery hooks. Greased ride.	R Pretorius
1532	7/10/2010	# 18 - Scorpion	Greased ride.	R Pretorius
1496	7/11/2010	# 18 - Scorpion	Alberta Inspection No deficiencies noted.	M Hupalo
1533	7/12/2010	# 18 - Scorpion	Greased ride.	R Pretorius
1546	7/14/2010	# 18 - Scorpion	Greased ride.	R Pretorius
1547	7/16/2010	# 18 - Scorpion	Greased ride.	R Pretorius

APPENDIX 'I'

**SCORPION OPERATIONS MANUAL ISSUED BY TIVOLI
(SELECTED PAGES)**

SECTION 1

**SET UP
INSTRUCTIONS**

SET UP INSTRUCTIONS

- STEP 1 Locate trailer on as level an area as possible. The length of the trailer should be located parallel to the midway with goose neck to the right side as viewed from the Midway. The trailer center should be located approximately 30 ft. from the midway edge. * See ride layout on previous page.
- STEP 2 Install adiquite blocking under four mechanical leveling jacks on traile . Note: Standerd block size is approxitly 24" square 6" thick. constructed of 2'x6' pine boards. Different ground or soil conditions can cause a change in blocking requirements, note this before supporting ride on blocks. Using the two front independent landing legs, raise trailer enough to remove tractor. When tractor is out of the way, lower trailer until approximately eye level. Procede to level trailer using four manual leveling jacks. When level install screw jacks with similar blocking under center of trailer, tighten until jack starts to support trailer weight.
- STEP 3 Unhook hanging platforms by lifting and turning "U" shaped pin at two places for each platform. (pins located approximately a quarter of the way in from both front and back of trailer). Pull out hanging platform to check that they are free.
- TEP 4 Unlatch both main outriggers at front of the trailer. Swing out each outrigger until they are perpendicular with the trailer and top surface of outrigger is directly under platform roller. **ATTENTION; Swinging out the outrigger also pulls out the hanging platform, this will cause a force against the outrigger when pushing into position. Take caution during this operation.** Swing out free end of cross brace attached to outrigger and pin to receptacles on trailer I beam. Complete this operation for both sides of trailer.
- STEP 5 Using 4 screw jack stands stored in possem belly block and level two main outriggers. Two (2) jack stands per outrigger.
- STEP 6 Remove main entrance steps racked on back end of trailer. Remove and set to outside of platform, diameter. Remove exit platforms racked under platform on front of trailer (passenger side).
- STEP 7 Let down rear platform on back end of trailer, by lifting and turning "U" pins on ether side. Lower platform into position. (This will require at least 3 persons to lower.) Using hand crank jack stands, level platform.
- STEP 8 Unfold two (2) wing sections on rear and set in line with main platform. Note; When lowering platform watch so they lay properly on the rest stops on the rear platform.

- STEP 9 Remove platform support outriggers from the center possem belly and install in there respective receptacle, 4 places each side. Using Jack stands racked under platform on front of trailer, block and level with trailer.
- STEP 10 Remove spacer braces between platform at top of trailer where platforms hinge. One is located at front of trailer,one at rear.

IMPORTANT

BEFORE GOING TO STEP 14 - READ THE FOLLOWING CAREFULLY

- **Under no circumstances should a person be underneath the platforms when they are under the support of the "Winch Cable." It is necessary to attach a rope to the platform and pull platforms out from a safe distance outside the ride perimeter. Failure to abide by this notification can cause Severe Injury.**

- STEP 11 **Lowering of platforms;** Before unpinning and lowering platforms attach a rope at least 30 feet long) to the bottom edge of the hanging platform to be lowered first. Extend the rope until it clears the ride perimeter.
- STEP 12 Turn control key to the maintenance / setup position. Start hydraulic pump. Have two persons climb to the top center of the ride and locate the winch.

Platform opposite winch is first to be lowered and last to be raised

- STEP 13 The winch cable is set for traveling by going through the pulleys on both platforms. Using winch control lever located next to winch, loosen cable enough to allow the cable to be removed from the pulley on the winch side platform. Run cable out of winch directly over pully above winch, over pully on oppisite sine of center, through platform pully, and hook to plate attached to ride center. **ASSURE THAT CABLE HOOK IS ATTACHED, SAFETY CLIP IS INTACT AND OPERATING PROPERLY BEFORE PUTTING CABLE UNDER LOAD.** Tighten cable and assure the cable is rolled evenly on the winch drum, connections to platform are secure and cable runs properly through pulleys.
- STEP 14 With cable taut, remove two platform securing brackets for side being lowered. **As persons pull on rope from outside ride perimeter to pull out wing in order to allow hanging platform to clear outrigger, Start to lower platform.** When platform is low enough to allow hanging platform to roll along the outrigger on it's own release rope and let platform roll on it's own. Lower platform down completely.
- STEP 15 Disconnect cable from platform pulley, roll up cable on winch , being careful to roll cable evenly on drum.

- STEP 16 Run cable through pulley on winch side of platform, over pulley above winch and attach cable hook back onto bracket. Check to assure cable is secure and running properly through pulleys.
- STEP 17 Follow steps 14 and 15 to lower winch side platform. When Platforms are completely down, re-roll cable completely on winch and leave slightly taught.
- STEP 18 Remove from underneath platform safety keys of vehicle racking pins which are attached to folding platforms on both sides of trailer. **DO NOT REMOVE THESE PINS UNLESS PLATFORMS ARE COMPLETELY DOWN.**
- STEP 19 Assemble car installation dolly. Using dolly move cars racked on folding platforms to the outside perimeter edge of the platform.
- STEP 20 Remove sweep locking and support brackets from between center and sweep flange of the two sweeps hinged forward for transport. 2 brackets each sweep. Remove platform protection block from sweep flange. Store all brackets under ride platform.
- STEP 21 Swing sweeps into operating position. Install bolts in holes provided on sweep flange and tighten in a cross pattern. **Torque bolts to 390 ft. lbs.**
- STEP 22 Spread short Spinner sweeps of the two sweeps described above into position (third sweep will be assembled later). Swing out and pin in place spreader frames. Swing over cross braces and pin in place. Two cross braces between each sweep
- STEP 23 Remove spinner sweep locking plate from spinner hub to release sweeps to allow them to turn freely. Locking plates are small and should be stored in safe place.
- STEP 24 Unrack and install fence light columns in sockets between fence and plug in under platform. Assemble and install 4 quartz light poles in sockets provided between fence. Plug in under platform.
- STEP 25 Remove scenery panels from racks on platform and install in receptacles around front half of ride platform. Install canvas bally cloth around back half of platform.
- STEP 26 Using vehicle installation dolly, place cars between sweeps with pivot balls in sockets of two assembled sweeps. The cars must be lifted, and installed with lap bar release handle to outside of circle.
- STEP 27 When all vehicles are installed on two sweeps, rotate entire ride so that unassembled sweep clears cars racked on trailer portion of platform. Turn off hydraulic pump.
- STEP 28 Assemble spinner sweeps and spreaders as described in Step 22.

- STEP 29 Install vehicles as described in Step 26
- STEP 30 Install car arm ball cap bushing into receptacle of each car (two per car) Push in firmly or tap in with rubber hammer. Swing down locking plate and pin in place. When plate is pinned it should be firmly hold in bushings, it shouldn't move easily by hand. If loose, tighten adjuster nut on either cap slightly until plate is firm.
- STEP 31 Install safety chains between car arm and sweep. Plug car light cord into receptacle under sweep.
- STEP 32 Assemble front entrance platform and steps.
- STEP 33 Install fence into sockets provided , Install flag poles in center of each fence section.
- STEP 34 Install exit ramps on both outside edges of platform. Install hand rails and gates.
- STEP 35 Switch over hydraulic redirectional valve located in top center of ride. This transfers fluid from winch service to operate one spinner motor.
- STEP 37 Sign assembly. Attach sign support poles to brackets at rear of ride, (in respect to midway) Install sign on brackets and lift into place.
- STEP 38 Install all center scenery.
- STEP 39 Using sweep lift override located on control panel, raise sweeps until they are approximately fully extended. **STANDING ON THE OUTSIDE OF THE CAR** remove three racking pins from each car by unscrewing pins. Store pins until tear down.

WARNING

Never let a person go under the sweeps while they are raised. In case of power failure sweeps will come down and possibly cause injury to persons under sweeps.

It is absolutely necessary to remove racking pins from vehicles before ride is put into operation. If left in during operation they could come loose and fly off ride causing injury to bystanders.

- STEP 40 Inspect all car hanger assemblies, assure all are keyed correctly and ball caps are tight. Check all sweep spreader pins and keys.
- STEP 41 Test Run Ride

IMPORTANT

When testing the "Star Force Amusement Ride" always check for unusual sounds or conditions which are not normally associated with the operation of the ride. Investigate all instances and report any problems to appropriate personnel, so that they can be rectified immediately. **REPORT ANY REOCCURRING PROBLEMS TO TIVOLI ENTERPRISES LTD.**

SECTION 2

**OPERATING PROCEDURES
&
SPECIFICATIONS**

RIDE NAME: STAR FORCE
OTHER NAMES: SCORPION

Manufacture:

U. S. A. Representative

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

AmTech / Amusement Technologies Intl. Inc.
3306 N. Main Street
Cleburne, Texas 76031

Date of inception and completion of first unit: 1993
Number of rides operating in U.S.A.: 3
Number of rides operating World wide: 3

OPERATING SPECIFICATIONS

Dimensions: (Approximate)

Static (No Clearance)

Height 16 ft.
Width 54 ft.
Depth 58 ft.

Dynamic (No Clearance)

Height 18 ft.
Width 54 ft.
Depth 58 ft.

Total Weight Static: 62,000.00 lbs.
Ride Speed: Center: 10 rpm, Spinners 33 rpm
Passenger Capacity: 42 Adults, 42 Children
Number of Vehicles: 21
Estimated Capacity per Hour: 840

OPERATING REQUIREMENTS

Passenger Height: 42"
Passenger Age Restriction Unless Accompanied by Adult: 7 Years

Recommended Ride Duration: 1.5 Minutes
Passenger Load Balancing Restrictions: 6 Persons out of Balance
Maximum Wind speed for operation with Passengers: 35 MPH

ELECTRICAL REQUIREMENTS

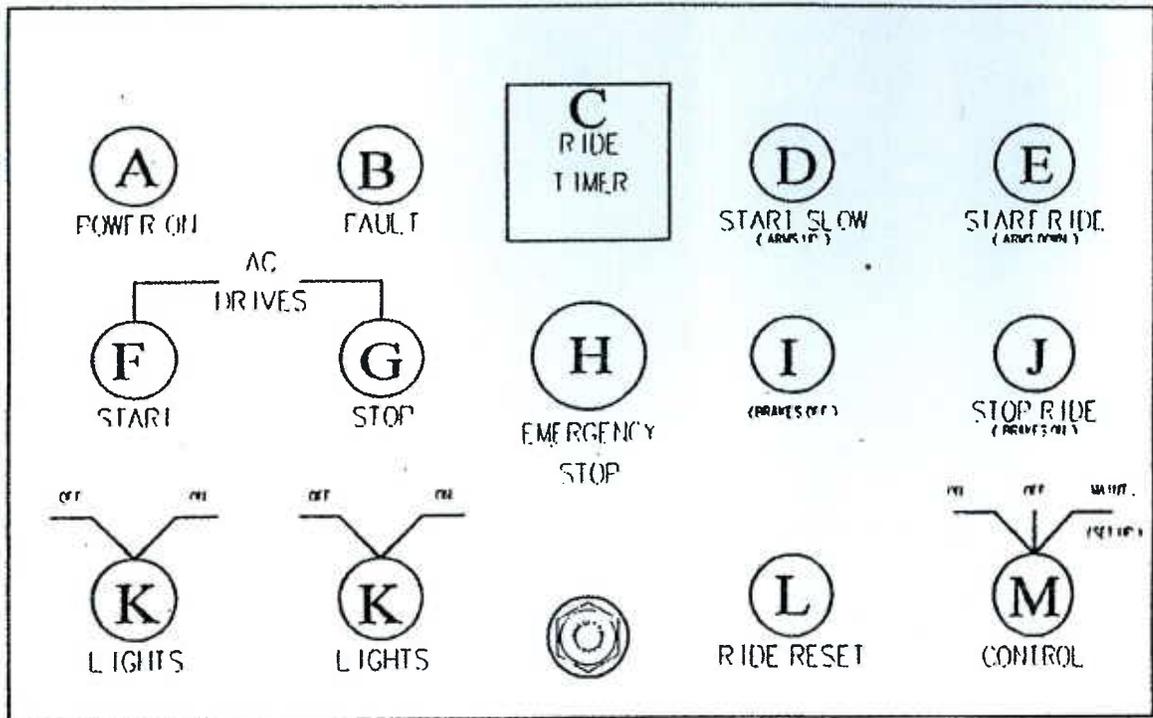
Voltage:	208 minimum, 230 Maximum
Type:	5 wire, 3 Phase, Neutral, Ground.
Cycles:	60 Hz.
Amperage / KW (Drive)	200 Amps (Approximately) 70 KW
Amperage / KW (Lights)	50 Amps (Approximately) 25 KW

TRAILER INFORMATION

Length:	53 Ft.
Width:	8ft. 6 ins.
Height:	13 ft. 6 ins.
Weight:	62,000 lbs. Gross.
	39,000 lbs Rear Split (10 ft.) Tandem
	23,000 lbs Kingpin

LOADINGS AT JACK STANDS

STAR FORCE CONTROL PANEL



OPERATING PROCEDURES

1. PERSONAL REQUIREMENTS:

The Star Force Amusement Ride requires a minimum of two (2) persons to operate and monitor the ride during operation. One (1) operator must be at the controls at all times, and be in constant view of the ride operation. A second operator must be located at the entrance with the duty of controlling the entrance, the exit and assisting patrons. During high traffic times additional personal should be added to assist in the more efficient flow of patrons.

2. PASSENGER RESTRICTIONS:

The Star Force Amusement Ride is designed to accept up to 42 passengers. Only two (2) persons per vehicle. This number should not be exceeded for any reason. Maximum weight per vehicle is 400 lbs. The following is a list of special restrictions which should be posted so that all potential riders are aware prior to entering the ride.

1. No Riders under 42 inches tall allowed.
2. No riders under 48 inches unless accompanied by an adult.
- 3. No food or drink allowed on ride.
- 4. Remove all loose articles before entering ride.
- 5. Anyone under medical care, or with back or neck problems should not ride
- 6. Pregnant women are not allowed to ride.
- 7. Only **TWO (2)** passengers per vehicle.
- 8. Riders acting in an unsafe manner will be evicted from the ride immediately.
9. **DO NOT SWING THE VEHICLES**

Note:

It is extremely important that the operator monitor all patrons riding the ride. Entrance must be denied to any persons which may be under the influence of alcohol, drugs, or acting in such a way that they may compromise the safety of other riders.

3. **OPERATORS RESPONSIBILITIES PER RIDE CYCLE:**

When operating the Star Force Amusement Ride with Patrons, the Operator must assure that the following points are followed before, during and after each ride cycle.

1. Allow a maximum of 42 passengers to enter ride.
2. Check all patrons to assure they meet passenger restrictions.
3. Check all seats to assure passengers are seated and lap bars are closed and securely locked.
4. Make sure that all entrance and exit gates, or chains are closed and all non-riding patrons are behind the fence.
5. **No patrons or operators are allowed on platform during operation.**
6. Start ride in slow speed first. During one revolution check all passengers to assure they are properly seated and lap bars are down and locked.
7. Start Ride in fast speed.
8. Monitor ride during operation.
9. After ride cycle is over and vehicles come to a complete stop, assist passengers in exiting the ride. Only when passengers have exited, allow new patrons to enter.

4. **RIDE CONTROLS**

The Star Force Amusement ride is fitted with an Operators control panel located on the counter of the control cabin. This console contains all necessary controls to safely operate the ride. The following is a description and explanation of each control.

- A. **Power On Light** This red indicator light when illuminated shows that there is power to the operator panel and main control panel .
- B. **Fault Light** The yellow indicator light shows whether one of the electrical motors has overloaded, or a ground fault has tripped etc. when this light is illuminated check PLC red indicators for explanation of fault.
- C. **Ride Duration Timer** Set this timer to control the length of ride. It is recommended that this timer be set for no more than 1.5 minutes. Timer activates when fast start button is depressed.
- D. **Slow Start/(Arms Up)** This illuminating green button activates the slow speed rotation. This button is active only when it is illuminated. Slow speed allows only the center to rotate at a slow speed to check riders before full ride operation. The spinners will not rotate in this mode. This button also has an additional function. When the control key switch is in the Maintenance /(setup) position, this button will activate the manual arm lift. This raises the arms for maintenance and setup. Note; Arms will still come down in the case of a power failure.

- E. **Fast Start** This illuminating green button activates full ride cycle and ride duration timer (C). This mode cannot be activated unless button is illuminated. This button also has an additional function. When control key is in the Maintenance / (setuo) position this button will activate the manual lower. This lowers the arms during maintenance and setup.
- F. **Drives Start;** This activates the center hydraulic motor, and AC inverters for center and spinner rotation. The drive system is activated once and left on during the days operation.
- G. **Drives Off;** This turns off the AC inverters and the hydraulic motor.
- H. **Emergency Stop** This Red emergency button operates by pushing to latch and turn to release. When activated, hydraulic pump, AC inverters and controls are shut off. Ride arms come down, spinners, and center come to a complete stop.
- I. **(brakes off);** This control only works when the key switch is in the maintenance / (setup) position. This is used to release the electric brakes on the motors and let the ride Freewheel during set up and maintenance.
- J. **Stop / (brakes on)** The red button when activated will bring ride to a normal stop any time during a ride cycle. When the key switch is in the maintenance / (setup) position this control activates the brakes on all motors. **Important; If ride is sitting for a long period of time (over 15 minuits) the brakes should be switched on in order to deenergize brakes in order to extend life of brake coils**
- K. **Light Switch (s)** These switches control main ride, vehicle , and platform lighting.
- L. **Reset** This yellow illuminated button activates ride control system. When the button is illuminated, the control system is not active. The control system will become inactive for three reasons,
1. The emergency button has been activated.
2. The ride control key switch (M) has been turned off.
3. There has been a ground fault.
Before resetting assure all problems have been corrected.
- M. **Control Key Switch** Activates and deactivates control panel. It also puts the controls on maintenance / (setup) mode.

5. **EMERGENCY PROCEDURES**

1. **Emergency Button**

This button is designed to be used to completely shut down the ride in an emergency situation. When activated all hydraulic pumps, and AC inverters are shut down, control panel is deactivated, and ride is brought down to a quick controlled stop. These procedures should be followed whenever the emergency shut down button is used:

- A. Let ride come to a complete stop before unloading all passengers.
- B. Make sure all passengers have exited platforms completely, before investigating cause of emergency.
- C. Investigate cause and inform necessary personnel as to the problem.
- D. Correct the cause and do a full "start up" inspection of the ride.
- E. Test run ride and get management approval before opening ride to the public.

IMPORTANT

When ever the emergency system is activated due to the failure of any component of the ride or any lack of function of the ride, notify the manufacture so a determination may be made as to it's cause and proper repair procedures.

Emergency reset:

To reset emergency system and reactivate control panel

- A. Turn out emergency button.
- B. Turn on hydraulic pump motors.
- C. Assure control key switch is on.
- D. Press reset button.
- E. Start ride cycle and test run ride.

2. **Power Failure Procedure.**

In the case of a power failure ride will slow down , arms will come down and ride will come to a stop in the loading position. After ride has stopped, unload passengers and clear platforms. **Do not** re start ride until power is restored and correct voltage is determined.

6. **LAP BAR OPERATING PROCEDURE:**

The Star Force Amusement Ride vehicle is equipped with a ratcheting lap bar. This bar is designed to adjust to the largest passenger size. It is recommended that the larger person sit to the outside of the vehicle. The lap bar automatically locks when pulled down and is released by pulling up on release knob located on the top front outside of vehicle. The operator should check security of each lap bar before every ride cycle by pulling tightly on bar to assure it is locked. If a lap bar is found not to operate properly, that particular vehicle should be closed off until necessary repairs can be made.

RIDE CYCLE DESCRIPTION:

To better understand the operation of the Star Force, the following is a description on what actions take place per one ride cycle. The ride cycle is controlled by a programmable controller located in the main electrical cabinet. This controller has a pre-set program which activates different functions to form one complete ride cycle. When the slow speed button is depressed the whole structure of the ride begins to rotate at approximately 1 3/4 rpm. This function is not controlled by any timing process and will stay in this mode until the fast speed, stop ride, or emergency button is depressed. When the operator is ready to start a ride cycle the fast speed button is depressed. This action activates the main ride cycle timer and initiates the controller sequence. During this sequence the spinners AC inverters activate beginning vehicle rotation. After a short time period and the vehicles have reached their operating speed (30 rpm) the high speed center drive AC inverter engages, bring the center up to its operating speed (10 rpm). When the center reaches its top speed the arm hydraulic cylinders activate raising the arm to their extended limit. The extension of these arms cylinder is regulated by a proximity switch which relays information to the controller. Prior to the expiration of the main ride cycle timer the arms dump valve deenergises the arms lower to the loading position. When the arms are completely down, the ride cycle timer expires causing the center and spinners to brake to a stop through their own internal braking system. When at a complete stop an auxiliary brake activates on each motor.

8.

DAILY OPERATORS PRE-OPENING INSPECTION PROCEDURES

The following are general guidelines as to the critical components and areas which require a daily inspection in order to assure the safe operation of the ride for passengers and operators. These points are guidelines for the operator to use in his/her daily inspection of the equipment. It is also necessary that the operator use their expertise and common sense in evaluating all components and procedures respective to their and / or rides particular environment and conditions.

1. Assure all pre-opening maintenance is complete.
2. Inspect all ride and trailer blocking.
3. Assure all fence, ramps, chains and gates are secure.
4. Check platforms for obstructions and any signs which may indicate a problem with ride. (oil spill, parts, etc.)
5. Inspect all lap bars for proper operation.
6. Assure all sweep spreader and cross braces are pinned and safety keyed.
7. Inspect car hanger ball caps to make sure they are tight and locking pin is secure.
10. Assure car safety chains are in good condition and secure.
11. Check vehicle attachment ball joint for security.
12. **Test run ride.** Check for any unusual noises or actions. (investigate if necessary)
13. Test emergency system.
14. **Report any problems or concerns to proper personnel.**

SECTION 3

GENERAL MAINTENANCE PROCEDURES

NON-DESTRUCTIVE TESTING AND SAFETY MODIFICATIONS
POLICY FOR TIVOLI ENTERPRISES 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 Enterprises Ltd., therefore, requires no scheduled testing by non-destructive means for the engineered life of the components, unless listed below and issued to the operators in the form of a safety bulletin, or indicated in the operations manual.

It should also be understood that this policy is based on the operator / owner exercising proper maintenance and care procedures of all components according to the manufacture's specifications, along with routine visual inspection of all structural components for any unusual circumstances.

Any unusual circumstances must be reported to the manufacturer immediately.

In the event that a fault or potential safety problem is discovered through our own testing or field experience requiring an annual test or modification, information concerning these tests or modifications will be made available immediately to the owner of the equipment.

Below are listed current safety bulletins or equipment modification bulletin.

<u>BULLETIN NUMBER</u>	<u>RIDE</u>	<u>CONCERNING</u>	<u>EFFECTIVE</u>
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NDT Requirements

In Conjunction with the annual thorough daily and weekly examination of the Star Force Amusement ride the following Non Destructive testing should be carried out.

After the first two years of operation and then every year after that;

Vehicle Frames:

A sample of four cars at random should be N.D. Tested by using Magnetic Partical inspection to monitor weld attachments at the upper and lower end of the vertical attachment posts. Should any signs of cracking occur in any of these samples then 100% examination of fault areas should be carried out. If cracks or any other irregularities are discovered the manufacture must be notified immediately so proper repair procedures can be determined.

Car Pivot Ball: A random sample of seven car ball connectors should be checked by Magnetic Partical Testing. All car ball connectors must be visually checked for wear and signs of damage to the neck of the ball. Any test failures must be reported to the manufacture immediately.

Vehicle Spinners:

Vehicle Sweeps: The inner end of the seven sweep arms where the pivot pin is located along with "L" shaped sweep sections must be tested by M.P.T.

Two sweeps at random from each spinner should be removed and all welds should be tested with particular attention to the pin holes and hollow tube sections.

Sweep Spreaders: A random sample of 3 spreaders should be tested to monitor the weld attachments between the main hollow section and the cross bracing. Pin holes should also be included.

Main Sweep Arms:

Inner Fixed Arms: The outer end of the inner fixed arm should be tested to include the pivot shaft bosses and gussets, special attention should be given to the welds around the outer ends of the boss gusset plates.

Important

This section deals with the general maintenance, visual inspections and safety checks of the Star Force Amusement Ride. They are designed to assist the operator / owner in the control of the operation of the ride. The maintenance and checks should be accomplished by a qualified technician capable of understanding purpose and function of the ride and all it's sub components. This equipment has been designed and built to handle normal wear and tear of every day operation. It is necessary to inspect all components and structures on a regular basis and to investigate and repair any irregular conditions. In the event that any abnormal conditions are found which is capable of causing a future failure or possible safety hazard, report immediately to a supervisor and if necessary notify Tivoli Enterprises Ltd. for consultation.

**ALWAYS USE PROPER SAFETY EQUIPMENT WHEN ERECTING, REPAIRING OR DOING
GENERAL MAINTENANCE**

MAINTENANCE AND INSPECTION PROCEDURES

Pre-Opening Maintenance and inspections

When erection of the Star Force Amusement Ride is complete and prior to opening ride to the public, the following maintenance and inspection procedures should be followed in order to assure trouble free operation. These points should be covered in addition to normal start up maintenance required prior to operation each day.

- A. **Power Supply:**
Assure incoming power supply is correct and adequate for operation. Correct voltage, and power consumption requirements are indicated on the rides data plate fixed to the underside of one of the three (3) sweeps near the center of the ride.
- B. **Blocking:**
Check all trailer, outrigger, and platform blocking to assure it is adequate for that particular soil consistency. For average condition it is recommended that the main trailer and outrigger blocking points have a minimum of an 24 in. x 24 in. x 6 in. block under each jack stand. Platform jacks require under average conditions a minimum of 6 in. x 6 in. x 2 in. under each jack stand. Inspect blocking for looseness and movement. If necessary readjust and relevel.
- C. **Fencing, Gates, and Platforms:**
Check all fence and gates to assure they are fitted properly in their sockets and all are in their proper place. Inspect platform level and assure there are no obstructions which may cause a tripping hazard. Make sure all exit platforms and entrance steps are solid and blocked properly. Check all scenery panels and back bally cloth for proper installation.
- D. **Vehicle inspection:**
Inspection of Passenger compartments and vehicle components is a part of normal daily and operational routine. Listed below is a more indepth control to be followed after the ride is erected.

1. **Lap Bars;** Check lap bar for proper operation by lowering completely. While bar is lowering a ratcheting sound will be detected, which will indicate the ratchet mechanism is working correctly. Pull up lap bar to assure it stops in the lowered position (It should lift slightly then stop). Release lap bar by pulling up on knob located on the top right side of car. Each vehicle should be checked.
2. **Car Hanger Ball Joint;** Visually check ball joint to car connection, assure ball is fitted properly and there are no signs the ball security nut has become loose. Check ball caps and cap cover to assure they are secure and tight. If cap cover is loose, adjust cover adjustment bolts to take out any play between ball cap and cover. Adjustment should be only enough that the cover cannot be moved easily by hand. Assure cover locking pin is installed and properly keyed.
3. **Safety Chains;** Check car to sweep safety chains to ensure that chains are in good condition and attachment clevises are screwed in completely.
4. **Fiberglass Body;** Inspect passenger compartment for any conditions which could possibly be of harm to riders, such as sharp edges, tears in fiberglass, or foreign objects. Make any repairs before opening to public.
5. **Racking Pins;** Check Vehicles to ensure all racking pins are removed from the underside of the vehicles. There are (3) three pins per car. **It is absolutely necessary to remove these pins before operation. If left on during operation these pins can fly off causing injury to bystanders.**

E. SPINNER Sweeps, Spreaders, and Cross Braces;

1. Inspect spreader and cross brace "L" pins. Ensure all are keyed with safety keys in good condition.

F. Center and sweep arms;

1. Inspect all light panels and fiberglass center scenery. Ensure all panels are secured.
2. Check arm flange bolts on two sweeps which hinge for transportation. All bolts should be torqued to 390 ft. lbs.
3. Inspect arm hinge pin for security and proper function.

G. Hydraulic system;

A regular inspection of hydraulic hoses, fittings, valves and other components are necessary for proper operation of the Star Force. Prior to opening check for leaks, fluid levels etc. Repair all problems quickly. Refer to the hydraulics section 4 for indepth maintenance and inspections.

H. **Electrical system:**

The following checks are general housekeeping information to keep the electrical system operating to its maximum efficiency. For a more detailed view of the Star Force electrical system refer to the electrical section 5.

1. Check all electrical enclosures to assure covers are closed and weather seals are in good condition
2. Inspect all exposed electrical cords, check insulation and look for any damage which may have arisen from transportation.
3. Check all electrical enclosures to insure all wire connections are tight on the components and terminal blocks.
4. Inspect lighting repair or replace any broken or burned out light fixtures.

DO NOT WORK ON ANY ELECTRICAL COMPONENTS WITH POWER ON. TURN OFF AT MAIN BEFORE ANY WORK IS STARTED.

I. **Gearboxes:**

Check fluid levels in spinner and center drive.

J. **Lubrication:**

Consult lubrication section 7 for daily and pre-opening lubrication schedule.

STAR FORCE
Maintenance Schedule

COMPONENT	PROCEDURE	FREQUENCY
Structural		
Hinged sweep flange bolts	Replace	Annually
Fixed sweep flange bolts	Check Tightness	Monthly
Main Center Bearing Bolts	Check Tightness	Monthly
Spinner Bearing Bolts	Check Tightness	Monthly
Spinner Drive Gear	Check Tightness	Monthly
Center Drive Gear	Check Tightness	Monthly
<u>Hydraulic System</u>		
(Review Hydraulic Section 6)		
Lift Cylinder Pressure Filters (3)	Replace	After First 100 Hours Every 500 Hours After If Bypass Indicator is Red
Lift Cylinder Suction Filter (2)	Replace	After First 100 hours Every 500 Hours After If Bypass Indicator is Red
Center Column Oil Reservoir	Replace	Bi-Annually
Hoses and Fittings		
	Check for leaks	Daily
Pressure Settings		
	Check gauges for Proper Settings	Monthly
<u>Lubrication</u>		
(Review Lubrication Section 7)		
Center Main Bearing	Lubricate through 3 fittings to right of center drive pinion gear. While ride is in slow Rotation.	Every 6 hours of operation
Spinner Center Bearing	Lubricate through 3 fittings directly into bearing located above sweeps.	Every 12 hours of operation

Sweep Arm Pivot Joint	Lubricate through fitting on end of pivot shaft	Every 12 hours of operation
Lift Cylinder End Bearings	Lubricate through fittings on cylinder end cap	Every 36 hours of operation
Vehicle Ball Joint Bearing	Place small film of grease on all bearing surfaces	Prior to each set up
Lap Bar Latching Mechanism	Spray with light oil	Bi-Monthly
All sweep and racking pins	Place small film of grease on contact surfaces	Every set up or as needed
Platform winch rollers and pulleys	Place light film of grease on bearing surfaces. Lubricate rollers through access hole.	Every set up or as needed

Electrical System

(Review Electrical Section 5)

Ground Fault Interrupters (GFI)	Test Function by tripping through test button on each GFI.	After each set up
Wiring and Component Connections	Tighten if necessary	Monthly
Center Brushes and Commutator	Clean and check spring tension on brushes	Monthly
Control Transformer	Check output voltage Adjust for 115-120 V	After each set up

STAR FORCE
WEAR TOLERANCES

COMPONENT	ALLOWABLE WEAR	ACTION
Sweep Arm Pivot Bushings	.0625"	Replace
Sweep Arm Pivot Shaft	.0625"	Replace
Spinner Sweep to Hub Pins	.09375"	Replace
Spinner Sweep Turnbuckle Pins.	.0625"	Replace
Spinner Sweep Turnbuckle Pin Receiver	.125"	Rebore
Spinner Spreader Pins.	.0625"	Replace
Spinner Spreader Pin Receiver	.125"	Rebore
Vehicle Pivot Ball	.0625"	Replace
Vehicle Pivot Ball Bushings	.0625"	Replace