MFG: A.R.M. (UK) LTD.
NAME: HOT WHEELS
Type: NON-KIDDIE

OPERATION AND MAINTENANCE MANUAL

'HOT WHEELS'

MANUFACTURER : A.R.M.

I N D E X

SECTION 1

TYPE DESIGNATION

TYPE DESIGNATION

TYPE DESIGNATION	'HOT WHEELS'
SERIAL NO.	
MONTH OF MANUFACTURE	
YEAR OF MANUFACTURE	
MANUFACTURER	A.R.M. (UK) LIMITED,
ADDRESS	ENSTONE,
	OXFORDSHIRE,
	ENGLAND.

SECTION 2

DESIGN SPECIFICATION

		MM	INS
Max Length	Travelling	14,630	576
	Erected	18,897	744
Max Width	Travelling	2,590	102
Max height top of machine	Travelling	4,000	157
Max overall dia. (with paybox)	Erected	17,068	672
Max diameter swept by cars	Erected	10,058	Rad 396
Max height top of machine	Erected	4,685	184
Max height of decking	Erected	2,400	94
Max width of seating (internal)	Erected	1,200	48
Max car length front to back internal	Erected	1,400	55
Min clearance to any adjacent ride	Erected	1,000	39
Max weight gross	Travelling	29,000 Kg	63,800 Lbs.
Max weight gross	Erected	32,000 Kg	70,500 Lbs
Max No. of passengers per car	Erected	3	
Max no. of passengers per car total	Erected	66	
Max passenger weight per car	Erected	231 Kg	510 Lbs
Max passenger weight total	Erected	5,095 Kg	11,220 Lbs.
Max loaded weight of machine	Erected	37,095 Kg	81,700 Lbs.
Max design rotational speed of centre	Erected	15 rpm	
Direction of rotation centre	Erected	Clock or Anti-Clock	
Max loading on footings	Static/Dynamic	2800Kg	6200 Lbs.

Max force on passengers outwards from centre	1.4G
Max force on passengers vertically	± 0.9G
Max linear velocity of passengers @ max radius	21 mph
Max recommended passenger time per ride	3.0 Min
Min recommended passenger height	48" - 1220mm
Max imbalance distribution when half empty	50%
Max overturning moment @ max imbalance and max load	123 Ton/Ins
Min restoring moment available unladen	660 Ton/Ins
Max horizontal force @ max imbalance and max load	5025 Lbs.
Min coificient of adhesion required unladen	0.06
Min available on hardstand steel on concrete	0.15
Min factor of safety @ max imbalance and load tipping	5.3:1
Min factor of safety @ max imbalance and load sliding	2.5:1
Max recommended deviation from horizontal when erected	± 2.5°
Max drive wheel torque @ max passenger load	Total 600 Lb/Ft.
Max mechanical power @ max passenger load	27 H.P.
Max hydraulic power @ max passenger load	45 H.P.
Max electrical power @ max passenger load	50 H.P.
Max rated power of machine (electrical) nominal	50 H.P.

Min static F.O.S. (on yield) fully loaded of any structure	3:1
Min static F.O.S. (on ultimate shear stress) arm axle	10:1
Min static F.O.S. (on ultimate shear stress) Car mounting pins	10:1

STANDARDS COMPLIED WITH OR EXCEEDED

Structural standards				BS5400-10
				BS449
Material Specification	-	Plate	Minimum	BS4360-G43A
		Hollow Section	Minimum	BS4360-G43C
		Bright Bar	Minimum	EN8

Health and Safety Executive Code of Practice (Current draft copy)

Health and Safety Executive Code of Practice 1984

ASTM Amusement Rides and Devices 1987.

	YIELD	UTS
All Plate and Rolled Sections	16.0 Ton/In²	28.0 Ton/In²
All Hollow Sections	16.0 Ton/In²	28.0 Ton/In²
All Bright Bar and Fixing Pins	18.0 Ton/In²	35.0 Ton/In²
All Imperial Sized Bolts - UNF	34.0 Ton/In²	50.0 Ton/In²
All Metric sized bolts - 150 coarse G.8.8.	34.0 Ton/In²	50.0 Ton/In²

BOLT TORQUES

3/8" UNF	4.8 kg/m	35 lb/ft.
1/2" UNF	11.7 kg/m	85 lb/ft.
5/8" UNF	23.5 kg/m	170 lb/ft.
3/4" UNF	41.5 kg/m	300 lb/ft.
1" UNF	101.0 kg/m	730 lb/ft.
M10	5.9 kg/m	43 lb/ft.
M12	10.3 kg/m	75 lb/ft.
M16	25.6 kg/m	18.5 lb/ft.
M20	50.1 kg/m	362 lb/ft.
M24	86.5 kg/m	625 lb/ft.

MAIN DRIVE MOTOR (ELECTRICAL) EURO SPEC

Voltage	415 Volts AC
Supply	3 Phase
Supply Frequency	50 HTZ
Number of Poles	2
Power	50 H.P.
Speed	3,000 RPM
Frame	D200
Mounting	Foot and flange with bellhousing to pump

MAIN DRIVE MOTOR (ELECTRICAL) AMERICAN SPEC

Voltage	220 VoltsAC
Supply	3 Phase
Supply Frequency	60 HTZ
Number of Poles	4
Power	50 H.P.
Speed	1,800 RPM
Frame	D326TS
Mounting	Nema foot and flange with bellhousing to pump

MAIN DRIVE MOTOR (HYDRAULIC)

Type	Orbitol
Displacement	9 In^3/Rev
Max Working Pressure	2500 PSI
Max Intermittent Pressure	3000 PSI
Max Drain Line Pressure	580 PSI
Max Continuous Speed	620 RPM
Max Continuous Power	33 H.P.
Max Working Temperature	80°C
Minimum Working Pressure	- 30°C
Max Torque @ 3000 PSI	366 Lb/Ft.
Rotation	Reversible
Mounting Type	Flange and Spigot
Shaft	Keyed
Filtration	15 Microns

MAIN DRIVE TYRES

Designation	520 x 10
Ply Rating Minimum	6 Ply
Max Load	1000 Lbs
Pressure	25 PSI

MAIN DRIVE PUMP

Type : Axial Pistol Variable Displacement (Swash Plate)

over Centre Closed Loop

Output Max	5.4 In^3/REV
Charge Pump	1.09 In^3/REV
Control	Manual Servo
Rotation	Clockwise
Max Pressure (Peak)	6,100 PSI
Max Pressure (Working)	3,000 PSI
Max Casing Pressure	36 PSI
Max Speed	2,900 RPM
Max Temp	95°
Min Temp	- 40°
Viscosity Range	12-200 Centistokes
Filtration	10 Microns

AUXILLARY DRIVE PUMP

Type	External Gears
Output	0.42 In^3/REV
Rotation	Clockwise
Max Pressure (Peak)	3,600 PSI
Max Pressure (Working)	3,000 PSI
Max Speed	3,500 RPM
Max Temp	80°C
Min Temp	- 20°C
Viscosity Range	12-300 Centistokes
Filtration	25 Microns
Suction	0.7-1.5 ATMOS
Mounting Type	Group 1

ROTATING ROOF DRIVE MOTOR (HYDRAULIC)

Type	Orbitol
Displacement	9.8 In^3/Rev
Max Intermittent Pressure	3,800 PSI
Max Continuous Pressure	2,500 PSI
Max Continuous Torque	300 Lb/Ft.
Max Continuous Power	33 HP
Max Working Temperature	60°C
Min Working Temperature	- 30°C
Rotation	Reversible
Mounting Type	Flange and Spigot
Filtration	15 Microns
Viscosity Range @ Working Temperature	35-75 Centistrokes

DRIVE PINION

Number of Teeth	12 Teeth
Module	M8
Pressure Angle	20°
Material	EN8

AUXILLARY DRIVE MOTOR (ELECTRICAL) EURO SPEC

Voltage	415 Volts AC
Supply	3 Phase
Supply Frequency	50 HTZ
Number of Poles	4
Power	H.P.
Speed	1440 RPM
Frame	D100L
Mounting	Nema foot and flange with bellhousing

AUXILLARY DRIVE MOTOR (ELECTRICAL) AMERICAN SPEC

Voltage	220 AC	110 Volts AC
Supply	Three Phase	Single Phase
Supply Frequency	60 HTZ	60 HTZ
Number of Poles	4	4
Power	3 H.P.	3 H.P.
Speed	1440 RPM	1440 RPM
Mounting	Nema foot and flange with bellhousing	

CENTRE SLEWING RING

Type	Ball Bearing Single Row
Number of Gear Teeth	163
PCD	64"
Module	M10
Pressure Angle	20°
Tracks	Hardened
Outer Mounting Holes	48 x 0.86"
Inner Mounting Holes	48 x 0.86"

ROTATING ROOF SLEWING RING

Type	Ball Bearing Single Row
Number of Gear Teeth	129
PCD	41"
Module	M8
Pressure Angle	20°
Tracks	Hardened
Outer Mounting Holes	20 x M12
Inner Mounting Holes	20 x 0.70"

LIFTING WINCH (MAIN)

Type	Drum and Cable
Motor	12/24 Volt DC
Reduction Gearbox - 1st Stage	2 Stage Spur Gear
Reduction Gearbox - 2nd Stage	Worm and Wheel
Overall Reduction	228:1
Max Line Pull	8,000 Lbs.
Max current at max load 24 Volt	170 Amps
Max line speed at max load	3.5 Feet/Min
Max Drum Stowage	75' 0"
Min Cable Diameter	8mm
Cable Specification	6 x 1 Fibre Core RH4AY
Cable Breaking Load	10,000 Lbs.
Direction	Reversible

LIFTING WINCH (MOBILE)

Type	Chain
Motor	0.5 H.P.
Max S.W.L.	0.5 Tons
Max Lift Speed	13 Feet/Min
Max Chain Length	50 Feet

SECTION 3

ERECTION AT SITE

The erection of the 'Hot Wheels' will require a minimum of two operatives to accomplish in a safe and efficient manner.

Before erecting the ride, examine the potential site for any signs of soft ground (if not on hardstanding) and general suitability, i.e. flatness with no excessive undulations.

Two sets of timber packings are recommended, size 5' 0" long min. These to be positioned as follows - adjacent to hydraulic jacking system.

On completion of erection, the squareness and level of the machine should be re-checked before operation is commenced.

LEVELLING TRAILER

1. Park trailer on site.
2. Disconnect air lines from tractor.
3. Untie any transit ropes and remover upper transit bars.
4. Fit temporary castors to folded floor frame (dropsides).
5. Connect three phase electricity supply to pay box.
6. Position packing under trailer chassis at front end.
7. Position 4 off screw jacks under chassis centre.
8. Take trailer weight on front hydraulic jacks.
9. Remove tractor.
10. Lower front of chassis on to packings.
11. Lower rear of chassis onto packings behind rear axle.
12. Check levels and repeat as necessary.
13. Ensure height at front allows shutters clearance.
14. When trailer is level, adjust centre jacks to suit.
15. Fit screw jacks under trailer rear - 2 off.
16. Fit long screw jacks under trailer front - 2 off.
17. When level ensure all jacks and packing are secure.

LEVELLING FLOOR

This operation requires the use of permanent winch, fitted to centre bobbin.

1. Connect winch to floor frame (dropside) and remove fixing pin.
2. Pull out outer section and position temporary castors on ground.
3. Lower floor frame to ground using winch.
4. Swing out rear arms to either side.
5. Lower rear trailer section.
6. Fit screw jacks under inner section both ends and centre 4 off.
7. Level inner section.
8. Repeat 1 to 5 for opposite side of trailer.
9. Fit screw jacks under outer floor sections - 7 off.
10. Level outer floor sections.
11. Swing vertical floor supports into position starting with highest.
12. Fix vertical floor supports into position with pins provided - 7 off.
13. Fit jacks under vertical floor support beams.
14. Fit spacing stays between vertical floor supports in number sequence.
15. Place aluminium steps on ground, rear, and trailer sides.
16. Repeat 7 to 13 for opposite side of trailer.
17. Fit all aluminium steps after platforms and segments assembled.

ROOF SWEEPS ASSEMBLY

1. Swing out sweeps in sequence, folding out joints and pinning in position, and fit outer spacing bars.
2. Repeat this for both sides of roof.
3. Fit centre and inner spacing bars rotating roof in sequence.
4. Fit winch beam brackets between two adjacent sweeps.
5. Fit winch beam to brackets.
6. Fit winch bracket brace to centre.
7. Fit wire rope between brake and winch beam outer bracket.

To facilitate rotation of roof in Item 3, open hydraulic tap fitted to roof rotation hydraulic motor. This releases hydraulic pressure and allows motor to be back driven.

TRAM ASSEMBLY

1. Fit first section 'A' to trailer and vertical floor support, at pay box end of trailer.
2. Continue around L.H. side of trailer in sequence.
3. Finish with section 'G' attaching to trailer.
4. Repeat 1 to 3 for R.H. side of trailer.
5. Tighten all retaining bolts to correct torque.
6. Re-check all screw jacks for tightness.
7. Re-check floor frame levels are still correct.

FLOOR ASSEMBLY

1. Remove transit bar from floor sections.
2. Start in a valley and work to top of hill. L.H. and R.H.
3. Repeat for other valley.
4. Remove floor section stacking frame.

ROOF ROUNDING BOARD ASSEMBLY

1. Fit first section adjacent to electrical socket in roof sweeps.
2. Continue round in sequence (20 sections)
3. To facilitate this operation, stand at trailer front and rotate roof round by hand.
4. On completion, raise roof section.

PLATFORM LIGHTS ASSEMBLY

1. Fit 18 off light modules in numbered sequence around floor perimeter.

2. Test for correct operation.

STEP AND HANDRAIL ASSEMBLY

1. Fit aluminium steps to centre of L.H. side.
2. Fit handrails in number sequence, starting at trailer centre L.H. side.

ARMS ASSEMBLY

1. Fit bar between car mounting bracket (inner).
2. Use bar to attach to winch hook.
3. Lift arm and rotate roof to position arm on ball located at hill opposite paybox.
4. Attach arm end to ball and fit pin.
5. Lower arm wheel onto tram and chock in position.
6. Fit length of keel to arm and pin.
7. Continue round in sequence.
8. Slacken off the two inner drive tyres to allow fitment of drive keel.
9. Re-adjust drive tyres when all keels are fitted.
10. Operate ride to check correct function before fitting cars.

CAR ASSEMBLY TO ARMS

(May need lever to position rear of car. Fit first car below top of hill with car pointing uphill).

1. Push front bar through slotted hole.
2. Fit pins and 'R' clips to rear of car.
3. Rotate ride to position next car in sequence.
4. Continue till last car but one, but do not pin until last car is in position.
5. Fit last car and pin into position.
6. Fit pins to remaining car.

ROOF TILT ASSEMBLY

1. Remove portable winch, beam, and brackets from roof sweeps.
2. Lower roof.
3. Spread four tilt sections out on roof.
4. Fit outer eyelets to anti-luce fasteners along sweeps. (12 off).
5. Fit hooks on outside of tilt to rounding boards.
6. Fit intermediate straps.
7. Fit centre straps.
8. To facilitate this operation, stand at trailer front and rotate roof by hand.

MAIN ARM TILT ASSEMBLY

1. Spread over arms. Lace two sections together at joints.
2. Fit elasticated straps to car frames, two per car.

Fold out three sections of Hot Wheel logo

and fix to anti-luce fasteners.

SECTION 4

OPERATIONAL PROCEDURES

THE CONTROLS OF THE 'HOT WHEELS'

COMPRISE THE FOLLOWING

1. Illuminated red stop/start button for main motor, compressor and jack motor.
2. Control lever forward and reverse and stop.
3. Switch for car lights.
4. Switch for pillar lights.
5. Switch for roof lights.

   Switch for 'Hot Wheels' logo.
6. Rounding board lights.
7. Switch for car lap bar.
8. Switch for car locks.

To operate machine, first ensure motor is switched on. Push/pull operating lever in the desired direction of rotation, slowly incrementing to allow the machine to gather speed. When lever has reached its extremity of travel, then full speed is reached. To stop machine, slowly pull/push lever to centre position.

NOTE. Machine may be operated clockwise or anti-clockwise. In emergency, reverse direction of operating lever.

Before operating machine, ensure all passenger restraints are in position and no limbs are protruding outside the car. Ensure there are no personnel in the vicinity of any moving parts of the machine.

NORMAL OPERATIONAL SPEED - 12RPM

SECTION 5

TESTING AND INSPECTION

DAILY INSPECTION

AND MAINTENANCE

TRAILER

1. Check any timber shoring under trailer for security.
2. Check surrounding area for local subsidence.
3. Check machine is true and level.
4. Check any hydraulic jacks, securing pins and fastenings.
5. Check any hydraulic hoses and fittings.

DECKING

1. Check full circumference of perimeter fence for security.
2. Check steps at entrance points for security.
3. Check all deck plates for loose screws and protrusions.
4. Check for any loose debris or grease.
5. Check for cracks at slewing ring/trailer connection.
6. Check securing of bolts slewing ring/trailer connection.
7. Check there are no obstructions in front of control booth door.

MACHINE

SECURING PINS, 'R' CLIPS AND NUTS AND BOLTS

1. Check all main platform securing pins are in position complete with 'R' clips.
2. Check car securing pins and 'R' clips.
3. Check slewing ring/car bolts for security.
4. Check all passenger restraining bars for proper function.
5. Check all passenger restraining bars linkage for security.
6. Check slewing ring/trailer bolts for security.
7. Check hydraulic drive motor bolts for security.
8. Check all drive wheel securing bolts for security.
9. Check all drive shaft bearing block bolts for security.

FABRIC AND WELDMENTS

1. Check all structures for major distortion, buckling etc.
2. Check all cars fabric for cracks or damage.
3. Check all wiring and light fittings for security.
5. Check all structures for cracks in parent metal at critical points.
6. Check all structures for cracks in weldments at critical points.

DRIVE SYSTEM

1. Check all pneumatic tyres for correct pressure, cuts or abrasions.
2. Check drive shafts for cracks and security.
3. Check drive shaft bearings for operation.
4. Check all hydraulic hoses and fittings for security or damage.
5. Check all power cables and contactors for damage and operation.

LUBRICATION

1. Check all hydraulic fluid levels.
2. Check all securing/pivotal pins are greased.
3. Check all bearings for adequate lubrications, (including slewing ring).
4. Check all linkages and safety devices are lubricated.
5. Check any control linkages and bowden cables.

RUN MACHINE UP TO FULL OPERATIONAL SPEED (UNLADEN) AND CHECK

1. All gauges and warning lights for correct function.
2. Machine does not exceed max operation speed (12 rpm)
3. For unfamiliar noises or vibrations.
4. Proper function and smoothness of controls.
5. Proper function of any safety devices or interlocks.
6. Any unusual movements or deflections of machine.
7. All drive tyres are functioning correctly and following correct path.
8. Any signs of overheating or smoke.
9. For any loose cover panels or fittings about to detach from machine.
10. Braking/stopping system of machine at least twice, in succession.
11. Any signs of hydraulic fluid being ejected.
12. Any fire extinguishers are in position and correct type.

WEEKLY INSPECTION

AND

MAINTENANCE

TRAILER

1. Check main structural members and weldments for cracks.
2. Check any hydraulic jacks for corrosion of chromed stem.
3. Check any hydraulic jacks for seepage of fluid.
4. Check any hydraulic hoses and fittings for seepage or damage.

DECKING

1. Check perimeter fence for damage and security.
2. Check all aluminium chequer plate decking for damage and security.
3. Check slewing rings/trailer retaining bolt torque with reliable torque wrench.
4. Check for metal/weldment cracks at slewing ring/trailer connection.

MACHINE

SECURING PINS, 'R' CLIPS AND BOLTS

1. Remove platform securing pins and check as (4).
2. Remove car retaining pins and check as (4).
3. Remove car arm retaining bolts and check as (4).
4. From 1 to 4 inclusive, check for any signs of the following - surface indentation, fretting, (bright spots), cracking, deformation and corrosion.

CHECK THE FOLLOWING BOLT TORQUES

WITH A RELIABLE TORQUE WRENCH

5. Slewing ring/trailer.
6. Hydraulic drive motor securing bolts.
7. All drive wheel securing bolts.
8. All drive shaft bearing blocks securing bolts.

FABRIC AND WELDMENTS

1. Examine one complete structure of each type for cracks in the vicinity of weldments and including the actual weldments. The structures to be examined in sequence, i.e. platform 1, month 1, platform 2, month 2, platform 3, month 3, platform 4, month 4, etc.
2. Check paintwork and make good if required.

DRIVE SYSTEM

1. Check drive tyres for wear, min tread depth 1mm.
2. Check drive shaft bearings for wear and tight spots.
3. Check slewing ring for wear by rocking.
4. Check slewing ring for tight spots.

LUBRICATION

1. Check hydraulic fluid for carburisation and contamination.
2. Check hydraulic filters for proper function and silting.
3. Grease slewing ring at grease nipples provided.
4. Grease drive shaft bearings at nipples provided.

Operation machine and check as in daily inspection.

TWELVE MONTHLY INSPECTION AND MAINTENANCE

Every twelve months the machine must undergo a thorough examination by an appointed person who is an independent examiner suitably qualified to undertake this task and preferably having experience of non-destructive testing (N.D.T.) on steel fabrications.

To aid this examination, all weldments not visible by virtue of being masked by other structures must be made visible and reasonable access provided by appropriate dismantling, in part, or whole, of the relevant sub-assemblies.

The following are the major areas of the machine to be examined using the appropriate procedures and working to the relevant checklist in a methodical manner.

Structural Examination
Mechanical Examination
Electrical Examination
Hydraulic Examination
Pneumatic Examination
Test Procedure Examination

Any defects found, to be noted, and the implications for the integrity of the machines safe operation to be noted. Any serious structural defects must be communicated to the manufacturer at the earliest opportunity so that suitable rectification methods may be formulated and any necessary design modifications may be incorporated in future machines.

If satisfactory, sign logbook and issue inspection certificate. If not, replace unsatisfactory members and test machine as relevant checklist.

STRUCTURAL EXAMINATION

1. Check all structures for gross deformation and signs of impact.

2. Check all connecting pins and bolts for deformation, cracks, surface fretting, and correct material grade. If in doubt, **discard.**

3. Check slewing ring securing bolts for defects and correct material grade.

4. Check structures for corrosion and cracking of parent metal or weldment especially in highly stressed regions in the vicinity of securing and retaining pins or bolts. If in doubt use N.D.T. such as dye penetrant test to corroborate findings.

5. Check deck plates for damage and cracks. If in doubt, **discard.**

6. Check any timber fabric for security and damp rot. If in doubt, **discard.**

7. Check any superficial covers for security.

8. Check general level of upkeep and comment in writing.

9. Check general condition of paint finish and corrosion, i.e. superficial or deep corrosion.

10. For general correctness of assembly, with particular attention to securing pins, i.e. positioned correctly or incorrectly.

NOTE Prior to examination of 1 to 3 inclusive, degrease and clean thoroughly.

Prior to examination of 1 to 4, remove any paint or corrosion and clean thoroughly.

PNEUMATIC EXAMINATION

1. Check for leaks in cylinders or pipework.
2. Check cylinder stems for pitting or corrosion.
3. Check cylinders for retention of fluid (water).
4. Check main filter for sludge and water retention.
5. Check cylinders for jerky or intermittent operation.
6. Check cylinders for bent rods.
7. Check main reservoir for leaks and retention of water.
8. Check all valves for function, especially the exhaust section.
9. Check pressure is within design specification.

HYDRAULIC EXAMINATION

1. Check hydraulic pump for smooth operation with no signs of cavitation, noise or leakage.
2. Check shaft drive coupling for wear and security (if not close coupled).
3. Check for hose or fitting leaking and kinked or damaged pipes.
4. Check any indicators on oil filters (where provided) for evidence of sludging.
5. Check oil filler cap is not sludged and tank is open to atmospheric pressure.
6. Check oil is not heavily contaminated, sludged or carburised.
7. Check any bundy tubing is not pitted or corroded.
8. Check drive motor for jerky running or loss of power (leakage).
9. Check circuit pressure is correct and within design specifications.
10. Check settings of any relief or cross over relief valves.
11. Listen for squealing noises from valves.
12. Check control linkage for smooth consistent operation.

MECHANICAL EXAMINATION

1. Check slewing ring for roughness in operation, also check for play between races.

2. Check slewing ring for adequate greasing and any corrosion.

3. Check slewing ring drive gears for pitting, flaking and backlash.

4. Check slewing ring bolts for correct grade and torque.

5. Check passenger restraint device linkages for wear, lubrication and operation.

6. Check car slewing rings for roughness in operation and play.

ELECTRICAL EXAMINATION - 240 VOLT AND 416 VOLT A.C.

1. Check all generator terminals. Single or three phase are enclosed.

2. Check all sockets and connectors are of industrial type LE BS.4343.

3. Check that neutral points of conductors are connected to the metal enclosures of all the equipment and where possible be connected to an earth electrode via a protective conductor. The connection to earth should be made at one pint, i.e. the generator.

4. Check no switches are inserted in any protective conductor and no single pole switch inserted in any neutral conductor.

5. Check if a rotary inventor is used to produce AC from DC earthing. Requires special consideration.

6. Check residual current circuit breakers for max setting of 30 MA.

7. Check residual current circuit breakers are installed in the conductors between earth reference point and the distribution equipment.

8. Check all metallic parts of the ride carrying electrical equipment should be bonded and connected to the protective conductors.

9. Check where the ride is on hard standing. It may not be possible to earth. It is imperative that protective bonding is checked regularly.

10. Check all cables are flexible multi-core with correct rating.

11. Check any flexible armouring is connected to system protective conductors.

12. Check all cable joints and terminations are mechanically protected and provided with the appropriate strain relief.

13. Check that any 13 amp domestic fitting is weatherproofed and properly supported.

14. Check all motor starters are provided with overload and short circuit protection and where restarting after power loss may cause danger is fitted with a device which opens the starter switch on loss of power.

15. Check all AC motors are totally enclosed.

16. Check that where 3 phase supplies are used for lighting the separate phases are at least 2 metres apart and clearly identified.

17. Check all fuses and circuit breakers are correctly rated.

18. Check all cables, couplers or plugs and sockets are connected so that live pins cannot be exposed.

19. Check neon lights are inaccessible and the transformer and cables are out of reach and weatherproofed.

20. Check that if AC and DC lighting is used, plugs and sockets are not to be cable or cross connections.

21. Check all parts of system for earth leakage and faults remedied.

22. Check continuity of protective conductors. Max voltage 50 volts, max current 25 amps. The measured value of resistance low enough to protect the system by removal of the supply in the event of short circuit to metal parts.

23. Check insulation resistance. Max test voltage 500v DC. The measured resistance to be not less than 1 megohm. Ensure test voltage is not applied across electronic components that may be damaged.

24. Check residual circuit breakers with suitable RCCB instrument. They should trip to the rated current. Also check the test button to ensure tripping mechanism is free.

25. Check all electrical enclosures are properly secured to prevent unauthorised access. Check where such enclosures are accessible to the public. They should be fitted with lockable handles so a tool is necessary to gain access.

26. Check interlocking control systems with wiring diagram to ensure system integrity is maintained after any modifications. The devices should be examined for mechanical wear and deterioration of insultation resistance between conductors and also checked for correct operation.

ELECTRICAL EXAMINATION - 110 VOLT DC

1. Check generator output is not connected to earth.

2. Check there is a generator isolator switch in each pole.

3. Check for correct fuses on output panel, one per pole.

4. Check isolators and fuses are not shorted out by wire links.

5. Check terminal connectors are brass not ferrous.

6. Check all exposed live points have covers of robust insulating material.

7. Check all metal enclosures are connected by low resistance bonding conductors, including the generator frame.

8. Check cables are flexible with tough outer cover, not metal armoured.

9. Check all cables are protected from mechanical damage by conduit etc.

10. Check all cables on output panel to be restrained to prevent strain on terminations.

11. Check if ride is on hardstanding, cables to be clear of main thoroughfare.

12. Check all joints to make good electrical contact and be of adequate mechanical strength and properly insulated. Twisted wire joints are not acceptable.

13. Check joints for signs of overheating and high resistance.

14. Check all motor starting systems incorporate a no-volt device to ensure that if supply fails it reverts to off position.

15. Check the resistance elements enclosure is adequately ventilated and robust.

16. Check all cable terminations, starters and motors are shrouded with robust covers.

17. Check all terminations under rides are shrouded and enclosed.

18. Check fuses are fitted in each pole at the starter to protect from overloads.

19. Check lighting circuits are fused against overloads.

20. Check flashing light contactor panels are enclosed.

21. Check all DC conductors and cables for faults to earth are correct.

22. Check continuity of bonding conductors. Test volts max 50v, current not exceeding 25 amps. Resistance of conductors 0.5 OHM max.

23. Check the insulation resistance of equipment. Max test voltage 500v, min resistance not less than 0.5 MEGOHMS.

TEST PROCEDURE

1. Request all parts found defective are replaced.

2. When satisfied that ride is erected in correct manner, request ride is operated unladen to maximum design speed.

3. Observe ride in unladen operating condition.

4. If satisfied, request ride be fully loaded to design specification.

5. Request ride is operated at maximum design speed.

6. Observe ride in fully laden operating condition.

7. Request ride be unloaded and re-examine as in:-

   Structural Check List : 1-10

   Hydraulic Check List : 1-12

   Mechanical Check List : 1-15

8. If satisfactory, issue certificate and sign logbook.

9. If second examination reveals defects, downrate ride and repeat examination. Nature of defects should be communicated to manufacturer for their dissemination and appraisal.

2 YEARLY INSPECTION (NDT)

Every two years the machine should be submitted to non-destructive testing (N.D.T) of its structural components.

This should be carried out by an appointed person who is an independent examiner (as in the 12 monthly inspection) and an NDT technician certified to appropriate level in a nationally recognised certification scheme, viz:-

1. PCN - (Personal certification in N.D.T)
2. ASNT - (American Society of N.D.T)

Appropriate level for evaluation of results is level II. It is the responsibility of the appointed person to verify the technician is suitably qualified and agree the test method and technique to be used.

The appointed person must distinguish between original manufacturing flaws and ones developed during use. Also, he must distinguish between significant and insignificant flaws.

It is advised that the appointed person consults expert opinion as appropriate in the following disciplines:-

1. N.D.T.
2. Stress Analysis.
3. Welding Technology.

See checklist for N.D.T. of machines structure.

N. D. T. OF MACHINE'S STRUCTURE

RECOMMENDED METHODS OF N.D.T.

1.	Dye Penetrant Test	D.P.T. for (surface cracks).
2.	Magnetic particle test	M.T. for (surface cracks).
3.	Ultrasonic Testing	U.T. for (flaws and thickness).

APPLICATION CHECK LIST

1. Check for surface cracks in parent metal at weld toes, edges of holes and any flamecut edges, in general terms in the vicinity of any stress raised.

2. Check for cracks in the surface of weldments. These should appear along the throat of the weldment.

3. Check for cracks in drive shafts in the vicinity of keyways, holes, changes in dia. or any other discontinuity.

4. For reduction in wall thickness in hollow sections caused by internal corrosion, also check for serious external corrosion (this is far less likely). This is important on thin wall sections in the vicinity of weldments and high stress areas.

NOTE Use DPT/MT for 1-3 after thorough surface preparation and degreasing of structural surface.

Use U.T. for 1-4. Remove paint and thoroughly clean coat with grease to give a good acoustic coupling.

On completion of testing, re-paint all surfaces.

SPECIFIC AREAS TO BE CHECKED

1. Check main arm to ball block connection.
2. Check main arm to axle and keel plate.
3. Check car rear mounting arms.
4. Check car front slipper bar.
5. Check keel attachment brackets.

NOTE : THESE ARE ALL AREAS OF MAX STRESS

Other areas to be checked are at the discretion of the appointed person.

Machine to be dismantled as in twelve monthly inspection to allow sufficient access for the N.D.T. technician and equipment.

THE FOLLOWING INFORMATION IS REQUIRED ON N.D.T. REPORT

1. Date of examination.
2. Technicians name and qualification.
3. Details of N.D.T. technique.
4. Parts examined and which elements comprised part of sample.
5. Parts unavailable for examination, if any.
6. Results of examination.

ALL REPORTS TO BE KEPT AVAILABLE BY THE RIDE OWNER