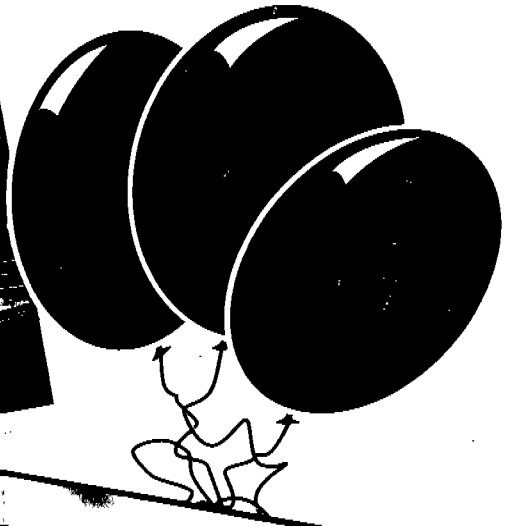
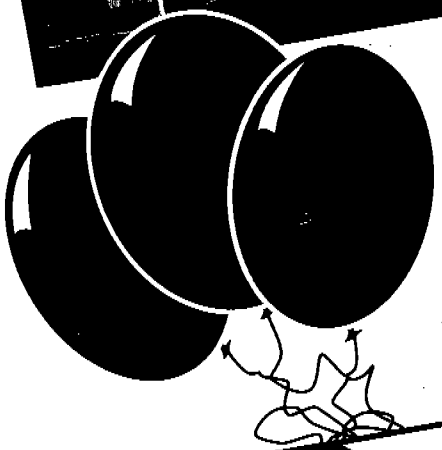
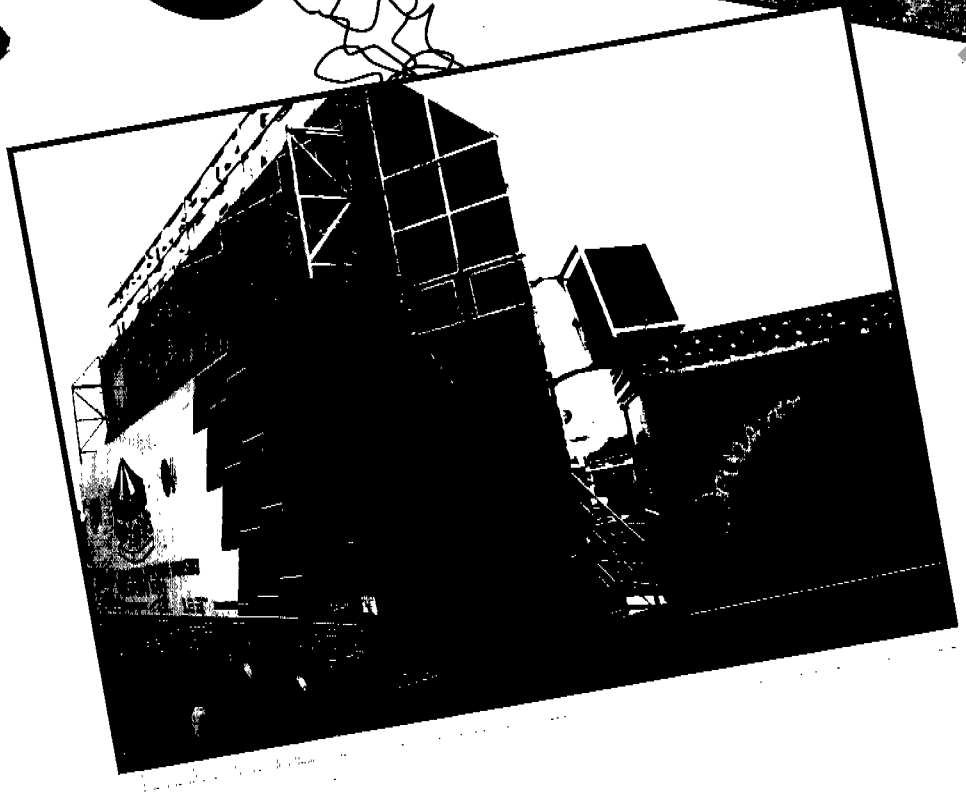
MFG: EMMETT & SONS LTD
RIDE: DEVASTATOR

KEITH EMMETT & SONS LTD.







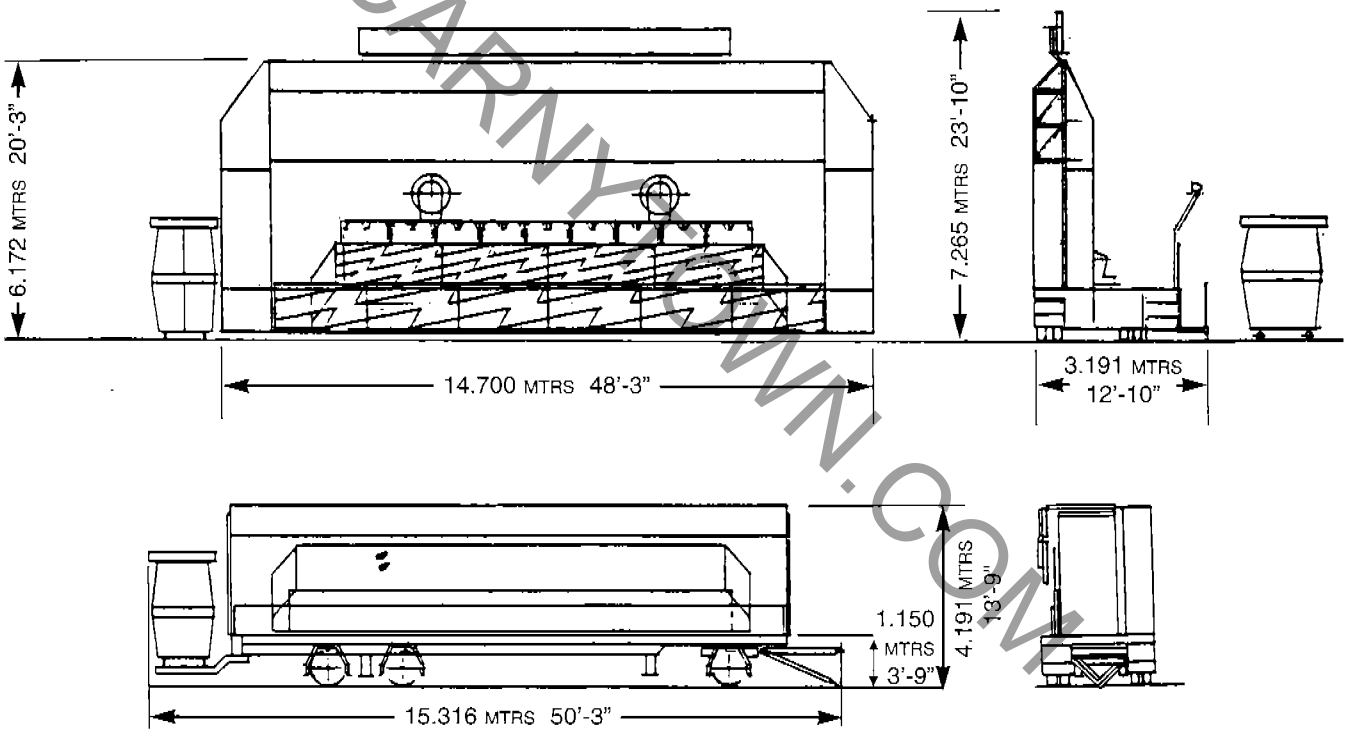
Specifications

Seating:	18 Person Bench Type Seat
Capacity:	720 People Per Hour
Construction:	Steel - Aluminium - Fibreglass Artistic Scenery Painted On Aluminium Panels
Lighting:	30 kw
Power:	150 kw
Drive:	Hydraulic - Electric
Set Up Time:	2 Men 30 Minutes (Hydraulic Operated Folding
Panels)	
Trailer:	Single Axle (Front) & Tandem Axle (Rear) Air Ride Suspension

Optional Extras

Hydraulic Operated Jack Legs,
Choice of Border Lights & Sign,
Name & Artwork to Customer Specification,
Front Apron Lights,
Mobile or Static Paybox Designed to Suit Customer Specification,
Smoke Machine,
Music System.

24 HOUR SERVICE & SPARES BACK-UP



A truly exhilarating experience, this adult ride has proved to be very popular, not only with the public, but with the operators because of the ease of setting up and dismantling.

Instant acceleration thrusts the ride to a height of approximately 25 feet, side to side movement, and the ride swoops to the floor - leaving the rider breathless and wanting more!.

Manufacturer:-

K T ENTERPRISES
in association with
KEITH EMMETT & SONS LTD.
Tel: 01908 670734
Fax: 01908 671271

Sales:-

KEITH EMMETT & SONS LTD.
76 High Street
Stony Stratford
Milton Keynes
MK11 1AH
Tel: 01908 261631
Fax: 01908 561862

'Miami' Type Fairground Ride

Owner's Manual

In Association with Keith Emmett and Sons,
76 High Street, Stony Stratford, Milton Keynes,
MK11 1AH Tel: 01908 670734 Fax: 01908 671271

With Compliments

INDEX

SECTION 1

INTRODUCTION

INTRODUCTION

The Owner's Manual covers the Operation and Service of your Ride.

Two important factors concerning the quality of this ride are Reliability and Long Service Life. We have written this Manual with these factors in mind. Please read it carefully.

The Manual contains Technical Data concerning your Ride and lots of useful information about its Operation and Maintenance.

Keith Emmett & Sons are always at your service if you have questions regarding Service or Maintenance which may not be included in this Manual.

SECTION 2

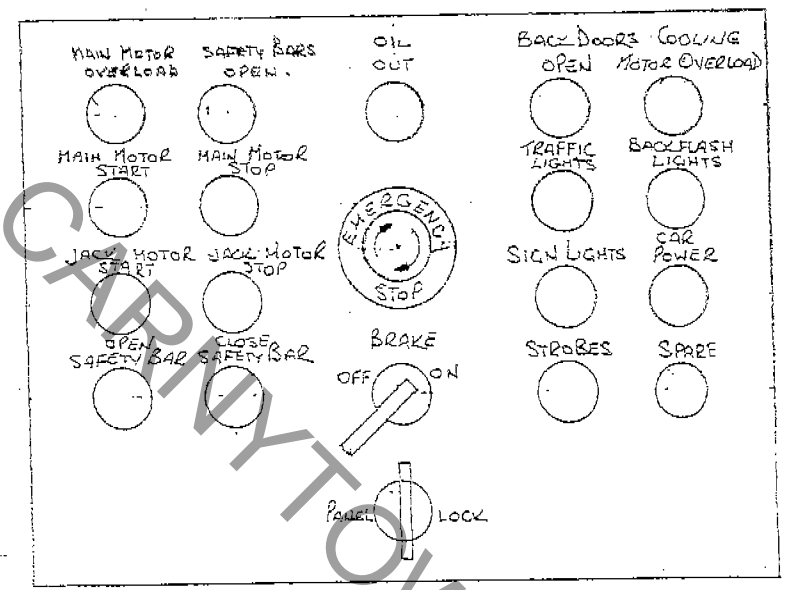
INSTRUMENTS AND CONTROLS

ELECTRICAL INSTRUMENTS

Situated in the Pay Box are the controls for operating the ride.

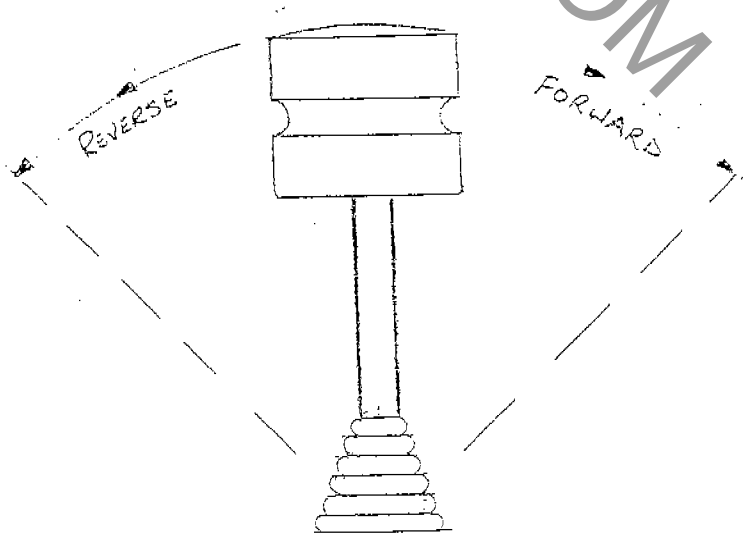
For Example: Press Button Controls and Warning Lights (see Figure 1)
Joy Stick (see Figure 2)

Figure 1



Operating Control Box

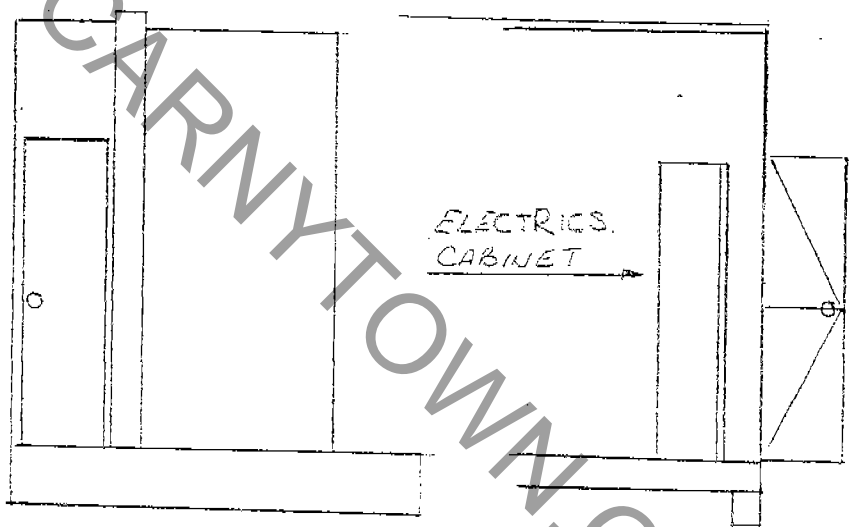
Figure 2



Joy Stick

ELECTRICAL INSTRUMENTS

The main Electrics Cabinet is situated at the rear of the Trailer inside the Counter Balance Weight Compartment.



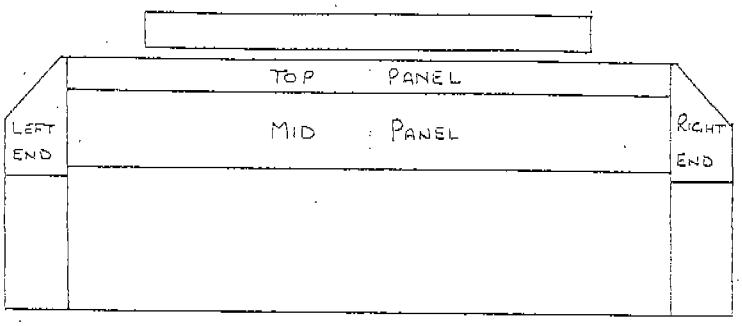
Rear End of Trailer

SECTION 3

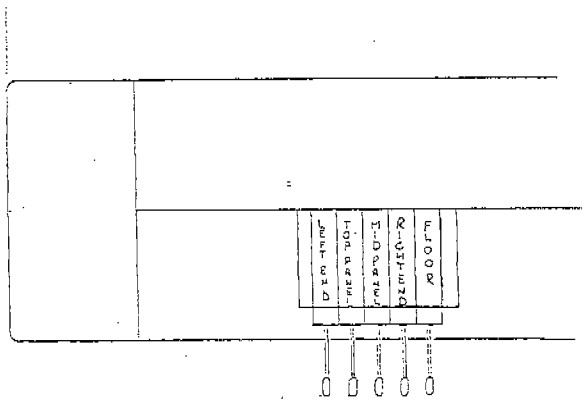
SETTING UP RIDE

SETTING UP RIDE

Situated at the offside rear of the trailer are the hydraulic levers for raising and lowering the backflash, end panels and the folding floor.



Folding Panel Layout

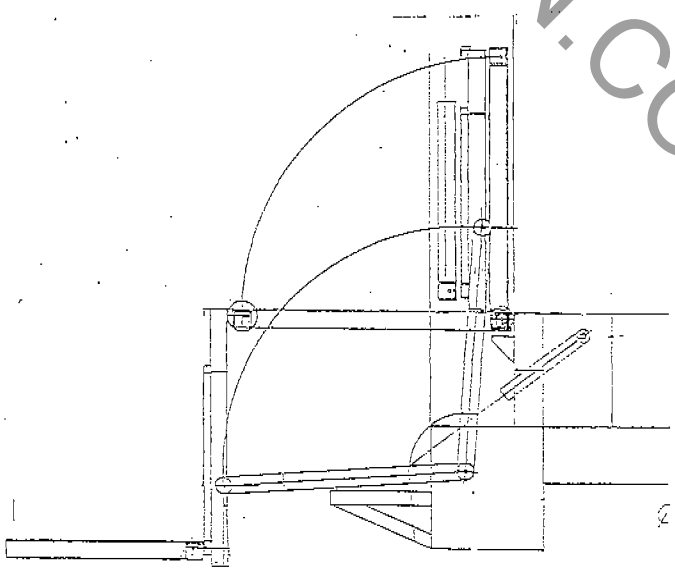


Hydraulic Levers

PROCEDURE FOR SETTING UP RIDE

1. By pushing the lever marked 'Floor' forward, lower the folding floor (which also lowers the front apron) until it comes to rest on stop plates (or level with the main floor of the trailer).

2. Manually fold down walkway and apron.



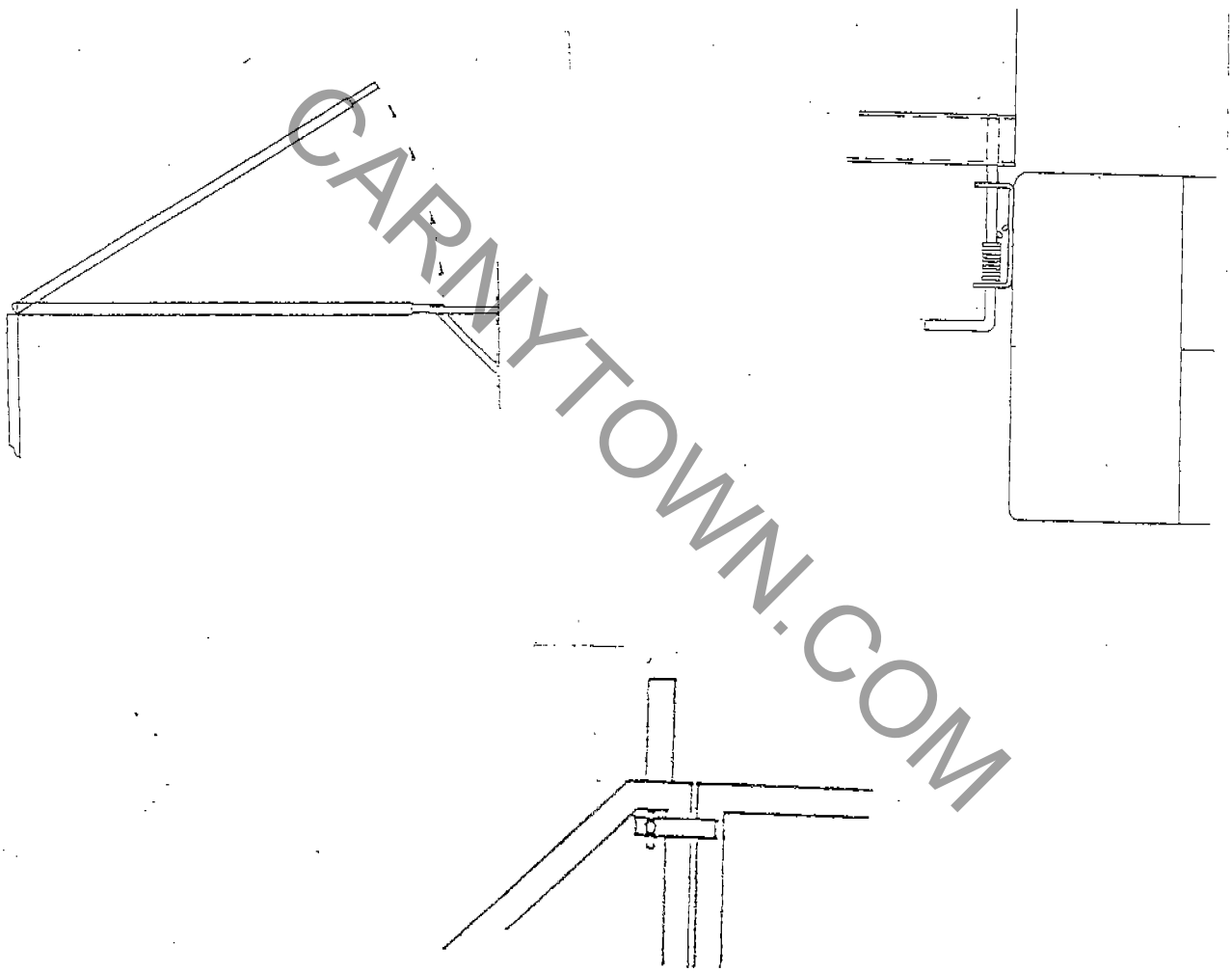
PROCEDURE FOR SETTING UP RIDE, Continued

4. End Panels.

(a) By pushing the lever marked 'Right End' raise the end folding panel until it is clear of the holding bracket, then manually pull the panel round into position.

(b) Secure with shoot bolt.

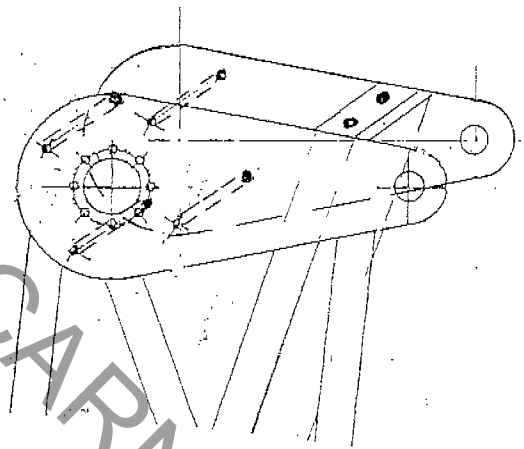
(c) Push lever again and raise the panel until in the upright position and located into anti-loose fastener. Manually lock anti-loose fastener.



All Panels are now in working position.

PROCEDURE FOR CONNECTING COUNTERBALANCE WEIGHTS

1. The seat beam has to be driven anticlockwise to the top position until the counterbalance weights rest on the stop plates between the two pear shaped side plates. This will line up the four locking bolt holes.



Fit 2 No M24 Locking Bolts at top of Counterbalance Weights and torque to 607 ft lbs.

Fit 4 No M24 Locking Bolts and torque to 607 ft lbs

2. Repeat on other counterbalance weight.

The ride is now ready to operate.

PROCEDURE FOR SETTING UP RIDE, Continued

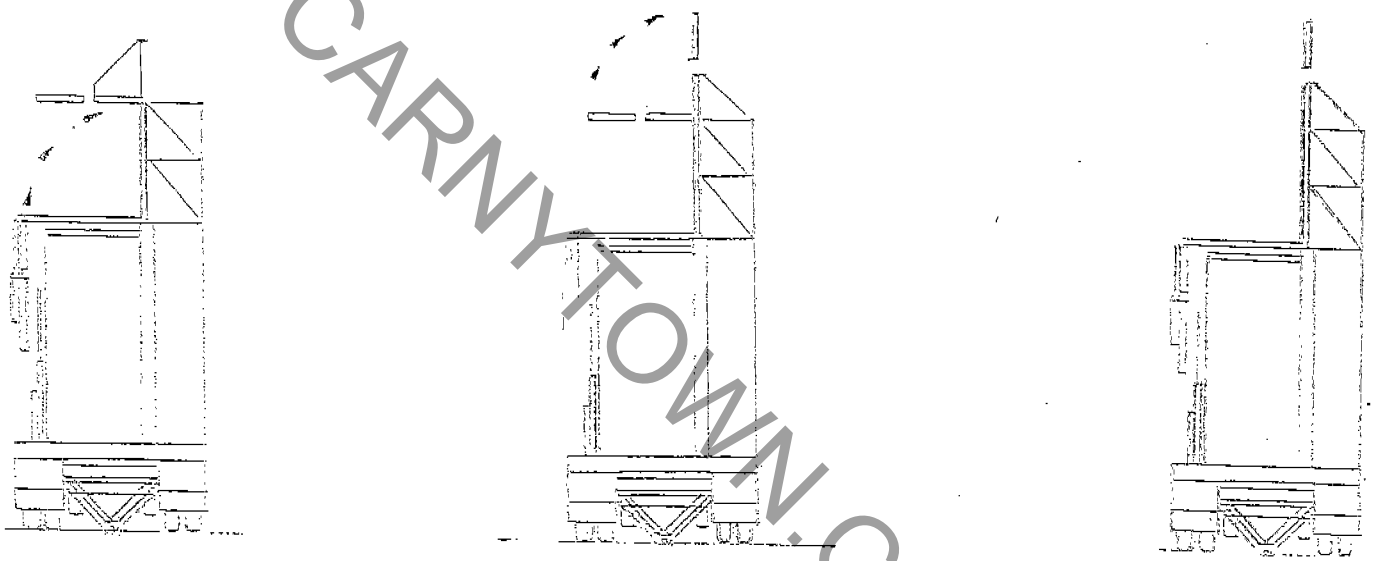
3. Mid and Top Panels.

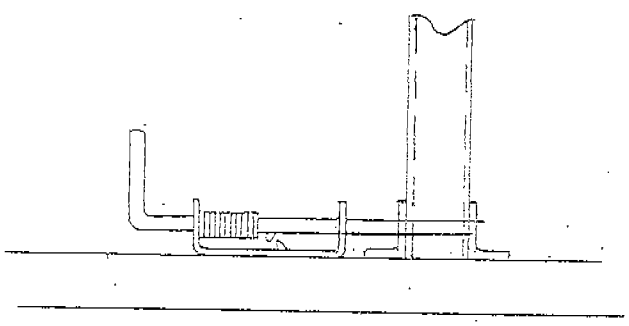
(a) By pushing lever marked 'Mid Panel' raise the panel clear of holding brackets.

(b) Manually swing round in position the three braces and secure with shoot bolts.

(c) Continue to raise the mid panel until in the upright position and braces are located into holding brackets. Manually secure with shoot bolts.

(d) Manually swing round the three top braces. Push lever marked 'Top Panel' until in the upright position and secure with shoot bolts.





SECTION 4

ROUTINE MAINTENANCE AND GENERAL INFORMATION

ROUTINE MAINTENANCE AND GENERAL INFORMATION

HYDRAULICS

It is very important that the hydraulic oil is checked and changed at regular intervals.

1. It is recommended that the hydraulic oil level is checked on a weekly basis and is topped up as necessary.

2. Hydraulic filters must be checked (for debris, etc) before starting the ride at any time. If in doubt replace filters.

3. All hydraulic motors, brake, pump, connection bolts and fittings must be checked daily and tightened as necessary.

NOTE:

Unchecked oil and filters can damage the motors, brake and pumps and will result in the loss of work time for the ride.

There is a hydraulic maintenance contract available which enables our hydraulic engineer to ensure that the important maintenance of the hydraulics is regularly monitored (details can be found in Section 6 of this manual).

LUBRICATION

1. Grease Slewing Ring Bearings every 10 hours by way of Grease Nipples on the inside of the Ring.

2. Slewing Ring Gearing must be greased every 10 hours using Castrol Grippa or equivalent.

BOLTS

It is important that all bolts are regularly checked for correct torque.

1. Main Shaft Bolts must be checked daily and torqued to 180 ft.lbs.

2. Counter Balance Weight Locking Bolts must be checked daily and torqued to 507 ft.lbs.

3. All Trailer Wheel Nuts must be checked and torqued to 550 ft.lbs. before starting on the next journey.

4. All Tie Bar Bolts must be checked daily.

MAIN SHAFTS

It is strongly recommended the two main shafts that support the seat beam are:

1. Visually checked daily.
2. NDT (ultrasonically) tested six monthly.
3. Replace shafts every two years.

SAFETY FEATURES

1. There are two main doors at the rear of the ride. Each door has a safety switch. If while the ride is in motion a door is opened the ride will immediately stop. A red light marked 'Door Open' will register on the Electrical Panel in the Pay Box. The door must then be closed before the ride will restart.

2. The seat beam also has a safety switch. If in the unlikely event the lap bar was to open a red light marked 'Lap Bars Open' will register on the Electrical Panel in the Pay Box and the ride will immediately stop.

HEIGHT RESTRICTION

IMPORTANT NOTICE

It is recommended that persons under the height of 4'0" not be allowed to ride on this machine, as an extra safety precaution.

SPEED RESTRICTION

It is recommended by the Health and Safety Executive that this ride is not run in excess of 20 rpm.

ELECTRICS

It is recommended that all electrical faults be reported to the manufacturer so that our electrical engineer can ensure that any repairs are carried out to a satisfactory standard.

NOTE

The Mannufacturer would prefer that Owner's carry out only basic maintenance while the machine is under warranty.

WILSON CONSULTANTS

A member of the National Association for Leisure Industry Certification

BROOK FARM, WILSON, MELBOURNE, DERBY DE73 1AH, ENGLAND
Tel & Fax : Derby (01332) 863380 - International : +44 1332 863380

Mr Sid Midlane
Keith Emmett & Sons Ltd
Unit 3B
Deans Road
Old Wolverton
Milton Keynes
MK12 5NA

15 May 1995

Dear Sid,

Design Review Report No. 0694/03

You asked me to write to you concerning the above Wilson Consultants' report which deals with the design safety of a Miami Trip gondola support shaft. The detail of the particular design was prepared in an A4 drawing by yourself and forwarded to me by fax on 27 June 1994. This design version (the sixth) of the shaft consists of two main diameters (108mm and 100mm) meeting at a shoulder. I assumed that the shoulder was 400mm in from the narrow end of the shaft and that there would be a shoulder fillet radius of 4mm.

The report concluded that fatigue failure of these shafts should not occur providing that they are maintained in good condition (e.g. corrosion etc.). However, I noted that the shafts are safety critical components with no secondary back up. I consequently recommended that you should consider including instructions in the ride Operations Manual covering medium and long term inspection and maintenance of the shafts.

I confirm that it is my view that your proposal to advise annual strip down inspection and magnetic particle NDT of the shaft shoulder should satisfactorily ensure the future safe operation of the shafts. On discovery of any crack or deterioration the operator should seek further advice before reopening the ride to the public.

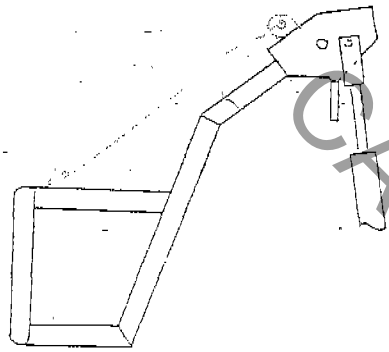
Yours sincerely

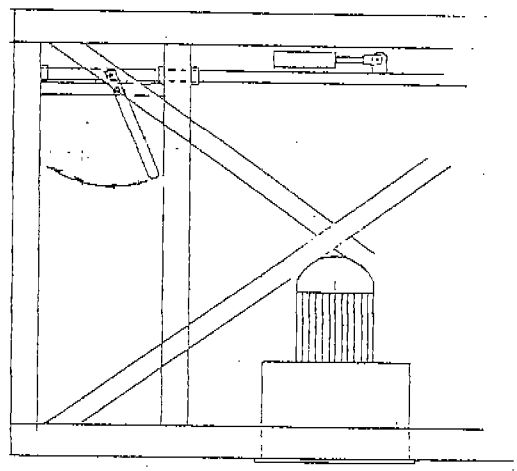
Dr Garry Fawcett, Wilson Consultants

MANUAL LAP BAR RELEASE

The Lap Bars are operated by Hydraulic Rams and a Slide Bar.

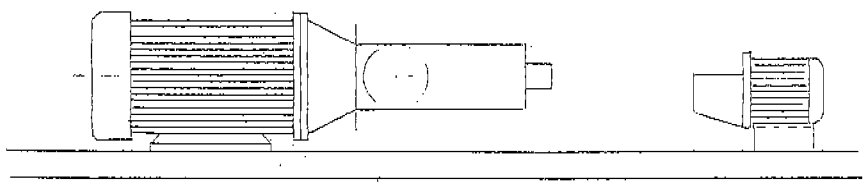
The Slide Bar has a series of slots which allow the Lap Bar Retaining Plate to pass through it. When the 'Bars Open' button is pressed the Lap Bar will raise to the open position. When the 'Bars Closed' button is pressed the Lap Bar will lower to the closed position. The Slide Bar will move sideways away from the slots, which means the Lap Bar Retaining Plate is locked to the top edge of the Slide Bar.





If in the event the Slide Bar fails to open hydraulically, a manual release bar can be operated allowing the Slide Bar to move sideways so that the Lap Bar Retaining Plates can pass through the slots and the hydraulic rams can raise the Lap bar to the open position.

The main electric motor and hydraulic pump are located on the offside of the trailer (Gt Britain) and nearside (Europe), under the folding floor.



Main Electric Drive Motor and Pump Jack Pump

SECTION 5

SPECIFICATIONS AND CALCULATIONS

STRUCTURAL REPORT

FAIRGROUND AMUSEMENT RIDE

SUBJECT:	MIAMI SURF MK II
COMMISSIONED BY:	Keith Emmett & Sons Ltd
PREPARED BY:	MAGER DESIGNS
AUTHOR:	GERALD HOBSON
DATED:	MAY 1993

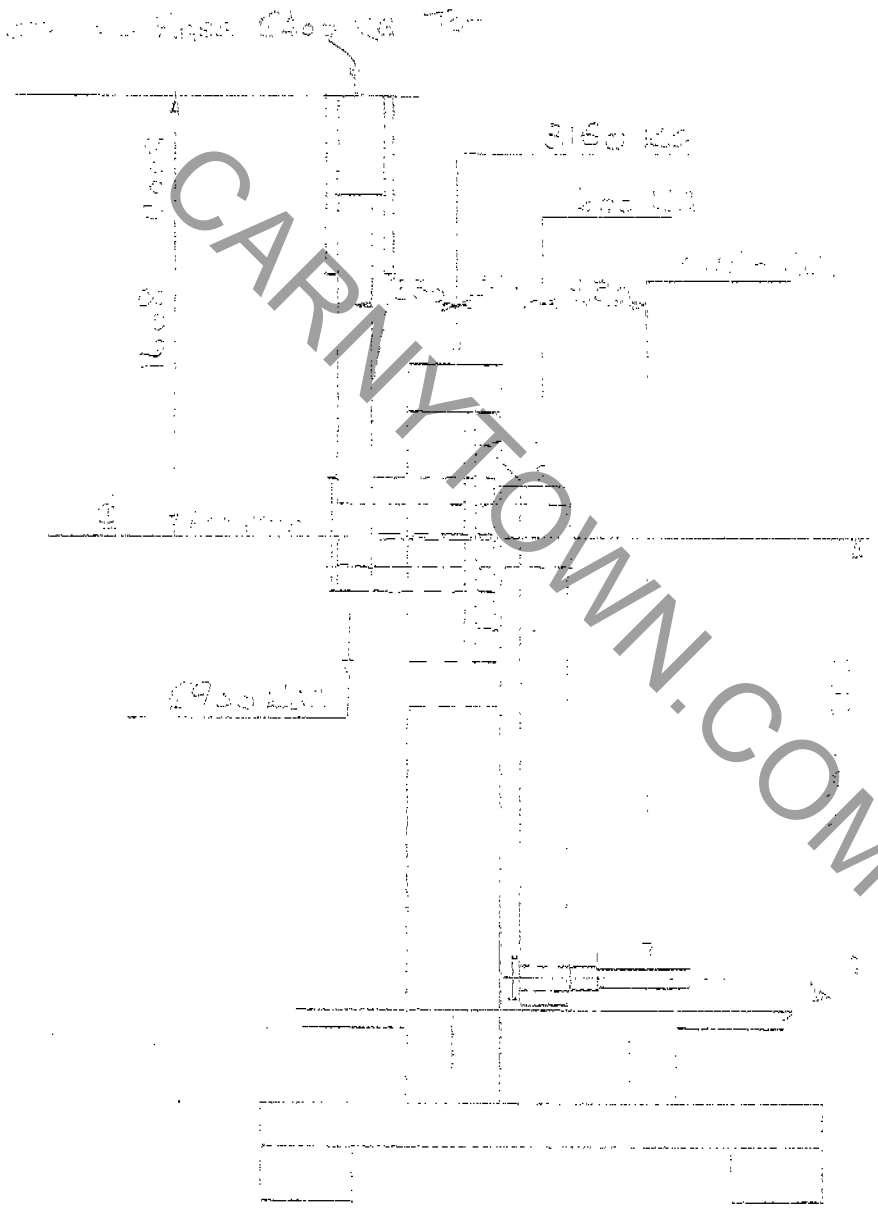
SECTION A

DRIVE SYSTEM AND DYNAMICS

ESTIMATED MASSES

18 Passengers	@ 77 Kg each	=	1386 Kg
9 G.R.P. Seats	@ 25 Kg each	=	225 Kg
4 S/S Lap Bars	@ 25 Kg each	=	100 Kg
		Total =	1711 Kg
1 Seat Beam		=	528 Kg
		Total =	2239 Kg

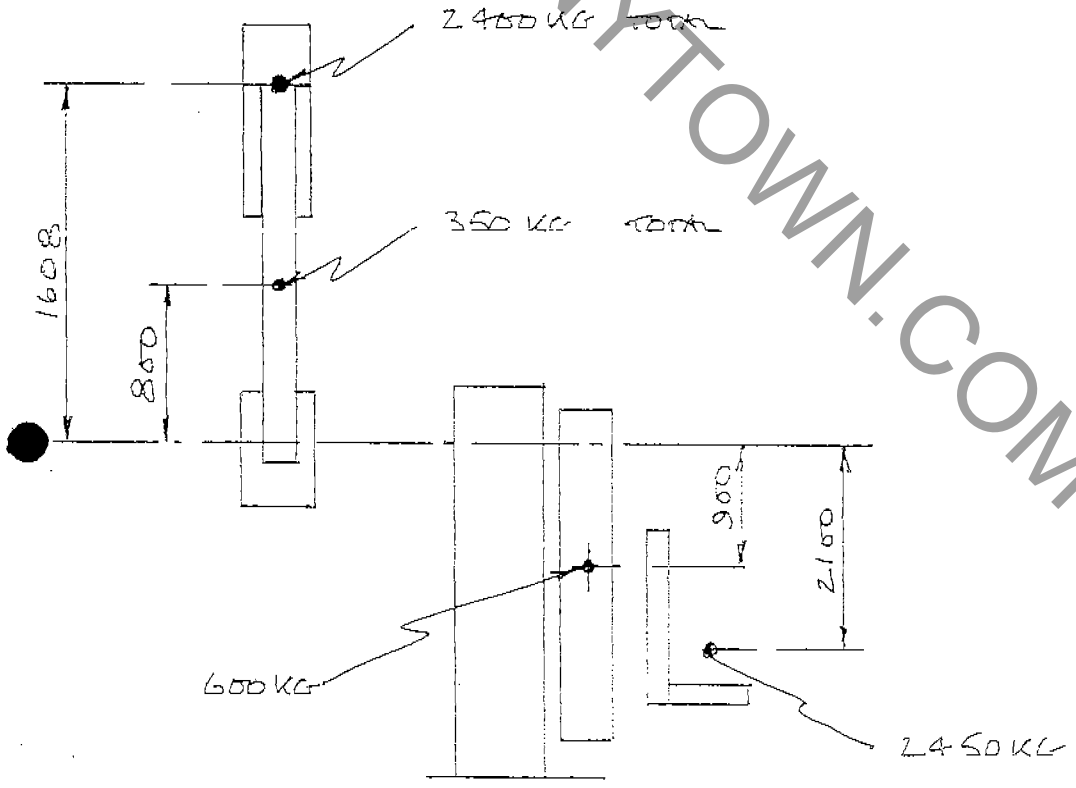
PRIMARY MASSES AND DIMENSIONS



MASS INERTIA

TOTAL MASS INERTIA

2400×1.6^2	=	6144 KgM^2
$\frac{350 \times 1.5^2}{3}$	=	262 KgM^2
$\frac{600 \times 2.1^2}{3}$	=	882 KgM^2
2450×2.1^2	=	10804 KgM^2
Total	=	18092 KgM^2



DRIVE SYSTEM

HYDRAULIC MOTOR TO PINION TO SLEWING RING

Hydraulic Motors 2 off Max Torque @ 270 Bar		= 2 KNM/Motor
Total with 2 x Motors		= 4 KNM
Breakout Torque	= 4 x .84	= 3.4 KNM
Pinion	= 14 Tooth x Module 6 x 60 face width	
Slewing Ring	= 142 Tooth x Module 6 x 55 face width	
Max Drive Torque	= $\frac{142 \times 4}{14}$	= 40 KNM
Max Tooth Load	= $\frac{4 \times 2}{2 \times .084}$	= 48 KN

DRIVE SYSTEM

Max Load Torque = $\frac{(1.9 \times 600) + (2.1 \times 2450) \times 9.8}{1000}$ = 56 KNM

Max Counter Torque = $\frac{(1.6 \times 2400) + (.9 \times 350) \times 9.81}{1000}$ = 40 KNM

Resultant Torque (Arms Horizontal) = 56-40 Load Torque = 16 KNM

Min Surplus Drive Torque = 40-16 = 24 KNM

Max Accel. from Horizontal = $\frac{24 \times 1000}{18092}$ = 1.3 RAD/S^2

Max Accel. from Vertical = $\frac{40 \times 1000}{18092}$ = 2.2 RAD/S^2

In 'g' Terms Horizont (At Passenger C of G) = $\frac{1.3 \times 2.1}{9.81}$ = 1.28 'g'

In 'g' Terms Horizont (At Counterweight) = $\frac{1.3 \times 1.6}{9.81}$ = 1.21 'g'

DRIVE SYSTEM

HYDRAULIC MOTOR TO PINION TO SLEWING RING

Hydraulic Motors 2 off Max Torque @ 270 Bar		= 2 KNM/Motor
Total with 2 x Motors		= 4 KNM
Breakout Torque	= 4 x .84	= 3.4 KNM
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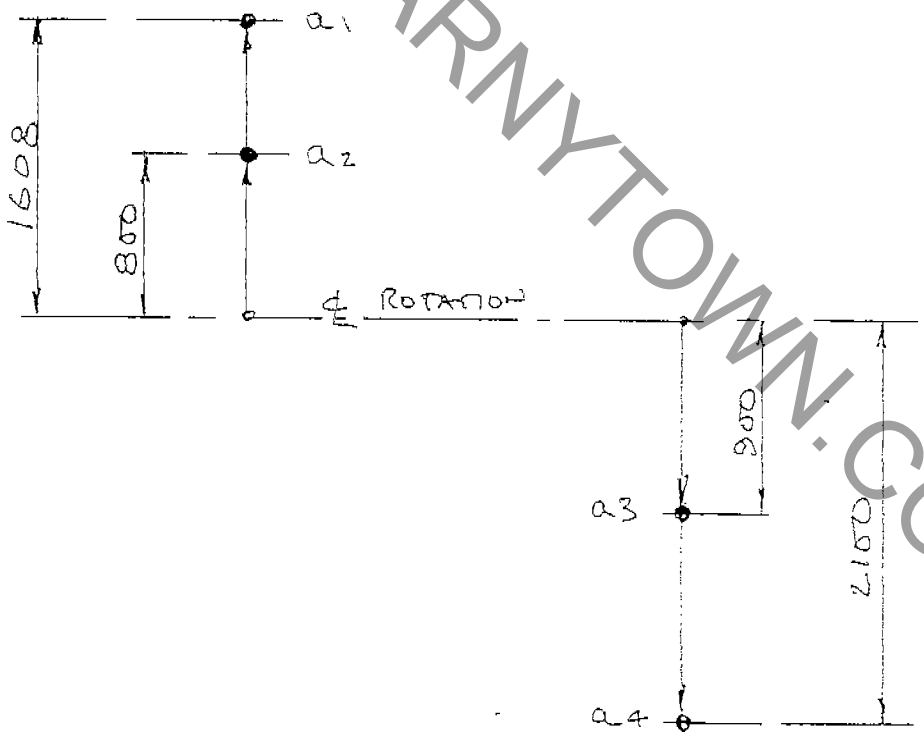
Max Tooth Load	= $\frac{4 \times 2}{2 \times .084}$	= 48 KN

CENTRIPETAL ACCELERATION

(ROTATING AT 2.0 RAD/S)

a	=	2^2 x 1.608	= 6.4 RAD/S^2
a2	=	2^2 x 0.8	= 3.2 RAD/S^2
a3	=	2^2 x 0.9	= 3.6 RAD/S^2
a4	=	2^2 x 2.1	= 8.4 RAD/S^2



SECTION B

LOADINGS AND STRESSES

(PARENT METAL)

MAIN ARM

STRUCTURAL PROPERTIES

'A'-'A'

$$'I'_{xx} = \frac{(20 \times 45^3) - (18.4 \times 43.4^3)}{12} = 26,530cm^4$$

$$'Z'_{xx} = \frac{30,530 \times 2}{45} = 912cm^3$$

$$'I'_{yy} = \frac{(45 \times 20^3) - (43.4 \times 18.4^3)}{12} = 7,470cm^4$$

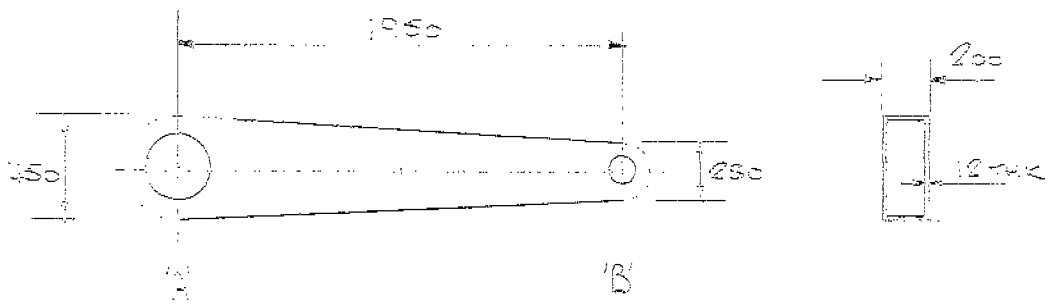
$$'Z'_{yy} = \frac{7470 \times 2}{20} = 747cm^3$$

$$'J' = \frac{2 \times .8\,(45 - .8)^2 \times (20 - .8)^2}{(45 + 20) - (2 \times .8)} = 18,175cm^4$$

'B'-'B'

$$'J' = \frac{2 \times .8\,(23 - .8)^2 \times (20 - .8)^2}{(23 + 20) - (2 \times .8)} = 7,021cm^4$$

$$'Z'_{yy} = \frac{(23 \times 20^3) - (21. \times 18.4^3)}{6 \times 23} = 367cm^3$$



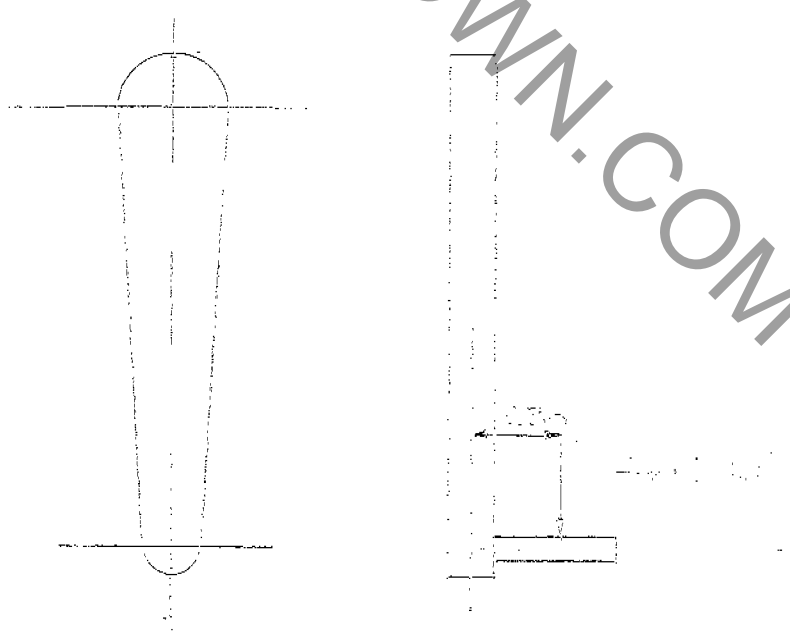
MAIN ARM STRESSES AT BDC

ROTATING AT 2.0 RAD/SEC

Max Bending Stress yy = $\frac{44.6 \times 530}{2 \times 367 \text{ min}}$ = 32 N/mm^2

Min Bending Stress yy = $\frac{44.6 \times 530}{2 \times 747 \text{ max}}$ = 16 N/mm^2

Static Bending Stress yy = $\frac{2450 \times 9.81 \times 530}{2 \times 367 \times 1000}$ max = 17 N/mm^2



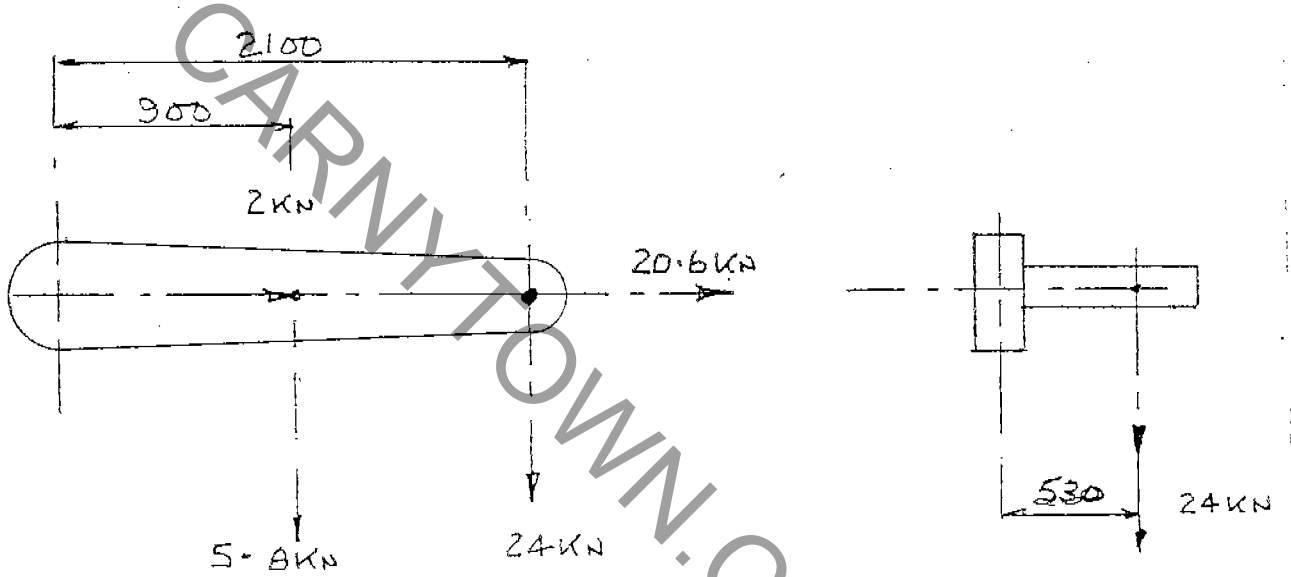
MAIN ARM STRESSES AT HORIZONTAL

(ROTATING AT 2.0 RAD/SEC)

Max Bending Stress xx $= \frac{(24 \times 2100) + (5.8 \times 900)}{2 \times 912} = 30.5\ N/mm^2$

Max Bending Stress yy $= \frac{20.6 \times 530}{2 \times 367} = 15\ N/mm^2$

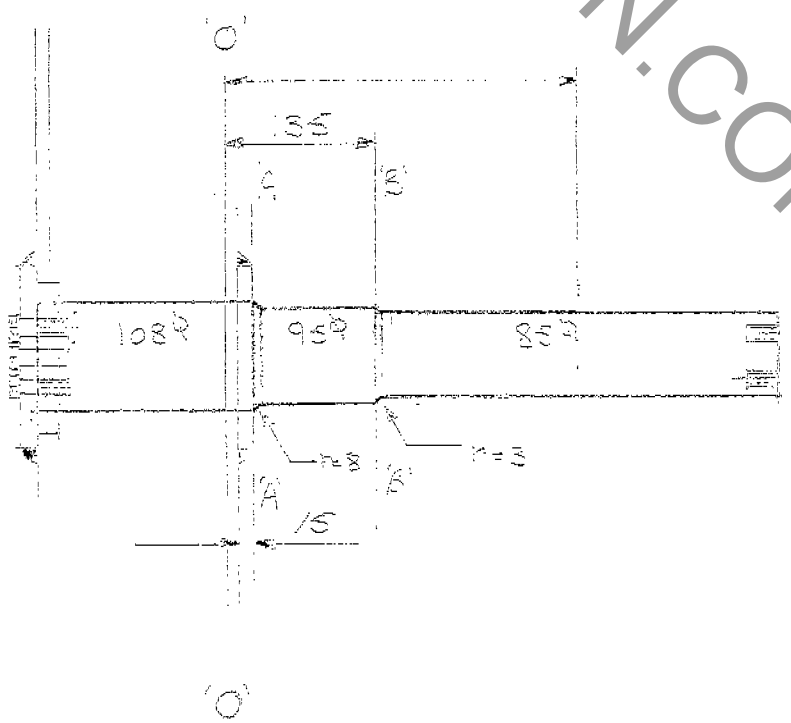
Max Torsional Stress $= \frac{24 \times 530 \times 1000}{2 \times 8\ (230-8) \times (200-8) \times 2} = 9\ N/mm^2$



STRESSES ON MAIN SHAFT

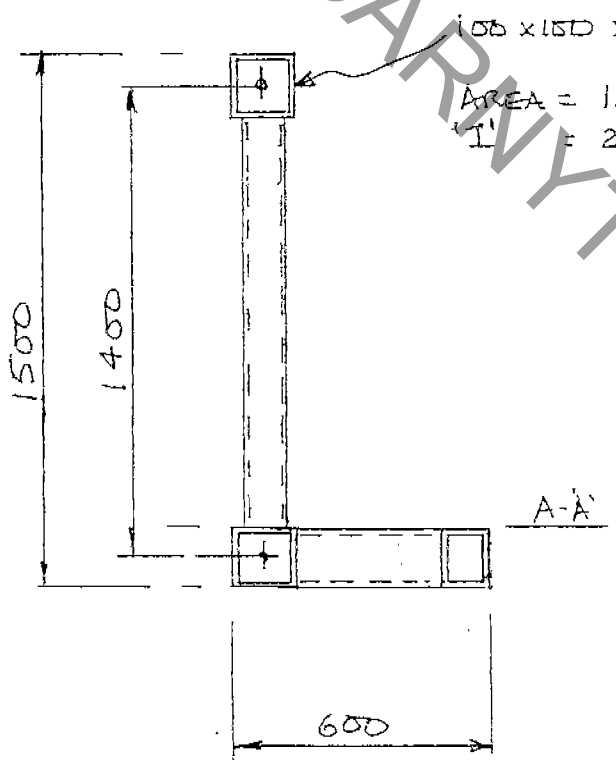
(ROTATING AT 2.0 RAD/S)

Section Modulus 'A''A'	'Z'	=	$\frac{\pi \times 9.5^3}{32}$	'Z'xx	=	84 cm^3
Section Modulus 'B''B'	'Z'	=	$\frac{\pi \times 8.5^3}{32}$	'Z'xx	=	60 cm^3
Max Stress 'A''A'		=	$\frac{44.6 \times 405}{84 \times 2}$	xx	=	107.8 N/mm^2
Min Stress 'A''A'		=	$\frac{3.6 \times 285}{2 \times 84}$	xx	=	8.6 N/mm^2
Max Stress 'B''B'		=	$\frac{44.6 \times 285}{2 \times 60}$	xx	=	105 N/mm^2
Min Stress 'B''B'		=	$\frac{3.6 \times 285}{2 \times 60}$	xx	=	8.5 N/mm^2
Static Stress 'A''A'		=	$\frac{24 \times 405}{2 \times 84}$	xx	=	57.8 N/mm^2
Static Stress 'B''B'		=	$\frac{24 \times 405}{2 \times 60}$	xx	=	81 N/mm^2
Max Stress 'C''C'		=	$\frac{44.6 \times 420}{2 \times 98}$	xx	=	95 N/mm^2



SEAT BEAM

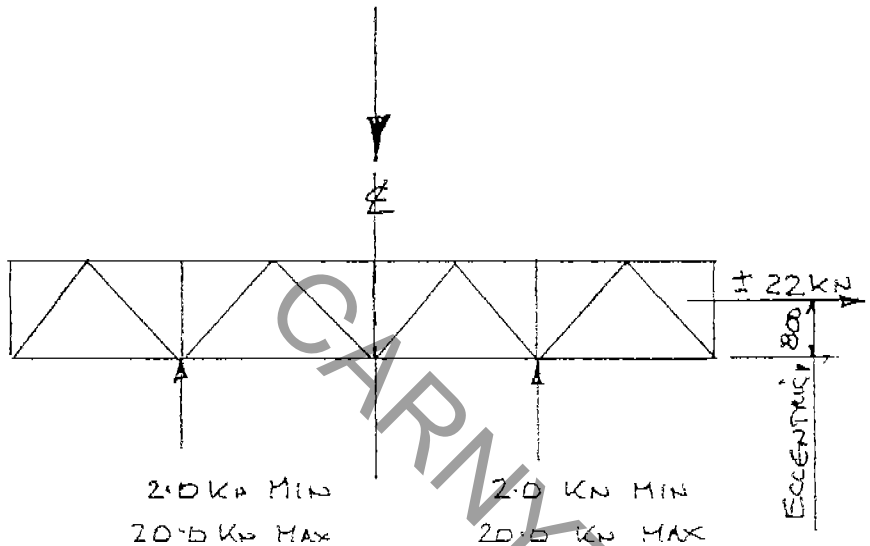
Moment of Inertia	$xx = 70^2 \times 15.3 \times 2 + (234 \times 2)$	=	150,408 cm^4
Section Modulus Minimum	$xx = \frac{150,408}{75}$	=	2005 cm^3
Section Modulus at 'A''A'	$xx = \frac{150,408}{65}$	=	2314 cm^3



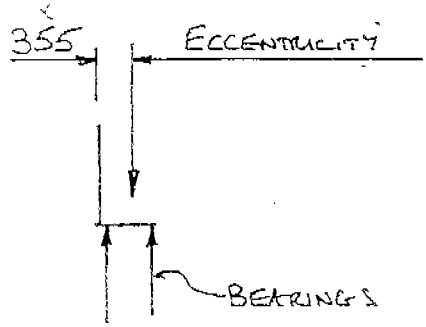
MAIN SEAT BEAM

FORCES ON BEAM

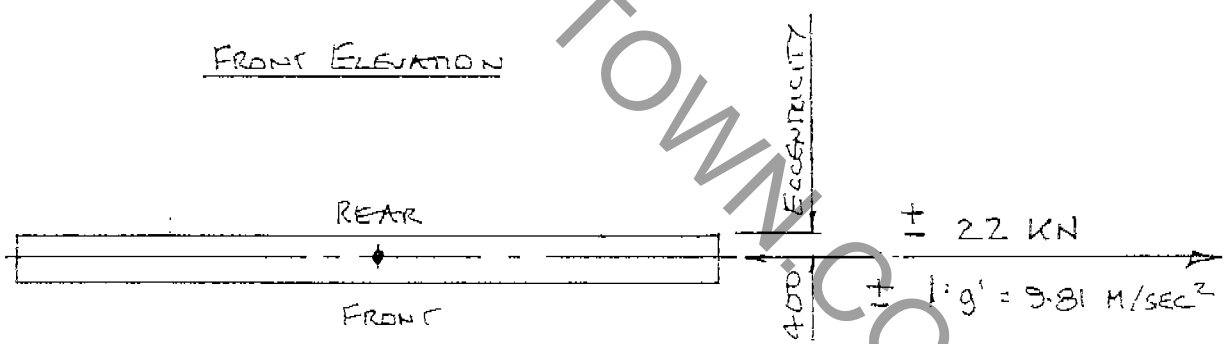
Min 4.0 KN @ T.D.C.
Max 40.0 KN @ B.D.C.



FRONT ELEVATION



SIDE ELEVATION



PLAN ON BEAM

MAIN SEAT BEAM

Mass of 18 Passengers	=	1386 KG
Mass of G.R.P. Seats and Fittings	=	250 KG
Mass of Main Seat Plus Lights and Trim etc	=	615 KG
	Total =	2251 KG

Forces at + or - 8m/Sec^2 Max $= \frac{2251 \times (9.81 + 8)}{1000}$ B.D.C. = 40 KN

Max Reaction R-'A' $= \frac{40}{2}$ = 20 KN

Max Bending Moment at 'A' $= \frac{40 \times 2.0^2}{9 \times 2}$ = 9.0 KNM

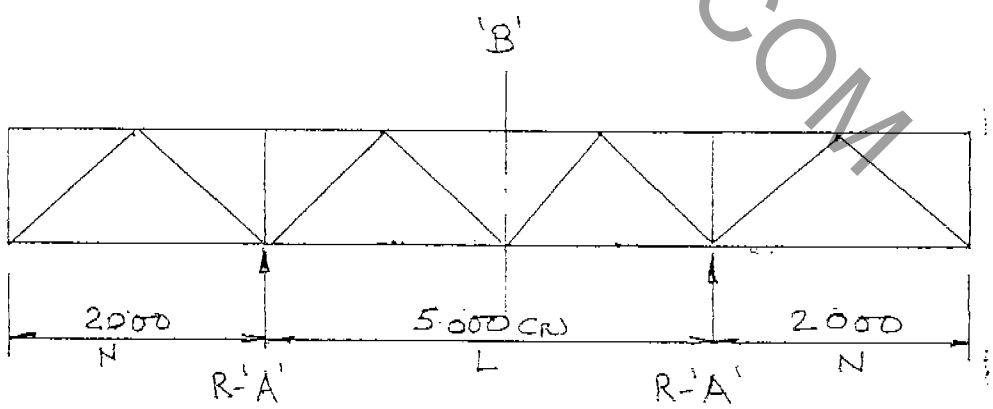
Max Bending Moment at 'B' $= \frac{40 \times 5.0^2}{9 \times 8} + 9.0$ = 23 KNM

Max Stress at 'A' $= \frac{9 \times 1000}{2005}$ xx = 5 N/mm^2

Max Stress at 'B' $= \frac{23 \times 1000}{2005}$ xx = 11.5 N/mm^2

Max at 'B' $= \frac{4.4 \times 5^4}{384 \times E \times 150,408} \times (5 - 24n^2)$ - = 2.3 mm

$n = N/L$



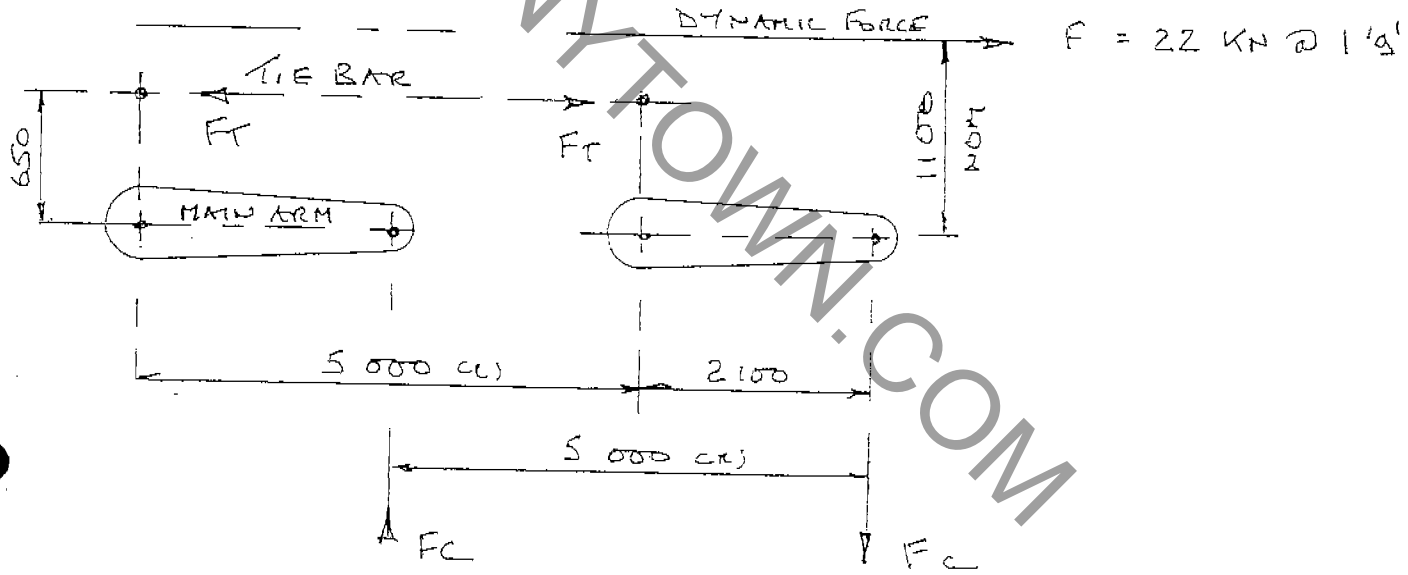
TIE BAR FORCES

(ROTATING AT 2.0 RAD/SEC)

Couple FC from eccentricity $= \frac{22 \times 1.1}{5}$ FC = 5 KN

Tie Bar Force Max FT $= \frac{5 \times 2.1}{.65}$ Max FT = 16 KN

NOTE: This is always tensile and fluctuates from 0 to max twice per revolution.



STRESSES IN TIE BAR ARM

'I' xx @ 'A''A' = $(.8 \times 15 \times 25^2 \times 2) + \left(\frac{(1.5 \times 50^3)}{12} \times 2\right)$ = 46,250 cm^4

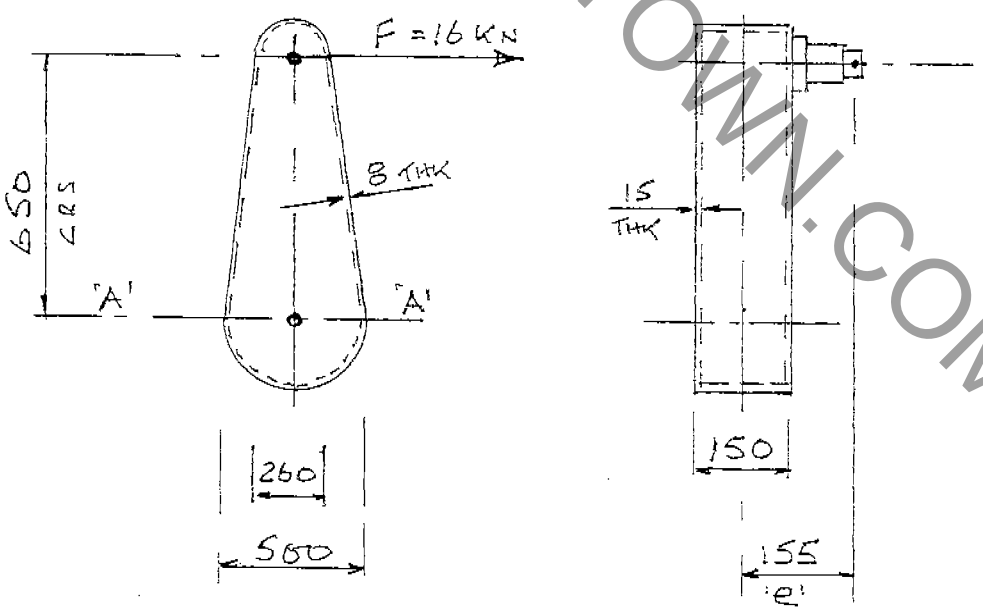
'J' @ 'A''A' = $\frac{2 \times 1.5 \times .8\ (15 - 1.5)^2 \times (50 - .8)^2}{(15 \times .8) + (50 \times 1.5) - 1.5^2 - .8^2}$ = 12,399 cm^4

Stress @ 'A''A' = $\frac{16 \times 650}{1850}$ Bending xx = 6 N/mm^2

Twist Dia 'A''A' = $\frac{16{,}000 \times 100 \times .155}{\text{'G'} \times 46{,}250} \times 0.65$ = .000043 RAD

Shear Stress AA = .000043 x 8 x 'G' In 8 thk Plate = 28 N/mm^2

Shear Stress AA = .000043 x 15 x 'G' In 15 thk Plate = 52 N/mm^2



TIE BAR STRESSES

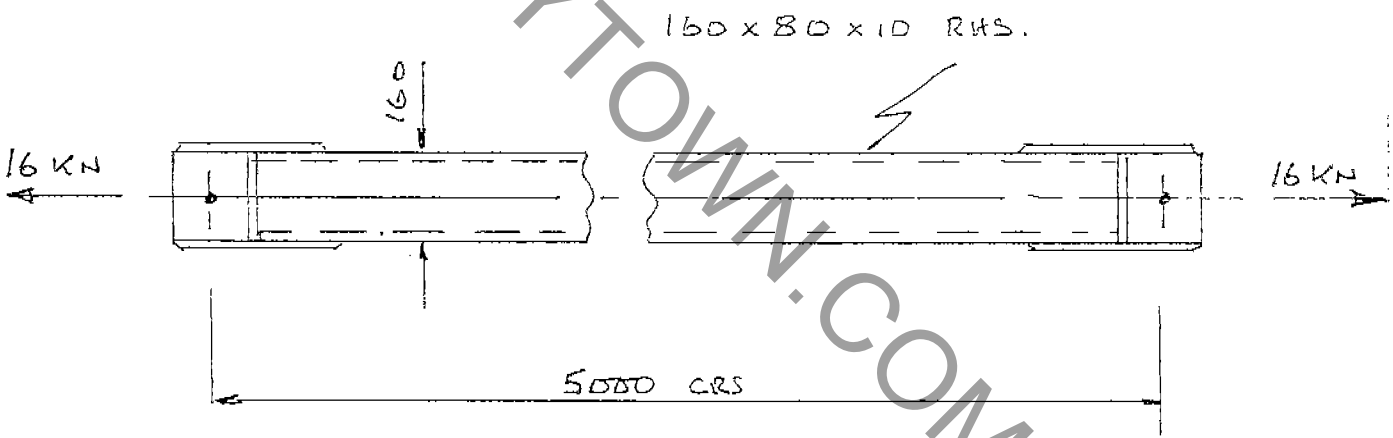
Max Axial Tie Bar Force = 16 KN

Max Axial Stress = $\frac{16 \times 10}{43.5}$ = 4 N/mm^2

CHECK BUCKLING YY

l/r (Assume Pinjointed) = $\frac{500}{3.1}$ yy = 161

Max Permitted Stress in Compression yy = 36 N/mm^2



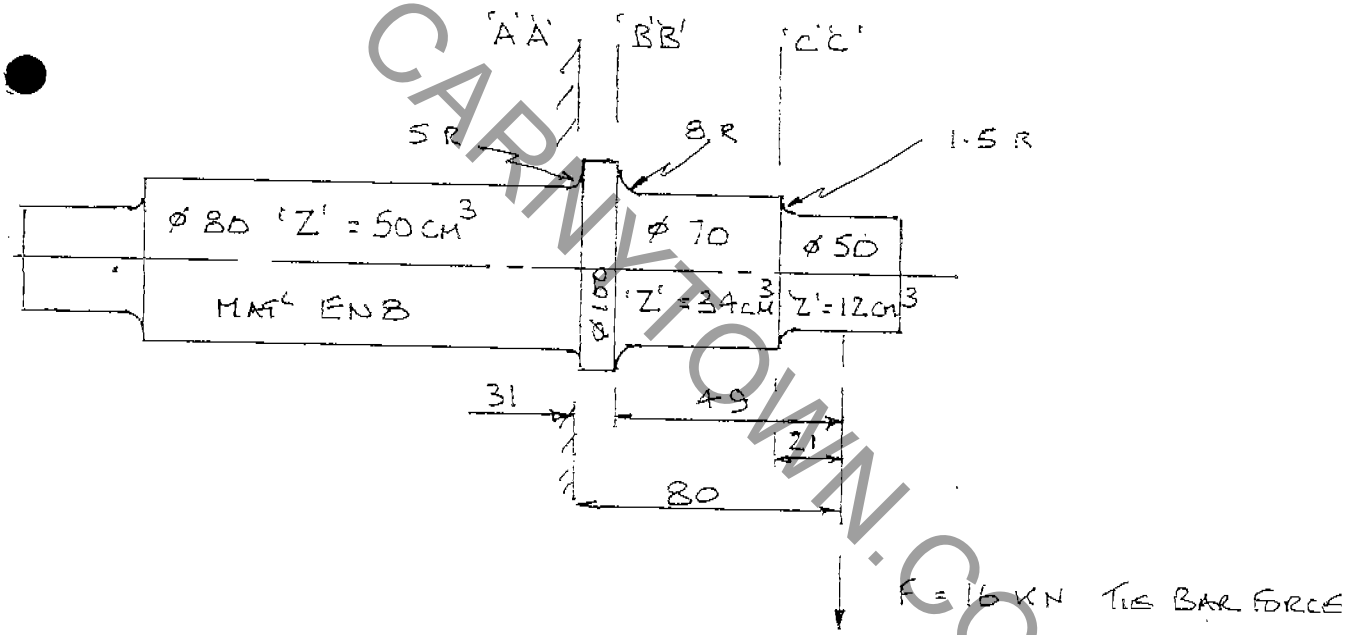
STRESSES ON TIE BAR PIN

(ROTATING AT 2.0 RAD/SEC)

Stress at 'A''A' $xx = \frac{16 \times 80}{50}$ max = 26 N/mm^2

Stress at 'B''B' $xx = \frac{16 \times 49}{34}$ max = 23 N/mm^2

Stress at 'C''C' $xx = \frac{16 \times 21}{12}$ max = 28 N/mm^2



STRUCTURAL PROPERTIES - SUPERSTRUCTURE

400 x 200 x 10 RHS 'A' = 116 cm^2
'I'x = 8,138 cm^4
'I'xx = 24,140 cm^4

First Moments @ 'B''B' = $\frac{(20 \times 116) + (314 \times 116)}{116 \times 2}$ N.A. xx = 167 cm

First Moments @ 'A''A' = $\frac{(20 \times 116) + (184 \times 116) + (314 \times 116)}{116 \times 3}$ N.A. xx = 172 cm

Second Moment @ 'B''B' = $((147^2 \times 116) + (147^2 \times 116)) +$ 8138 + 24,140 = 5,045,566 cm^4

Second Moment @ 'A''A' = $((152^2 \times 116) + (12^2 \times 116) + (142^2 \times 116))$

Total = 5,035,792 + 8138 + 8138 + 24,140 = 5,076,208 cm^4

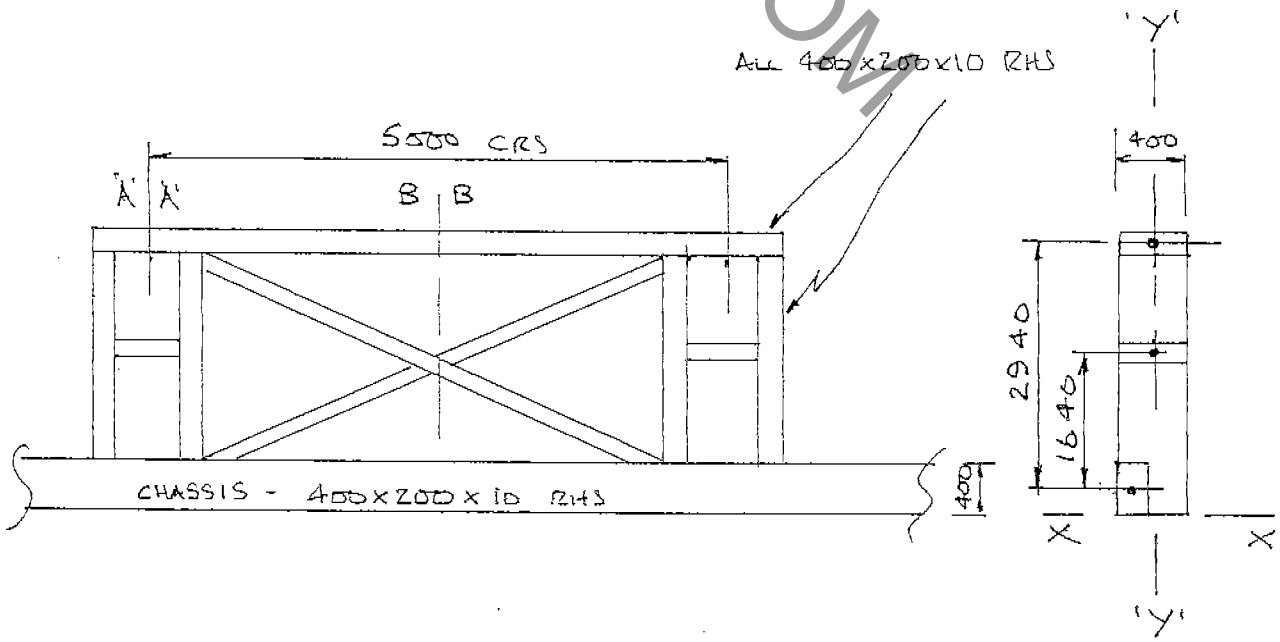
Section Modulus @ 'B''B' = $\frac{5,045,566}{167}$ Min xx = 30,212 cm^3

Section Modulus @ 'B''B' = $\frac{5,045,566}{157}$ Max xx = 32,137 cm^3

Section Modulus @ 'A''A' = $\frac{5,076,208}{172}$ Min xx = 29,513 cm^3

Section Modulus @ 'A''A' = $\frac{5,076,208}{152}$ Max xx = 33,396 cm^3

Section Modulus yy = 1207 x 4 Max yy = 4,828 cm^3



MOMENTS ON SUPERSTRUCTURE

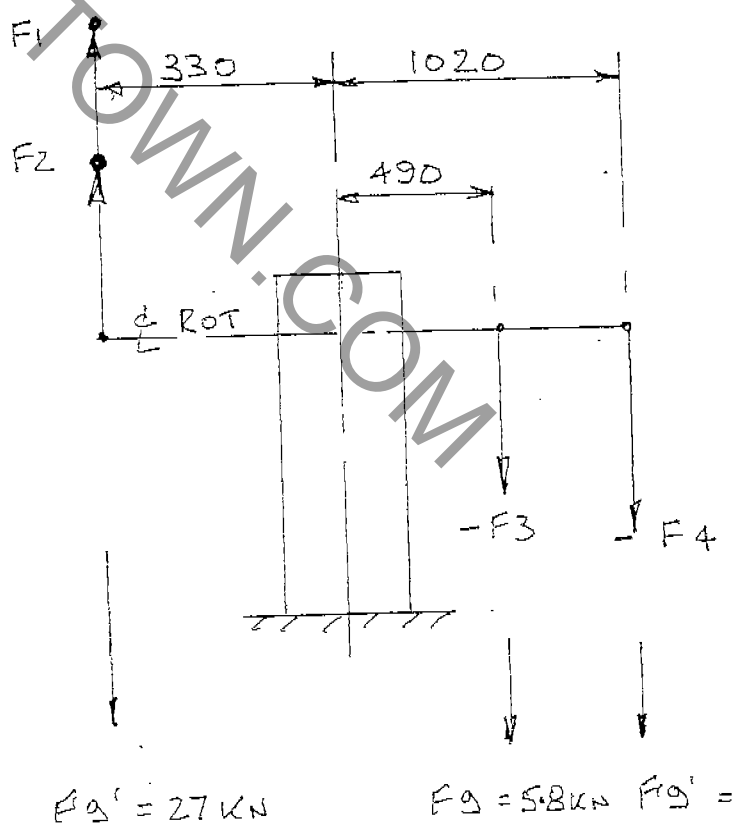
(CAR AT T.D.C.)

MOMENTS

A.C.W.	= (15 + 1 - 27) x .330	ACW = 4 KN
C.W.M.	= ((-2 - 5.8) x .490) + ((-21 - 24) x 1.02)	= 50 KN
Moment	= 50 - 4	CWM = 46 KN
Stability	= $\frac{3150 \times 9.81 \times .4}{2 \times 1000}$	* = 6 KNM

* Inherent Stability of Superstructure only

F1 = 6.4 x 2400 x 10^{-3} = 15 KN
F2 = 3.2 x 350 x 10^{-3} = 1 KN
F3 = 3.6 x 600 x 10^{-3} = 2 KN
F4 = 8.4 x 2450 x 10^{-3} = 21 KN



F9' = 27 KN F9 = 5.8KN F9' = 24 KN

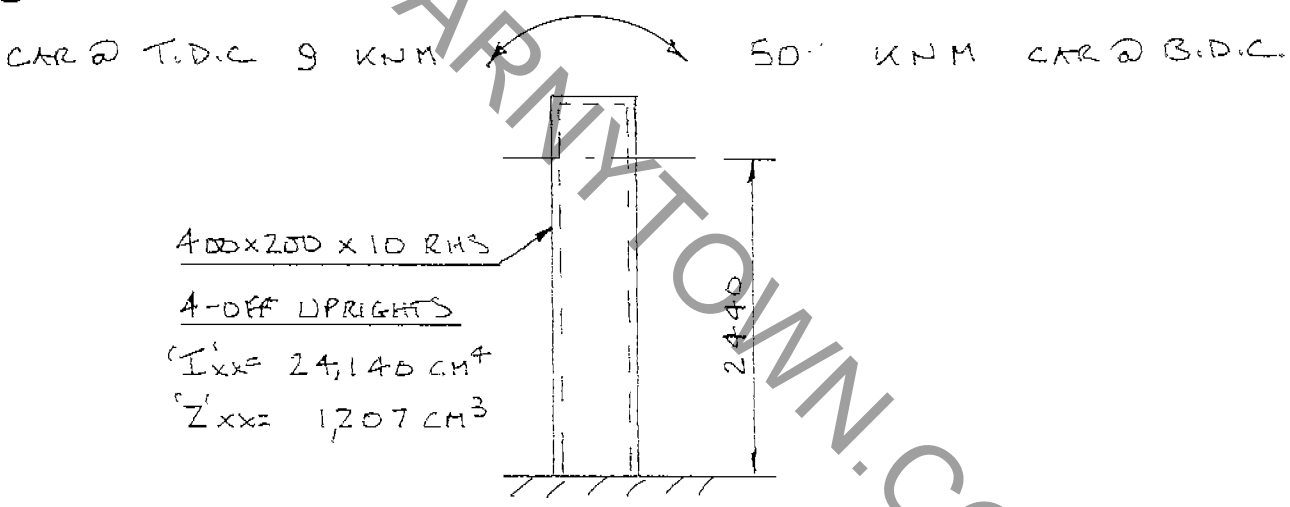
STRESSES ON SUPERSTRUCTURE

Max Bending Stress xx = $\frac{50 \times 1000}{4 \times 1207}$ Max xx = 10 N/mm^2

Min Bending Stress xx = $\frac{9 \times 1000}{4 \times 1207}$ Min xx = 2 N/mm^2

Max Axial Stress = $\frac{77}{4 \times 116}$ Max = 0.2 N/mm^2

Max Deflection = $\frac{50 \times 244^2}{2 \times E \times 4 \times 24,140}$ Δ = 0.0007 cm



STRESSES ON CHASSIS X-MEMBERS

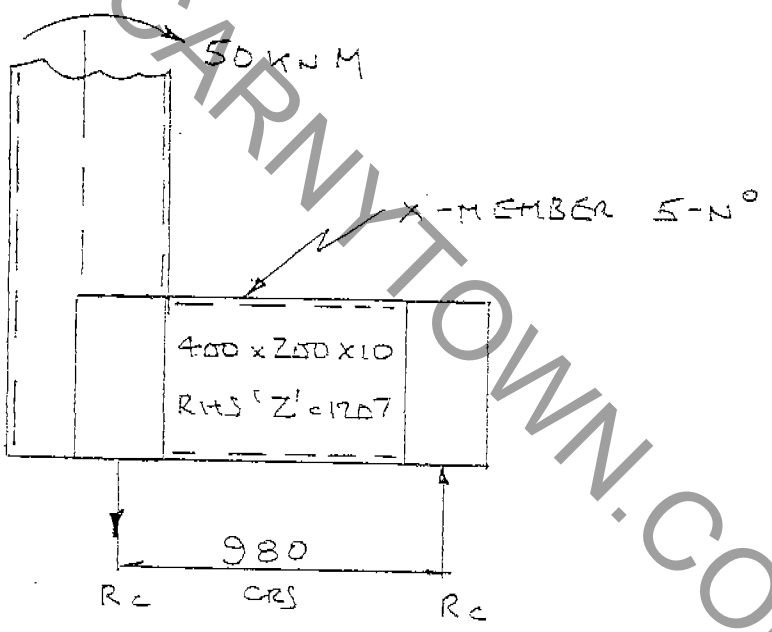
Max Stress in X Member = $\frac{50 \times 10^3}{5 \times 1207}$ xx = 8 N/mm^2

Couple RC = $\frac{50}{.98}$ = 51 KN

Max Stress in chassis (Dynamic Only) = $\frac{26 \times 600}{2 \times 1207}$ Max xx = 6 N/mm^2

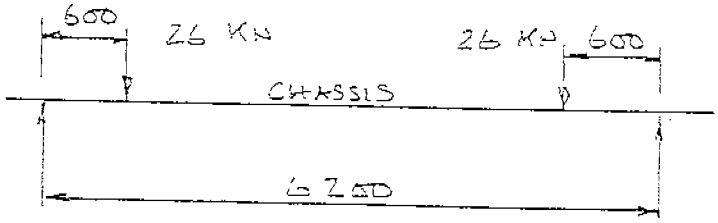
Max Stress in Chassis (All on Superstructure Side) = $\frac{26 \times 600}{29,513}$ Max xx = 0.5 N/mm^2

Superstructure Side is Dominant Case



MAX STRESS IN X MEMBER = $\frac{50 \times 10^3}{5 \times 1207}$

COUPLE $R_c = \frac{50}{.98}$

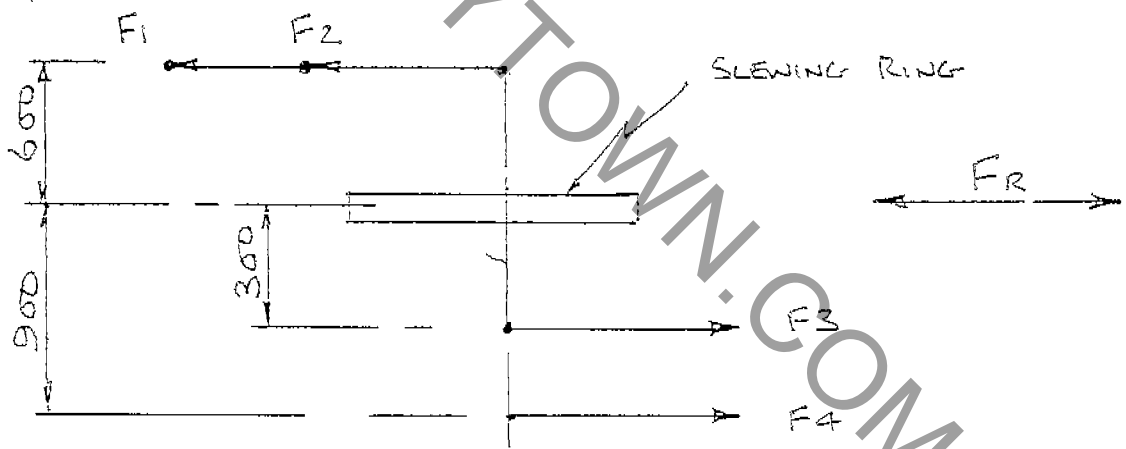


FORCES IN PLAN VIEW

DYNAMIC FORCES

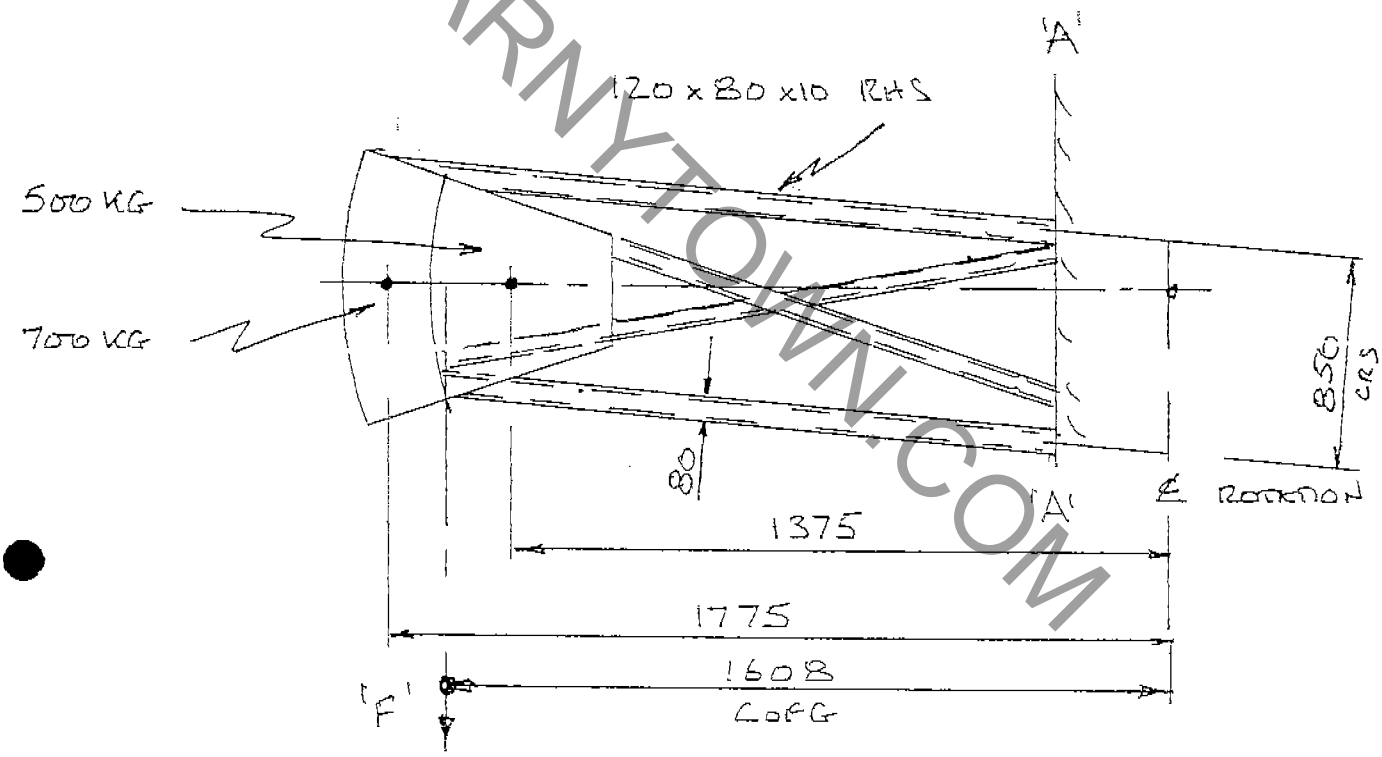
F1 = 15 KN
F2 = 1 KN
F3 = 2 KN
F4 = 21 KN

Resultant Horizontal Force FR	=	-15 - 1 + 2 + 21	=	7 KNM
Total Couple on Slewing Ring	=	((15 + 1) x .6)	=	9.6 KNM
	=	(2 x .3) + (21 x .9)	=	19.5 KNM
		Total	=	29.1 KNM
Couple per Slewing Ring	=	$\frac{29}{2}$	=	14.5 KNM



STRESSES IN COUNTERWEIGHT

Max c/w Acceleration (from Drive System)	= From Horizontal NOM	=	0.25 'g'
Max Force 'F' (Arm Horizontal)	xx = $\frac{1.25 \times (500 + 700) \times 9.81}{1000}$	Total =	15 KN
Force/Arm	= $\frac{15}{2}$	=	7.5 KN
Max 'I' @ 'A''A'	= $(42.5^2 \times 35.5 \times 2) + (320 \times 2)$	=	128,883 cm^4
Max Bending Stress @ 'A''A'	= $\frac{7.5 \times 1608 \times 93}{128,883 \times 2}$	=	4.3 N/mm^2



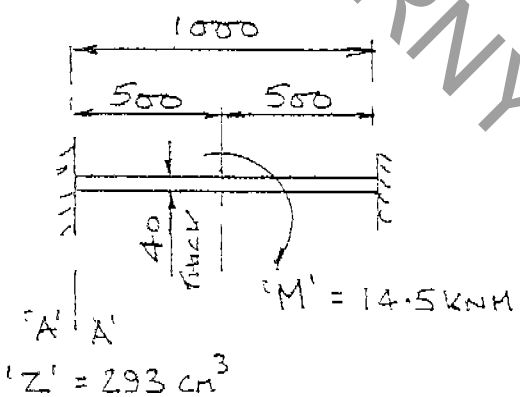
STRESSES IN SLEWING RING PLATE

Max Moment at 'A''A' = $\frac{14.5 \times .5 \times ((3 \times .5) - 1)}{1^4}$ = 3.6 KNM

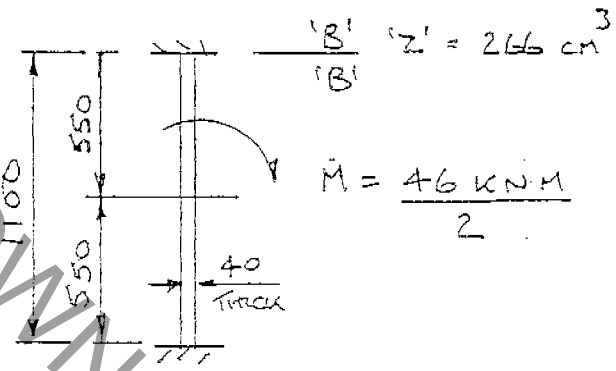
Max Moment at 'B''B' = $\frac{46.2 \times .55 \times ((3 \times .55) - 1.1)}{2 \times 1.1^4}$ = 5.7 KNM

Max Stress at 'A''A' = $\frac{3.6 \times 1000}{293}$ = 12 N/mm^2

Max Stress at 'B''B' = $\frac{5.7 \times 1000}{266}$ = 21 N/mm^2



CASE 'A' ARM HORIZONTAL



CASE 'B' CAM AT B.D.C.

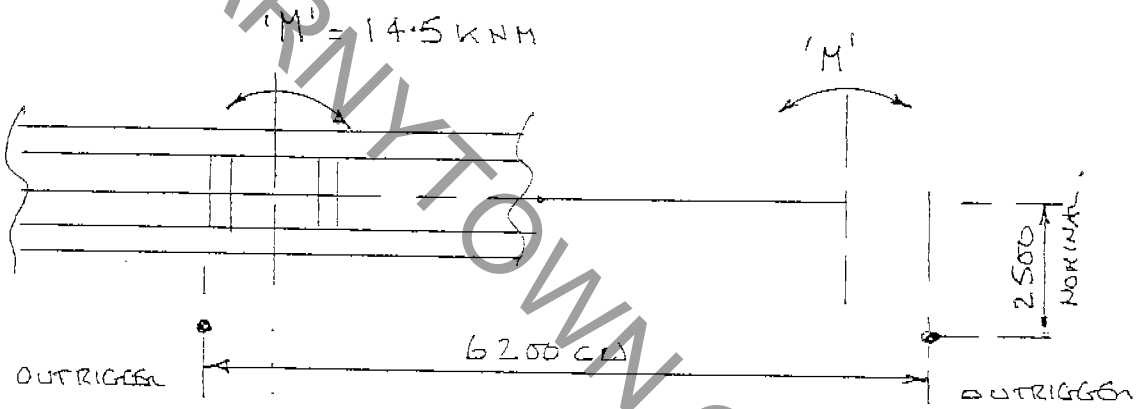
STRESSES IN CHASSIS PLAN VIEW

Chassis Stress yy $= \frac{14.5 \times 1000}{2 \times 814}$ $= 9\ N/mm^2$

Force on Outrigger $= \frac{14.5 \times 2}{3.1^2 + 2.5^2}$ $= 7\ KN$

Min Packing Load $= \frac{7}{.5}$ Per Outrigger = 14 KN

N = 0.5



TIE BAR FORCES ON MAIN TUBE

C/B WEIGHT FORCES DITTO

OD 265
ID 240 'Z' = 597 cm^3

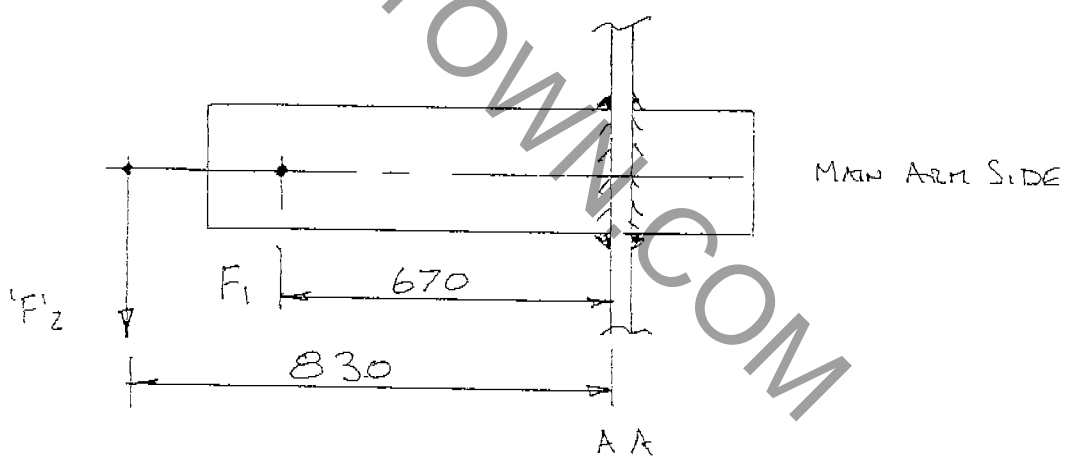
NOTE: Forces F1 and F2 are 90^0 Out of Phase

F1 C/B Weight Forces
F2 Tie Bar Forces

F1 Max C/B Weight @ BDC — Per Tube = 21.5 KN
F2 Max Tie Bar Forces = 16.0 KN

F1 Max Stress at AA $= \frac{21.5 \times 670}{597}$ = 24 N/mm^2

F2 Max Stress at AA $= \frac{16.0 \times 830}{597}$ = 22 N/mm^2

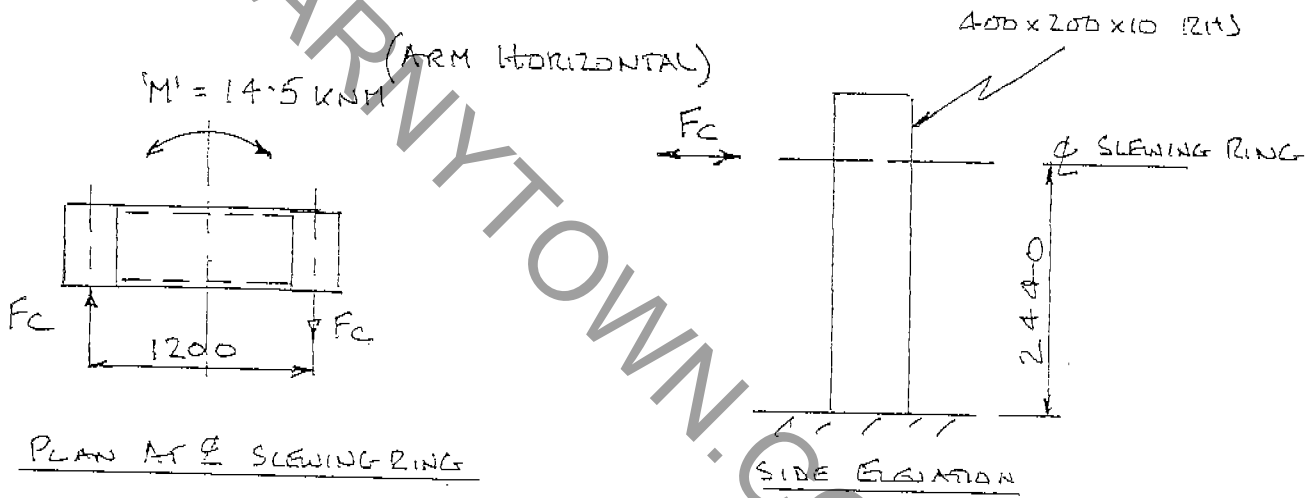


STRESSES ON SUPERSTRUCTURE

(ARM HORIZONTAL)

Force FC from 'M'	$= \frac{14.5}{1.2}$	= 12 KN
Max Bending Stress (Ignoring Torsion)	$= \frac{12 \times 2440}{1207}$	= 24 N/mm^2
Deflection	$= \frac{12 \times 244^3}{3 \times E \times 24,140}$	= 0.1 cm

NOTE: Bending Stress will be reduced by Torsional Restraint



LAP BARS

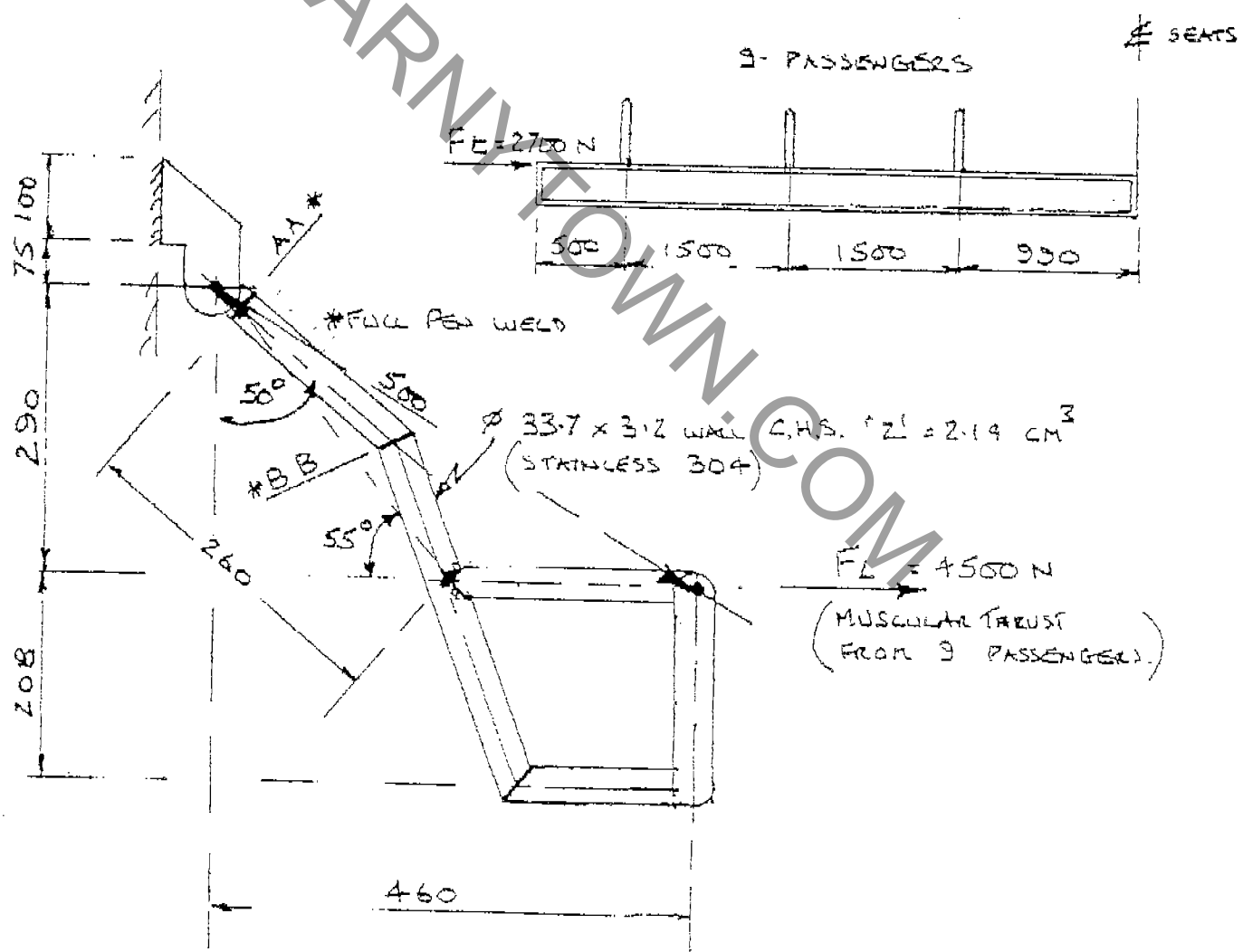
Stress at Weld 'A''A' (and Tube) = $\frac{\text{Sine } 55^0 \times 4500 \times 260}{3 \times 2.14 \times 10^3}$ (From FL) = 150 N/mm^2

Stress at Weld 'B''B' = $\frac{\text{Sine } 70^0 \times 4500 \times 150}{3 \times 2.14 \times 10^3}$ (From FL) = 100 N/mm^2

Stress at Weld 'A''A' = $\frac{2700 \times 260}{3 \times 2.14 \times 10^3}$ (From Ft) = 110 N/mm^2

Stress at Weld 'B''B' = $\frac{2700 \times 150}{3 \times 2.14 \times 10^3}$ (From Ft) = 63 N/mm^2

NOTE: Stresses from FL are not to be used for fatigue calculation



LAP BAR BRACKETS

F = 2700 N

Assume Couple on 4 Plates only FC = $\frac{2700 \times 500}{1500}$ = 900 N

Assume 'F' acts on 3 Plates only

Shear Stress in Weld from FC = $\frac{900}{100 \times 10 \times .707 \times 4 \times 2}$ = 0.2 N/mm^2

ZW of Weld on yy = 100 x 12 Per Plate = 1200 mm^2

Weld Stress from 'F' on yy = $\frac{2700 \times 50}{3 \times 1200 \times 10 \times .707}$ = 5 N/mm^2

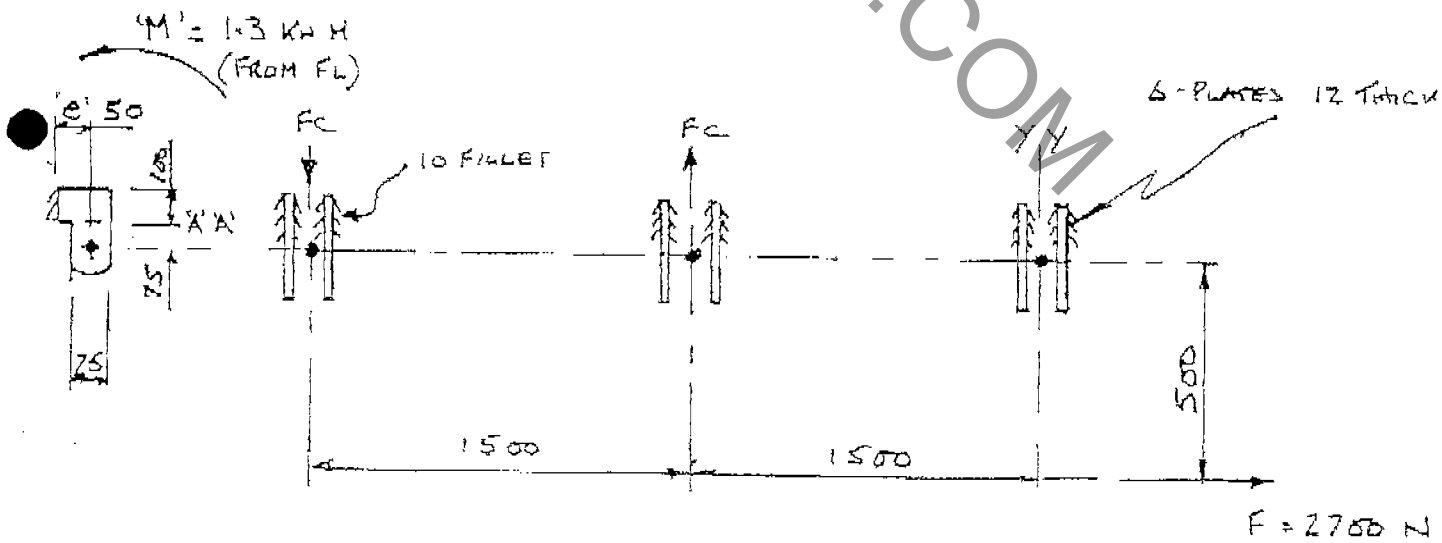
Section Modulus of Plate at Weld yy = $\frac{12^2 \times 100}{6}$ = 2400 mm^3

Section Modulus of Plate at 'A''A' yy = $\frac{12^2 \times 75}{6}$ = 1800 mm^2

Bending Stress at Weld (Plate) yy = $\frac{2700 \times 50}{3 \times 2400}$ = 19 N/mm^2

Bending Stress at 'A''A' (Plate) yy = $\frac{2700 \times 75}{3 \times 18.00}$ = 37 N/mm^2

Bending Stress at AA from 'M' xx (Assume all 6 Plates act) = $\frac{1.3 \times 10^6}{6 \times 11250}$ = 19 N/mm^2



SECTION C

LOADINGS AND STRESSES

(CONNECTIONS)

MAIN ARM (LARGE END)

(STRESSES IN WELDMENTS)

Max Torque on Arm from Drive System — Per Arm = 20 KNM

JW for W1 = $\frac{TT \times 26.5}{4}$ — 2 - N° = 14,615 cm^3

JW for W2 = $\frac{TT \times 45^3}{4 \times 2}$ — 1 - N° = 35,784 cm^3

Total = 65,014 cm^3

Shear Stress in Welds = $\frac{20 \times 10^6 \times (265 + 450)}{65.014 \times 10^3 \times 2 \times 2 \times 6 \times .707}$ = 13 N/mm^2

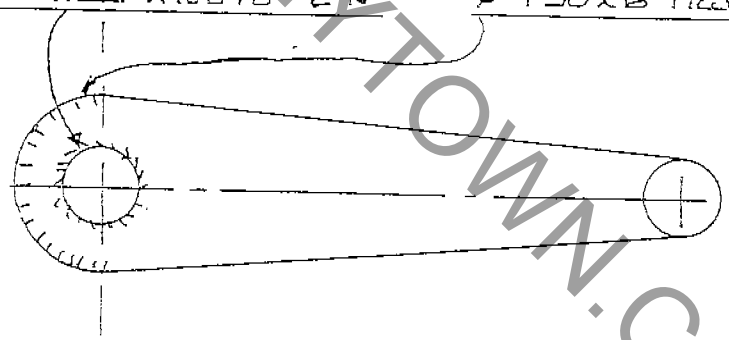
All Gusset Connections have been ignored

W1

WELD Ø 265 x 6 FILLET x 100% 2-N°

W2

Ø 450 x 6 FILLET x 50% 1-N°



MAIN TORQUE TUBE

(STRESSES IN WELDMENT)

W1 - Max Torque through Weld Driving — Per Tube = 20 KNM

W1 & W3 JW $= \frac{TT \times 26.5^3}{4} \times 2$ $= 29{,}231\ cm^3$

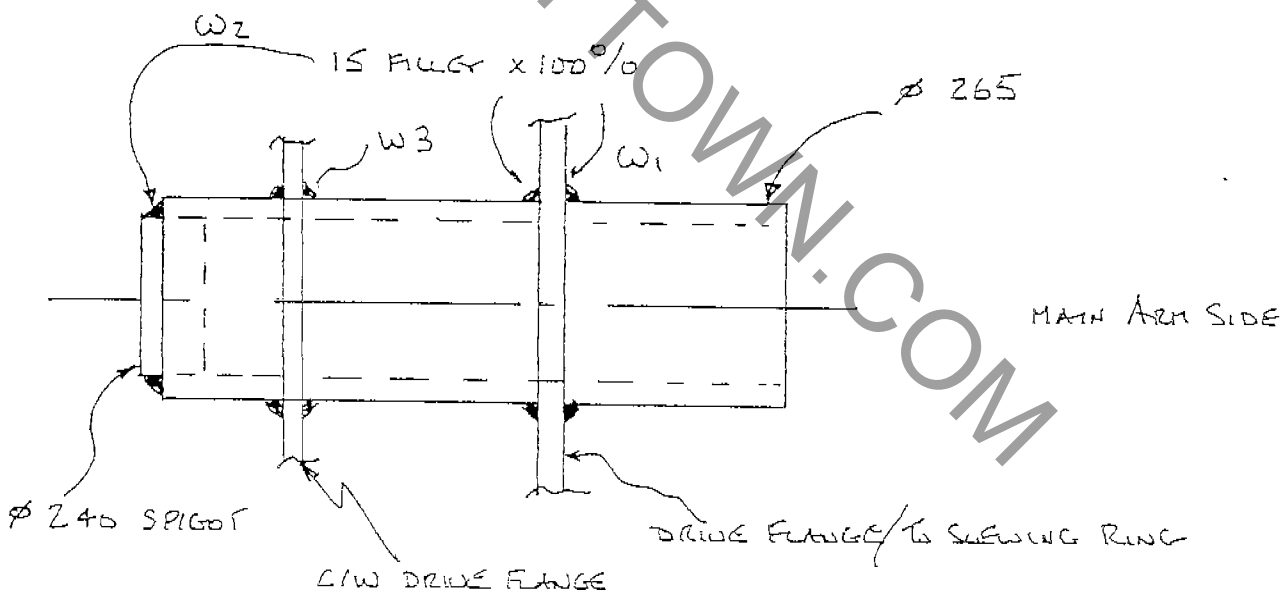
W1 - Max Weld Stress $= \frac{20 \times 265 \times 10^3}{29{,}231 \times 2 \times 15 \times .707}$ $= 8.5\ N/mm^2$

W2 - Max Torque from C/Balance Weight — Per Tube = 24 KNM

JW $= \frac{TT \times 24^3}{4}$ $= 10{,}857\ cm^3$

W2 - Max Weld Stress $= \frac{12 \times 240 \times 10^3}{10{,}857 \times 2 \times 15 \times .707}$ $= 12\ N/mm^2$

W3 - Max Weld Stress $= \frac{12 \times 265 \times 10^3}{29{,}231 \times 2 \times 15 \times .707}$ $= 5\ N/mm^2$



MAIN TORQUE TUBE

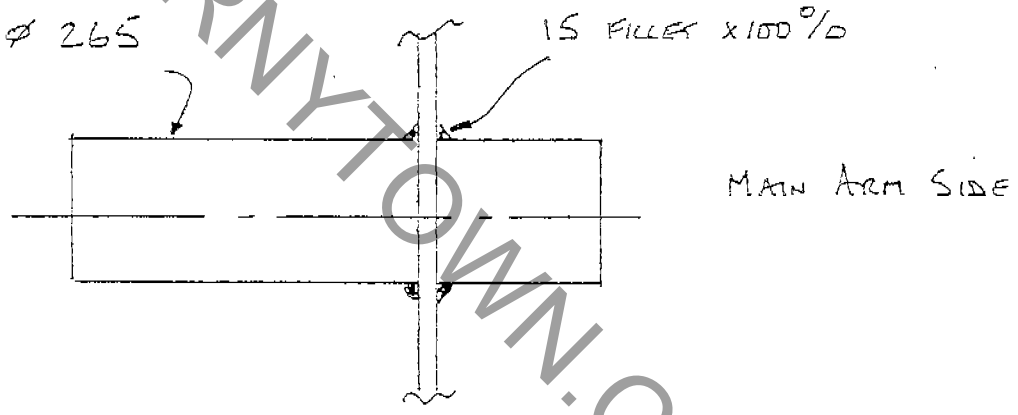
(STRESSES IN WELDMENT)

ZW of Weld $= \frac{TT \times 26.5^2}{4} = 551\ cm^2$

Bending Stress (from Tie Bar) $= \frac{16 \times 830 \times 10}{551 \times 2 \times 15 \times .707} = 11\ N/mm^2$

Bending Stress (from C/B Weight) $= \frac{21.5 \times 670 \times 10}{551 \times 2 \times 15 \times .707} = 12\ N/mm^2$

NOTE: These Stresses are 90^0 Out of Phase



TIE BAR ENDS

(STRESSES IN WELDMENTS)

Max Shear Area Group 'A' = (20 x 4) + (16 x 2) x .707 x 1 = 79 cm^2

Max Shear Area Group 'B' = (16 x 2) + (8 x 2) x 1 = 19 cm^2

= (25 x 4) x .707 x 1 = 71 cm^2

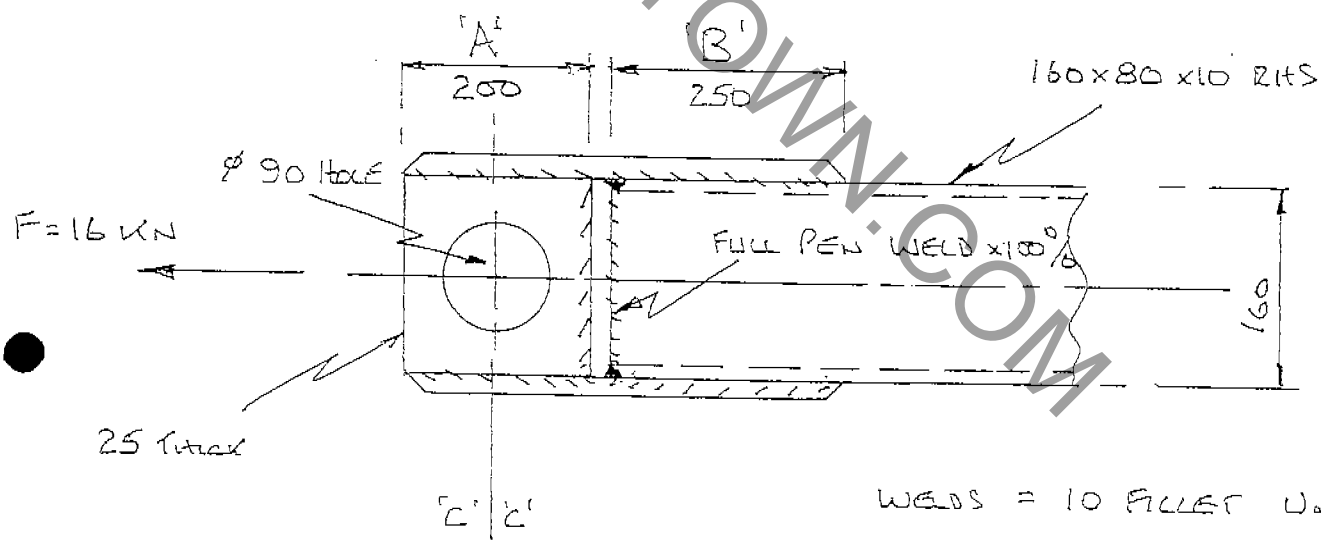
Total 'B' = 90 cm^2

Shear Stress 'A' Group = $\frac{16 \times 10}{79}$ = 2N N/mm^2

Shear Stress 'B' Group = $\frac{16 \times 10}{90}$ = 1.7 N/mm^2

Shear Stress at CC = $\frac{16 \times 1000}{(160 \times 25) - (90 \times .25)}$ Nett = 9 N/mm^2

S.C.F. at CC = 2.1



WELDS = 10 FILLET U.O.S.

STRESSES IN COUNTERWEIGHT WELDMENTS

$$F2 = \frac{15}{\text{Sine } 20^0 \times 2}$$

F2 Per Diagonal = 22 KN

$$F1 = 22 \times \text{Cos } 20^0$$

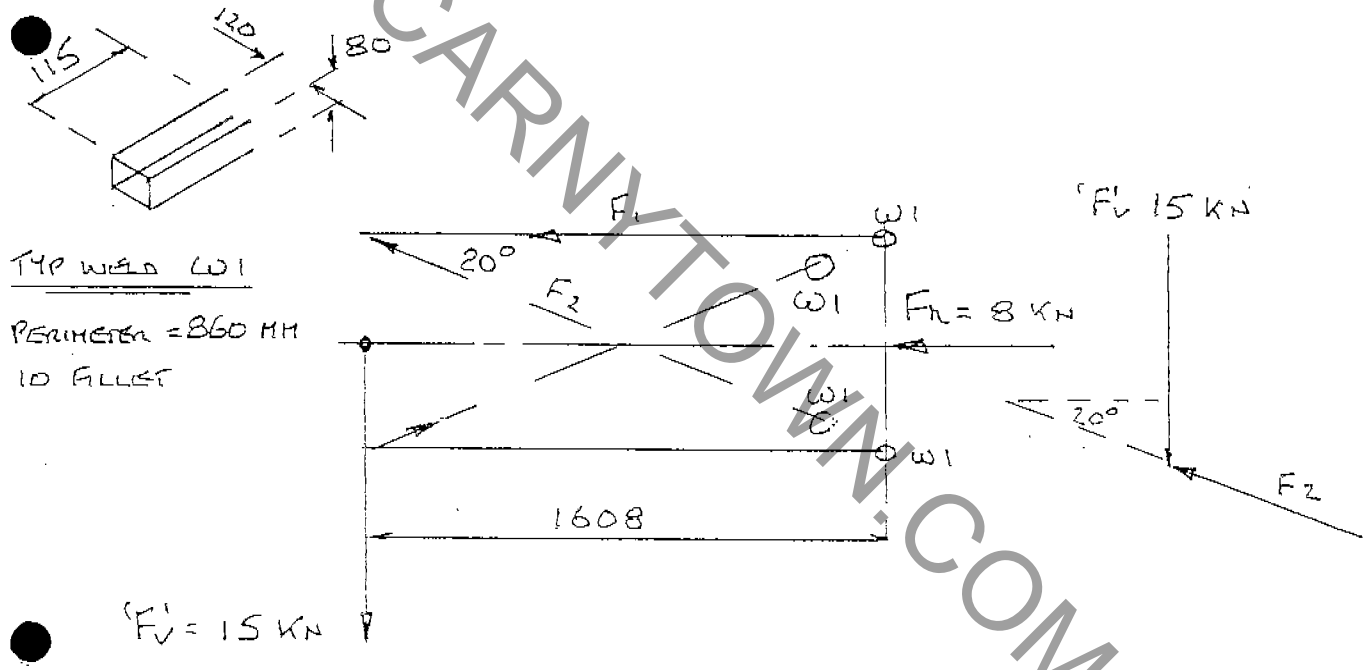
F1 Per Member = 21 KN

$$\text{Weld Stress (Shear FV)} = \frac{22 \times 1000}{860 \times 10 \times .707}$$

F2 = 4 N/mm²

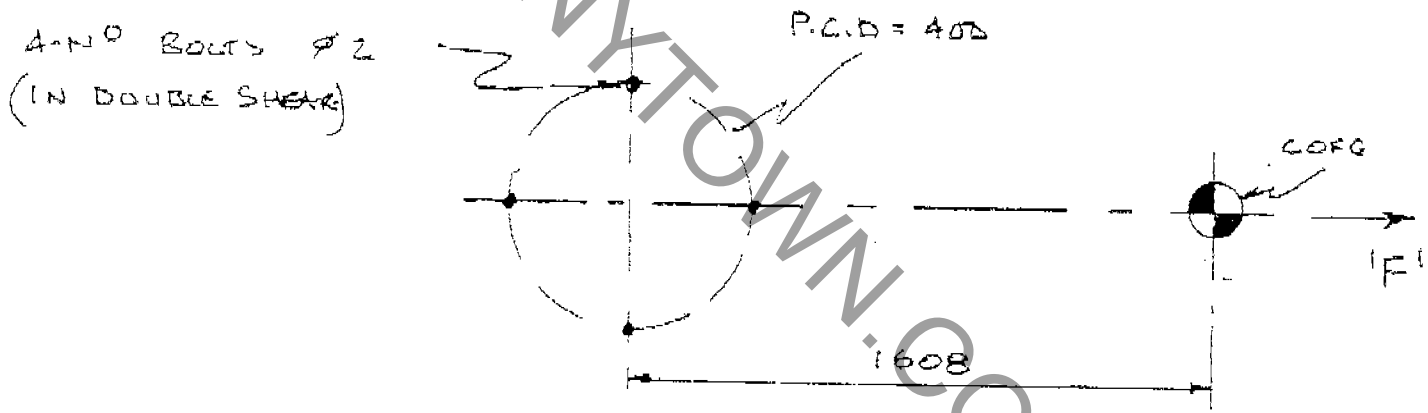
$$\text{Weld Stress (Shear Fn)} = \frac{8 \times 1000}{4 \times 860 \times 10 \times .707}$$

F2 = 0.3 N/mm²



COUNTERWEIGHT BOLTS

Bolt Modulus	=	$200^2 \times 4$	= 160,000 mm^2
Max Arm Torque	=	15×1.608	= 24 KNM
Max Bolt Stress	=	$\frac{24 \times 10^6}{160{,}000 \times 490 \times 2}$	= 0.15 N/mm^2
Max Force 'F' Horizontal	=	8.5 KN	
Max Force 'F' B.D.C.	=	21.5 KN	
Max Bolt Stress Horizontal	=	$\frac{8.5 \times 1000}{4 \times 490 \times 2}$	= 2.0 N/mm^2
Max Bolt Stress BDC	=	$\frac{21.5 \times 1000}{4 \times 490 \times 2}$	= 5.0 N/mm^2



SECTION D

DESIGN LIFE

SUMMARY OF STRESS RANGES

(ROTATING AT 2.0 RAD/SEC)

Main Arm Large End	Axis xx		=	61 N/mm^2
Main Arm Large End	Axis yy		=	16 N/mm^2
Main Arm Small End	Axis yy		=	32 N/mm^2
Main Arm Torsional Shear			=	18 N/mm^2
Main Shaft 00	Axis xx		=	100 N/mm^2
AA	Axis xx		=	180 N/mm^2
BB	Axis xx		=	167 N/mm^2
AA	Axis yy		=	82 N/mm^2
BB	Axis yy		=	76 N/mm^2
Tie Bar Pin AA	Axis xx		=	26 N/mm^2
BB	Axis xx		=	23 N/mm^2
CC	Axis xx		=	28 N/mm^2
Superstructure Upright	Axis xx	Car Horizontal	=	48 N/mm^2
Chassis X-Member	Axis xx	Car B.D.C.	=	9 N/mm^2
Chassis Main Rail Max	Axis xx	Car B.D.C.	=	7 N/mm^2
Main Torque Tube	Axis yy	Tie Rod	=	22 N/mm^2
Main Torque Tube	Axis xx	Counterweight	=	12 N/mm^2

FATIGUE OPERATIONAL SPECTRUM

(OPERATING SPEED 20 RPM)

Max length of Ride Time		= 2.0 Min
No of Full Speed Revolutions (either Direction)	max	= 20 Revs.
Time of Full Speed Revolutions		= 1.0 Min.

BASIC ASSUMPTIONS

Machine available for work	= 8 Hours/Day
Machine available for work	= 6 Days/Week
Machine available for work	= 8 Months/Year

Total Hours available per Year = 8 x 6 x 8 x 4 Standing Time = 1536 Hours

Actual Time Machine Runs 40% of Standing Time per Year = 614 Hours

ACTUAL NO OF COMPLETE REVOLUTIONS @ FULL SPEED

$\frac{614 \times 60}{2}$ = No of complete Rides/Year = 18,420

18,420 x 20 = No of complete Revs/Year = 368,400

No of Stress Cycles for Tie Bar	= 368,400 x 2	= 736,800
No of Stress Cycles for Lap Bar	= 368,400 x 2	= 736,800
No of Stress Cycles for Main Arm	= 368,400	= 368,400
No of Stress Cycles for Main Pin	= 368,400	= 368,400

SUMMARY OF DESIGN LIFE

(ROTATING AT 2.0 RAD/SEC)

BS 5400 PT 10

			CLASS	LIFE
Main Arm Large End		Axis xx	'D'	7×10^6
Main Arm Large End		Axis yy	'F2'	80×10^6
Main Arm Small End		Axis yy	'F2'	10×10^6
Main Shaft	OO	Axis xx	'F'	6×10^5
Main Shaft	AA	Axis xx	'E'	8×10^5
Main Shaft	BB	Axis xx	'B'	1×10^6
Main Shaft	AA	Axis yy	'B'	20×10^6
Main Shaft	BB	Axis yy	'B'	30×10^6
Tie Bar Pin	AA	Axis xx	'B'	∞
Tie Bar Pin	BB	Axis xx	'B'	∞
Tie Bar Pin	CC	Axis xx	'B'	∞
Superstructure Upright		Axis xx	'F'	5×10^6
Chassis X-Member		Axis xx	'F'	∞
Chassis Main Rail		Axis xx	'F'	∞
Main Torque Tube			'F'	∞
Main Torque Tube		Axis xx	'F'	∞

SUMMARY OF REF STRESSES

(To BS 2573 Pt 2)

LOCATION	STRESS		REF STRESS
Main Shaft @ 'A'-'A'	= 167 N/mm^2	$\frac{0.85 \times 540}{1.6 \times 1.3 \times 1.7}$	xx = 130 N/mm^2
Main Shaft @ 'A'-'A'	= 82 N/mm^2	Ditto	yy = 130 N/mm^2
Main Shaft @ 'B'-'B'	= 155 N/mm^2	$\frac{0.85 \times 540}{1.6 \times 1.3 \times 1.6}$	xx = 138 N/mm^2
Main Shaft @ 'B'-'B'	= 76 N/mm^2	Ditto	yy = 138 N/mm^2
Tie Bar Pin 'A''A'	= 26 N/mm^2	$\frac{0.5 \times 540}{1.6 \times 1.3 \times 2.1}$	= 62 N/mm^2
Tie Bar Pin 'B''B'	= 23 N/mm^2	$\frac{0.5 \times 540}{1.6 \times 1.3 \times 1.6}$	= 81 N/mm^2
Tie Bar Pin 'C''C'	= 28 N/mm^2	$\frac{0.5 \times 540}{1.5 \times 1.3 \times 2.2}$	= 63 N/mm^2

SLEWING RING BOLTS

Max Drive Torque Per Ring = 20 KN
P.C.D. of Bolts = 800 mm
Bolt Size = M16
No of Bolts = 24

Load on Bolts $= \frac{24 \times 2 \times 10^6}{800 \times 24}$ = 2500 N

Stress on Bolts $= \frac{2500}{157}$ Shear = 16 N/mm^2

Max Moment on Bolts @ BDC Per Ring = 18 KNM

Max Z6 $= \frac{\pi \times 80^4}{4}$ = 5026 cm^2

Max Stress/Bolt $= \frac{18 \times 10^4}{5026 \times 157}$ = 0.2 N/mm^2

PINION STRESSES

'Z' at Root = $\frac{60 \times 12^2}{6}$ = 1440 mm^3

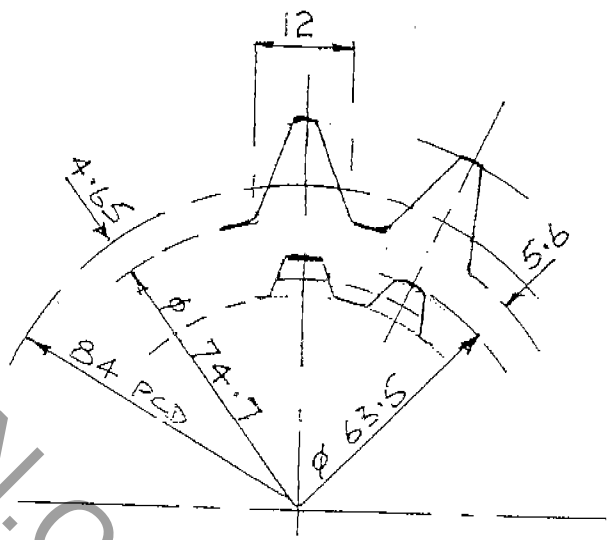
Stress at Root = $\frac{2024 \times 2 \times 4.65 \times 1000}{84 \times 1440}$ = 156 N/mm^2

Ref Stress EN24T = $\frac{0.5 \times 852}{1.6 \times 1.4 \times 2}$ = 95 N/mm^2

Ref Stress EN36B (Shot Peened) = $\frac{0.5 \times 1000}{1.6 \times 1.1 \times 2}$ = 142 N/mm^2

Reduce Motor Pressure to 3.600 PSI EN36B

N	=	14 Tooth
Mod	=	6
Face	=	60mm
Material	=	EN24/EN36B
Max Motor Torque	=	2024NM



SECTION 6

HYDRAULIC MAINTENANCE CONTRACT

Hydraulic System - General Information

Hydraulics play a major role in the set-up, operation, and stowage of the Miami ride. Hydraulic circuits are employed to open and close the folding flash panels; the main seat platform is driven by a closed-loop hydraulic circuit, and the seat lap-bars are also hydraulically operated.

In addition to these circuits, there are several sub-systems performing less obvious functions. These comprise:

- *A Brake Circuit which will halt the ride in the event of a hydraulic failure.*
- *A Flushing Circuit which maintains the hydraulic oil at a safe working temperature.*
- *An Emergency Circuit which enables the seat platform to be driven to a safe position in the event of a failure of the electrical supply.*

Each of the hydraulic circuits has been carefully designed, calibrated and tested to ensure they provide safe and reliable operation of the ride, whilst delivering maximum performance. Providing these circuits are properly maintained, they will provide many years of trouble-free service.

Please note that tampering with the hydraulic circuits is dangerous, and will invalidate the warranty offered by K. Emmett & Sons. Basic maintenance however is the responsibility of the operator and full details are provided on the next page.

Servicing And Maintenance

General Maintenance

Although full servicing and maintenance should only be carried out be a fully qualified hydraulics engineer, the following daily and weekly checks are the responsibly of the ride operator and must be carried out as specified.

1. Oil level checks

Miami rides are equipped with two types of level indicator for the hydraulic system: A sight glass in the reservoir (later models only) and an electrically-operated warning lamp. For rides equipped with a sight glass, the oil level should be checked daily. Operation of the switch should be checked weekly.

2. Visual Inspection

At least once per week, and always after transporting the ride to a new site, visually inspect the complete system for component damage, hose chafing and leaks. All pipe and hose unions must also be checked to ensure they are tight.

3. Filter Blockage Indicator

At least once per week, inspect the visual indicator fitted to the hydraulic filter must be checked. (the filter is located adjacent to the reservoir). The filter must be changed BEFORE the indicator reaches the red section.

Servicing And Adjustment

Every four months the complete system should be serviced and tested by a qualified hydraulics engineer.

K. Emmett and Sons recommend that this work is carried out by Applied Hydraulics Ltd. To arrange for servicing or repair, please contact us on the telephone number shown on the front page. We will be pleased to discuss your requirements. We also offer a planned maintenance scheme, full details of which are given overleaf.

Breakdown Procedure

In the unlikely event of a breakdown, or malfunction in the ride hydraulic systems, within the on-year warranty period, contact K. Emmett and Son. Arrangements will then be made for a service engineer from Applied Hydraulics to rectify the fault. Please provide a full description of the fault and give the circumstances under which the failure occurred.

DO NOT ATTEMPT TO REPAIR OR ADJUST ANY PART OF THE HYDRAULIC CIRCUIT. THIS MAY INVALIDATE YOUR WARRANTY.

Breakdown call-outs which result from unauthorised adjustment, tampering, or lack of maintenance, will be charged for.

For breakdowns which occur outside the warranty period, K. Emmet & Sons recommend that all repairs are carried out by Applied Hydraulics and you may contact us direct.

Miami Ride Planned Maintenance

Applied Hydraulics are offering a Planned Maintenance scheme for the Miami ride which can bring you a number of benefits.

- *We designed, built and installed the hydraulic circuits on your Miami ride; nobody knows them better than us. Our knowledge and expertise will ensure that your ride is correctly maintained and adjusted and is always operating at peak efficiency. This will considerably reduce the possibility of breakdowns and the consequent loss of revenue caused by having a ride out of service.*
- *We are the only hydraulics engineers approved by K. Emmett & Sons for the Miami ride.*
- *We take care of everything, contacting you 4 times a year to arrange a convenient date and time to carry out the service and we provide all the necessary parts.*
- *You can join the Planned Maintenance Scheme at any time, however if you join before your ride is more than three months old, we extend the original warranty on the hydraulic components for a further 12 months - see below for details.*

The Service Provided

When you join the Planned Maintenance Scheme, Applied Hydraulics will arrange to service the ride every three months, at a time and date convenient to you. The service includes:

- *An oil condition test of the system oil*
- *Full flow and pressure testing*
- *Individual circuit check*
- *All adjustments as required*
- *Pressure and leak testing plus rectification of any faults*
- *Oil filter renewal and top-up*
- *Full operation test and check.*

Applied Hydraulics Ltd., The Barn Hall, Stock Road, Coggeshall, Essex CO6 1NX
Telephone: 0376 563746

To Join

Contact Applied Hydraulics on: 0376 563746, or writ e to us at the address shown on the front cover. We will be pleased to answer any queries you may have and to provide any further information which may be required.

Terms

All warranties are parts only. Travelling costs and labour will be chargeable except in the case of components returned to Applied Hydraulics, or rides transported to the Emmet & Son engineering workshop at Stanton, Suffolk, in which case travelling will be free of charge.

- For the extended warranty to be valid, the Planned Maintenance services must be carried out every three months as scheduled. A one-month period of grace is allowed. The only exception to this is in cases where Applied Hydraulics have failed to service the ride at the time specified.

The Cost

The costs are quite straightforward. Each service is £ 265.00 Plus Vat. Travel will be charged at 45 p per mile. For journeys of more than 200 miles a charge for overnight accommodation will also be made. The price includes the oil filter and up to 25 litres of oil for topping-up.

Please Note: Payment is due on the day, following completion of the service.

The Extended Warranty

The following components carry a 12-month parts-only warranty against manufacturing or material defects:-

Electric motors
Pumps and couplings
Valves (all types)
Steel Pipes and Fittings
Gauges
Filter Body (excluding filter element)

Please note: **This applies only to components in those circuits designed and installed by Applied Hydraulics. These are:**

Lap Bar circuit
Flash circuit
Brake circuit
Flushing circuit
Emergency circuit

In the case of the main closed-loop circuit, Applied Hydraulics offers no warranty, nor accepts any liability accept for that arising as a result of poor workmanship in the installation of the hydraulic hoses.

Applied Hydraulics Ltd., The Barn Hall, Stock Road, Coggeshall, Essex CO6 1NX
Telephone: 0376 563746

SECTION 7

ELECTRICS

ELECTRICAL CONTROL SYSTEM FOR K.EMMETT

STANDARD MIAMI RIDE

CIRCUIT DIAGRAM DWG. No. JX502 8 sheets.

1. Sheet 1

1.2 MCB - Door interlocked moulded case circuit breaker with shunt trip operated from Emergency Stop pushbutton on operator's control station. The circuit breaker is fitted with an earth leakage module.

1.3 Contactors K1, K2, K3 form a standard star-delta circuit for starting the main 45kW motor. Overload protection is from CB1 (100 Amps) and OL3 (37 -50A).

1.4 The Jack motor is a single phase capacitor start and run motor. It is fed via a 13 Amp plug and socket adjacent to the motor. If the ride is not powered up the Jack motor can be plugged into a regular 13A socket (240v). Protection for this motor is via CB16 (10 Amp) and overload OL4 (4-6 Amps), except when externally powered.

1.5 The cooling motor is a three-phase motor fed via CB5 (10A) and contactor K6. Protection against single phasing and overload is via OL6 (1-1.6 Amp). The cooling motor starts when the ride is powered up unless the overload has tripped.

1.6 The two bulk-head lights are situated in the rear of the ride and can be switched on and off via the switch on the front of the main control cabinet.

2. Sheet 2

2.1 Circuit breaker CB2 is required when optional smoke machine socket is required.

2.2 The electronic control box for the 'Terminator' sign is controlled via contactor K9 with overload protection from circuit breaker CB8 (32A).

2.3 The electronic control box for the 'Backflash' lights is controlled via contactor K10 and circuit breaker CB9 (32A).

2.4 The traffic lights are controlled via contactor K8 with circuit protection from circuit breaker CB11 (32A). Note that individual circuit protection is provided within the traffic lights' control box.

2.5 240v AC power is taken to the paybox via circuit breaker CB12 (16A).

3. Sheet 3

3.1 Circuit breaker CB7 provides 240v AC power to the car, the fluorescent tubes along the front of the ride and the brake solenoid.

3.2 When the 'OPEN SAFETY BARS' pushbutton (PB10) is pressed, the 'open' solenoid is energised via wire no. 35. At the same time as the seat safety bar opens, the safety bar interlock opens, which de-energises relay RL2. When RL2 de-energises, the power to the speed control unit is cut off (see sheet 6).

3.3 When the 'CLOSE SAFETY BARS' pushbutton (PB9) is operated, the 'close' solenoid is energised via wire no. 36. The 'close' solenoid must remain energised until the safety bar interlock is fully engaged and relay RL2 energised. The speed control can then be operated.

3.4 The Hydraulic Power Pack on the car is driven from a single phase motor which is protected via motor overload starter MS1, which is located within the terminal box mounted on the car chassis.

3.5 The brake solenoid is operated via the BRAKE OFF/ON switch, mounted on the operator's control panel.

3.6 Transformer TX1 is the main control transformer providing a 110v AC supply for the pushbuttons.

4. Sheet 4

4.1 Operation of the EMERGENCY STOP pushbutton PB1, mounted on the operator's control panel energises relay coil RL1 which is located within the main isolator, MCB (see sheet 1). When the EMERGENCY STOP pushbutton is operated the MCB is tripped which isolates all equipment from the incoming AC supply.

4.2 The main motor can only be started if:

- EMERGENCY STOP pushbutton released.
- Main motor overload, OL3, reset.
- Back door safety switches closed and RL3 energised (Sh.5).
- Hydraulic oil level is high, and RL13 not energised (Sh.5).
- 3 phase power is available.

4.3 Operation of the MAIN MOTOR START pushbutton will energise relay RLX, contactor K2, and contactor K1. Power will then be applied to the motor in the star configuration to minimise the starting current. After 3 or so seconds the timer on K2 operates to de-energise K1 and instead energises K3 which puts the motor in delta configuration for normal running.

PART OF

DO NOT SCALE

SHEET OF

DRG. No.

ITEM	QUAN	DESCRIPTION	SYMBOL
	1	CABINET ES 5684	C3159
	1	C161N/D160 MCCB M/G 40515 WITH 41 551 ELCB (097661D TERMINALS) 42912 SHUNT TRIP	
	1	M/G CB NC100C/D100A PIN27276	CB1
	1	C60 HD 310	CB5
	1	C60 HD 216	CB13
	2	C60 HD 110	CB16
	2	C60 HD 116	CB12, 14
	3	C60 HD 132	CB8, CB9 CB11
	1	C60 HD 120 14885 (BUSBAR CONNECTOR) 14893 BUSBAR.	CB7
	2	LC1 D5011 F7	K1, K2
	1	LC1 D4011 F7	K3
	1	LA2 DS2	(K1)
	1	LR2 D3357 (37-50A)	OL1

ITEM	QUAN	DESCRIPTION	SYMBOL
	3	LC1 - D0910 F7	K4, 6, 7
	1	LR2 - D1310 (4-6)	OL2
	1	LR2 - D1306 (1-1.6)	OL4
	3	LC1 - D1810 F7	K8, K9, K10
	2	CA2 - DN 22 F7	RL3, RL13
	1	CA2 - DN 22 U7	RL2
	1	500VA 415/110V TXF LOUTH 3022	
	1	12V 1A PSU ER115 RIS 591-916	PSU
	2	HANN/HTG 231.390 1-16 Male	
	2	" 231.400 17-32 "	
	2	" " 231.330 1-16 Female	
	2	" " 231.340 17-32 "	
	2	" " 231.380 Hood	
	2	" " 235.220 Cable clamp	
	2	" " 231.420 endcover hsg	
	2	14/4/110V + BASE HTE 739-610 HTE 736-180	RLY RLY
	1	50R POT R/S 173-013	

ITEM			
	1	OPERATORS ENCLOSURE ELDON AM 0403020 CHASSIS AMPL 04030	
	1	2 POSN SWITCH ZB2-BD2 1 N/O 1 N/C	SW1
	1	E/STOP ZB2-BS54 1 N/O	PB1
	2	START PB (ILL) ZB2-BW33 1 N/O + LAMP	PB2B PB3B
	2	STOP PB (ILL) ZB2-BW34 1 N/C + LAMP	PB2A PB3A
	5	ON/OFF PB (ILL) ZB2-BW31 1 N/O + LAMP WITH LATCH ZB2-BZ21	PB5, PB6 PB7, PB8
	17	N/O ILL. BODY ZB2-BW061	PB2B, 3B 5, 6, 7, 8
	2	N/C " " ZB2-BW062	PB2A, 3A
	2	YELLOW PB (NON-ILL) ZB2-BA5 WITH 1 N/O 1 N/C	PB9-10
	5	WARNING LAMP ZB2-BV04	C2, C3, C4 C5, C6
	1	GREEN LAMP ZB2-BV03	
	3pk	(1pk=10) T/M ZB2-BY2101 BLANK LEGEND PLATES	
	6	PILOT LIGHT ZB2-BV6	C2, 3, 4, 5, 6
	2	N/O CONTACT ZB2-BZ101	PB9, SW1
	3	N/C " ZB2-BZ102	PB1, 10, SW1
	20	BULBS R/S 589-468	
	5	HTE 018522 (25A TERM.)	
	2	020530 END PLATE	
	4	017710 BARRIER	

ISSUE	DESCRIPTION	APPD.	DATE
	RIDE no 8		AP 93
2	STANDARD	MM	DEC 93

ASHTRONICS LTD
2, LACRE WAY
WORKS ROAD
LETCHWORTH, HERTS SG6 1NR
PHONE: (0462) 482068
FAX: (0462) 670999

TITLE

K. EMMETT & SONS

MIAMI STANDARD

DRAWN	TRACED	CHECKED	APPROVED	DATE
MAP				DEC 92

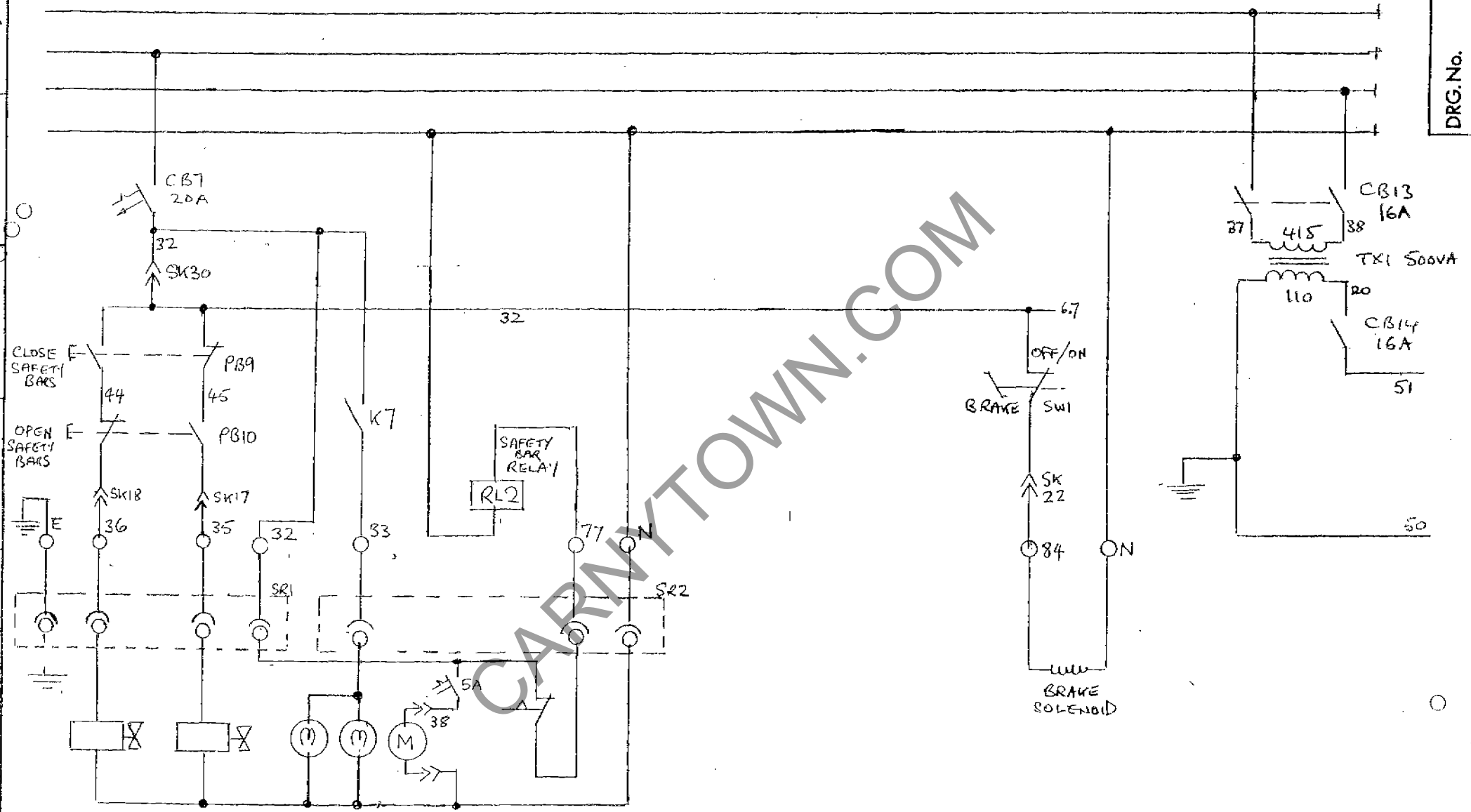
DRAWING No. JX502 SL 7 (sh 2)

PART OF

DO NOT SCALE

SHEET OF

DRG. No.



ISSUE	DESCRIPTION	APPD	DATE
	RIDE N° 8		4/93

ASHTRONICS LTD
2, LACRE WAY
WORKS ROAD
LETCHWORTH, HERTS SG6 1NR
PHONE: (0462) 482066
FAX: (0462) 670999

TITLE

K-EMMETT TONS

TERMINATOR [redacted]DE

DRAWN	TRACED	CHECKED	APPROVED	DATE
MAR				DEC 92

DRAWING No. JX502 SH.3

PART OF

DO NOT SCALE

SHEET OF

ITEM	QUAN	DESCRIPTION	SYMBOL
	2	BULKHEAD LAMPS EG. RS 566-077	
	1	SAFETY BAR I/LOCK SWITCH R/S 337-469	
	2	BACK DOOR SAFETY SWITCHES R/S 351-241	
	1	DUAL 13A SOCKET FOR KIOSK	
	6	4FT FLUORESCENTS	
	2	2FT FLOURESCENTS FOR PM BOX	

ITEM	QUAN	DESCRIPTION	SYMBOL
	100m	3 core 1mm² PVC 100m reel STC 051677R O/D 7·2mm	
	23m	4 core 10mm² SY STC 075232E O/D 25·2mm GLAND CXT32	
	35m	4 core 2·5mm² YY STC 401194F	
	12m	18 core 1·5mm² SY STC 075214R CXT32 O/D 20·6mm TYPE 3 GLAND	
	50m	5C 0·75mm YY STC 401195D O/D 7-3 PLASTIC GLAND	
	13m	34C 1mm SY STC 075206R O/D 23·8 GLAND CXT 32	
	8	CXT-32 GLAND (19-25·5mm) + SHROUDS	
	30	PLASTIC GLAND F/N 151-832 (7-10·5mm)	

ITEM			
	2	ENCLOSURE 164x129x70 SAREL 03564	JB6 JB7
	1	ENCLOSURE 267x207x110 SAREL 03720	JB4
	1	ENCLOSURE 214x162x92 SAREL 03624	JB 3
	6	ESD 406244D	
	3	406166X	
	3	406170H	
	3	406168G	
	3	406171F	
	2	13A SOCKET. IP66	CAR, JACK HTR
	2	ON/OFF SWITCH FOR B/HEAD LAMPS	CABINET FIXTURES

DRG.No.

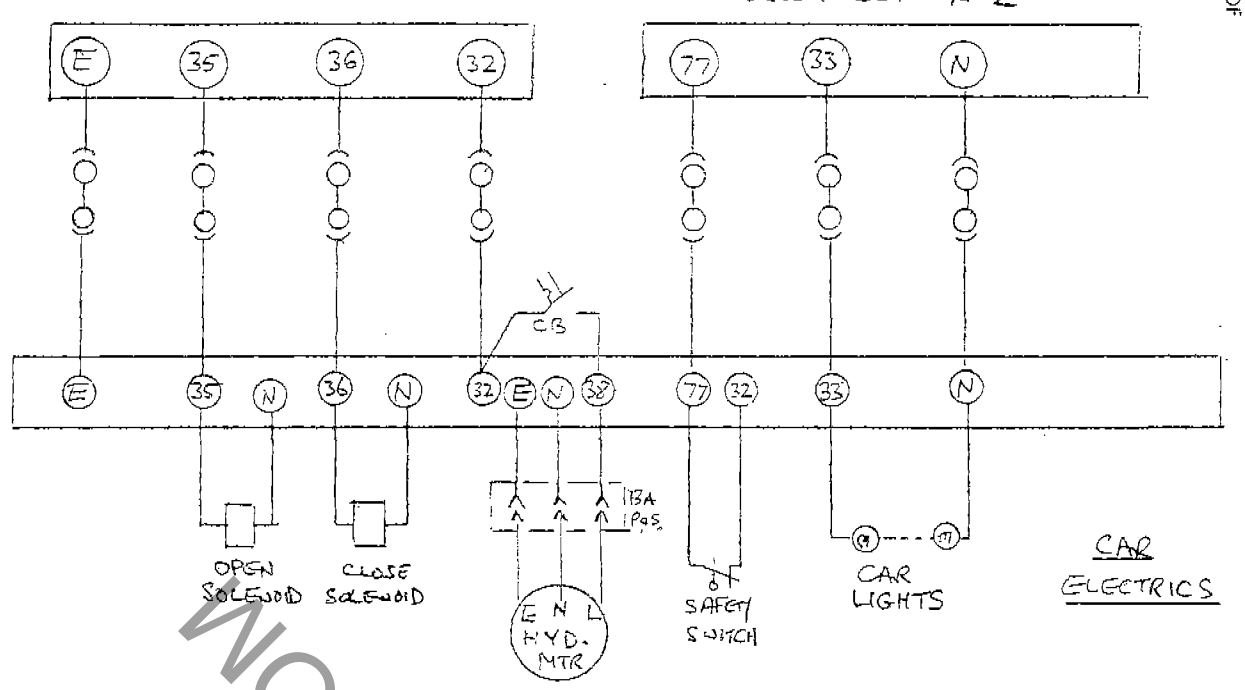
ISSUE	DESCRIPTION	APPD	DATE
	RIDE N° 8		APR 93
2	'STANDARD'	MAS	DEC 93

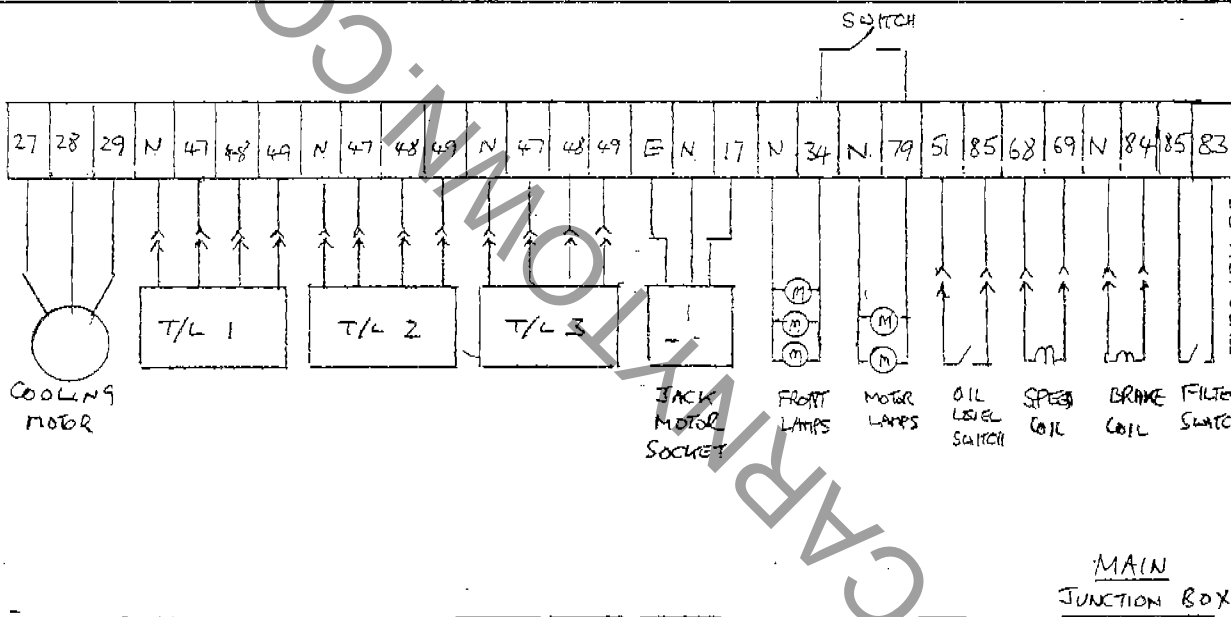
ASHTRONICS LTD
2, LACRE WAY
WORKS ROAD
LETCHWORTH, HERTS SG6 1NR
PHONE: (04462) 482066
FAX: (04462) 670999

TITLE
K. EMMETT — JONS
MIAMI STANDARD

DRAWN	TRACED	CHECKED	APPROVED	DATE
MAS				Dec 92

DRAWING No. JX502 SL8 Iss2





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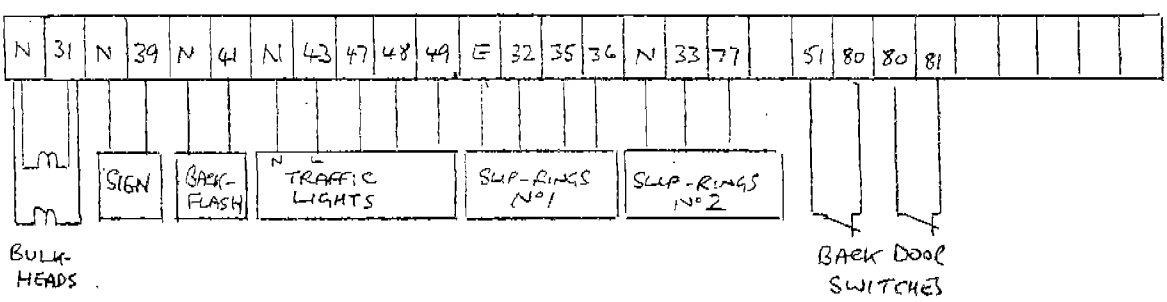

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ISSUE | DESCRIPTION | APPD | DATE

1

ASHTRONICS LTD
2 LACRE WAY
WORKS ROAD
LETCHWORTH, HERTS SG6 1NR
TEL: 0462 482066
FAX: 0462 670399

TITLE: K. Barrett Ltd
TERMINAL BLOCKS

DRAWN: MAS
TRACED:
CHECKED:
APPROVED:
DATE: 23 DEC 93

DRAWING No. JX502 SH 9

PART OF

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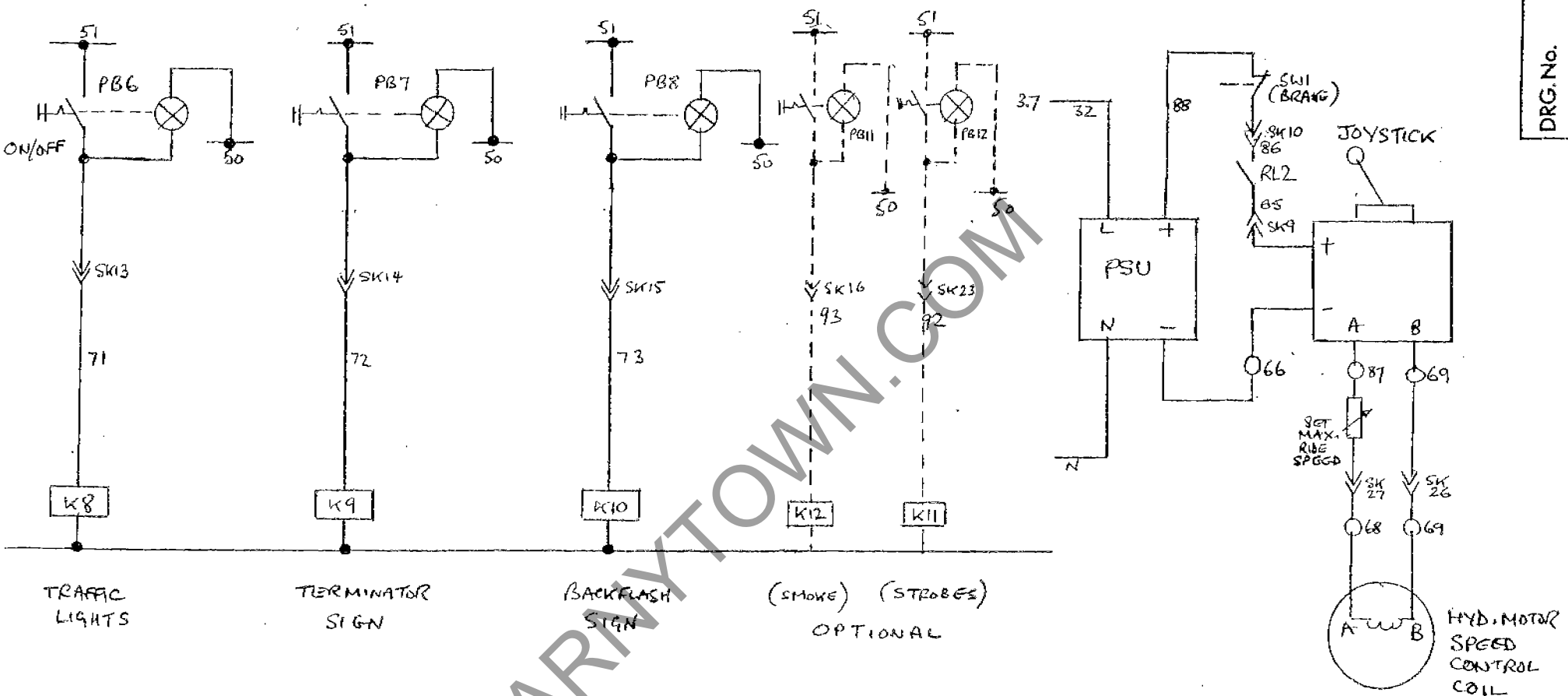


ISSUE	DESCRIPTION	APPD	DATE
	RUG No 8		AP 93

ASHTRONICS LTD
2, LACRE WAY
WORKS ROAD
LETCHWORTH, HERTS SG6 1NR
PHONE: (0462) 482066
FAX: (0462) 670999

TITLE

K. EMMETT & SONS

TERMINATOR

DRAWN	TRACED	CHECKED	APPROVED	DATE
MAB				DEC 92

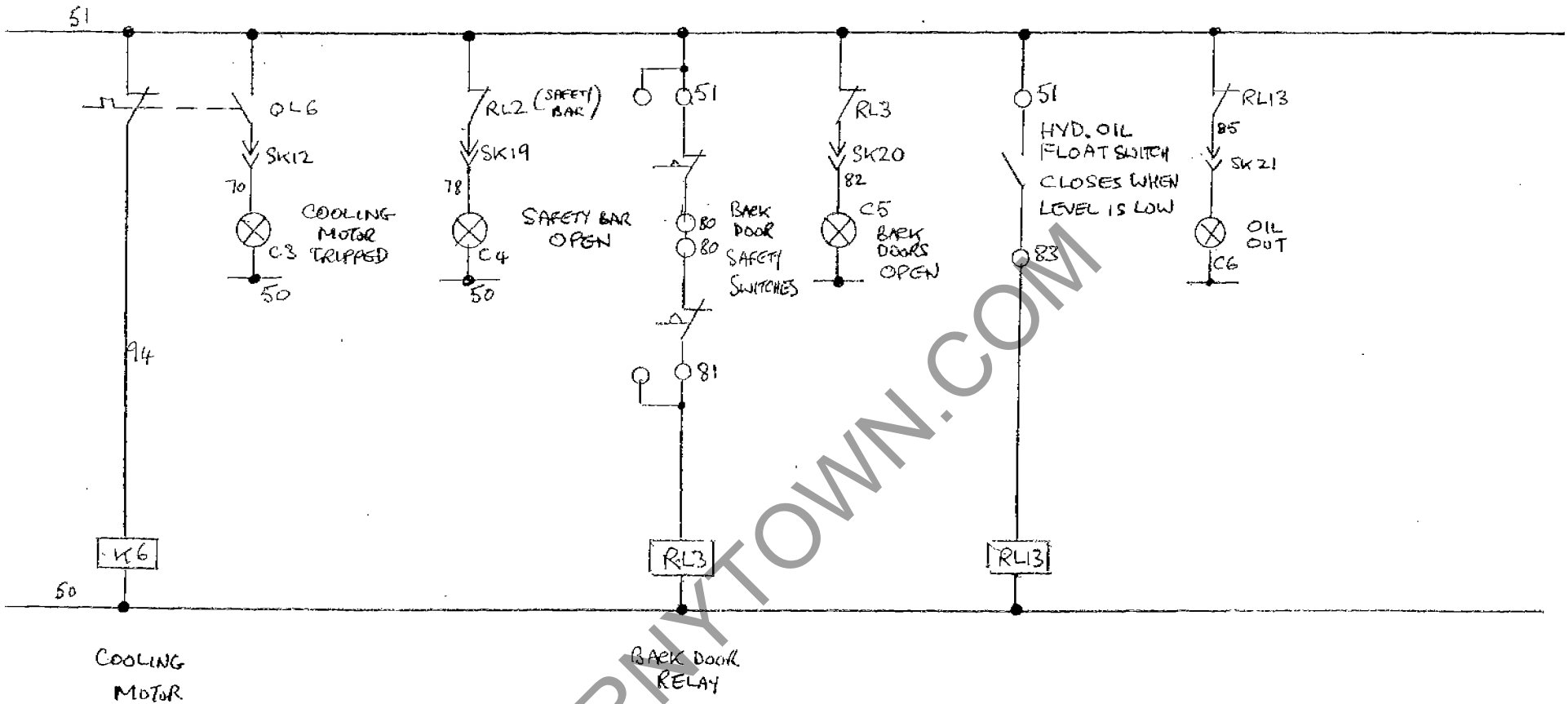
DRAWING No. JX502 SL6

PART OF

DO NOT SCALE

SHEET OF

DRG. No.



ISSUE	DESCRIPTION	APPD	DATE
	RIDE N°8		AP 93

ASHTRONICS LTD
2, LACRE WAY
WORKS ROAD
LETCHWORTH, HERTS SG6 1NR
TELEPHONE: (0462) 482086
FAX: (0462) 670999

TITLE

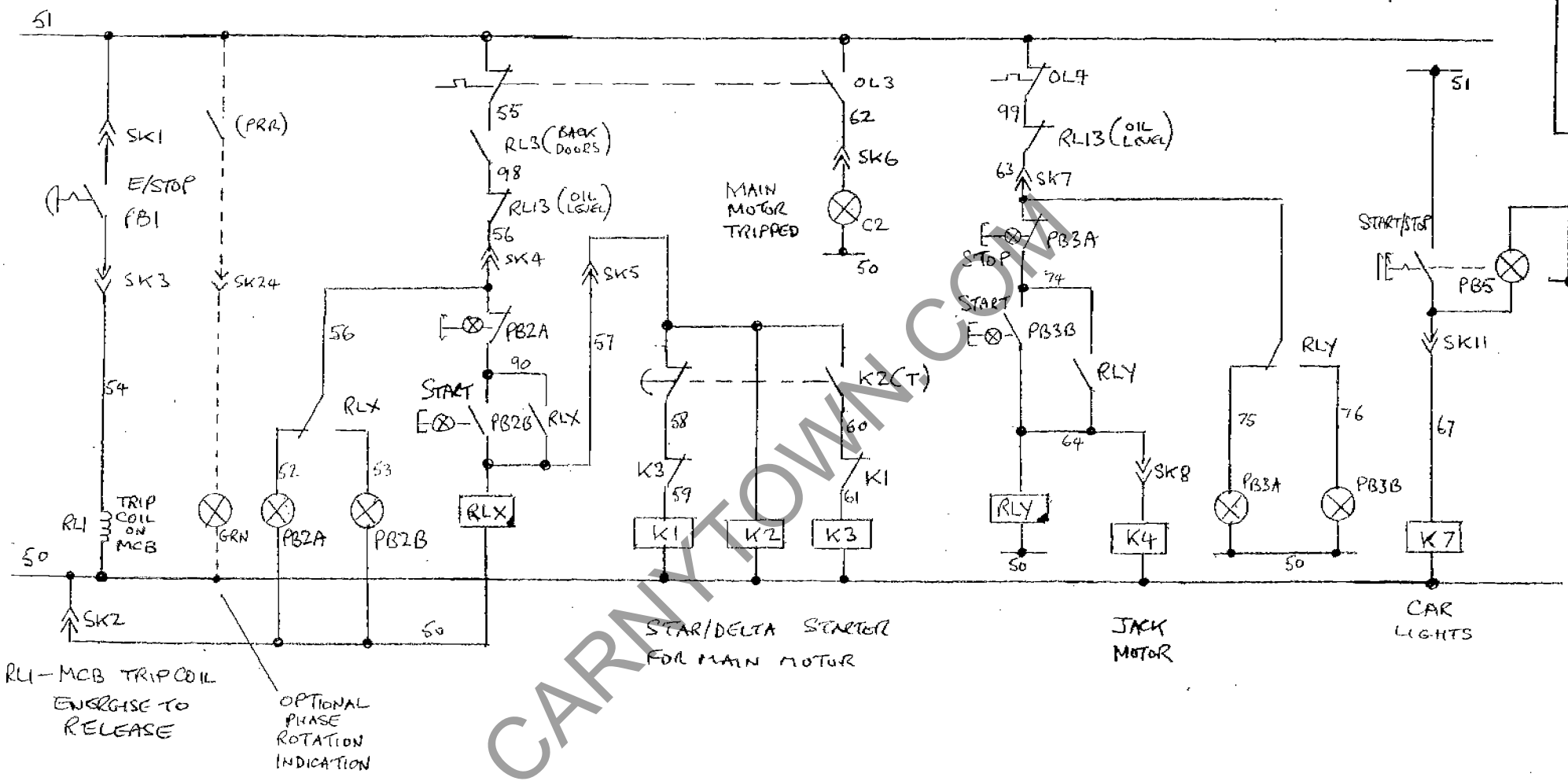
K. EMMETT & SONS

TERMINATOR RIDE

DRAWN	TRACED	CHECKED	APPROVED	DATE
MJS				Dec 92

DRAWING No. JX502 SH5.

PART OF | DO NOT SCALE | SHEET OF | DRG. No.



ISSUE	DESCRIPTION	APPD	DATE
	RIDE No 8		AP 93

ASHTRONICS LTD
2, LACRE WAY
WORKS ROAD
LETCHWORTH, HERTS SG6 1NR
PHONE: (0462) 482066
FAX: (0462) 670999

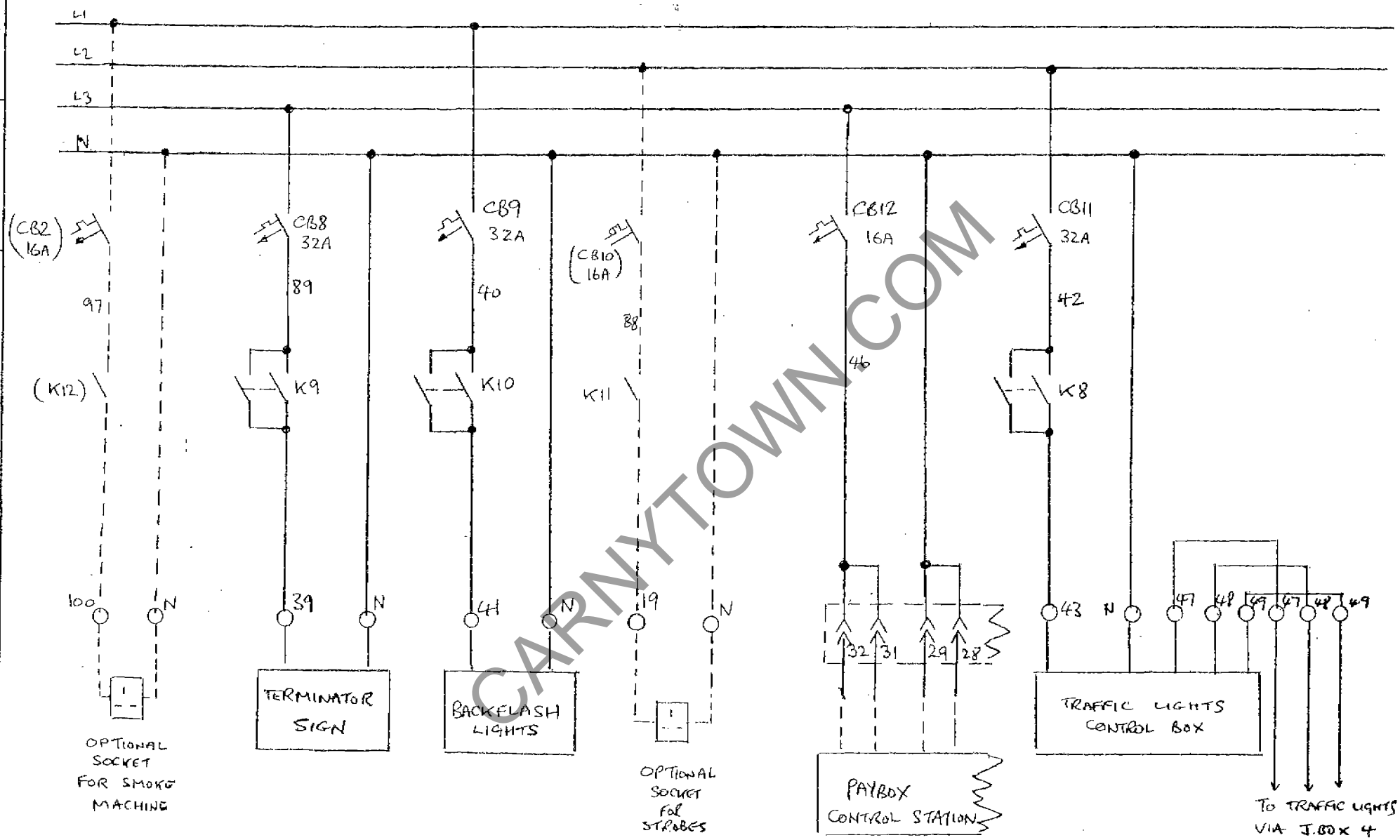
TITLE: K. EMMETT + SONS

TERMINATOR [illegible]DE

DRAWN	TRACED	CHECKED	APPROVED	DATE
MAS				DEC 92

DRAWING No. JX502 SK4

PART OF | DO NOT SCALE | SHEET OF | DRG. No.



ISSUE	DESCRIPTION	APPD	DATE
	RIDE No 8		Apr 93

ASHTRONICS LTD
2, LACRE WAY
WORKS ROAD
LETCHWORTH, HERTS SG6 1NR
PHONE: (0462) 482066
FAX: (0462) 670999

TITLE K. EMMETT & SONS

TERMINATOR RIDE

DRAWN	TRACED	CHECKED	APPROVED	DATE
MAS				DEC 92

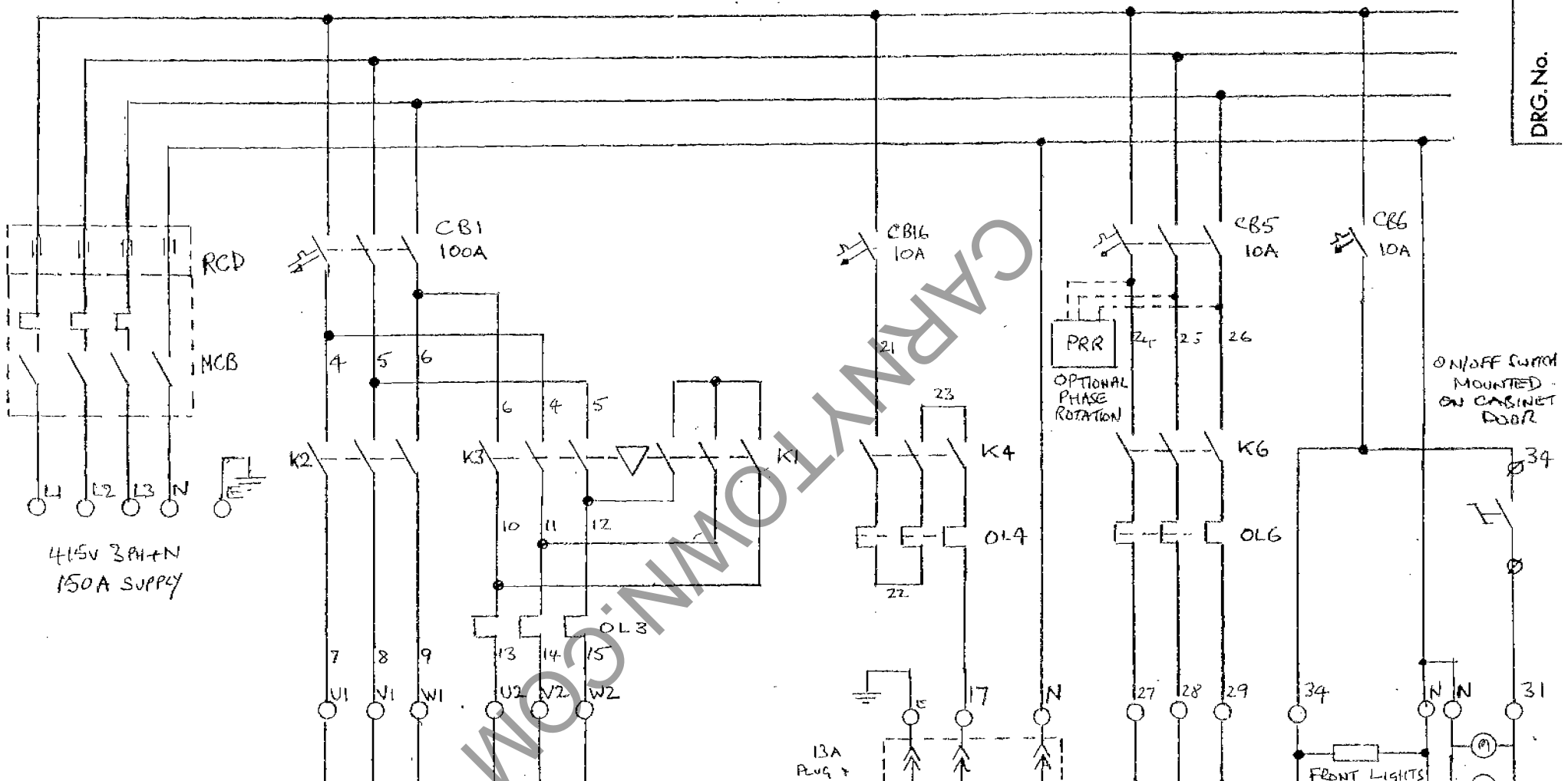
DRAWING No. JX502 SH 2

PART OF

DO NOT SCALE

SHEET OF

DRG. No.



ISSUE	DESCRIPTION	APPD.	DATE
	Rule No 8		AP 93
2	'STANDARD' M/C UPDATED	MAS	NE 93

ASHTRONICS LTD
2, LACRE WAY
WORKS ROAD
LETCHWORTH, HERTS SG6 1NR
PHONE: (0462) 482066
FAX: (0462) 670999

TITLE

K. EMMETT & SONS

MIAMI – STANDARD M/C

DRAWN	TRACED	CHECKED	APPROVED	DATE
MAS				DEC 92

DRAWING No. IJX 502 Sh1 Iss2