



THE
AMERICAN
RECREATIONAL EQUIPMENT
ASSOCIATION, INC.



THE 1987 SAFETY & MAINTENANCE SEMINAR

MTG: EUROPEAN Equip.
NAME: SEMINAR
Type: N/A

EUROPEAN EQUIPMENT.

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This booklet is some extracts from a manual currently being compiled of European equipment information. It is not an inspection guide but contains some of the lesser known information and checks for European rides.

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EUROPEAN ELECTRICS

Single Phase	L & N	220V - 240V	50 cps
Two Phase	2L & N	380V 440V	50 cps
Three Phase	3L & N	380V - 440V	50 cps

Motors wired for 50 cps when run on American 60 cps will turn 20% faster.

Example:-

Motor revolving at 1400 RPM at 50 cps
will revolve at 1680 RPM at 60 cps.

Cable Colours

Single Phase: -	Green/Yellow Blue Brown	Ground Neutral Live
Two Phase:-	Green/Yellow Blue Brown Black	Ground Neutral Live Live
Three Phase:-	Green/Yellow Blue Brown Black Red	Ground Neutral Live Live Live

Sometimes yellow/white are also used as Live.

Low Voltage

24V is common for low voltage lighting due to trucks having 24V systems.

Wire numbering in control circuits is used extensively both imprinted in cable and externally tagged at ends of cable.

CONVERSION FACTORS

CONVERSION FROM CUSTOMARY UNITS

CONVERSION FROM METRIC UNITS

TO CONVERT FROM	TO	MULTIPLY BY	TO CONVERT FROM	TO	MULTIPLY BY
inch	mm	25.4	millimetre	in	0.0394
inch	μ m	25,400.0	Micrometre	in	3.9×10^{-5}
foot	m	0.3048	metre	ft	3.2808
yard	m	0.9144	metre	yd	1.0936
square inch	mm ²	654.16	square millimetre	in	1.55×10^{-3}
cubic inch	mm ³	16,387.06	cubic millimetre	in	6.1×10^{-5}
pound	kg	0.4536	kilgram	lb	2.2046
ton	Mg	0.9072	Megagram	ton	1.1023
Fahrenheit	°C	$^{\circ}\text{C} = (^{\circ}\text{F} - 32) / 1.8$	Celsius	°F	$^{\circ}\text{F} = 1.8^{\circ}\text{C} + 32$
pounds/cubic foot	kg/m ³	16.0185	kilograms/cubic metre	lb/ft ³	0.624
pounds force	N	4.4482	newton	lbf	0.2248
pounds force	kN	0.0044	kilonewton	lbf	224.810
inch-pound	N.m	0.1130	newton-metre	in-lb	8.8496
foot-pound	N.m	1.3558	newton-metre	ft-lb	0.7376
pounds/square inch	MPa	0.0069	megapascal	psi	145.039
pounds/square inch	Bar	0.069	Bars	psi	14.5

BOLT COMPARISON



.187 in	=	3/16 in	=	4.763 mm	M 5	=	0.197 in
.25 in	=	1/4 in	=	6.35 mm	M 6	=	0.236 in
.312 in	=	5/16 in	=	7.937 mm	M 8	=	0.3152 in
.375 in	=	3/8 in	=	9.525 mm	M 10	=	0.394 in
.437 in	=	7/16 in	=	11.112 mm	M 12	=	0.473 in
.5 in	=	1/2 in	=	12.7 mm	M 14	=	0.552 in
.625 in	=	5/8 in	=	15.875 mm	M 16	=	0.630 in
.75 in	=	3/4 in	=	19.05 mm	M 20	=	0.788 in
.875 in	=	7/8 in	=	22.225 mm	M 24	=	0.946 in
1.00 in	=	1 in	=	25.4 mm			
1.125 in	=	1 1/8 in	=	28.575 mm	M 30	=	1.182 in
1.25 in	=	1 1/4 in	=	31.875 mm			
1.375 in	=	1 3/8 in	=	34.925 mm	M 36	=	1.418 in
1.5 in	=	1 1/2 in	=	38.1 mm			
.125 in	=	1/8 in	=	3.125 mm	M 4	=	0.158 in

METRIC HEX HEAD MARKINGS

- THE FOLLOWING DIAGRAM ILLUSTRATES THE HEAD MARKINGS AND THE GRADE COMPARISON BETWEEN SAE AND METRIC.
- ONE DIFFERENCE BETWEEN SAE AND METRIC IS THAT IN SAE THE TWO WEAKEST GRADES - GRADE 1 AND GRADE 2 - HAVE NO HEAD MARKING, WHILE IN THE METRIC SYSTEM, THESE TWO LOW STRENGTH GRADES ARE MARKED WITH, SAY, 4.6 or 5.8.
- REMEMBER, JUST BECAUSE A METRIC CAPSCREW HAS NUMERALS ON THE HEAD DOESN'T MEAN IT'S HIGH STRENGTH.
- THE OFFICIAL ISO HEAD MARKING IS TWO NUMERALS WITH A DECIMAL POINT IN BETWEEN - SUCH AS 8.8. SOME FOREIGN MANUFACTURERS, HOWEVER, OMIT THE DECIMAL POINT BETWEEN THE NUMERALS SO THE MARK READS 88. OTHERS, MAINLY JAPANESE MANUFACTURERS, USE ONLY ONE NUMERAL AND MARK THE HEAD WITH AN 8, AS AN EXAMPLE. THIS CAN BE VERY CONFUSING BECAUSE A METRIC CAPSCREW WITH JUST THE NUMERAL 8 ON THE HEAD CAN BE MISTAKEN AS BEING EQUAL TO SAE GRADE 8 - WHICH IT ISN'T - IT IS EQUAL TO SAE GRADE 5.
- YOU WILL ALSO FIND JAPANESE CAPSCREWS MARKED WITH THE NUMERAL 7. THIS IS NOT AN OFFICIAL ISO GRADE.
- NO GRADES OF METRIC CAPSCREWS ARE MARKED WITH RADIAL LINES SUCH AS VARIOUS SAE STRENGTH GRADES ARE.

METRIC FASTENERS — HEX HEAD PRODUCT MARKING

COMPARISON OF STRENGTH-GRADES AND HEAD MARKING**

SAE GRADE	HEAD MARKING	*GERMAN DIN GRADE AND HEAD MARKING	ISO METRIC GRADE AND HEAD MARKING
(NON HEAT TREATED)			
1	NONE	4D 4S	4.6 4.8
2	NONE	5D 5S	5.6 5.8
(HEAT TREATED)			
5		8G	8.8
8		10K	10.9
-	-	12K	12.9
-	-	14K	14.9

NOTE: * By ISO agreement, the German DIN product should use ISO metric Markings. You will, however, run into many DIN markings.

** There is an important basic difference in Metric marking practice vs. inch practice.

1. In the Inch System, there are no strength grade markings for fastener strengths less than SAE Grade 5.
2. In the Metric System, however, fasteners with strengths less than 8.8 (equivalent to SAE Grade 5) may or may not be marked

Ranger/Rainbow/1001 Nights

Bolt Torques

Ranger

Boat to Arm	796 N.m)	
Arms to Center	1842 N.m)	Lightly
Counterweights	1842 N.m)	Lubricated

Rainbow

Boat to Arm	1446 N.m)	
Arms to Center	1923 N.m)	Lightly
Counterweights	1446 N.m)	Lubricated

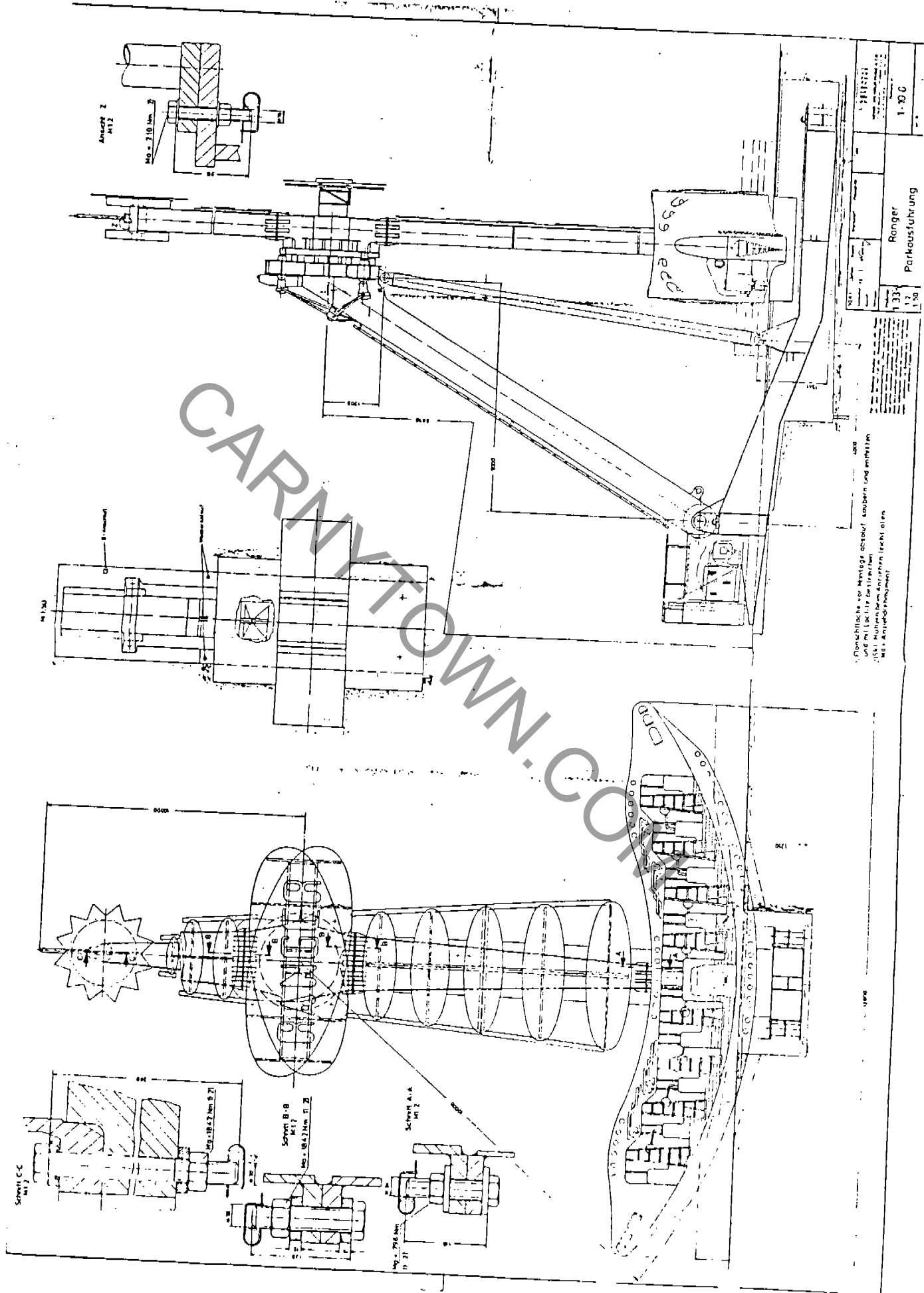
1001 Nights

Lubricated and dry torques are stamped on plates fitted to ride in area of all torqued bolts.

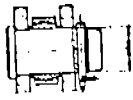
Check computer deliberate fault program.

All above bolts must be safety keyed.

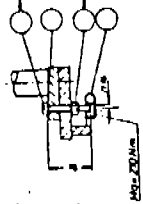
Check bolts for stretching through excess torque.



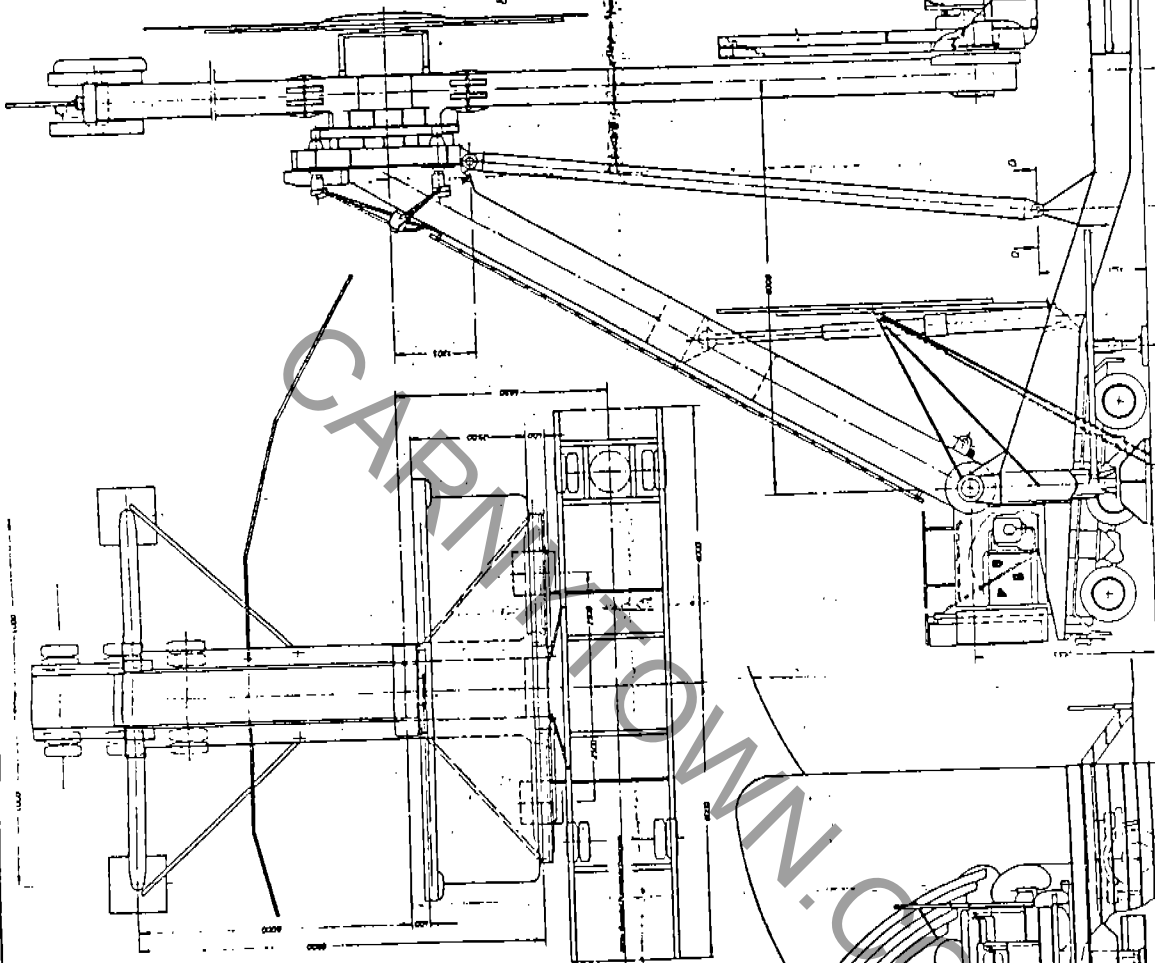
Schnitt D-D



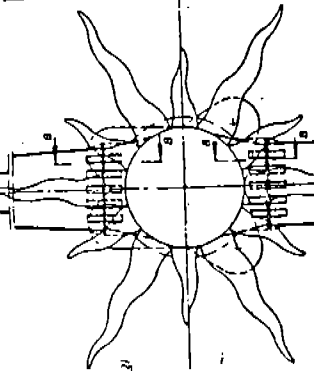
Einheit 1:1



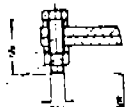
Maßstab 1:1



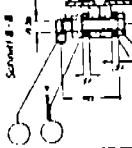
RAINBOW



Schnitt A-A



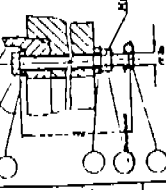
Maßstab 1:1



Schnitt B-B

Maßstab 1:1

Schnitt C-C



Maßstab 1:1

EINRICHTUNG	
1-11	
5	1:10
RAINBOW	

1) Für Bänke auf den Flächenflächen mit einem
größeren Abmaß von 1000

2) Set-Muttern dem Abmaß nach Geht

REG. ANTIKUPF. ERHODMENT

1/16

1/8

1/4

1/2

3/4

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