**A.R.M. Inc.**
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Bulletin No.:SB091505
Release Date:09/15/05
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Supercedes: N/A
Completion Date: N/A


# SERVICE BULLETIN

RIDE MANUFACTURER: A.R.M. Inc. AFFECTED PRODUCTION DATES: 4/04 – 6/05
RIDE NAME: SS1002 Super Shot AFFECTED SERIAL NO.: SSPK101 – SSPK105
MODEL NUMBER: Park Model SS1002 Super Shot

ABSTRACT OF ISSUE:
NDT Requirements for the Passenger Vehicle and Trolley Devices

REASON FOR RELEASE:
Re-evaluation of stress analysis indicates (7) areas of minor concern.

ACTION TO BE TAKEN (INSPECTION, MODIFICATION,REPLACEMENT, NDT, ORDER PARTS, MANUAL REVISION, PROCEDURAL CHANGE, ETC.)

NDT Procedures to be followed as outlined in the new Section 5 of the ride manual.

DETAIL OF ISSUE:
(TEXT/DRAWINGS/SCHEMATICS)

Included with this bulletin is NDT Section 5 of the ride manual. This section is to be reviewed immediately and added to the existing manual for future reference.

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09/15/05

Mr. Donald Van Houten
State of New Jersey
Department of Community Affairs
Carnival Amusement Ride Safety Unit
101 South Broad Street
Trenton, NJ 08625-0808

Ref: SS1002 TC-00291-00 Super Shot

Dear Don,

This letter is in regards to the SS1002 Super Shot. I am issuing a Service Bulletin regarding NDT requirements for areas of concern on the passenger vehicle and trolley mechanisms. In this package you will have a copy of the issued Service Bulletin and a NDT section to be added to the maintenance manual.

Please feel free to phone with any questions regarding either of these items.

Thank you,

Mike Gill
President

# A.R.M. (U.S.), INC.

# NDT PROCEDURES

## TESTING, INSPECTION & ENGINEERING SPECIFICATION

# ATMOSFEAR AMUSEMENT RIDE

# SECTION 1
# INTRODUCTION:

## 1. INTRODUCTION:

The purpose of this text is to establish guidelines covering methods, techniques and procedures for the application of Nondestructive Testing (NDT) methods and the inspection of the "Atmosfear" Amusement Ride manufactured by A.R.M. (U.S.), Inc.

# SECTION 2
# SPECIAL
# CONDITIONS

## 2. SPECIAL CONDITIONS:

This text contains proprietary trade secret information. These specifications and its contents are disclosed only to our customer, who is hereby bound to keep the contents of this text confidential. Disclosure of the contents of these specifications cannot be made without our written and specific authorization. Failure to treat this text, its contents, and format as proprietary, will result in criminal and/or civil prosecution.

# SECTION 3
# DEFINITIIONS

## 3. DEFINITIONS:

a. **Manufacturer:**
A.R.M. (U.S.), Inc.
1506 Fernwood Road
Wintersville, OH 43953
Phone 740.264.6599

b. **Design Engineer:** A.R.M. (U.S.), Inc.

c. **Structure or Test Specimen:** "Atmosfear" Amusement Ride

d. **Owner:** Morey's Piers
3501 BoardWalk
Wildwood, NJ 08260

e. **Manufacture Date:** 2005

f. **Serial Number:** SSPK104-04-05-05

g. **Independent Inspection Consultant (IIC):**

Independent subcontractor, engineering firm or inspection consultant whose responsibilities include reviewing the NDT requirements of the manufacturer and design engineer and preparing NDT procedures to meet in-house safety, preventive maintenance or quality assurance programs, or the specific requirements of the customer, whether domestic or international. The IIC shall be required to have one or more individuals who maintain a minimum certification of SNT-TC-1A Level III.

h. **Test Zones:** These are specific areas noted by the manufacturer or design engineer as critical areas or high stress concentration zones during static loading. These areas, sometimes called hot spots, shall be inspected frequently and periodically, as defined by the manufacturer.

i. **Nondestructive Testing (NDT):** Application of various inspection and testing methods to a material or specimen, which when completed, have not altered the specimen or characteristics of the material or specimen in any way.

j. **Discontinuity:** As defined by AWS D1.1, a discontinuity is an "interruption of the typical structure of a weldment, such as lack of homogeneity in the mechanical, metallurgical or physical characteristics of the material or weldment. It is important to note that a discontinuity is not necessarily a defect.

k. **Defect:** A defect is defined as a "discontinuity or discontinuities, which by nature or accumulated effect, render a part or product unable to meet minimum applicable standards or specification." This term designates "Rejectability." Specific data regarding judgment and classification of discontinuities are contained in this procedure.

# SECTION 3
# DEFINITIIONS

I. **Classification of Defect, Discontinuity or Note Inventory:** (3-classifications)

1) **"ACCEPT":** Address all discontinuities or notes of interest documented during the survey under this classification as a preventive maintenance measure or to improve quality assurance. If discontinuities or notes of interest are not corrected, then they should be monitored between inspection frequencies for growth propagation.

a) Other Alternate Acceptance Criteria:

i. (AWS D1.1, Section 1.1.2)
- "suitability for service using past experience, experimental evidence or engineering analysis, considering material type, service load effects and environmental factors."

ii. (AWS D1.1, Commentary 1.1.1)
- "what is achievable"
- "should not be considered as a boundary for suitability for service."

2) **"REJECT":** Address all defects noted during the survey under this classification without hesitation and prior to placing the item back in service. If the defect is not corrected, it should be monitored daily until the defect is corrected. However, defects under this classification by nature or accumulated effect render a part or product unable to meet minimum applicable acceptance standards or specifications.

3) **"FRACTURE CRITICAL":** Address all defects noted during the survey without hesitation and prior to use. Not addressing the defect could pose immediate threat to life and property.

# SECTION 4
# GENERAL

## 4. GENERAL:

Establishing specifications for inspection and compiling the final inspection report for our customer will require careful consideration to manufacturing processes, types of services involved, stress, areas to be inspected, methods of inspection and frequency of testing. The total program will require some refinement as the inspection programs progress and are repeated. Certain methods may not be feasible under existing conditions in which case adjustments will have to be made, and this will require close cooperation of both the inspector and client supervision.

The following specification and components have been written by A.R.M. Inc. and are derived in accordance with appropriate specifications and codes of leading American Societies including the guidelines of ASNT-TC-1A, and with instruments calibrated and certified by independent laboratories, in conformity with the Bureau of Standards, Washington, D.C. In addition to the said standards, inspection specifications include utilization of the IIW-2 calibration block, Alcoa "A" blocks and sectional parts involved in actual failures. Qualified inspectors will be required to hold a minimum of a NDT Level II status or higher for all procedures other than VT, and in accordance with the American Society of Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A, designated IIC. All VT may be performed by qualified Morey's Piers maintenance personnel. However, there are many variables that enter the picture in field testing applications, such as material composition, alloy content, temperatures and geometrics of the part, all of which affect the multiple NDT methods employed or specified. Complete cooperation will be appreciated when adjustments are necessary in the questionable areas, where resolution for the most suitable method of testing and inspection of areas of interest must be determined.

NDT is the use of physical methods for evaluating materials without impairing their usefulness. NDT test methods are simple in principle, yet play an important role in daily operations in almost all aspects of industry. However, success in their use depends heavily upon intelligent application and discriminating interpretation of the results. They are easily applied cure-alls, but they can be instrumental in assuring improved reliability, safety and productivity when applied as an efficient and effective NDT program.

NDT tests must be designed, specified, and scheduled for validity and reliability on each individual application. These specifications, and mainly the test areas and points themselves, are specific for a particular problem or potential failure area. There is no such thing as a general or universal NDT test applicable to every kind of material part or structure, nor to all their function or operating conditions.

Each of the specifications in this text have been based upon the best understanding of the nature and function of the material or part being tested and the conditions of its service. Any drawings and service data furnished to the inspector will enhance the inspection reliability. This information is a necessary prerequisite to a NDT test in correlating material properties, type of service and "Accept", "Reject" or "Fracture Critical" criteria. Failure in not having this information before applying and depending upon a NDT test can be costly.

It's absence can create an element of doubt with the inspector, and as a result, they will tend to be highly conservative. In many cases, this could result in parts being rejected because indications of discontinuities or relevant indications that would not actually be detrimental to its operation. In order for your NDT program to operate more effectively and with meaningful results, certain basic elements will be incorporated into your present system. These elements referred to as standards are (1) test specifications, (2) test methods, and (3) a reference standard. A discussion of each of these elements and their relation to our overall program follows:

**a. Specification:** Specifications may be either performance or design. It will be the end use of the equipment and the type of service to which it will be exposed that will govern the "Accept", "Reject" or "Fracture Critical" limits on the discontinuities or relevant indications. Specification must include a description of an acceptable quality level, and this level must be defined in terms of, or related to, performance standards, which can be understood by persons performing the inspection or by persons responsible for interpreting the test results. There are certain areas of the test specimen, due to geometrics, that will not permit us to establish definite "Accept", "Reject" or "Fracture Critical" criteria based on standard reference blocks. However, guidelines will be established for these situations, whereby an evaluation will be made of the discontinuity or relevant indication at the time. Also, realizing it is an inescapable necessity that the specifications covering NDT tests define the limits of acceptable quality, we will attempt to minimize situations where an "on the spot" evaluation will have to be made regarding a discontinuity or relevant indication.

# SECTION 5
# INSPECTION AREAS

**a. Designated Inspection Areas:**

1) General: Based on design requirements and specific loading calculations, which have determined where specific stress concentrations exist during normal loading, there are a minimum of seven (7) areas identified for annual inspection frequencies. The seven areas are located on the following two (2) components:

a) Trolley Assembly - 4-Areas (Reference Inspection Areas 1 through 4)
   i. Area 1 - Wheel Guide Brackets (8 Total) - Fillet Welds
   ii. Area 2 - Trolley Cable Attachments (2 Total) - Fillet Welds
   iii. Area 3 – Trolley Corners – (4 Total) - Full Penetration Welds
   iv. Area 4 – Trolley Lifting Hook Lugs (2 Total) – Fillet Welds

b) Car Frame Assembly: 3-Areas (Reference Inspection Areas 5 through 7)
   i. Area 5 – Car Frame Lifting Lug (2 Total) – Fillet Welds
   ii. Area 6 – Wheel Assemblies (16 Total) – Fillet Welds
   iii. Area 7 – Car Frame Seat Supports (4 Sides Total) - Box Tubing Fillet Welds

**b. Methods of Testing and Inspection:**

1) General: Based on design, fabrication, specific loading calculations, accessibility and limitation, the NDT methods recommended for the specified test zones are as follows:
   a) Areas 1, 2, 3, 4, 5, 6 & 7 (VT)
   All of these areas shall be visually inspected for surface discontinuities, particularly in welded details. Once in service, these areas should be inspected annually for damage, defects and any discontinuities.
   b) Area 3 (MT)
   All of these test zones shall be inspected by magnetic particle testing for surface and near surface discontinuities, particularly in welded details. Once in service, these areas should be inspected annually for damage, defects and any discontinuities.

2) For surface testing a designated IIC will utilize two- (2) methods. They include VT and MT. A.R.M. Inc. reserves the right to implement other NDT methods in conjunction with these two- (2) methods if additional evaluations or interpretations are required. When using these methods, the length of the discontinuity or relevant indication in the surface is fairly-well defined. However, the depth can only be estimated, unless the geometry of the part permits us to use another NDT method to determine the depth of penetration, in which case the designated IIC shall utilize UT. When using UT, the actual size of an indication or relevant indication is not an absolute measure, even with the best techniques, and taking into account all of the variables that may influence test results.

When selecting an NDT method, it should be kept in mind that the various methods may supplement each other, and that several methods are capable of performing the same task. The methods to be selected on a particular piece of equipment was arrived at through close consideration of part geometry, type of discontinuity sought, type of material, application or service, manufacturer's recommendations, feasibility, level of acceptability desired, and accessibility.

3) For sub-surface testing a designated IIC will utilize one- (1) method, UT.

We will not attempt to set reference standards or specifications for the surface-testing portion of the program. However, we will establish procedures and protocol formulated from analysis of the test specimen, review of past history and experience with similar items.

The designated IIC will incorporated into the UT method of the program certain rules governing standard references and calibration of the test equipment based on standard references blocks and sectioned parts of actual equipment which have failed in service. These set-ups will vary, depending upon the specimen and the area of interest.

**c. Frequency of Inspection and Testing:**

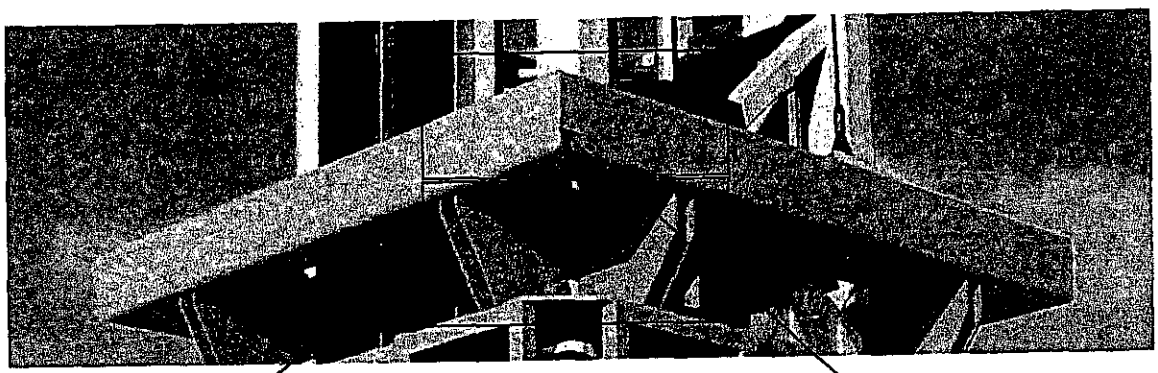
Shall meet or exceed all federal, state and local regulatory agencies. Inspection frequencies shall comply with the manufacturer's recommended guidelines and latest bulletins and shall meet the Owner or manufacturer's specific safety, PM, and operating procedures. Many other variables may affect the actual periodic or frequent inspection requirements. The minimum inspection frequency for nondestructive testing to the test zones identified in this procedure is **"Annually."** Note: Any repairs, damage or discontinuities noted in these areas will result in more frequent testing and inspection frequencies.

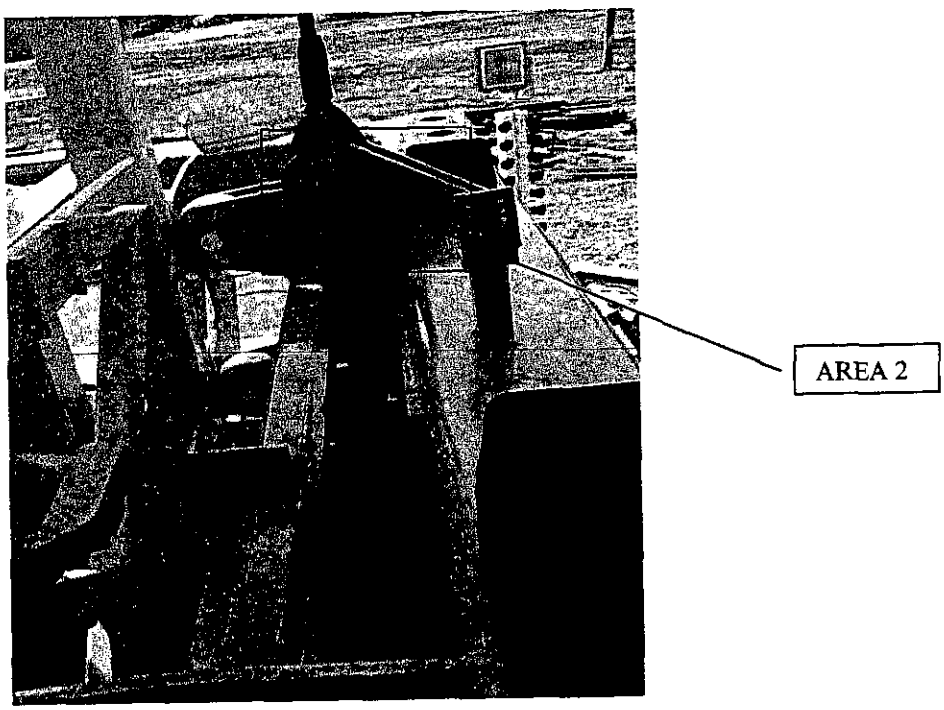
## 5. EVALUATIONS AND INTERPRETATIONS:

In evaluating NDT test methods, it is necessary to discriminate between the reliability of the test method and the reliability of the judgment of the inspector. Lack of specific data, inadequate operating experience or bad judgment may seriously influence the inspector's conclusions. The combination of accurate test data with good judgment and intelligence is essential to the success of the overall program. The designated IIC, should assure that inspectors, technicians and associates performing the work are trained and certified for their designated responsibilities and will not change, modify, or deviate from this standard in any way. The methods that we have selected in our specifications for each of the items, is based on the type of defect that we are looking for, and the most accurate way to reveal it. Any data available such as drawings, material specifications,, and historical data including previous inspection information, that is furnished to the inspectors will be essential in achieving a thorough and valid test and will improve the quality of your NDT program. Failure to furnish said information may result in inaccurate interpretations and may compromise the test results, particularly during the classification segment of the report.

## 6. RECORD KEEPING:

Documentation and record keeping is of major importance to the success and operation of any quality assurance or NDT program. Those items in the program will require identification. Historical data will be collected and should be maintained for each item. This will permit us to duplicate test conditions, and enable us to plot crack progression and recommend corrective maintenance work prior to failure. This type of record keeping is necessary in maintaining realistic "Accept", "Reject" or "Fracture Critical" criteria.


AREA 1
AREA 3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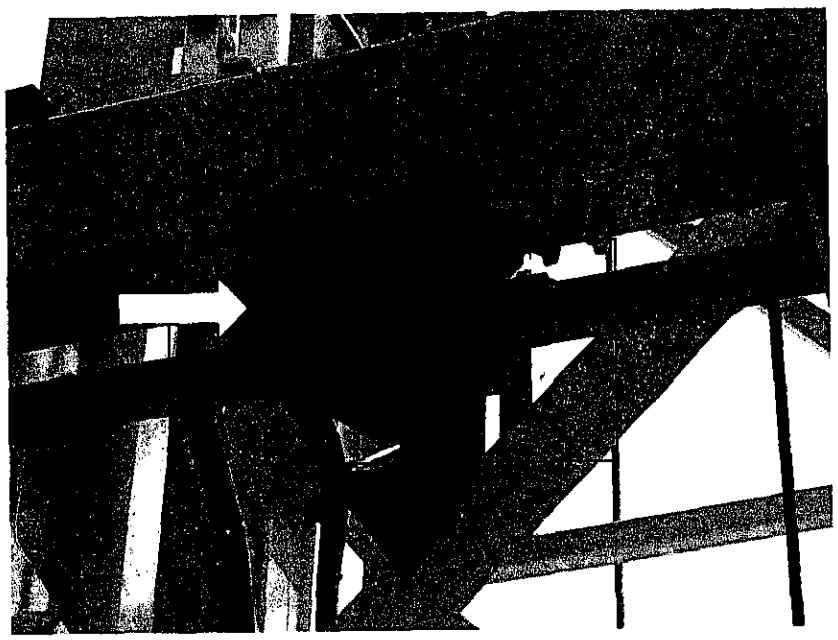

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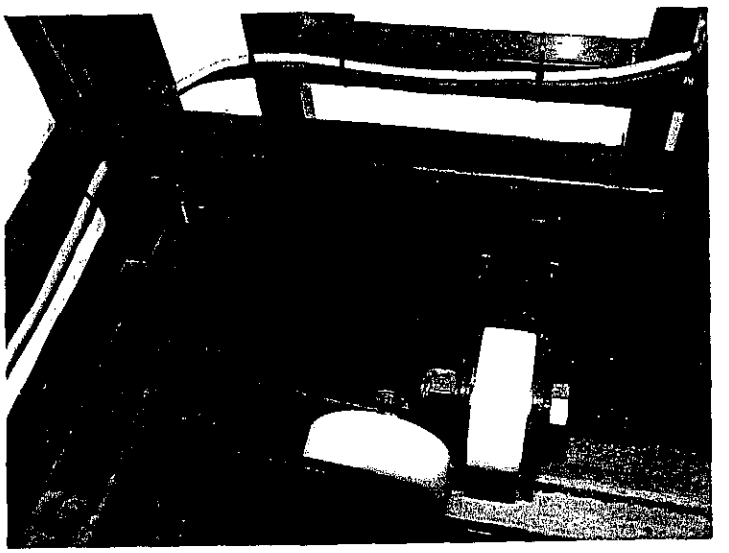
**AREA 5**



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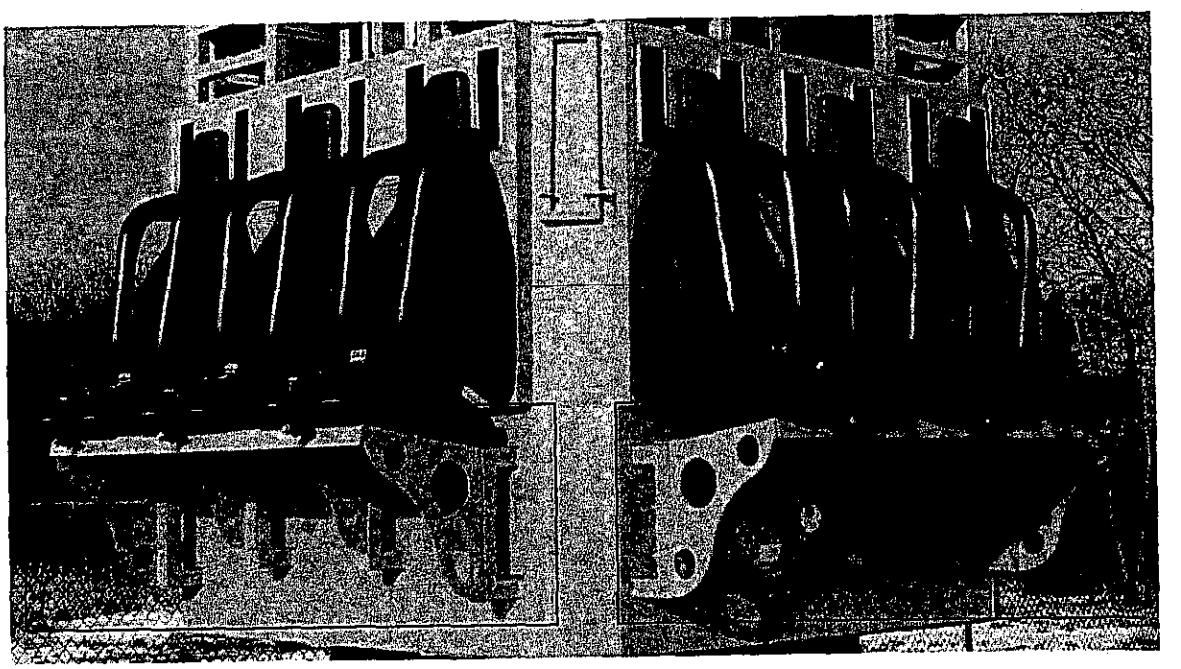

**AREA 7**

# SECTION 6
# MAGNETIC BRAKE DEGRADATION TESTING

## 1. GENERAL OUTLINE:

The Atmosfear amusement ride passenger vehicle is equipped with permanent magnet frictionless brakes. Through methods of engineering, performance testing and test data analysis, these magnetic brake modules have been fixed to the passenger vehicle frame in a specific orientation and with a specific "air gap" between each of the mating module sets. The "air gap" is specific to design criteria and braking profile for the SS1002 model Atmosfear. This "air gap" allows and maintains a specific flux density for repetitive braking performance within the design criteria. For verification and certification of the designed flux density necessary for optimum brake performance, a test of the magnetic system is performed upon initial installation. These values are documented by the brake manufacturer, Velocity Magnetics, and will be used for reference in the required annual degradation test.

## TESTING PROGRAM

The first required annual magnetic brake degradation test will be performed by the magnetic brake manufacturer, Velocity Magnetics, dating 12 months from the ride installation. A training session will be available, at the owners' request, upon this onsite visit. This training session is intended for the certification of the owners' maintenance personnel and to enable this test procedure to be performed by these certified personnel only at the required annual frequency.

The training session in general will include, but not limited to, recommended equipment purchase and specific test procedures as outlined by the magnetic brake manufacturer Velocity Magnetics.

## Manufacturer Contact Information

Mr. Domenic Marzano
Velocity Magnetics Inc.
186 Covert Road
New Castle, PA 16102

Ph: 724-657-8290
Fax: 724-657-8291

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Supercedes: N/A
Completion Date: N/A


# SERVICE BULLETIN

RIDE MANUFACTURER: A.R.M. Inc. AFFECTED PRODUCTION DATES: 01/04 – 03/05
RIDE NAME: Super Shot AFFECTED SERIAL NO.: SSPK101 – SSPK104
MODEL NUMBER: SS1002

ABSTRACT OF ISSUE: New rope available from wire rope manufacturer.

REASON FOR RELEASE: Newly designed wire rope available from WRCA. Load Star wire rope technology offers higher breaking forces, higher strength during fatigue life and minimizes stretch.

ACTION TO BE TAKEN (INSPECTION, MODIFICATION,REPLACEMENT, NDT, ORDER PARTS, MANUAL REVISION, PROCEDURAL CHANGE, ETC.)
The Load Star wire rope in a 7 x 31 construction will be made available for annual wire rope replacements of both the 7/8 inch main and 5/8 inch secondary wire ropes.

DETAIL OF ISSUE:
(TEXT/DRAWINGS/SCHEMATICS)

Informational Brochure Included.

file

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Bulletin No.: SB063005
Release Date: 7/05/06
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Supersedes: N/A
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Page: 1 of 1

# SERVICE BULLETIN

RIDE MANUFACTURER: A.R.M. Inc. AFFECTED PRODUCTION DATES: All
RIDE NAME: Super Shot AFFECTED SERIAL NO.: All
MODEL NUMBER: All Park Model SS1002 & Portable SS1001 Super Shot Amusement Rides

ABSTRACT OF ISSUE:

Mandatory lubrication of all lifting wire ropes (3) to extend service life and meet factory warranty

REASON FOR RELEASE:

After research by wire rope supplier of early wire rope failure, it has been recommended that wire ropes on Super Shot rides be lubricated.

ACTION TO BE TAKEN: (INSPECTION, MODIFICATION, REPLACEMENT, NDT, ORDER PARTS, MANUAL REVISION, PROCEDURAL CHANGE, ETC.)

Lubricate wire ropes with Bridon American Bronze wire rope lubricant or equivalent.

DETAIL OF ISSUE:
(TEXT/DRAWINGS/SCHEMATICS)

Lubricate as required to stop ropes drying out or rusting. Spray entire length of cable at a minimum of once a month.