

APPENDIX A

DORR-OLIVER (OVIVO) CLARIFIER BRIDGE O&M MANUAL & RELATED DRAWINGS

**THE CITY OF WINNIPEG
WORKS AND OPERATIONS DIVISION
WATERWORKS, WASTE AND DISPOSAL DEPARTMENT**

**SOUTH END WATER POLLUTION
CONTROL CENTRE**

**CONTRACT NO 2 FOR
PRIMARY CLARIFIER EXPANSION**

OPERATING AND MAINTENANCE MANUALS

VOLUME 2 OF 3

**PREPARED BY: EMPIRE IRON WORKS LTD.
CONSTRUCTION SERVICES DIVISION**

CONSULTANTS: WARDROP/MA CLAREN

CONTRACTOR: PCL CONSTRUCTORS WESTERN INC.

JANUARY 1991

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SECTION 15200
PRIMARY SLUDGE COLLECTING AND SCUM
CROSS-COLLECTING EQUIPMENT

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15200

I M P O R T A N T

A T T E N T I O N

FIELD WELDING OR FIELD BOLTING

AFTER ANY FIELD WELDING AND/OR FIELD BOLTING WITH MILD STEEL BOLTS, IMMEDIATELY PREPARE THE AREA FOR FIELD PAINTING AND APPLY ONE COAT OF FIELD TOUCH UP PRIMER OR FIRST COAT DEPENDING ON PAINT SYSTEM.

AS SOON AS POSSIBLE APPLY FINISH OR TOP COAT OF PAINT TO THE AREA.

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EQUIPMENT FURNISHED ON THIS ORDER

INSTRUCTIONS AND PARTS LISTS IN THIS MANUAL

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" " 11798-2	(1) Cross Collector	-----	Erection Instructions Primary Sludge Collector with Cross Collector.
		-----	Lubrication Data
			<u>DRAWINGS</u>
		L-32917	Gen. Arrgt. Primary Clarifier (Scraper Bridge)
		L-32918	Cross Section of Primary Clarifier.
		L-32983	Anchor Bolt & Rail Setting Plan.
		L-33033	Bridge Drive Arrgt. & Erection. Sludge Coll. Bridge.
		L-33106	Scraper & Skimmer Assy.
		L-33165	Limit Switch Mounting - Bridge Travel.
		L-33152	Limit Switch Arrgt. for Hoist Bridge.
		L-33200	Lubrication Arrgt.
		L-33099	Hoist Drive Assy. & Erection.
		L-33098	Sub-Assy. Hoist Drive 5HP
		L-33006	Chain Guard Assy.
		M-26907	Cable Drum Guard Installation
		M-26771	Motor & Limit Switch Connections Primary Clarifier.
		L-32667	Concrete & Anchor Bolt Arrgt. Cross Collector.
		L-32666	Cross Collector Mechanism.
		M-26652	Cross Collector Drive Assy.
		M-26725	Lubrication Arrgt.
		L-33105	Bridge Assy. - Primary Clarifier

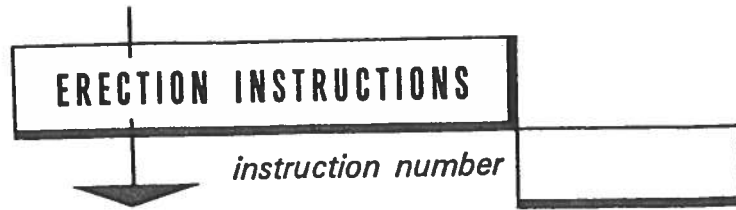
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EQUIPMENT FURNISHED ON THIS ORDER

INSTRUCTIONS AND PARTS LISTS IN THIS MANUAL

SERIAL No.	UNIT	INSTR. No.	TITLE
GL&V Ontario 11798-1	(1) 65' Dia. Scraper Bridge.		<u>VENDOR MATERIAL</u>
" " 11798-2	(1) Cross Collector	425-412B	"Falk" Controlled Torque Cplg. Type T41-2 Dimn. Print.
		428-414	"Falk" Controlled Torque Cplg. Spring Adjustment Chart.
		428-411	"Falk" Controlled Torque Cplg. Spring Adjustment Chart.
		428-410	"Falk" Instructions for Install. & Maint. Type T41 Coupling.
		428-110	"Falk" Steelflex Cplg. Type T10 Instructions for Install. & Maint.
		428-010	"Falk" Stellflex Cplg. All Types Typical Lubricants.
		2540E	"Westinghouse" Motor Dimn. Print. 5HP
		-----	Electric Motor Data Sheet.
		-----	"Westinghouse" Motor Test Report.
		2540E	"Westinghouse" Motor Dimn. Print. 1.5HP
		-----	Electric Motor Data Sheet.
		-----	"Westinghouse" Motor Test Report.
		3101E	"Westinghouse" Motor Install., Operation & Maint. Manual.
		-----	"Weg" Motor Dimn. Print. 1HP.
		-----	"Weg" Motor Install. & Maint. Instructions.
		MG1-12.54	"Weg" Motor Test Report.
		5R12 03A	"David Brown" Radicon Reducer AOD-12 Arrgt. Dwg.
		-----	"David Brown" Radicon Reducer Install., Maint. & Parts List Instructions.
		03775-A	"Euro" Reducer Dimn. Print.
		C2006	"Euro" Reducer Parts List.
		-----	"Euro" Reducer Service Manual.
		5R 1600-08 A	"David Brown" Reducer Dimn. Print.
		-----	"David Brown" Reducer Install., Maint. & Parts List Instructions.



PRIMARY SLUDGE COLLECTOR

WITH CROSS COLLECTOR

GENERAL

Use care in handling and unloading of the equipment. Failure to do so may result in bending or otherwise damaging the material, thereby causing considerable trouble and expense in erection.

Boxes containing bolts, washers and other small items should be opened up on receipt, the contents checked against the quantities and description on the packing list and then the boxes re-sealed if the installation of the equipment is to be delayed.

1 parts should be handled carefully from the time they arrive on the job site. No dirt or concrete should be allowed to collect on the bearings or pivot. Protect the drive unit from rain or dirt until properly assembled and installed. When painting in the field, use care not to gum up the bearings or pivots with excess paint. Remove, do not paint.

To prepare for erection, all drawings furnished should be examined carefully as they show the correct location and arrangement of all parts. In order to save erection time and produce a satisfactory job, a clear understanding of all drawings and of these instructions is necessary.

Concrete work should be carefully checked with dimensions and arrangement shown on the concrete drawings, particularly on the location, elevation and the projection of all anchor bolts. The concrete should be firmly set before the equipment is installed.

During the erection of the equipment, the correction of minor misfits and a reasonable amount of reaming of holes or cutting is considered a legitimate part of the erection. Any error which prevents the proper assembling and fitting up of parts by the moderate use of drift pins or a moderate amount of reaming and slight chipping or cutting should be immediately reported to GL&V Ontario for approval of the method of correction.

SEQUENCE OF ERECTION

1. Installation of anchor bolts for bridge collector as per drawing L-32983.
2. Installation of anchor bolts for scum collector as per drawing L-32667.
3. Installation of sleeper plate shims, sleeper plates, running rails, neoprene pad, cog track, end stops and floor rails (supplied by cust.)
4. Installation of scum collector support frame and hardware.
5. Installation of bridge collector truss and end trucks.
6. Installation of bridge collector scraper arms, scraper blades, cross ties, skimmer blade support arms, skimmer blades and hoist cables as per dwg. L-33106.
7. Shim and align all drive component parts.
8. Installation of scum collector chains, drives, lubrication system, springs and associated hardware and housing.
9. Installation of limit switch striker plates as per dwgs L-33165 and L-33152.
10. Set up skimmers, wipers, limit switches and electrical check-out of control circuitry.
11. Carry out all lubrication and check.
12. Test run.

BOLTS

The anchor bolts are to be installed with all dimensions taken from the tank centreline. The rows of anchor bolts must be installed parallel to the centre line of the tank. The running rails, floor rails, cog track and sleeper plates are to be installed on proper elevation, parallel to the centreline of the tank, in line and at the proper distances from the tank centreline.

The cog track teeth on both sides of the tank must be in line (phase). Periodic checks of the alignment will insure proper assembly.

COLLECTOR BRIDGE

The collector bridge has been pre-assembled and run in our shop. Lower the bridge onto the rails. Attach the pivot arms, scraper blade and secondary skimmer blade to the bridge. Align the rake arms and install the guy rods. Install the wear shoe assemblies and rubber tip on the scraper blade. Adjust them so that they just touch the floor rails. Install the rubber tip on the secondary skimmer blade.

Install the primary skimmer pivot arms and attach the skimmer blade. Hook up the cables on the primary skimmer blade and the collector arm. Adjust the cables with the turnbuckles.

Final shimming and alignment of the drive components eg. reducer, bearings, couplings etc. should now be accomplished. Dowel all drive components.

Align both cog wheels so that they are driving equally. This can be accomplished by undoing one of the gear couplings in the drive shaft and rotating it until both wheels line up and contact the cog track at the same time. This however does not alleviate the necessity of aligning the cog track as outlined above.

Install limit switch striker plates and adjust if necessary as per dwgs. L-33165 and L-33152.

NOTE: Before operating make sure that all the equipment has been well lubricated in accordance with the manufacturers recommendations. See drawing L-33200 and lubrication chart #522.

SCUM COLLECTOR

The scum collector support frames are shipped in three sections. The other components are shipped knocked down. The cross collector to be assembled as per drawing L-32666.

LUBRICATION DATA

Proper lubrication of GL&V Ontario equipment is an important factor in obtaining good performance and long service life. Lubricants designed to withstand various conditions of operation are essential to assure maximum efficiency. The products listed are for general lubrication of the mechanisms other than electric motors or commercial speed reducers and will provide good, dependable lubrication to satisfy the various requirements.

Grit is always present and if allowed to penetrate may quickly ruin the best made bearings and gears. It is desirable to take precautions in this regard to keep abrasive material away from points where it may do harm. Fittings should be wiped clean before the grease gun is applied and other points of application should be kept free of dirt. Tooth surfaces of open gears should be cleaned before they are re-lubricated. All drums and containers should preferably be stored in a clean closed room and covers kept tight.

Plain sleeve bearings without grease seals should be pumped completely full until some of the old grease shows at the bearing ends. This practice forces out the old grease and seals the bearing against penetration of foreign matter. Anti-friction bearings (ball or roller) should be lubricated sparingly and housings should not be filled more than 1/2 full. A full bearing will overheat and is likely to result in failure. If in doubt about the grease level, remove the fitting or filler plug and let the machine run for a few minutes so that excess grease may escape. Level indicators are provided to determine the proper oil level for both lubricated gears and bearings. Electric motors and commercial speed reducers should be lubricated according to instructions furnished by the manufacturer.

Regular intervals of grease application are essential. Operating conditions will largely determine how often each part must be serviced but in general frequent application of lubricant in small quantity is always better than heavy dosage at longer or irregular intervals. Oil baths should be inspected at regular intervals for proper oil level and to see that the oil remains clean and of good body. At each inspection it is important to drain off a small quantity of oil in order to eliminate any water which may have accumulated through leakage or condensation.

The proper interval for changing oil will depend upon amount and severity of service, but in no case should exceed a year. If the mechanism is unprotected and subject to cold winter temperatures, the grade of lubricant should be changed with the seasons. However, if regular inspections reveal the presence of grit or lacking body and oiliness, the oil should be promptly changed.

EXPLANATION OF CHART GROUPINGS

- Group 1 -- Enclosed bath lubricated worm gears and combinations, including worm gears; classifier gears; drive heads; centre mechanisms.
- Group 2 -- Enclosed bath lubricated gears and combinations NOT including worm gears.
Bath lubricated chains. (see also special recommendations for D/H & C/M chains where differing from group 2)
- Group 3 -- Distributor
- Group 4 -- Open gears and chains.
- Group 5 -- Plain sleeve bearings.
- Group 6 -- Commercial ball and roller bearings.
- Group 7 -- Underwater metallic bearings.
- Group 8 -- Underwater non-metallic bearings and underwater chains.
- Group 9 -- Sludge pump plungers.

With the exception of group 1 lubricants should be changed to winter grade when temperatures go below 5 deg. C. Where only one product is shown it is suitable for all climates. Lubricants should be renewed in any case as recommended in the instructions. Group 1 lubricants for operation below -30 deg. C should be recommended by lubricant supplier.

All lubricants have not been tested and are not guaranteed by GL&V Ontario. However, they comprise the best recommendations of the oil companies after careful joint consideration of the applications and study of the specifications. Substitutions are practical in many cases but should be made only at the advice of GL&V Ontario, or a qualified lubrication engineer.

RECOMMENDED LUBRICANTS FOR DORR-OLIVER-LONG LTD.

PROCESS AND MINING EQUIPMENT CHART 552

GROUP	TEMP. RANGE	GULF CANADA	IMPERIAL OIL	SHELL CANADA	TEXACO CANADA	B.P. CANADA	SUN OIL
1	-30°C to +10°C	ULTIMA EP 68	SPARTAN E.P. ARCTIC	OMALA 68	MEROPA 68	ENERGOL GR-220-XP	SUNEP 1050
	-18°C to 20°C	ULTIMA EP 150 or 220	SPARTAN EP220	OMALA 220	MEROPA 220	ENERGOL GR-220-XP	SUNEP 1090
	0°C to 52°C	ULTIMA EP 460	SPARTAN EP680	OMALA 680	MEROPA 680	ENERGOL GR-680-XP	SUNEP 1150
2	W	ULTIMA EP 68	SPARTAN EP68	OMALA 68	MEROPA 68	ENERGOL HL-150 or 175	
	S	ULTIMA EP 150	SPARTAN EP220	OMALA 220	MEROPA 220	ENERGOL HL-300	
3	-	HARMONY AW 100	NUTO H100	TELLUS 100	RANDO 22	ENERGOL HL-150	SUNVIS 764
	W	FLUID LUBCOTE 1	GEAR COVER FLUID ARTIC	SHELL GEAR ARTIC	GEARTAK 46	ENERGOL GR-3000-2	N/A
4	S	FLUID LUBCOTE 2	GEAR COVER FLUID 21	SHELL GEAR MEDIUM OR HEAVY	GEARTAK 1500 CRATER 2X-F	ENERGOL GR-3000-2	SUN GEAR COMPOUND C
	W	GULFCROWN EP 1	UNIREX EP1 / EP2	ALVANIA EP1	REGAL AFB2	ENERGREASE LG-1-EP	PRESTIGE 741 EP
5	S	GULFCROWN EP2	UNIREX / EP2	ALVANIA EP2	REGAL AFB2	ENERGREASE MP MARK II	PRESTIGE 742 EP
	W	GRAPHITE GREASE 2	ESSO MP GREASE MOLY	M.P. GREASE MDS LOWTHERM	GREASE 904 W	ENERGREASE MP MARK II	SUN C-801-T
6	S	GRAPHITE GREASE	ESSO MP GREASE MOLY	M.P. MDS GREASE	GREASE 904 S	ENERGREASE MP MARK II	SUN C-892-T
	-	ULTIMA EP 460	SPARTAN EP 460	OMALA 680	MEROPA 220	ENERGOL GR-680-XP	SUNEP 1150

SPECIAL RECOMMENDATIONS

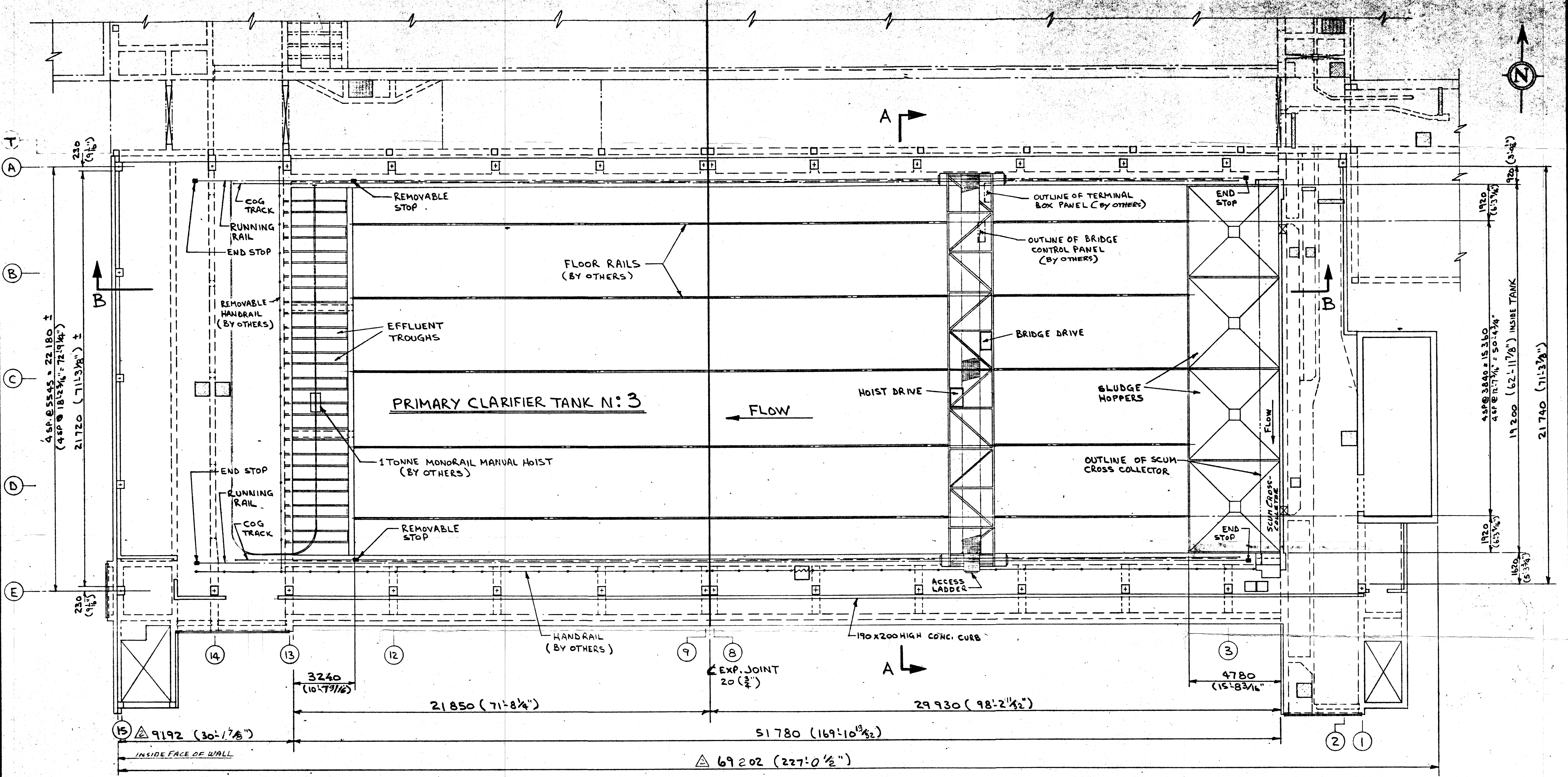
Centre drive gear	Chain Oil Bath W	HARMONY 150	SPARTAN EP68	OMALA 150	CLINGTEX 100	ENERGOL CS 250
	Chain Oil Bath S	HARMONY 220	SPARTAN EP220	OMALA 220	CLINGTEX 220	ENERGOL CS 425
	Chain Cup Grease	GULFCROWN SUPERCROWN EP2	UNIREX EP1 / EP2	ALVANIA EP2	OLYMPIAN 2	ENERGOL WRL
MINE HEAD SHEAVES			UNIREX LOTEMP EP	ALVANIA EP1	REGAL AFB2 (-18°C) MULTIFAK EP O	
	MINE CAR & SKIP WHEELS & ROLLERS		UNIREX EP1	ALVANIA EP 2	(OLYMPIAN 1 or 2) REGAL AFB2	

GROUP	TEMP. RANGE	SPECIFICATION 77/10/22
1	Below -30°C to -10°C	<ul style="list-style-type: none"> - Mild extreme pressure worm and gear lubricant. See lubricant supplier for suitable grades. Some products follow Ultima EP 68., Imperial Spartan Arctic; Shell Omala 68
	-30°C to +10°C	<ul style="list-style-type: none"> - Agma 2EP worm and gear lubricant - Viscosity 60 to 87 cSt at 40°C - Pour point -30°C maximum - Viscosity index 90 minimum - Contain mild extreme pressure additive - To have good demulsability, pass rust corrosion tests, approx. BSI grade 68
	-18°C to +20°C	<ul style="list-style-type: none"> - Agma 5EP worm and gear lubricant - Viscosity 15 to 21 cSt at 100°C - Pour point - 15°C Max. - Viscosity index 90 minimum - Contain mild extreme pressure additive - To have good demulsability, pass rust, corrosion tests, approx. BSI grade 220
	0°C to 52°C	<ul style="list-style-type: none"> - Agma 8EP worm and gear lubricant - Viscosity 32 to 41 cSt at 100°C - Pour point 0°C max. - Viscosity index 90 minimum - Contain mild extreme pressure additive approx. BSI grade 680.
2	W	<ul style="list-style-type: none"> - Agma 2/2EP gear lubricant - Viscosity 60 to 87 cSt at 100°C - Pour point -30°C maximum - Viscosity index 90 minimum - To have good demulsability, pass rust and corrosion tests approx. BSI grade 68; SAE 80
	S	<ul style="list-style-type: none"> - Agma 5/5EP gear lubricant - Viscosity 15 to 21 cSt at 100°C - Pour point -15°C Maximum - Viscosity index 90 minimum - To have good demulsability, pass rust and corrosion tests approx. BSI grade 220; SAE 90
3		<ul style="list-style-type: none"> - Agma 2 or 3 general lubricant - Viscosity 60 to 100 cSt at 40°C - Pour point -30°C maximum - Viscosity index 90 minimum - To have good demulsability, pass rust and corrosion test. - Anti-wear additive preferred - Approx. BSI grade 100; SAE 20,30,80; Asle 100

GROUP	TEMP. RANGE	SPECIFICATION
4	W	<ul style="list-style-type: none"> - Open gear and chain lubricant - Min. application temp. less than -10°C - Operating Range -35°C to 0°C - To have good rust protection and copper corrosion resist. - NOTE: More than one grade may be required to span this temperature range.
	S	<ul style="list-style-type: none"> - Open gear and chain lubricant - Min. Application temp. less than 5°C - Operating Temp. range 0°C to 30°C minimum - Pass rust test and copper corrosion test NOTE: More than one grade may be required to span this temperature range.
5 6 7	W	<ul style="list-style-type: none"> - N.L.G.I. grade 1 or 2 ball bearing grease with water resistant qualities. - ASTM worked penetration 265 - 340 at 25°C - Dropping point 150°C minimum - Soap composition - lithium - Extreme pressure additive - Minimum start-up temp. -30°C or less - Minimum application temp. -20°C or less - Maximum operating temp. 75°C or greater
	S	<ul style="list-style-type: none"> - N.L.G.I. grade 2 ball bearing grease with water resistant qualities - Astm worked penetration 265 to 295 at 25°C - Dropping point 170°C minimum - Soap composition - lithium - Extreme pressure additive or anti-wear additive - Minimum start-up temp -10°C or less - Minimum application temp 0°C or less - Max. operating temp. range 100°C or greater
8	W	<ul style="list-style-type: none"> - N.L.G.I. grade 1 or 2 for underwater use on chains and non-metallic bearings. - Astm worked penetration 265 - 365 at 25°C - Dropping point 90°C or greater - Soap composition - calcium or lithium - Extreme pressure additive preferred. - Minimum application temp. -18°C or less - NOTE: To contain solid lubricants molybdenum disulphide or graphite preferred. - See note under 8 (S)
	S	<ul style="list-style-type: none"> - N.L.G.I. grade 2 for underwater use on chains and non-metallic bearings. - Astm worked penetration 265 to 295 at 25°C - Soap composition - calcium or lithium - Extreme pressure additive preferred - Solid lubricants such as molybdenum disulphite or graphite preferred. (continues on next page)

77/10/22

GROUP	TEMP. RANGE	SPECIFICATION
8		<p style="text-align: right;">77/10/22</p> <ul style="list-style-type: none"> - Minimum application temp. 0°C or less - NOTE: The lower N.L.G.I. grades may be used on central system lubrication in particular. Brush or swab applications may use higher grades.
9		<ul style="list-style-type: none"> - Agma 7EP/8EP worm and gear lubricant - Viscosity 400 to 750 cSt at 40°C - Pour point 0°C Maximum - Viscosity index 90 minimum - Contain mild extreme pressure additive - To have good demulsability, pass rust, and corrosion tests



GENERAL NOTES:

- THIS DWG. COVERS OUR GENERAL RECOMMENDATION RELATIVE TO THE INSTALLATION OF THE "DORR-OLIVER CANADA PRIMARY SLUDGE COLLECTING MECHANISM" AND IS FOR GENERAL INFORMATION ONLY.
- DORR-OLIVER CANADA IS NOT RESPONSIBLE FOR THE DESIGN OF THE CONCRETE TANK OR ANY PART THEREOF.
- DORR-OLIVER CANADA FURNISHES: MECHANISM TO FIT TANK OF DIMENSIONS SHOWN, INCLUDING DRIVES C/W MOTORS, RUNNING WHEELS & RUNNING RAILS, COG WHEELS & COG TRACK C/W MOUNTING HARDWARE, ANCHOR BOLTS, END STOPS AND REMOVABLE END STOPS. STRUCTURAL ALUMINUM WALK THRU BRIDGE MOUNTED ON ALUMINUM END TRUCKS C/W ALUMINUM WALKWAY GRATING, ALUMINUM PIPE HANDRAIL RUNNING THE FULL LENGTH OF THE BRIDGE, AND ACCESS PLATFORM WITH LADDER ON SOUTH END OF BRIDGE ONLY. SAFETY CHAIN SLINGS OF GALVANIZED STEEL ARE PROVIDED TO CLOSE OFF NORTH END OF BRIDGE & ACCESS TO DRIVES. 316SS SCRAPER BLADE, STEEL SCRAPER ARMS, ALUMINUM SKIMMER BLADES & ARMS. 316SS WIRE CORE CABLES. HEAVY DUTY LIMIT SWITCHES C/W MOUNTING BRACKETS & HARDWARE, 7 SWITCHES ARE BRIDGE MOUNTED, 1 SWITCH SHIPPED LOOSE FOR FLOOR MOUNTING ON TANK (BY OTHERS).

- DORR-OLIVER CANADA DOES NOT FURNISH: ANY PIPING, HANDRAILING & GRATING OTHER THAN ON THE BRIDGE. NOR FLOOR RAILS & ANCHORS FOR FLOOR RAILS, NOR BRIDGE CONTROL PANEL, TERMINAL BOX PANEL & STANDS FOR PANELS, NOR ANY WIRING OR CONDUIT, FESTOON CABLE SYSTEM & TOW POST, ALL OTHER ELECTRICAL EQUIPMENT.
- BRIDGE AND HOIST DRIVES ARE LOCATED AT WALKWAY LEVEL. MOTORS ARE RATED FOR 575/3/60 CONTINUOUS SERVICE T.E.F.C., CLASS "F" INSULATION
- THE TWO-SPEED MOTOR ON MAIN DRIVE GIVES THE BRIDGE A TRAVEL SPEED OF 1.8 M/MIN. IN SCRAPING MODE (FORWARD) AND 3.6 M/MIN. IN REVERSE, WITH SKIMMER AND SCRAPER IN RISED POSITION. IF DIFFERENT SPEEDS ARE DESIRED EG: 1.2 OR 2.4 M/MIN IN SCRAPING MODE AND 2.4 OR 4.8 M/MIN. IN REVERSE MODE, THE DRIVE SPROCKET MUST BE CHANGED. EG: 14 OR 26 TOOTH SPROCKET. THESE SPROCKETS ARE SUPPLIED WITH THE SPARE PARTS.
- HOIST CABLE SPEED IS APPROX. 1.9 M/MIN (6.2 FT/MIN) SCRAPER BLADE VERTICAL LIFT SPEED IS APPROX. 3 M/MIN (10 FT/MIN)
- DIMENSIONS ARE IN MM, DIMENSIONS IN () ARE IN FT & INCHES.
- FOR SECTIONS & ADDITIONAL DETAILS SEE DWG. L-32918

- ALUMINUM STRUCTURE DESIGN & CONSTRUCTION TO BE AS PER CSA S-157 "WELDED ALUMINUM DESIGN & WORKMANSHIP."
- QUALITY ASSURANCE PROGRAM ACCORDING TO CSA CAN 3-2299-4.

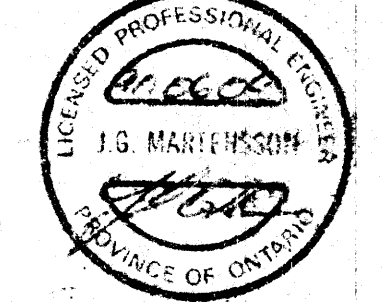
FOR ADDITIONAL DETAILS SEE REFERENCE DRAWINGS:

CROSS SECTION PRIMARY CLARIFIER	L-32918
ANCHOR BOLTS & RAIL SETTING PLAN	L-32983
BRIDGE ASSEMBLY	L-33105
BRIDGE DRIVE ASSEMBLY	L-33033
HOIST DRIVE ASSEMBLY	L-33099
SCRAPER & SKIMMER ASSEMBLY	L-33106
HOIST LIMIT SWITCH ASSEMBLY	L-33152
BRIDGE TRAVEL LIMIT SWITCH ASSEMBLY	L-33165
ELECTICAL CONNECTIONS	M-26771
CROSS COLLECTOR MECHANISM	L-32666

DORR-OLIVER CANADA

CUSTOMER: WINNIPEG SOUTH END W.P.C.C.
 EQUIPMENT: (U) PRIMARY CLARIFIER N:3
 CUST. NO. P.W.#3181 DORCAN NO. 11798-1
 FOR: INFORMATION □ PRELIMINARY □ FINAL □
 CONSTRUCTION □ APPROVAL □ CERTIFIED □
 DATE: 90/08/31 BY: [Signature]

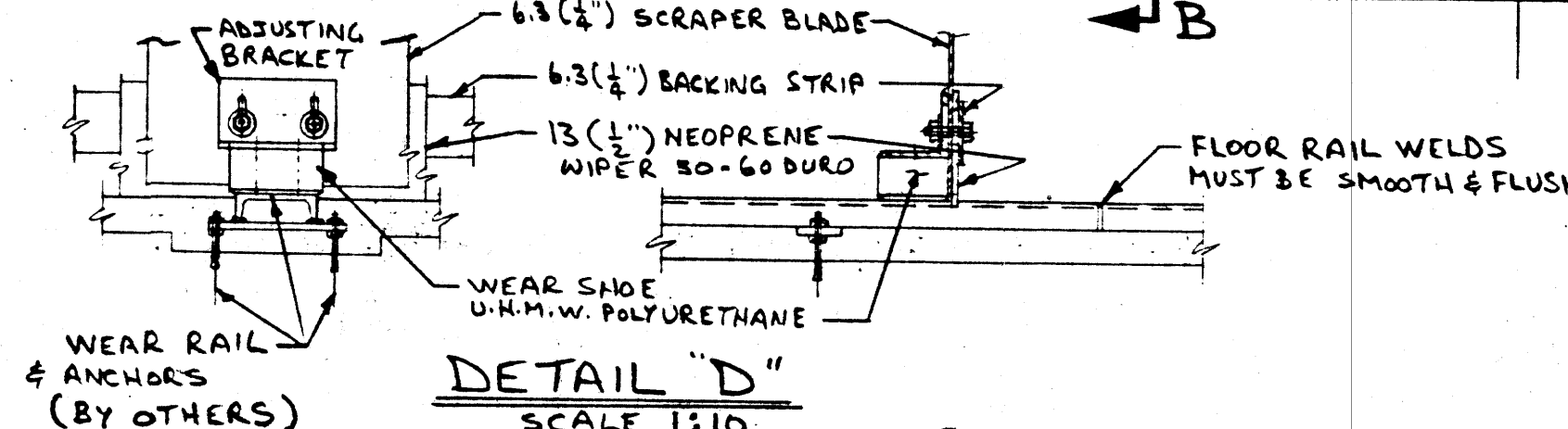
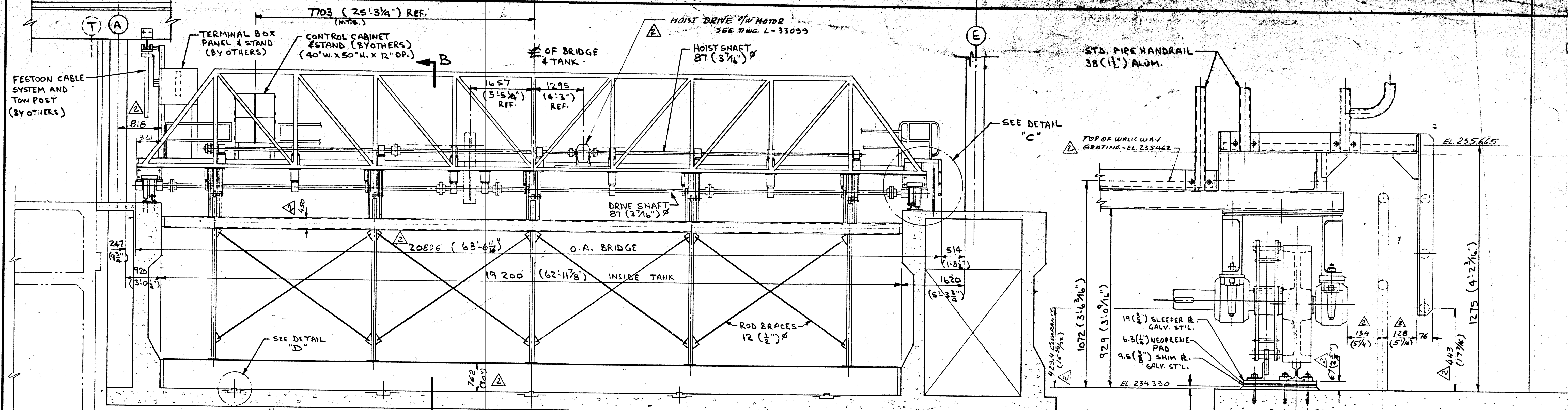
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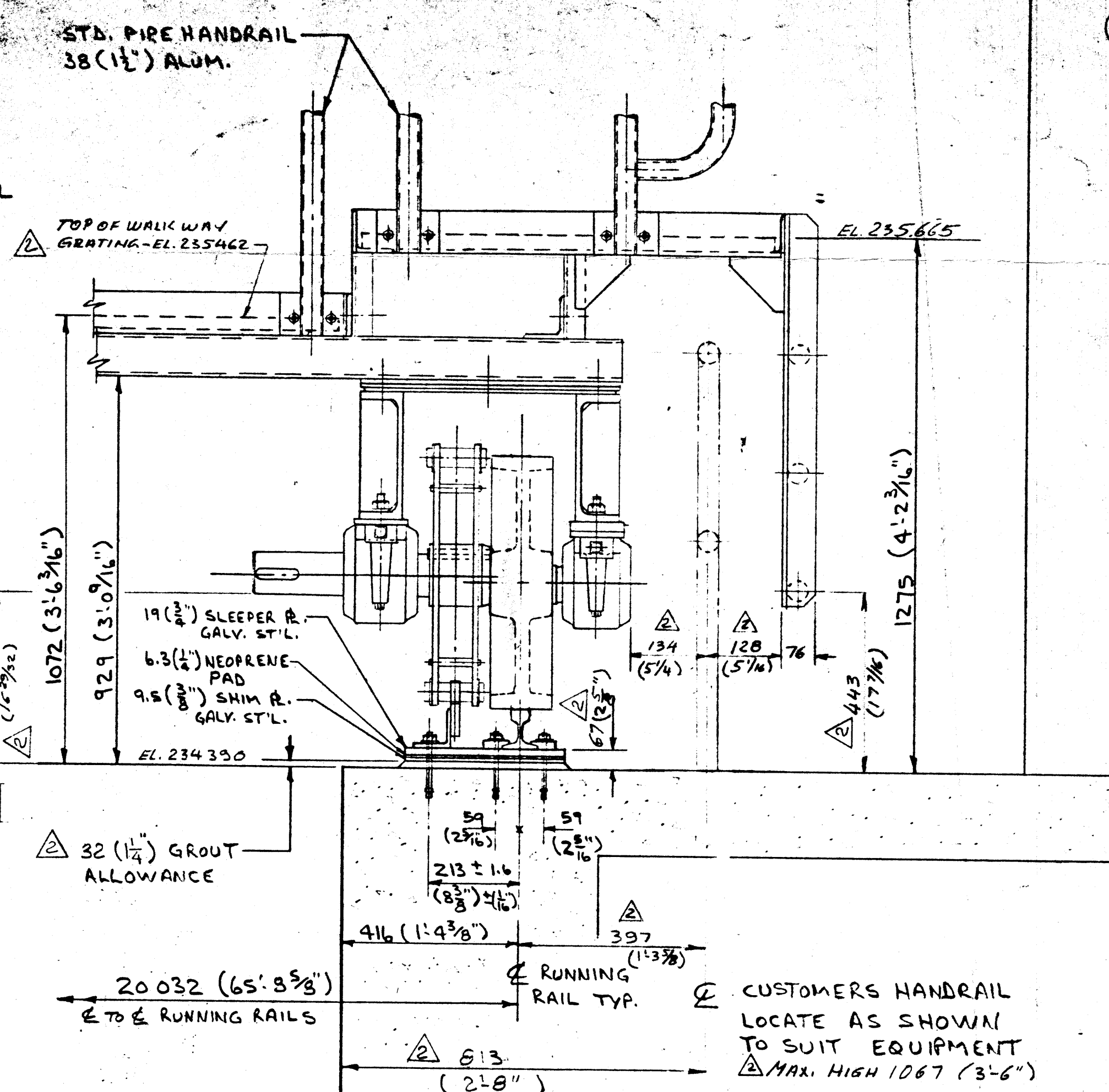
DORCAN PART NO. 00050780

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS ALL FRACTIONAL DIMENSIONS ARE 1/32" METRIC MACHINING DIMENSIONS ARE 0.15 mm OTHER METRIC DIMENSIONS ARE 2.0 mm ANGLE 5° CONCENTRIC 2° THE DESIGNATION "MILD STEEL" OR "MS" MEANS A.S.T.M. A-36 OR BETTER ALL WELDING TO BE IN ACCORDANCE WITH SPECIFICATIONS OF C.S.A. W89

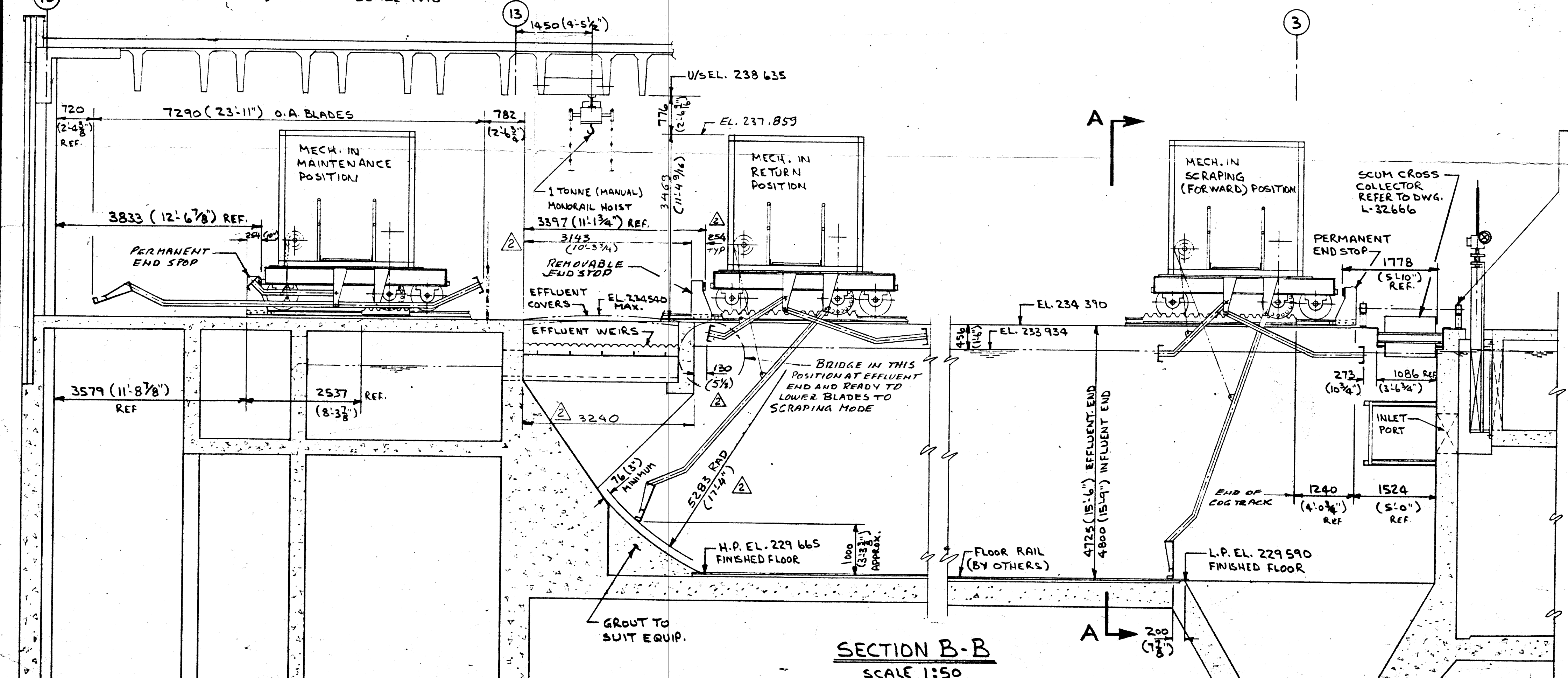
90/08/02	OVERALL DIM. CHANGED TO INSIDE FACE OF WALL AND DIM. FOR TABLE DOORS	5199	E.P.R.
90/06/01	ADDED NOTES & COLUMN REFERENCES	5043	P.M.
DATE	NO.	REVISION	BY
90/08/04			WINNIPEG (11798-1)
DRAWN BY	P.M.	DATE	90/08/04
CHECKED	[Signature]	SCALE	1:100
THIS BOX FOR MFG. ENG. USE ONLY			FLOT SCALE
THIS DRAWING CONTAINS CONFIDENTIAL PROPRIETARY INFORMATION OF DORR-OLIVER CANADA LIMITED AND IS NOT TO BE EMPLOYED NOR TO BE USED EXCEPT FOR THE EXACT PURPOSES OF DORR-OLIVER CANADA LIMITED UNLESS OTHERWISE AUTHORIZED BY WRITTEN PERMISSION OF DORR-OLIVER CANADA LIMITED			DORR-OLIVER CANADA LIMITED
ORILLIA, ONTARIO, CANADA			L-32917
G.A. PRIMARY CLARIFIER			2



SECTION A-A
SCALE 1:50



DETAIL C (SOUTH END OF BRIDGE SHOWN NORTH END WITH DOUBLE FLANGED WHEELS)
(NOT TO SCALE)



SECTION B-B
SCALE 1:50

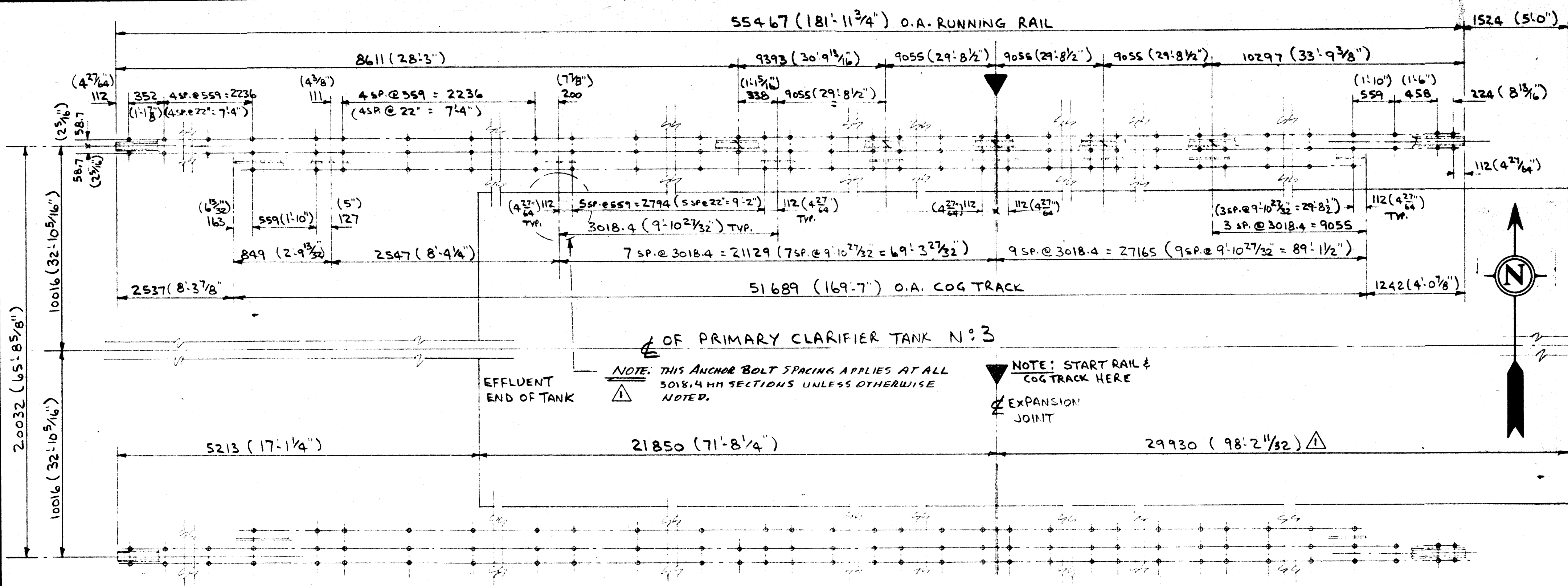
- NOTES:**
- 1. RUNNING RAIL ON FLANGED WHEEL SIDE MUST BE STRAIGHT ± 3, OTHER RAIL & COG TRACKS MUST BE PARALLEL ± 3 TO FLANGED WHEEL'S RAIL. COG TRACK TEETH MUST BE IN PHASE EXACTLY 90° OPPOSITE ACROSS TANK. DIFFERENCE OF ELEVATIONS OF FLOOR RAILS NOT TO EXCEED ± 3. FLOOR RAILS MUST BE INSTALLED HORIZONTALLY STRAIGHT & PARALLEL TO ONE ANOTHER ± 1/4."
 - 2. DIMENSIONS ARE IN MILLIMETERS DIM'S IN () ARE IN FEET & INCHES.
 - 3. FOR G.A. SEE DWG. L-32917
 - 4. ALUMINUM STRUCTURE DESIGN AND CONSTRUCTION TO BE AS PER CSA S-157 "WELDED ALUMINUM DESIGN AND WORKMANSHIP"
 - 5. QUALITY ASSURANCE PROGRAM ACCORDING TO CSA CAN3-Z299.4

DORR-OLIVER CANADA

CUSTOMER: WINNIPEG SOUTH END W.P.C.C.
EQUIPMENT: PRIMARY CLARIFIER NO. 3
CUST. NO. PW#3181 DORCAN NO. 11798-1
FOR: INFORMATION CONSTRUCTION APPROVAL FINAL
DATE: 90/04/31 BY: [Signature]

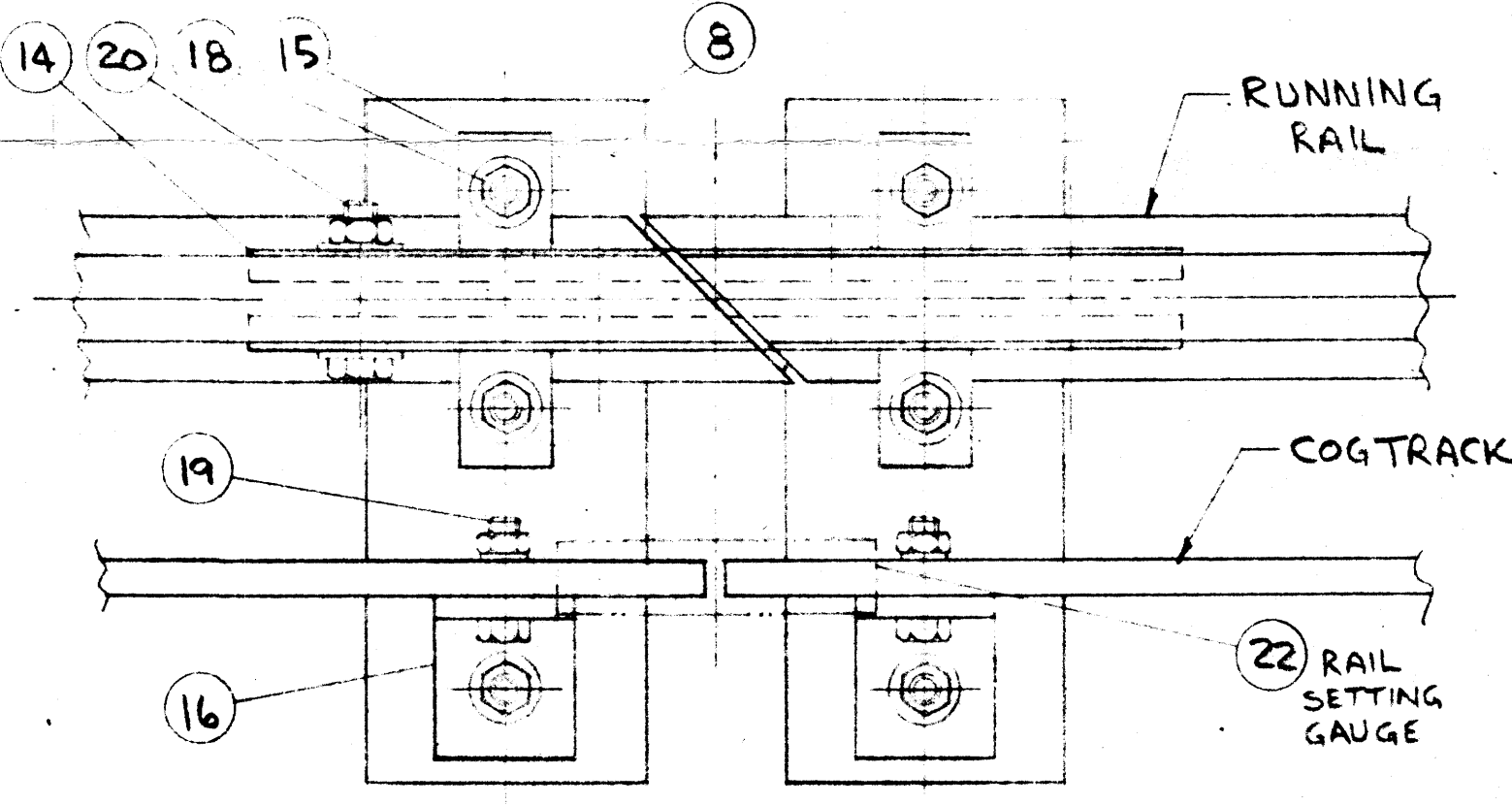
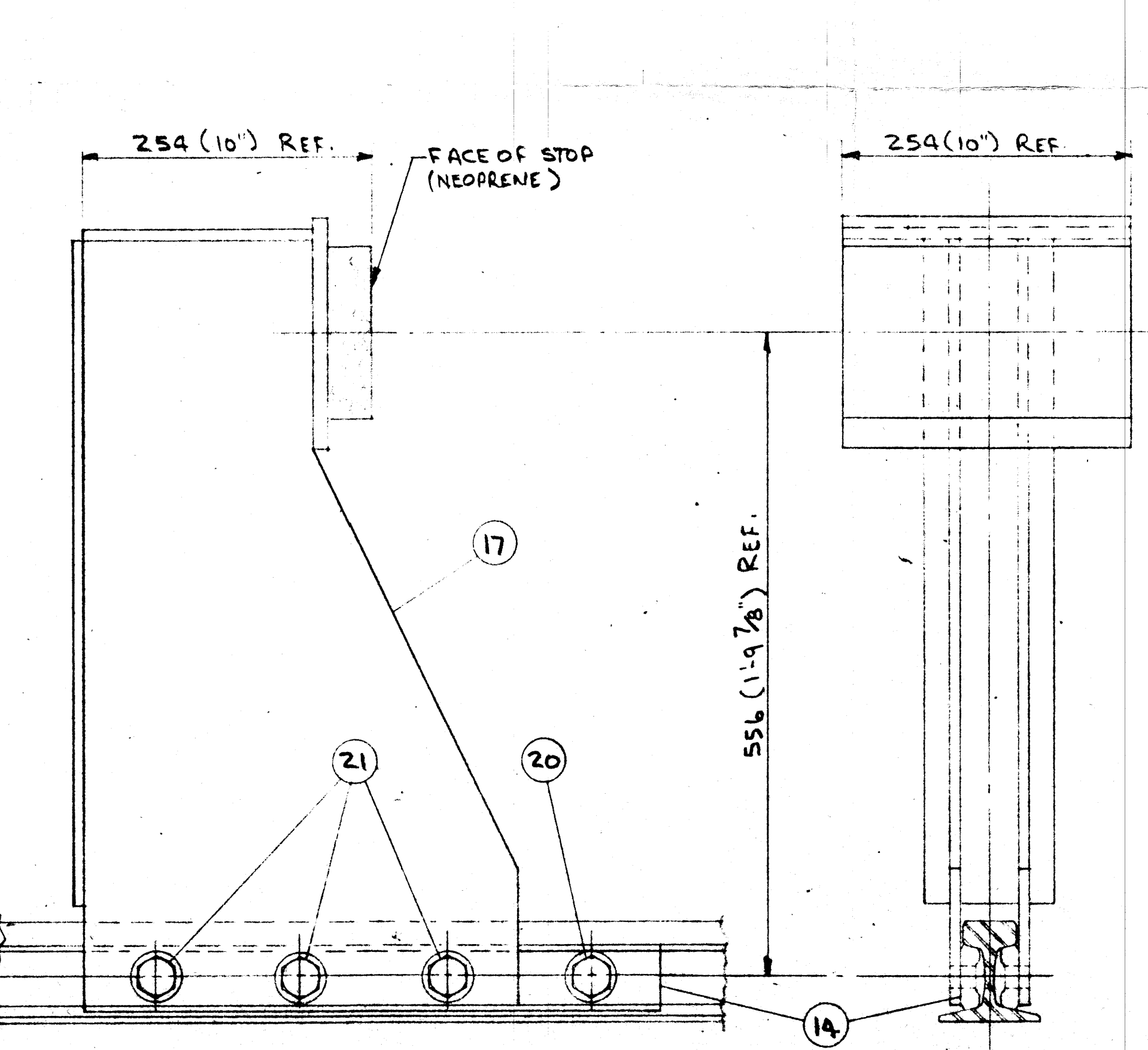
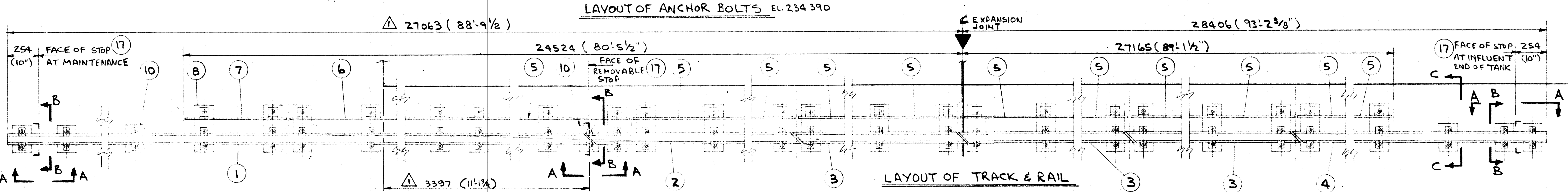
DORCAN PART NO. 00050781

UNLESS OTHERWISE SPECIFIED ALL DECIMAL DIMENSIONS ARE ± .005" ALL FRACTIONAL DIMENSIONS ARE ± 1/32" METRIC MACHINING DIMENSIONS ARE ± 0.15 mm OTHER METRO DIMENSIONS ARE ± 0.25 mm ANGLES ± CONCENTRIC ± THE DESIGNATION "MILD STEEL" OR "S.S." MEANS A.S.T.M. A-36 OR BETTER ALL WELDING TO BE IN ACCORDANCE WITH SPECIFICATIONS OF C.S.A. W59		THIS BOX FOR MFG. ENG. USE ONLY PLOT SCALE ISSUE DORR-OLIVER CANADA ORILLIA, ONTARIO, CANADA LIMITED	THE DRAWING CONTAINS CONFIDENTIAL, PROPRIETARY INFORMATION OF DORR-OLIVER CANADA LIMITED AND IS NOT TO BE DISCLOSED NOR TO BE USED EXCEPT FOR EVALUATED PROPOSALS OF DORR-OLIVER CANADA LIMITED OR INSTALLATION, OPERATION OR MAINTENANCE OF DORR-OLIVER CANADA LIMITED EQUIPMENT. COPYRIGHT © DORR-OLIVER CANADA LIMITED
90/04/28 2 90/06/01 1 DATE NO. DRAWN BY P.M.	NOTES ADDED TO THIS DIMENSIONAL REVISED TO CUST. APPROV. POINT ADDED COLUMN REFERENCES, ADDED 2 NOTES. ADDED DIM. TO E. SECURITY ENCLOSURE & GE. CHAIN DRIVE - ADDED DIM. TO FACE OF STOP AND TO EVAL. OF COG TRACK & RUNNING RAIL FOR REFERENCE	E.F.R. 5043 P.M. E.C.R. BY DATE 90/05/09 CHECKED E.F.R.	THIS BOX FOR MFG. ENG. USE ONLY PLOT SCALE ISSUE DORR-OLIVER CANADA ORILLIA, ONTARIO, CANADA LIMITED CROSS SECTIONS OF PRIMARY CLARIFIER (WINNIPEG (11798-1)) SCALE 1:50 MADE FROM L-32918

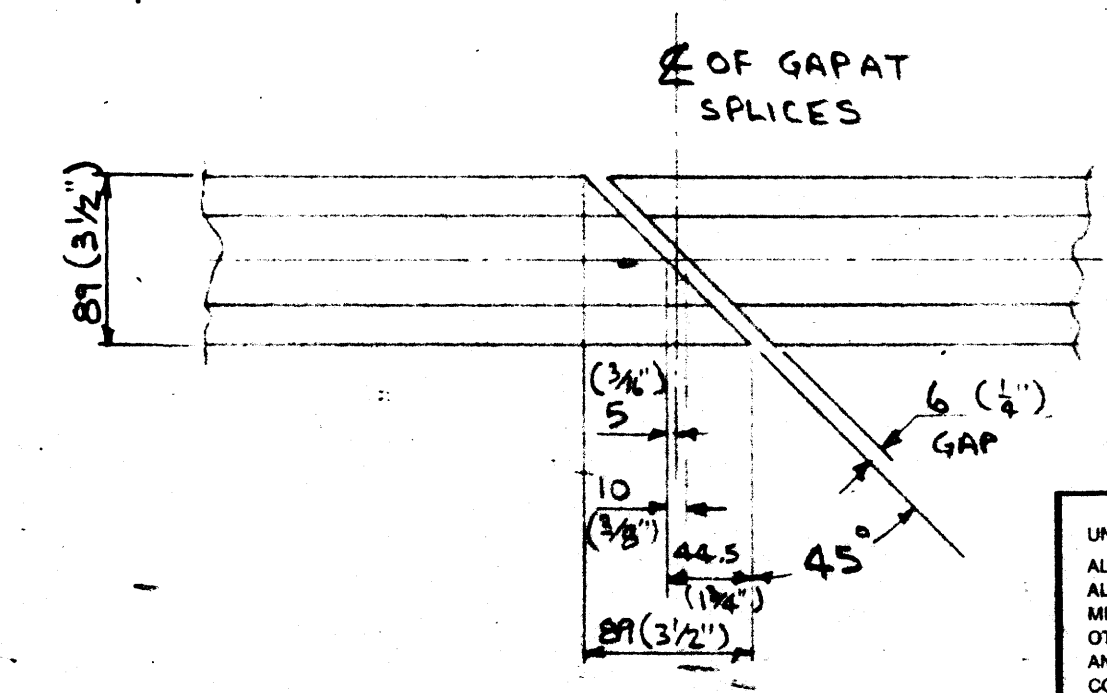


ITEM	QTY	DESCRIPTION	MATL	PART NO.	DRAWING NO.	WT. LBS
1	2	RAIL ASCE 40 ⁴ /YD (19.9K ₉ /M) X 28' 9 1/2"	STL.	50810 A	M-26824	752
2	2	" " " " X 31'-1"	"	50810 B	"	820
3	6	" " " " X 29' 11 3/8"	"	50810 C	"	2370
4	2	" " " " X 33'-10 1/2"	"	50810 D	"	900
5	32	COG TRACK X 9'-10 27/32" NOMINAL	GALV./M.S.	27905 A	M-19075	5328
6	2	" " " " X 8'-4 1/4"	"	27910 A	M-24319	175
7	2	" " " " X 2'-9 1/16"	"	50809 A	M-26823	59
8	206	RAIL & COG TRACK SLEEPER R. (LONG)	"	50812 A	A-38146	3914
9	206	" " " " (SHORT)	"	50814 A	A-38148	1854
10	18	" SLEEPER R. (SHORT)	"	50815 A	A-38149	198
11	18	" " " SHIM	"	50817 A	A-38151	90
12	206	NEOPRENE PAD (1/4" X 6" X 1/4")	NEOPRENE 50-60 DURE	50813	A-38147	430
13	18	" " (1/2" X 6" X 8 5/8")	"	50816	A-38150	24
14	28	RAIL SPLICE BARS	STL.	30075	A-32072	168
15	448	RAIL CLAMPS	GALV./B.I.	1137 A	A-18545	339
16	206	COG TRACK MOUNTING CLIP ANGLE	GALV./M.S.	27907 A	A-35172	573
17	6	BRIDGE STOP	STL.	50811	M-26825	600
18	680	5/8" X 8 1/2" HILTI KWIK-BOLT	304 SS	41468 L	S-26983	
19	206	5/8" X 2 1/4" H.H. BOLT + HH + L.W.	316 SS	1248, 1382 #1852		
20	38	3/4" X 3" " " " + 2 F.W.	"	1222, 3161 #1197		
21	18	3/4" X 4" " " " + 2 F.W.	"	22424, 3161 #1197		
22	1	RAIL SETTING GAUGE	M.S.	27902	A-23511	
23						

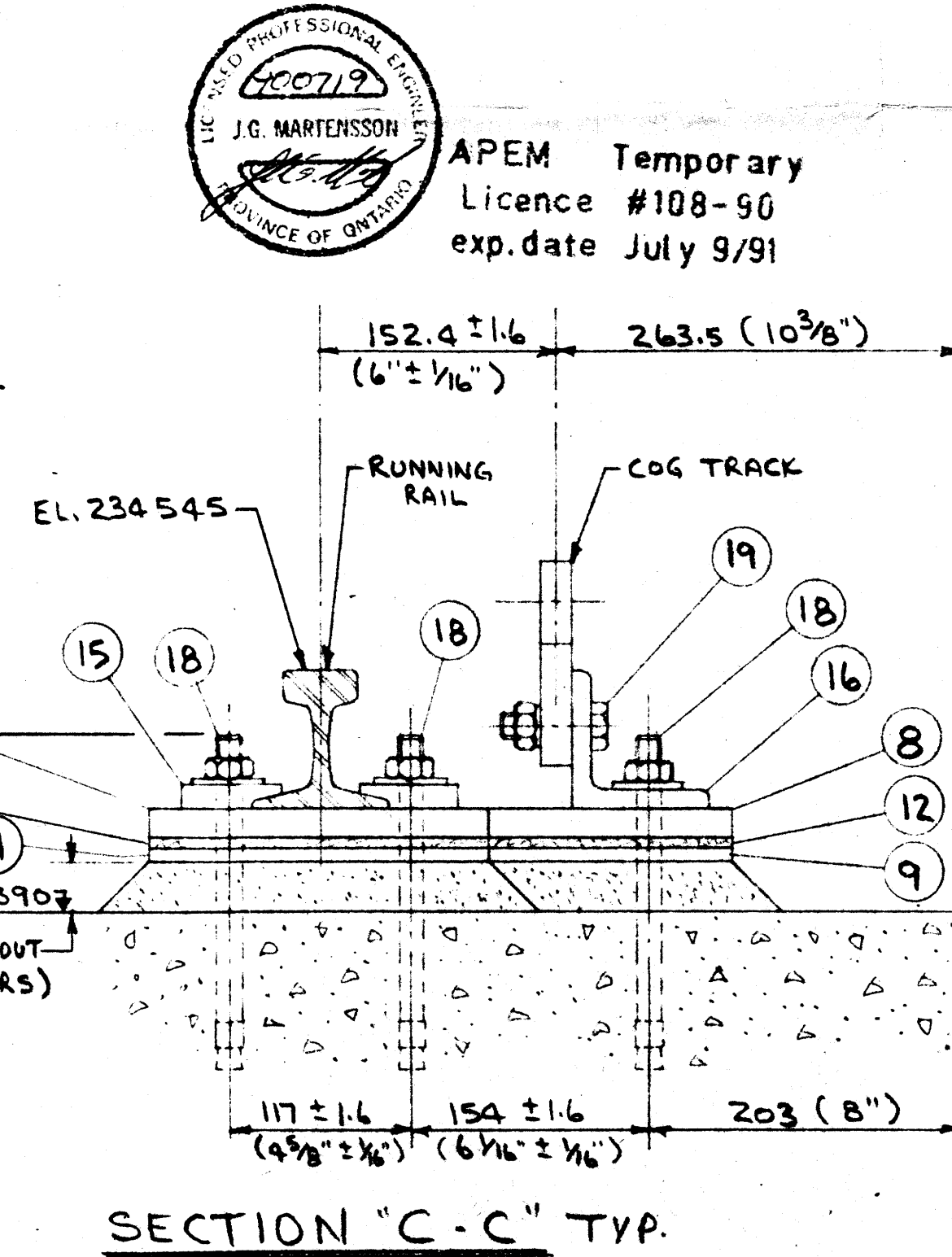
NOTE ITEM 18 INCLUDES 26 EXTRA



TYPICAL PLAN VIEW AT RAIL & COG TRACK SPLICES



RAIL CUTTING & GAP SETTING DETAIL TYP.



SECTION "C-C" TYP.



APEM Temporary Licence #108-90 exp. date July 9/91

NOTE: LOCATE ANCHORS & SLEEPER PLATES BEGINNING AT STARTING POINT AS INDICATED. LOCATE RUNNING RAILS AS INDICATED FROM STARTING POINT. LOCATE COG TRACK SECTIONS FROM STARTING POINT USING TRACK SETTING GAUGE SUPPLIED.

- : RUNNING RAIL MUST BE STRAIGHT TO ± 3.2 ($\pm 1/8$ "), RUNNING RAILS & COG TRACKS MUST BE PARALLEL TO ± 3.2 ($\pm 1/8$ "), COG TRACK TEETH MUST BE IN PHASE EXACTLY 90° OPPOSITE ACROSS TANK.
- : FLOOR RAILS MUST BE INSTALLED HORIZONTALLY STRAIGHT AND PARALLEL TO ONE ANOTHER TO ± 6.3 ($\pm 1/4$ "), DIFFERENCE OF FLOOR RAIL ELEV. NOT TO EXCEED ± 3.2 ($\pm 1/8$ ").
- : USE LOCTITE 242 BLUE ON ALL STAIN. STEEL THREADS.
- : DIMENSIONS ARE IN M.M. DIM. IN. () ARE IN FT. & IN.

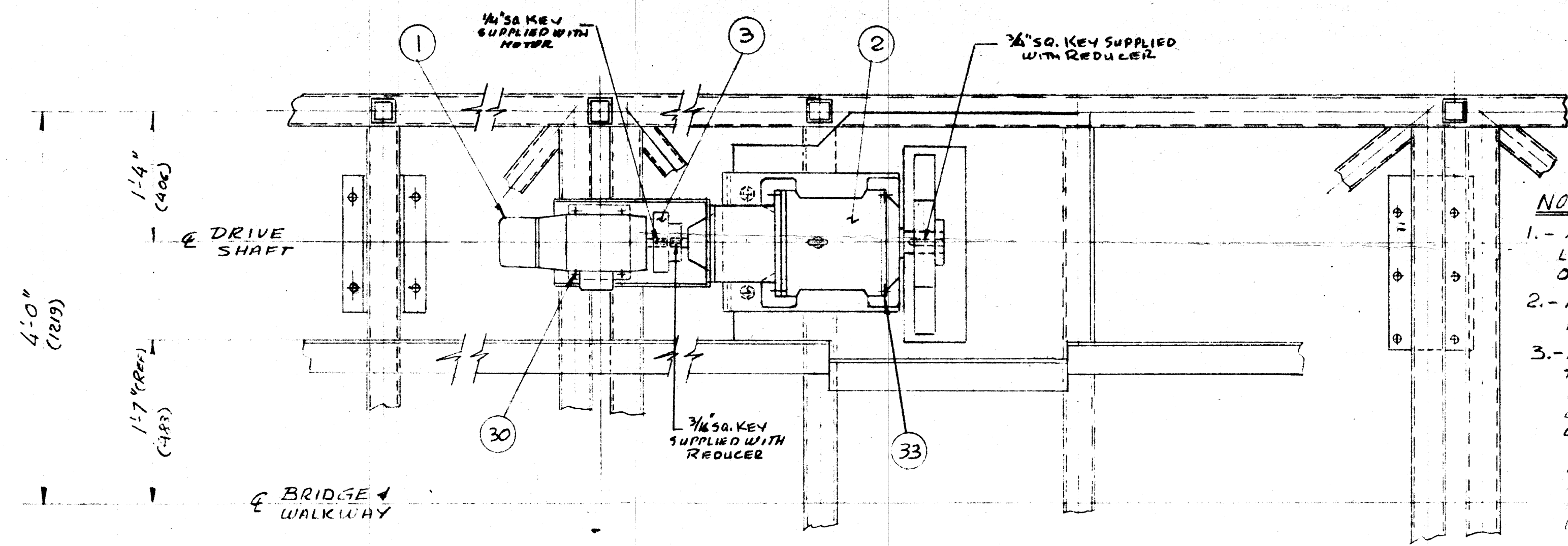
DORR-OLIVER CANADA

CUSTOMER: WINNIPEG SOUTH END W.P.C.C.
EQUIPMENT: PRIMARY CLARIFIER N:3
CUST. NO. PW*3181
FOR: INFORMATION CONSTRUCTION PRELIMINARY APPROVAL FINAL CERTIFIED

DATE: 9/16/08 BY: [Signature]

DORCAN PART NO. 000 50818

UNLESS OTHERWISE SPECIFIED ALL DECIMAL DIMENSIONS ARE $\pm .005$ " ALL FRACTIONAL DIMENSIONS ARE $\pm 1/32$ " METRIC MACHINING DIMENSIONS ARE ± 0.15 mm OTHER METRIC DIMENSIONS ARE ± 1.0 mm ANGLE \pm CONCENTRIC \pm THE DESIGNATION "MILD STEEL" OR M.S. MEANS A.S.T. M-A-36 OR BETTER ALL WELDING TO BE IN ACCORDANCE WITH SPECIFICATIONS OF C.S.A. W59		THIS BOX FOR MFG. ENG. USE ONLY		THIS DRAWING CONTAINS CONFIDENTIAL PROPRIETARY INFORMATION OF DORR-OLIVER CANADA LIMITED AND IS NOT TO BE REPRODUCED OR USED EXCEPT FOR QUALIFYING PROPOSALS OF DORR-OLIVER CANADA LIMITED FOR INSTALLING, OPERATING OR MAINTAINING DORR-OLIVER CANADA LIMITED EQUIPMENT UNLESS OTHERWISE AUTHORIZED BY WRITING OF DORR-OLIVER CANADA LIMITED	
30/08/20	DATE	NO.	REVISION	5189	E.J.E.
DATE	NO.	REVISION	E.C.R.	BY	REV.
DRAWN BY: P.M.	DATE: 9/16/08	CHK'D: [Signature]	SCALE: AS SHOWN	MADE FROM: L-28847 REF.	L-32983 1



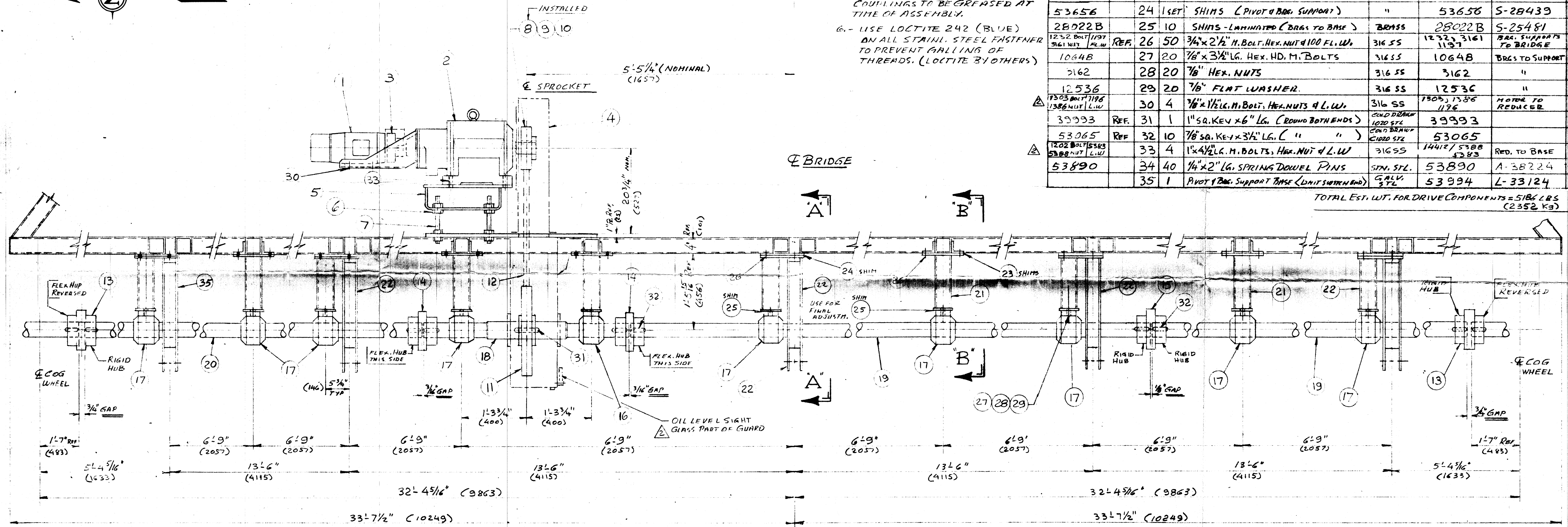
PLAN VIEW

NOTES

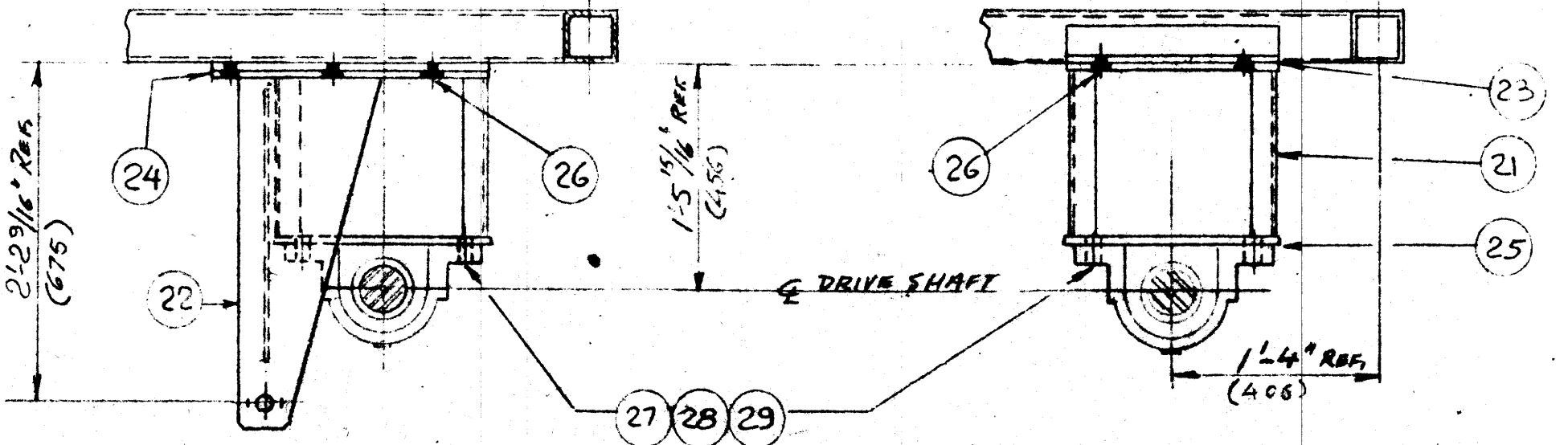
- 1.- ALL PARTS WILL BE SHIPPED LOOSE FOR FIELD ERECTION BY OTHERS. SEE ERECTION MARKS.
- 2.- ALL KEYS & COUPLINGS TO BE FITTED IN FIELD.
- 3.- ALIGNMENT OF SHAFTS & BEARINGS TO BE DONE WITH ALL DEAD LOADS ON BRIDGE. 29: BRIDGE DRIVE COMPONENTS, HOIST DRIVE COMPONENTS, SKIMMER AND SLUDGE SCRAPER ASSEMBLIES MOUNTED TO BRIDGE. USE SHIMS ITEMS 23 & 24 AS REQ'D. FINAL ADJUSTMENT TO BE DONE USING SHIMS ITEM 25 UNDER BRGS.
- 4.- AFTER FINAL ALIGNMENT BEARING BASES ITEMS 21 & 22, AND ALL BEARINGS TO BE DOWELLED USING DOVELS ITEM 34.
- 5.- ALL BEARINGS AND FLEXIBLE COUPLINGS TO BE GREASED AT TIME OF ASSEMBLY.
- 6.- USE LOCTITE 242 (BLUE) ON ALL STAINL. STEEL FASTENER TO PREVENT GALLING OF THREADS. (LOCTITE BY OTHERS)

ERECTION MARKS	GROUP	ITEM	QTY	DESCRIPTION	MATL	PART NO.	DRAWING NO.	WT.
50782	1	1	1 1/2 H.P. CONT. H.P. BRAKE MOTOR - 1800-3000RPM - 213T	50782	A-38109	110		
50785	2	1	EURODRIVE REDUCER - R103R7023-4261	50785	A-38112	470		
50786	3	1	FALK CONTROL TORQUE COUPLING 1040TAN-2	50786	A-38113	15		
53418	4	1	CHAIN GUARD ASSY. - OIL TIGHT	53551	L-33006	83		
53068	5	1	REDUCER SUPPORT BASES	53068	M-26803	161		
5388-NUTS 18410-FL.W	REF.	6	1"-NC HEX. NUTS & B-FLAT WASHER	5388	"	5		
29061	REF.	7	1"-NC X 11" LG. THREADED ROD	29061	"	8		
50791	8	1	DRIVE SPROCKET - 120-2-20 TEETH	50791	A-38118	50		
50790	REF.	9	ALTERNATE SPROCKET - 120-2-14 TEETH	50790	A-38117	25		
50792	REF.	10	" - 120-2-26 TEETH	50792	A-38119	90		
50793	11	1	DRIVEN SPROCKET - 120-2-45 TEETH	50793	A-38120	188		
50794A	12	1	DRIVE CHAIN - 120-2-32 PITCH	50794A	A-38121	91		
50788A	13	2	FLEX-RIGID COUPL. FS203 FLEX HUB REVERSED	50788A	A-38115	90		
50788A	14	2	FLEX-RIGID COUPL. FS203	50788A	A-38115	90		
50789A	15	1	RIGID-RIGID COUPL. 203 TYPE F	50789A	A-38116	55		
28016	16	1	5KF PILLOW BLOCK - 5NH2250/376	28016	A-35190	53		
28015	17	9	5KF PILLOW BLOCK - 5NH2250/376	28015	A-35189	475		
53067	18	1	DRIVE SHAFT - 4'-2" LG.	53067	S-28326	145		
53555A	19	2	DRIVE SHAFT - 17'-0 1/4" LG.	53555A	S-28418	1082		
53555B	20	1	DRIVE SHAFT - 23'-2 1/8" LG.	53555B	"	858		
53069	21	5	INTERMEDIATE BEARING BASE	53069	M-26808	275		
53553	22	4	PIVOT & BRG. SUPPORT BASE	53553	L-33020	483		
53657	23	1 SET	SHIMS (INTERM. BRG. BASE)	53657	S-28440	26		
53656	24	1 SET	SHIMS (PIVOT & BRG. SUPPORT)	53656	S-28439	37		
28022B	25	10	SHIMS - LAMINATED (BRG. TO BASE)	28022B	S-25481	25		
1232-BOLT/1197 1386-NUT L.W	REF.	26	3/4" X 2 1/2" H. BOLT, HEX. NUT & L.W.	1232	RAIL FASTENERS TO BRIDGE	32		
10648	27	20	3/8" X 3 1/2" LG. HEX. HD. M. BOLTS	10648	BRGS TO SUPPORT	22		
3162	28	20	3/8" HEX. NUTS	3162	"			
12536	29	20	3/8" FLAT WASHER	12536	"			
1386-NUT L.W	30	4	3/8" X 1 1/2" H. BOLT, HEX. NUTS & L.W.	1386	MOTOR TO REDUCER	0.5		
39993	REF.	31	1" SQ. KEY X 6" LG. (ROUND BOTH ENDS)	39993	"	1.5		
53065	REF.	32	10 3/8" SQ. KEY X 3 1/2" LG. (" ")	53065	"	7		
1202-BOLT/1543 5388-NUT L.W	REF.	33	4 1" X 4 1/2" LG. M. BOLTS, HEX. NUT & L.W.	14012/5388	RED. TO BASE	8		
53890	34	40	1/4" X 2" LG. SPRINGS DOWEL PINS	53890	A-38224			
	35	1	PIVOT & BRG. SUPPORT BASE (UNIT SUPPLY)	53994	L-33124	120		

TOTAL EST. WT. FOR DRIVE COMPONENTS = 5184 LBS (2352 KG)

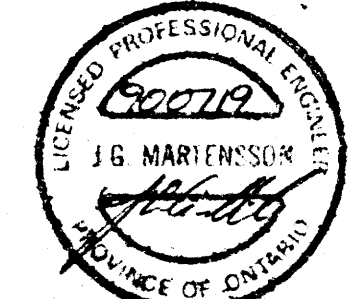


ELEVATION
LOOKING EAST



SECTION A-A
TYPICAL 5-PLACES

SECTION B-B
TYPICAL 5-PLACE



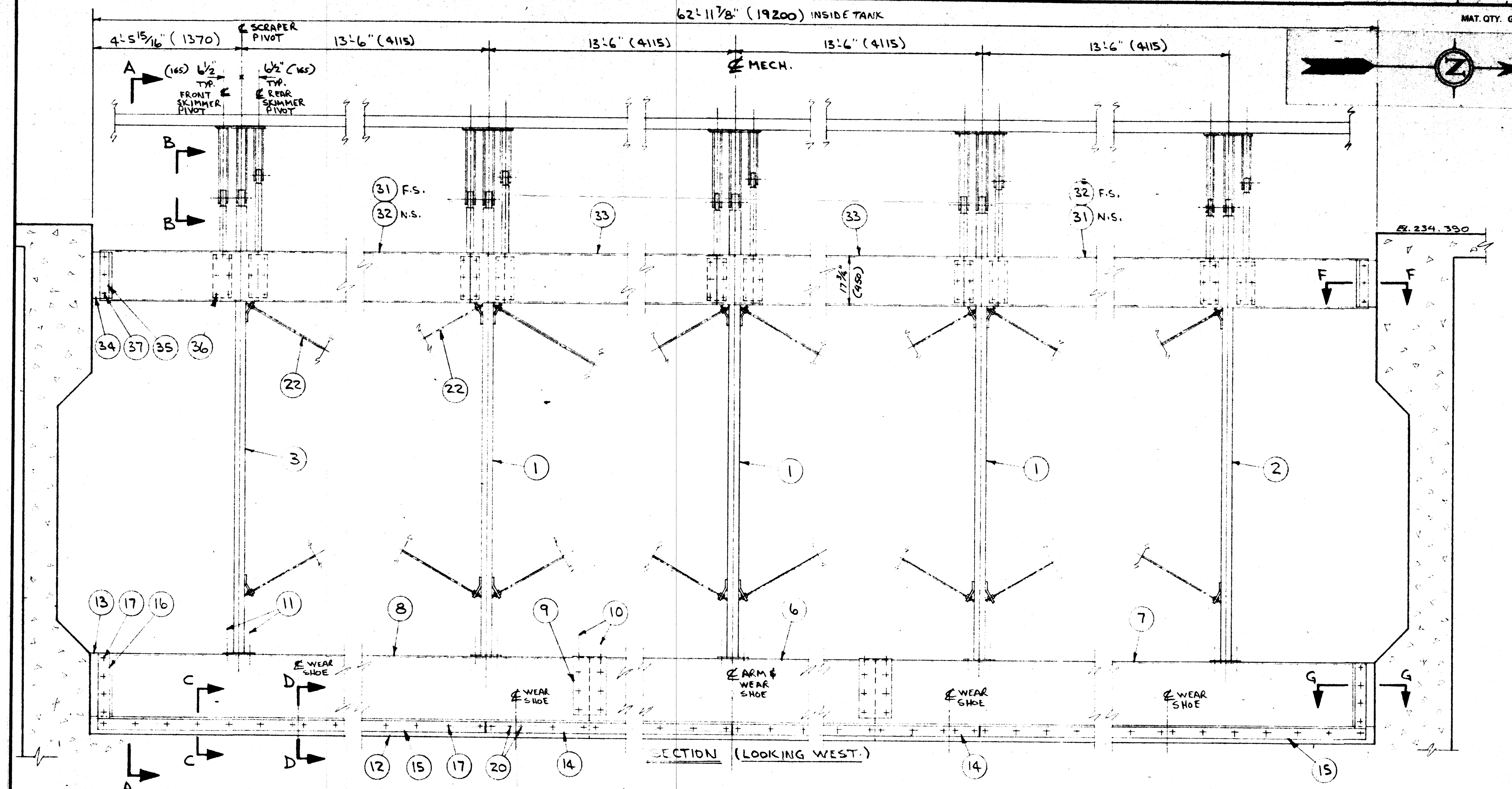
APEM Temporary
Licence #108-90
exp. date July 9/91

DORCAN PART NO. 00053655

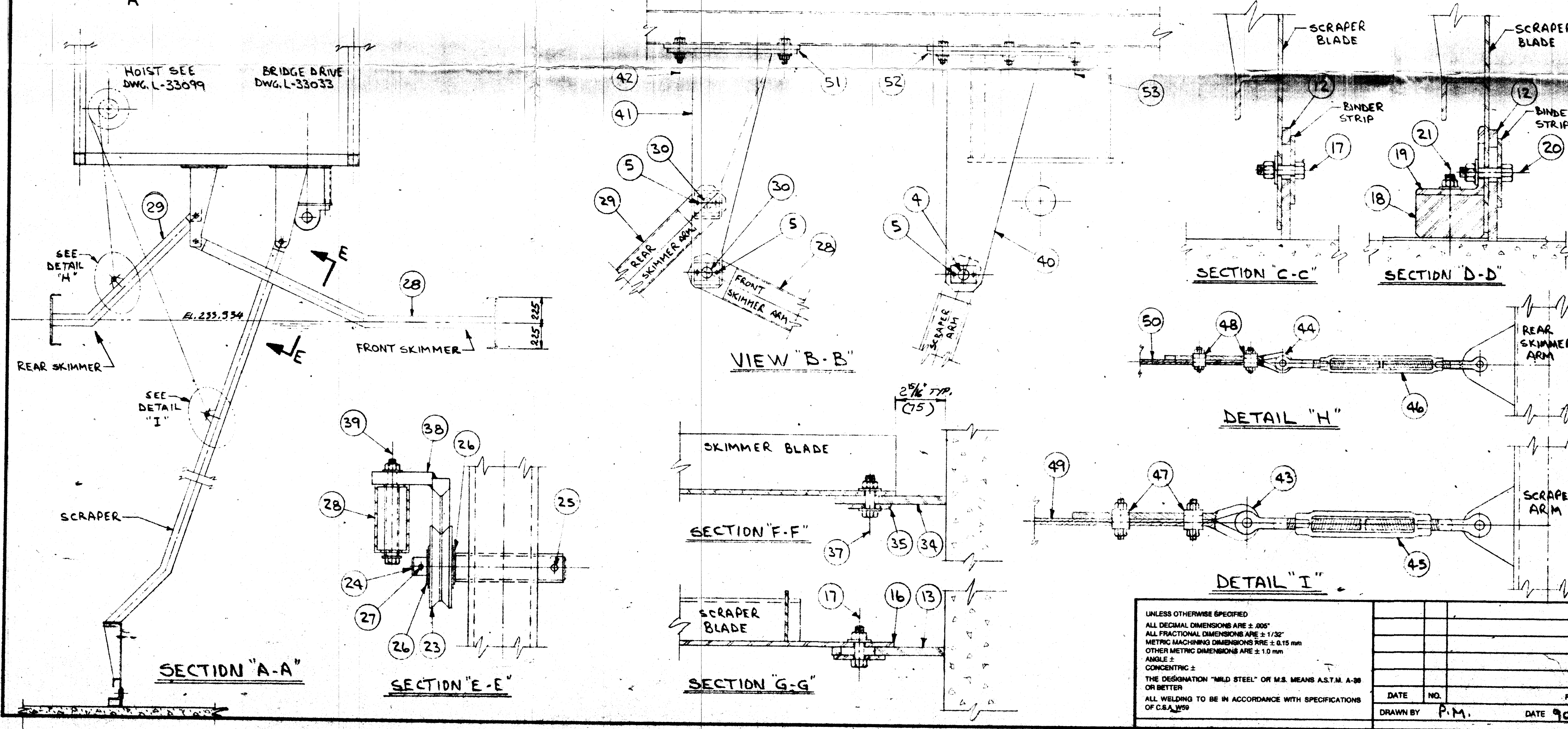
DORCAN OLIVER CANADA LTD.
 CUSTOMER: WINNIPEG SOUTHWEST W.P.C.C.
 EQUIPMENT: PRIMARY CLARIFIER N°3
 CUST. NO. P.M.#3181 DORCAN NO. 11798-1
 FOR: INFORMATION CONSTRUCTION APPROVAL CERTIFIED
 DATE: 9/24/91 BY: [Signature]

DATE	NO.	REVISION	E.C.R.	BY	SCALE	MADE FROM
20/06/90	2	ISSUE FOR ESTIMATE & APPROVAL	5189	E.J.R.		
20/07/90	1	NOTICE TO PROCEED FROM 1847 TO 2137	5144	E.J.R.		

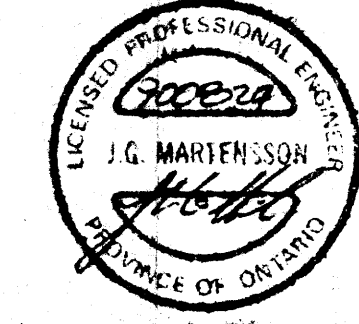
THIS BOX FOR MFG. ENCL. USE ONLY
 PLOT SCALE
 ISSUE
 BRIDGE DRIVE ARR'G AND ERECTION
 67-3 SLUDGE COLL. BRIDGE
 SCALE 1"=12'
 MADE FROM L-33033



ITEM	QTY	DESCRIPTION	MATL	ER. MK.	DRAWING NO.	WT.
1	3	SCRAPER ARM	M.S.	50835	M-26862	897
2	1	SCRAPER ARM L.H.	"	50836	M-26863	295
3	1	SCRAPER ARM R.H.	"	50837	M-26864	295
4	5	SCRAPER ARM PIVOT PIN	316 S.S.	53715	S-18449	10
5	30	3/8" N.C. x 3/4" L.G. H.H. CAP SCR. + F.W.	"	1304, 28691	-	-
6	1	SCRAPER BLADE CENTER	"	50822A	L-33040	795
7	1	SCRAPER BLADE L.H.	"	50822B	"	812
8	1	SCRAPER BLADE R.H.	"	50822C	"	812
9	2	BLADE SPLICE PLATE	"	50822D	"	50
10	20	5/8" N.C. x 1/2" H.H. BOLT + H.N. + F.W.	"	1261, 1382, 3143	-	-
11	20	3/4" N.C. x 1 3/4" H.H. BOLT + H.N. + F.W.	"	1229, 3161, 1197	-	-
12	1	NEOPRENE SCRAPER	NEOPRENE 50-60 DURO	50820A	L-33039	120
13	2	END WIPERS FOR SCRAPER BLADE	"	50820B	"	7
14	2	BINDER STRIP FOR NEOP. SCRAPER	316 SS	50819A	M-26858	92
15	2	BINDER STRIP FOR NEOP. SCRAPER	"	50819B	"	121
16	2	BINDER STRIP FOR NEOP. END WIPER	"	50819C	"	14
17	72	1/2" N.C. x 1 3/4" H.H. BOLT + H.N. + F.W.	"	17770, 3158, 1292	-	-
18	5	WEAR SHOE	U.H.M.W. POLYURETH.	8562 A	A-32025	8
19	5	WEAR SHOE BRKT.	M.S./GALV.	53689 B	A-22747	25
20	10	5/8" N.C. x 2 1/2" H.H. BOLT + H.N. + F.W.	316 SS	1262, 1382, 3143	-	-
21	10	1/2" N.C. x 2" S.H. CAP SCR. + H.N. + F.W.	"	1292, 3158, 12926	-	-
22	8	CROSS. BRACE 5/8" 4 H.N. + 4 F.W. EA	M.S./GALV.	53691	S-28437	90
23	5	CAM ROLLER	ALUM. 6061 T6	53693	S-28438	15
24	5	CAM ROLLER PIN	316 SS	53690	A-31959	20
25	5	3/8" N.C. x 2 1/2" H.H. BOLT + 2 H.N.	"	12631, 1386	-	-
26	10	1" STD. FLAT WASHER	"	14410	-	-
27	5	1/4" x 1/4" COTTER PIN	"	18397	-	-
28	5	SKIMMER ARM - FRONT	ALUM. 6351 T6	50825	M-26860	140
29	5	SKIMMER ARM - REAR	"	50826	M-26861	110
30	10	SKIMMER ARM PIVOT PIN	316 SS	53688	S-23049	20
31	2	SKIMMER BLADE - R.H. SECTION	ALUM. 6061 T6	50823A	M-26859	250
32	2	SKIMMER BLADE - L.H. SECTION	"	50823B	"	236
33	4	SKIMMER BLADE - MID SECTION	"	50823C	"	370
34	4	END WIPERS FOR SKIMMER BLADE	NEOPRENE 50-60 DURO	53713	A-38237	12
35	4	BINDER STRIP FOR NEOP. END WIPER	ALUM. 6351 T6	53712	A-38236	4
36	60	1/2" N.C. x 1 1/2" H.H. BOLT + H.N. + 2 F.W. EA.	316 SS	1251, 3158, 12926	-	-
37	12	1/2" N.C. x 1 3/4" H.H. BOLT + H.N. + 2 F.W. EA.	"	17770, 3158, 12924	-	-
38	5	CAM FOR FRONT SKIMMER ARM	ALUM. 5083 H321	53694	M-26865	35
39	10	1/2" N.C. x 6" H.H. BOLT + H.N. + 2 F.W. EA.	316 SS	28107, 3158, 12926	-	-
40	REF.	PIVOT BRKT. REAR BASE SCRAPER	M.S./GALV.	53553	L-33020	-
41	REF.	PIVOT BRKT. FOR SKIMMER	ALUM. 5083 H321	53554	M-26853	190
42	20	REF. 3/8" N.C. x 2 1/2" H.H. BOLT + H.N. + 2 F.W. EA.	316 SS	1262, 1382, 3143	-	-
43	5	3/8" WIRE ROPE THIMBLE CROSBY N° 55-414	STAIN. ST.	29643	-	2
44	5	1/4" WIRE ROPE THIMBLE CROSBY N° 55-414	"	53720	-	1
45	5	5/8" x 6" TAKE-UP TURNBUCKLE JAW & JAW	ST./GALV.	53721	-	15
46	5	3/8" x 6" TAKE-UP TURNBUCKLE JAW & JAW	"	53722	-	5
47	10	3/8" CABLE CLAMP	316 SS	53723	-	5
48	10	1/4" CABLE CLAMP	316 SS	53724	-	3
49	5	3/8" WIRE CORE CABLE 7x19 x 40 FT. LG.	316 SS	53725	-	50
50	5	1/4" WIRE CORE CABLE 7x19 x 21 FT. LG.	316 SS	53726	-	12
51	1 SET	SHIMS - SKIMMER PIVOT BRKT.	ALUM. BRASS	53727	S-28504	25
52	1 SET	SHIMS - SCRAPER PIVOT BRKT.	"	53656	S-28439	-
53	REF.	3/4" N.C. x 2 1/2" H.H. BOLT + H.N. + F.W.	316 SS	1232, 3161, 1197	-	-



NOTE
 : ARM PIVOT POINTS MUST BE IN LINE & PARALLEL
 : SHIM UNDER BRKTS TO SUIT FINAL CAMBER.
 : USE LOCTITE 242 BLUE ON ALL S.S. THDS.
 : DIMENSIONS IN () ARE IN M.M. FOR REF.



APEM Temporary
 Licence #108-90
 exp. date July 9/91

DORR-OLIVER CANADA
 CUSTOMER: WINNIPEG SOUTH EAST W. REC.
 EQUIPMENT: PRIMARY CLARIFIER NO. 3
 CUST. NO. P.V. 5181 DORCAN NO. 11798-1
 FOR: INFORMATION ID PRELIMINARY ID FINAL
 CONSTRUCTION ID APPROVAL ID
 DATE: 90/07/19 BY: [Signature]

DORCAN PART NO. 00053709

UNLESS OTHERWISE SPECIFIED
 ALL DECIMAL DIMENSIONS ARE ± .005"
 ALL FRACTIONAL DIMENSIONS ARE ± 1/32"
 METRIC MACHINING DIMENSIONS ARE ± 0.15 mm
 OTHER METRIC DIMENSIONS ARE ± 1.0 mm
 UNLESS OTHERWISE SPECIFIED
 THE DESIGNATION "MILD STEEL" OR "M.S." MEANS A.S.T.M. A-36
 OR BETTER
 ALL WELDING TO BE IN ACCORDANCE WITH SPECIFICATIONS
 OF C.S.A. 5199

DATE	NO.	REVISION	E.C.R.	BY
90/07/19				P.M.

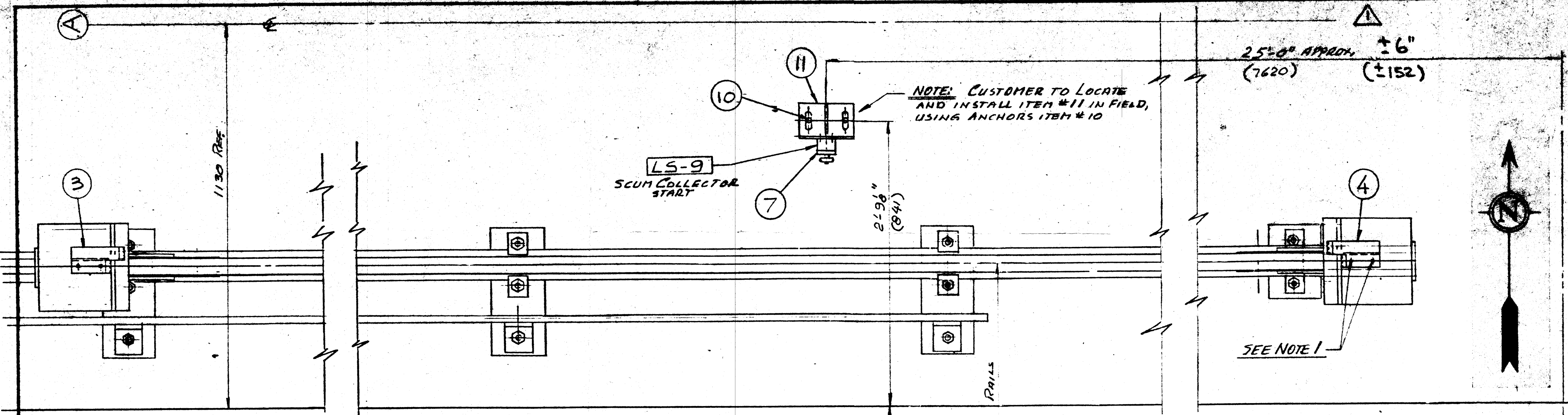
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1/2" = 1'-0"	1	1/2" = 1'-0"	1

THIS BOX FOR MFG. ENG. USE ONLY

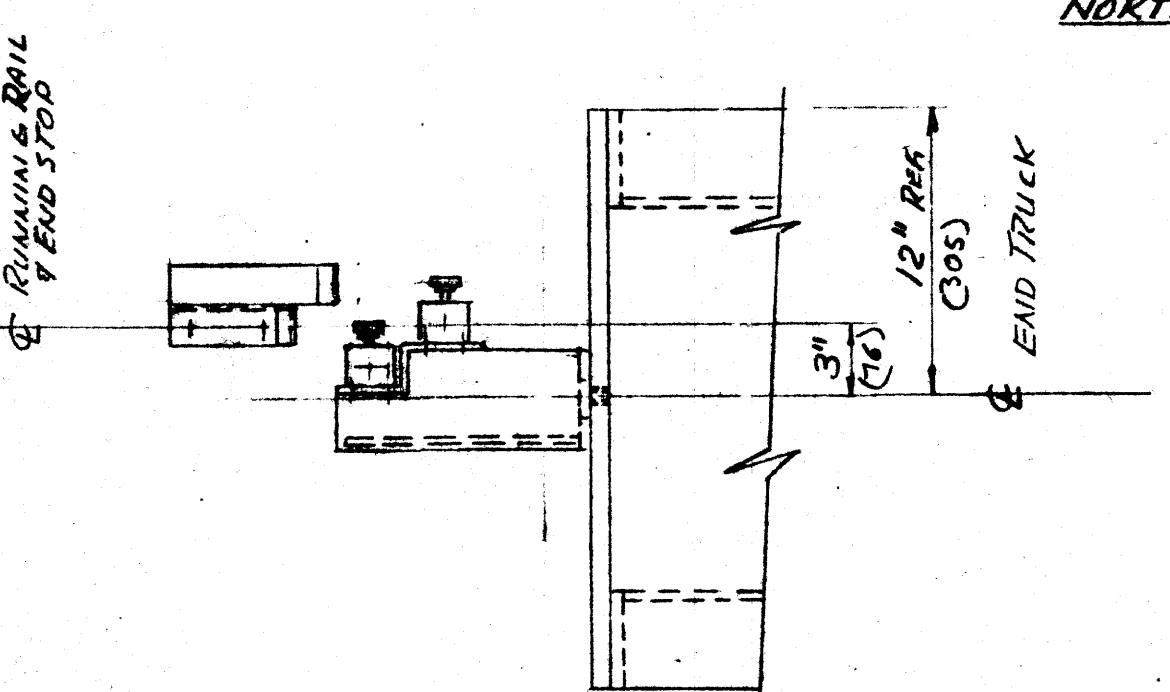
THIS DRAWING CONTAINS CONFIDENTIAL, PROPRIETARY INFORMATION OF DORR-OLIVER CANADA LIMITED AND IS NOT TO BE DISCLOSED NOR TO BE USED EXCEPT FOR THE LIMITED PURPOSES OF DORR-OLIVER CANADA LIMITED OR INSTALLING, OPERATING OR MAINTAINING DORR-OLIVER CANADA LIMITED EQUIPMENT. UNLESS OTHERWISE AUTHORIZED IN WRITING BY DORR-OLIVER CANADA LIMITED.

DORR-OLIVER CANADA LIMITED
 ORILLIA, ONTARIO, CANADA

SCRAPER & SKIMMER ASSY.
 WINNIPEG (11798-1)
 SCALE: 1/2" = 1'-0" MADE FROM L-33106 0



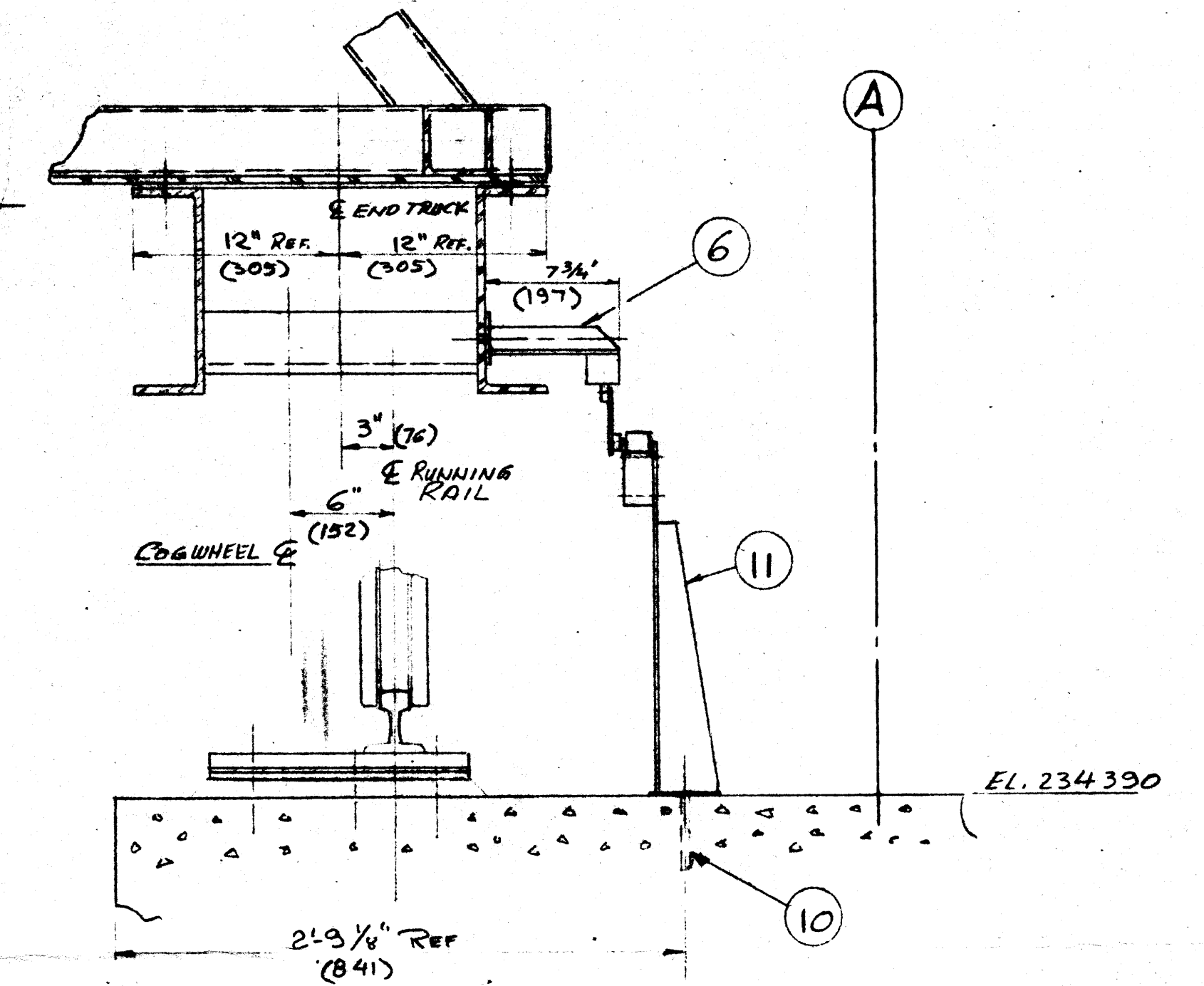
PLAN VIEW
NORTH END OF BRIDGE



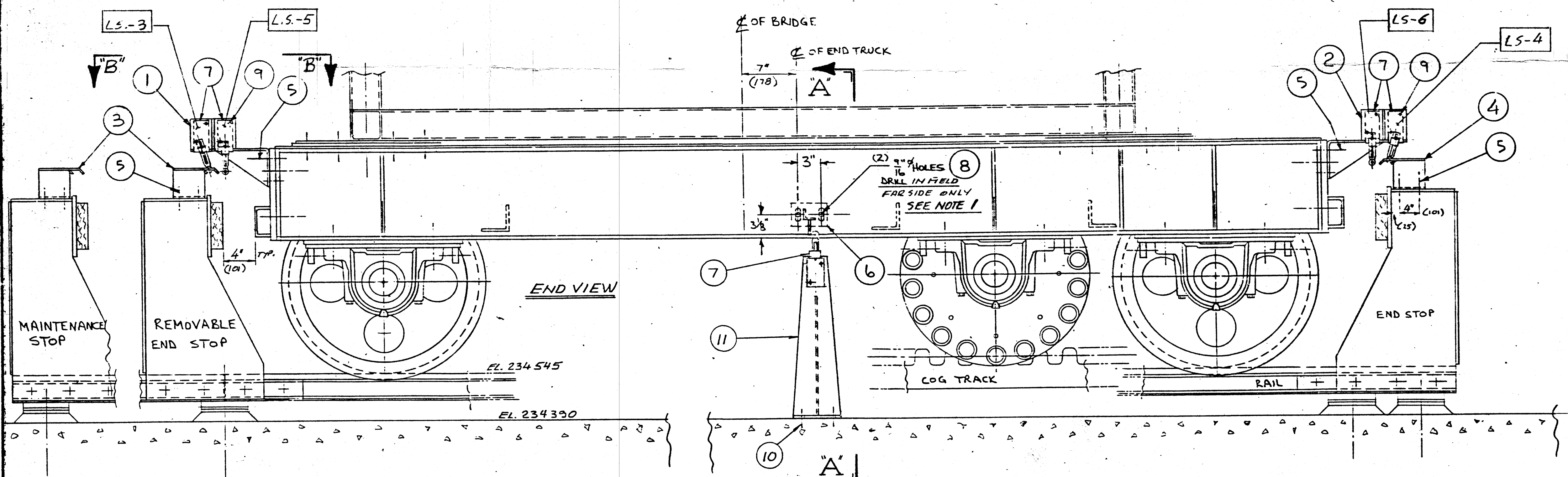
VIEW B-B
TYPICAL BOTH ENDS
EXCEPT FOR HANDING

ITEM	QTY	DESCRIPTION	MATL.	ER. MK.	DRAWING NO.	WT.
1	1	MNT'G. BRKT. - FOR LIMIT SWITCH R.H.	ALUM.	53732A	M-26931	2.5
2	1	MNT'G. BRKT. - FOR LIMIT SWITCH L.H.	"	53732B	"	2.5
3	2	STRIKER - FOR LIMIT SWITCH R.H.	316 SS	53731A	M-26930	1
4	1	STRIKER - FOR LIMIT SWITCH L.H.	316 SS	53731B	"	1
5	10	3/8-16 NC. x 1" H.H. CAP SCR. + F.W.	316 SS	1305, 28691		
6	1	STRIKER ARM FOR TANK MOUNT. SWITCH	ALUM.	53734	S-28511	1
7	5	HONEYWELL TYPE L.S. SWITCH LSAIA-2A		20914AA	A-34224	
8	2	1/2" NC. x 1 1/2" H.H. BOLT + H.N. + F.W.	316 SS	1251, 3258, 1393		
9	10	10-32 x 2 1/4" S.H. CAP. SCR. + H.N. + F.W.	"	42215, 5108, 2090		
10	REF.	3/8" x 8 1/2" MILIT. KWIK BOLT	304 SS	41468 L	S-26983	
11	1	MNT'G. BRKT. FOR TANK MOUNT. SWITCH	M.S.	42212 B	S-23238A	10

- NOTES:**
- 1- CUSTOMER TO DRILL & TAP 3/8" DIA. HOLES IN EACH STOP AS SHOWN. 6 - HOLES TOTAL FOR MOUNTING STRIKERS ITEMS 3 & 4 ALSO DRILL (2) 3/16" DIA. HOLES FOR STRIKER ITEM 6. SEE ELEVATION & SECTION A-A.
 - 2- ALL LIMIT SWITCHES HAVE 1/2" TO 3/4" (38 TO 89) ADJUSTABLE LEVERS.
 - 3- SEE DRAWING M-26771 FOR CONNECTION AND FUNCTION OF LIMIT SWITCHES LS-3 TO LS-9.
 - 4- ALL WIRING OF LIMIT SWITCHES BY OTHERS USING A SHORT LENGTH OF TYPE VLN 90 CABLE OR EQUAL AND WATER TIGHT METAL STRAIN RELIEF CABLE GRIP TO PREVENT MOISTURE TO ENTER LIMIT SWITCHES.



SECTION A-A



ELEVATION OF END TRUCK
AT NORTH END.



APEM Temporary
Licence #108-90
exp. date July 9/91

DORR-OLIVER CANADA

CUSTOMER: WINNIPEG SOUTH END W.D.C.C.

EQUIPMENT: PRIMARY CARTRIDGE NO. 2

CUST. NO. PW-3181 DORCAN NO. 11798-1

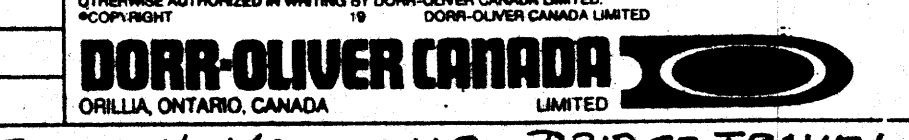
FOR: INFORMATION PRELIMINARY FINAL

CONSTRUCTION APPROVAL

DATE: 30/08/15 BY: [Signature]

DORCAN
PART NO. 00053733

UNLESS OTHERWISE SPECIFIED ALL DECIMAL DIMENSIONS ARE ±.005" ALL FRACTIONAL DIMENSIONS ARE ± 1/32" METRIC MACHINING DIMENSIONS ARE ± 0.15 mm OTHER METRIC DIMENSIONS ARE ± 1.0 mm		THIS BOX FOR MFG. ENG. USE ONLY		PLOT SCALE	
DATE: 30/08/15		NO. 1		ISSUE	
DRAWN BY: P.M./E.L.R.		DATE: 30/08/15		SCALE: DO NOT	
CHECKED: [Signature]		DATE: 30/08/15		MADE FROM L-26024 REF.	
DATE: 30/08/15		REVISION		L-33165	
DATE: 30/08/15		REVISION		L-33165	
DATE: 30/08/15		REVISION		L-33165	



LIMIT SWITCH MOUNTING - BRIDGE TRAVEL

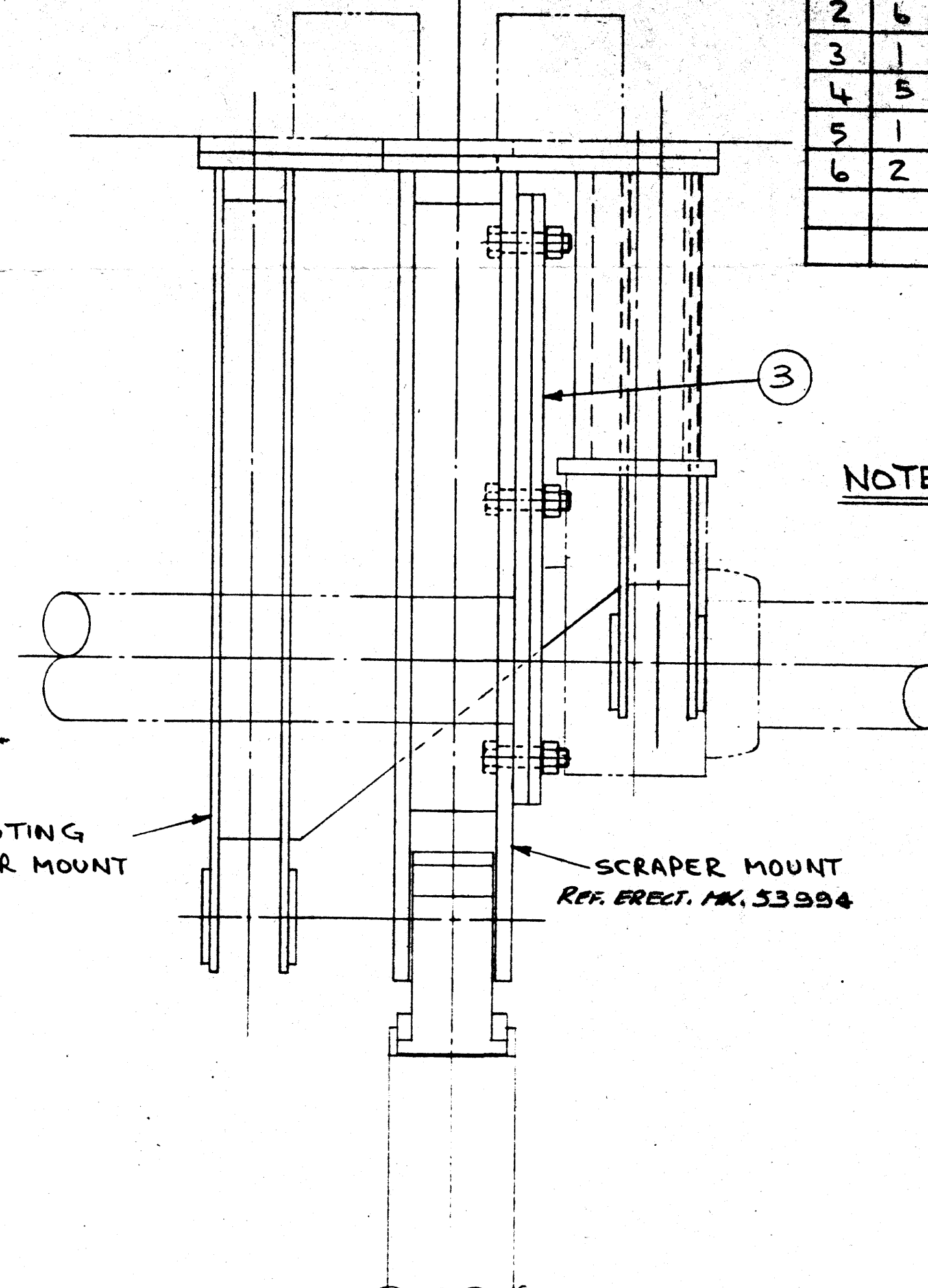
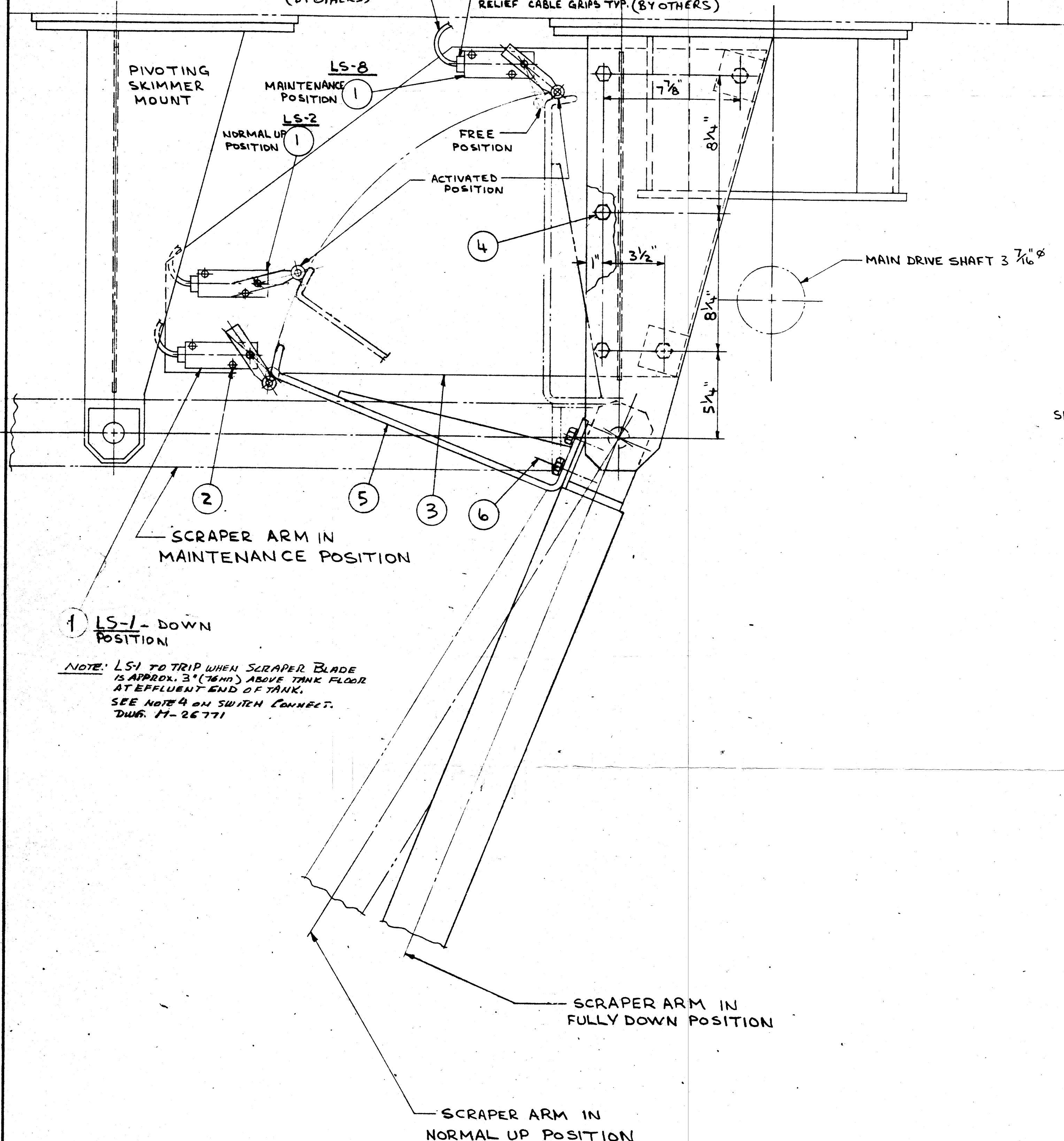
L-33165

JUNCTION BOX
STAINLESS STEEL
(BY OTHERS)

TYPE VN 90 CABLES OR EQUAL
TO JUNCTION BOX TYP.
(BY OTHERS)

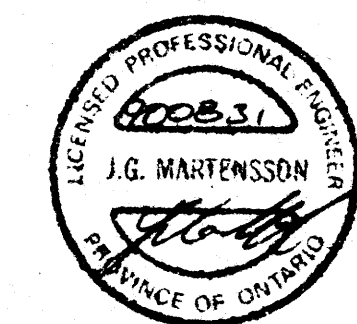
WATER TIGHT, METAL STRAIN-
RELIEF CABLE GRIPS TYP. (BY OTHERS)

ITEM	QTY.	DESCRIPTION	MATL.	ERECT. MK.	DRAWING NO.	WT.
1	3	"HONEYWELL" MICRO SWITCH	LSA1A-2A	20914AA	A-34224	
2	6	#10-32 x 2 1/4" SOKT. HD. CAP SCR. + H.N. + F.W.	316 SS	42215, 5158, 5109		
3	1	LIMIT SWITCH MNTG. BRKT.	ALUM.	53729	M-26923	25
4	5	1/2" x 2 1/2" M. BOLT + H.N. + F.W.	316 SS	R80, 3158, 3142		
5	1	STRIKER ARM	316 SS	53728	A-32790	4
6	2	1/2" x 1 1/4" CAP SCR. + F.W.	316 SS	1288, 3142		



NOTE: ABOVE QUANTITIES ARE FOR ONE (1)
COLLECTOR BRIDGE.
LOCATE IN VACINITY OF MAIN CONTROL
CABINET
WIRING, CONDUIT & JUNCTION BOX. (BY OTHERS)

NOTE: LS-1 TO TRIP WHEN SCRAPER BLADE
IS APPROX. 3" (76mm) ABOVE TANK FLOOR
AT EFFLUENT END OF TANK.
SEE NOTE 4 ON SWITCH CONNECT.
DWR: 11-26771



APEM Temporary
Licence #108-90
exp. date July 9/91

DORR-OLIVER CANADA LIMITED	
CUSTOMER: WINNIPEG SOUTH END W.P.C.C.	
EQUIPMENT: PRIMARY CLARIFIER NO. 3	
CUST. No. P.W. #3181	DORCAN No. 11798-1
FOR: INFORMATION <input type="checkbox"/> CONSTRUCTION <input type="checkbox"/>	PRELIMINARY <input type="checkbox"/> APPROVAL <input type="checkbox"/> FINAL <input type="checkbox"/>
DATE: 9/28/91	BY: [Signature]

DORCAN PART NO. 00953730

UNLESS OTHERWISE SPECIFIED
ALL DECIMAL DIMENSIONS WITH $\pm .000$
ALL FRACTIONAL DIMENSIONS WITH $\pm 1/32$
UNTOLERANCED METRIC MACHINING DIM. TO BE ± 0.15 mm
OTHER UNTOLERANCED METRIC DIMENSIONS TO BE ± 1.0 mm
ANGLES \pm
CONCENTRIC \pm
THE DESIGNATION "MILD STEEL" OR M.S. MEANS A.S.T.M. A-36
OR BETTER
ALL WELDING TO BE IN ACCORDANCE WITH SPECIFICATIONS
OF C.S.A. W58

DATE	NO.	REVISION	BY
9/08/13	1	CHKD	[Signature]

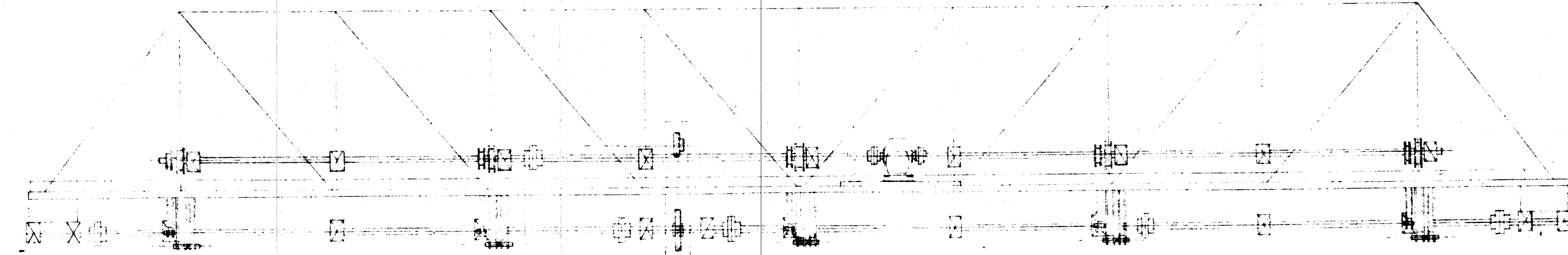
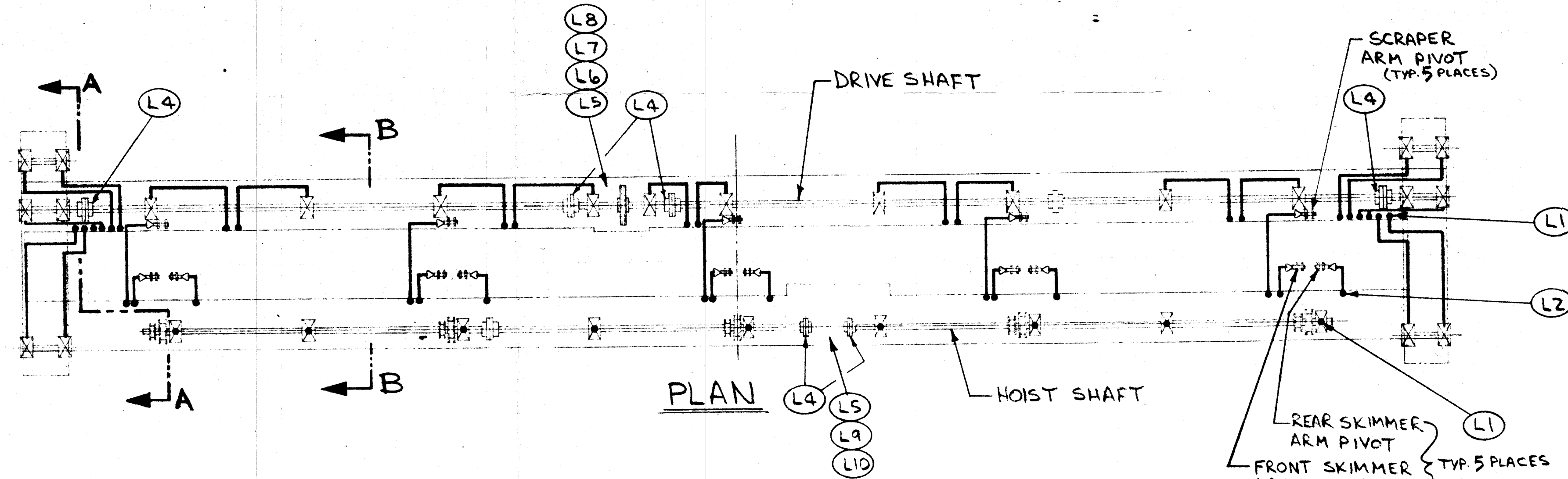
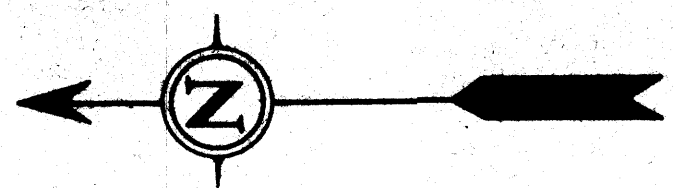
THIS BOX FOR MFG. ENG. USE ONLY

THIS DRAWING CONTAINS CONFIDENTIAL PROPRIETARY INFORMATION OF DORR-OLIVER CANADA LIMITED AND IS NOT TO BE REPRODUCED OR USED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF DORR-OLIVER CANADA LIMITED. THE DESIGNATION "MILD STEEL" OR M.S. MEANS A.S.T.M. A-36 OR BETTER. ALL WELDING TO BE IN ACCORDANCE WITH SPECIFICATIONS OF C.S.A. W58.

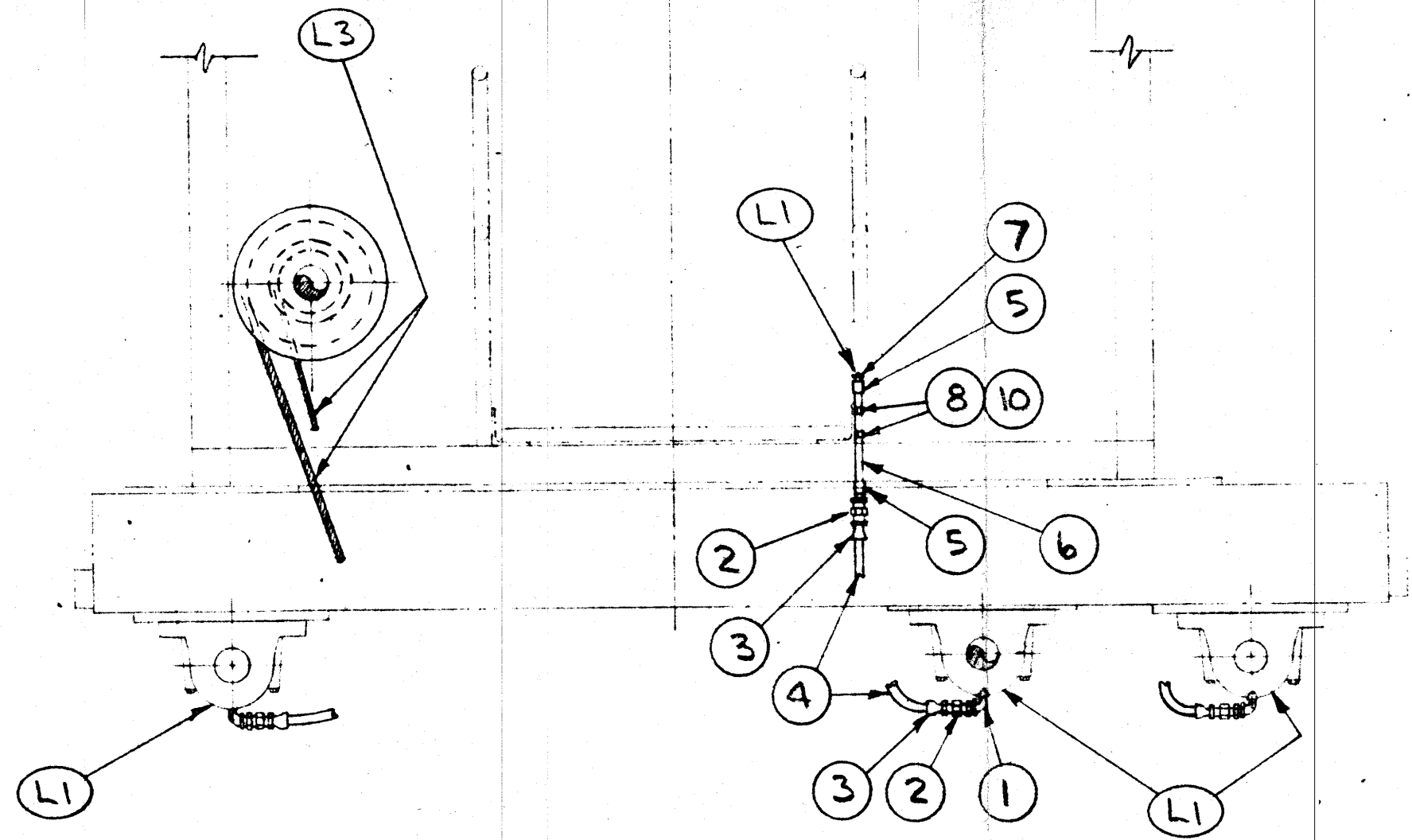
DORR-OLIVER CANADA LIMITED
ORILLIA, ONTARIO, CANADA

LIMIT SWITCH ARRANGEMENT FOR HOIST BRIDGE #3

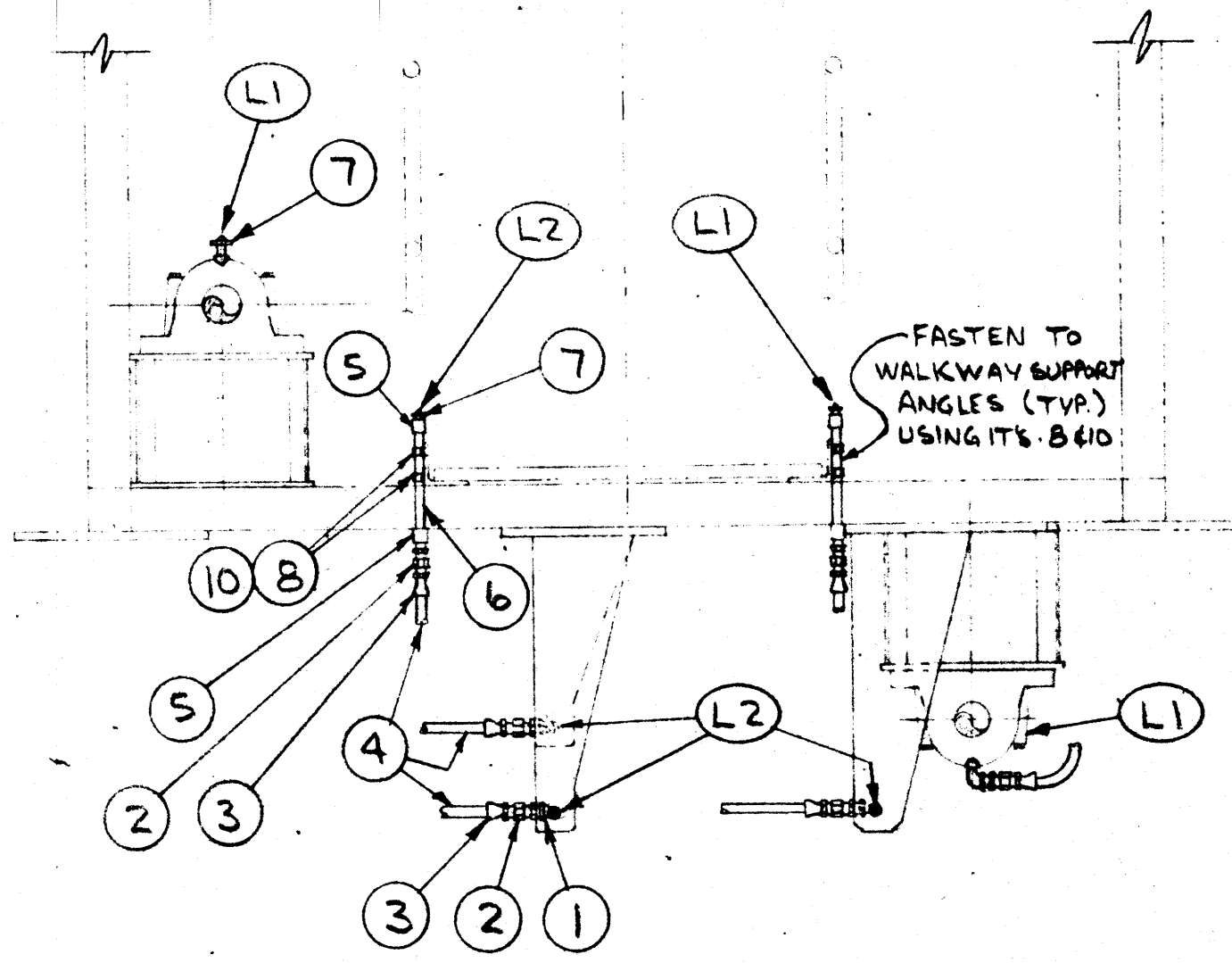
SCALE 3" = 1'-0" MADE FROM L-26610 L-33152



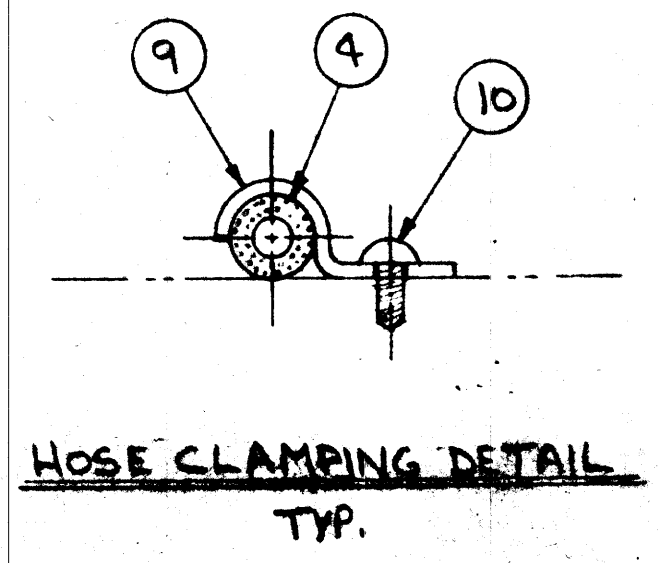
ELEVATION



SECTION "A-A"



SECTION "B-B"



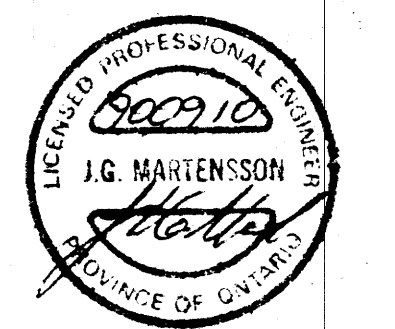
HOSE CLAMPING DETAIL
TYP.

MAT. QTY. GROUP	ITEM	QTY	DESCRIPTION	MATL.	EMEC. MK. & PART N°	DRAWING NO.	WT.
	1	37	1/8" x 90° STREET ELBOW	GALV. STL.	27323		
	2	74	N° 2021-2-4S FITTING 1/8" N.P.T.	PLATED	27315	AEROQUIP	
	3	74	N° 4721-4-4S FITTING 37° SWIVEL	"	27316	"	
	4	550	N° 1509-4 FLEX. HYDRAULIC HOSE	RUBBER	27317	"	
	5	74	1/8" PIPE COUPLNG	GALV. STL.	27318		
	6	37	1/8" SCH. 40 PIPE X 8" LG. T.B.E.	"	53735		
	7	46	1/8" N.P.T. FITTING N° A-1184	PLATED	2001	ALENITE GREASE FITTING	
	8	74	3/8" TUBE CLAMP N° C-622	"	31441		
	9	74	3/4" " " N° C-628	"	27321		
	10	148	N° 10 X 3/8" LG. SELF TAPPING SCR.	316 SS	27322		

LUBE N°	EQUIP. QTY.	EQUIPMENT DESCRIPTION	LOCATION OF EQUIP. & REF. DWG. N°	LUBE GROUP N° OR SPEC.	LUBE FREQUENCY
L1	31	SKF PELLOW BLOCK SNH 22520/3 1/8" (1/8" NPT)	HOIST L-33099 ENDTRUCK L-33105 MAIN DRIVE L-33033	GROUP 6	AT ASS'Y. & ANNUALY
L2	15	SCRAPER & SKIMMER ARM PIVOT PIN (1/8" NPT)	SCRAPER & SKIMMER ASS'Y. L-33106	GROUP 5	WEEKLY
L3	5	3/8" WIRE CABLE	"	WIRE ROPE DRESSING ESSO ELBAC FLD 75 (APPLY HOT)	AT STARTUP & ANNUALY
L4	6	ZURN FLEX-RIGID TYPE 'F' COUPLING SIZE 203	HOIST L-33099 MAIN DRIVE L-33033	GROUP 6	AT ASS'Y. & ANNUALY
L5	2	FALK CONTROL TORQUE COUPLING 1040 T41-2	"	"	"
L6	1	EURODRIVE REDUCER R103R702S 426:1 RATIO	MAIN DRIVE L-33033	SEE NOTE 5	CHANGE SUMMER & WINTER
L7	1	1/2 HP 2 SPEED BRAKE MOTOR (1800 & 900 RPM) CLASS 'F'	"	"	AS RECOMMENDED BY MANUFACTURER
L8	1	DRIVE CHAIN IN OILTIGHT CHAIN GUARD # 120-2	"	GROUP 3	CHANGE SUMMER & WINTER
L9	1	DAVID BROWN RADICON WORM GEAR REDUCER N° A0D 12 1000:1 RATIO	HOIST DRIVE L-33098 & 99	SEE NOTE 5	"
L10	1	5 HP BRAKE MOTOR (1800 RPM) CLASS 'F'	"	"	AS RECOMMENDED BY MANUFACTURER

GEN. NOTES:

- 1) DORR-OLIVER CAN. SUPPLIES ONLY PARTS INDICATED ON THIS DWG.
- 2) ASSEMBLY OF LUBRICATION COMPONENTS TO BE DONE INFIELD BY OTHERS.
- 3) LUBRICATION HOSES TO BE CUT TO LENGTH IN THE FIELD FROM NOSE SUPPLIED. MINIMUM BEND RADIUS OF NOSE IS 102 MM (4").
- 4) FOR RECOMMENDED GROUPS OF LUBRICANTS SEE D.O. CHART #552 (PART OF MANUALS SUPPLIED WITH MACHINE.)
- 5) FOR MORE LUBRICATION INFORMATION ON REDUCERS, MOTORS, BEARINGS & COUPLING REFER TO MAINTENANCE INSTRUCTIONS INCLUDED WITH MANUALS, SUPPLIED WITH MACHINE.
- 6) LUBRICATE CABLES ABOVE WATER LEVEL ONLY. APPLY LUBRICANT HOT TO DRY CABLES.
- 7) THE SUGGESTED LUBRICANTS & FREQUENCIES MAY BE MODIFIED TO SUIT ACTUAL CONDITIONS & EXPERIENCE OF THE OPERATOR.



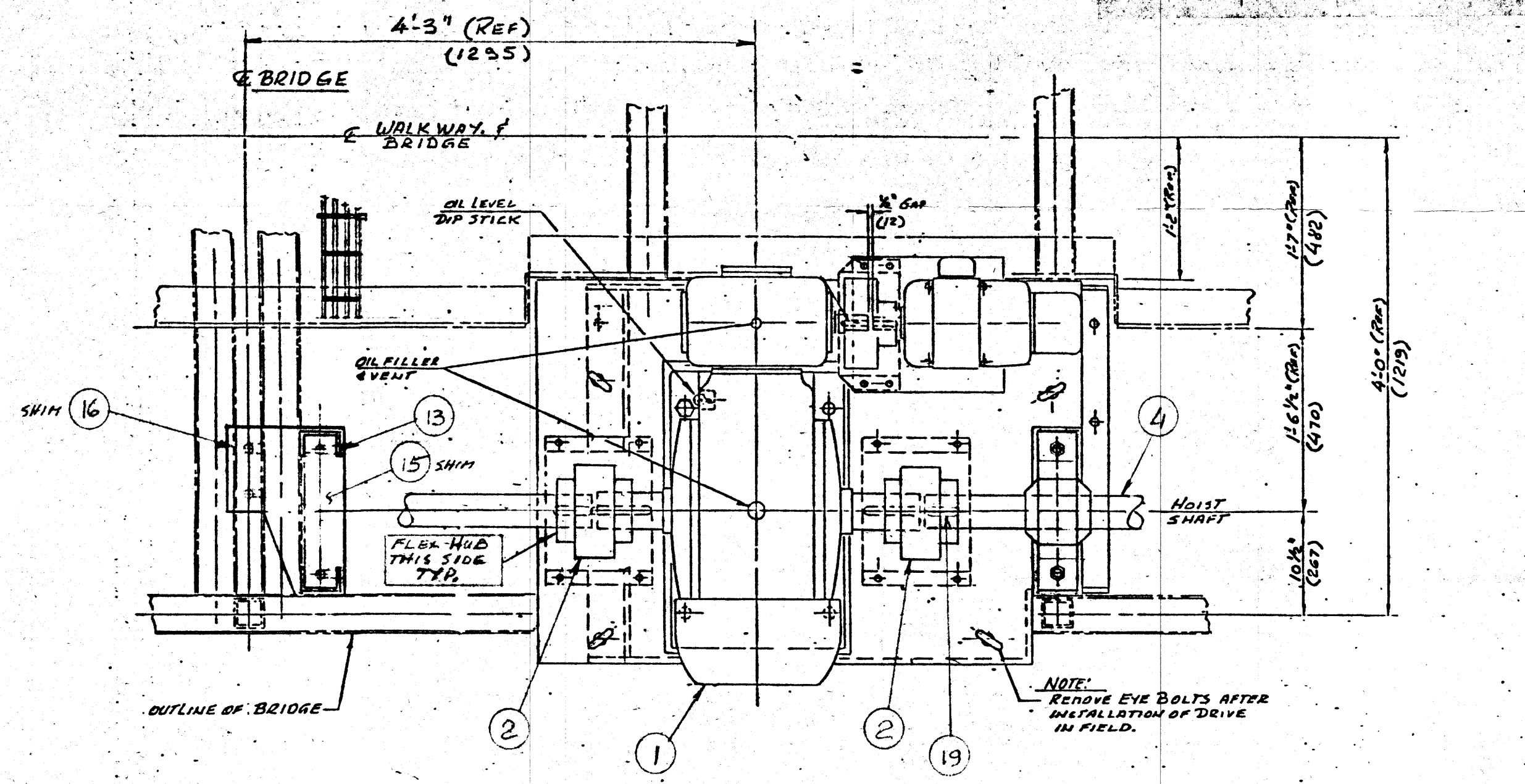
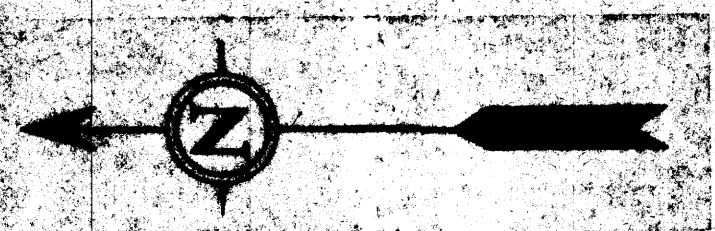
APEM Temporary Licence #108-90 exp. date July 9/97

DORR-OLIVER CANADA

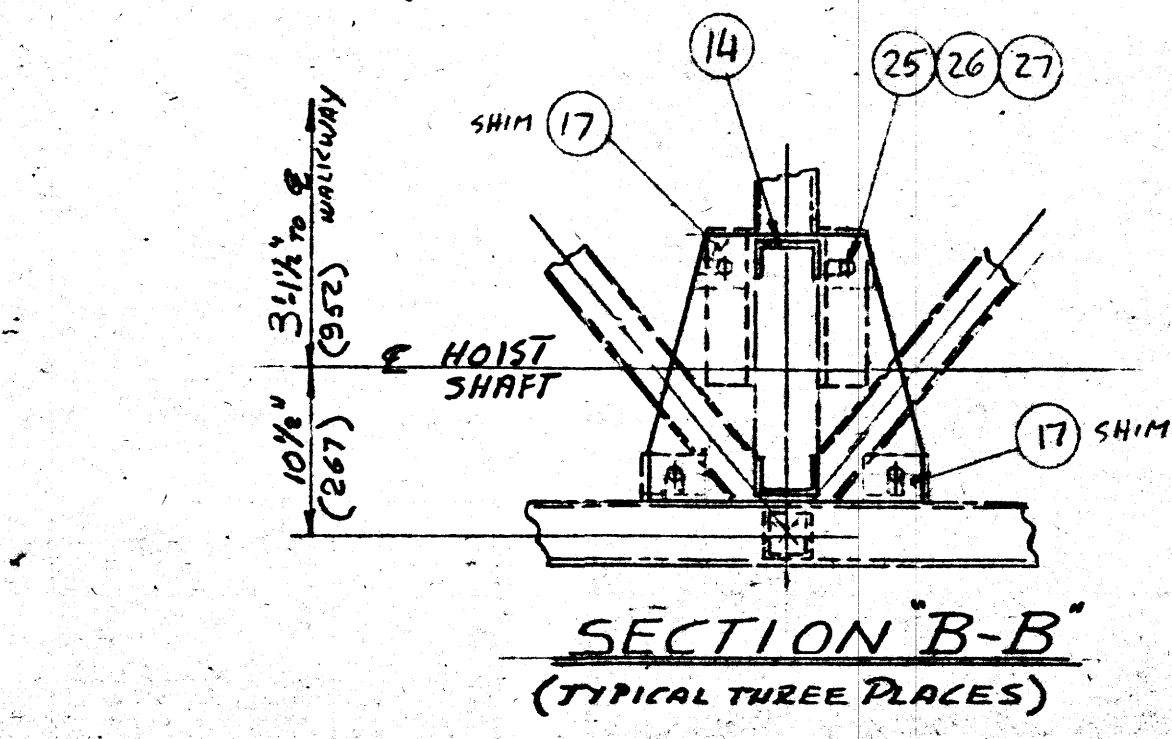
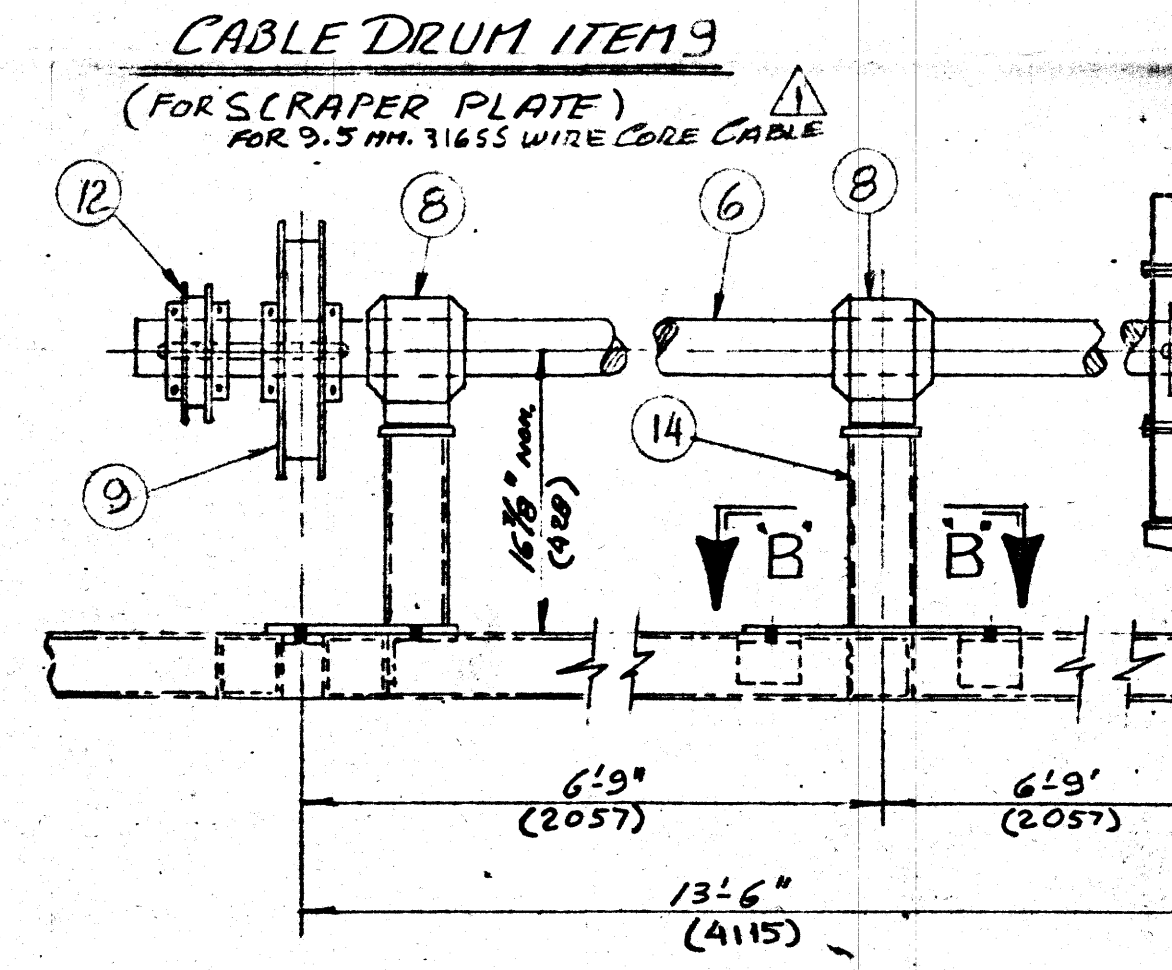
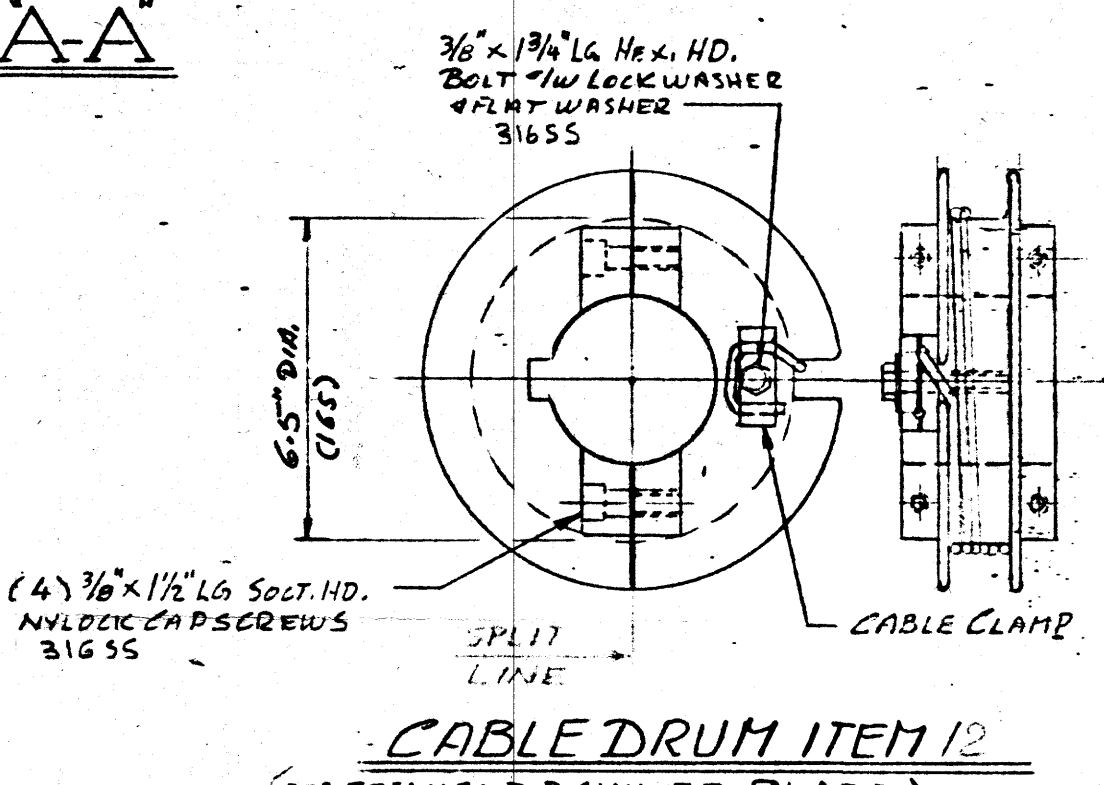
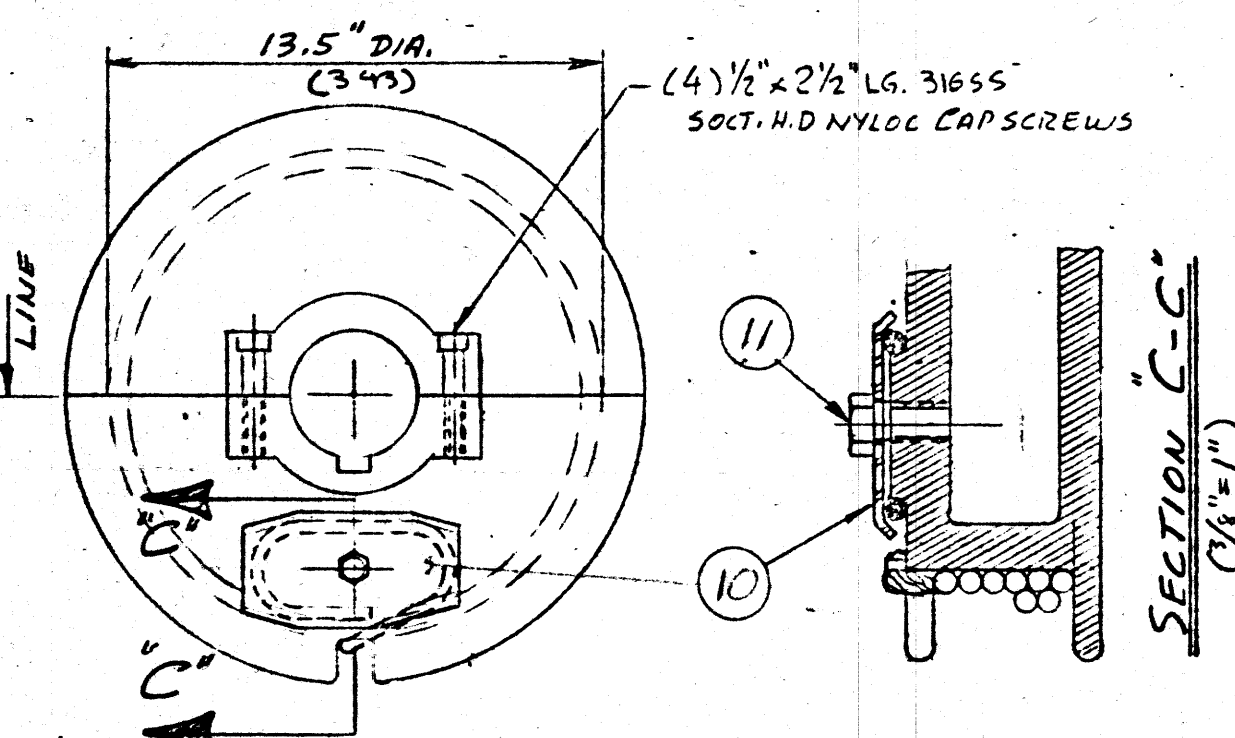
CUSTOMER: WINNIPEG SOUTH END W.P.C.C.
EQUIPMENT: PRIMARY CLARIFIER N° 3
CUST. NO. PW 3181 DORCAN NO. 11798-1
FOR: INFORMATION CONSTRUCTION APPROVAL CERTIFIED
DATE: Sept. 11/90 BY: [Signature]

DORCAN PART NO. 00053336

UNLESS OTHERWISE SPECIFIED ALL DECIMAL DIMENSIONS ARE ± .002" ALL FRACTIONAL DIMENSIONS ARE ± 1/32" METRIC MACHINING DIMENSIONS ARE ± 0.15 mm OTHER METRIC DIMENSIONS ARE ± 1.0 mm ANGLES ± .05 DEGREES THE DESIGNATION "MILD STEEL" OR "M.S." MEANS "A36" OR BETTER ALL WELDING TO BE IN ACCORDANCE WITH SPECIFICATIONS OF C.S.A. 515		THIS BOX FOR MFG. ENG. USE ONLY		PLOT SCALE		DORR-OLIVER CANADA LIMITED WINNIPEG, ONTARIO, CANADA	
DATE	REV.	DATE	REV.	SCALE	MADE FROM	REV.	
DRAWN BY: P.M.	DATE: 8/28/90	CHECKED: [Signature]	SCALE: 2:1	MADE FROM: L-28048 REF.	L-33200	0	



SECTION A-A

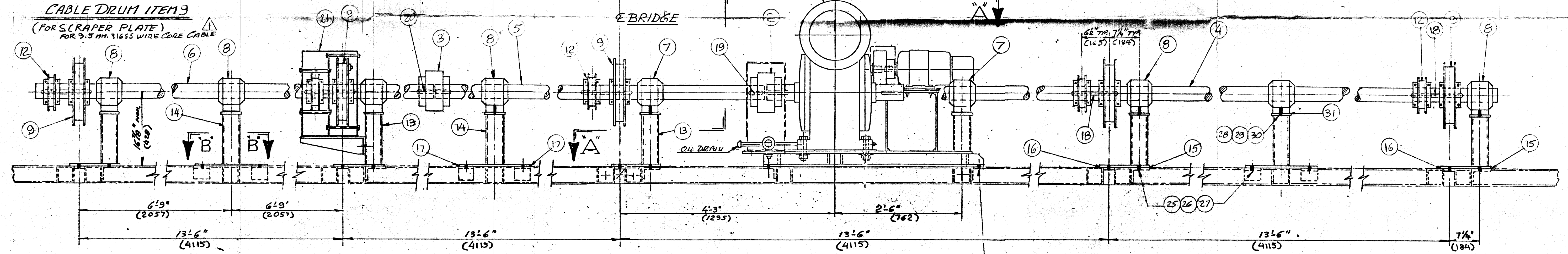


SECTION B-B
(TYPICAL THREE PLACES)

- NOTES:**
- 1- ALL PARTS WILL BE SHIPPED LOOSE FOR FIELD ASSEMBLY AND ERECTION BY OTHERS. SEE ERECTION MARKS
 - 2- ALL KEYS AND COUPLINGS TO BE FITTED IN FIELD.
 - 3- ALIGNMENT OF SHAFTS & BEARINGS MUST BE DONE WITH ALL DEADLOADS ON BRIDGE. EG: HOIST DRIVE COMPONENTS, BRIDGE DRIVE COMPONENTS, SKINNER AND SCRAPER ASSY, WALKWAY GRATING AND HANDRAIL. USE SHIMS ITEM 15, 16 & 17 AS REQ'D. SHIM SETS ARE SUPPLIED IN VARIOUS THICKNESS TO COMPENSATE FOR BRIDGE CAMBER. FINAL ADJUSTMENT TO BE MADE BY USING LAMINATED SHIMS ITEM 31 UNDER BEARINGS.
 - 4- AFTER FINAL ADJUSTMENT, BEARING SUPPORTS ITEMS 13 & 14 AND ALL BEARINGS TO BE DOWELLED USING DOWELS ITEM 32
 - 5- ALL BEARINGS AND COUPLINGS TO BE GREASED AT TIME OF ASSEMBLY.
 - 6- USE "LOCTITE" 242 (BLUE) ON ALL STAINL. STEEL FASTENERS (LOCTITE BY OTHERS)
 - 7- DIMENSION IN () ARE MILLIMETERS.
 - 8- FOR CABLE DRUM GUARD INSTALLATION SEE DWG. M-26307.

ITEM NO.	QTY	DESCRIPTION	MATL.	PART NO.	DRAWING NO.	QTY
53914	1	HOIST DRIVE SUB-ASSY.		53914	L-33098	1863
50788B	2	ZURN FLEX. RIGID COUPLING-20B	STL	50788B	A-38115	90
50789A	3	ZURN RIGID-RIGID COUPLING-20B	STL	50789A	A-38116	55
53882A	4	HOIST SHAFT-3 1/2" DIA. X 22'-4"	STAINL. STEEL	53882A	M-26875	701
53882B	5	HOIST SHAFT-3 1/2" DIA. X 13'-0"	"	53882B	"	407
53882C	6	HOIST SHAFT-3 1/2" DIA. X 17'-9"	"	53882C	"	557
28016	7	3PK SPHERICAL ROLLER BEARING -5MM2252013 1/4	-HELD-	28016	A-35190	106
28015	8	" -5MM2252013 1/4	-FLOAT-	28015	A-35189	370
50797	9	CABLE DRUM (3/8" DIA. CABLE)	ALUM. BRASS	50797	L-20359	445
50800	10	CABLE LOCKING PLATE	304SS	50800	A-24095A	5
128B	11	1/2" X 1 1/4" LG. HEX. HD. BOLT	316SS	128B		1
53660	12	CABLE DRUM (1/2" DIA. CABLE)	ALUM. BRASS	53660	M-26871	45
53177	13	HOIST BRG. SUPPORT (PANEL POINT)	"	53177	M-26809	91
53178	14	HOIST BRG. SUPPORT (INTERM.)	"	53178	M-26810	67
53920	15	SHIM (UNDER BRG. SUPP. AT CABLE DRUM)	ALUM. BRASS	53920	S-28469	35
53977	16	SHIM (" " ")	"	53977	S-28470	14
53919	17	SHIM (UNDER INTERM. BRG. SUPPORT)	"	53919	A-38243	14
53888	18	7/8" SQ. X 1 1/4" LG. KEY - R.B.E.	COLD STEEL	53888		12
53065	19	7/8" SQ. X 3 1/2" LG. KEY - R.B.E.	"	53065		1.5
53889	20	7/8" SQ. X 7" LG. KEY - R.B.E.	"	53889		1.5
53918	21	CABLE DRUM GUARD ASSY.	ALUM.	53918	M-26307	160
1232	22	3/4" X 2 1/2" LG. HEX. HD. MACH. BOLT	316SS	1232		4
3161	23	3/4" HEX. NUTS	316SS	3161		
1197	24	12 3/4" FLAT WASHER	316SS	1197		
1262	25	5/8" X 2 1/2" LG. HEX. HD. MACH. BOLT	316SS	1262		14
1382	26	5/8" HEX. NUTS	316SS	1382		
2383	27	5/8" FLAT WASHER	316SS	2383		
10648	28	7/8" X 3 1/2" LG. HEX. HD. MACH. BOLTS	316SS	10648		21
3162	29	7/8" HEX. NUTS	316SS	3162		
12536	30	7/8" FLAT WASHER	316SS	12536		
28022B	31	SHIM (BRG. TO SUPPORT)	LAMIN. BRASS	28022B	S-25481	22
53890	32	1/4" DIA. X 2" LG. SPRING DOWEL PINS	STAINL. STEEL	53890	A-38224	1

EST. TOTAL WT: 5109 LBS.
(2317 kg.)



ELEVATION
LOOKING EAST

APEM Temporary Licence #108-90 exp. date July 9/91

PROFESSIONAL ENGINEER
16 MARTHENSON
WINNIPEG, MANITOBA, CANADA

DORCAN PART NO. 00053915

WINNIPEG SOUTH PLANT

DATE	NO.	REVISION	E.C.R.	BY
30/07/95	1	ISSUING OF S.K.P. BILLS CHANGED TO I.E.S.P. ADDED TO ITEM 8	5191	EJR

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONAL DIMENSIONS ARE IN INCHES
ALL FRACTIONAL DIMENSIONS ARE IN 16THS
METRIC MACHINING DIMENSIONS ARE ± 0.13 mm
OTHER METRIC DIMENSIONS ARE ± 1.0 mm
ANGLE ±
CONCENTRIC ±
THE DESIGNATION "MILD STEEL" OR M.S. MEANS ASTM A-36 OR BETTER
ALL WELDING TO BE IN ACCORDANCE WITH SPECIFICATIONS OF C.S.A. W58

THIS BOX FOR MFG. ENG. USE ONLY
PLOT SCALE
ISSUE

THE DRAWING CONTAINS PROPRIETARY INFORMATION OF DORCAN-OLIVER CANADA LIMITED AND IS NOT TO BE DISCLOSED NOR TO BE USED EXCEPT FOR INSTALLATION, OPERATING OR MAINTENANCE OF DORCAN-OLIVER CANADA LIMITED EQUIPMENT, UNLESS OTHERWISE AUTHORIZED IN WRITING BY DORCAN-OLIVER CANADA LIMITED.

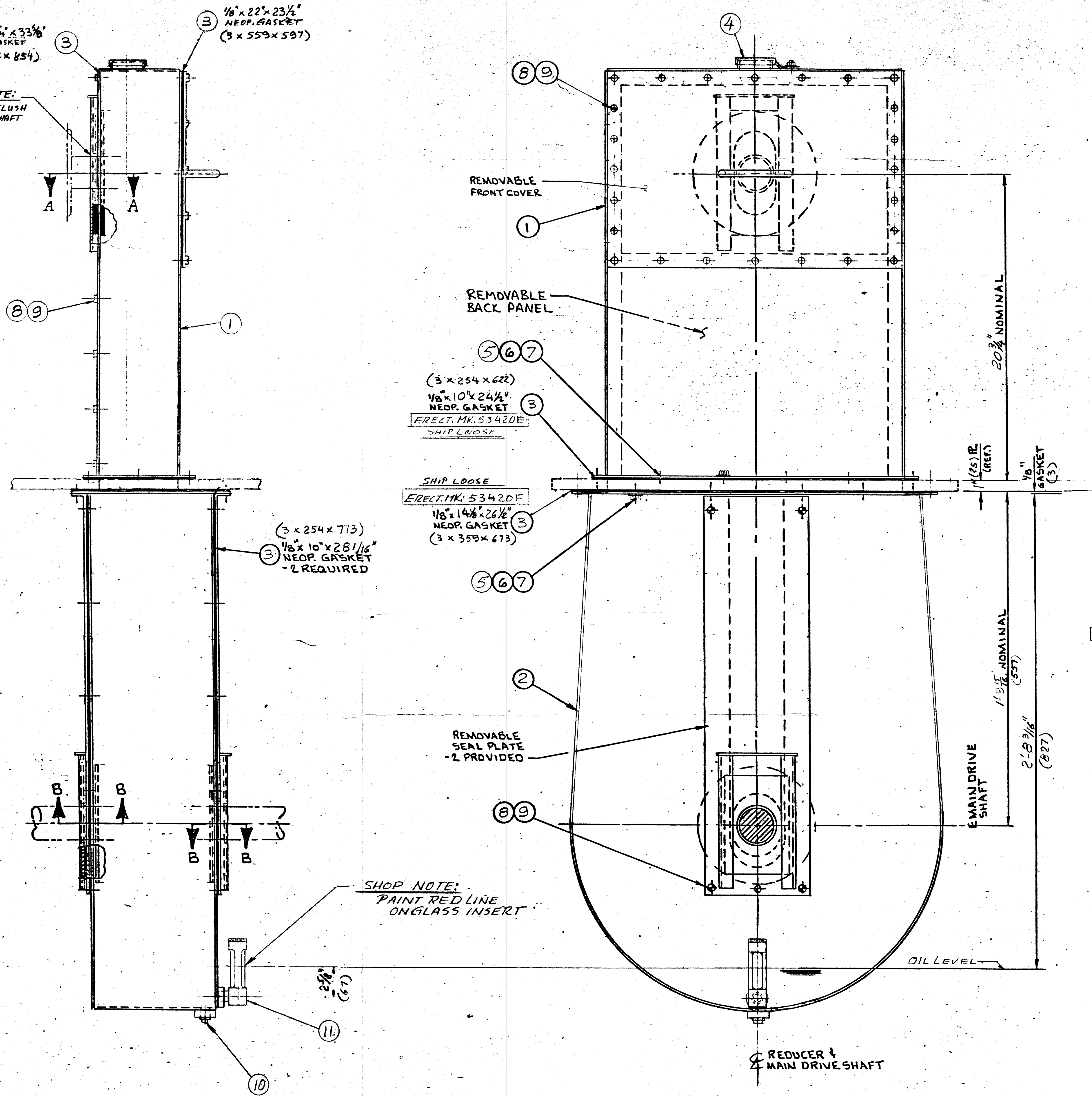
DORCAN-OLIVER CANADA LIMITED
ORILLIA, ONTARIO, CANADA

HOIST DRIVE ASSEMBLY & ERECTION
WINNIPEG SOUTH PLANT
SCALE 1"=12" MADE FROM L-33099

1/8" x 2 1/4" x 3 3/8"
NEOP. GASKET
(3 x 552 x 854)

1/8" x 22" x 23 1/2"
NEOP. GASKET
(3 x 559 x 597)

SHOP NOTE:
GRIND KEY FLUSH
IN AREA OF SHAFT
SEAL.



(3 x 254 x 622)
1/8" x 10" x 24 1/2"
NEOP. GASKET
ERECT. MK. 53420E
SHIP LOOSE

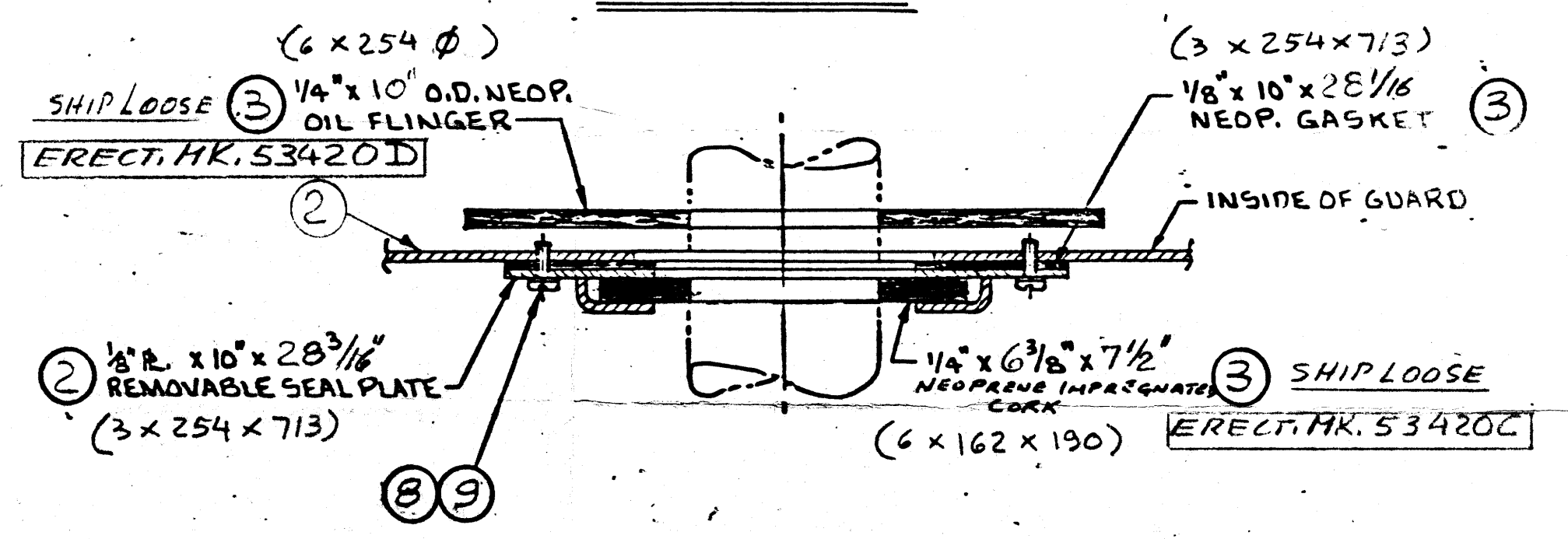
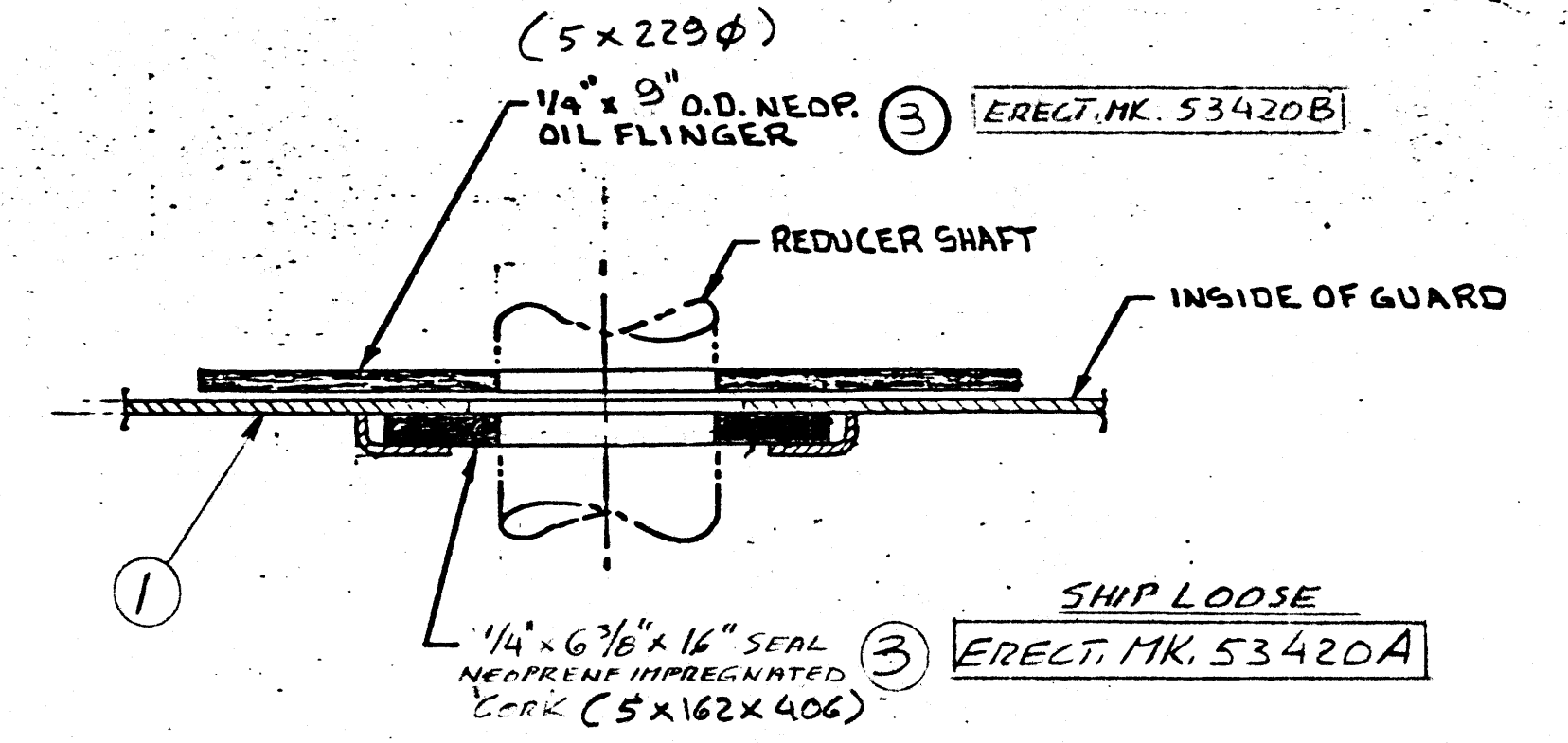
SHIP LOOSE
ERECT. MK. 53420F
1/8" x 14 1/8" x 26 1/2"
NEOP. GASKET
(3 x 359 x 673)

(3 x 254 x 713)
1/8" x 10" x 28 1/16"
NEOP. GASKET
- 2 REQUIRED

SHOP NOTE:
PAINT RED LINE
ON GLASS INSERT

ERECT. MARK'S	ITEM	QTY	DESCRIPTION	MATL.	PART NO.	DRAWING NO.	WT.
53418	1	1	CHAIN GUARD - UPPER SECTION	ALUM.	53418	L-33003	55
53419	2	1	CHAIN GUARD - LOWER SECTION	ALUM.	53419	L-33004	41
53420	3	1	SET GASKET, SEALS & FLINGERS	NEOP.	53420	L-33005	5
	4	1	INSPECTION HOLE COVER	NEOP.	21223	27207/B	
1200B	5	32	5/16" NC x 3/4" LG. H. H. MACH. BOLTS	316SS	1200B		
13B1	6	32	5/16" LOCK WASHER	316SS	13B1		
7315	7	32	5/16" FLAT WASHER	316SS	7315		
	8	81	#8-32 x 1/2" LG. PAN HD. H. SCREW	316SS	29057		
	9	81	#8- LOCK WASHER	316SS	29058		
	10	1	7/8" - 18 NPT. SQ. HD. PIPE PLUG	316SS	11709		
53552	11	1	7/8" - 6 ITS OIL GAUGE - # FG 15221	ANOD. ALUM.	53552		

EST. TOTAL WT. INCL. HARDWARE IS 83 LBS



- NOTES:
- CHAIN GUARD TO BE FULLY SHOP ASSEMBLED PER THIS DRAWING. REFER TO DRIVE ASSEMBLY DWG. L-33033 FOR LOCATION.
 - ALL GASKETS TO BE CEMENTED TO GUARDS AT ASSY, EXCEPT AS NOTE.
 - FLINGERS, SHAFT SEALS AND ITEMS 5, 6, 7 & 11 TO BE BOXED SEPARATELY AND SHIPPED WITH GUARD FOR FIELD INSTALLATION.

DORR-OLIVER CANADA

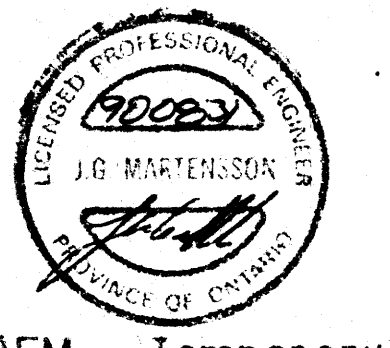
CUSTOMER: MAMMOET TANKS AND U.S. P. C. S.
EQUIPMENT: BRIDGE DRIVE, NO. 3
CUST. NO. 3181, DORCAN NO. 11794-1
DATE: 9/9/92 BY: [Signature]

APEM Temporary Licence #108-50 exp. date July 9/91

DORCAN PART NO. 00053551

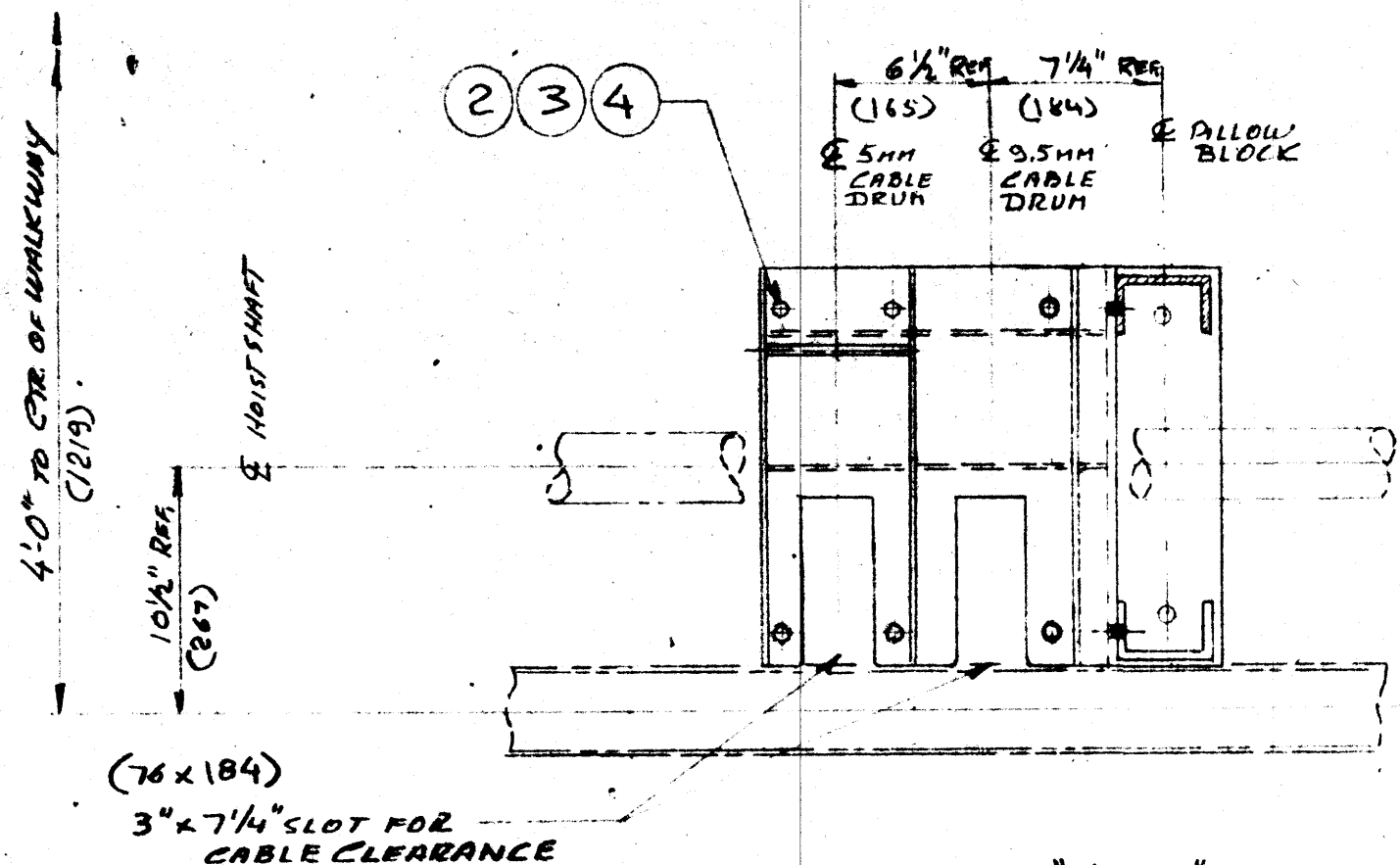
APEM Temporary Licence #108-92 exp. date July 9/91

UNLESS OTHERWISE SPECIFIED ALL DECIMAL DIMENSIONS ARE ± .005" ALL FRACTIONAL DIMENSIONS ARE ± 1/32" METRIC MACHINING DIMENSIONS ARE ± 0.15 mm OTHER METRIC DIMENSIONS ARE ± 1.0 mm		THIS BOX FOR MFG. ENG. USE ONLY		PLOT SCALE		ISSUE		DATE		NO.		REVISION		E.C.R.		BY		SCALE		MADE FROM L-31027		L-33006	
ANGLE ±		CONCENTRIC ±		THE DESIGNATION "MILD STEEL" OR M.S. MEANS A.S.T.M. A-36 OR BETTER		ALL WELDING TO BE IN ACCORDANCE WITH SPECIFICATIONS OF C.S.A. W88		DATE		NO.		REVISION		E.C.R.		BY		SCALE		MADE FROM L-31027		L-33006	

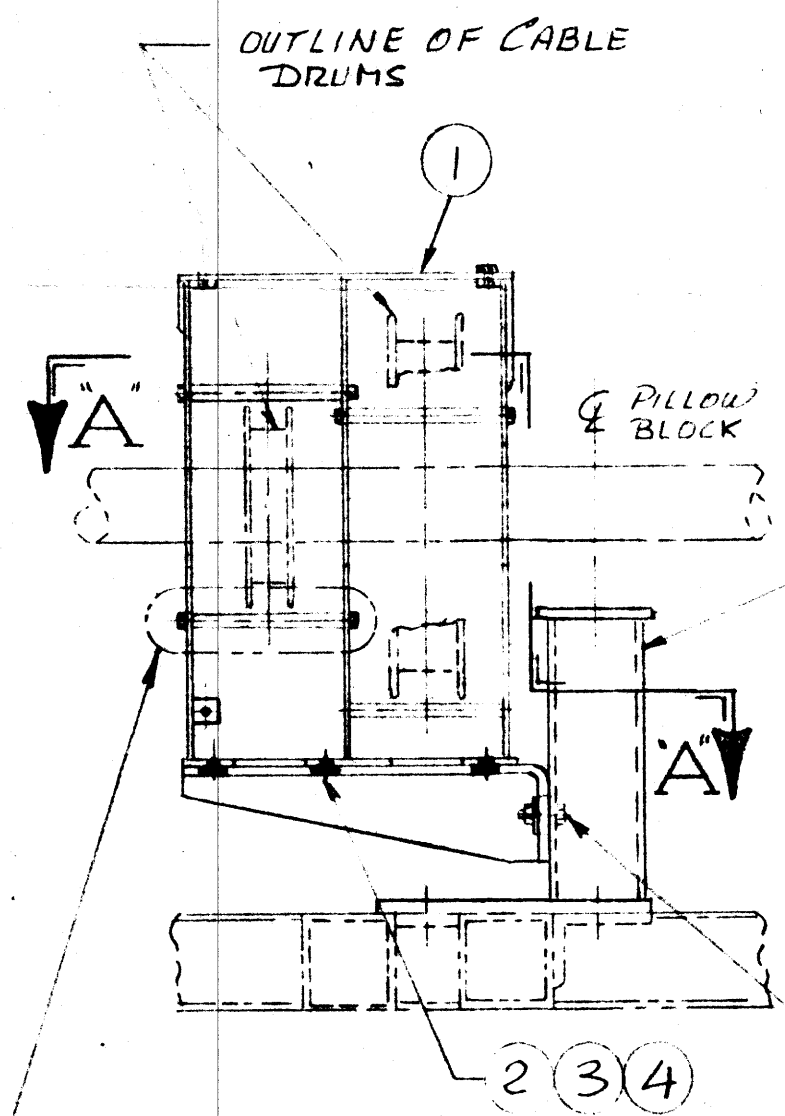
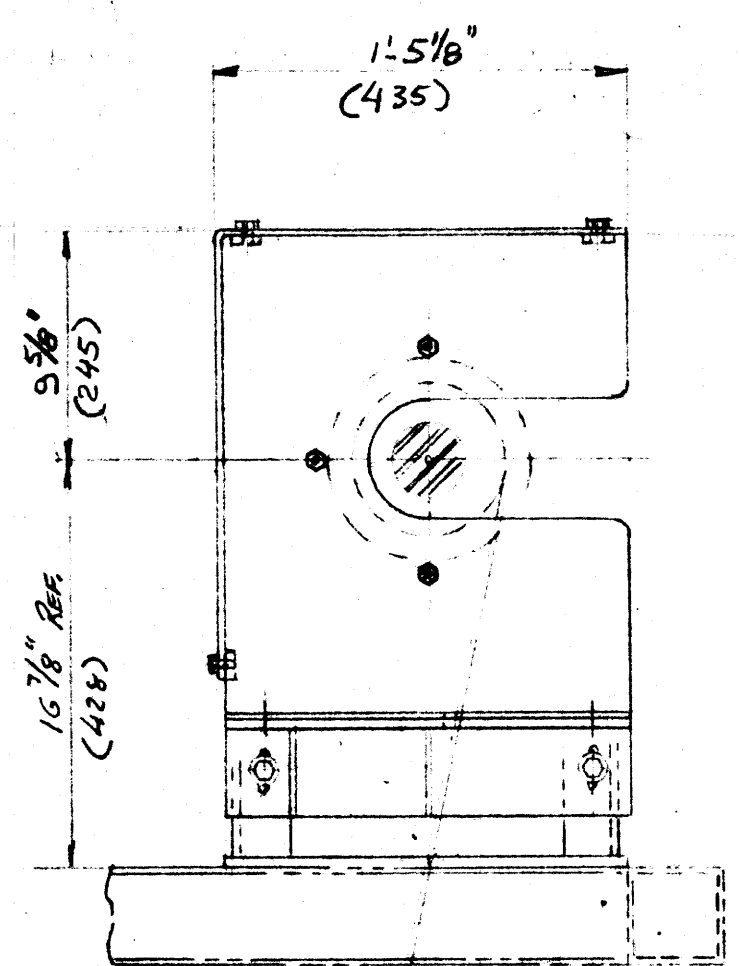


CHAIN GUARD ASSY. - OIL TIGHT

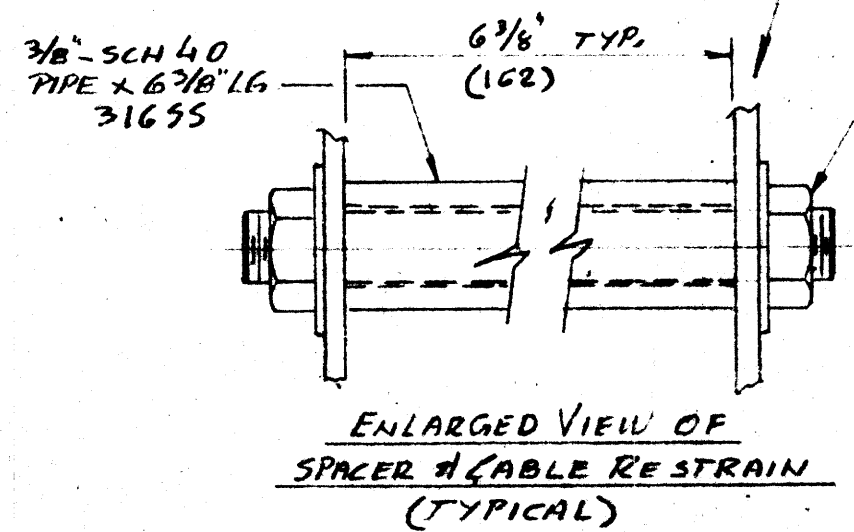
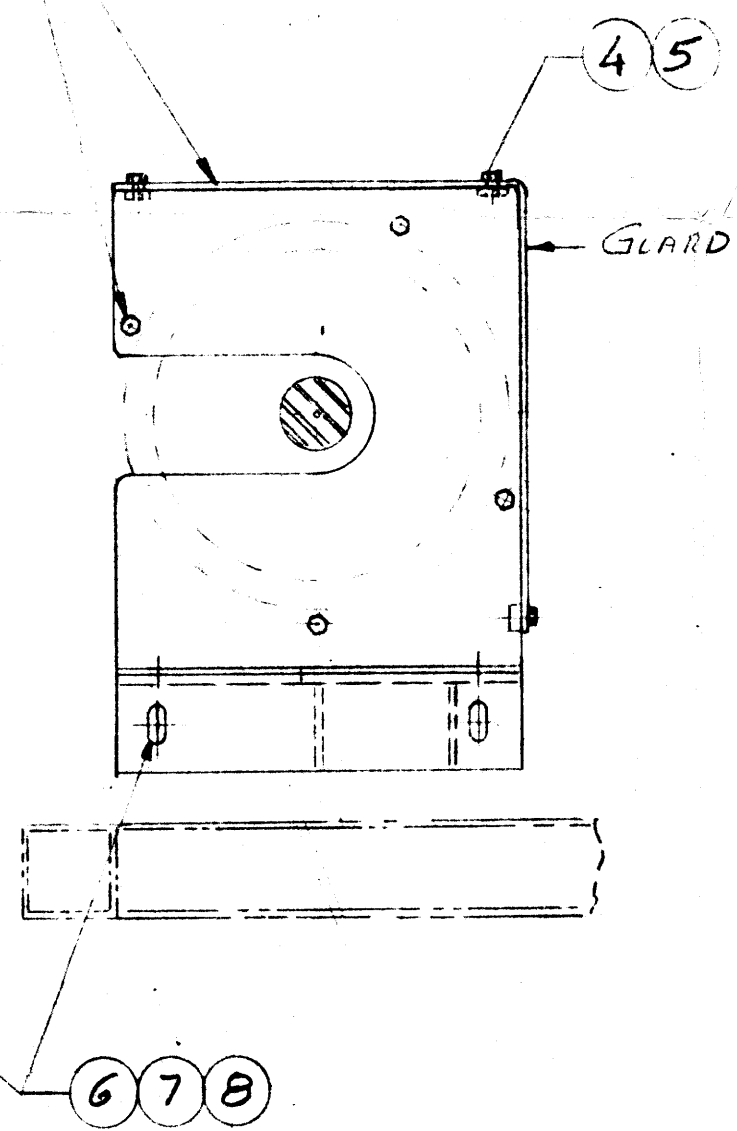
BRIDGE DRIVE



SECTION "A-A"



REMOVE GUARD COVER AND THIS SPACER TO INSTALL GUARD. (SEE NOTE 1)



NOTES:

- 1- TO INSTALL GUARD REMOVE GUARD COVER AND ONE PIPE SPACER AS INDICATED.
- 2- SLIDE GUARD OVER CABLE DRUMS AND FASTEN TO BRG. SUPPORT ITEM 9 (REF. DWG. L-33099) USING TWO BOLTS ITEMS 6, 7 & 8
- 3- ALIGN GUARD, SO THAT PIPE SPACERS ARE EQUAL DISTANCE FROM O.D. OF CABLE DRUMS. PIPE SPACERS NOT TO TOUCH CABLE DRUMS. TIGHTEN 1/2" BOLTS ITEM 6 & BOLTS ITEM 2.
- 4- RE-INSTALL PIPE SPACER & GUARD COVER
- 5- REFERENCE DWG. L-33099-HOIST DRIVE ERECTION.
- 6- DIMENSIONS IN () ARE MILLIMETER



APEM Temporary Licence #108-90 exp. date July 9/91

DORR-OLIVER CANADA

CUSTOMER: WINNIPEG SOUTH END W.P. CO.

EQUIPMENT: 1- PRIMARY CLARIFIER #3

CUST. NO. 211 621 DORCAN NO. 11798-1

FOR: INFORMATION PRELIMINARY FINAL

CONSTRUCTION APPROVAL

DATE: 10/20/95 BY: [Signature]

DORCAN PART NO. 00053910

UNLESS OTHERWISE SPECIFIED ALL DECIMAL DIMENSIONS ARE ± .005" ALL FRACTIONAL DIMENSIONS ARE ± 1/32" METRIC MACHINING DIMENSIONS ARE ± 0.15 mm OTHER METRIC DIMENSIONS ARE ± 1.0 mm ANGLE ± CONCENTRIC ± THE DESIGNATION "MILD STEEL" OR M.S. MEANS A.S.T.M. A-36 OR BETTER ALL WELDING TO BE IN ACCORDANCE WITH SPECIFICATIONS OF C.S.A. W59		THIS BOX FOR MFG. ENG. USE ONLY		THIS DRAWING CONTAINS CONFIDENTIAL PROPRIETARY INFORMATION OF DORR-OLIVER CANADA LIMITED AND IS NOT TO BE DISCLOSED NOR TO BE USED EXCEPT FOR EVALUATING PROPOSALS OF DORR-OLIVER CANADA LIMITED OR INSTALLING, OPERATING OR MAINTAINING DORR-OLIVER CANADA LIMITED EQUIPMENT. USE OR REPRODUCTION IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF DORR-OLIVER CANADA LIMITED. COPYRIGHT © 1995 DORR-OLIVER CANADA LIMITED	
DATE	NO.	REVISION	E. C. R.	BY	PLOT SCALE ISSUE DORR-OLIVER CANADA ORILLA, ONTARIO, CANADA LIMITED CABLE DRUM GUARD INSTALLATION
DRAWN BY E. J. R.		DATE Jul 18/90	CHK'D P.M.	BY	
SCALE 1 1/2" = 12"				MADE FROM M-26307	
					REV. 0

	ITEM	QTY	DESCRIPTION	MATL	PART NO.	DRAWING NO.	WT.
	1	1	CABLE DRUM GUARD	ALUM.	53881	L-33067	32
REF	2	6	5/16" x 1" LG. HEX. HD. CAP SCREWS	316SS	12253		
REF	3	6	5/16" HEX. NUTS	316SS	3157		
REF	4	18	5/16" FLAT WASHER	316SS	52380	A-38045	
REF	5	6	5/16" x 3/4" LG. HEX. HD. CAP SCREW	316SS	12008		
REF	6	2	1/2" x 1 1/4" LG. HEX. HD. MACH. BOLT	316SS	1288		
REF	7	2	1/2" HEX. NUT	316SS	3158		
REF	8	2	1/2" FLAT WASHER	316SS	12926		
	9	REF	BEARING SUPPORT	ALUM.	53177		

MAT. QTY. GROUP	ITEM	QTY	DESCRIPTION	MATL	PART NO.	DRAWING NO.	WT.
	1	1 REF.	SCRAPER BRIDGE	ALUM. 6061 T6	52384	L-32931	3731
	2	1 REF.	END TRUCK - SOUTH END	"	50795	L-32933	474
	3	1 REF.	END TRUCK - NORTH END	"	50795	L-32933	474
	4	48	5/8" NC x 2 3/4" H.H. BOLT + H.N. + 2 F.W. EA.	316 SS	1249, 1282, 3143	-	-
	5	4	# 8 x 2" TAPERED DOWEL PIN	"	27660	-	-
	6	2	24" DIA. FLANGED WHEEL (FLAME HARDENED)	DUCTILE IRON 100-70-03	52021AA	M-26743	520
	7	2	24" DIA. FLAT WHEEL (FLAME HARDENED)	"	52644AA	M-26745	590
	8	4	AXLE (PRESSED INTO 24" WHEELS)	HR STEEL C1018 F20	25395	M-24164	268
	9	6	SKF P.B. BRG. SNH 22520/3 1/16 TGA-Y	FLOATING C/W COVER	28019	A-35191	316
	10	4	" " " SNH 22520/3 1/16 TGA-Y	FIXED C/W COVER	27661	A-35327	211
	11	2	" " " SNH 22520/3 1/16 TGA	FIXED	28016	A-35190	105
	12	2	COG WHEEL SHAFT 3 7/16"	H.S.D.F. PREC. GROUND	25396	M-24165	89
	13	2	COG WHEEL - 545.75 (21.486") P.D.	ST'L.	50808B	M-26812	195
	14	36 REF.	DRIVE PIN	C-1045	50802	S-28334	54
	15	36 REF.	COTTER PIN 3/16" x 1 1/2"	316 SS	23948	-	2
	16	36 REF.	1" TYPE 'B' PLAIN WASHER 2 1/2" O.D.	"	14910	-	2
	17	36 REF.	DRIVE ROLLER (C/W U.H.M.W. POLYETH. BRG.)	H.S.D.F. PREC. GROUND	50807	S-28335	36
	18	2 REF.	KEY 7/8" SQ. X 5 3/4" ROUND 2 ENDS	CRS.	25401	-	-
	19	4 REF.	1/2" - 13 NC x 3/4" HEX. SET SCR.	ST'L.	4237	-	-
	20	8	7/8" NC. X 4 1/2" H.H. BOLT + H.N. + 2 F.W. EA.	316 SS	1214, 3162, 28029	-	-
	21	16	7/8" NC. X 5" H.H. BOLT + H.N. + 2 F.W. EA.	"	27662, 3162, 28029	-	-
	22	2 REF.	KEY 7/8" SQ. X 4" ROUND 2 ENDS	CRS.	25402	-	-

ABBREVIATIONS OF MATERIAL:
H.S.D.F. = HIGH STRENGTH, DISTORTION FREE - C1045
 PRECISION GROUND SHAFTING - 100,000 P.S.I. TENSILE STRENGTH
C.R.S. = COLD FINISHED C-1020 STEEL
U.H.M.W. = ULTRAHIGH MOLECULAR WEIGHT POLYETHYLENE

NOTE: Δ - EXPANSION END OF BRIDGE SHOWN (SOUTH SIDE).
 NON-EXPANSION END OF BRIDGE (NORTH SIDE) TYP. BUT WITH FLANGED WHEELS

- ASSEMBLE COMPONENTS AS SHOWN MAKING SURE WHEEL DISTANCES ARE THE SAME ON ALL SHAFTS. WHEEL SHAFTS MUST BE PARALLEL AND TRUCKS MUST BE 90° TO BRIDGE \perp TO INSURE PARALLEL RUNNING OF BRIDGE.
- ALL BEARINGS MUST BE FILLED WITH GREASE AS RECOMMENDED BY BEARING MANUFACTURER.
- USE LOCKTITE N° 242 BLUE ON ALL STAINLESS STEEL THREADS.
- DIMENSIONS IN () ARE MILLIMETERS.

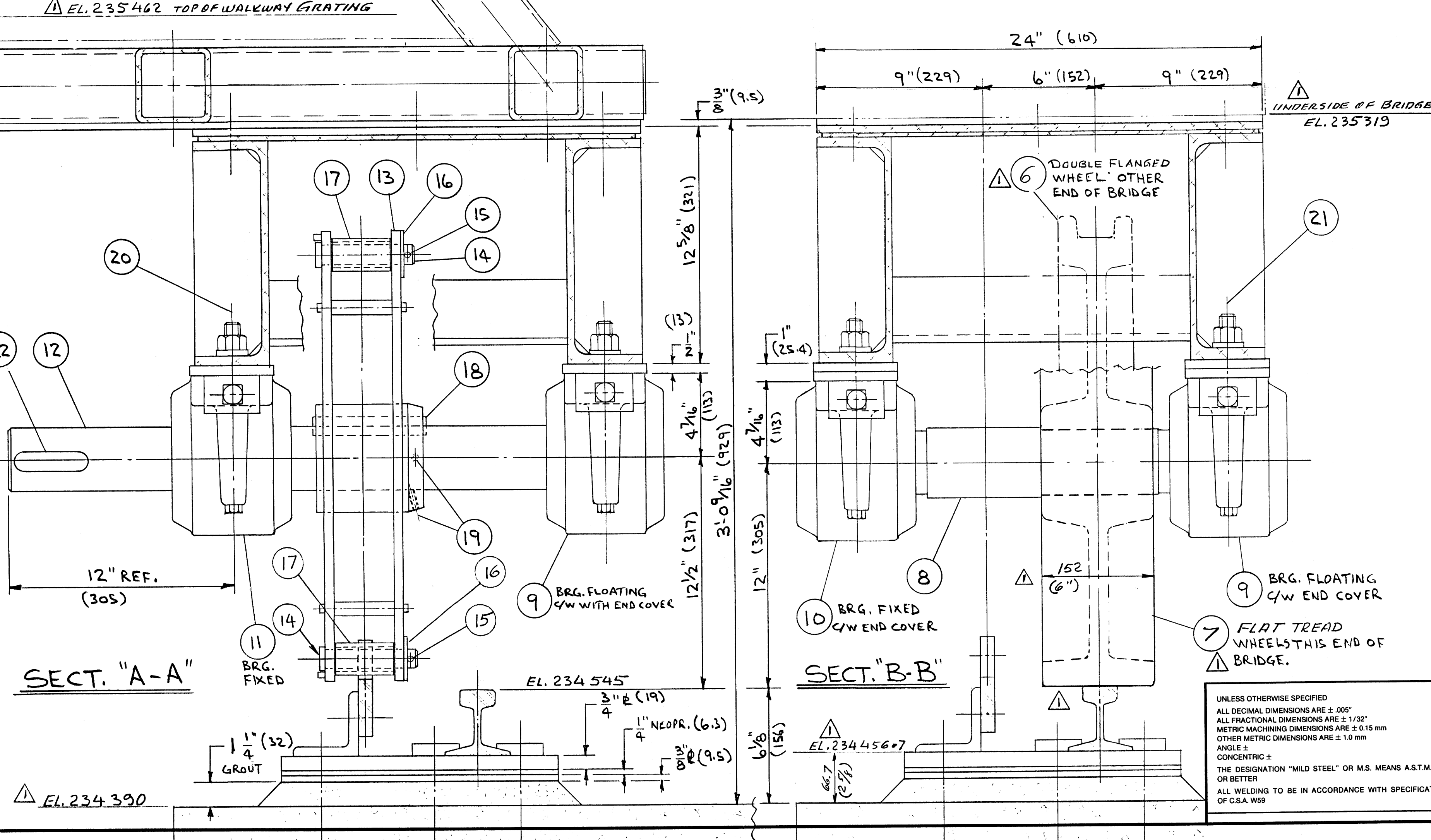
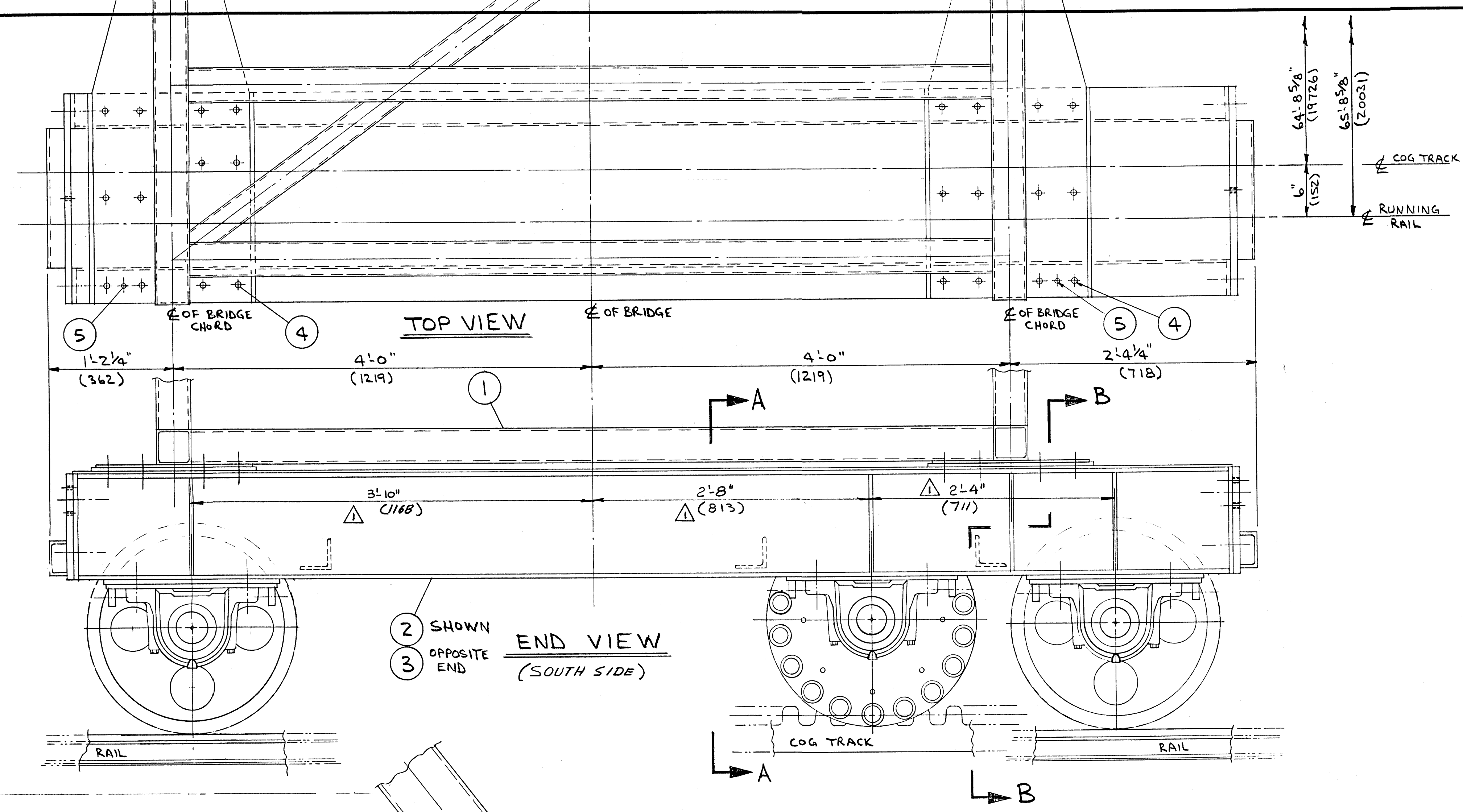
Δ REFER TO ANCHOR BOLT & RAIL SETTING PLAN DWG. L-32983



APEM Temporary Licence #108-90
 exp. date July 9/91

DORR-OLIVER CANADA	
CUSTOMER: WINNIPEG SOUTH END W.P.C.C.	
EQUIPMENT: PRIMARY CLARIFIER N° 3	
CUST. NO. P.W. #3181	DORCAN NO. 11798-1
FOR: INFORMATION <input type="checkbox"/> PRELIMINARY <input type="checkbox"/> FINAL <input checked="" type="checkbox"/>	CONSTRUCTION <input type="checkbox"/> APPROVAL <input type="checkbox"/>
DATE: 30/06/91	BY: [Signature]

DORCAN PART NO. 00053710



UNLESS OTHERWISE SPECIFIED ALL DECIMAL DIMENSIONS ARE $\pm .005"$ ALL FRACTIONAL DIMENSIONS ARE $\pm 1/32"$ METRIC MACHINING DIMENSIONS ARE ± 0.15 mm OTHER METRIC DIMENSIONS ARE ± 1.0 mm ANGLE \pm CONCENTRIC \pm THE DESIGNATION "MILD STEEL" OR M.S. MEANS A.S.T.M. A-36 OR BETTER ALL WELDING TO BE IN ACCORDANCE WITH SPECIFICATIONS OF C.S.A. W59		THIS BOX FOR MFG. ENG. USE ONLY		THIS DRAWING CONTAINS CONFIDENTIAL PROPRIETARY INFORMATION OF DORR-OLIVER CANADA LIMITED AND IS NOT TO BE DISCLOSED NOR TO BE USED EXCEPT FOR EVALUATING PROPOSALS OF DORR-OLIVER CANADA LIMITED OR INSTALLING, OPERATING OR MAINTAINING DORR-OLIVER CANADA LIMITED EQUIPMENT UNLESS OTHERWISE AUTHORIZED IN WRITING BY DORR-OLIVER CANADA LIMITED	
DATE: Aug 23/90	NO. 1	REVISION	DATE: 9/07/12	BY: P.M.	DATE: 9/07/12
NON-EXPANSION END OF BRIDGE SHOWN SOUTH TO NORTH END. ELEVATIONS & NOTES ADDED			574	5/12	BRIDGE ASS'Y. - PRIMARY CLARIFIER
WINNIPEG (11798-1)			SCALE: 1 1/2" = 1'-0" MADE FROM L-31031 & L-32652 REF. L-33105		

FALK

a good name in industry
THE FALK CORPORATION
MILWAUKEE

Controlled Torque Coupling with Straight Bore or Taper and C'Bore SIZES 1030 thru 1140

STEELEX COUPLINGS

Tapered Grid

Type T41-2

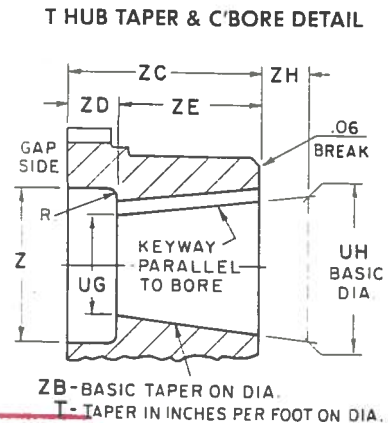
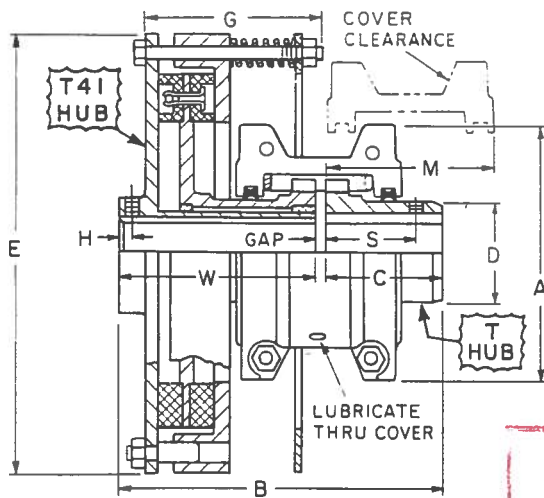
Subject to change without notice

425-412B

DIMENSIONS

June 1986

Supersedes 425-412A



**CERTIFIED
RECORD PRINT**

SIGNED *BH*

PURCHASER

TO SLIP AT..... POUND-INCHES

SIZE T41-2 ★	Allow. Speed rpm	Min T & T41 Bore▲	Maximum Bore			Slip Torque Range lb-in.	Cplg Wt♦ With No Bore—lb	Lube Wt lb	DIMENSIONS—INCHES											
			T41 Hub		T Hub				A	B	C	D	E	G	H	M±	S	W	GAP	
			Sq Key*	Rect Key	Sq Key*															
1030T	3600	.500	1.250	1.375	1.375	50-140	18.0	.07	4.30	5.12	1.88	1.94	7.94	2.74	.22	2.00	1.54	3.12	.125	
1040T	3600	.500	1.375	1.625	1.625	60-230	24.9	.12	4.62	5.24	2.00	2.24	9.12	3.24	.22	2.50	1.58	3.12	.125	
1050T	3600	.500	1.750	1.875	1.875	90-370	35.2	.15	5.44	5.94	2.38	2.62	10.64	3.50	.22	2.50	1.76	3.11	.125	
1060T	3600	.750	1.875	2.125	2.125	100-650	46.9	.19	5.94	6.42	2.50	3.00	11.86	3.50	.32	3.00	2.06	3.80	.125	
1070T	3600	.750	2.250	2.500	2.500	120-960	60.2	.25	6.38	7.20	3.00	3.44	12.74	4.00	.32	3.26	2.12	4.08	.125	
1080T	2800	1.062	2.625	3.000	3.000	390-1,700	88.9	.38	7.62	8.12	3.50	4.12	14.24	4.00	.32	3.62	2.54	4.50	.125	
1090T	2500	1.062	3.125	3.500	3.500	660-2,800	133	.56	8.38	9.06	3.88	4.88	16.28	5.00	.32	4.30	2.80	5.06	.125	
1100T	2100	1.625	3.625	4.000	4.000	1,200-5,100	202	.94	9.88	10.60	4.75	5.60	19.34	5.50	...	5.80	...	5.66	.188	
1110T	1850	1.625	4.000	4.500	4.500	1,800-7,600	267	1.1	10.62	11.35	5.00	6.32	21.38	6.00	...	6.00	...	6.16	.188	
1120T	1750	2.375	4.500	5.000	5.000	2,600-11,400	383	1.6	12.12	13.43	5.88	7.06	23.24	7.00	...	7.00	...	7.30	.250	
1130T	1450	2.625	5.250	6.000	6.000	3,800-16,000	548	2.0	13.62	14.21	6.38	8.56	26.92	7.50	...	7.30	...	7.58	.250	
1140T	1300	2.625	6.500	7.250*	7.250*	5,400-23,000	793	2.5	15.12	15.32	7.25	10.00	30.18	8.00	...	8.40	...	7.82	.250	

★ To permit air circulation for cooling, use only expanded metal coupling guards. Unless otherwise specified, Sizes 1030 thru 1090 will be furnished for CLEARANCE FIT with set screw over keyway and Sizes 1100 and larger will be furnished for INTERFERENCE FIT without set screw.

* Except as noted with (●) symbol, maximum bores are for hubs with keyways for AGMA square keys in smaller hub sizes and AGMA rectangular keys in the larger sizes marked with (★) symbol.

▲ Minimum bore is smallest bore to which a stock hub can be bored.

● This symbol indicates that a hub with maximum bore requires a special rectangular key by purchaser.

♦ Weights are for couplings with Dimension C and W length hubs.

‡ To remove cover without disturbing torque setting, allow M clearance.

Dimensions are for reference only and are subject to change without notice unless certified.

SIZE & TYPE	STRAIGHT BORED T41 HUB					STRAIGHT (OR TAPER) BORED T HUB (Cont'd Below)					
	Bore	Keyway	Overhang	Fitted To	Fitted By	Bore	Keyway	Overhang	Fitted To	Fitted By	
1040T41-2	1.125 ^{+0.002/-0}	1/4 x 1/8			PURCH	1.500 ^{+0.002/-0}	3/8 x 3/16			PURCH	
TAPER BORED HUB (Cont'd)	B	R	T	Z	UG	UH	ZB	ZC	ZD	ZE	ZH

PRELIMINARY CERTIFIED PRINT OF FALK COUPLING FOR **GROUP LAPIERRIERE & VERBEAULT**..... CO.

DRAWN	<i>BH</i>	DATE	<i>12/6/90</i>
CHECKED		NO. REQ'D.	<i>1</i>
DRAWING NO.	<i>425-412B</i>	FOR UNIT ON M.O.	
		P.O.	<i>24416</i>
		COUPLING M.O.	<i>90-02305</i>

Spring Adjustment Charts For Standard Slip Torques

SIZES 20 and 30, Page 1
SIZES 40 and 50, Page 2

STEELEX COUPLINGS

Tapered Grid
Type T41

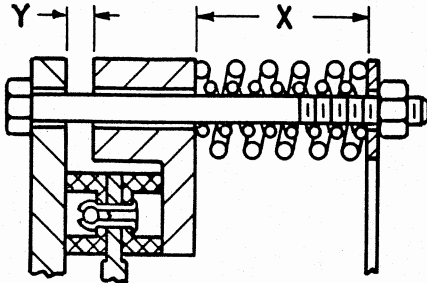
Subject to change without notice

428-414

SERVICE MANUAL
November 1977

NEW

DIMENSIONS X and Y



INSTRUCTIONS

Refer to Service Manual 428-410 for complete installation instructions. Refer to the coupling cover for the coupling size. Prepare the controlled torque assembly for operation as follows:

1. Set Distance X for all springs to the value indicated by the triangle (▲) in the applicable chart.
2. Break in the friction segments as instructed in Manual 428-410.
3. Determine Distance X for the required slip torque.
4. Tighten each adjusting nut approximately two turns in sequence until Distance X is reached.
5. Do NOT set Distance X to less than the minimum value indicated by the diamond (◆).

IMPORTANT

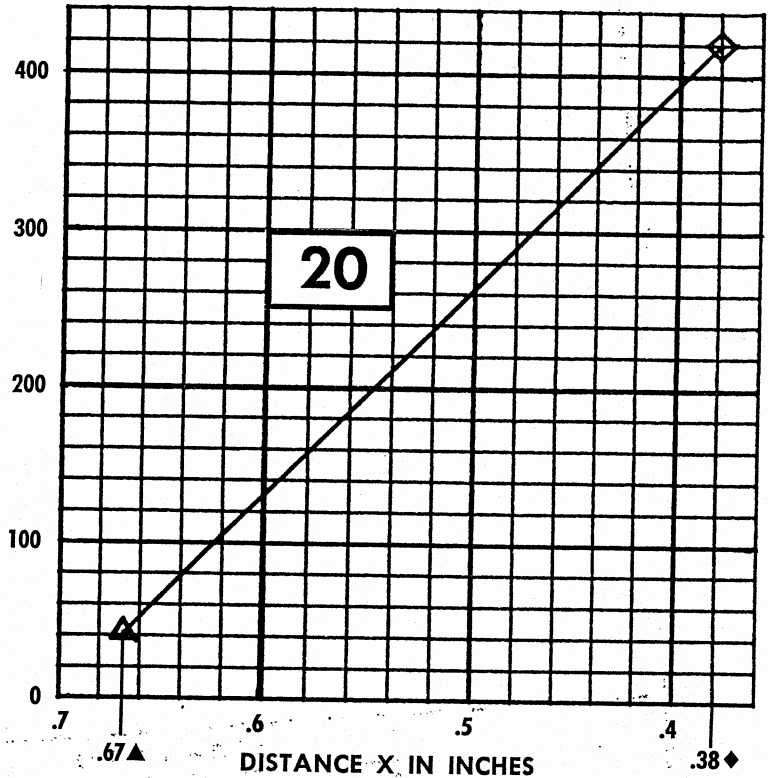
Overload slippage causes friction faces to wear and increases Distance X. Readjust, as required, to the original Distance X to maintain the required slip torque. Replace friction segments when Distance Y approaches .050 inches.

SPRING DATA

COUPLING SIZE	Spring	Part No.	DIMENSIONS — INCHES		
			Wire Dia.	Outside Dia.	Free Height
20	Inner	1178283	.055	.42	.70
	Outer	1178291	.078	.63	.70
30	Inner	1178284	.072	.44	.96
	Outer	1178292	.109	.72	.96

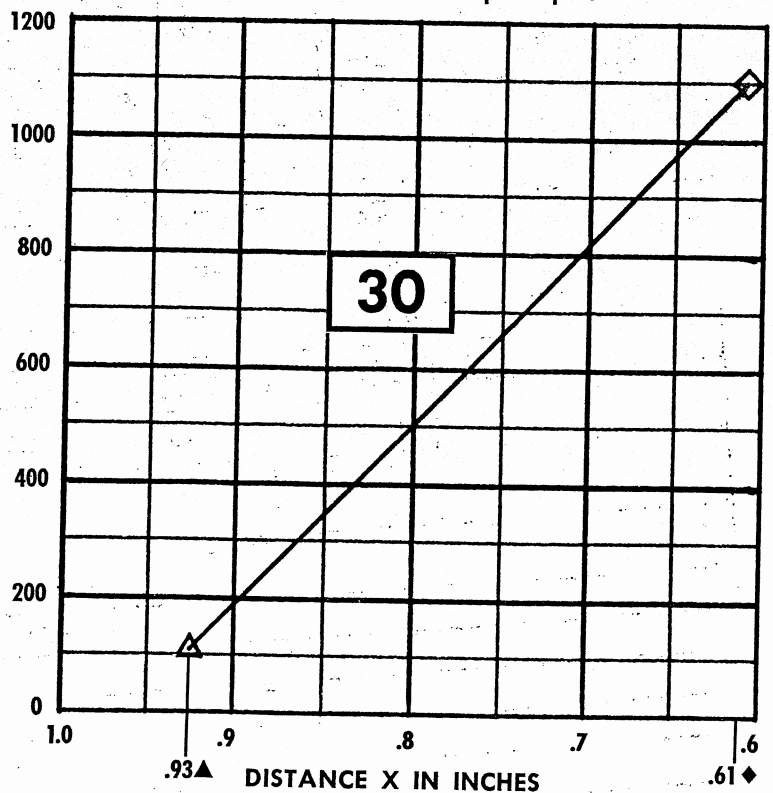
SLIP TORQUE LB.-IN. (±20%)

SIZE 20 Standard Slip Torques



SLIP TORQUE LB.-IN. (±20%)

SIZE 30 Standard Slip Torques



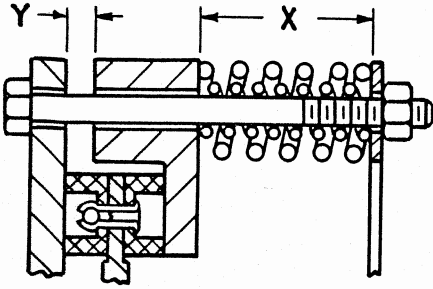
▲ Set Distance X to this value for breaking in of friction segments.

◆ Do NOT set Distance X to less than this minimum value.

SPRING ADJUSTMENT CHARTS FOR STANDARD SLIP TORQUES

(Sizes 20 and 30, Page 1; Sizes 40 and 50, Page 2)

DIMENSIONS X and Y



INSTRUCTIONS

Refer to Service Manual 428-410 for complete installation instructions. Refer to the coupling cover for the coupling size. Prepare the controlled torque assembly for operation as follows:

1. Set Distance X for all springs to the value indicated by the triangle (▲) in the applicable chart.
2. Break in the friction segments as instructed in Manual 428-410.
3. Determine Distance X for the required slip torque.
4. Tighten each adjusting nut approximately two turns in sequence until Distance X is reached.
5. Do NOT set Distance X to less than the minimum value indicated by the diamond (◆).

IMPORTANT

Overload slippage causes friction faces to wear and increases Distance X. Readjust, as required, to the original Distance X to maintain the required slip torque. Replace friction segments when Distance Y approaches .050 inches.

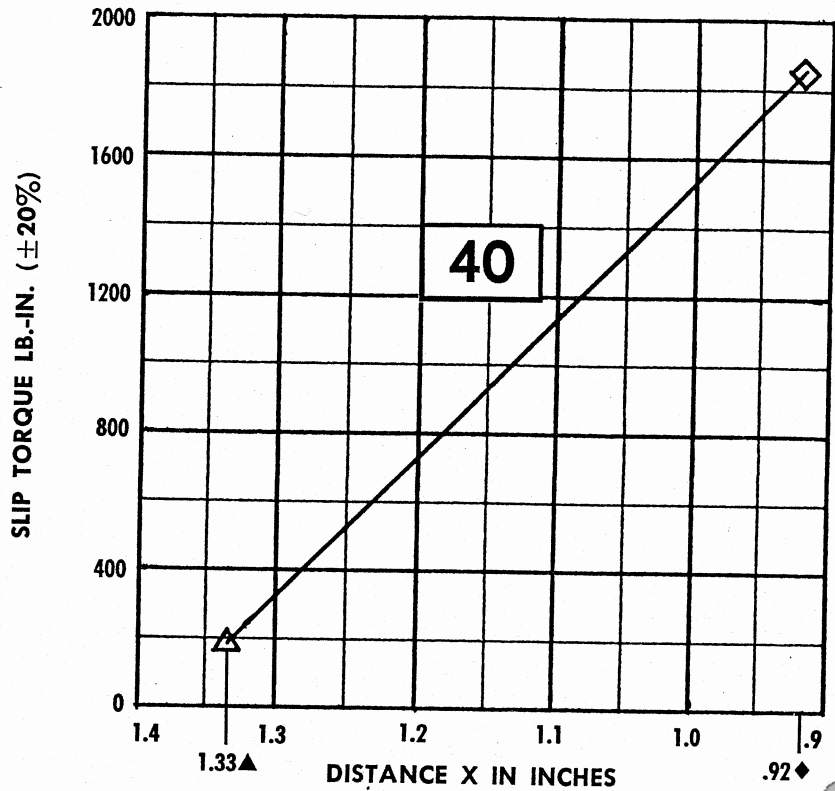
SPRING DATA

COUPLING SIZE	Spring	Part No.	DIMENSIONS — INCHES		
			Wire Dia.	Outside Dia.	Free Height
40	Inner	1178285	.093	.55	1.38
	Outer	1178293	.139	.88	1.38
50	Inner	1178286	.101	.58	1.32
	Outer	1178294	.149	.96	1.32

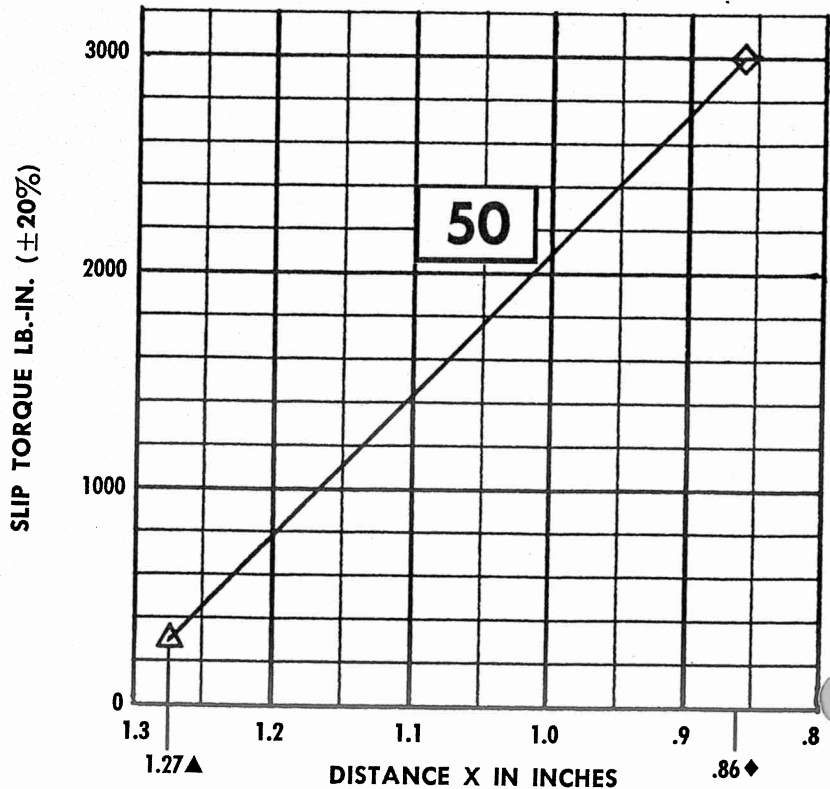
▲ Set Distance X to this value for breaking in of friction segments.

◆ Do NOT set Distance X to less than this minimum value.

SIZE 40 Standard Slip Torques



SIZE 50 Standard Slip Torques



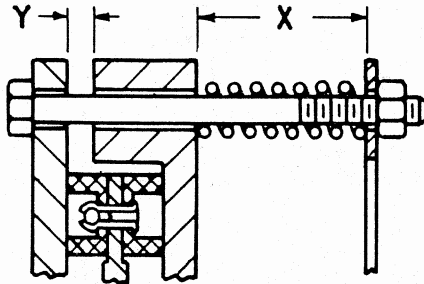
**Spring Adjustment Charts
for Standard Low Slip Torques**

SIZES 30, 40 and 50, Page 1
SIZES 60, 70 and 80, Page 2

Tapered Grid
Type T41-2

Subject to change without notice

DIMENSIONS X and Y



INSTRUCTIONS

Refer to Service Manual 428-410 for complete installation instructions. Refer to the O.D. of the T41 hub or drive plate for the coupling size. Prepare the controlled torque assembly for operation as follows:

1. Set Distance X for all springs to the value indicated by the triangle (▲) in the applicable chart.
2. Break in the friction segments as instructed in Manual 428-410.
3. Determine Distance X for the required slip torque.
4. Tighten each adjusting nut approximately two turns in sequence until Distance X is reached.
5. Do NOT set Distance X to less than the minimum value indicated by the diamond (◆).

IMPORTANT

Overload slippage causes friction faces to wear and increases Distance X. Readjust, as required, to the original Distance X to maintain the required slip torque. Replace friction segments when Distance Y approaches .050 inches.

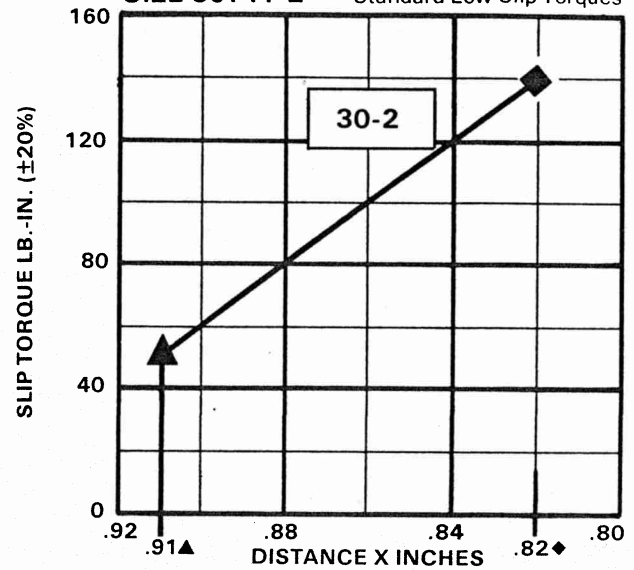
SPRING DATA

COUPLING SIZE T41-2	Number of Springs	Part No.	DIMENSIONS-INCHES		
			Wire Dia.	Outside Dia.	Free Height
30	4	1178284	.072	.44	.96
40	4	1178285	.093	.55	1.38
50	4	1178285	.093	.55	1.38

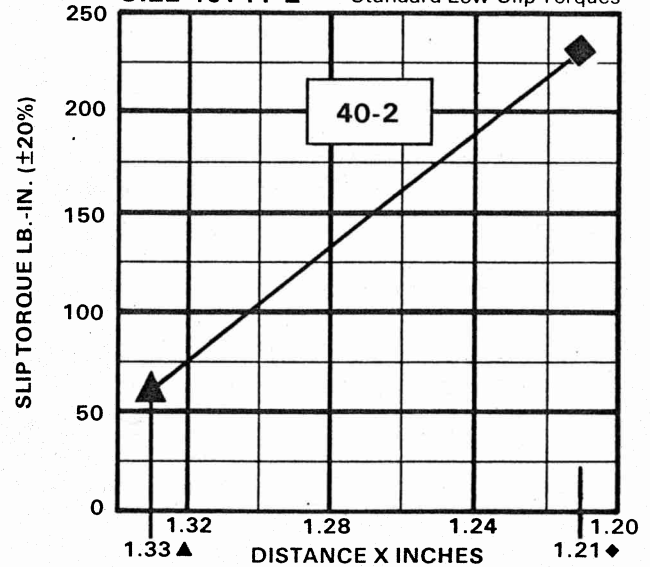
▲ Set Distance X to this value for breaking in of friction segments.

◆ Do NOT set Distance X to less than this minimum value.

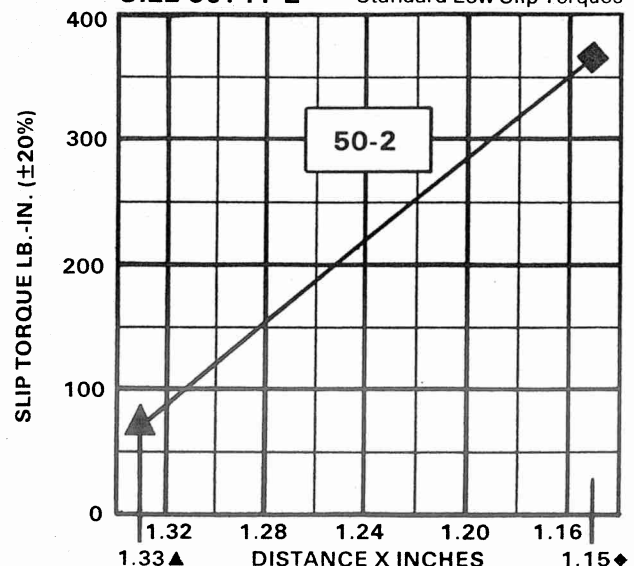
SIZE 30T41-2 Standard Low Slip Torques



SIZE 40T41-2 Standard Low Slip Torques

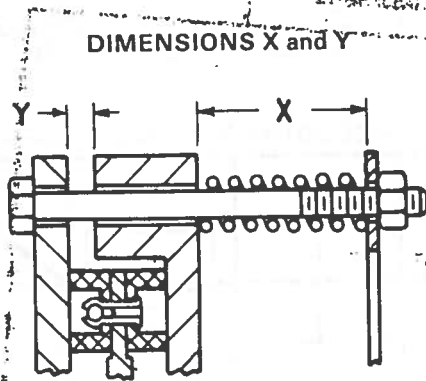


SIZE 50T41-2 Standard Low Slip Torques



SPRING ADJUSTMENT CHARTS FOR STANDARD LOW SLIP TORQUE

SIZES 60, 70 and 80



INSTRUCTIONS

Refer to Service Manual 428-410 for complete installation instructions. Refer to the O.D. of the T41 hub or driveplate for the coupling size.

IMPORTANT: When installing Sizes 60 thru 140 couplings, locate the springs and fasteners in alternate fastener holes in the coupling flange.

Prepare the controlled torque assembly for operation as follows:

1. Set Distance X for all springs to the value indicated by the triangle (▲) in the applicable chart.
2. Break in the friction segments as instructed in Manual 428-410.
3. Determine Distance X for the required slip torque.
4. Tighten each adjusting nut approximately two turns in sequence until Distance X is reached.
5. Do NOT set Distance X to less than the minimum value indicated by the diamond (◆).

IMPORTANT

Overload slippage causes friction faces to wear and increases Distance X. Readjust, as required, to the original Distance X to maintain the required slip torque. Replace friction segments when Distance Y approaches .050 inches.

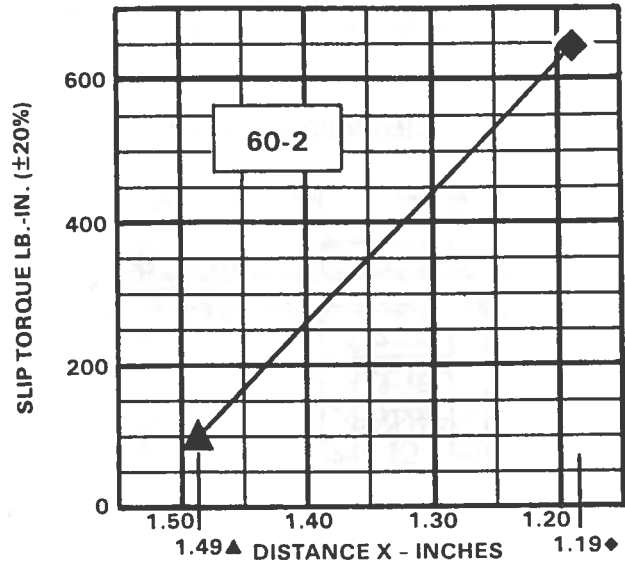
SPRING DATA

COUPLING SIZE T41-2	Number of Springs	Part No.	DIMENSIONS-INCHES		
			Wire Diam.	Outside Diam.	Free Height
60	3	1178287	.105	.58	1.55
70	3	1178288	.124	.68	1.98
80	3	1178289	.148	.78	1.98

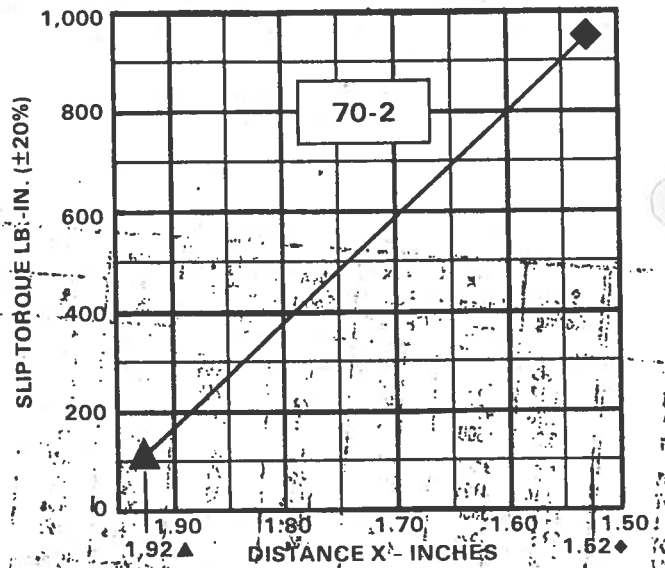
▲ Set Distance X to this value for breaking in of friction segments.

◆ Do NOT set Distance X to less than this minimum value.

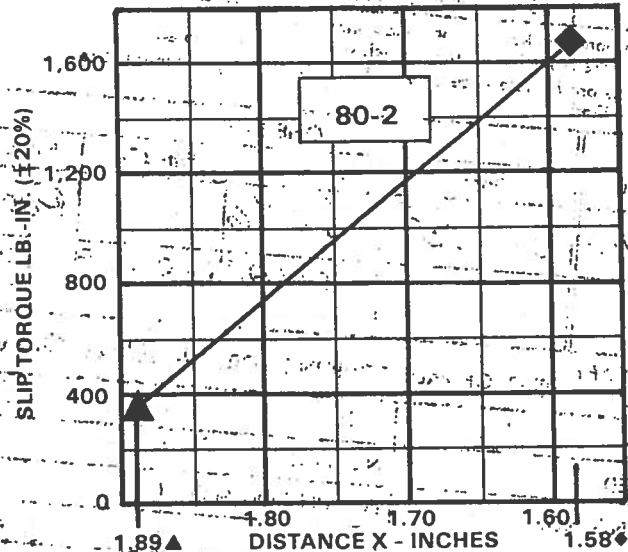
SIZE 60T41-2 Standard Low Slip Torques



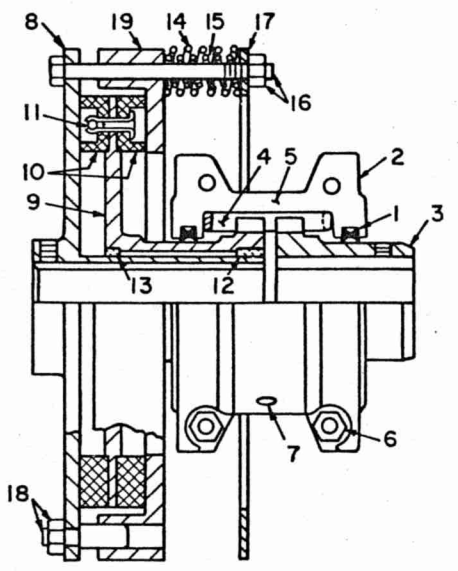
SIZE 70T41-2 Standard Low Slip Torques



SIZE 80T41-2 Standard Low Slip Torques



TYPE T41 CONTROLLED TORQUE COUPLING PARTS



PART NUMBERS

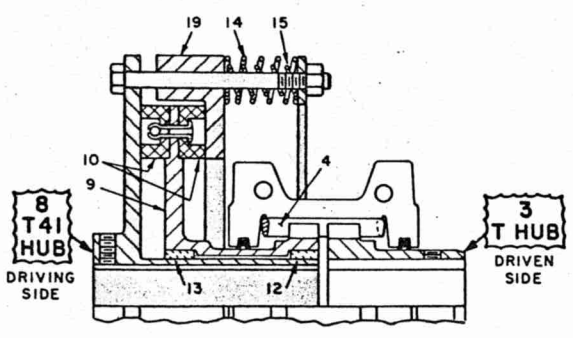
- 1. T10 Seal
- 2. T10 Cover
- 3. T Hub (Specify Bore and Keyway)
- 4. T Grid
- 5. T10 Gasket
- 6. T10 Fastener, Cover
- 7. Lube Plug
- 8. T41 Hub (Specify Bore and Keyway)
- 9. T41 Sleeve*
- 10. Friction Segment*
- * 11. Rivet*
- 12. Bearing, Outer
- 13. Bearing, Inner
- 14. Spring, Outer (T41 Only)
- 15. Spring, Inner
- 16. Fastener and Adjusting Nut, Spring
- 17. Guide Ring, Spring
- 18. Drive Pin and Nut
- 19. Drive Plate

*Part 9 is available only in assembly with Parts 10 through 13; however, Parts 10 & 11 and Parts 12 & 13 may be purchased without Part 9.
 • Friction segments with rivets consist of a complete set for a coupling and are available only as sets.

IMPORTANT: SPECIFY HUB SIZE and TYPE . . . T or T41
 When ordering parts, state coupling size and type stamped on cover AND hubs and specify hub bores and keyways.

How the Controlled Torque Coupling Operates

In the drawing at the left, the pressure from the springs (14 and 15) causes the drive plate (19) and the T41 hub (8) to engage the friction lining (10) on the T41 sleeve (9) with a predetermined force. When the T41 hub is the DRIVING hub, the load is transmitted from the shaded section of the unshaded section from Parts 8 and 19 through 10 and 9, through the grid (4) and T hub (3) into the driven shaft. When the driven machine is loaded beyond the spring setting, the unshaded portion of the coupling stalls while the remainder of the assembly (shaded) rotates on bearings (12 and 13). As soon as the torque requirements are reduced to the set limits, the coupling will again transmit the load. When the friction lining becomes worn, the load regulating spring setting can be adjusted as instructed on Page 3.



CAUTION — When abnormal abrasive, corrosive or wet conditions exist, use a guard that will protect the coupling and will also permit air to circulate to cool the coupling. Consult applicable local and national safety codes for proper guarding of rotating members.

INTRODUCTION — This manual applies to Falk Controlled Torque Tapered Grid Couplings. They are designed for horizontal operation; consult Factory for modifications for vertical applications. The performance and life of the couplings depend largely upon how they are installed and serviced. Carefully follow the instructions in this manual for optimum performance and trouble free service.

LIMITED END FLOAT — When electric motors, generators, engines, compressors and other machines are fitted with sleeve or straight roller bearings, limited axial end float kits are recommended for protecting the bearings. Refer application details to Factory for analysis.

OVERLOAD CUTOFF SWITCH — To avoid prolonged slip during jams and overloads, install a proximity sensor cutoff switch. This device detects reduction in speed of driven shaft and electrically shuts

LUBRICATION — Cover halves have 1/8 and 3/8 NPT lube holes. Adequate lubrication is essential for proper operation of the coupling. Refer to Table 1 on Page 3 for the amount of lubricant required. Check the coupling at least once a year and add lubricant if required. For extreme or unusual operating conditions, lubricate more frequently.

LUBRICANT SPECIFICATIONS — Refer to Manual 428-010 for recommended lubricants. The following specifications apply to lubricants for Falk couplings which are lubricated annually and operate within ambient temperatures of 0° to 150°F (-18° to +66°C). For temperatures beyond this range, consult the Factory.

Dropping Point — 300°F (149°C) or higher.

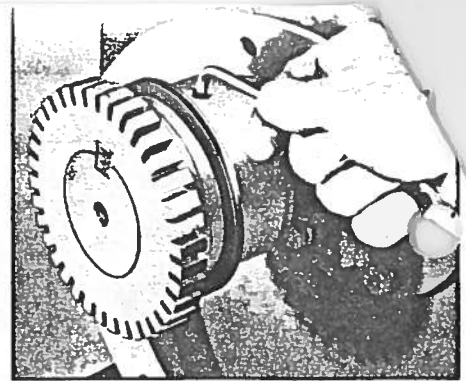
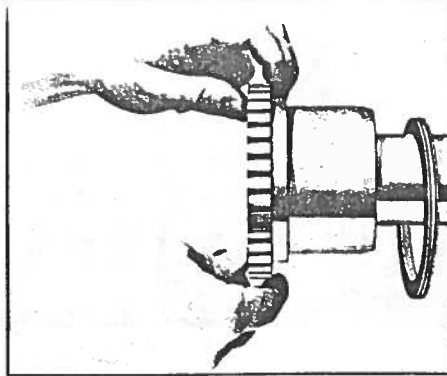
Consistency — NLGI No. 2 with worked penetration value in the range of 250 to 300.

Separation and Resistance — Low Oil separation rate and high resistance to separation from centrifuging.

Liquid Constituent — To possess good lubrication properties . . . equivalent to a high quality, well refined petroleum oil.

1 CAUTION

Lock out starting switch of prime mover. Clean all metal parts with a non-flammable solvent. DO NOT get grease on friction segments. Sizes 100 and larger are furnished with INTERFERENCE fit hubs. Heat these hubs in an oil bath or an oven to a maximum of 275°F (135°C). The oil flash-point must be 350°F (177°C) or higher. DO NOT rest the hub grid groove area on the bottom of the container or apply a flame directly to the grid groove area.

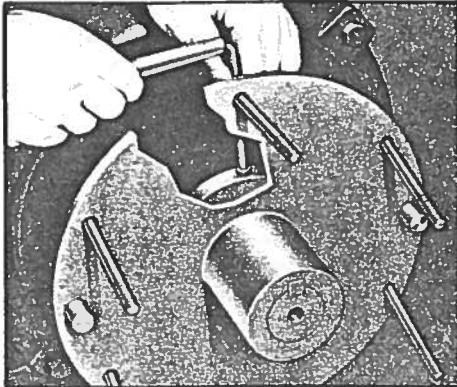


2 MOUNT SEALS

Place seal on shaft BEFORE mounting T hub. To mount original seal or replacement seals over hubs, wrap cloth or tape over the sharp grid grooves and then stretch and roll the seal over the hub grooves.

3 MOUNT T HUB

Mount hub so that hub face is flush with end of shaft (unless otherwise required). Tighten set screw when furnished.

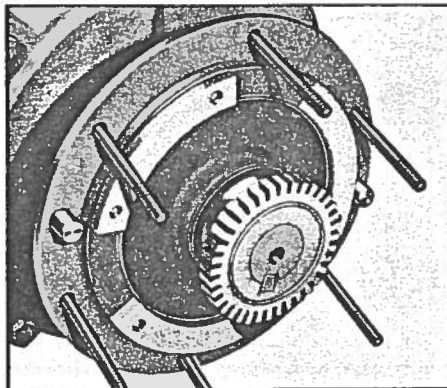


4 MOUNT T41 HUB

NOTE: DO NOT damage bearing surfaces. Sizes 60-140T41-2 couplings use one-half the number of fasteners as Type T41. Locate fasteners in alternate holes.

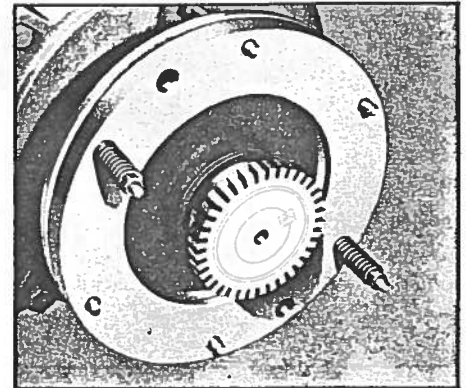
CLEARANCE FIT HUBS: Mount controlled torque assembly (Parts #8 thru #19) with T41 hub flush with end of shaft. Proceed to Step 7.

INTERFERENCE FIT HUBS: Position spring guide ring on T hub. Heat T41 hub per Step 1. Insert fasteners in hub flange BEFORE mounting hub. Mount T41 hub with face flush with end of shaft. Proceed to Step 5.



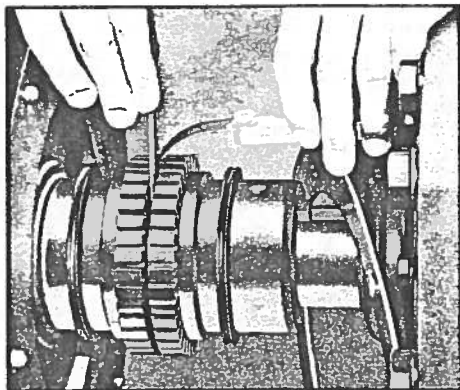
5 MOUNT T41 SLEEVE ASSEMBLY

Carefully slide the T41 sleeve assembly onto the T41 hub. The assembly must slide on freely and rotate freely. Mount seal per Step 2.



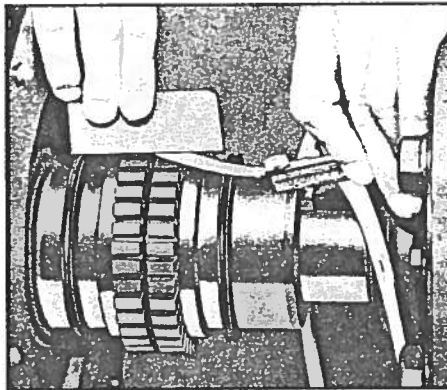
6 MOUNT DRIVE PLATE

Mount drive plate so that the drive pins are engaged. Temporarily hold the assembly in place with two or three inner springs and adjusting nuts.



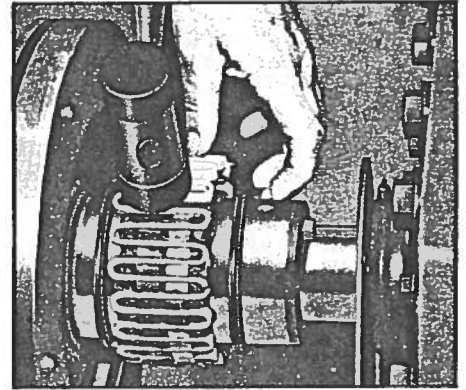
7 GAP AND ANGULAR ALIGNMENT

Use a spacer bar equal in thickness to the gap specified in Table 1. Insert bar, as shown above, to same depth at 90° intervals and measure clearance between bar and hub face with feelers. The difference in minimum and maximum measurements must not exceed the ANGULAR limit specified in Table 1.



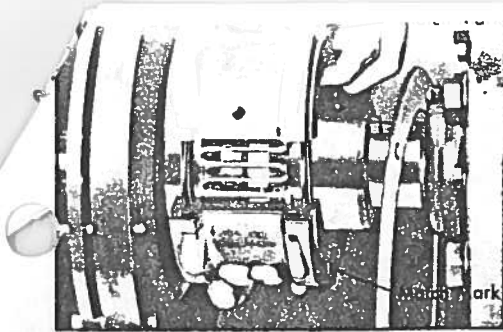
8 OFFSET ALIGNMENT

Align so that a straight edge rests squarely (or within the limits specified in Table 1) on both hubs as shown above and also at 90° intervals. Check with feelers. The clearance must not exceed the OFFSET limit specified in Table 1. Tighten all foundation bolts and repeat Steps 7 and 8. Realign coupling if necessary. **NOTE:** Use a dial indicator for more accurate alignment.



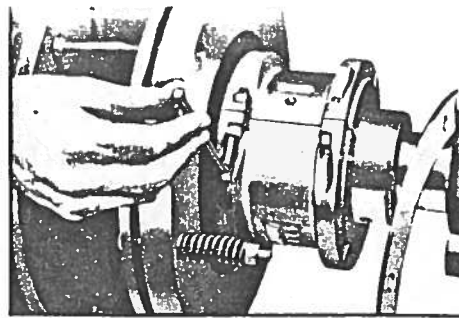
9 INSERT GRID

CAUTION — Do not get grease on friction segments. Pack gap and grooves with specified lubricant before inserting grid. When grids are furnished in two or more segments, install them so that all cut ends extend in the same direction; this will permit cover installation. Spread the grid slightly to pass it over the coupling teeth and seat with a soft mallet.



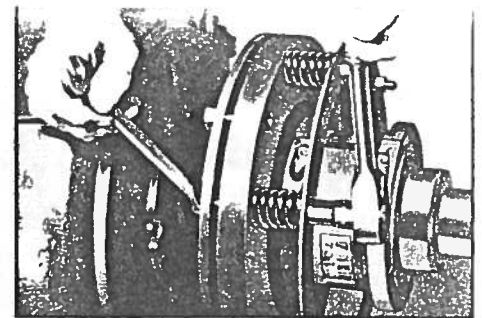
10 PACK WITH GREASE AND ASSEMBLE COVERS

Pack the spaces between and around the grid with as much lubricant as possible and wipe off excess flush with top of grid. Position seals on hubs to line up with grooves in cover. Position gaskets on flange of lower cover half and assemble covers so that the match marks are on the same side (see above).



11 TORQUE COVER FASTENERS

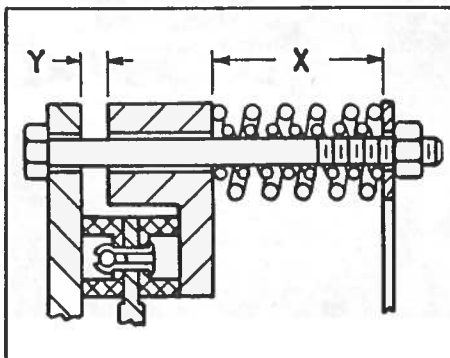
Secure cover halves with fasteners and tighten to torque specified in Table 1. (Note that Sizes 20 thru 70 have a self-locking feature for the stop nuts.) CAUTION: Make certain lube plugs are installed before operating. Remove excess lubricant.



12 ASSEMBLE SPRINGS, GUIDE RING & ADJUSTMENT NUTS

Remove the springs and adjusting nuts that were temporarily installed in Step 6. Type T41, All Sizes: Install a set of both inner and outer springs. Type T41-2, Sizes 30, 40 and 50: Install inner springs. Type T41-2, Sizes 60 thru 140: Install inner springs on alternate fasteners; only one-half the number of inner springs of a T41 are required.

Install the spring guide ring and tighten adjusting nuts evenly until springs are slightly compressed.



14 DISTANCE X — OPERATING

Determine the Operating Distance X for the required slip torque. Uniformly tighten adjusting nuts to the required Distance X for ALL springs.

15 STARTUP AND RUN

Momentary slip may occur at startup. If slip continues at operating load, shut down. If the system is not overloaded, determine a new Distance X for 20% more slip torque from the Spring Adjustment Chart. Restart. If slip continues, shut down and refer complete details to the Factory. Overtightening of adjusting nuts will defeat purpose of coupling and may cause connected equipment to be damaged.

16 DISTANCE X — PERIODIC ADJUSTMENT

Refer to Service and Maintenance Section.

13 DISTANCE X — BREAK-IN

Refer to the Spring Adjustment Chart furnished with the coupling. Set Distance X for ALL springs to the (Δ) value given on the chart for your coupling size. Tighten adjusting nuts two turns in sequence to this value (Δ). Operate the coupling for 1000 revolutions at 100% slip. Slip time in minutes equals $1000 \div \text{RPM}$.

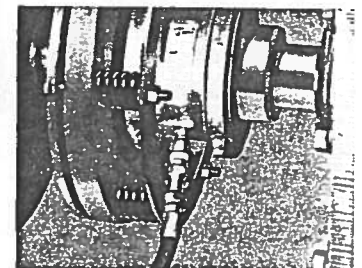
SIZE	Max Speed (rpm)	Gap	Operating Alignment Limits ^m		Cover Bolt Torque (lb-in.)	Lube Wt (lb)
			Offset (Max)	Angular (Max)		
20T	3600	.125	.005	.005	100	.06
30T	3600	.125	.005	.005	100	.06
40T	3600	.125	.005	.005	100	.12
50T	3600	.125	.005	.005	200	.12
60T	3600	.125	.010	.010	200	.19
70T	3600	.125	.010	.010	200	.19
80T	2800	.125	.010	.010	200	.38
90T	2500	.125	.012	.012	200	.56
100T	2100	.188	.012	.012	260	.94
110T	1850	.188	.012	.012	260	1.1
120T	1750	.250	.012	.012	650	1.6
130T	1450	.250	.012	.012	650	2.0
140T	1300	.250	.015	.015	650	2.5
150T	1100	.250	.015	.015	650	4.2
160T	950	.250	.015	.015	650	6.2
170T	870	.250	.015	.015	1300	7.7
180T	760	.250	.015	.015	1300	8.3
190T	720	.250	.015	.015	1300	9.7
200T	620	.250	.015	.015	2300	12.4

Refer to Bulletin 421-410 for maximum bores and Engineering 427-108 for reborring instructions.

- Align couplings within "Operating Alignment Limits" specified above. Exceeding these limits reduces coupling life.

SERVICE AND MAINTENANCE

PERIODIC LUBRICATION—Remove all lube plugs and install your lube fitting in one hole. Fill coupling with lubricant specified on Page 1 until an excess appears at an open hole and then insert lube plug in that hole. Continue procedure until all lube plugs have been installed. Remove lube fitting and install lube plug.



DISTANCE X — PERIODIC ADJUSTMENT — Distance X will increase as the coupling slips and parts wear. Retighten ALL locknuts to the Distance X determined in Step 14 (or 15).

NOTE: If coupling is furnished with optional adjustment sleeves; when lining wear occurs due to slippage, steel sleeves must be ground to maintain the desired X-distance.

DISTANCE Y — Replace friction segments when Distance Y approaches .050". See Page 4 for instructions.

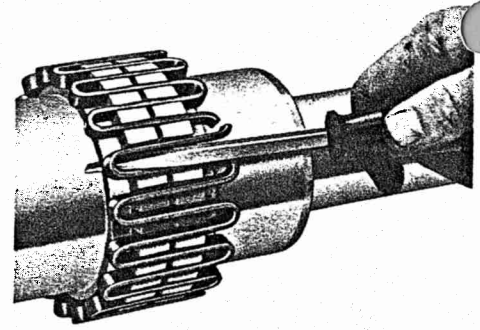
Continued on Page 4

COUPLING DISASSEMBLY AND COMPONENT REPLACEMENT

COUPLING DISASSEMBLY — Whenever it is necessary to completely disassemble the coupling, lock out the starting switch, remove load from system and reverse Steps 1 thru 12.

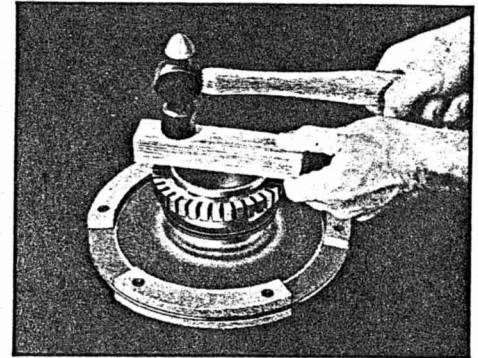
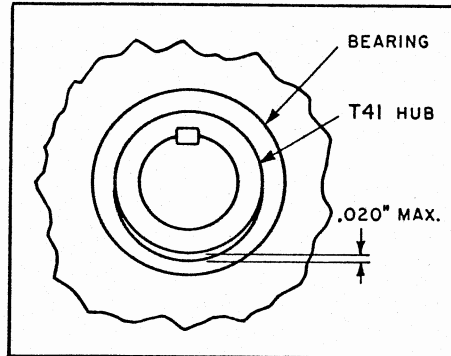
SEAL REPLACEMENT — Refer to Step 2.

GRID REMOVAL AND REPLACEMENT — To remove the grid, use a round rod or screw driver that will conveniently fit into the loop ends of the grid. Begin at the open end of the grid section and insert the rod or screw driver into the loop ends. Use the teeth adjacent to each loop as a fulcrum and pry the grid out radially in even, gradual stages, proceeding alternately from side to side. Install new grid per Step 9.



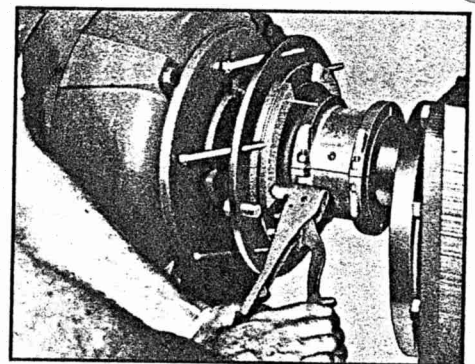
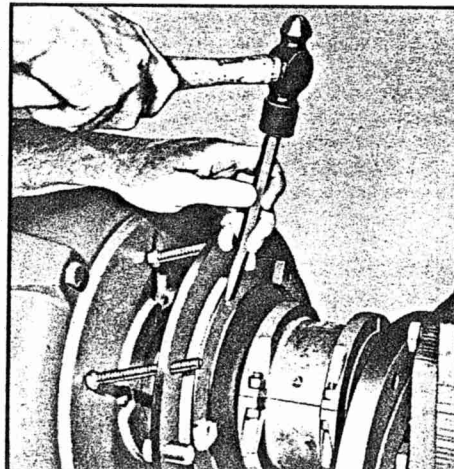
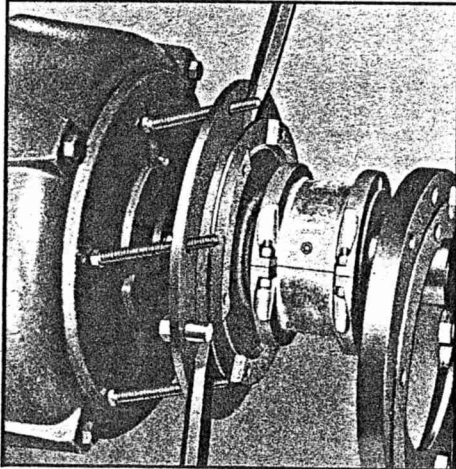
BEARING REPLACEMENT — Move connected equipment to expose bearing and measure clearance as illustrated. If clearance exceeds .020 inch at either bearing, replace both bearings. To measure inner bearing clearance, remove T41 sleeve and reverse assembly on T41 hub.

Carefully drive out old bearings and tap new bearings in place as illustrated. Mount the T41 sleeve on the T41 hub. The assembly must slide on and rotate freely. Complete assembly as instructed above. Use new gaskets and seals.



FRICION SEGMENT REPLACEMENT

CAUTION: Always replace ALL friction segments.



A. Remove the spring guide ring and drive plate and hang them on the T hub shaft. Insert pry bars as shown to separate the T41 sleeve from the T41 hub enough to insert new friction segments. **CAUTION:** Do not bend the T41 sleeve flange.

B. Chisel rivets flush with the T41 sleeve face. Drive out the inner friction segments. Clean metal parts, especially the friction surfaces of the T41 hub and drive plate. Use a non-flammable solvent.

IMPORTANT: Always use the same size and number of friction segments as were removed; these vary with coupling size and type.

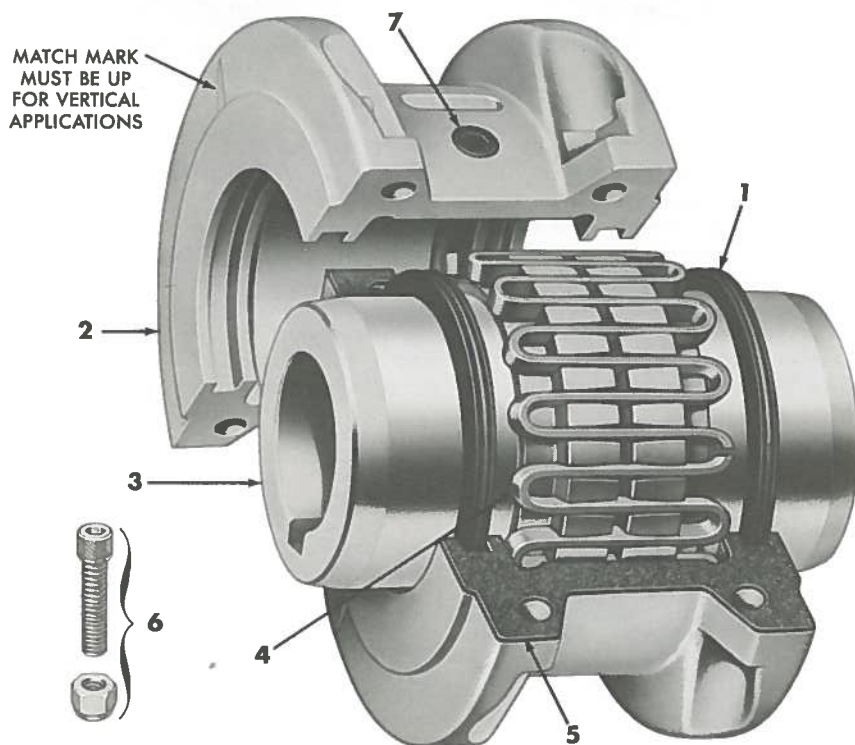
C. Position an inner and outer friction segment in line with the T41 sleeve holes and insert all the blind rivets. Place rivet gun over pin of blind rivet and firmly seat gun against washer face of rivet squeeze handle of gun until rivet pin breaks. Discard pin. Repeat procedure for all segments and rivets. Friction segments must be tight against the T41 sleeve. Assemble drive plate, springs, spring guide ring and adjust load regulating springs per Steps 12 thru 15.

MANUFACTURER	RIVET TYPE	HAND HELD RIVETER	POWER RIVETER
Cherry Commercial Products	Cherry "N" Rivets	G28	GH702-5C6Z
USM Corporation "Pop" Rivet Division	Open End Rivets	PRP26A	PRG510
Dayton	Blind Rivet	4X577
Marson Fastener Corporation	Buttonhead Rivets	HP-2	PHT-2

RIVET GUNS AND RIVETS — The blind rivets and rivet guns employed are standard commercial products of the fastener industry and are nationally available. Blind rivet size shall be 3/16" diameter with aluminum material for all Type T41 coupling sizes. Rivets are supplied by Falk with replacement friction segments.

The following blind rivets and rivet guns are acceptable:

TYPE T10 STEEFLEX COUPLING PARTS



PART NUMBERS

1. Seal (T10)
2. Cover (T10)
3. Hub (Specify bore and keyway)
4. Grid
5. Gasket (T10)
6. Fasteners (T10)
7. Lube Plug

WHEN ORDERING SPARE PARTS, SPECIFY COUPLING SIZE AND TYPE AS SHOWN ON COUPLING COVER

INTRODUCTION—This manual applies to Sizes 20 thru 140T10 and 1020 thru 1140T10 Falk Steelflex Tapered Grid Couplings. Unless otherwise stated, information for Sizes 1020 thru 1140 applies to Sizes 20 thru 140 respectively, e.g. 1020 = 20, 1100 = 100, etc. These couplings are designed to operate in either the horizontal or vertical position without modification. However, for vertical applications, the match mark shown above, must be up. The performance and life of the couplings depend largely upon how you install and service them. Carefully follow the instructions in this manual for optimum performance and trouble free service.

PARTS IDENTIFICATION—All coupling parts have identifying part numbers as shown above. Parts 3 and 4 (Hubs and Grids), are the same for both T10 and T20 couplings; all other coupling parts are NOT INTERCHANGEABLE between Types T10 and T20. Parts are interchangeable between Sizes 20 and 1020, 30 and 1030, etc., but do not use orange grids in place of blue grids. However, blue grids may be used in place of orange grids. When ordering parts, always SPECIFY SIZE and TYPE shown on the COVER. Sizes 80 thru 140T10 covers have been manufactured with two and three ribs; DO NOT mix these cover halves.

LUBE FITTINGS—Cover halves have $\frac{1}{8}$ NPT lube holes. Use a standard grease gun and lube fitting as instructed in Step 6 on Page 2.

LIMITED END FLOAT—When electric motors, generators, engines, compressors and other machines are fitted with sleeve or straight roller bearings, limited axial end float kits are recommended for protecting the bearings. Falk Steelflex couplings are easily modified to limit end float; refer to Manual 428-820 for instructions.

LUBRICATION—Adequate lubrication is essential for proper operation of the coupling. Refer to Table 1 on Page 2 for the amount of lubricant required. It is recommended that the coupling be checked once a year and lubricant added if required. For extreme or unusual operating conditions, check more frequently.

LONG TERM GREASE (LTG)—Steelflex couplings initially lubricated with Falk LTG will not require re-lubrication until the connected equipment is stopped for servicing. Refer to Manual 428-010.

CAUTION

Consult applicable local and national safety codes for proper guarding of rotating members. Observe all safety rules when installing or servicing couplings. During assembly, seal keyways of oil lubricated couplings.

LUBRICANT SPECIFICATIONS—Refer to Manual 428-010 for recommended lubricants. The following specifications apply to lubricants for Falk couplings which are lubricated annually and operate within ambient temperatures of 0° to 150°F (−18° to +66°C). For temperatures beyond this range, consult the Factory.

Dropping Point—300°F (149°C) or higher.

Consistency—NLGI No. 2 with worked penetration value in the range of 250 to 300.

Separation and Resistance—Low oil separation rate and high resistance to separation from centrifuging.

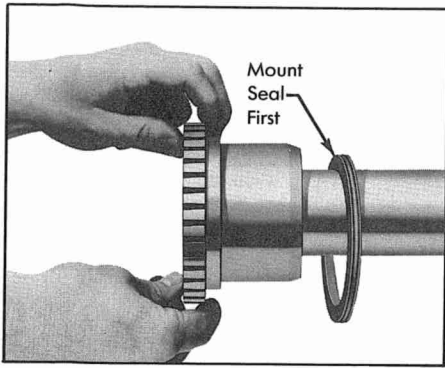
Liquid Constituent—To possess good lubrication properties . . . equivalent to a high quality, well refined petroleum oil.

Inactive—Must not corrode steel or cause swelling or deterioration of synthetic seals.

Clean—Free from foreign inclusions.

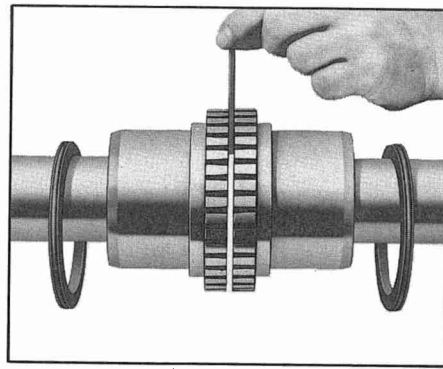
INSTALLATION—Only standard mechanics tools, wrenches, a straight edge and feeler gauges are required to install Falk Steelflex couplings. Coupling Sizes 1020 thru 1090 are generally furnished for CLEARANCE FIT with set screws. Sizes 1100 and larger are furnished for an INTERFERENCE FIT without set screws. Heat hubs with interference fit in an oil bath to a maximum of 275°F (135°C) to mount. The oil flashpoint must be 350°F (177°C) or higher. Refer to Page 2 for detailed mounting instructions.

INSTALLATION OF TYPE T10 STEELFLEX TAPERED GRID COUPLINGS



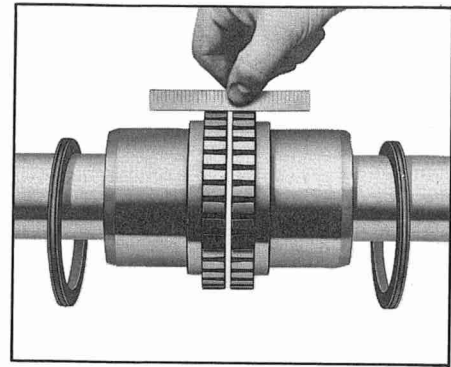
1 MOUNT SEALS AND HUBS

Lock out starting switch of prime mover. Clean all metal parts using a non-flammable solvent. Lightly coat seals with grease and place on shafts BEFORE mounting hubs. For vertical couplings, seal keyway to prevent leakage. Mount hubs on their respective shafts so the hub face is flush with the end of its shaft. Tighten set screws when furnished. Heat interference fit hubs as instructed on Page 1.



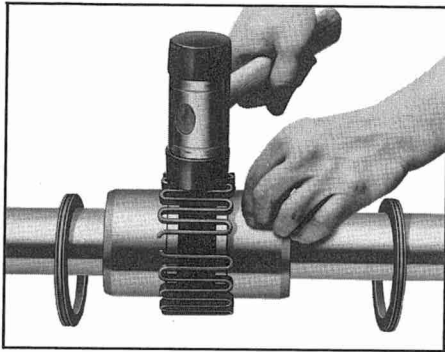
2 GAP & ANGULAR ALIGNMENT

Use a spacer bar equal in thickness to the gap specified in Table 1. Insert bar, as shown above, to same depth at 90° intervals and measure clearance between bar and hub face with feelers. The difference in minimum and maximum measurements must not exceed the ANGULAR limit specified in Table 1.



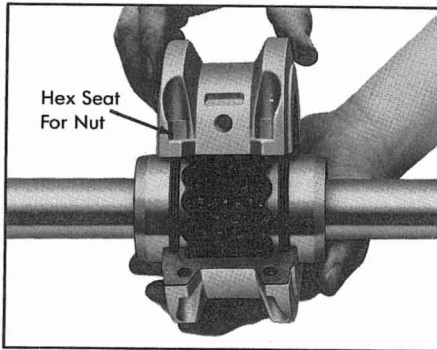
3 OFFSET ALIGNMENT

Align so that a straight edge rests squarely (or within the limits specified in Table 1) on both hubs as shown above and also at 90° intervals. Check with feelers. The clearance must not exceed the OFFSET limit specified in Table 1. Tighten all foundation bolts and repeat Steps 2 and 3. Realign coupling if necessary. NOTE: Use a dial indicator for more accurate alignment.



4 INSERT GRID

Pack gap and grooves with specified lubricant before inserting grid. When grids are furnished in two or more segments, install them so that all cut ends extend in the same direction; this will assure correct grid contact with non-rotating pin in cover halves. Spread the grid slightly to pass over the coupling teeth and seat with a soft mallet.



5 PACK WITH GREASE AND ASSEMBLE COVERS

Pack the spaces between and around the grid with as much lubricant as possible and wipe off excess flush with top of grid. Position seals on hubs to line up with grooves in cover. Position gaskets on flange of lower cover half and assemble covers so that the match marks are on the same side (see above). If shafts are not level (horizontal) or coupling is to be used vertically, assemble cover halves with the lug and match mark UP, or on the high side. Secure cover halves with fasteners and tighten to torque specified in Table 1. (Note that Sizes 1020 thru 1070 have a self-locking feature for the stop nuts.) CAUTION: Make certain lube plugs are installed before operating.

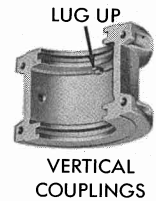
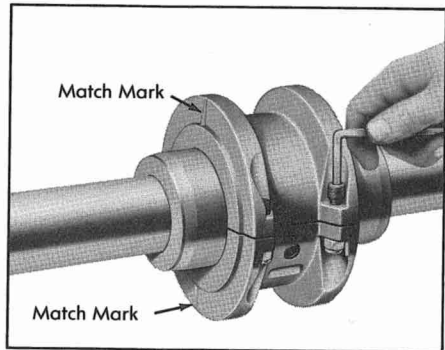


TABLE 1 INSTALLATION DATA* (Dimensions-Inches)						
SIZE	Gap	Installation Alignment Limits		Cover Bolt Torque (lb-in)	Allow. Speed (rpm)	Lube Wt (lb)
		Offset (Max)	Angular (Max)			
1020T	.125	.006	.003	100	4500	.06
1030T	.125	.006	.003	100	4500	.09
1040T	.125	.006	.003	100	4500	.12
1050T	.125	.008	.004	200	4500	.15
1060T	.125	.008	.005	200	4350	.19
1070T	.125	.008	.005	200	4125	.25
1080T	.125	.008	.006	200	3600	.38
1090T	.125	.008	.007	200	3600	.56
1100T	.188	.010	.008	260	2440	.94
1110T	.188	.010	.009	260	2250	1.1
1120T	.250	.011	.010	650	2025	1.6
1130T	.250	.011	.012	650	1800	2.
1140T	.250	.011	.013	650	1650	2.5

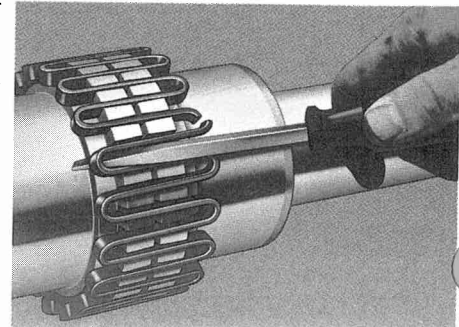
* Refer to bulletin for maximum bores and Engineering 427-108 for reborring instructions.

Flexible couplings are designed to accommodate changes in operating conditions. Coupling life expectancy between initial alignment and maximum operating limits is a function of load, speed and lubrication. Application requirements in excess of twice the OFFSET and/or four times the ANGULAR limits shown, must be referred to Falk for review.

6 PERIODIC LUBRICATION—Remove both lube plugs and insert lube fitting. Fill with recommended lubricant until an excess appears at the opposite hole. CAUTION: Make certain all plugs have been inserted after lubricating.

COUPLING DISASSEMBLY AND GRID REMOVAL

Whenever it is necessary to disconnect the coupling, remove the cover halves and grid. A round rod or screw driver that will conveniently fit into the open loop ends of the grid is required. Begin at the open end of the grid section and insert the rod or screw driver into the loop ends. Use the teeth adjacent to each loop as a fulcrum and pry the grid out radially in even, gradual stages, proceeding alternately from side to side.



GREASE LUBRICANTS FOR FALK GEAR COUPLINGS

(For Steelflex Coupling Lubricants, Refer to Page-1)

NOTE: Lubricants listed in this manual are typical products ONLY and should not be construed as exclusive recommendations.

LUBRICATION — To satisfy the centrifuge and fluidity limitations of greases, two grades of grease listed below are recommended for all gear couplings. For normal service, use a NLGI #1 extreme pressure (EP) grease EXCEPT when the coupling speed is less than the minimum specified in Table 3 below. At these lower speeds, use a NLGI #0 extreme pressure (EP) grease. When one or more gear couplings in an application require NLGI #0 grease, the same grease may be used in all of the couplings. DO NOT use cup grease.

Adequate lubrication is essential for satisfactory operation of gear couplings. Where heavy shock loads, frequent axial movement, large speed variation or extreme temperatures are encountered, submit application details to the Factory for a lubricant recommendation. During assembly, seal keyways of oil lubricated couplings.

MAINTENANCE — Lubricate couplings at least once every six months. Lubricate couplings more frequently when they are exposed to excessive moisture, extreme temperatures, rapid reversing or shock loads or excessive misalignment.

Table 1 NLGI #1 Grease For Gear Couplings

Coupling speed range	See Table 3
Temperature range	+30°F to +200°F (-34°C to +93°C)
Worked penetration at 77°F (25°C)	310-340
Dropping point	300°F (149°C) or higher
Texture	Smooth or fibrous
Resistance to centrifuging	High
Oil separation rate	Low
Minimum Timken O.K. load	30 lbs.
Does not corrode steel or swell or deteriorate Neoprene or Buna N	

Manufacturer	Lubricant #
Amoco Oil Co.	Rykon Grease #1 EP
Ashland Petroleum Co.	Val-Lith #1 EP
Atlantic Richfield Co.	Litholine HEP 1
Chevron U.S.A. Inc.	Chevron Dera-Lith Grease EP 1
Cities Service Co.	Citgo HEP 1
Conoco Inc.	EP-Conolith #1
Exxon Company, U.S.A.	Lidok EP 1
Gulf Oil Corporation	Gulfcrown Grease EP#1
E. F. Houghton & Co.	Cosmolube 1 EP
Imperial Oil Limited	Nebuta EP #1
Kendall Refining Co.	Kendall L-406 Grease
Keystone Div. Pennwalt Corp.	Zeniplex #1
Mobil Oil Corp.	Mobilux EP 1
Phillips Petroleum Co.	Philube EP 1
Shell Oil Co.	Alvania EP Grease #1
Standard Oil Co. (Ohio)	Pactran EP 15
Sun Oil Co.	Sun Prestige 741 EP
Texaco Inc.	Multifak EP 1
Union Oil Co. (Calif.)	Union Unobag EP1

Table 2 NLGI #0 Grease For Gear Couplings

Coupling speed range	See Table 3
Temperature range	-30°F to +200°F (-34°C to +93°C)
Worked penetration at 77°F (25°C)	355-385
Dropping point	300°F (149°C) or higher
Texture	Smooth or fibrous
Minimum Timken O.K. load	30 lbs.
Does not corrode steel or swell or deteriorate Neoprene or Buna N	

Manufacturer	Lubricant #
Amoco Oil Company	Rykon Grease #0 EP
Chevron U.S.A. Inc.	Dura-Lith Grease EPO
Exxon Company, U.S.A.	Lidok EP-O
Gulf Oil Company	Gulfcrown Grease EP #0
Kendall Refining Co.	Kendall L-406 Grease
Keystone Div. Pennwalt Corp.	Zeniplex #0
Mobil Oil Company	Mobilux EPO
Phillips Petroleum Co.	Philube EP-O
Shell Oil Company	Alvania EP-RO
Standard Oil Co. (Ohio)	Bearing Guard LT-O
Sun Oil Co.	Sun Prestige 740 EP
Texaco Oil Company	Multifak EPO
Union Oil Co. (Calif.)	Union Unobag EPO

♦ Lubricants listed may not be suitable for use in the food processing industry; check with lube manufacturer for approved lubricants.

Table 3 Grease Speed Range — rpm

Coupling Size	10	15	20	25	30	35	40	45	50	55	60	70	1080	1090
Speed Range with NLGI #1 Grease*	Min. 1030 Max. 7000	Min. 700 Max. 6000	Min. 550 Max. 5000	Min. 460 Max. 4750	Min. 380 Max. 4400	Min. 330 Max. 3900	Min. 290 Max. 3600	Min. 250 Max. 3200	Min. 230 Max. 2900	Min. 210 Max. 2650	Min. 190 Max. 2450	Min. 160 Max. 2150	Min. 140 Max. 1750	Min. 120 Max. 1550
Coupling Size	1100	1110	1120	1130	1140	1150	1160	1180	1200	1220	1240	1260	1280	1300
Speed Range with NLGI #0 Grease*	Min. 110 Max. 1450	Min. 100 Max. 1330	Min. 94 Max. 1200	Min. 88 Max. 1075	Min. 82 Max. 920	Min. 76 Max. 770	Min. 72 Max. 650	Min. 64 Max. 480	Min. 58 Max. 370	Min. 52 Max. 290	Min. 48 Max. 270	Min. 44 Max. 250	Min. 40 Max. 230	Min. 38 Max. 220

*Coupling speed range with NLGI #0 grease is from zero to the maximum shown

GREASE LUBRICANTS FOR STEEFLEX COUPLINGS♦

(For Falk Gear Coupling Lubricants, Refer to Page 2)

NOTE: Lubricants listed in this manual are typical products ONLY and should not be construed as exclusive recommendations

LUBRICATION

Adequate lubrication is essential for satisfactory operation. Lubricate couplings at least once every twelve months. Lubricate oftener when the coupling is exposed to excessive moisture, extreme temperatures, rapid reversing or shock loads or excessive misalignment.

SPECIFICATIONS

Annual Lubrication — The following specifications and the lubricants listed at the right apply to Falk Steelflex couplings that are lubricated annually and operate within ambient temperatures of 0° to 150°F (-18°C to +66°C). For temperatures beyond this range, consult the Factory.

DROPPING POINT — 300°F (149°C) or higher.

CONSISTENCY — NLGI #2 with worked penetration value in the range of 250 to 300.

SEPARATION AND RESISTANCE — Low oil separation rate and high resistance to separation from centrifuging.

LIQUID CONSTITUENT — Possess good lubricating properties . . . equivalent to a high quality, well refined, petroleum oil.

INACTIVE — Must not corrode steel or cause swelling or deterioration of neoprene.

CLEAN — Free from foreign inclusions.

Ambient Temperature Range	0°F to 150°F (-18°C to +66°C)	-30°F to 100°F* (-34°C to +38°C)
NLGI Grade	#2	#2
Manufacturer	Lubricant †	Lubricant †
Amoco Oil Co. Ashland Petroleum Co. Atlantic Richfield Co. Chevron U.S.A. Inc. Cities Service Co.	Amolith Grease #2 Val-Lith EP #2 Atlantic Lubricant 52 Chevron Dura-Lith EP-2 Citgo HEP-2	Amolith Grease #2 Val-Lith EP #2 Atlantic Lubricant 54 Chevron Dura-Lith EP 2 Citgo HEP-2
Conoco Inc. Exxon Company, U.S.A. Gulf Oil Corp. E. F. Houghton & Co. Imperial Oil Ltd.	EP Conolith #2 Ronex MP Gulfcrown Grease #2 Cosmolube #2 Esso MP Grease H	EP Conolith #2 Ronex MP Gulfcrown Grease #2 Cosmolube #1 Lotemp EP
Kendall Refining Co. Keystone Div. Pennwalt Corp. Mobil Oil Corp. Phillips Petroleum Co. Shell Oil Co.	Kenlube L-421 Grease #81 Light Mobilux #2 IB & RB Grease Alvania Grease #2	Kenlube L-427 Grease #84 Light Mobilux #1 Philube IB & RB Grease Alvania Grease #2
Standard Oil Co. (Ohio) Sun Oil Company Texaco Inc.	Factran #2 Prestige 42 Marfak Heavy Duty #2	Factran #2 Prestige 42 1917 Marfak All-Purpose Grease
Texaco Canada Inc. Union Oil Co. (Calif.)	Marfak HD2 Union Unoba #2	Marfak AP Union Unoba

*For northern climate applications. For continuous operation at constant ambient temperatures less than 0°F or -18°C (for example, refrigeration systems) consult The Falk Corporation.

♦ Lubricants listed may not be suitable for use in the food processing industry; check with lube manufacturer for approved lubricants.

SECTION 16010
ELECTRICAL - MOTOR SURVEY SHEET

Motor Name and Number P313 - SC BRIDGE HOIST MOTOR

Manufacturer WESTINGHOUSE

H.P. 5 Max. Ambient 40 °C

R.P.M. 1722 Service Factor 1.15

Volts 575 / / Insulation Class F

Phase 3 Time Rating CONT.

Frame 184T Time

Serial # 1-78S1750

Model #

Starter Type TELEMECANIQUE

Full Load Operating Amps A 5.3 B 5.6 C 5.5

Full Load Operating Voltage A-B 600 B-C 594 C-A 595
At Motor

Overload Relay Installed Adjustable Setting 6.5 AMP

M C P Amps Adjustable Setting

Acceleration Time (if over 7 seconds)

Reduced Voltage Starter Transition Time Setting

Special Controls and Remarks (Thermistor and Relay Type, Capacitors and where connected, etc.)

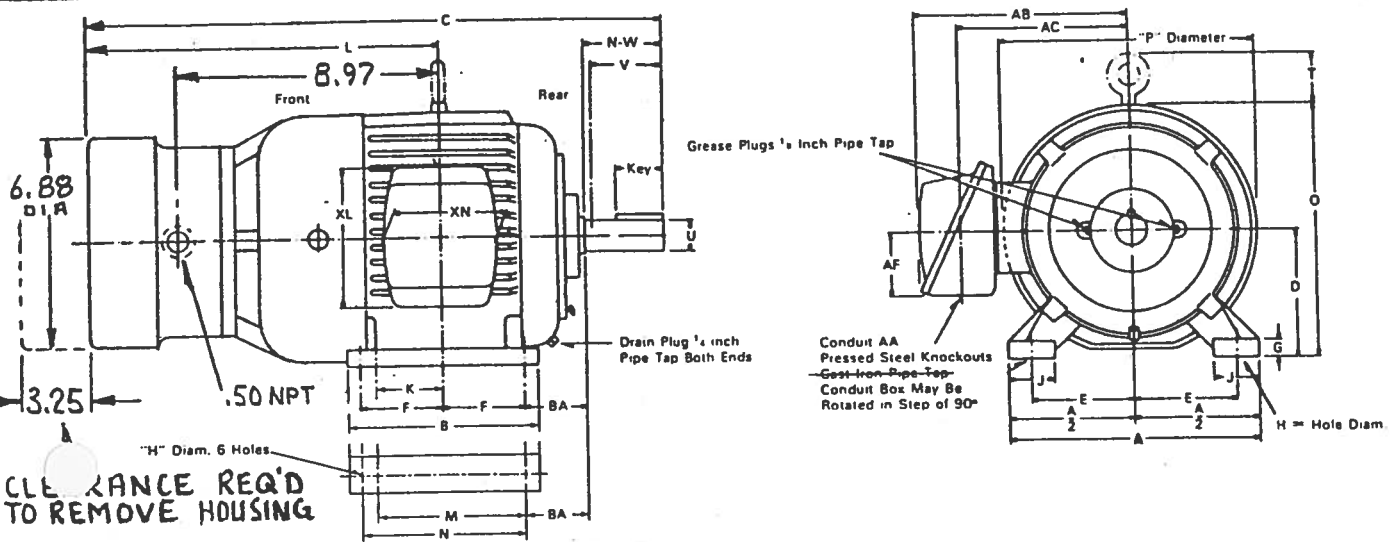


September 1981
New Information
Mailed to: 104, 305 and 355

TEFC, Explosion-Proof Frames
182T-215T Cast Iron
WITH STEARNS 15 FT LBS
DISC BRAKE - SERIES-55,000

Squirrel Cage Motors Life-Line T, Type HSB

Note: Not Suitable for Field Reverse — F2 Assy. Must be Specifically Ordered.



Dimensions, Inches Not to be used for construction purposes unless dimensions are approved.

Applying to each frame number

Frame No.	Drive End (Rear End)				End Opposite Drive End (Front End) ①			A	B	C	D ②	E	F	G	H	J	K	L	M	N	
	U ③	N-W	V	Key Size	FU ③	FN-FW	FV														Key Size
182-184T	1.125	2.750	2.50	.250x.250x1.750	.875	2.250	2.00	.187x.187x1.375	8.88	6.76	21.65	4.50	3.75	2.75	.62	.406	1.84	1.75	13.40	4.50	5.50
213-215T	1.375	3.375	3.12	.312x.312x2.375	1.125	2.750	2.500	.250x.250x1.750	10.40	8.50		5.25	4.25	3.50	.62	.406	1.96	2.00		5.50	7.00

Applying to each frame number

Frame No.	O	P	T	BA	XA	Approx. Net Wt., Lbs.
182-4T	9.50	9.60		2.75	4.93	100
213-5T	10.86	11.20	1.88	3.50	5.83	175

Common to each frame series

Frame Series	Conduit Box Dimensions						TEFC Cast Iron Box					
	TEFC Pressed Steel Box (standard)						AA	AB	AC	AF	XL	XN
182-4	1/2	1/2	7.88	6.42	2.38	5.50	4.88	8.30	6.62	2.68	5.62	4.76
213-5	1/2	1/2	8.70	7.25	2.38	5.50	4.88	9.12	7.44	2.68	5.62	4.76
Explosion Proof Box												
182-4	3/4	3/4	9.00	6.68	2.68	6.12	5.38					
213-5	3/4	3/4	9.82	7.50	2.68	6.12	5.38					

① "D" dimension will not be exceeded. When exact dimension is required, shims up to .03 of an inch may be necessary

② Manufacturer's allowance +.000, -.0005 for shaft dia. 1.500 and below

③ Double extended shaft furnished only when specially ordered. This front extension is not suitable for transmitting rated torque through belt drive.

Reproduced from Drawings 384-D-800, sub 9 and 384-D-900, sub 4

Approval
Purchaser:
Name... DORR OLIVER CANADA
Order No.... 24391
Machine No.....

For Motor:
Frame... 184T
Hp... 5 Rpm. 1800
Ph... 3 Cy. 6.0 Volts. 575
Style No... 78S1750B

Westinghouse Canada
Date Sept. 7/90
Approval. Roy Boddien
G.O. No. 10-6793
Item No.....

ELECTRIC MOTOR DATA SHEET	SHEET NO. <u>1</u> OF <u>1</u> DORCAN NUMBER <u>11798-1</u>
PLEASE RETURN PROMPTLY TOGETHER WITH CERTIFIED MOTOR DIMENSION PRINTS	

ALL MOTORS		HOIST DRIVE				
	SERVICE <u>BRIDGE SLUDGE CLARIF.</u>					
	MOTOR NUMBER	<u>7851750</u>				
	MANUFACTURER	<u>WESTINGHOUSE</u>				
	TYPE	<u>HSB</u>				
	FRAME DESIGNATION	<u>184T</u>				
	HORSEPOWER OUTPUT	<u>5</u>				
	TIME RATING/TEMP. RISE °C	<u>CONT/80</u>	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>
	RPM AT FULL LOAD	<u>1712</u>				
	VOLTAGE	<u>575</u>				
	FULL LOAD AMPS	<u>5.7</u>				
	* ENCLOSURE	<u>TEFC</u>				
	VERTICAL OR HORIZONTAL	<u>HORIZ.</u>				
	BEARINGS (SLEEVE OR BALL)	<u>BALL</u>				
	TYPE OF LUBRICATION	<u>GREASE</u>				
INSULATION CLASS	<u>F</u>					
ROTATION (VIEWED FROM END OPP. SHAFT)	<u>BI-DIRECT.</u>					
FULL LOAD TORQUE <u>LB-FT</u>	<u>15</u>					
STARTING TORQUE - % OF FULL LOAD	<u>185</u>					
EFFICIENCY - 100% LOAD	<u>85.9</u>					
- 75% LOAD	<u>86.3</u>					
- 50% LOAD	<u>81.9</u>					
SERVICE FACTOR	<u>1.15</u>					
IS THERMAL PROTECTION PROVIDED	<u>NO</u>					
WEIGHT <u>LBS.</u>	<u>125</u>					
PHASE	<u>3</u>					
FREQUENCY	<u>60</u>					
LOCKED ROTOR CURRENT	<u>37</u>					
POWER FACTOR - 100% LOAD	<u>80.2</u>					
- 75% LOAD	<u>73.7</u>					
- 50% LOAD	<u>64.3</u>					
NEMA DESIGN LETTER	<u>B</u>					
BREAKDOWN OR PULLOUT TORQUE - %	<u>260</u>					
TYPE OF WINDING	<u>-</u>					
SHUNT FIELD CURRENT	<u>-</u>					
ALLOWABLE WK ² OF LOAD <u>LB-FT²</u>	<u>27</u>					
SPACE HEATERS - WATTS/VOLTS	<u>- / -</u>	<u>/</u>	<u>/</u>	<u>/</u>	<u>/</u>	
TWO SPEED MOTORS - NO OF WINDINGS	<u>-</u>					
<u>TORQUE</u>	<u>-</u>					
THRUST BEARING CAPACITY - UP (LBS)	<u>-</u>					
CAPACITY - DOWN (LBS)	<u>-</u>					
NO LOAD CURRENT	<u>-</u>					
MOTOR <u>4W</u> STEARNS 15 LB-FT DISC BRAKE, SERIES <u>55,000</u>						

REV.	DESCRIPTION	DATE	BY
------	-------------	------	----

* ENCLOSURE: DRIPPROOF (DP), SPLASHPROOF (SP), WEATHER PROTECTED (WP), TOTALLY ENCLOSED NON-VENTILATED (TENV), TOTALLY ENCLOSED FAN COOLED (TEFC), TOTALLY ENCLOSED PIPE VENTILATED (TEPV), ETC., EXPLOSIONPROOF XP, TO INDICATE GUARDED ADD 'G'.



Westinghouse Motor Company Canada Ltd.

Box 2510
Hamilton, Ontario
L8N 3K2
Telephone (416) 528-8811

CERTIFIED ELECTRICAL TESTS

CUSTOMER: DORR OLIVER CANADA
G.O.: 10-6793

Order No.: 24391

Serial #: 78S1750
Page No. 1 OF 1

CERTIFIED TESTS
ALTERNATING CURRENT MOTOR TEST OBSERVATION FORM

Type of Motor: HSB Fr. Size: 184T Encl.: TEFC L.H.: 82594A
5 HP 1800 RPM Syn. Speed, 3 Ph. 60 Hz 575 Volts

COLD RESISTANCE

T1-T2:4.80 @ 23°C Wdg. Det.: ohms @ °C
T2-T3:4.80 Loop Res.: ohms @ °C
T1-T3:4.80 Brg. Det.: D.E. N.D.E. ohms @ °C
Loop Res.: ohms @ °C
Heaters:

VIBRATION - PEAK TO PEAK AMPLITUDE

LEADS TAGGED FOR ROTATION

Horizontal Motor D.E. N.D.E. VIEW:
Cl ed Rubber Clamped
H Mils H Mils SHAFT CURRENTS @ OHMS
V Mils V Mils SHORT ON = Volts
A Mils A Mils SHORT OFF = Volts

COMMERCIAL NO LOAD TEST

VOLTS VOLTS VOLTS AMPS AMPS AMPS WATTS TOTAL KW RPM
XI XI XI XI XI XI XI XI
549 554 555 2.21 2.40 2.52 342 .342 1800

3 PHASE LOCKED ROTOR

1 PH. LOCKED ROTOR

Wound Rotor
Open Circuit Secondary Volts @ V

VOLTS AMPS TORQUE LB.FT. VOLTS AMPS
XI XI XI XI XI
549 26.8
Cold Res. @ °C
M1 - M2 ohms
M2 - M3 ohms
M1 - M3 ohms

DIELECTRIC FOR 1 MINUTE

Stator Winding 2640 Volts =
Heaters Volts =
Wdg. Temp. Det. Volts =
Brg. Det. Volts =
Wound Rotor Sec. Volts =

INSULATION RESIS. @ Volts
Stator Winding = Megohms
Heaters = Megohms
Wdg. Temp. Det. = Megohms
Brg. Det. = Megohms
Wound Rotor Sec. = Megohms
Shields To Ground = Megohms

Tested By: R. Ferguson
Witnessed By:

Approved By: [Signature]
Date: September 10, 1990

SECTION 16010
ELECTRICAL - MOTOR SURVEY SHEET

Motor Name and Number P311 - BDM BRIDGE DRIVE MOTOR

Manufacturer WESTINGHOUSE

H.P. 1.5 - 1.5 Max. Ambient 40 °C

R.P.M. 1767 884 Service Factor 1.15

Volts 575 / / Insulation Class F

Phase 3 Time Rating CONT.

Frame 213T Time _____

Serial # 1-78S2495

Model # _____

Starter _____ Type TELEMECANIQUE

Full Load Operating Amps _____ A 4.1/2.1 B 4./2 C 2.1/2.2

Full Load Operating Voltage _____ A-B 600/600 B-C 594/590 C-A 592/593
At Motor

Overload Relay Installed _____ Adjustable
Setting 4 + 2.5 AMP

M C P Amps _____ Adjustable
Setting _____

Acceleration Time (if over 7 seconds) _____

Reduced Voltage Starter Transition Time Setting _____

Special Controls and Remarks (Thermistor and Relay Type, Capacitors and where
connected, etc.)

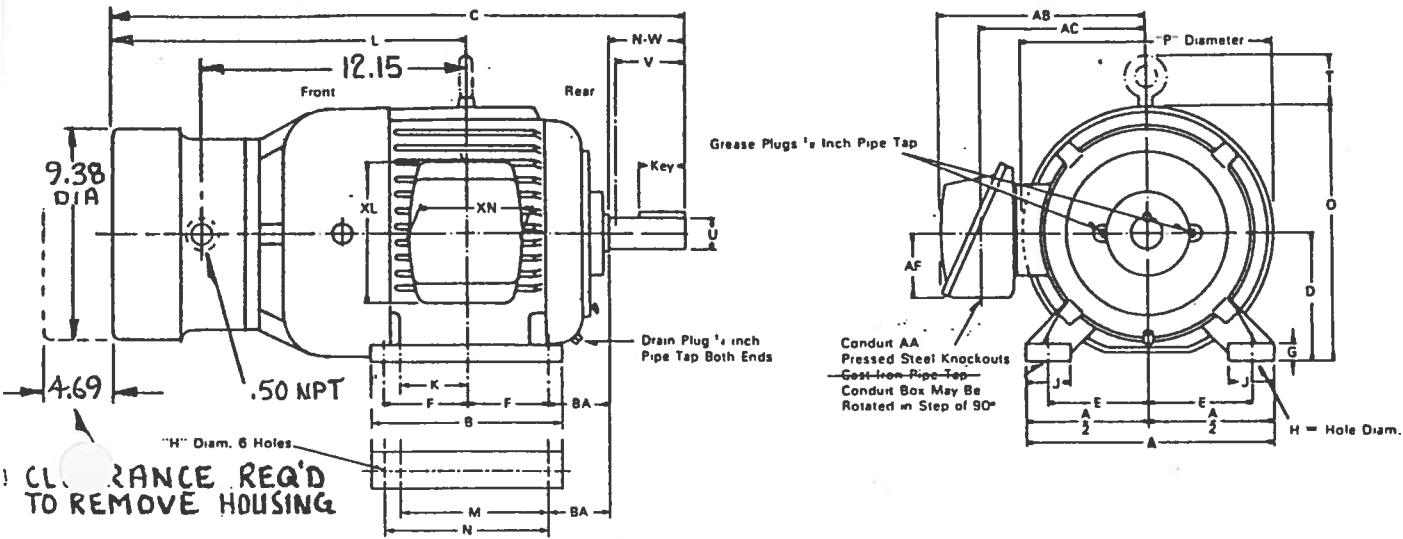


September 1981
New Information
Mailed to: 104, 305 and 355

TEFC, Explosion-Proof Frames
182T-215T Cast Iron
**WITH STEARNS 6 FT LBS
DISC BRAKE - SERIES - 87,000**

**Squirrel Cage Motors
Life-Line T, Type HSB**

Note: Not Suitable for Field Reverse — F2 Assy. Must be Specifically Ordered.



Dimensions, Inches Not to be used for construction purposes unless dimensions are approved.

Applying to each frame number

Frame No.	Drive End (Rear End)			Key Size	End Opposite Drive End (Front End) ①			A	B	C	D ②	E	F	G	H	J	K	L	M	N	
	U ③	N-W	V		FU ④	FN-FW	FV														Key Size
182-																					
184T	1.125	2.750	2.50	.250x.250x1.750	.875	2.250	2.00	.187x.187x1.375	8.88	8.78		4.50	3.75	2.75	.82	.406	1.84	1.75		4.50	5.50
213-																					
215T	1.375	3.375	3.12	.312x.312x2.375	1.125	2.750	2.500	.250x.250x1.750	10.40	8.50	28.10	5.25	4.25	3.50	.62	.406	1.96	2.00	17.72	5.50	7.00

Applying to each frame number

Frame No.	O	P	T	BA	XA	Approx. Net Wt., Lbs.
182-4T	9.50	9.60		2.75	4.93	100
213-5T	10.86	11.20	1.88	3.50	5.83	175

Common to each frame series

Frame Series	Conduit Box Dimensions						TEFC Cast Iron Box						
	TEFC Pressed Steel Box (standard)						AA	AB	AC	AF	XL	XN	
182-4	1/2	1/2	7.88	6.42	2.38	5.50	4.88	1/2	8.30	6.62	2.88	5.62	4.76
213-5	1/2	1/2	8.70	7.25	2.38	5.50	4.88	1/2	9.12	7.44	2.88	5.62	4.76
Explosion Proof Box													
182-4	1/2	1/2	9.00	6.68	2.68	6.12	5.38						
213-5	1/2	1/2	9.82	7.50	2.68	6.12	5.38						

① "D" dimension will not be exceeded. When exact dimension is required, shims up to .03 of an inch may be necessary
 ② Manufacturer's allowance +.000, -.0005 for shaft dia. 1.500 and below
 ③ Double extended shaft furnished only when specially ordered. This front extension is not suitable for transmitting rated torque through belt drive.

Reproduced from Drawings 384-D-800, sub 9 and 384-D-900, sub 4

Approval

Buyer:
Name...DORR, OLIVER CANADA.
Order No. 24391
Machine No.

For Motor:
Frame...213T.....
Hp...1.5..... Rpm 1800/900
Ph...3 Cy. 60 Volts 575
Style No...78S2495B.....

Westinghouse Canada
Date Sept. 7/90
Approval...R. Bodden
G.O. No. 10-6793
Item No.

ELECTRIC MOTOR DATA SHEET

SHEET NO. 1 OF 1
DORCAN NUMBER 11798-1

PLEASE RETURN PROMPTLY TOGETHER WITH CERTIFIED MOTOR DIMENSION PRINTS

ALL MOTORS	SERVICE	BRIDGE SLUDGE CLARIF.	BRIDGE DRIVE				
	MOTOR NUMBER		7852495				
	MANUFACTURER		WESTINGHOUSE				
	TYPE		HSB				
	FRAME DESIGNATION		213T				
	HORSEPOWER OUTPUT		1.5				
	TIME RATING/TEMP. RISE °C		CONT/80	/	/	/	/
	RPM AT FULL LOAD		1769/886				
	VOLTAGE		575				
	FULL LOAD AMPS		1.8/3.7				
* ENCLOSURE		TEFC					
VERTICAL OR HORIZONTAL		HORIZ.					
BEARINGS (SLEEVE OR BALL)		BALL					
TYPE OF LUBRICATION		GREASE					
INSULATION CLASS		F					
ROTATION (VIEWED FROM END OPP. SHAFT)		BI-DIRECT					
FULL LOAD TORQUE	LB-FT		4/9				
STARTING TORQUE - % OF FULL LOAD			346/331				
EFFICIENCY - 100% LOAD			81.2/75.6				
- 75% LOAD			79.4/72.0				
- 50% LOAD			75.0/65.6				
SERVICE FACTOR			1.15				
IS THERMAL PROTECTION PROVIDED			NO				
WEIGHT	LBS.		200				
PHASE			3				
FREQUENCY			60				
LOCKED ROTOR CURRENT			16/16				
POWER FACTOR - 100% LOAD			76.1/40.7				
- 75% LOAD			67.9/33.3				
- 50% LOAD			55.8/25.3				
NEMA DESIGN LETTER			B				
BREAKDOWN OR PULLOUT TORQUE - %			533/513				
TYPE OF WINDING			-				
SHUNT FIELD CURRENT			-				
ALLOWABLE WK ² OF LOAD			8.6/45				
SPACE HEATERS - WATTS/VOLTS			-/-	/	/	/	
TWO SPEED MOTORS - NO OF WINDINGS			ONE				
CONSTANT HP			YES				
THRUST BEARING CAPACITY - UP (LBS)			-				
CAPACITY - DOWN (LBS)			-				
NO LOAD CURRENT			-				
MOTOR C/W STEARNS 6 LB-FT DISC BRAKE, SERIES 87,000							

A-C MOTORS
S.C. CAGE
D-C
SPECIAL FEATURES

REV.	DESCRIPTION	DATE	BY
------	-------------	------	----

* ENCLOSURE: DRIPPROOF (DPI), SPLASHPROOF (SPI), WEATHER PROTECTED (WP), TOTALLY ENCLOSED NON-VENTILATED (TENVI), TOTALLY ENCLOSED FAN COOLED (TEFC), TOTALLY ENCLOSED PIPE VENTILATED (TEPV), ETC., EXPLOSIONPROOF XP. TO INDICATE GUARDED ADD 'G'.



Westinghouse Motor Company Canada Ltd.
CERTIFIED ELECTRICAL TESTS

Box 2510
 Hamilton, Ontario
 L8N 3K2
 Telephone (416) 528-8811

CUSTOMER: DORR OLIVER CANADA LTD.
 G.O.: 10-6793 Order No.: 24391

Serial #: 1-78S2495B
 Page No. 1 OF 1

CERTIFIED TESTS
ALTERNATING CURRENT MOTOR TEST OBSERVATION FORM

Type of Motor: HSB Fr.Size: 213T Encl.: TEFC L.H.: 77600A
 1.5 HP 1800/900 RPM Syn. Speed, 3 Ph. 60 Hz 575 Volts

COLD RESISTANCE

T1-T2:10.51 @ 22°C Wdg.Det.: ohms @ °C
 T2-T3:10.51 Loop Res.: ohms @ °C
 T1-T3:10.51 Brg.Det.: ohms @ °C
 Loop Res.: ohms @ °C
 Heaters: 240 ohms @ 22°C

VIBRATION - PEAK TO PEAK AMPLITUDE

Horizontal Motor			Vertical Motor			LEADS TAGGED FOR ROTATION		
D.E.	N.D.E.		0°	90°		VIEW:		
Mils H	Mils	Top	Mils	Top	Mils	SHAFT CURRENTS @	OHMS	
Mils V	Mils	Mid	Mils	Mid	Mils	SHORT ON =	Volts	
Mils A	Mils	Bott	Mils	Bott	Mils	SHORT OFF =	Volts	
			Axial	Mils				

COMMERCIAL NO LOAD TEST

VOLTS X1	VOLTS X1	VOLTS X1	AMPS X1	AMPS X1	AMPS X1	WATTS X1	TOTAL KW X1	RPM
554	559	556	1.36	1.26	1.38	237	.237	1800
550	556	552	3.67	3.64	3.75	386	.386	900

3 PHASE LOCKED ROTOR

1 PH. LOCKED ROTOR

Wound Rotor
 Open Circuit Secondary Volts @ V

VOLTS X1	AMPS X1	TORQUE LB.FT. X1	VOLTS X1	AMPS X1
			546	13.9

Cold Res. @ °C
 M1 - M2 ohms
 M2 - M3 ohms
 M1 - M3 ohms

DIELECTRIC FOR 1 MINUTE

INSULATION RESIS. @ Volts

Stator Winding	2640 Volts =	Stator Winding	=	Megohms
Heaters	1500 Volts =	Heaters	=	Megohms
Wdg.Temp. Det.	Volts =	Wdg.Temp.Det.	=	Megohms
Brg.Det.	Volts =	Brg.Det.	=	Megohms
Wound Rotor Sec.	Volts =	Wound Rotor Sec.	=	Megohms
		Shields To Ground	=	Megohms

Tested By: R. FERGUSON
 Witnessed By: _____

Approved By: [Signature]
 Date: OCTOBER 26, 1990.



December, 1986
Supersedes issue dated May, 1985

Installation, Operation and Maintenance
180T to 500 Frame motors, Rolling
Bearings, Horizontal, and Vertical
Normal Thrust, 3 Phase, Drip-proof and
Totally Enclosed

Squirrel Cage and Wound Rotor Induction Motor

Receiving

1. If there is shipping damage, place a claim on the carrier.
2. Remove shipping braces, if any. If motor is to be reshipped, reinstall shaft shipping braces to prevent damage to the bearings.

Storage

Store motors in a clean, well ventilated, and heated location. Energize the motors' space heaters if provided. Remove drain plugs unless provided with optional drain fittings, as totally enclosed motors "breathe" and moisture condenses inside. Before start-up, check insulation resistance as instructed under MAINTENANCE. After 1-2 months storage we recommend motors with rolling bearings have shafts rotated on a monthly basis to redistribute the lubricant and minimize brinelling and/or corrosion.

Location

Locate the motor in an area where nothing obstructs the motors ventilating air.

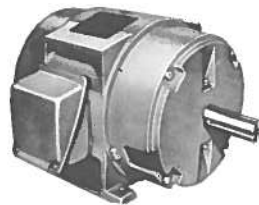
1. Drip-proof motors are for clean and non-corrosive locations.
2. Totally enclosed, motors are for dirty, moist, corrosive, or outdoor locations.
3. Motors for hazardous locations are CSA approved for the Classification stated on the nameplate. Dismantling or repair may invalidate this approval and require local electrical inspection authority approval. Because your Westinghouse Industry Service Centre recognizes the hazardous location features, have only your Westinghouse Industry Service Centre repair motors for hazardous locations.

Electrical Connections

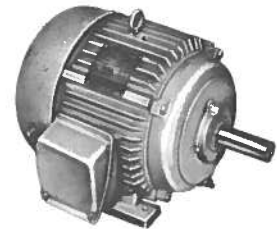
1. Megger the windings and dry out if the insulation resistance is lower than recommended under MAINTENANCE.
2. Connect motor to the correct power supply. Parallel leads are marked to aid in proper connection.
3. Install all wiring in accordance with Canadian Electrical and local codes.
4. The conduit box may be rotated in steps of 90 degrees.
5. Connect motor auxiliary devices, such as space heaters or temperature sensors, in proper circuits and insulate from motor power cables.

Wound Rotor Motors

1. Connect cables from secondary control to rotor leads in the main conduit box.



Drip-proof Horizontal



Fan Cooled Horizontal



Drip-proof Vertical



Weather Protected II

- See nameplate attached to motor for identity of leads. On motors supplied with a squeeze connector, bring the secondary control cables through the squeeze connector and connect to the terminals provided on the brushholders.
2. Brushes must make good contact with slip rings over the whole face of the brush. If needed, seat brushes with fine glass-paper. Do not use lubricants. Service parts are provided for inspection of slip rings and brushes. Spring pressure is preset at about 1 lb. on 254 to 286T frames, and 4 lb. on 324 to 449T frames.
 3. Operate the motor under load with the brush inspection ports open until the slip rings form a proper film.
 4. Keep slip rings smooth and true. Machine if necessary to restore proper surface for brushes.
 5. Replacement brushes must be the same grade as supplied by the factory.
Warning: Keep the brush holders and brush rigging free from carbon dust. Prolonged low or high load may cause excessive dusting. If excessive dusting persists, provide your Westinghouse service centre with nameplate data, average load and unusual conditions.

Installation

Grease lubricated motors (except drip-proof 3600 RPM Frames 360TS-440TS and

TEFC/TEXP 440T, all speeds may be mounted in any position. However, motors which have been specified for vertical mounting are equipped with special covers and drain holes.

Assure that the motor does not rock on its base and, to allow movement for aligning, select the largest standard size bolts that will fit loosely in the mounting holes.

Check that the rotor turns freely by hand. Apply voltage momentarily to check direction of rotation. If incorrect, allow motor to stop before interchanging any two leads. Reverse the external fan on its shaft if a unidirectional totally enclosed fan cooled motor is required to operate in a direction opposite to its direction plate.

Caution: Shrink fit sheaves, couplings, sprockets or pinions onto the motor shaft. Do not hammer them on.

Direct Drive

1. Mount a balanced flexible coupling.
2. Parallel alignment of shafts must be within .001" (.002" indicator runout). Angular alignment of shafts must be within .002" per foot of coupling diameter (.004" indicator runout).
3. Dowel the motor to its base. Use two dowels minimum.

Vee-Belt Drive

1. The sheave diameter must not be smaller than the EEMAC minimum unless Westinghouse approves.
2. Allowing for rotor end play, mount the sheave to just clear the Motor housing. If the centre of belt pull is beyond the end of the shaft, the sheave is too wide.
3. Mount the motor on slide rails or base to allow belt adjustment and accurately align the sheaves.
4. Adjust the belts to slip slightly ("chirp") when starting but not when on full load. Because the tension drops rapidly during run-in, check that the tension is within these limits at 20 and 50 hrs. of operation and then periodically.

Warning : The motor's shaft and bearing will likely be overloaded if the belts are adjusted to the belt manufacturer's recommended tension on a belt drive that has more capacity than needed for the motor's rating. To avoid such overload be sure that the belts are loose enough to "chirp" during starting or momentary overload.

Chain Drive

1. Allowing for rotor end play, mount the sprocket to just clear the motor housing.
2. Mount the motor on slide rails or base to allow for chain adjustment and accurately align the sprockets.

Gear Drive

1. Allowing for rotor end play, mount the gear to just clear the motor housing.
2. Accurately align and mesh the gears.
3. Dowel the motor to its base.

Flange Motors

1. Check that the mating surfaces are free from dirt and burrs and engage solidly with the driven equipment.
2. Mount the motor and assure that the shaft or bearings are not stressed from mis-alignment or thrust.

Start Up

1. Connect power. The motor should start quickly and run smoothly. If not, shut off at once. Completely re-check the assembly and wiring before restarting.
2. If vibration is over .2 in. per sec. velocity, check for misalignment, loose mounting bolts, too flexible a motor base, unbalanced coupling or vibration from adjacent machinery.
3. Check current against nameplate rating when the motor is operating on load.

Starts

Every start reduces motor life, the following is a condensed guide :

1. Maximum starting time for any one start : 15 sec.

2. Maximum starting time for any one hour : 35 sec.
3. For reasonable motor life do not exceed 150 sec. total starting time in 8 hrs.
4. On part winding start motors — check with factory.

Maintenance

Excessive dirt, moisture, heat and vibration account for 90% fo all motor failures.

1. Keep motors clean outside and in. Wipe and vacuum periodically.
2. Keep dry. Avoid hosing. Totally enclosed motors "breathe". Unless provided with special drain fittings, periodically remove the drain plugs in the end brackets to drain condensed water. If conditions allow, leave the drains open. "Megger" the winding of motors going into service and motors on stand-by duty. Dry-out, if insulation resistance in megohms is less than rated KV plus one. e.g. for 2300V, min R = 3.3 MΩ.
3. If bearing temperature rises rapidly or reaches 85°C, check for: overgreasing, insufficient or incorrect lubricant, excessive belt tension, poor alignment, lack of end play, excessive end or side thrust, obstructed ventilation. If motor exceeds nameplate temperature rating, check for: overload, dirt in air passages, obstructed ventilation and current unbalance or single phasing.
4. Avoid vibration. If motor vibrates, check for: Vibrating driven equipment, mis-alignment, foundation settling, loose mounting bolts, loose coupling or sheave, excessive belt tension, dirty rotor, unbalanced coupling, defective bearings, uneven airgap.

Grease Lubrications: Type of Grease

Use the lubricant specified on the lubrication plate. If no lubrication plate is attached to the motor, the bearings contain Shell Cyprina C3 which gives good bearing and grease life when the ambient is in the -40°C to 40°C temperature range. The other greases listed below are lithium based and compatible but some have a narrower temperature range. If requested, Westinghouse Canada will recommend greases for extreme temperatures.

B.P. Energrease LG2	B.P. Oil Ltd.
Crown Medium	Gulf Oil Can. Ltd.
Cyprina C3	Shell Canada Ltd.
Multifak # 2	Texaco Canada Ltd.
Prestige #42	Sun Oil Ltd.
Esso Unitol and MPH	Imperial Oil
Chevron SRI-2	Std Oil of Cal.
Alvania #2	Shell Canada Ltd.

Greasing Interval

Regrease bearings operating continuously at 60°C max. as follows :

Speed Rpm	Frame Size		
	140T-280T	320T-440T	Over 440T
Up to 2000	36 months	24 months	18 months
Over 2000	24 months	18 months	12 months

Use proportionately longer intervals for motors not running continuously and halve these intervals for high dirt, temperature, shock or vibration conditions. In addition, quarter the interval for belt drives.

Regreasing Procedure

Use clean grease fittings. Fit grease ripples if the motor does not have them, and remove the grease escape plugs if provided. Using adequate grease gun extension to avoid rotating parts regrease while the motor is running using not more than the following : Do not overgrease.

Shaft Diameter (at Face of Bracket)	Amount to add	
	cu. in.	oz.
up to 1"	.125	0.1
over 1" to 2"	.375	0.3
over 2" to 3"	1.0	0.8
over 3" to 4"	2.5	2.0
over 4" to 5"	5.0	4.0

Run the motor ten minutes minimum before replacing grease escape plugs. Some smaller ratings use prelubricated bearings and do not have grease fittings.

Repair and Renewal Parts

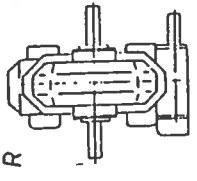
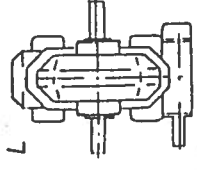
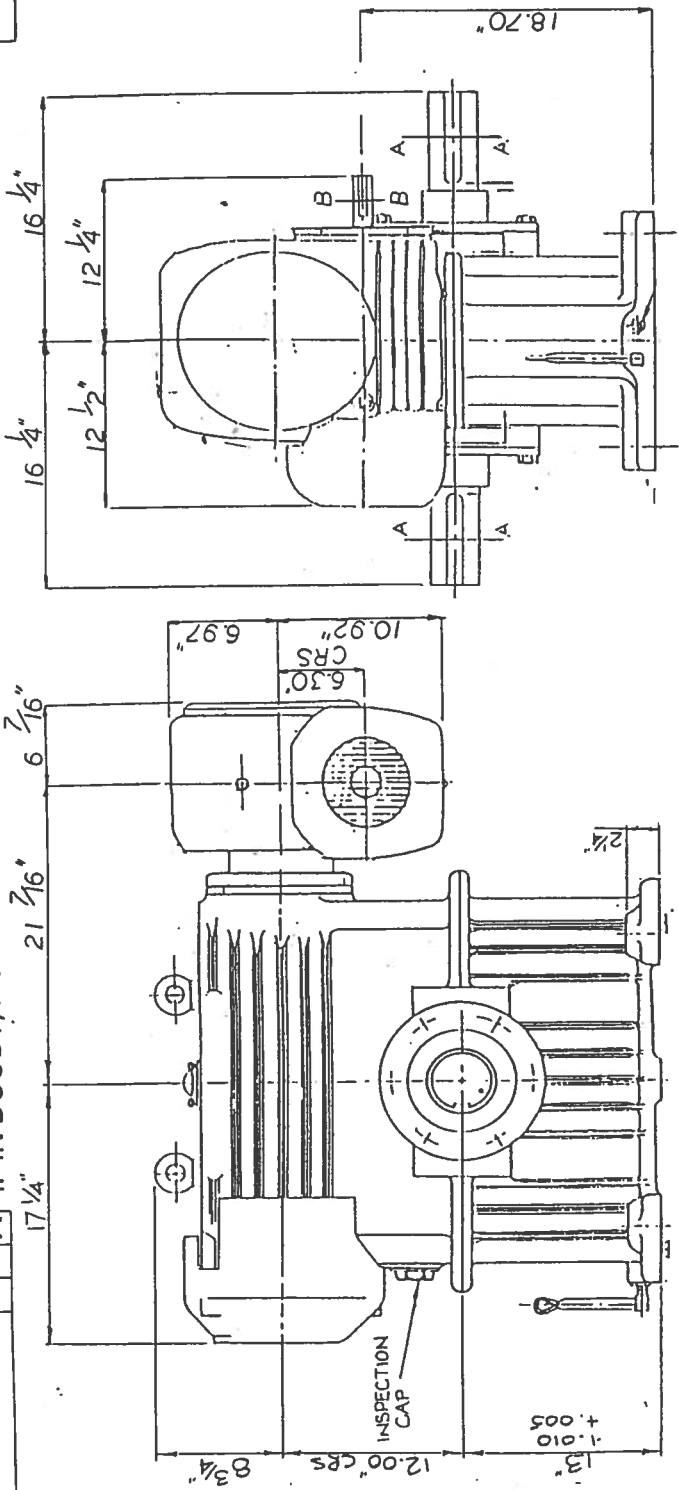
Do not operate a defective motor to its detriment. If you need help, call the nearest Westinghouse Sales or Industry Service Centre, describe required parts, and give the motor's complete nameplate information. Identify and obtain shipping instructions before returning any item. Westinghouse Canada is not responsible for material returned nor for warranty repair costs incurred without prior Westinghouse approval.

Warranty

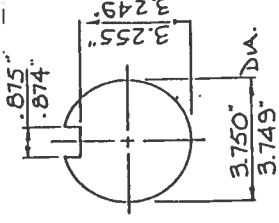
Westinghouse Canada warrants the apparatus to be of the kind designated or specified and shall repair or replace any defective parts, f.o.b. the Company's factory, Apparatus Service Centre or warehouse, which prove to be defective under proper storage and use within one year from shipping date, provided that the Purchaser gives the Company immediate written notice of any such defects. In no event (including, but not limited to the negligence of the Company, its employees or agents) shall the Company be liable for special or consequential damages or damages for loss of use. On expiration of the Warranty period, any liability of the Company shall terminate. This constitutes the only Warranty of the Company and no other warranty or condition, statutory or otherwise, shall apply.

THIS CASE IS NOT DESIGNED TO TAKE ANY EXTERNAL LOADS OTHER THAN THOSE SPECIFIED

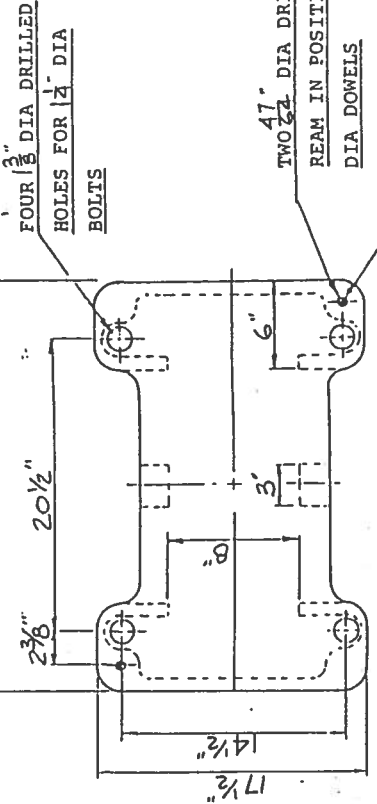
A IF IN DOUBT, ASK



HANDING DIAGRAMS



SECTION A-A



DETAILS OF BASE LOCKING ON TOP

CERTIFIED FOR CONSTRUCTION

Customer .DOOR...OLIVER.....

Cust. Order ...2.4400.....

D.B. W.O.2.322.....

DAVID BROWN GEAR INDUSTRIES INC.

1125 SQUIRES BEACH RD.

PICKERING, ONTARIO L1W 3T9

DATE July 9/90. BY B. Carrigan

CLIENTS ORDER NO.	24400
ESG: ORDER NO.	2322
QUANTITY	1
RATIO	1000
HANDING	2 L

ARRANGEMENT OF RADICON
AOD-12 D/E OUTPUT
MUST NOT BE SCALED SCALE NTS

DAVID BROWN GEAR INDUSTRIES LIMITED

5R12 03 A

ALTERNATIONS	1
DRAWN	BC
CHECKED	
DATE	July 90

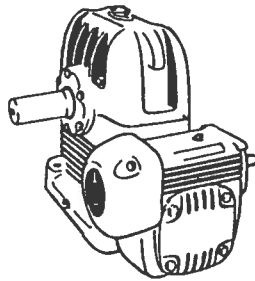
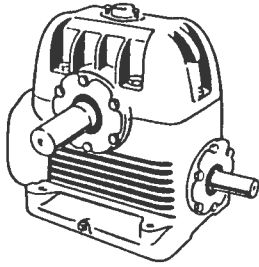
UNLESS SPECIFIED OTHERWISE MACHINED DIMENSIONS ±

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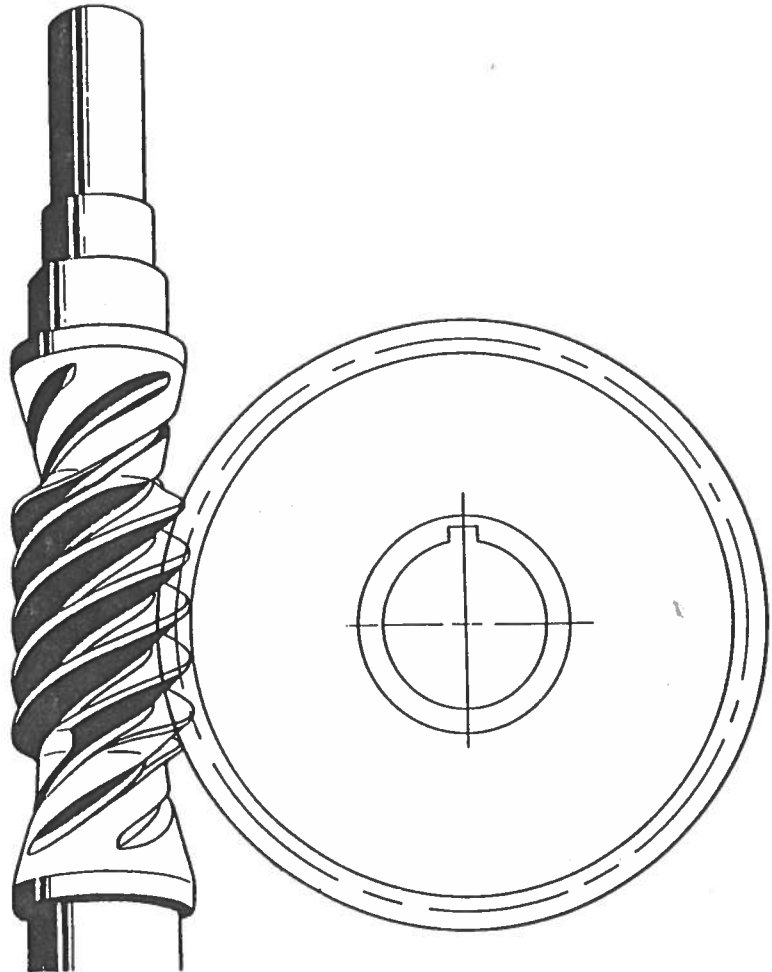
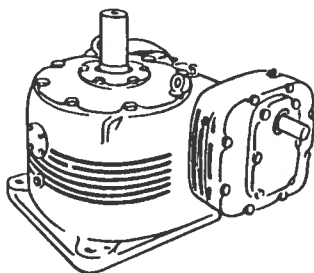
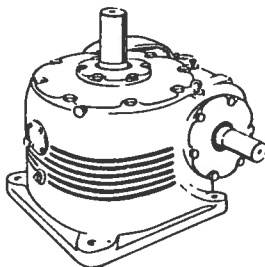
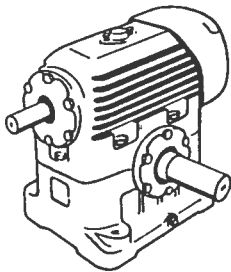
RADICON



SOLID FOOT



Installation
Maintenance
Parts lists



DAVID BROWN GEAR INDUSTRIES INC.
60 Emblem Court
Agincourt, Ontario M1S 1B1
Telephone: (416) 291-9735 Telex: 065-25153

DAVID BROWN GEAR INDUSTRIES INC.
255 Boul. Roland Therrien, Suite 102
Longueuil, Québec J4H 4A6
Téléphone: (514) 526-2815 Téléc: 05-268731

Identification

HOW TO IDENTIFY YOUR UNIT

1 All gear units are stamped with an individual six figure number and the year of manufacture for identification purposes. This is in the form:

R430852/70

An enquiry to David Brown quoting this order number will enable us to identify the basic standard gear unit.

NOTE: Units manufactured before 1969 will have the six figure number only and units prior to 1966 will not carry the year of manufacture.

2 All gear units are inscribed with a six digit David Brown - Canada shop number. For example: 612023. This number will provide full details of the order and whether modification was made to the basic standard unit.

3 All gear units have also a code number on the nameplate for identification purposes. This is in the form:

AU	700	30	L.H.
Type	Size	Ratio	Handing

By using this reference in conjunction with the above, your gear unit can be identified.

Mounting

Foot-mounted Units

Gear unit and prime mover should preferably be installed on a common bedplate and any foundation used should be rigid so as to minimise the effect of varied or heavy loads.

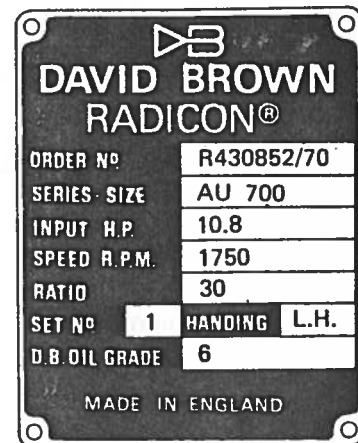
When lowering a bedplate onto its foundation, flat steel packings should be used. Place these on either side of each foundation bolt as close as possible. In this position support is given in the plane of the coupling faces.

During final bolting down take care to avoid springing the bedplate; this can cause strains in the gear casing resulting in errors of alignment of shafts and gearing. Finally, check alignment of assembly as detailed on page 3.

For units not mounted on bedplates, first line up as detailed on page 3, then select any two diagonally opposite feet, drill, ream and dowel in position.

Note: The letter A (type designation AU) denotes units manufactured to American Standards. Units to Metric Standards carry the letter C, i.e. CU, while units manufactured to British Standards have the letter B, i.e. BU.

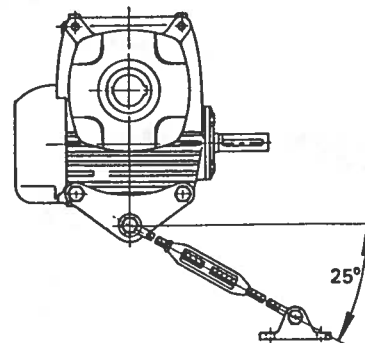
When ordering replacement parts quote full particulars from the nameplate. Replacement parts cannot be identified without proper information.



Check your stock of replacement parts. For a running period of three years we normally recommend that bearings and oil seals are held. We will be pleased to make specific recommendations on request.

Shaft-mounted Units

Shaft-mounted units should be fitted as close as possible to a bearing on the driven machine and locked in position axially. CAS and CASM type units are provided with grub screws in the hubs for axial location.



Torque arm position types CAS-CASM

The torque arm should be loaded in tension and the angle between the input shaft centre line and the torque arm MUST NOT EXCEED 25° (See drawing).

Note: There must be two torque arms fitted if a reversing drive is required. For units required to operate at angles greater than 25° consult David Brown.

Installation

The Radicon speed reducer is a specialized product incorporating the very best in worm gear design. It is a self-contained unit of simple construction, involving a minimum number of moving parts and embodying an automatic lubrication system which ensures a positive supply of lubricant to gears and bearings at all normal running speeds. Adaptable and HW type Radicons are factory filled with synthetic lubricant and with proper installation should require no further attention.

Other Radicon units employ splash lubrication and are supplied either with or without bedplates. Of the former arrangement, units are coupled to the motors and both are dowelled to the bedplates, thus ensuring correct alignment.

This publication outlines all necessary steps for the correct installation and maintenance of the unit and following this sequence will help ensure that high efficiency is maintained in operation.

Ensure that the baseplate, where fitted, is rigid and not distorted.

Check the alignment after grouting baseplate.

Check that the unit is lined up correctly.

Fill to correct level with approved lubricant — all units are despatched without oil except the Adaptables and the HW range, which are factory filled with synthetic lubricant.

Do not overfill — correct level is by dipstick or plug.

Make sure that the breather if fitted is clean.

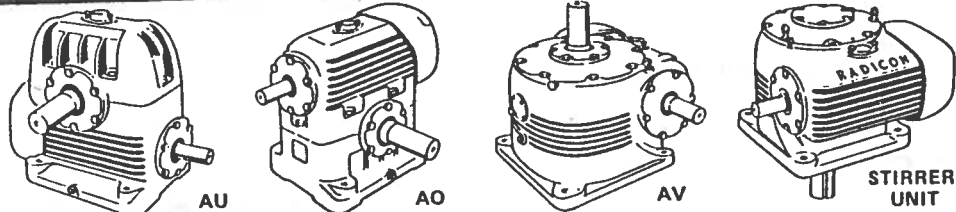
Check motor wiring for correct direction of rotation, this is important when holdback device is fitted.

Mount guard/s in accordance with Safety Regulations.

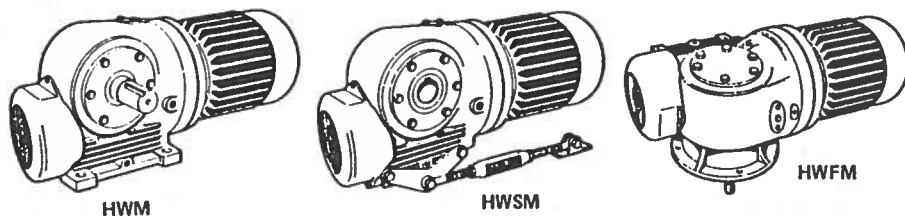
Quote order number and unit code number when ordering replacement parts.

If in doubt consult David Brown.

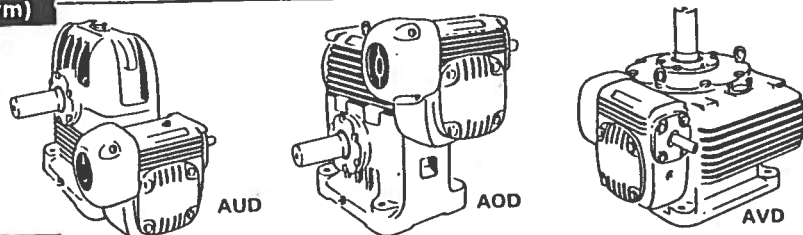
SINGLE REDUCTION UNITS



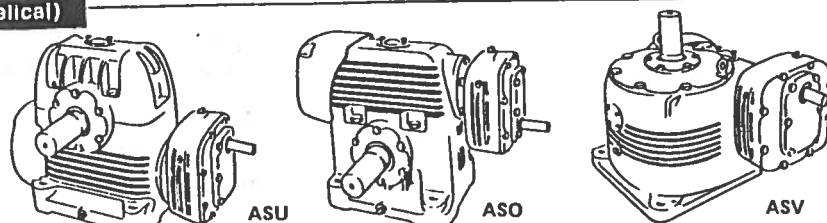
HELICAL/WORM UNITS



DOUBLE REDUCTION (Worm)



DOUBLE REDUCTION (Helical)



This type of unit is now obsolete and no longer catalogued. Please check for availability.

SHAFT ALIGNMENT

Whilst no general rule can be laid down for permissible errors in lining up, we recommend that for flexible couplings the faces be true to within 0.05 mm. (0.002 in.) + 0.0002D (where D = shaft diameter) and the peripheries within 0.1 mm. (0.004 in.). With rigid type couplings these figures should be halved.

Errors of alignment are either of angularity (Fig. 1) or eccentricity (Fig. 2) or a combination of both.

Errors of Angularity

These should be corrected before any attempt is made to eliminate errors of eccentricity. The procedure is shown in Fig. 3 using a thickness gauge in conjunction with feeler gauges. Readings should be taken in positions 1, 2, 3 and 4 with any axial float taken up.

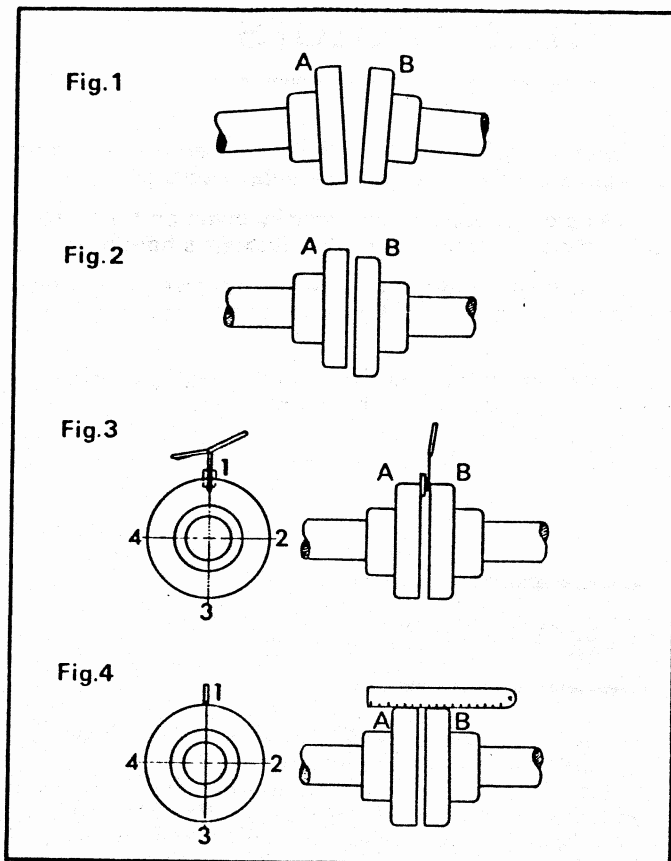
Errors of Eccentricity

These occur when the centre lines of shafts do not intersect (Fig. 2). Where the misalignment is in the vertical plane it can be corrected by altering the height of either unit by means of packing shims placed under the feet.

When the error is in the horizontal plane, correction may be made by moving one of the units transversely until set in the required position.

If both coupling halves are of the same diameter their concentricity can be checked with the use of a straight edge as shown in Fig. 4. If the coupling diameters are not equal, a straight edge should be used in conjunction with a feeler gauge equal to half the difference in diameter.

Extra care should be taken where taper roller bearings are fitted to ensure that alignment is checked with shafts in mid-point position and a final check made with the unit at operating temperature.



The Adaptable type of unit is lined up with the feet positioned so that the shaft is in the desired assembly position and the feet bolts should be screwed home to thumb tightness. When securing the assembled unit onto its foundations it is important that the locating pads under the feet are seated correctly, as possible distortion when tightening the bolts may cause errors of alignment or worse, breakage. Hole clearances in the feet provide a degree of flexibility so that the unit may then be lined up accurately and final bolt adjustment made.

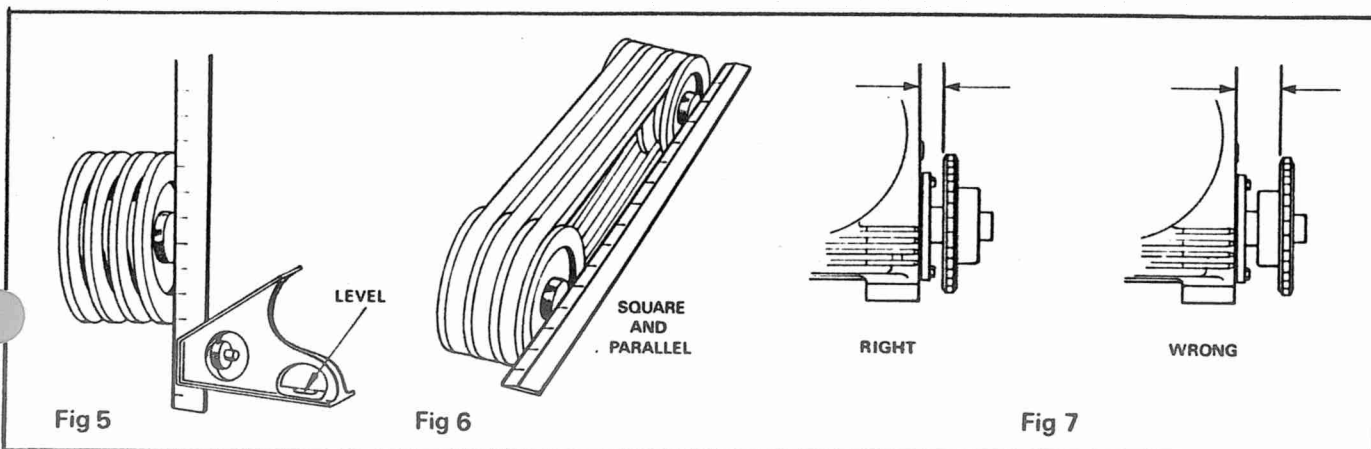
Chain and Belt Drives

Mount sprockets or pulleys as close to the gear unit as possible to avoid undue bearing loads and shaft deflection. See Fig 7

Chains and belts should be sufficiently tight to prevent slip. **OVER TIGHTENING CAN CAUSE DAMAGE TO THE UNIT.** Consult manufacturers' recommendations.

Check that driving and driven shafts are square and parallel using straight edge as in Fig. 6

Check horizontal shaft alignment using combined square and level as in Fig. 5



NOTE: Check the alignment after running the unit until it has attained its normal working temperature. Adjust alignment as necessary.

Electric motors

Check that the voltage range specified on the motor nameplate corresponds with the supply voltage.

Wiring instructions are normally given on the motors but, if in doubt, consult the manufacturer's handbook.

Check that the motor is wired to give the correct direction of rotation. This is very important for units fitted with holdback.

To obtain the desired direction of rotation it may be necessary to interchange the supply leads.

Bearings

With the exception of the Helical/Worm range units supplied for the British and Continental markets have angular contact bearings. Units supplied to the North American market and the Helical/Worm range have taper roller bearings. For specific details of type and size consult David Brown quoting full nameplate details. All bearings are assembled with a pre-determined amount of axial float to allow for thermal expansion at operating temperatures.

Bearing Replacement

The following procedure should be used when it is necessary to replace worn bearings.

- 1 Clean and drain the unit.
- 2 Dismantle — remove bolts from flange, end cover and oil catcher of wheelshaft line and lift off top case half.

Note: Units of 10in. centres and above are supplied with a 0.006in. paper packing which should be renewed on re-assembly.

- 3 Wheelshaft — lift out the wheelshaft complete with bearings, end cover and oil catcher, remove end cover and oil catcher. The bearings can now be pressed off and new bearings fitted.

Note: If wormshaft bearings are not to be replaced, continue with item 5.

- 4 Wormshaft — remove fan and cowl, when fitted, end cover and oil catcher, and slide the wormshaft out of the case. Bearings can now be pressed off and new bearings fitted.

Note: Ensure all bearings are pressed on the correct way round. Pressure must not be applied to the outer races of new bearings.

- 5 Refit all items except top case half.
- 6 Check contact markings as detailed on page 7 and adjust if necessary.
- 7 Refit top half case using new 0.006in. paper packing where fitted, and align case on its mountings.
- 8 Refill with the correct amount of an approved lubricant, see page 5.

Caution

If the circuit is broken on one phase of a three-phase machine the motor is unlikely to start, but if it does it will turn very slowly. If the break occurs when the motor is running it will continue to run as a single phase machine. In both cases the MOTOR WILL BURN OUT unless adequate protection is fitted.

Certain motors have sealed bearings and require no further lubrication. Where grease nipples are provided these should be covered by protective caps and kept free from grit and dust. Before applying further grease to the motor, the nipples must be cleaned carefully since the entry of grit may lead to bearing failure.

Allowance for Bearing Clearance

If a foot-mounted unit is connected to a prime mover or driven machine with plain bearings, an allowance for lift should be made. The thickness of oil film can cause changes in centre height when running and there may also be an upward reaction under load. Certain other factors are also involved and the amount of clearance is largely a matter of practical experience. We shall be pleased to make recommendations on request.

Effect of Temperature

If there is an appreciable difference in the operating temperature of a gear unit and the driving or driven machine, the resultant difference in centre height, due to linear expansion, can cause misalignment resulting in heavy additional loads being applied to the bearings and gear case.

This applies particularly in the case of large gear units and those which are close-coupled.

Note: The coefficient of linear expansion of cast iron is 0.00006in. (0.00016mm) for 1°F, 0.000011in. (0.0003mm) for 1°C. Hence for a centre height of 20in. (508mm) and a difference in temperature of 50°F (27.7°C) between gear case and machine, the error of alignment, if correct when cold, will be 0.006in. (0.15 mm). It is thus recommended that allowance be made so that alignment will be correct under normal working conditions.

Low Temperature Operation

Standard Radicons are designed to operate at ambient temperatures down to minus 10°C without modification. David Brown must be consulted where units are required for duties involving temperatures lower than this figure. For extremes of temperature, low, high or both, consult David Brown.

Lubrication

Single Reduction Units. Types AU, AO, AV Oil Capacity (U.S. gallons)

Size	400	500	600	700	800	10	12	14	17	20	24	28
AU	0-83	1-20	1-64	2-40	2-64	4-80	7-80	10-80	15-00 +	18-00	27-60	49-20
AO	0-60	0-74	0-90	1-27	1-43	2-70	3-90	6-30	6-30	9-60	15-00	26-40
AV	0-53	0-97	1-20	1-80	2-40	4-80	7-80	13-20	28-80	38-40	51-60	74-40

+ For Speeds above 875 RPM — Oil Quantity 12 gallons

Double Reduction Units. Type AD Worm/Worm Oil Capacity (U.S. gallons)

Size		400	500	600	700	800	10	12	14	17	20	24	28
AUD	Primary Unit	0-12	0-18	0-24	0-48	0-72	1-08	1-44	2-40	3-96	4-44	7-20	12-00
	Secondary Unit	1-13	1-73	2-47	3-67	4-34	7-80	11-40	19-80	27-00	40-80	72-00	120-00
AOD	Primary Unit	0-12	0-18	0-24	0-48	0-72	1-08	1-44	2-40	3-96	4-44	7-20	12-00
	Secondary Unit	0-60	0-74	0-90	1-27	1-43	2-70	3-90	6-30	6-30	9-60	15-00	26-40
AVD	Primary Unit	0-12	0-18	0-24	0-48	0-72	1-08	1-44	2-40	3-96	4-44	7-20	12-00
	Secondary Unit	0-67	1-13	1-64	2-33	3-07	6-30	10-20	16-20	33-60	38-40	51-60	74-40

Double Reduction Units. Type AS Helical/Worm Oil Capacity (U.S. gallons)

Size		400	500	600	700	800	10	12	14
ASU	Primary Unit	0-18	0-18	0-24	0-30	0-30	0-46	0-60	0-90
	Secondary Unit	1-13	1-73	2-47	3-67	4-34	7-80	11-40	19-80
ASO	Primary Unit	0-18	0-18	0-24	0-30	0-30	0-46	0-60	0-90
	Secondary Unit	0-60	0-74	0-90	1-27	1-43	2-70	3-90	6-30
ASV	Primary Unit	0-18	0-18	0-24	0-30	0-30	0-46	0-60	0-90
	Secondary Unit	0-67	1-13	1-64	2-33	3-07	6-30	10-20	16-20

On double reduction units, the primary unit MUST be filled independently of secondary unit.

Oil quantities for AS type units are listed for input shaft positions 2 and 4.

Approximately HALF the oil quantities shown are required for input shaft positions 1 and 3.

Note: Units are supplied without oil.

The above oil quantities are approximate.

To ensure correct lubrication CHECK ACTUAL OIL LEVEL IN UNIT using the OIL LEVEL PLUG OR DIPSTICK PROVIDED.

OVERFILLING CAN RESULT IN OVERHEATING AND OIL LEAKAGE.

RECOMMENDED OILS

David Brown Grade	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
Rubbing Speed (ft./min.)	3,000 5,000	2,000 3,000	1,000 2,000	0 - 1,000 Medium Duty	0 - 500 Heavy Duty	0 - 200 Extra Heavy Duty
Ambient Temperature	-25 to +25° F	+25 to +50° F	+25 to +50° F	+50 to +70° F	+70 to +100° F	+100 to +150° F
Exxon/Esso	Spartan EP 68	Spartan EP 150	Spartan EP 220	Spartan EP 320	Spartan EP 680	Xylessso-185
Gulf	S-50	S-70	S-80 S-100	S-120	S-150 S-170	Security 205
Shell	Geartherm	Omala 150	Omala 220	Omala 320	Omala 680	Vitrea 1300
Texaco	Meropa 68	Meropa 150	Meropa 220	Meropa 320	Meropa 680	Honor

Maintenance

Weekly Inspection

- (a) Check oil level and if necessary top up with the recommended grade of lubricant.
- (b) Add two shots of grease to units having grease lubricated bearings. Where screw-in type lubricators are fitted, screw in the lubricator two turns.
- (c) Refill lubricators when necessary with the recommended grease

Oil Changes

Regular oil changes are essential except for those filled with synthetic long life lubricant. The following factors should be used to determine the frequency at which these are carried out.

- (a) Oil temperature — unit operating under load.
- (b) Type of oil — plain or containing additives.
- (c) Environment — humidity, dust, etc.
- (d) Operating conditions — shock loading, etc.

At elevated temperatures the effective life of the oil is very much reduced. This is most pronounced with oils containing fatty and E.P. additives.

To prevent damage to the unit through lubricant breakdown the oil should be renewed as detailed in the following tables:

1 Using plain mineral oil

Temperature °F	Oil filled units
170 or less	5000 hr. or 12 months
180	3500 hr. or 6 months
190	2500 hr. or 6 months
200	1000 hr. or 3 months

— Whichever is the shorter period.

2 Using oils containing additives

Temperature °F	Oil filled units
170 or less	5000 hr. or 12 months
180	3000 hr. or 6 months
190	2000 hr. or 6 months
200	750 hr. or 3 months

— Whichever is the shorter period.

Note: Figures quoted are for oil temperatures when the unit has attained normal running temperature when operating under load.

These figures are based on normal running but where conditions are particularly severe it may be necessary to change the oil more frequently.

Replacement of Oil Seals

- 1 Clean and drain the unit.
- 2 Remove the holding screws and withdraw oil catcher.
Note: Take care not to damage the shims and do not alter the shaft position. Check for burrs or scratches on the shaft which could damage the new seal.
- 3 Tap the old seal out of the housing using an appropriate sized drift.
- 4 Ensure that joint faces and shims are clean and position the shims in the oil catcher.
- 5 Coat joint faces of oil catcher and case with a good jointing compound, such as 'Welseal', replace oil catcher and tighten screws.
- 6 Fit replacement seal on a seal guide, slide it along the shaft and press the seal into the housing.
- 7 Refill with the correct amount of an approved lubricant, see page 5.

Points to Note

- 1 Oil quantities given on page 5 are approximate. Check the level using the dipstick or level plug when the unit is stationary.
- 2 DO NOT OVERFILL, an excess of lubricant will cause overheating and leakage, particularly on 'V' type units.
- 3 On double reduction units having two oil level drain each unit and fill separately, using the appropriate filler, level and drain plugs.
- 4 Operation oil temperature must not exceed 200°F.
- 5 When re-assembling after having dismantled HW and Lift type units * 'Studlock' should be used as a recommended sealant to secure the locknut whilst 'Loctite' retaining compound should be used on HW type units to secure the fan. Gaskets should be renewed on re-assembly.
- 6 For long term storage DAVID BROWN engineers should be consulted as to the necessary procedure.

* 'Studlock' is one of a range of sealants under the 'Loctite' brand.

Note: Oils containing E.P. additives must not be used on Radicon units fitted with holdback devices. These oils severely affect the anti-friction properties of the device and therefore reduce its efficiency.

Handing—Contact Marking

Changing Shaft Handing

It is recommended that units be returned to David Brown if a change of handing has to be made. However, if it is necessary to change the shaft handing on site the following procedure should be used:

- 1 Clean and drain unit.
- 2 Dismantle — remove bolts from flange, end cover and oil catcher of wheelshaft line and lift off top.
Note: Units of 10in. centres and above are supplied with a 0.006in. paper packing which should be renewed on re-assembly.
- 3 Wheelshaft — lift out the wormwheel, shaft, bearings and covers complete and reverse. On 'V' type units the position of the wormwheel **must not** be changed. Press the wheel from the shaft, reverse the shaft and press the wheel back on.
- 4 After completing the above, wormwheel contact markings must be checked as detailed below. Oil scraper clearance relative to wheel must be set at 0.010in. to 0.015in. (0.25mm. to 0.38mm.) on 'U' type units after adjustments have been made for contact marking.
- 5 Wormshaft — Turn the case as a whole completely round and reverse the position of the wheelshaft as detailed in 3 above. For 'V' type units, simply turn the wormshaft round and fit fan and cowl on opposite end; the case should not be turned on this type. Check contact markings.
- 6 Refit and align case on its mountings.
- 7 Refill with the correct amount of an approved lubricant, see page 5.

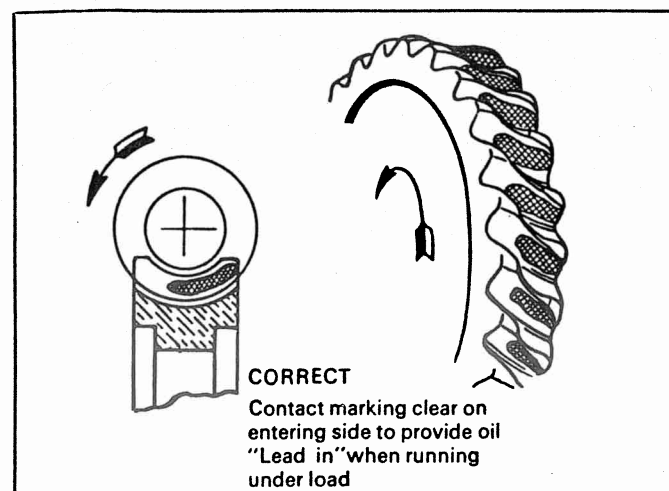
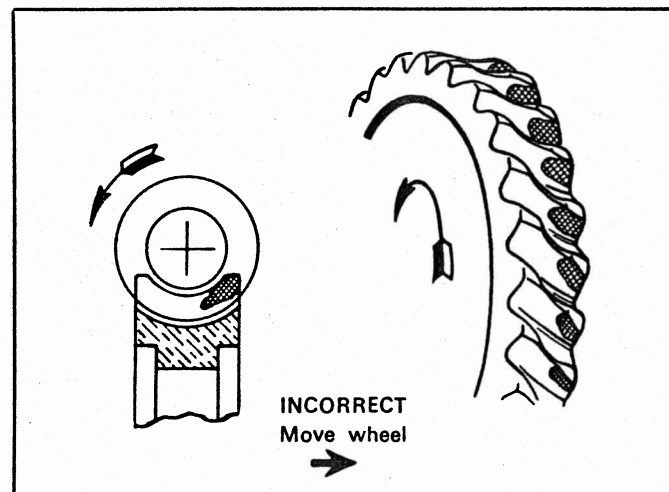
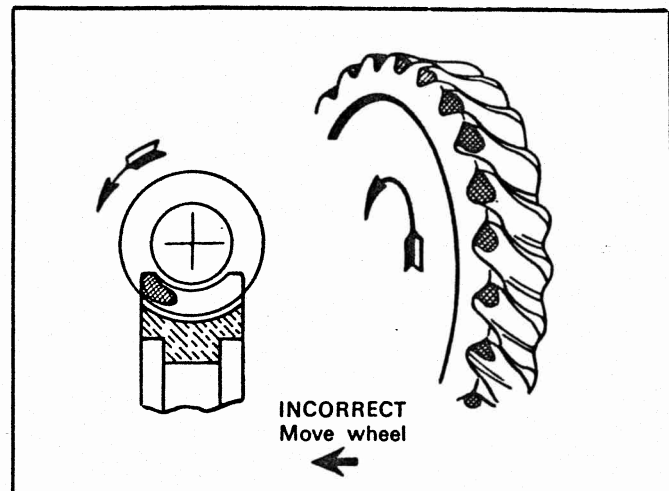
Checking Contact Marking

It is essential that the contact between worm and wormwheel is correct and this must be checked and adjusted as detailed below if the worm, wormwheel or both, are removed for any reason.

Provision has been made for adjustment by shimming in all David Brown gear units up to and including size 20 units. For adjustment of larger sized units consult David Brown.

- 1 Paint over the worm with engineer's marking blue.
- 2 Rotate the worm by hand, at the same time apply a slight braking pressure to the wormwheel, also by hand.
- 3 Compare the markings made on the wormwheel with those shown on the diagrams.
- 4 Adjust the wormwheel as necessary by moving the shims, positioned between case and covers, from one side to the other.

Note: The correct marking should be clear on the entering side of the teeth relative to the direction of rotation of the worm to provide a "lead in" for the lubricant and to avoid concentration of pressure on the entering side.



Identification

TYPICAL NAMEPLATE DESIGNATION	SERIES	TYPE OF UNIT	DESCRIPTION and FEATURES
AU-400-25-R	(A)	Solid Foot 400-800 'U', 'O' & 'V'	Angular Contact Ball Bearings with extra Roller Bearings on High Tensile Steel Low Speed Shaft.
AU-400-25-R-B	B*	Solid Foot 400-800 'U', 'O' & 'V'	Taper Roller Bearings throughout and High Tensile Steel Low Speed shaft.
237/500-40	(A)	Primary for Worm/Worm Solid Foot 400-800	Angular Contact Ball Bearings. To suit Model (A) Secondary Unit.
237/500-40-B	B	Primary for Worm/Worm Solid Foot 400-800	Angular Contact Ball Bearings. To suit Model (B) Secondary Unit.
237/500-40-C	C*	Primary for Worm/Worm Solid Foot 400-800	Taper Roller Bearings on Wormshaft. To suit Model (B) Secondary Unit.
3" x 500	(A)	Primary for Hel/Worm Solid Foot 400-800	Angular Contact Ball Bearings to suit Model (A) Secondary Unit.
3" x 500-B	B*	Primary for Hel/Worm Solid Foot 400-800	Angular Contact Ball Bearings to suit Model (B) Secondary Unit.
AU-10-25-R-TR	TR	Solid Foot 10-14 'U', 'O' & 'V'	Angular Contact Ball Bearings on Wormshaft. Taper Roller Bearings on High Tensile Steel Low Speed Shaft.
AU-10-25-R-C	C*	Solid Foot 10-14 'U', 'O' & 'V'	Taper Roller Bearings throughout with High Tensile Steel Low Speed Shaft, but NO oil seal on Low Speed Shaft — 'U' type only.
AO-10-25-R-D	D*	Solid Foot 10-14 'U', 'O' & 'V'	Taper Roller Bearings throughout with High Tensile Steel Low Speed Shaft, but WITH oil seal on Low Speed Shaft.
8AV-10-25-R-D	8D*	Solid Foot 10-14 'V' only	Taper Roller Bearings throughout with High Tensile Steel Low Speed Shaft — Single piece V-type case.
500/10-40	TR	Primary for Worm/Worm Solid Foot 10-14	Angular Contact Ball Bearings to suit Model (TR) Secondary Unit.
500/10-40-C	C	Primary for Worm/Worm Solid Foot 10-14	Angular Contact Ball Bearings to suit Model (C) or (D) Secondary Unit.
500/10-40-B	B	Primary for Worm/Worm Solid Foot 10-14	Taper Roller Bearings to suit Model (TR) Secondary Unit.
500/10-40-D	D*	Primary for Worm/Worm Solid Foot 10-14	Taper Roller Bearings on Wormshaft. To suit Model (C) or (D) Secondary Unit.
ASU-10-TR Primary	TR	Primary for Hel/Worm Solid Foot 10/14	Angular Contact Ball Bearings to suit Model (TR) Secondary Unit.
ASU-10-C Primary	C*	Primary for Hel/Worm Solid Foot 10-14	Angular Contact Ball Bearings to suit Model (C) or (D) Secondary Unit.
AU17-25-R-TR	TR	Heavy Duty 17" only, 'U' & 'V' types	Ball and Duplex Bearings on Wormshaft Taper Roller Bearings on High Tensile Steel Low Speed Shaft.
AU17-25-R-D	D*	Heavy Duty 17" only, 'U' & 'V' types	Taper Roller Bearings throughout with High Tensile Steel Low Speed Shaft. Cast Iron case for 'U' type Fabricated steel case for 'V' type (to be supplied in future).

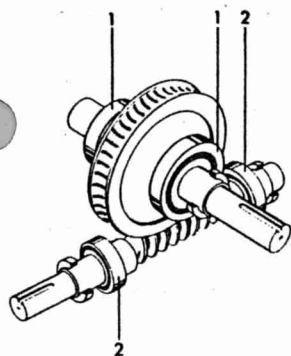
* denotes units currently being supplied in Canada and the USA.

Notes: Model (A) units will not have "A" marked on the nameplate but model (A) should be quoted when ordering parts.

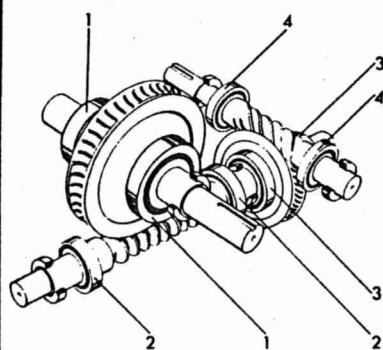
Refer to David Brown for Sizes 20, 24 and 28.

Nameplate Details (4" thru 28")	AU Type of Unit	10 Size of Unit	25 Ratio	R Shaft Handing	TR Series Number
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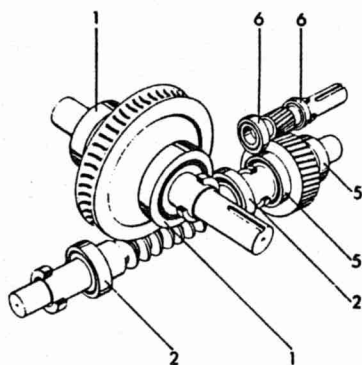
Bearing Interchangeability



SINGLE REDUCTION
AA, AU, AO, AV
All Sizes



DOUBLE REDUCTION
Worm-Worm
AUD, AOD, AVD
Sizes 400 thru 28



DOUBLE REDUCTION
Helical-Worm
ASU, ASO, ASV
Sizes 400 thru 14

TABLE 1 TAPER ROLLER BEARINGS

Size of Unit	Type of Unit	Series	Diagram Reference		
			1	2	4
400	All Types	B	3780/3720	44157X/44348	Refer to Table 3
500	All Types	B	39581/39520	HM804848/HM804810	Refer to Table 3
600	All Types	B	559/552A	HM907643/HM907614	Refer to Table 3
700	All Types	B	566/563	HM907643/HM907614	Refer to Table 3
800	AU, AO, AV, ASU, ASO, ASV AUD AOD, AVD	B	JH415647/JH415610	78250/78551	Refer to Table 3
10	All Types All Types AUD, AOD, AVD	C*	JH415647/JH415610	78250/78551	44157X/44348
		TR	759/752	Refer to Table 3	Refer to Table 3
		C	759/752	9378/9321	Refer to Table 3
12	All Types All Types AUD, AOD, AVD	D*	759/752	9378/9321	HM804848/HM804810
		TR	780/772	Refer to Table 3	Refer to Table 3
		C	780/772	98350/98788	Refer to Table 3
14	All Types All Types AUD, AOD, AVD	D*	780/772	98350/98788	HM907643/HM907614
		TR	95500/95925	Refer to Table 3	Refer to Table 3
		C	95500/95925	98350/98788	Refer to Table 3
17	AU, AO, AV	D*	95500/95925	98350/98788	HM907643/HM907614
		D*	99600/99100	593/592D with Cone Spacer X1S593 at Shaft Extension End HM926740/HM926710 with Cup Spacer HM926710EE at Fan End.	Refer to David Brown
		D*	99600/99100	593/592D with Cone Spacer X1S593 at Shaft Extension End HM926740/HM926710 with Cup Spacer HM926710EE at Fan End.	Refer to David Brown

* Denotes units currently being supplied in Canada and the USA.

Notes:

Sizes 400-800 Model (A) single reduction and secondary units only are equipped with ball bearings and extra roller bearings. See Table 2.

Sizes 400-800 Model (B) and (C) single reduction and secondary units are equipped with tapered bearings, see Table 1.

For complete details see DB Parts Manual, Pub. F687.18/A.

Refer to David Brown for sizes 20, 24 and 28.

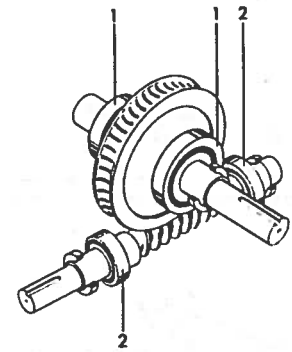
TABLE 2 EXTRA ROLLER BEARING (Additional to Diagram Reference 1) with Double Lip Inner Race and Straight Outer Race

Size of Unit	EXTRA ROLLER BEARING (Additional to Diagram Reference 1) with Double Lip Inner Race and Straight Outer Race					Old Part Number
	RHP	Ransome & Marles	Rollway	Hyatt	Bower	
400	N210	LRJ50	U1210E	BU1210Z	MU1210CL	919370
500	N212	LRJ60	U1212E	BU1212Z	MU1212CL	919371
600	N213	LRJ65	U1213E	BU1213Z	MU1213CL	919372
700	N215	LRJ75	U1215E	BU1215Z	MU1215CL	919373
800	N216	LRJ80	U1216E			919374
10	LRJ3½	LRJ3½				919369
12	LRJ4E	LRJ4E				
14	LRJ5E	LRJ5E				

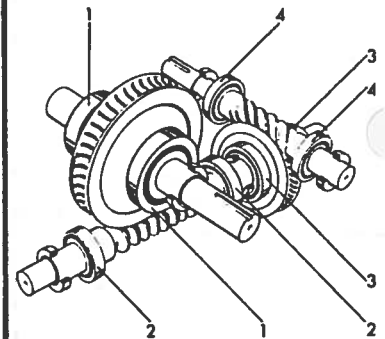
Bearing Interchangeability cont.

TABLE 3 ANGULAR CONTACT BALL BEARINGS without Shield, Seal or Snap Ring

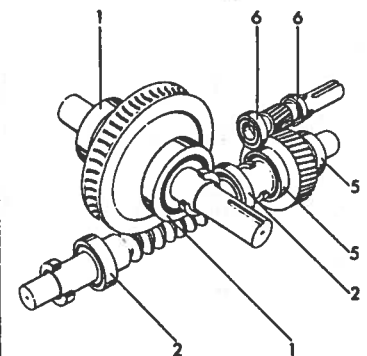
Size of Unit	Diagram Reference	RHP	Ransome & Marles	Fafnir	Old Part Number
400	1	7210	LJT50	7210W	919361
	2	7308	MJT40	7308W	919359
	3	7209	LJT45	7209W	919360
	4	7204×4	LJT20×4	7204W	919352
	5	6011	XXLJ55	9111K	920230
	6	6204	LJ20	204K	919262
500	1	7212	LJT60	7212W	919364
	2	7310	MJT50	7310W	919362
	3	7211	LJT55	7211W	919392
	4	7304×4	MJT20×4	7304W	919353
	5	6011	XXLJ55	9111K	920230
	6	6204	LJ20	204K	919262
600	1	7213	LJT65	7213W	919366
	2	7311	MJT55	7311PW	919363
	3	7212	LJT60	7212W	919364
	4	7305×4	MJT25×4	7305W	919355
	5	6211	LJ55	211K	919310
	6	6205	LJ25 (DC2)	205K	919015
700	1	7215	LJT75	7215W	919368
	2	7312	MJT60	7312W	919365
	3	7213	LJT65	7213W	919366
	4	7306×4	MJT30×4	7306W	919357
	5	6213	LJ65	213K	920227
	6	6207	LJ35 (DC2)	207K	919647
800	1	7216	LJT80	7216PW	919369
	2	7313	MJT65	7313PW	919367
	3	7213	LJT65	7213W	919366
	4	7308	MJT40	7308W	919359
	5	6213	LJ65	213K	920227
	6	6207	LJ35 (DC2)	207K	919647
10	1	LJT3½	LJT3½		919395
	2	MJT2¾	MJT2¾		919375
	3	7217	LJT85	7217PW	919407
	4	7310	MJT50	7310W	919362
	5	6216	LJ80		920228
	6	6208	LJ40	208K	919405
12	1	LJT4E	LJT4E		919039(2)
	2	MJT3	MJT3		919376
	3	7218	LJT90	7218PW	919408
	4	7311	MJT55	7311PW	919363
	5	6217	LJ85		919406
	6	6210	LJ50	210K	920226
14	1	LJT5E	LJT5E		
	2	MJT3½	MJT3½		919377
	3	7024	HXXLJT120		
	4	7312	MJT60		919365
	5	6221	LJ105		920229
	6	6211	LJ55	211K	919402 919310(2)



SINGLE REDUCTION
AA, AU, AO, AV
All Sizes



DOUBLE REDUCTION
Worm-Worm
AUD, AOD, AVD
Sizes 400 thru 28

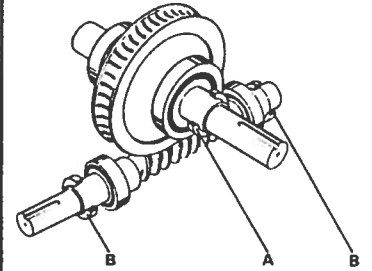


DOUBLE REDUCTION
Helical-Worm
ASU, ASO, ASV
Sizes 400 thru 14

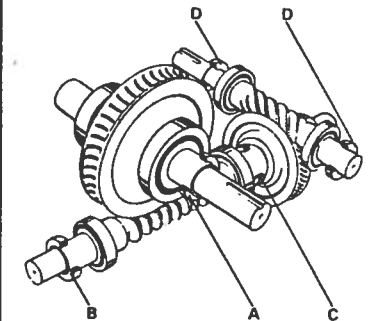
Seal Interchangeability

NOMINAL SEAL

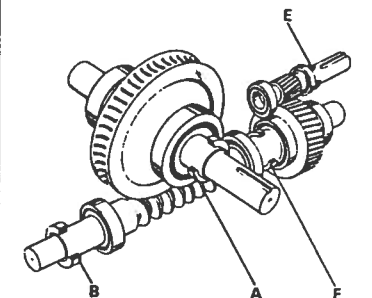
Size of Unit	Diagram Reference	Inside dia. (in.)	Outside dia. (in.)	Width (in.)	Gaco Seal Number	Old Part Number
400	A	1 1/8	2 1/4	1 1/8	IN 33758	912959
	B	1 1/8	2 1/8		IN 33756	912956
	C	1 1/8	2 1/2		IND46645	912977
	D	1 1/8	1 3/4		IND46642	912952
	E	1 1/8	1 1/2		MIS012	912979
	F	1 1/8	2 1/2		IN 33755	
500	A	2 1/4	3	2 1/4	IN 33757	912961
	B	2 1/4	2 1/2		IND46645	912958
	C	2 1/4	2 7/8		MIS22	912975
	D	2 1/4	1 3/4		IND46642	912952
	E	2 1/4	1 1/2		MIS012	912979
	F	2 1/4	2 7/8		MIS22	912975
600	A	2 1/2	3 1/4	2 1/2	IN 33411	912962
	B	2 1/2	2 1/2		IND46645	912958
	C	2 1/2	3		IN 33757	912961
	D	2 1/2	1 3/8		IND46643	912953
	E	2 1/2	1 3/8		MIS014	912970
	F	2 1/2	2 5/8		MIS22	912975
700	A	2 3/4	3 1/2	2 3/4	IN 33759	912963
	B	2 3/4	2 3/4		IN 21601	912960
	C	2 3/4	3 1/4		IN 33411	912962
	D	2 3/4	1 1/2		IND46380	912954
	E	2 3/4	2		MIS14	912971
	F	2 3/4	3 1/4		IN 33411	912972
800	A	2 1/2	3 3/4	2 1/2	IN 36731	
	B	2 1/2	3		IN 33757	912961
	C	2 1/2	3 1/4		IN 33411	912962
	D	2 1/2	2 1/8		IN 33756	912956
	E	2 1/2	2		MIS14	912971
	F	2 1/2	3 1/4		IN 33411	912972
10	A	3 1/2	4 1/2	3 1/2	IND45846	
	B	3 1/2	3 3/8		IN 15356	912965
	C	3 1/2	4 1/2		IND45844	912966
	D	3 1/2	2 1/2		IND46645	912958
	E	3 1/2	2 1/2		MI 150250	
	F	3 1/2	4 1/2		MI 300450	912973
12	A	4	5 1/4	4	IND45845	912978
	B	4	3 3/8		IN 15356	912965
	C	4	4 1/2		IND45846	
	D	4	2 1/2		IND46645	912958
	E	4	2 1/2		MI 150250	
	F	4	4 1/2		IND45844	912966
14	A	5	6	5	IND46977	
	B	5	4 1/2		IND45844	912966
	C	5	5 1/2		MIS48	912980
	D	5	2 1/2		IN 21601	912969
	E	5	2 1/2		MI 175287	
	F	5	5 1/2		IND45845	912978
17	A	6	7	6	MIS60	
	B	6	4 1/2		IND45844	912966
	C	6	4 1/2		IND45844	912966
	D	6	2 1/2		MI 175287	



SINGLE REDUCTION
All Sizes



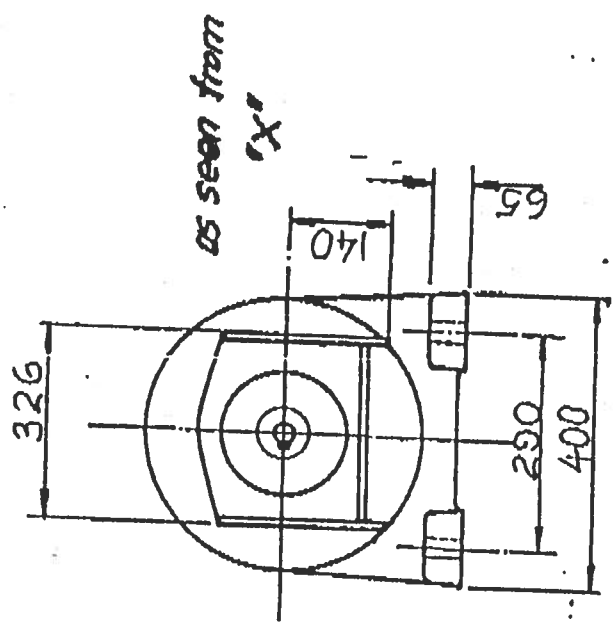
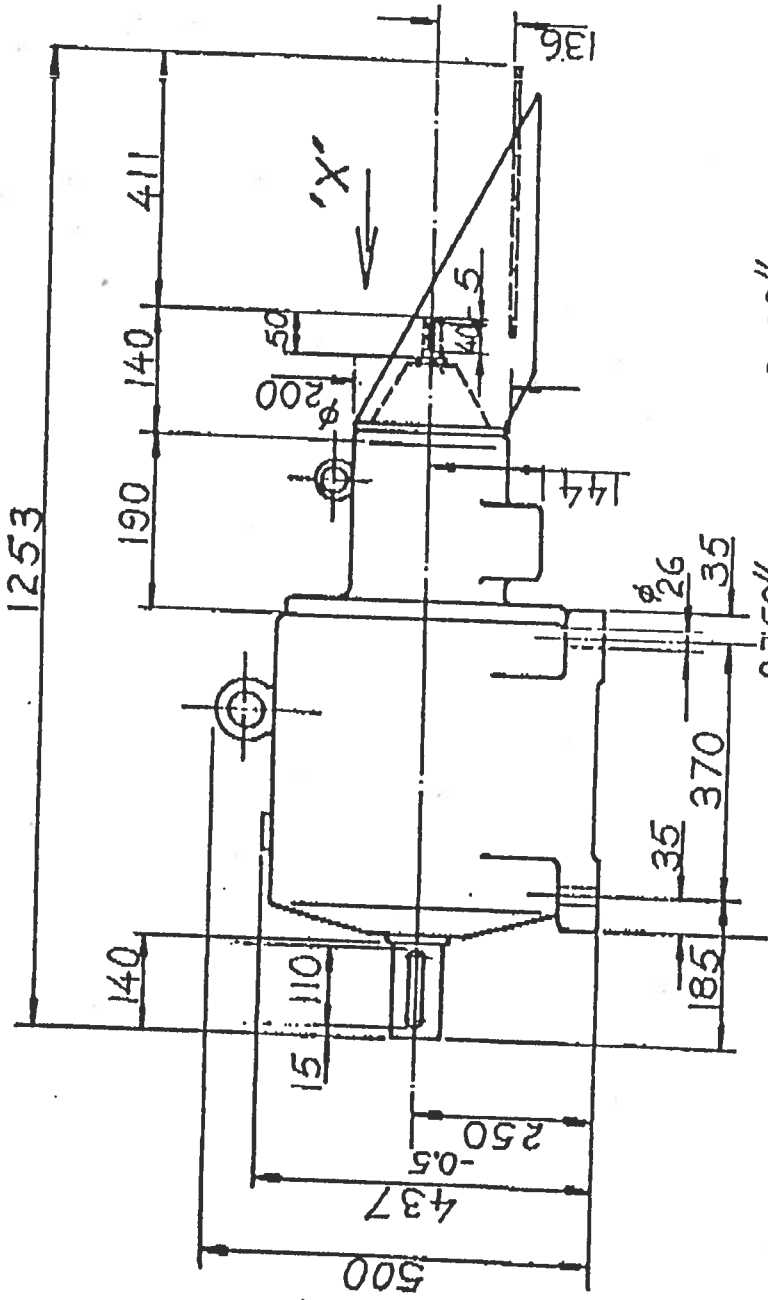
DOUBLE REDUCTION
Worm-Worm
Sizes 162 thru 28



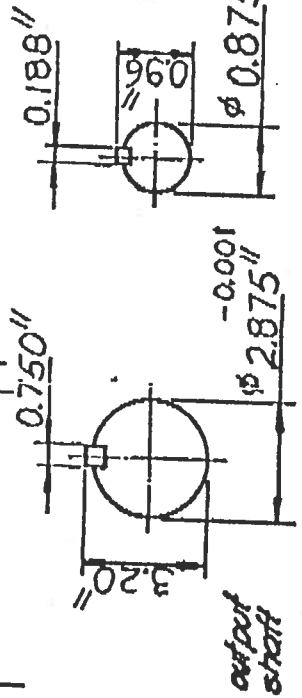
DOUBLE REDUCTION
Helical-Worm
Sizes 400 thru 14

DATE	
BY	
CHECKED	
APPROVED	

DIMENSION PRINTS
 Certified
 Dec 27 1990
 Eurodrive Canada Ltd.



Dimensions in mm, unless otherwise noted!



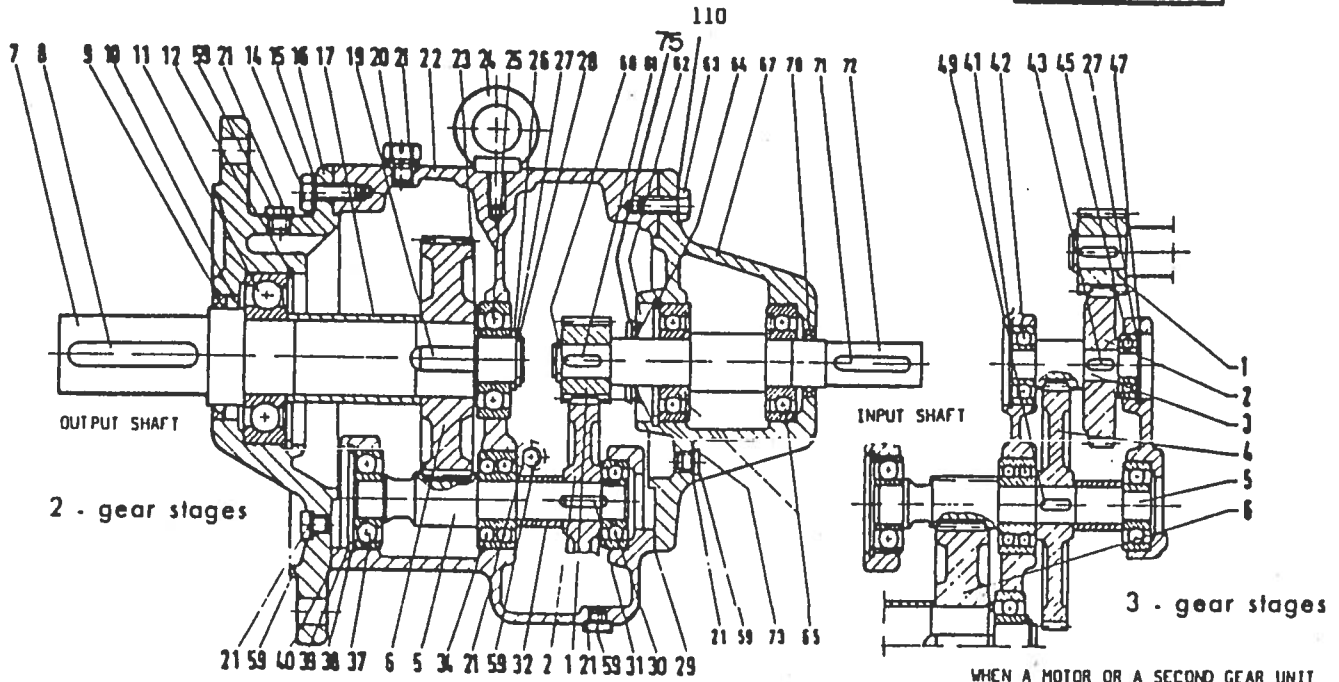
check mounting position sheets for location of oilplugs!

TOLERANCES	ARROW SPEED CONTROL
UNLESS OTHERWISE SPECIFIED	
FRACTIONAL	N.T.S.
DECIMAL	
ANGULAR	
DATE	12.12.90
TITLE	R103R70ZK (213T)
DESIGNED BY	J.H.
APPROVED BY	
REVISED	03775-A

4 RPM, 425.88:1 RATIO B3 MOUNTING G.L. 9V ONTARIO INC. PO # 24384

Parallel (Helical) Reducer RF70

PARTS LIST #
C 2006



WHEN A MOTOR OR A SECOND GEAR UNIT
IS ATTACHED, IGNORE ALL PARTS FOR THE
INPUT HOUSING.

ITEM	PART NAME	DIMENSIONS	PART NO.	QTY	PRICE
38	SHIM	42x52X0.1mm	010 375 6	x	
37*	BALL BEARING	6304	010 508 2	1	
34*	BALL BEARING	4304	011 065 5	1	
32	SPACER		101 349 1	1	
31	KEY	B6x6x18mm	011 485 5	1	
30*	BALL BEARING	6303	010 507 4	1	
29*	GASKET		100 643 6	1	
28	SNAPRING	25x1.2mm	010 274 1	1	
27	SHIM	25x35X0.3mm	010 393 4	x	
27	SHIM	25x35X0.1mm	010 369 1	x	
26	SPACER	525x35x2mm	010 345 4	1	
25*	BALL BEARING	6305	010 509 0	1	
24	EYE BOLT	M10 thread	010 229 6	1	
23	SPACER	535x45x2.5mm	010 350 9	1	
22	GEAR CASE		101 331 9	1	
20	BREATHER PLUG	M12x1.5mm	010 467 1	1	
19	KEY	B12x8x28mm	011 487 1	1	
17	SPACER		101 345 9	1	
16	MOUNTING FLANGE 300mm		101 337 8	1	
16	MOUNTING FLANGE 250mm		101 339 4	1	
15	LOCK WASHER	B10mm	010 992 4	6	
14	HEX. HEAD BOLT	M10x25mm	010 116 8	6	
12	SNAPRING	90X3mm	010 326 8	1	
11*	BALL BEARING	6308Z	010 525 2	1	
10*	OIL SEAL	A50x65X8mm	011 313 1	1	
9*	OIL SEAL	A550x65X8mm	011 319 0	1	
8	KEY	3/8x3/8x2 1/4 In.		1	
7	OUTPUT SHAFT	1.625 In. Dia	107 645 0	1	
6	GEAR			1	
5	PINION SHAFT			1	
4	GEAR			1	
3	PINION SHAFT			1	
2	GEAR			1	
1	PINION			1	

110	LOCKWASHER	B10mm	010 992 4	4	
75	OIL SLINGER	25x40mm	011 662 9	1	
75	SHIM	50X62X0.3mm	010 400 0	x	
75	SHIM	50X62X0.1mm	010 376 4	x	
72	INPUT SHAFT	22mm SH.	107 697 3	1	
72	INPUT SHAFT	18mm SH.	107 696 5	1	
72	INPUT SHAFT	16mm SH.	107 711 2	1	
72	INPUT SHAFT	14mm SH.	107 703 1	1	
72	INPUT SHAFT	10mm SH.		1	
71	KEY	3/16X3/16X1 1/4 In.		1	
70*	OIL SEAL	A525X35X7mm	010 654 2	1	
67	INPUT HOUSING		101 332 7	1	
65*	BALL BEARING	6305-2Z	010 532 5	2	
64	SNAPRING	62X2mm	010 321 7	1	
63	HEX. HEAD BOLT	M10X20mm	010 115 x	4	
62*	OIL SEAL	A25X62X10mm	010 613 5	1	
61	KEY 22mm SH.	A5X5X25mm	010 008 0	1	
61	KEY 18mm SH.	A4X4X20mm	010 003 x	1	
61	KEY 16mm SH.	A4X4X18mm	011 438 3	1	
61	KEY 14mm SH.	A3X3X14mm	010 069 2	1	
61	KEY 10mm SH.	A2X2X12mm	010 000 5	1	
60	SNAPRING 22mm SH.	22X1.2mm	010 272 5	1	
60	SNAPRING 18mm SH.	18X1.2mm	010 270 9	1	
60	SNAPRING 16mm SH.	16X1mm	010 268 7	1	
60	SNAPRING 14mm SH.	14X1mm	010 266 0	1	
60	SNAPRING 10mm SH.	SW10X1mm	011 519 3	1	
59	DRAIN PLUG	M12X1.5mm	011 430 8	4	
49	KEY	A6X6X18mm	010 012 9	1	
47	SNAPRING	35X1.5mm	010 314 4	1	
45*	BALL BEARING	6202	010 485 x	1	
43	KEY	A5X5X14mm	010 005 6	1	
42*	BALL BEARING	6302	010 506 6	1	
41	SNAPRING	42X1.75mm	010 317 9	1	
40*	GASKET		101 341 6	1	
39	SNAPRING	52X2mm	010 319 5	1	
38	SHIM	42X52X0.3mm	010 399 3	x	

*RECOMMENDED SPARE PARTS

IMPORTANT:
WHEN ORDERING PARTS, SUPPLY NAMEPLATE DATA:
1. S.O.# OR SERIAL #.
2. MODEL #.

Commissioning and Service

SEW
EURODRIVE

Installation and maintenance of gear reducers

General

Please read and follow these instructions carefully to obtain maximum performance while maintaining warranty rights on the equipment received.

Every EURODRIVE product is factory tested and properly packaged before it leaves our company. Please report any transport damage to the agent of the forwarding carrier.

Storage

If the reducers are to be stored before installation, the storage area should be dry and well ventilated. Prolonged storage and/or storage in areas of high humidity, requires special precautions. Instructions for long term storage can be obtained from EURODRIVE.

If storage is done in an area of extreme and rapid temperature changes, the ventilation plug should be installed for the period of storage (See "Lubrication").

Mounting

The reducers must be mounted on a firm, rigid, plane base, preferably with a machined surface. The support must not flex under load, and the unit has to run vibration free at all times.

Careful alignment with the driven machinery is essential. In applications that exert side loads onto the shaft, mechanical side stops, adjustable if possible, should be installed onto the mounting surface.

To maintain the warranty, the reducer shall not be modified or other equipment attached to it.

Installation of Driven Members

The shafts are protected against corrosion with a vinyl strippable coating, which can be easily removed without using chemicals. If chemicals are used for shaft cleaning, avoid contact with the shaft seals to protect seal and bearing lubrication.

EURODRIVE shafts are machined with tolerances as shown on the dimension sheets in our catalogues.

Drive members, sprockets, pulleys, and sheaves should be heated to 80 degr. C (180 degr. F), and pushed over the slightly greased shaft. Metric shafts are provided with centrebores which can be used for attachment of mounting tools.

Reducers with keyless hollow shafts (Ringfeder or Stuewe taper-locks) require special attention. See instructions on the next page.

Never force driven members with hammer strokes onto the shaft. Doing so will greatly decrease bearing life.

Belts, chains, etc., should be mounted as close as possible to the casting of the reducer to reduce overhung loads on the shaft. Values for maximum permissible overhung loads are published in EURODRIVE catalogues, or can be obtained from our offices.

Lubrication

EURODRIVE reducers are shipped with the proper oil level according to the mounting position specified on the original order.

The reducer is provided with: a red-painted level plug, a drain plug located on its lowest

Please read this manual carefully before proceeding with the installation of your EURODRIVE product. Warranty claims may be affected if the unit is not installed and maintained in accordance to these instructions. This manual will also enhance your understanding of EURODRIVE products to make their operation extremely dependable and efficient.

One copy of this manual should be included with every shipment, leaving our Ontario, Quebec or British Columbia assembly centres. Additional copies can be obtained from anyone of our offices in Canada.

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This manual may not provide all the information available concerning the installation, operation and maintenance of all EURODRIVE products. References within the text indicate the availability of additional information.

Because of ongoing technical improvements of the EURODRIVE product line, we reserve the right to change the data contained in this manual without notice.

Effective : January 1990

spot, and a blue-painted plug indicating the location for the breather plug. The breather plug is shipped in a plastic bag attached to the reducer. Breather plugs for gearmotors are shipped inside the motor terminal box. Some reducers (i.e., R/RF30 and S/SF30) do not require ventilation.

When the installation of the drive is completed, the blue plug should be located on the highest spot on the reducer. The location of the level plug and the ventilation plug must be checked according to the mounting position data contained in this book, pages 21 to 26.

In certain mounting positions, slight oil loss through the breather plug--due to foaming of oil, or due to internal agitation--might occur. In these cases, the ventilation plug can be substituted with a solid plug, since our reducers are safe to be run sealed.

For washdown applications, specially protected ventilation plugs are available to prevent water from being sucked into the gearcase enclosure.

Some gear reducers, specifically types R/RF30 and S/SF30, do not need any maintenance. They can be mounted in any position and therefore, do not have a level plug. For refills, see page 27 for type and quantity of oil to be used.

Before starting the unit, the proper oil level has to be checked at the red-painted level plug. If lubricant is missing, fill to the proper level with the oil suggested on page 27. Mixing different types of oils should be avoided. Using types of oils other than those shown on page 27 may void the warranty. Oil quantities needed for complete refills are shown on page 28.

After the initial start up, the oil level should be checked periodically, and the area surrounding the reducer should be inspected for evidence of leaking oil.

We suggest changing the reducer oil every 10,000 hours of operation, or every 2 years, whichever is shorter. With the use of synthetic lubricants, 20,000 hours or 4 years of operation can be obtained. Adverse environments, high humidity, aggressive media, and high temperature will shorten the useful life of the lubricant.

CAUTION: Synthetic lubricants must not be mixed with other types, or brands, under any circumstances.

Bearings

Antifriction bearings are either lubricated by the gear oil, or are provided with sealed grease packings. EURODRIVE does not prefer to provide field re-greaseable bearings (Zerk fittings) since today's high quality greases will likely outlast the bearing. If downtime, due to bearing failure must be avoided under any circumstances, periodic cleaning, checking and re-greasing with specified grease is recommended. As option, the input covers of helical gear units can be provided with regreasing facilities, or oil bath lubrication on larger units.

Dismantling Reducers

Please refer to page 5 of this manual.

Mounting and Dismounting Hollow Shaft Reducers

Keyed Hollow Shaft Units

EURODRIVE's keyed hollow shaft units are symmetrical. The driven shaft can be inserted from either side.

If the reducer has been delivered with the fasteners on the improper side, bolts, washers, circlip and the safety cover should be removed and mounted opposite of the driven shaft. See Fig.1. Note that some reducer styles have a plastic plug instead of the safety cover.

To avoid fretting corrosion, the inserted mating shaft must be undercut and finished with tolerances shown on page 4. Corrosion retarding greases such as Molykote 321R (or equivalent) must also be applied before slipping the reducer over the driven shaft. See table Fig.5 for other recommended lubricants.

The Removal

Removing hollow shaft reducers can be accomplished with the use of simple tools. One simple method is shown in Fig.2. To make this method practical, we suggest inserting a modified thrust washer into the hollow shaft before mounting the reducer onto the driven shaft. The washer may be inserted afterwards if there is sufficient space between the shaft-end and the circlip.

The modified washer is not included with the unit. It can be easily manufactured on-site with dimensions shown on page 4 of this booklet.

Hollow Shafts Without Keyways

This reducer uses the Stuewe or Ringfeder-shrink fit to hold the reducer onto the driven shaft. These reducers are not symmetrical. The shrink-fit assembly is always located opposite the output shaft. A change of the output side requires disassembly of the reducer. See page 5 of this manual for instructions.

To install these reducers, first remove the protective cover and make sure that the locking screws are loose. Next, clean the hollow shaft bore and the driven shaft, and then slip the reducer over the shaft. See Fig.3. A thin coat of Molykote can be applied to the shaft, at the location indicated in Fig.3.

Slightly tighten any three screws which form the points of an equilateral triangle (screws 1, 5 and 9 in Fig.4), until locking collars lose all their play, but still can be turned.

CAUTION: Heavy tightening of the screws at this time can cause permanent deformation of the inner ring. Measure the gap between both locking collars at various points to ensure equal spacing.

After measuring, tighten all locking screws gradually and in the sequence shown in Fig.4. Several passes are required until all screws are tightened to the specific torque which is embossed on one of the collars. A torque wrench must be used.

Removal

Removal of these units is similar to the installation procedure. Gradually loosen the screws in the order shown in Fig.4.

Do not remove the screws or the locking collars completely. The locking collar assembly should only be removed if the assembly is rusty or dirty. If it is to be removed, it must be cleaned and lubricated on the sliding surfaces with one of the lubricants shown in table Fig.5.

The locking screws should be lubricated with multi-purpose grease.

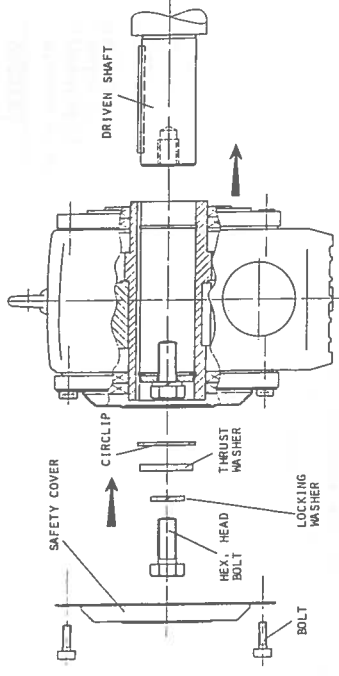


Fig.1: Mounting of Keyed Hollow Shaft Units

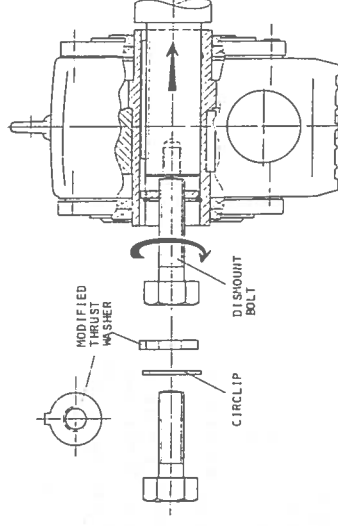


Fig.2: Dismounting of Keyed Hollow Shaft Units

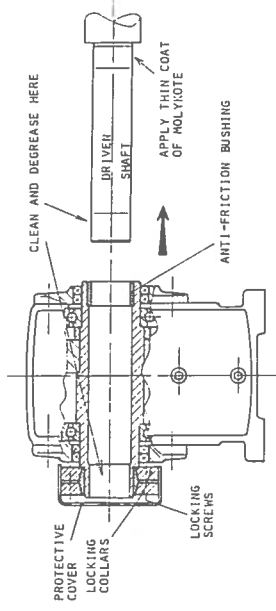


Fig.3: Mounting of Shrink-Fit Hollow Shaft Units

LUBRICANT (Mo S2) TYPE

LUBRICANT (Mo S2)	TYPE
MOLYKOTE 321 R (LUBE COAT)	SPRAY
MOLYKOTE SPRAY (POWDER SPRAY)	SPRAY
MOLYKOTE G RAPID (AEMASOL MO 19P) OR PASTE	SPRAY OR PASTE
DIO-SETRAL 57 N (LUBE COAT)	SPRAY OR PASTE

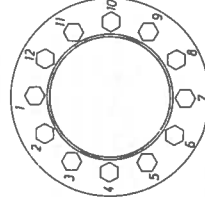


Fig.4: Tightening Sequence

Inserted Shaft Configuration and Hollowshaft Removal Tool

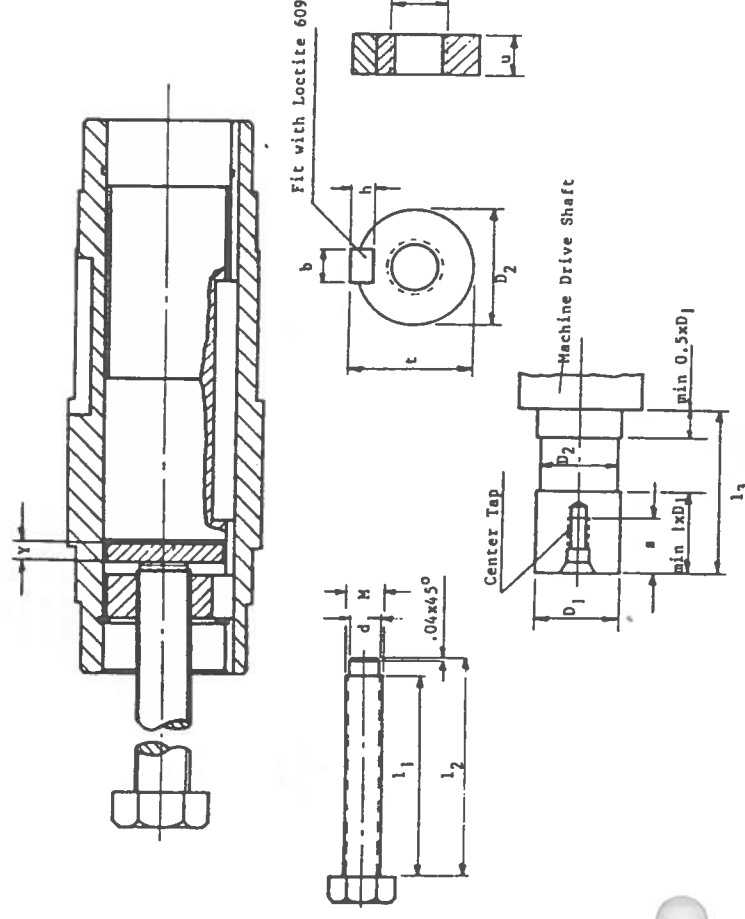


Fig.6: Dimensions for inch series shaft with keyway.

Reducer Size	D ₁	D ₂	d ₁	y	h ₁	h ₂	h ₃	M	t	b	h	s	Shockload Factor		Center Tap
													I	II	
FA,SA40	1.250	1.245	.500	.20	5.80	.250	1.36	5/8-18	1.36	.250	.250	1.0	.59		7/16-14
SA 50	1.375	1.370	.500	.20	5.80	.312	1.52	5/8-18	1.52	.312	.312	1.0	.59		1/2-13
FA60,KA66,SA60	1.500	1.495	.813	.20	6.80	.375	1.65	1-14	1.65	.375	.375	1.75	.79		5/8-11
FA70,KA76,SA70	2.000	1.995	.813	.20	8.30	.500	2.22	1-14	2.22	.500	.500	1.75	.79		5/8-11
FA80,KA86,SA80	2.375	2.370	1.000	.30	9.30	.625	2.65	1 1/4-12	2.65	.625	.625	2.0	.94		3/4-10
FA80,KA86	2.438	2.433	1.000	.30	9.30	.625	2.60	1 1/4-12	2.60	.625	.625	2.0	.94		3/4-10
FA90,KA96,SA90	2.750	2.745	1.000	.30	12.30	.750	3.02	1 1/4-12	3.02	.750	.750	2.0	.94		3/4-10
FA90,KA96	2.938	2.933	1.000	.30	12.30	.750	3.14	1 1/4-12	3.14	.750	.750	2.0	.94		3/4-10
FA100,KA106,SA100	3.250	3.245	1.000	.30	13.80	.875	3.58	1 1/4-12	3.58	.875	.875	2.0	.94		3/4-10
FA100,KA106	3.438	3.433	1.000	.30	13.80	.875	3.69	1 1/4-12	3.69	.875	.875	2.0	.94		3/4-10
KA126	4.000	3.995	1.250	.30	16.30	1.000	4.44	1 1/2-12	4.44	1.000	1.000	2.5	1.18		7/8-9

Disassembling Gear Reducers

General

The following information is a general guide-line for the disassembly of a typical EURODRIVE reducer. If additional information is needed, call our office and have the information contained on the reducer's nameplate available.

On the reducer's nameplate, under "type", a code of several digits will be embossed. The first digit (either an R, S, K, or F) establishes the type of reducer.

Typical cross sections of the four EURODRIVE reducer types are shown on page 20.

Some types and sizes are quite different than the ones shown on page 20. For this reason, a Spare Part List should be obtained for proper identification of parts prior to disassembly.

The Spare Part Lists do not bear any part numbers for the gears, since these will vary for different ratios. EURODRIVE gears have embossed numbers for positive identification. When ordering replacement gears, please have this number ready.

Certain reducer parts will be destroyed during the disassembling process. Replacement parts should be on hand before starting the disassembly. These items generally include: gaskets, seal rings, bearing caps, nilos rings and oil slingers. A set of shims is needed if gears are to be replaced.

Bearings used are standard sizes, their international code is shown on our Spare Parts Lists.

Helical Reducers Type "R....", "F...."

Drain oil and remove input and output cover assemblies. "RX.." and "FA.." type reducers do not have any output covers. The "FA.." reducer has a square coverplate instead.

All shafts, gears and bearings can be removed from the main body of the reducer after the circlips are removed.

Some shafts have to be pressed out of the gearhubs. To do so, on some gears supports have to be placed between the gears and the casting, to keep the gears aligned in a horizontal position during the pressing action.

Assemble the reducer in reverse order, placing shims between bearings and circlips to eliminate endplay.

If the input pinion has been removed from its shaft (motor shaft or input shaft) the shaft and the pinion have to be cleaned of any grease. Apply a few drops of "Loctite RC/609" on the shaft before remounting the pre-heated pinion gear.

On the assembled reducer, with the cover(s) removed, the embossed identification numbers should be visible on the gears.

Gaskets should be set in liquid seal (Permatex) to ensure tightness. Reducers of the latest design (R..2J, K...6) have no gaskets on the output housings or bearing flanges. Loctite 574 has to be applied in all areas.

Worm Gear Reducers Type "S.."

Proceed as with type "R.." and "F.." reducers, with following additional considerations:

On "S.." type reducers, footmounted style, the output shaft must be removed to enable the

removal of the remaining gears.

Removal of the output shaft:

After the seals, circlips, shims and bearing caps are removed, the gearbox must be placed under a press, with the output shaft pointing downwards. Place keystock of appropriate dimensions inside the reducer, below the wormwheel, to keep the shaft/wormwheel assembly in the centre of the reducer, while the shaft is being pressed out. Failure to support the worm wheel may damage the worm gear.

On flange-mounted and hollow shaft reducers type "SF.." and "SA.." these procedures are not needed, since the output shaft can be taken out of the housing together with the worm wheel.

Worm gear adjustment:

The worm wheel has to be centred on top of the worm gear, when assembling the drive in order to ensure proper lubrication, and achievement of full nominal service life of the gears.

For this purpose, shims are provided on both sides of the worm wheel bearings.

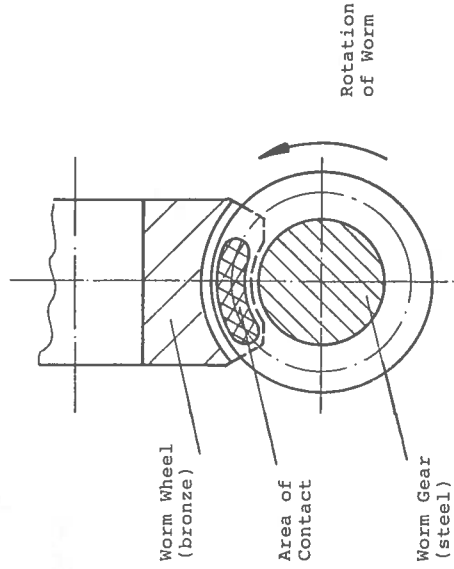


Fig.7: The location of the contact area between worm gear and worm wheel.

Proper shimming can be checked by applying a thin coat of dark grease (Molykote) onto the worm wheel and running the greased portion several times through the gear mesh. The gear contact will leave an imprint on the grease film. This imprint should be centred at the middle of the worm wheel, or slightly offset in the direction of the worm gears rotation. See Fig.7. This offset will ensure better oil penetration into the gear mesh.

Bevel Gear Reducers Type "K..."

There are special instructions available for the disassembly and assembly of these reducers. Please call our office for more information.

Belt Drives "VARIGEAR"

General

EURODRIVE enclosed belt drives do not require any maintenance, with the exception of a periodical check for belt wear.

Every drive is individually tested before it leaves our company. Careful installation and proper operation are essential for its trouble-free performance.

For prolonged storage, varigears may be supplied with the belt removed from belt housing, wrapped in special packing. Install belt according to instructions below.

See page 2 for further mounting and installation instructions.

The drive is designed to operate in temperatures from -30 to +40 degrees C (-22 to +104 degrees F). The speed adjustment mechanism should not be turned on while the drive is at a standstill. We suggest running the drive through the full speed range once a week.

The belt drive air intake and exhaust openings must be kept clear for cool operation. For dust laden environments, special non-ventilated belt drive enclosures (modification "HU") must be used.

In case of free turning speed adjustment wheels, the nut and screw assembly (Fig.8, parts #5 and #6) must be tightened.

Belt Replacement

Due to several design features, the belt life of this drive is exceptionally long under normal operating conditions. Should the belt need to be replaced, proceed as follows (See Figures 8 and 9). Original EURODRIVE belts must be used for replacements.

Adjust the drive to the maximum speed setting and de-energize the motor. Now, turn the speed adjustment wheel to its counter clockwise limit to open the motorized variable pitch pulley.

Remove bearing cover #3, both vent screens, and wheel cover #2. Separate belt housing half A and half B after removing the four bolts #1 (six bolts for drive size 4, 5, and 6).

NOTE: If one of the belt housing halves should need replacement, both halves have to be exchanged, since they come in matched sets only.

Squeeze a wooden wedge into the spring-loaded lower pulley (only on sizes 3, 4, 5, and 6) before removing the worn belt.

Insert the new belt first into the motorized pulley, and pull it over the spring loaded pulley. Remove the wooden wedge, and assemble the components in reverse order.

Lastly, turn the adjustment wheel clockwise until resistance is felt to tension the belt, before operating the unit.

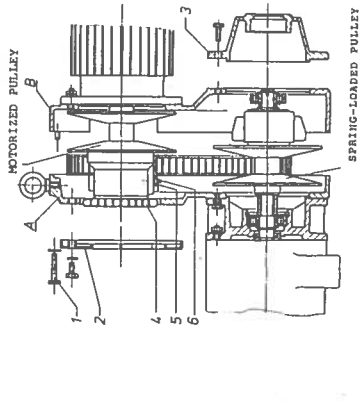


Fig.8: The Basic Belt Drive, Sizes VZ1...VZ4

Repair of Pulleys

EURODRIVE variable pitch pulleys are dynamically balanced for vibration-free operation. Disassembly of the driven pulley must never be attempted, since this assembly contains a heavily compressed coil spring, which when released could result in serious personal injury. Disassembly may also offset balancing. We recommend installing a matched set of new pulleys in case of wear. Any additional cost will be compensated by longer service life and less downtime.

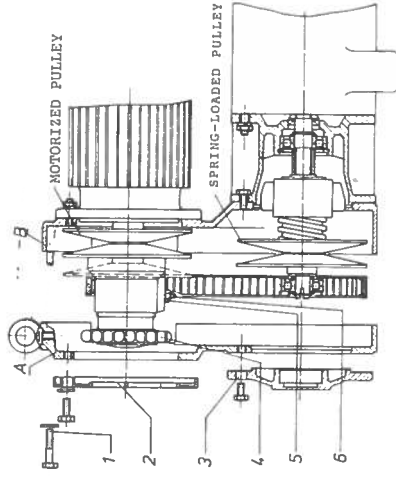


Fig.9: The Basic Belt Drive Sizes VU1...VU5

Speed Range Settings

On our standard drives, the speed range limits are an integral part of the motorized pulley. Contact our office for instructions to reset these limits.

Drives with modification "N", "H" and "HS" can be reset in the field (as needed) to compensate for any changes in speed range due to belt wear.

The movement of the motorized pulley is limited by hammer head screws (Fig.10, parts #11 and #12), which become visible after removal of cover #6, on the control head.

The speed range limits for servo-motors (modification "EP") are incorporated in enclosure #8 (Fig.10) in the form of cams and micro switches. For setting procedures see page 9 of this manual.

CAUTION: When changing the speed range on EURODRIVE belt drives, a replacement belt of different length may be needed. Check with our office.

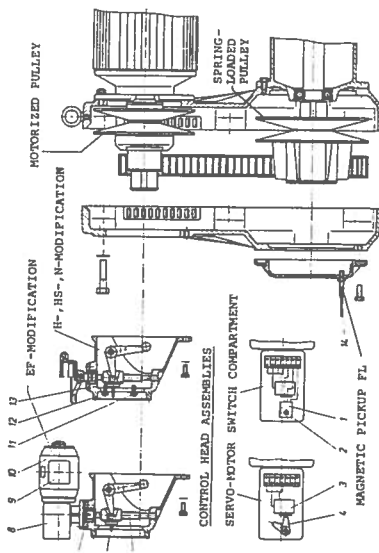


Fig.10: Belt Drive VU6, with std. modifications

Traction Drives "VARIMOT"

General

Every drive is individually tested before it leaves our facility. Careful installation and proper operation are essential for its trouble-free performance. See page 2 for installation recommendations.

Metric output shafts come with tapped centre bores to assist in the mounting of driving members (couplings, sprockets...) with appropriate tooling. Avoid hammering on the shaft. Hammer strokes will cause damage to the friction ring and bearings. If force must be used to mount a driving member, the Varimot drive must be separated as shown in Fig. 11. See "Replacing The Friction Ring" below. Hollow shaft #5, has to be removed and the driving member should be pressed onto shaft #1, supporting the opposite end below the press.

Electrical connections must be made in accordance with the drive's nameplate data and local regulations. See the electrical section of this manual for further instruction.

The Varimot, when adjusted through the speed range, moves the motor body vertically. It is therefore necessary to install about 0.5m (20") of flexible conduit at the motor's terminal box.

Varimot drives are typically maintenance-free, except for regular inspections for wear. Speed adjustments should be made only with the drive running. Frequent changes of the speed setting, at a standstill, may cause damage to the friction ring. Should the handwheel turn on its own, causing a shift in its speed setting, tighten locking pin #8.

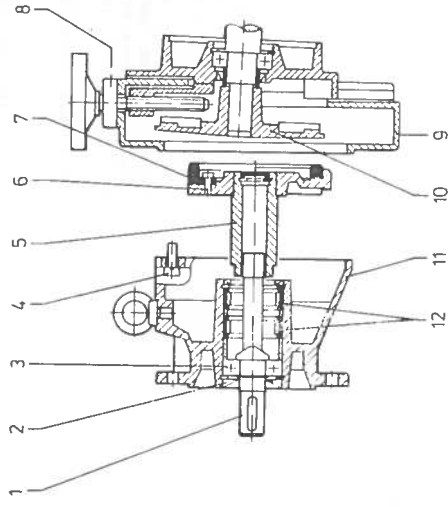


Fig. 11: The Varimot Drive

Determining Excessive Wear

As wear on friction ring #7 increases, the backlash of the output shaft, #1, will increase. This backlash therefore, can be used to judge the amount of wear on the friction ring.

The backlash can be gauged directly on the output shaft of footmounted Varimot-drives. When it approaches 45 degrees rotation, the unit should be scheduled for service.

If there is no direct access to the Varimot shaft (as in the case of geared drives for example) the backlash can be also estimated at the motor's fan. To gauge the backlash, the unit then has to be set

for 80% speed (pointer should indicate "80" on lateral scale) for this check. Again, if the backlash approaches 45 degrees rotation, schedule the unit for service.

Replacing The Friction Ring

The Varimot's mainbodies, #9 and #11, can be separated by removing the four bolts, #4, to gain access to the friction ring. Friction ring #7, and driving cone #10, have to be checked for wear. If the friction ring shows damage, the whole subassembly #5, #6 and #7 should be replaced.

Inspect the needle bearings, #12, clean and regrease if needed (see lubricants, page 27). If the cam surfaces (#5 end opposite to friction ring) show more wear than 1.0mm (1/25"), the output shaft #1, must be replaced.

Insert the new friction ring sub-assembly into the body. Make sure that the mating cams are lined up properly. Do not use force when tightening the bolts #4, but recheck cam alignment should parts #9 and #11 not seat properly.

CAUTION: Before assembling the drive, make sure that running surfaces of friction ring #7, and driving cone #10, are clean and free of grease. Do not clean with chemicals, but use dry cloth instead.

The assembled unit should have a small amount of backlash at the output shaft.

Energize the drive motor and run the unit slowly through its full speed range. The unit should operate free of noise and vibration.

Drives with Dial Handwheels, Modification "HS"

These speed indication dials work only in the vertical position with the handwheel located on either side of the drive.

This modification, similar to "K" (sprocket), or "N" (metric stub shaft, with key and circlip), can be easily field installed.

Change of the Handwheel Position

The position of the handwheel can be easily changed to a more convenient location, if needed. After removal of bolts #4, the tail-end portion of the drive can be turned at 90 degree sections.

Proceed as outlined under "Replacing the Friction Ring", when putting the unit back together (cam alignment!).

Wet Ambient Duty Drives, Modification "B"

These are special drives. Among other items, they are provided with drainage holes. Make sure that the hole, which is located at the lowest part of the drive is open.

Speed Ranges

Standard Varimot speed ranges are 5:1 (4:1 on sizes D44 and D45). There are no provisions on the standard drives to change them except on drives equipped with remote-controlled speed options. See the next page for additional information.

Servo-Motor Controlled Drives, Modification "EP" and Speed Indicators "FA", "FL"

Please see the electrical section of this manual for instructions on pages 8, 9, and 10.

Remote Speed Display for Adjustable Speed Drives

Remote Speed Display "PA" for Varimot Drives*

1) The instrument has to be connected to the terminal board of the servo-motor (limit switch compartment) as shown in Fig. 12.

Connect terminals 5, 6, and 7 with the corresponding terminals in the servo-motor's limit switch compartment.

2) Connect the supply voltage to terminals 220. Any voltage from 110 V.A.C. to 230 V.A.C. is acceptable.

3) Adjust the drive to the minimum speed setting, adjust screw "MIN" on back of the instrument so that pointer moves to the 20% mark (25% percent mark on Varimot sizes D42 and D43).

4) Adjust the drive to the maximum speed. Then turn the screw "MAX" on the back of the instrument so the pointer moves to the 100% mark.

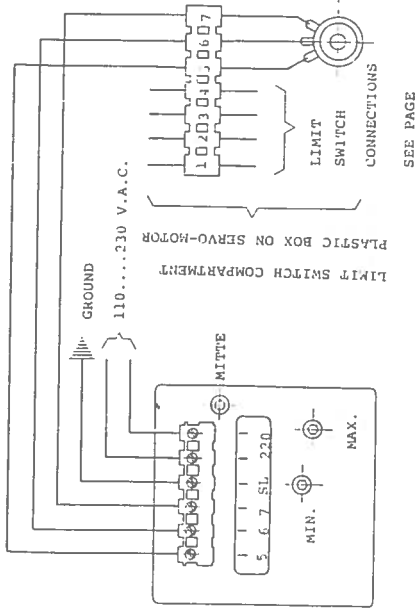


Fig. 12: "PA" Instrumentation

NOTE: Upon energizing the instrument with the specified voltage, it will show the speed (position) at which the drive is set, regardless of whether it is running or not.

*Remote Speed Display "PA" for Varigear Drives

Follow the same basic procedures given for the Varimot above. However, the back of the instrument has a third adjustment screw "MITTE".

Next, adjust the unit to the centre of the speed range (use a tachometer or a stopwatch). Adjust the pointer to the 50% mark on the dial by using the screw "MITTE" on the back of the instrument.

Speed Display "FL", for Varimot Drives

Connect instrument according to Fig. 13. Any voltage from 110 V.A.C. to 230 V.A.C. is acceptable.

Adjust the drive to the maximum speed and turn the pointer to the 100% mark with the screw "GROB" (coarse). Make final adjustments with the screw "FEIN" (fine).

In case of a malfunction, remove Varimot driving assembly (see instructions page 7) and check gap between pick-up and monitor screws. The proper gap should be 1.0 mm (0.04"), or one turn on the pick-up thread.

A cable length up to 100 metres (330'), or with a resistance up to 3.0 Ohms is acceptable.

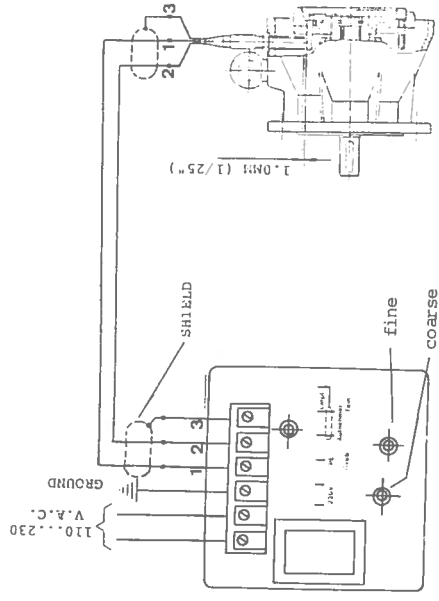


Fig. 13: "FL" Instrumentation

NOTE: The "FL" speed display is also available on some Varigear (V-Belt) drives. Proceed as above, or call office for assistance.

Speed Display "FA" Varigear (V-Belt) Drives only

Make electrical connections according to Fig. 14. Turn the screw at the back of the instrument so the pointer moves to the 100% mark when unit is adjusted for maximum speed.

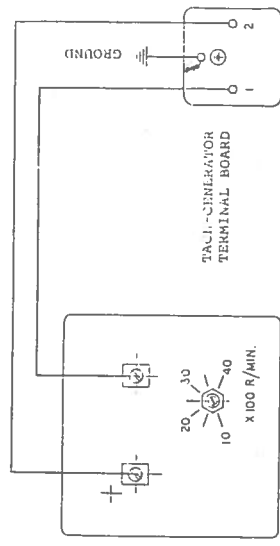


Fig. 14: "FA" ("FD") Instrumentation

Speed Display "FD" Varigear Drives only

Follow the same procedures for "FA" speed display. However, since the generator and indicator come as a matched and calibrated set, check the serial numbers of both units before connecting.

Digital Speed Readout "DA"

It can be operated from the magnetic pick-up "FL"-type, or with the tach-generator "FA" ("FD")-type.

Call office for instruction sheet 14 765 12E.

Adjustments on Electric Remote Controlled Motors

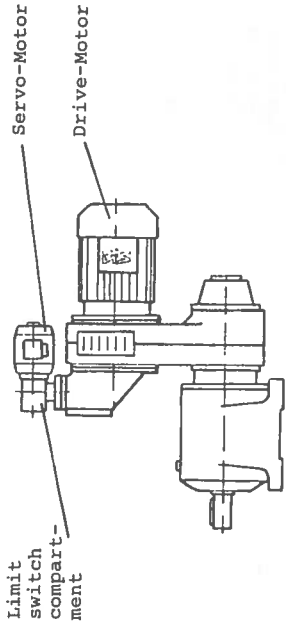


Fig. 15: Beltdrive "Varigear" with Servo-Motor

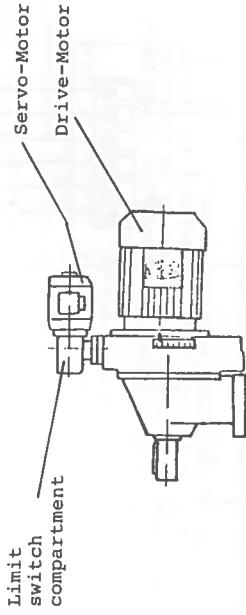


Fig. 16: Traction Drive "Varimot" with Servo-Motor

Limit Switch Adjusting Instructions For Varimot Drives For Varigear Drives, use information between brackets

The limit switches - limiting the unit's speed range - are factory set for maximum speed range. Resetting may be necessary after the unit has been dismantled.

The limit switches are located below the plastic cover at gear section of the servo-motor.

- 1) In case of a new installation, check the wiring of the drive, according to page 10.
- 2) Remove plastic cover from limit switch compartment.
- 3) Energize drive motor and adjust the drive to the high speed range limit.
- 4) Loosen the screws on the cams, and rotate the top cam counterclockwise (clockwise) until it triggers the limit switch contact. Retighten the screw.

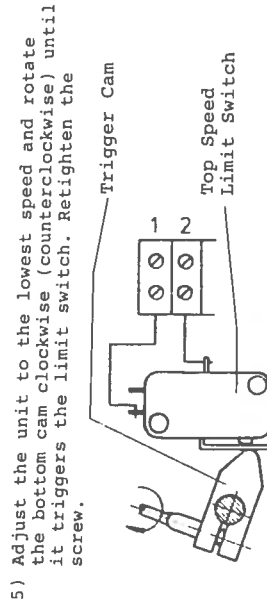


Fig. 17: Limit Switches and Cams

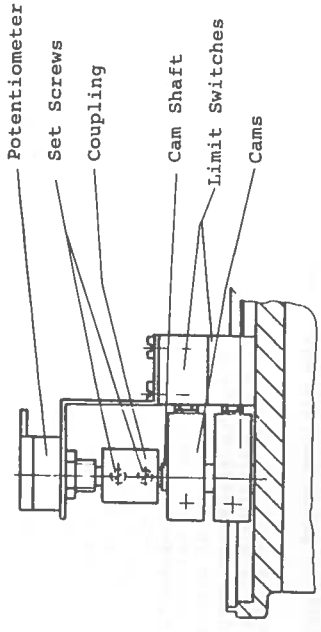


Fig. 18: Camshaft with Cams, Potentiometer

Instrumentation for Remote Speed Display

All instruments for EURODRIVE adjustable speed drives indicate the drive's output speed as a percent of the full speed.

Exceptions are: meters for "FD" types, mechanically coupled tachometers, which indicate RPM, FPM, etc.

Instruments for "PA", and "FL" speed display systems require A.C. input to the terminal marked 220. Any voltage from 110 V.A.C. to 230 V.A.C. will operate the instrument.

The "PA" type speed display requires a potentiometer to be mounted on top of the limit switch cam shaft (see figure 18).

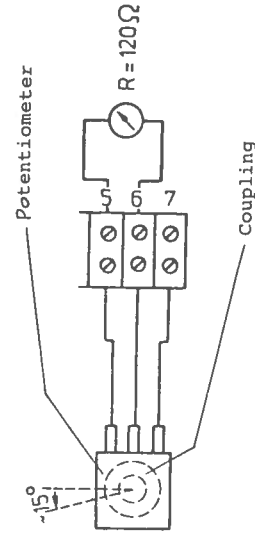


Fig. 19: Feedback Potentiometer Setting

Setting of the Feedback Potentiometer

On the cam spindle, a potentiometer will be supplied if a feedback signal - for speed display or closed loop system - is required. The correct setting is accomplished as follows:

- 1) Make sure the drive is at the minimum speed setting.
- 2) Loosen one set screw on coupling, and turn potentiometer clockwise (counterclockwise) until it contacts the mechanical stop. Then reverse it 15 degrees counterclockwise. Between terminals 5 and 6, a resistance of 120 Ohms can now be measured if set properly.
- 3) Retighten coupling set screws.

See page 10 for the electrical wiring of the servo-motor.

Wiring of Electric Remote Controlled Motors

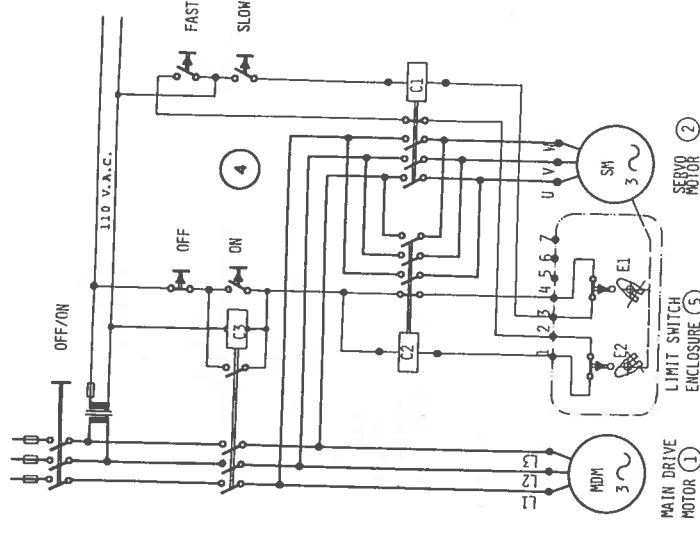


Fig. 20: Three-Phase Servo-Motor Push Button Control

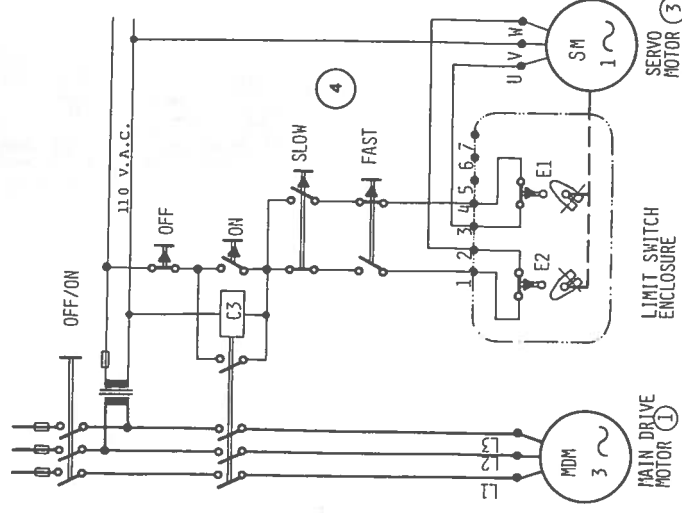


Fig. 21: Single-Phase Servo-Motor Push Button Control For Varimot
Reverse leads U-W for Varigear Drive

Variable Speed Drive Type and Size	Mains Voltage for Servo-Motor
3/575/60, 3/415/50	3/230/60
3/460/60, 3/380/50	3/208/60
3/220/50	3/220/50
VU/VZ 1, 2, 3 and D12, 22, 23	40.0 Watt 0.054 HP 0.2 A
VZ 4	75.0 Watt 0.10 HP 0.32 A
VU 4, 5, 6, D/DF 32, 42, 43	75.0 Watt 0.10 HP 0.55 A
Terminal Connections for Servo Motor	Z--X--Y U V W L 1 2 3

Fig. 22: Rating and Wiring of Three-Phase Servo Motors.

For rating and connection of single phase servo-motors, see note 3 and diagram 21.

For setting of limit switches see page 9.

For speed display devices see page 8.

EURODRIVE also supplies other remotely-controlled actuators, such as hydraulic controls type "Hy" for the Varigear drive, or air cylinders for pneumatically-controlled closed loop systems, type "pp". Call our office for further information.

Notes:

- 1) See the motor's nameplate for rating, and inside of the motor terminal box cover for proper terminal connections.
- 2) Three-phase servo-motor, see Fig. 22 for ratings.
- 3) Single-phase servo-motor, one type only for all mechanically adjustable speed drives (not available for the type "VU6"). 115 Volt / 2.1 Ampere rating / 120 Watts
- 4) This is only a wiring proposal. EURODRIVE usually does not provide any wiring hardware, except for the limit switches, which are part of the servo motor.
- 5) Location of limit switch compartment:
Compartment for limit switches and feed back potentiometer

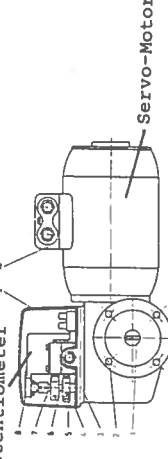


Fig. 23: Servo-Motor and Limit Switch Compartment

Three Phase Motors and Brake Motors

In General

Every EURODRIVE motor is fully inspected and dynamically tested prior to delivery. After receiving shipment, inspect for transport damage and report any damage to the forwarding agent of the shipping agency.

For storage, or for mechanical installation, please see page 2.

Electrical Installation

The electrical connections must be made in accordance with local regulations and with the motor's nameplate information.

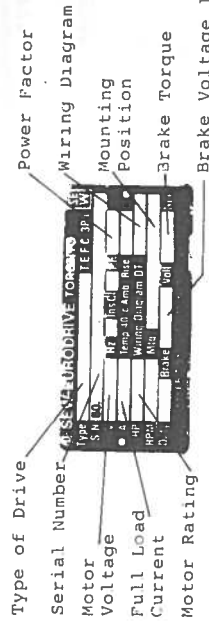
A sample of a nameplate is shown in Fig. 24. This nameplate also includes a connection diagram number. A copy of the corresponding diagram is placed inside the motor's terminal box cover. The most frequently encountered connection diagrams are also shown on page 15.

Check with our office if the motor is to run on a voltage or frequency different than specified on the motor's nameplate.

See pages 17 and 18 for typical wiring diagrams for brake motors, dual speed motors, etc.

Any additional questions can be answered by contacting the EURODRIVE office nearest to you. See page 29 for phone numbers.

We recommend that you check the motor's running, idling or starting current after completing the installation. A comparison with nameplate or catalogue data will confirm the proper connection and equipment's sizing.



1 voltage into brake rectifier

Fig. 24: Motor Nameplate

The motor should operate successfully on voltages which are within +/-5% of the nameplate specification, however, any deviation may increase the current draw.

Make sure the surrounding area does not restrict the ventilation intake of the motor.

Motor for Washdown Applications

Drainage holes should be installed in motor endbell and the terminal box, if motor is frequently exposed to washdowns.

Motors equipped with drainage holes are shipped from our company with plugs inserted into the holes, for protection. During final installation, these plugs should be removed and the location of the holes should be checked. They have to always be at the lowest points.

Maintenance

Periodically clean the motor's ventilation intake and its cooling fins for best cooling efficiency.

The bearings should be checked, cleaned and

regreased every 5000 hours of operation. Regreasing should be done only with specified greases. (see page 27) The bearings should be filled only to one-third of the available space between the races and rolling members to avoid overheating.

When assembling the motor, apply liquid seal around the joints of the end bells, and the stator.

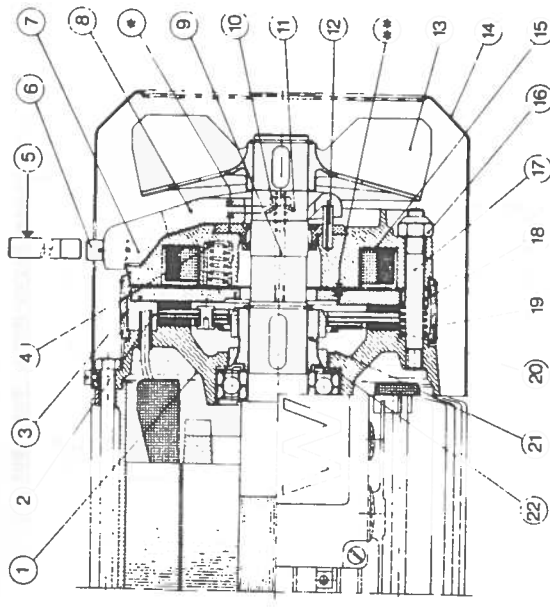
Resetting The Brake

On a properly set brake, the air gap must have the following minimum and maximum values, depending on the brake size:

BM05 - BM4: 0.25 - 0.6 mm (0.010" - 0.024")
 BM8 - BM31: 0.3 - 1.2 mm (0.012" - 0.047")
 BM32 - BM62: 0.4 - 1.2 mm (0.016" - 0.047")

Prolonged use of the brake will wear the brake lining, which increases the air gap. When the air gap approaches its maximum value, resetting the brake is necessary. To reset the brake proceed as follows:

1. Remove the fan cover (14), rubber seal (19), and all accessories at the fan end.
- 2) Insert a feeler gauge between the brake coil body (15) and the pressure plate (3), tighten the adjusting nuts (16) until the minimum value for the air gap is reached equally all around. With brakes BM30 to BM62 screw first the threaded bushing into the endshield. After the air gap setting, lock the bushings against the coil body.
- 3) Ensure a play of 1.5 to 2 mm in the releasing arm. See "The Hand Release Mechanism".



- 1 Brake end shield
- 2 Brake disc complete
- 3 Pressure plate
- 4 Brake spring
- 5 Release arm
- 6 Manual brake release screw for lining brake in the dis-engaged position
- 7 Release lever
- 8 Release spring
- 9 Stud
- 10 Spring nut
- 11 Cover end spring
- 12 Spring down pin
- 13 Fan
- 14 Fan guard
- 15 Brake coil body
- 16 Adjusting nut
- 17 Releasing screw
- 18 Pressure ring
- 19 Rubber sealing ring
- 20 Carrier
- 21 Cam
- 22 Waved socket
- ... Housing clearance 1.5-2.0 mm
- ... Working air gap

Fig. 25: Setting of Brake

Replacement of the Brake Disc

For motors up to size 100, when the thickness of the brake disc (2) reaches 9 mm, the disc must be replaced. For motors size 112 and up the limit is 10 mm. Contamination of the new brakelining with grease or oil must be avoided.

Changing the Brake Torque

Adjusting or changing the brake's torque is not usually required, since it has been set to the proper value before shipping. Changes in the brakes behaviour generally relate to problems other than the torque. See "Trouble Shooting".

To change the brake torque, remove the fan cover, (14) fan, (13) hand release mechanism, (8) rubber band, (19) and three adjustment nuts (16). Move the coil body (15) about 50mm (2.0") away from the motor. Before doing so, check the terminal box to make sure the brake wires are not jammed below the rectifier block.

Inside the brake coil, a set of up to 6 springs (4) becomes visible at this point. Replace these springs symmetrically with the proper ones to give the brake its desired torque rating. Call our office for information.

When assembling the brake, make sure the brake wire's rubber protection is properly inserted into the end shield (1). Avoid kinking the wire which will weaken the insulation.

Proceed as outlined above under "Resetting The Brake". A new motor nameplate, with the new torque rating should be obtained from our plant.

The Hand Release Mechanism

Most of our brakes are supplied with a hand-operated release mechanism. This allows opening of the brake without energizing the motor to facilitate adjustments on the driven machinery.

There are two types available: The screw-type "BMHF" (6) arrangement which requires an Allen head key, which, when turned clockwise, opens the brake.

The "BMHR" (5) type requires a lever to be inserted into the release arm. A pull away from the motor will open the brake. It will reset automatically, once the lever is released. This arrangement should be applied for hoisting applications. The lever, when not used, is attached to the cooling fins of the motor with clamps.

The hand release mechanism can be easily retrofitted onto the brake. Obtain the kit from our plant and assemble the parts as shown in Fig. 25. The studs (9) should be screwed tightly into the stationary disc using Loctite.

Since the stationary disc (3) will move away from the coil body during the brake's operation, it is vital that there is a play (*) on the arm of about 1.5-2.0 mm (0.060"-0.080"). The springs (11) should be placed between the arm (8) and the nuts (10) to eliminate noise.

THE BRAKE RELEASE MECHANISM IS NOT TO BE USED TO CHANGE THE BRAKES TORQUE SETTING. THERE MUST ALWAYS BE CLEARANCE ON THE LEVER, AS OUTLINED ABOVE.

Trouble Shooting Malfunctions

Fault: Motor does not run

- 1) Check the wiring for damage and proper connection.

- 2) Measure the values of all three phases
 - resistance
 - voltage
 - current.

- 3) If, on all three phases a current of similar value is present, either of the following conditions are evident:

- the motor may be blocked by either excessive external loads, or defects, in the reducer or the brake. In this case, the motor should draw locked rotor (in-rush) current. Check our catalogue for values. Release the brake mechanically, reset air gap if needed, or disconnect load for shaft.
- If the brake is at fault electrically see #4 below.
- If the current differs essentially from the in-rush current, the motor is either of the wrong voltage, or it is connected for the wrong voltage.

- 4) Check the brake for electrical problems, if it can be released mechanically, but does not respond to voltage:
 - make sure the wiring is connected according to instructions. Pay special attention to the correct voltages.
 - energize the brake circuit and measure the voltage on rectifier terminals 2 and 3 (BG/BGE rectifiers). The measured voltage should be identical to the nameplate inscription: "brake voltage".
 - measure the voltage on terminals 3 and 5 which should be about 1/2 of the previous measurement.
 - if there is no fault found up to this point measure the current into the rectifier and the resistance of the brake coils. Disconnect it from the rectifier for this purpose. Call our office, forwarding these values together with the drive's serial number and other nameplate information.
 - check with office for proper rectifier selection.

Special instructions for checking the BG/BGE rectifier can be obtained from our office. In case of rectifier failure, the brake coil has to be checked prior to start-up with the new rectifier.

Fault: Brake does not hold load in time

If the brake has been operating well for some time and the change came about in a gradual manner, the release arm has probably run-up against the coil body. Check arm end play, see above.

If the brake has been in operation for some time, and only lately behaves erratically, at irregular intervals, dust accumulations at the stationary disc guides may be the cause. Remove the brake's rubber tape and clean away any dust with an air hose. In such cases, it may be advisable to remove the rubber band permanently from the brake.

If the application is new, check the brake's wiring for fast hook-up (see following pages for wiring examples). Generally, all hoisting or vertical motion and indexing applications may require this connection. Increasing the brake's torque will most likely not remedy the situation, but only increase the stress on the transmission.

If the brake is jammed due to rust, call our office for information about our corrosion-proof brake.

On specially hard working brakes, the lining's surface may be glazed due to excessive heat. The application of BGE rectifier will improve this situation dramatically. BGE rectifiers are standard equipment on motors size DV112...DV225, but optional on the smaller sizes DF71...DF100. It also will extend the brake's reset cycle. Call our office for more information.

Direct Current Motors

In General

The basic instructions, as outlined on pages 11 and 12, for three-phase induction-motors apply. The only difference is the nature of the electrical hookup, and the care for the commutator and the brushes.

The same brakes are used for both A.C. and D.C. motors. Therefore, all instructions on brakes, provided on pages 11 and 12, are applicable for D.C. motors.

The EURODRIVE D.C. catalogue contains a detailed description of technical features of the EURODRIVE D.C. motor line. A copy should be obtained for a complete understanding of the equipment. The text below concentrates mainly on the maintenance of the equipment, assuming that the layout of the same has been done according to factory instructions.

The Electrical Hookup

Local electrical regulations, and recommendations contained in this manual, must be followed when making electrical connections.

When working on the motor, special care must be taken to protect the gaskets on the commutator opening, and the terminal box opening.

Most D.C. motors will be driven by a converter. Schematic diagrams of the converter should be obtained, and the electrical wiring designed accordingly.

Since there are a variety of converters, with different features, this manual can not take all of them into consideration. The proper manual should be obtained from the converter manufacturer.

Motor Features

EURODRIVE D.C. motors, sizes GN71 and GN80, are supplied without commutating poles. All larger sizes are equipped with commutation and compensation windings.

The terminal designations on these motors are as follows:

- A1 - A2 armature winding
- C1 - C2 armature winding with commutating and compensation winding, connected symmetrically
- D1 - D2 field winding, if connected in series
- F1 - F2 field winding, if shunt wound

A corresponding wiring diagram is located inside the motor's terminal box cover.

If the motor is equipped with a brake, check the motor nameplate inscription for brake voltage.

Auxiliary equipment such as forced cooling fans and tachogenerators, must be connected according to their nameplate data.

Tachogenerators with signal brushes - signalling excessively worn brushes - have additional terminals A5 and A6 in their terminal boxes which provide the corresponding signal.

The Power Rating, Starting and Overload Capacity

The motors are rated according to VDE 0530, at nominal voltage, for a form factor of 1.04.

They provide a constant torque from nominal speed down to standstill. If a motor is run continuously at full torque at speeds below 500 RPM, however, the motor has to be derated, or equipped with a forced cooling fan to compensate

for less efficient cooling.

The motors have the capacity to start with 200% of rated current at full field voltage for a limited time. To avoid higher currents, the voltage has to be reduced accordingly during starts. Only motors up to 0.75HP can handle across the line starts. Frequent across the line starts should be avoided to protect the brushes and the commutator.

In compliance with VDE 0530, the motors are designed to run at 150% rated current for 2 minutes at operational temperature. They also can withstand 160% of rated torque for 15 seconds, without suffering permanent damage.

The Field

The field coil must be energized before voltage is applied to the armature.

Voltage peaks, which will be generated by the field inductivity when disconnecting the field coil, have to be discharged over resistors or diodes, in shunt connection.

Use following guideline for resistor values:

Field voltage	factor "X"
110 V	10.0
195 V	7.0
340 V	5.5
440 V	4.0

The size of the necessary shunt is calculated as follows:

$$\text{Field voltage} \times \text{Factor "X"} = \text{Shunt in Ohms}$$

Neutral Zone, how to find it

The brushes are placed into the neutral zone before shipment. The brush holder is marked for this position. After disassembling the motor, the brush holder must be reset, and the old marking should be replaced with the new one.

If the stator is rotated to move the terminal box into a more convenient position, the motor's endshield, with the brush holder has to be rotated at the same rate to maintain the neutral zone setting.

To find the neutral zone, connect the field winding (F1 - F2) to its nominal power source (D.C.), and incorporate a switch into the circuit. Connect a moving coil instrument (50mV to 150mV range) to the armature circuit. The zero-point of this instrument should preferably be in the centre of the scale. Activation of the switch will generate voltage to the instrument as long as the brushes are outside the neutral zone. Turn the brush holder until no voltage is visible on the instrument, while activating the switch.

To avoid damage to the field winding, the protective resistance, as outlined above, should be used in parallel to the switch.

Servicing of the Brushes and Commutator

D.C. motors require constant attention. After the first 1500 hours of operation, a visual inspection of the brushes and the commutator should be performed. A well working commutator is clean and has a purple, satin finish surface.

In normal service, the brushes may have a service life of 4000 hours. However the form factor, pulsating currents, low humidity, frequent

running at low load, corrosive environments.... have a negative influence on brush life. Contact our office if you have questions.

The fan end of the motor is equipped with large covers which allow for inspection and replacement of the brushes. The brushes have to be replaced when their remaining length is 12mm (0.5") or less. Brushes of identical carbon quality must be used.

Signal brushes have to be connected to the isolated copper wire of about 1.0mm (0.04") diameter, which runs separated from the brushes power connection. The signal circuit is tied to screws on the brush holder ring.

The contours of new brushes have to be adapted to the commutator's diameter. Wrap Emery-cloth around the commutator, and rock the armature back and forth, until the brushes have full length contact to the commutator surface.

The commutator surface should be refinished only if it has been damaged through overload conditions or corrosion. Use fine grain Emery-cloth to polish the surface.

Spring-loaded brushes should have identical spring tensions on all brushes and the factory-installed value should be maintained. Only for drives subject to high vibrations will an increase of the spring load be beneficial.

After extended service, the commutator may develop uneven (excentrical) wear and the armature must be refinished on a lathe. In order to obtain satisfactory performance, the commutator surface must be finished to a run out accuracy of 0.015mm (0.0006"), and a finish of 5 microns.

The Mica insulation must be cut back at least 1.0mm (0.04") below the commutator's surface, over the full length. The remaining edges have to be deburred. The reduction of the commutator's

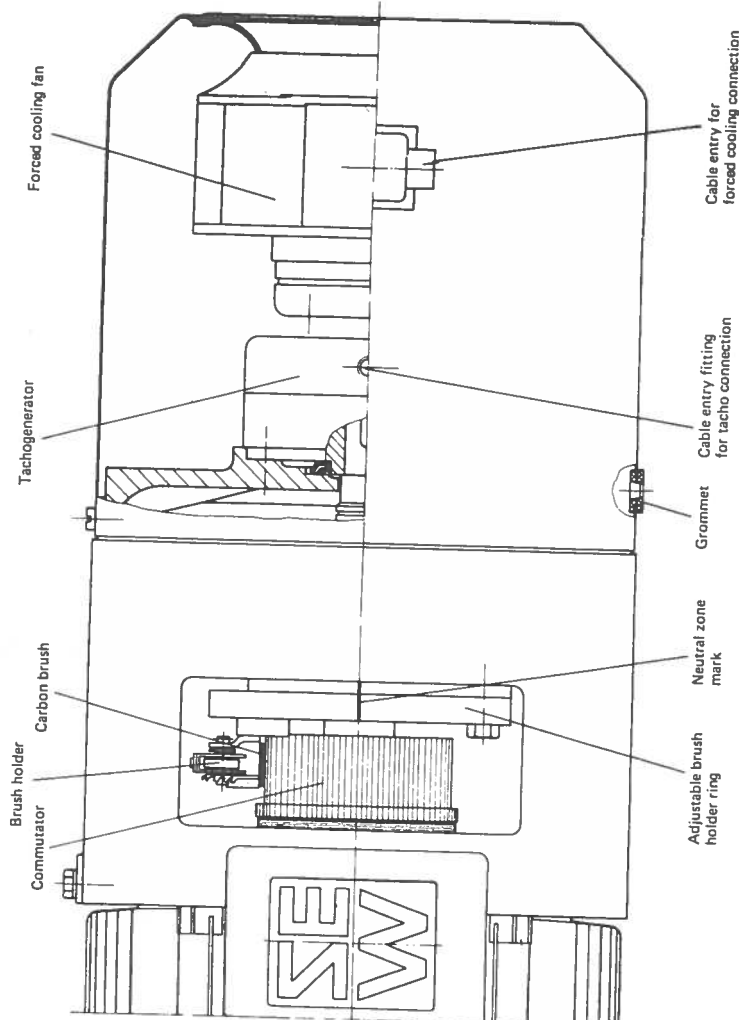


Fig. 30: Modifications of D.C. Motors

diameter will increase the gap between it and the brush holders. If the gap is beyond 2mm (0.08"), the holders have to be adjusted accordingly.

Carefully remove the carbon dust and other particles after every service is performed. Also check the neutral zone setting.

Make sure that the access covers to the commutator are tightly closed after every inspection.

Maintenance of the Tachogenerator

The hollow shaft tachogenerator is keyed onto the extended motor shaft and secured with an axial locking screw. Motors with brakes require the removal of the tachogenerator if the brake needs service.

The tachogenerator brushes should be inspected at least every 1500 hours. Remove the accumulated dust with pressurized air, and check the brushes to ensure they do not jam in their holders. If the brushes are worn, replace them with ones of identical quality, and shape them with Emery-cloth to the diameter of the commutator.

Remove all dust before sealing the closing cap.

Bearing Maintenance

Inspect, clean, regrease or replace the anti-friction bearings every 10,000 hours of operation. Regreasing should be done only with specified greases (see page 27). Only one-third of the volume around the rolling members should be filled with grease.

See page 11 for more details.

A cross-section through typical D.C. motors is shown on page 19.

Three Phase Motor Connection Diagrams and Brake Wirings

All motors manufactured by EURODRIVE COMPANY OF CANADA LTD., bear connection diagram numbers on the nameplate, and on respective factory documents.

These numbers (e.g. DT-79), indicate the specific wiring diagram furnished inside the terminal box cover, to the country of origin of the motor winding.

Below is a selection of the most frequently encountered connection diagrams. While the reference numbers are internationally used by EURODRIVE, the actual designations of the terminal pegs may vary, according to the CSA, NEMA or other codes, according to the country of origin of the motor winding.

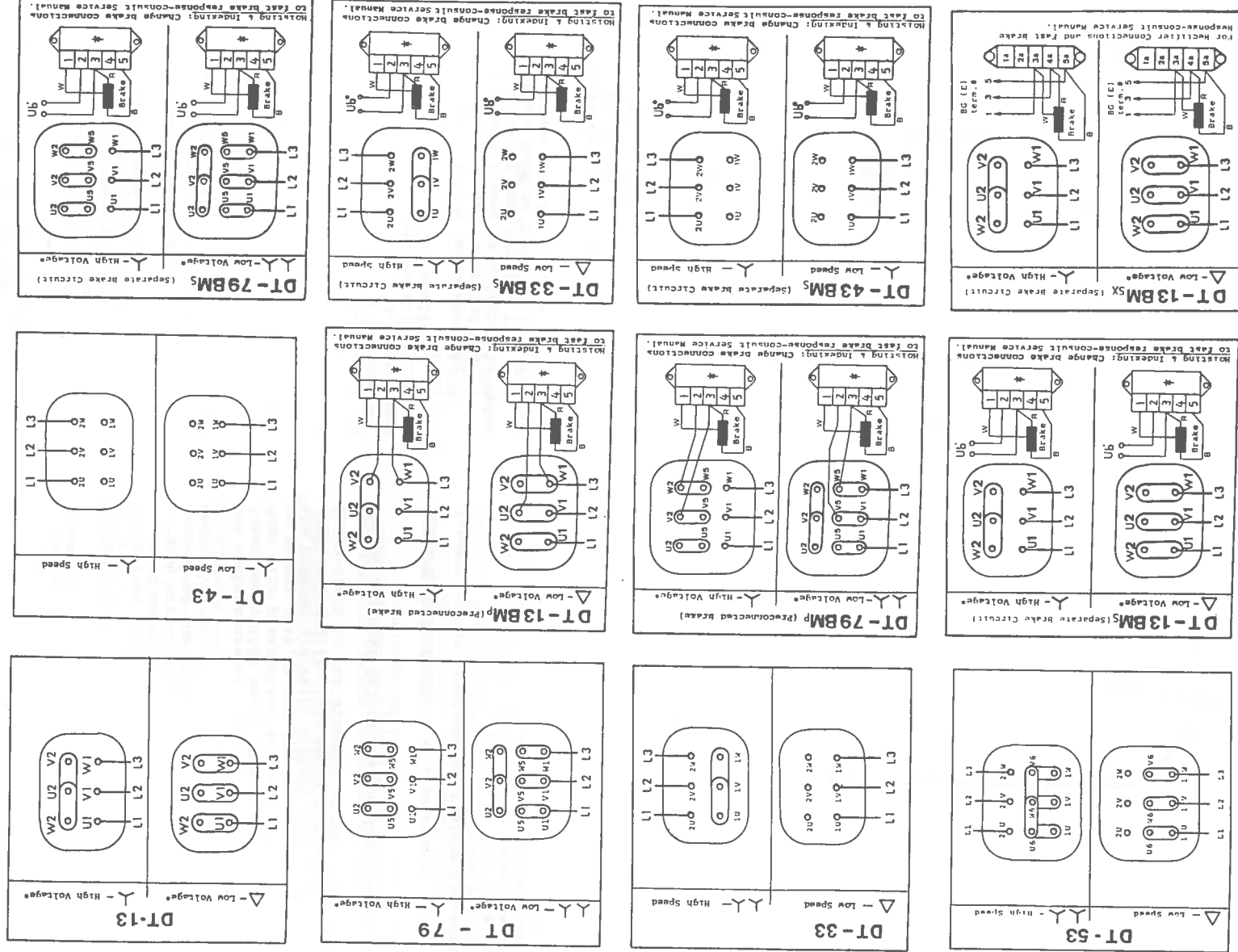


Fig.31: Connection Diagrams for Three-Phase Motors and Brake Wirings

* Check Motor Name tag for Voltage Rating

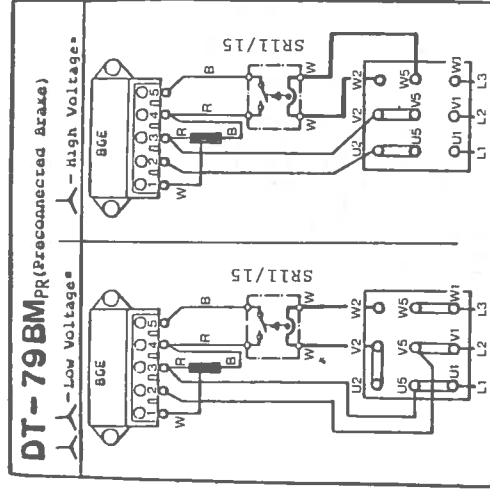
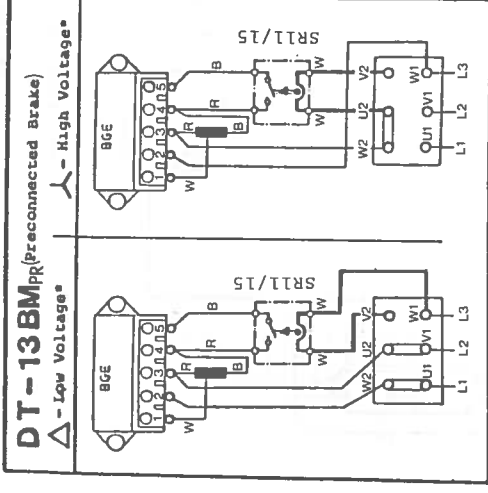


Fig.28: Preconnected brakes for fast response via SR relay.

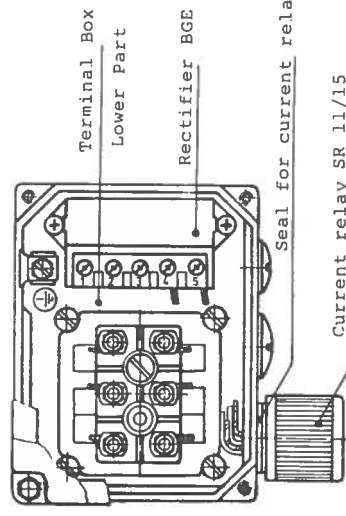


Fig.29: Terminal box with mounted SR relay.

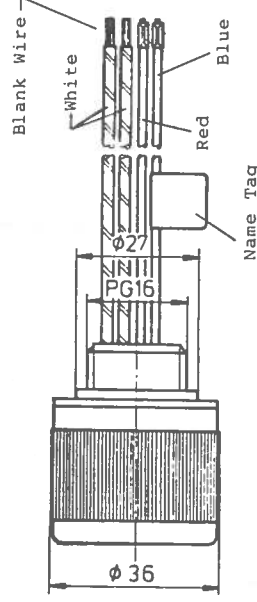


Fig.30 : SR11/15 current relay.

The following wiring samples are valid only for BM-brakes with BG or BGE rectifiers. For instructions relating to preceding brake models, specifically with rectifiers #825 009X and #825 0057, consult the 1986 edition of this Service Manual.

On your brake, the proper selection of the rectifier type and location will have been done already by Eurodrive.

The following general rules for selection apply:

- for motor sizes DV112 and larger, only the BGE type rectifier can be used:
 - a) blue version #825 3870 (BGE3) for voltages up to 150 VAC
 - b) red version #825 385 4 (BGE1.5) for voltages from 150 VAC to 500 VAC
 - c) mount rectifier #825 3870 (BGE3) in control panel for motors DV132M and larger, if brake voltage below 60VAC.
- for motor sizes DT71...DT100, BG type rectifiers are standard:
 - d) brown version #825 3862 (BG3) for voltages up to 150 VAC
 - e) black version #825 3846 (BG1.5) for voltages from 150 VAC to 500 VAC.

If the motor is submitted to a high start and stop cycle, or to a high ambient temperature, BGE-rectifiers should be used also on the smaller motor sizes DT71...DT100.

In case of a high motor temperature, or a high ambient temperature, specifically in case of insulation class "H" motors, remove the rectifier to the motor control panel. In this case, we suggest a 110 VAC brake circuit, operated from the control voltage, to minimize wiring. An additional terminal block must then be mounted in the terminal box for connection of the brake coils always to pegs 3a, 4a, 5a. See Fig.33.

For rectifiers in the terminal box, the additional terminal lock can be placed on the top of the rectifiers BG, BGE and BSG, for connection of auxiliary functions, like thermostats, thermostats, strip heaters...

For hoisting and indexing, fast brake disconnect should be used. This will require an auxiliary switch in the motor contactor to control the brake. (Fig.35 and Fig.36).

This auxiliary contact can be replaced with brake relays SR 11/15, which is installed at the motor terminal box. (Fig. 28).

SR relays is available in two types; SR11 for motor rated current between 0.6 and 10 A, and SR15 for 10 to 50 A. The primary circuit of the relays is inserted into one phase of the motor. SR relays is only suitable for single speed motors and is not available for insulation class "H". It is mounted in the motor terminal box into one unused PG 16 thread. See Fig.29. and Fig.30.

Two-speed motors have separate brake circuits. (Fig.37 and Fig.38).

In case of D.C. feed brakes, the BG (BGE) rectifiers have to be replaced with the BSG power supplies (#825 4591 - for 24 VDC only) which will be located in the Terminal Box, except for insulation class "H" (not available for motors DV160L and larger).

Ask office for wiring instructions for D.C. power supply "BSG" for 24 VDC operated brakes and brake heater/rectifier "BSH" for brakes in danger of ice freeze up.

BRAKE WIRING EXAMPLES

Note: For connections between rectifier and motor terminal pegs, see diagrams on page 15.

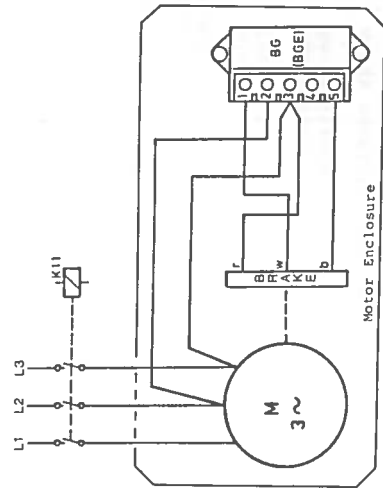


Fig. 31: Preconnected brake. Brake voltage identical to the lower of the two motor voltages. Standard brake response.

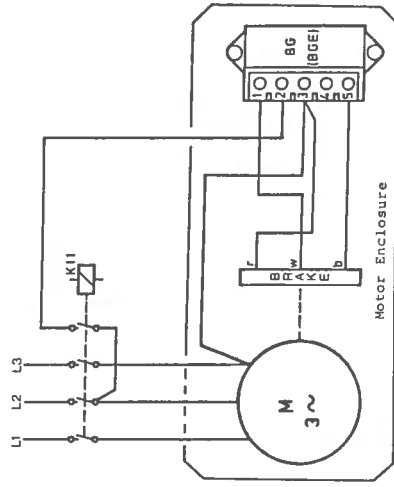


Fig. 34: Brake wiring for standard response. Brake voltage identical to the lower of the two motor voltages.

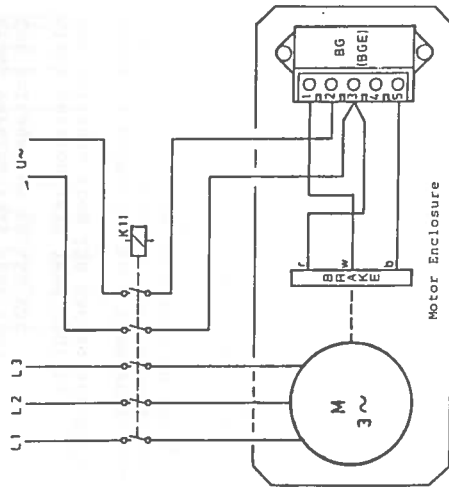


Fig. 32: Separate brake circuit. Standard brake response.

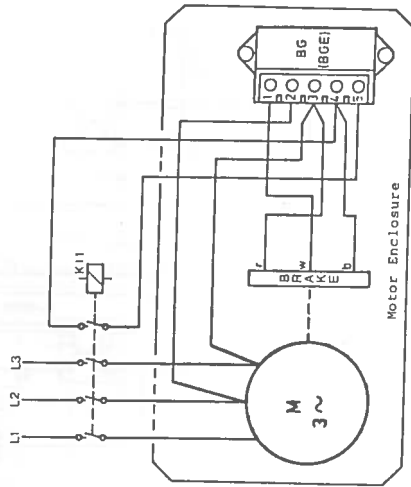


Fig. 35: Preconnected brake for fast response. Brake voltage identical to the lower of the two motor voltages.

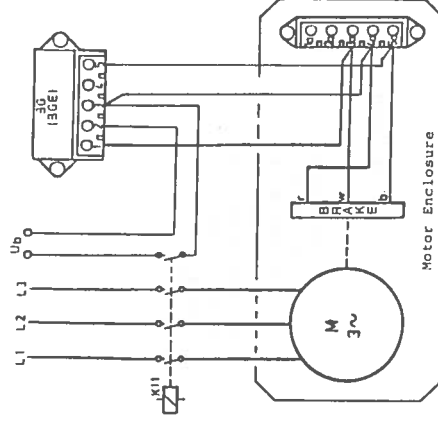


Fig. 33: Brake wiring for insulation class "H" motors, with separate brake circuit and rectifier in control panel. Standard brake response.

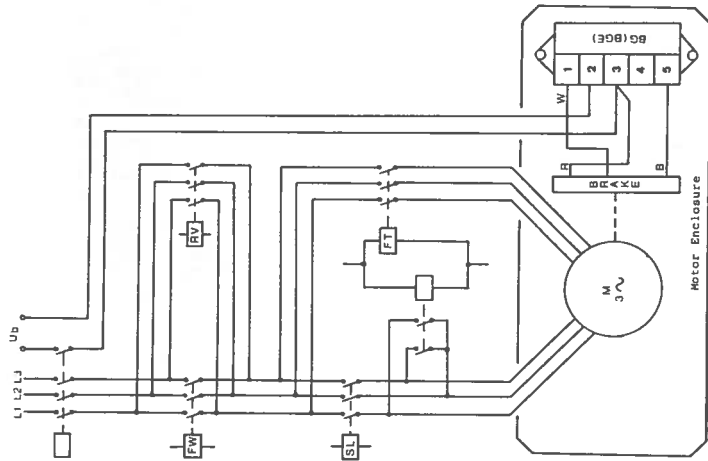


Fig. 37: Two speed motor with single winding. Separate brake circuit. Standard brake response.

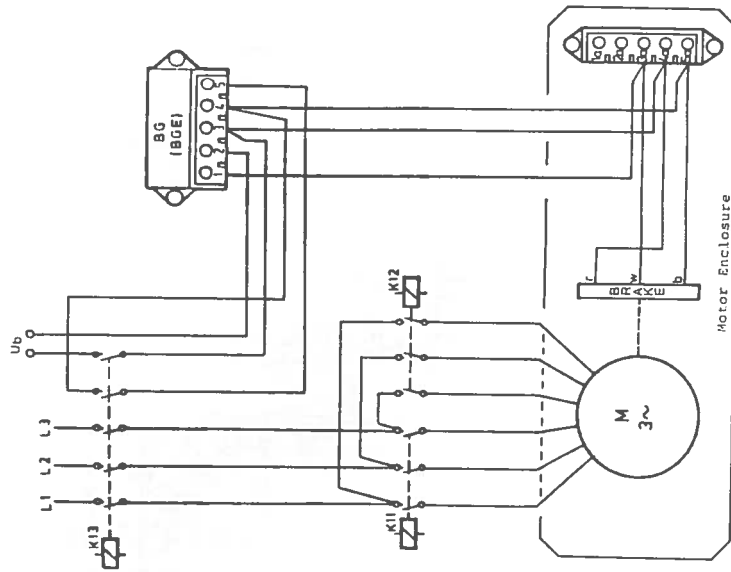


Fig. 38: Two speed motor with dual winding. Separate brake circuit with rectifier in control panel. Fast brake response.

Overload Protection

Thermistor Motor Protection

Thermistors are a very efficient motor protection. They offer fast and accurate response, and an extremely fast resetting time. They do not have any current setting and therefore are more tamper-proof than conventional motor protection.

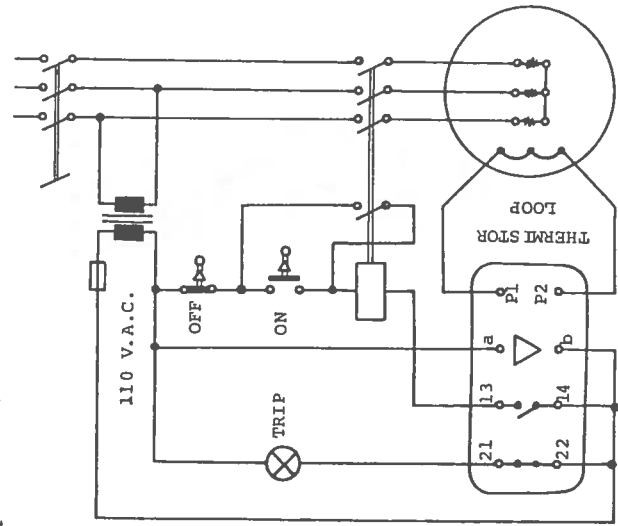


Fig. 39: Wiring of Thermistor Trip Unit JUNG

Connection diagram Fig. 39 is only to be used for the SIEMENS JUNG trip unit, which is available from EURODRIVE stock. For other types, see the corresponding instructions.

The following points should be observed when working with thermistors:

- 1) Avoid using trip units of US-origin with sensors of European make.
- 2) One trip unit can accept up to 15 sensors, so several motors can be protected by one relay. One three-phase motor usually has three sensors in its stator. Follow the trip unit's instruction.
- 3) Measuring the sensor loop should be done with less than 10 Volts. Using more than 10 Volts may damage sensors and motor windings.
- 4) Other motor overload protection interfering with the thermistors, such as "heaters" (BI-metal switches) have to be removed from the circuit. "Doubling up" will render thermistors useless.

While it is a common practice to install thermistor sensors into an established winding, we do not recommend this procedure. Most of the windings will get damaged during the process.

The sensor's temperature rating will establish the tripping point, without any other current related settings required.

Other Protection Devices

Eurodrive distributes other protection systems for which separate brochures are available upon request. PCU-System: Electrical overload protection, monitoring the KW-consumption of the drive motor. Also available for vari-speed drives. Load cell option for PCU systems.

Mounting Positions for Geared Motors

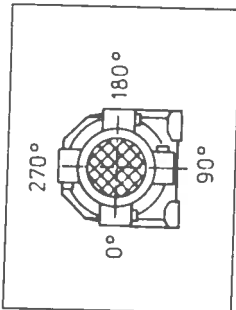
Legend

The various mounting positions in accordance with DIN IEC 34 are shown on the following pages with their designations and positioning, together with the oil plug point symbols, as defined below:

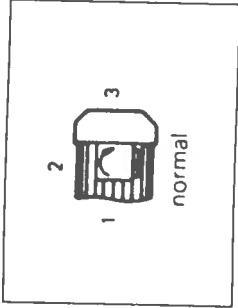
- = breather plug
- = oil level plug
- = oil drain plug

The mounting positions shown apply to the standard gear unit ranges R/F/K/S. Combinations of these gear unit types as well as with variable speed units VARIBLOC® VUVZ and VARIMOT® D are shown in the respective catalogues.

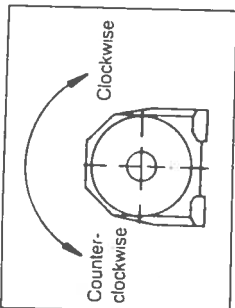
Furthermore, the following definitions apply to the mounting position diagrams:



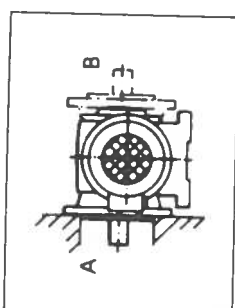
Position of the cable entry:
normal, 1, 2 or 3



Direction of rotation:
(only for drives with a backstop)
clockwise or counterclockwise
(output shaft viewed end on).



For right angular drives:
output shaft projection: A, B or A + B
Flange projection:
A, B or A + B
Connection side for shaft-mounted unit with shrink disc:
A or B



R 30-R 60 RF30-RF60

B3	B6	B7	B8
V5	V6	V1	V3
B5	B65	B75	B85

R 32-R 163 RF32-RF163

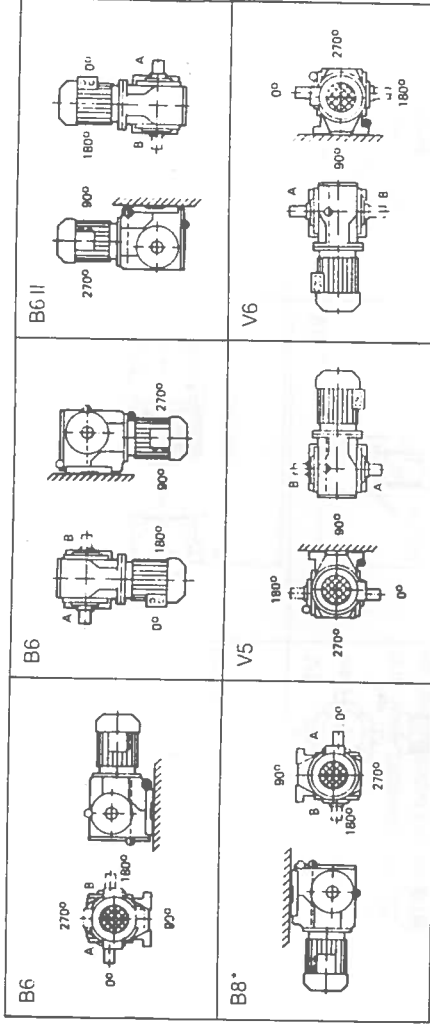
B3	B6	B7	B8
V5	V6	V1	V3
B5	B65	B75	B85

Helical Geared Motors RX 61-RX 101 RXF61-RXF101

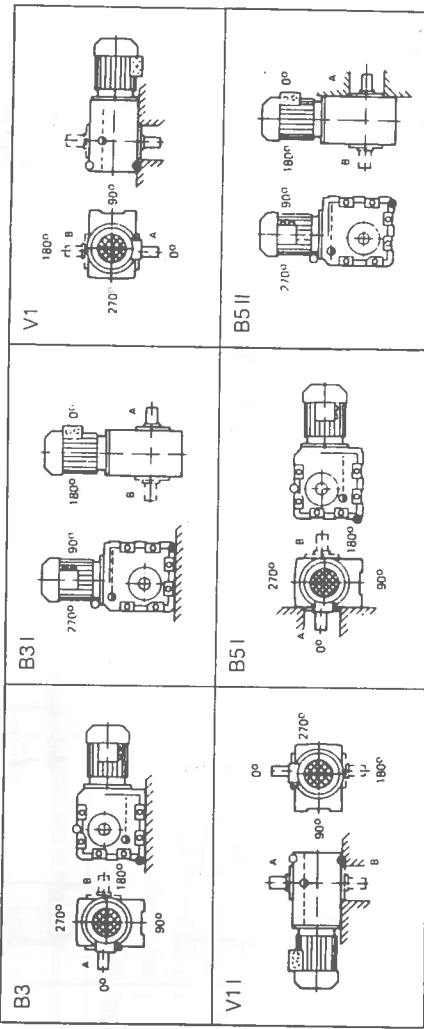
B3	B6	B7	B8
V5	V6	V1	V3
B5	B51		

Helical-Bevel Geared Motors

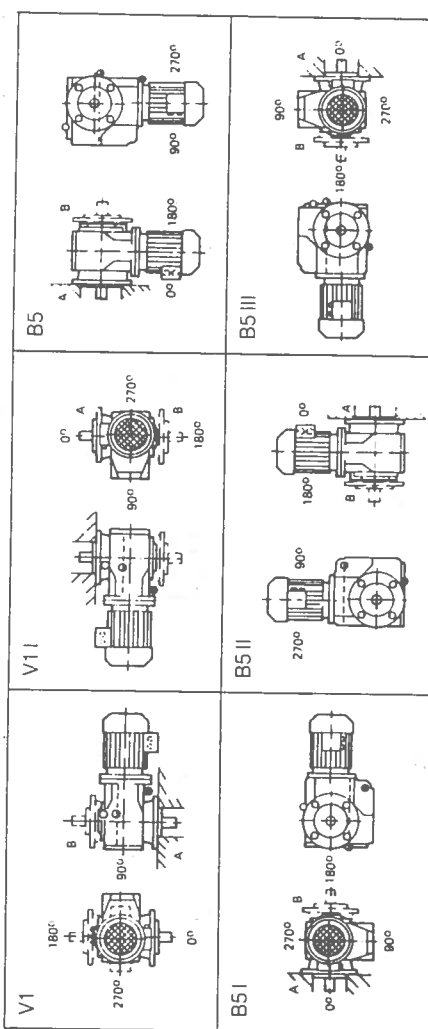
K66-K106



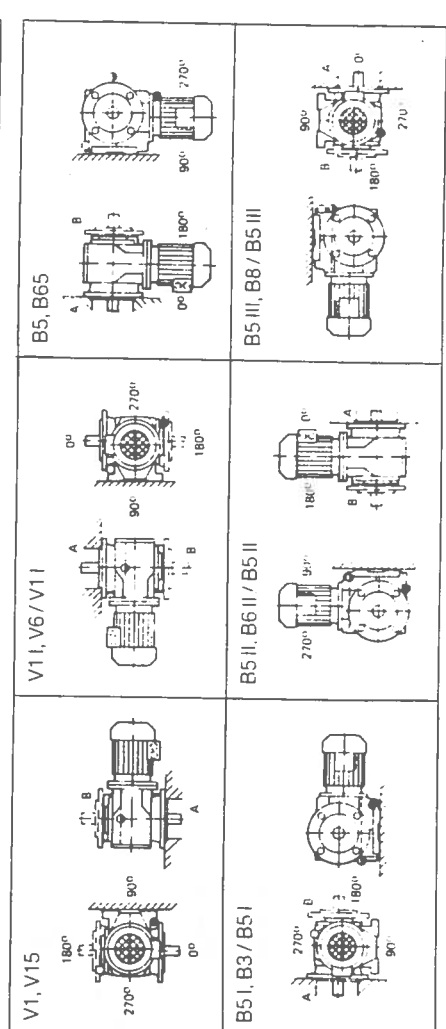
**K 160-K 180
KH160-KH180**



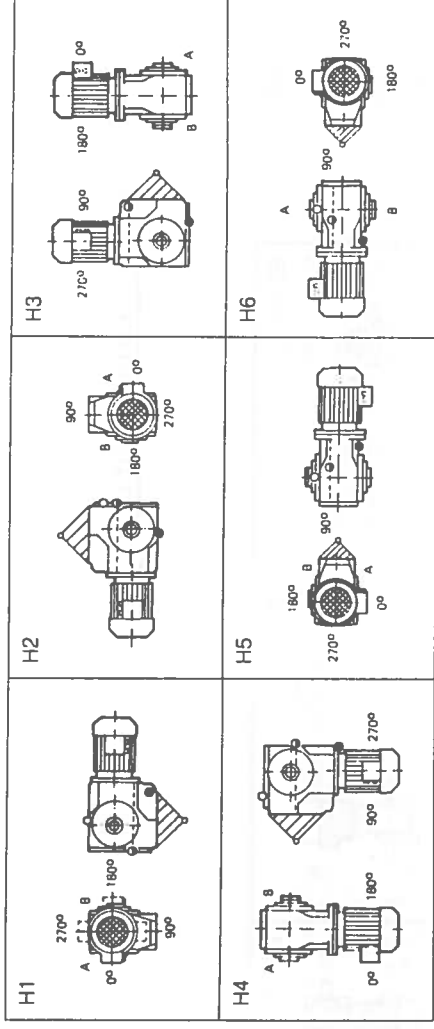
KF66-KF106



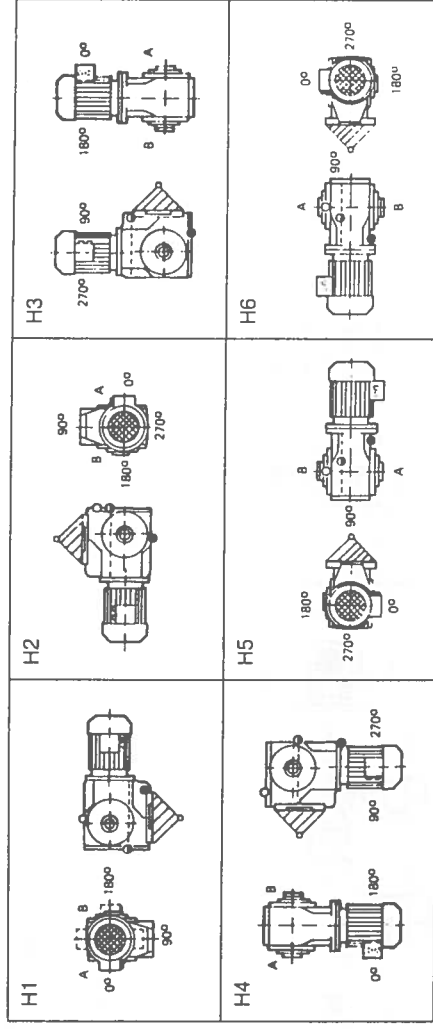
KF126-KF156



KA66-KA106

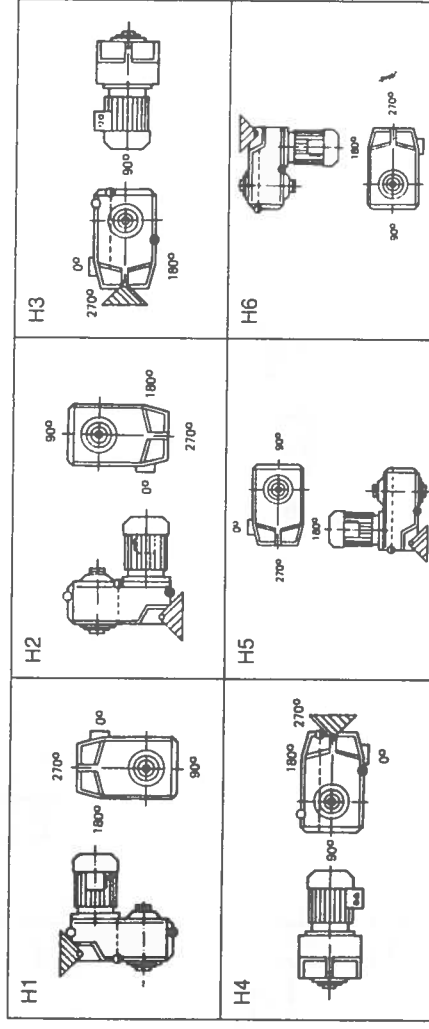


KA126-KA156

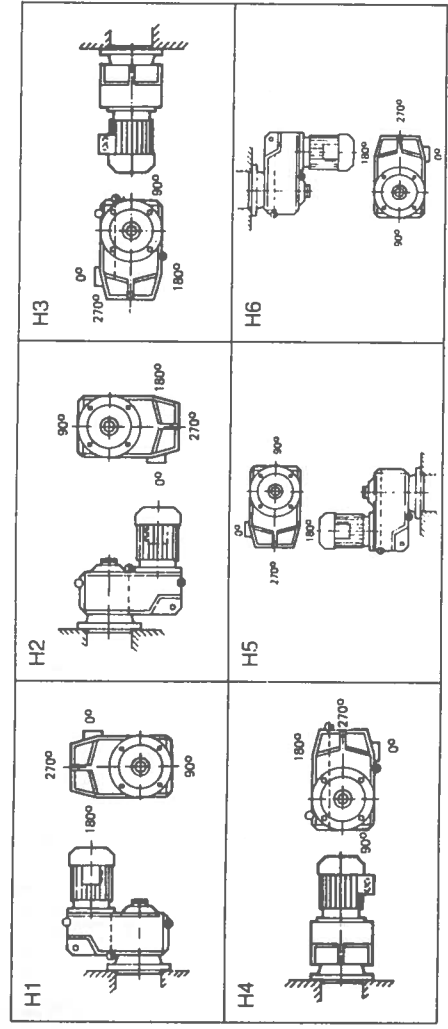


Shaft Mounted Helical Geared Motors

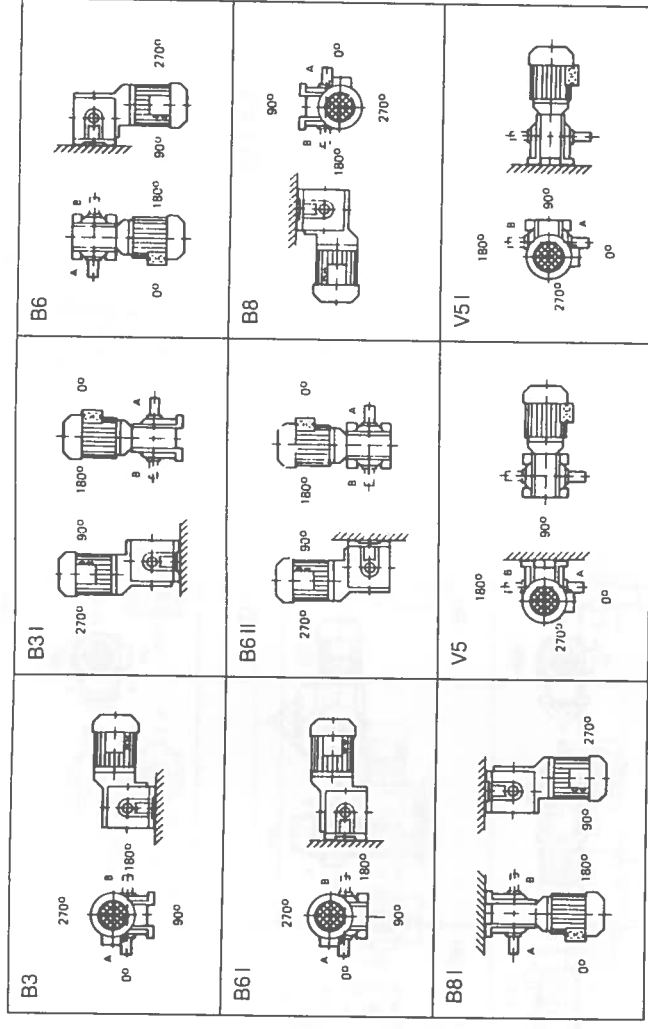
FA40-FA100



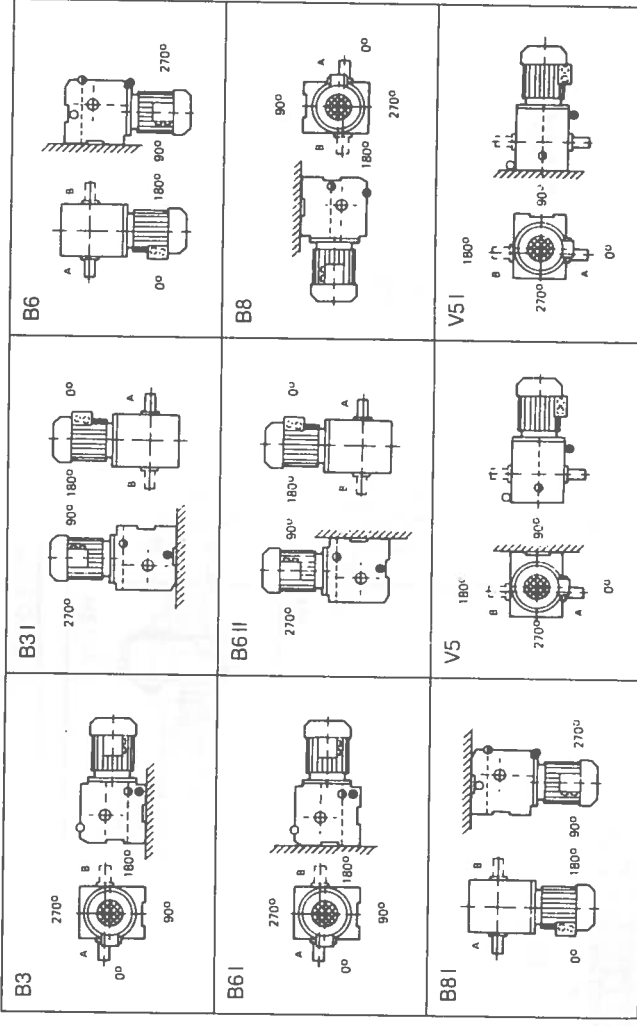
FAF40-FAF100



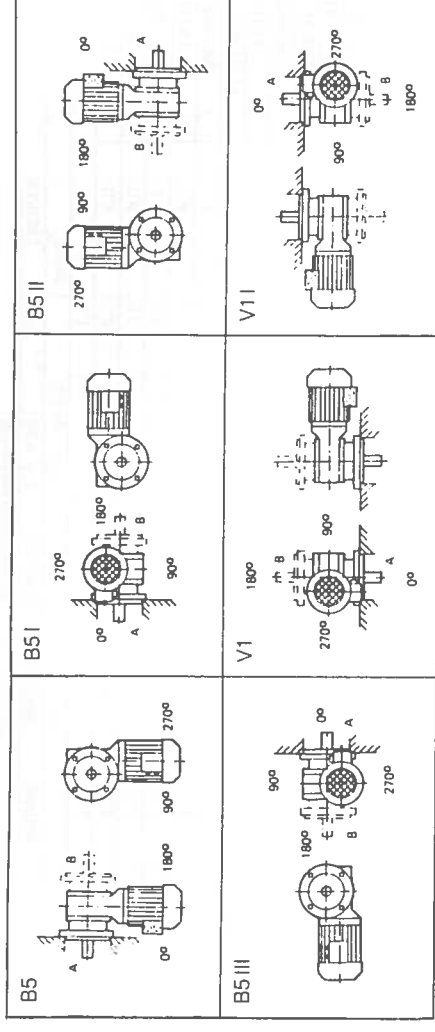
S30



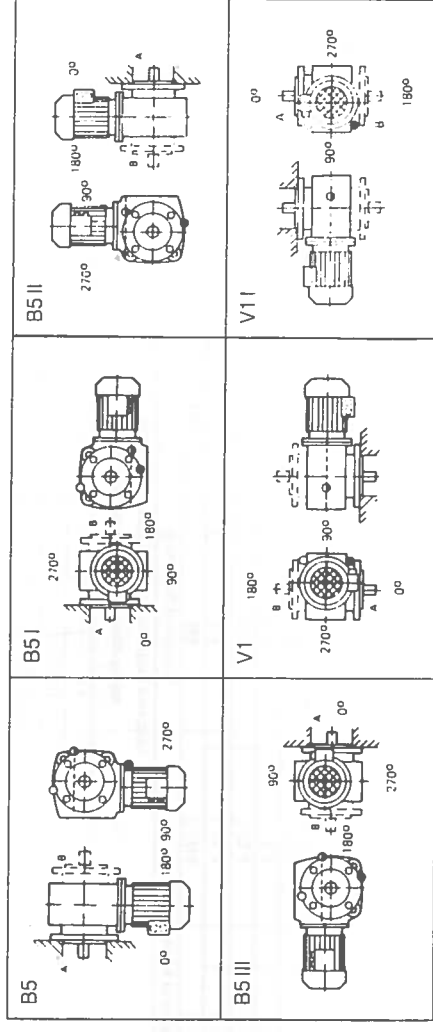
S40-S100



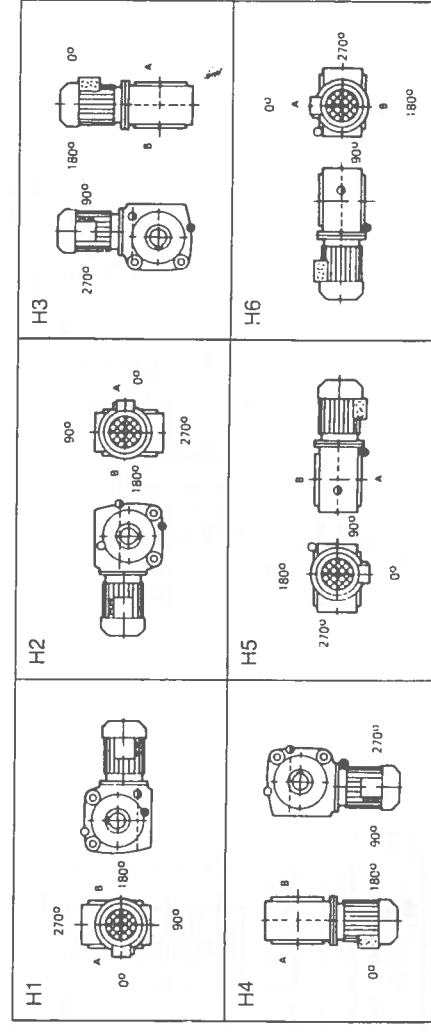
SF30



SF40-SF100



**SA 40-SA 100
SAF40-SAF100**



Quantities of Lubricants required

Quantities shown below are in litres.

Helical Gear Units¹⁾
approx. quantity (l) per mounting position

Size	Mounting positions IM...										
	B3/B35 ¹⁾	B5 ¹⁾	B6/B65	B7/B75	B8/B85	V1	V3	V5	V6		
R, RF302/32	0.3	0.3	0.6	0.7	0.6	1	1	1	1		
R, RF40	0.3	0.3	0.6	0.6	0.6	1	0.9	1.1	0.9		
R, RF42/43	0.6	0.5	1.2	1.3	1.1	2	1.8	2.2	1.9		
R, RF, RUF62/63	0.6	0.6	1.1	1.5	1.1	2	2	2	2.1		
R, RF60	0.8	0.4	0.7	0.7	0.7	0.6	0.5	0.9	0.9		
R, RF, RUF70/76	1.3	1.2	2.1	2.3	2	3.6	3.4	3.6	3.5		
R, RF, RUF72/73	1.3	1.2	2.1	2.3	2	3.6	3.4	3.6	3.5		
R, RF, RUF71	1.7	1	1.4	0.9	1.5	1.3	1.2	2.1	1.3		
R, RF802/803	2.6	2.5	4	4.8	4	7.5	7	7.3	7.3		
R, RF, RUF82/83	2.6	2.5	4	4.8	4	7.5	7	7.3	7.3		
R, RF, RUF81	2.6	1.4	2.7	1.8	2.9	2.2	1.5	3.7	2.3		
R, RF902/903	4.8	4.3	7.3	8	7.3	12.3	11.3	12.5	12		
R, RF, RUF92/93	4.8	4.3	7.3	8	7.3	12.3	11.3	12.5	12		
R, RF, RUF102/103	6.3	5.8	11	12	11.5	19.6	18.3	20.2	19		
R, RF, RUF101	6.1	3.5	6.0	4.2	3.8	7.3	5.2	4.5	9		
R, RF, RUF132/133	10	9.8	18.5	20	19	31.5	32.5	32	32		
R, RF, RUF142/143	15	14	27.5	30.5	28.5	50	50	49	49		
R, RF, RUF152	17.5	16	38	40	37	60	60	59	61		
R, RF, RUF163	21	18	45	44	43	73	71	74	75		

Shaft Mounted Helical Gear Units

Size	Mounting positions					Positions de montage				
	H1	H2	H3	H4	H5	H6	H6	H6	H6	H6
FA, FAF40	1.5	1.1	1.7	1.4	1.7	1.7	1.7	1.7	1.7	1.7
FA, FAF60	2.8	2.5	3.8	3.4	4.1	4.1	4.1	4.1	4.1	4.1
FA, FAF70	6.5	4.2	6.6	5.7	6.8	6.8	6.8	6.8	6.8	6.8
FA, FAF80	10.8	6.8	11.5	9.4	11.5	11.5	11.5	11.5	11.5	11.5
FA, FAF90	19.4	11.5	22.3	17.5	24.7	24.7	24.7	24.7	24.7	24.7
FA, FAF100	33.6	20	33.5	29.6	45.5	45.5	45.5	45.5	45.5	45.5

Helical-Bevel Gear Units

Size	Mounting positions IM...												
	B3, H1	B5 I	B5 II	B5 III	B6	B8	B8	V1	V1	V5	V6	H4	H5, H6
K, KF, KA66	0.9	3.4	2.4	3.4	2.4	3	3.1	3.1	3.3	3.3	3.3	2.3	3.2
K, KF, KA76	1.7	6.2	5	6.4	5.9	4.9	5.7	6.2	6.6	6.6	6.6	4.7	6.4
K, KF, KA86	2.5	9.5	8	9.9	7.8	9.1	10.4	10.4	10	10	10	7.3	9.5
K, KF, KA96	4.8	18	13.8	18.6	16.6	13.5	16	19.6	19	19	19	13	18.5
K, KF, KA106	8	32	24.5	33	29	24	28	33	32	32	32	23	31
K, KF, KA126	14	60	45	56	54	44	52	64	62	62	62	42	60
K, KF, KA156	27	102	74	106	92	72	88	109	105	105	105	70	103
K, KH166	28	120	—	120	—	—	—	95	—	—	—	—	—
K, KH186	52	195	—	195	—	—	—	160	—	—	—	—	—

Helical-Worm Gear Units

Size	Mounting positions IM...												
	B3	B3 I	B5	B5 I	B5 II	B5 III	B6	B8	B8	V1	V5	H4	H5
S, SF, SA31	0.25	0.25	0.35	0.35	0.35	0.35	0.25	0.25	0.25	0.25	0.25	0.25	0.25
S, SF, SA42	0.2	1	0.8	0.4	1.2	0.8	1.1	0.6	0.8	0.8	0.8	0.75	0.7
S, SF, SA52	0.3	1.5	1	0.45	1.7	1.2	1.6	1.1	1.1	0.8	0.9	1.1	0.9
S, SF, SA62	0.6	2.8	2.3	0.9	4	2.3	2.5	1.6	2.3	2.1	1.6	2.3	2.1
S, SF, SA72	1.1	5	4	1.5	7.4	4.8	5.3	3.3	4.4	4	3.1	4.5	3.6
S, SF, SA82	2.1	10	6.3	3.3	10.8	6	10.8	6	6.8	5.7	5.6	10.2	6
S, SF, SA92	3.8	19.5	12.5	5.5	22.5	13.6	20.5	11	11.7	10.5	10.5	20.3	11.6

¹⁾ On multi-stage gear units having mounting positions B3, B5 or B35 the larger gear unit is to be provided with the oil filling for B7.

Quantities of Lubricants required

Quantities shown below are in litres.

Helical Gear Units

Size	Mounting positions IM...													
	B3	B35	B5	B5 I	B6	B65	B7	B75	B8	B85	V1	V3	V5	V6
R, RF	0.3	0.3	0.3	—	0.6	0.6	0.7	0.7	0.6	0.6	1.0	1.0	1.0	1.0
R, RF, RUF60/66	0.6	0.6	0.6	—	1.4	1.4	1.5	1.5	1.1	1.1	2.6	2.0	2.0	2.1
R, RF, RUF70/76	1.4	1.4	1.2	—	2.3	2.3	2.5	2.5	2.3	2.3	4.0	3.8	3.8	3.9
R, RF, RUF80/86	1.7	1.7	1.0	—	4.3	4.3	4.5	4.5	4.3	4.3	7.5	7.5	7.5	8.0
R, RF, RUF90/96	2.6	2.6	1.4	—	7.5	7.5	8.0	8.0	7.5	7.5	12.5	11.3	12.5	12.5
R, RF, RUF100/106	4.9	4.9	4.7	—	12.0	12.0	13.0	13.0	12.0	12.0	20.7	19.0	21.0	20.3
R, RF, RUF120	6.9	6.9	3.5	—	18.7	18.7	20.2	20.2	18.7	18.7	29.0	30.0	31.0	31.0
R, RF, RUF130	6.7	6.7	6.0	—	17.7	17.7	20.0	20.0	16.6	16.6	30.0	29.0	31.0	31.0
R, RF, RUF140	10.5	10.5	10.0	—	25.0	25.0	26.0	26.0	25.0	25.0	42.6	43.0	45.0	45.0
R, RF, RUF150	16.0	16.0	14.0	—	37.0	37.0	40.0	40.0	37.0	37.0	60.0	62.0	60.0	62.0
R, RF, RUF160	21.0	21.0	16.8	—	44.0	44.0	44.0	44.0	44.0	44.0	72.0	71.0	73.0	74.0

Shaft Mounted Helical Gear Units

Size	Mounting positions						Mounting positions					
	H1	H2	H3	H4	H5	H6	H1	H2	H3	H4	H5	H6
FA, FAF40	1.5	1.1	1.7	1.4	1.7	1.7	1.5	1.1	1.7	1.4	1.7	1.7
FA, FAF60	2.8	2.5	3.8	3.4	4.1	4.1	2.8	2.5	3.8	3.4	4.1	4.0
FA, FAF70	6.5	4.2	6.6	5.7	6.8	6.8	6.5	4.2	6.6	5.7	6.8	7.1
FA, FAF80	10.8	6.8	11.5	9.4	11.5	11.5	10.8	6.8	11.5	9.4	11.5	11.4
FA, FAF90	19.4	11.5	22.3	17.5	24.7	24.7	19.4	11.5	22.3	17.5	24.7	23.2
FA, FAF100	33.6	20.0	33.5	29.6	45.5	45.5	33.6	20.0	33.5	29.6	45.5	41.0

Helical-Bevel Gear Units

Size	Mounting positions IM...												
	B3, H1	B5 I	B5 II	B5 III	B6	B8	B8	V1	V1	V5	V6	H4	H5, H6
K, KF, KA66	0.9	3.4	2.4	3.4	2.4	3.0	3.0	3.1	3.1	3.3	3.3	2.3	3.2
K, KF, KA76	1.7	6.2	5.0	6.4	5.9	4.9	5.7	6.2	6.2	6.6	6.6	4.7	6.4
K, KF, KA86	2.5	9.5	8.0	9.9	7.8	9.1	10.4	10.4	10.4	10.0	10.0	7.3	9.5
K, KF, KA96	4.8	18.0	13.8	18.6	16.6	13.5	16.0	19.6	19.6	19.0	19.0	13.0	18.5
K, KF, KA106	8.0	32.0	24.5	33.0	29.0	24.0	28.0	33.0	33.0	32.0	32.0	23.0	31.0
K, KF, KA126	14.0	60.0	45.0	62.0	54.0	44.0	52.0	64.0	64.0	62.0	62.0	42.0	60.0
K, KF, KA156	27.0	102.0	74.0	106.0	92.0	72.0	88.0	109.0	109.0	105.0	105.0	70.0	103.0
K, KH166	28.0	120.0	—	120.0	—	—	—	95.0	—	—	—	—	—
K, KH186	52.0	195.0	—	195.0	—	—	—	160.0	—	—	—	—	—

Helical-Worm Gear Units

Size	Mounting positions IM...												
	B3	B3 I	B5	B5 I	B5 II	B5 III	B6	B8	B8	V1	V5	H4	H5
S, SF, SA31	0.25	0.25	0.35	0.35	0.35	0.35	0.25	0.25	0.25	0.25	0.25	0.25	0.25
S, SF, SA42	0.2	1	0.8	0.4	1.3	0.8	1.1	0.6	0.8	0.8	0.8	0.75	0.7
S, SF, SA52	0.3	1.5	1	0.4	1.7	1.2	1.6	1.1	1.1	0.8	0.9	1.1	0.9
S, SF, SA62	0.6	2.8	2.3	0.8	4	2.3	2.5	1.6	2.3	2.1	1.6	2.3	2
S, SF, SA72	1.1	5	4	1.5	7.3	4.8	5.3	3.3	4.3	3.3	3.1	4.5	3.5
S, SF, SA82	2.1	10	6.3	3.3	10.6	6	10.8	6	6.7	5.6	5.6	10.4	6
S, SF, SA92	3.8	19.5	12.5	5.5	22	13.6	20.5	11	11.5	10.2	10.5	20	12

Refer to the appropriate page for recommended lubricants. RUF gear units not available as RUF 66, 76, 86, 96 and 106.

¹⁾ On multi-stage gear units having mounting positions B3, B5 or B35 the larger gear unit is to be provided with the oil filling for B7.

Recommended Lubricants

LUBRICATION SCHEDULE FOR EURODRIVE GEAR UNITS

Gear Type	Type of Lubricant	Ambient Temperature	kin. viscosity at 40°C cST (mm ² /s)	ARAL	BP	ESSO	Mobil	SHELL	TEXACO	
Helical & Bevel Reducers (T & K-Type)	Oil	+40 to 0	242 to 198	Degol BG 220	BP Energol GR-XP 220	Spartan EP 220	Mobilgear 630	Omala 220	Meropa 220	
		+25 to -15	165 to 90	Degol BG 100	BP Energol GR-XP 100	Spartan EP 150	Mobilgear 629	Omala 100	Meropa 150	
		+10 to -30	74.8 to 13.5	Degol BG 46	BP Energol GR-XP 68	Esso Automatic Transmission Fluid	Mobil D.T.E. 15	Tellus T37 or Tellus oil 32	Meropa 68	
		-20 to -50	16.5 to 13.5		BP Energol THB 22	UNIVIS J 13	Mobil D.T.E. 11	Aero Shell Fluid 4	Aircraft HO 15	
Worm Reducers (S-Type)	Grease	+40 to -15		Aralub FDP 00	BP Energol FG-00-EP	FIBRAX EP 370	Mobilplex 44	Alvania EPRO	Multifak EPO	
		+40 to 0	748 to 612	Degol BG 680	BP Energol GR-XP-680	Spartan EP 680	Mobilgear 636	Omala Oil 680	Meropa 680	
		+25 to -15	242 to 198	Degol BG 220	BP Energol GR-XP 220	Spartan EP 220	Mobilgear 630	Omala Oil 220	Meropa 220	
		+10 to -30	165 to 90	Degol BG 100	BP Energol GR-XP 100	Spartan EP 150	Mobil D.T.E. 18	Omala Oil 100	Meropa 150	
General	Synth. Oil * *	-20 to -50	16.5 to 13.5		BP Energol THB 22	UNIVIS J 13	Mobil D.T.E. 11	Aero Shell Fluid 4	Aircraft HO 15	
		+40 to -15		Aralub FDP 00	BP Energol FG-00-EP	FIBRAX EP 370	Mobilplex 44	Alvania EPRO	Multifak EPO	
		+80 to -25	352 to 198	Degol GS 220	BP Energol SGR-XP220		Mobil Glycoyle 30	Tivela Oil WB		
		+60 to -20				Reducer liquid grease EGL 3818A	RR 103B			
Fluid Coupling	Oil	≥ 0	approx. 40	Degol BG 32	BP Energol HLP 32	NUUTO H32	D.T.E. 25	Tellus Oil 32 or Tellus Oil T 37	Rando HD 32	
		≤ 0	approx. 14	Vitam GF 10	BP Energol HLP 10	NUUTO H15	D.T.E. 21	Tellus Oil T15	Spindura 10	
Antifriction Bearing	Grease	+60 to -30		Aralub HL 3	BP Energol LG-EP-3	Multi purpose grease Beacon 2	Mobilux 3	Alvania Grease R3	Regal AFB2	
		+80 to -30								

ESSO UNIREX N3

** EURODRIVE uses SHELL CL-1221-362 as synthetic lubricant.

* Only for intermittent duty, otherwise use synthetic grease.

▶ Lubricant used by Canadian assembly plants.

WHERE TO CALL FOR HELP

EURODRIVE OFFICE AND FACTORY LOCATIONS

LOCATION	TELEPHONE	TELEX	TELEFAX
IN CANADA			
BRAMALEA, ON	(416) 791-1553	06-97601	(416) 791-2999
DELTA, BC	(604) 964-5535	04-355752	(604) 946-2513
EDMONTON, AB	(403) 438-2175	03-73044	N/A
MONCTON, NB	(506) 387-4058	N/A	(506) 387-4058
MONTREAL, PQ	(514) 367-1124	055-66312	(514) 367-3677
WINNIPEG, MB	(204) 772-9441	07-55469	(204) 772-4041
IN THE U.S.A.			
HAYWARD, CA	(415) 487-3560	00172268	(415) 487-6381
LYMAN, SC	(803) 439-7537	00805550	(803) 439-0566
TROY, OH	(513) 335-0036	00288262	(513) 222-4104
DALLAS, TX	(214) 330-4824	N/A	(214) 330-4724
BRIDGEPORT, NJ	(609) 467-2277	N/A	(609) 845-3179

PRESENTLY EURODRIVE HAS APPROXIMATELY 30 ASSEMBLY FACTORIES AROUND THE WORLD.

IN CASE OF NEED, CALL ONE OF THE ABOVE MENTIONED NUMBERS TO GET A COMPLETE LISTING OF ALL CONTACTS.

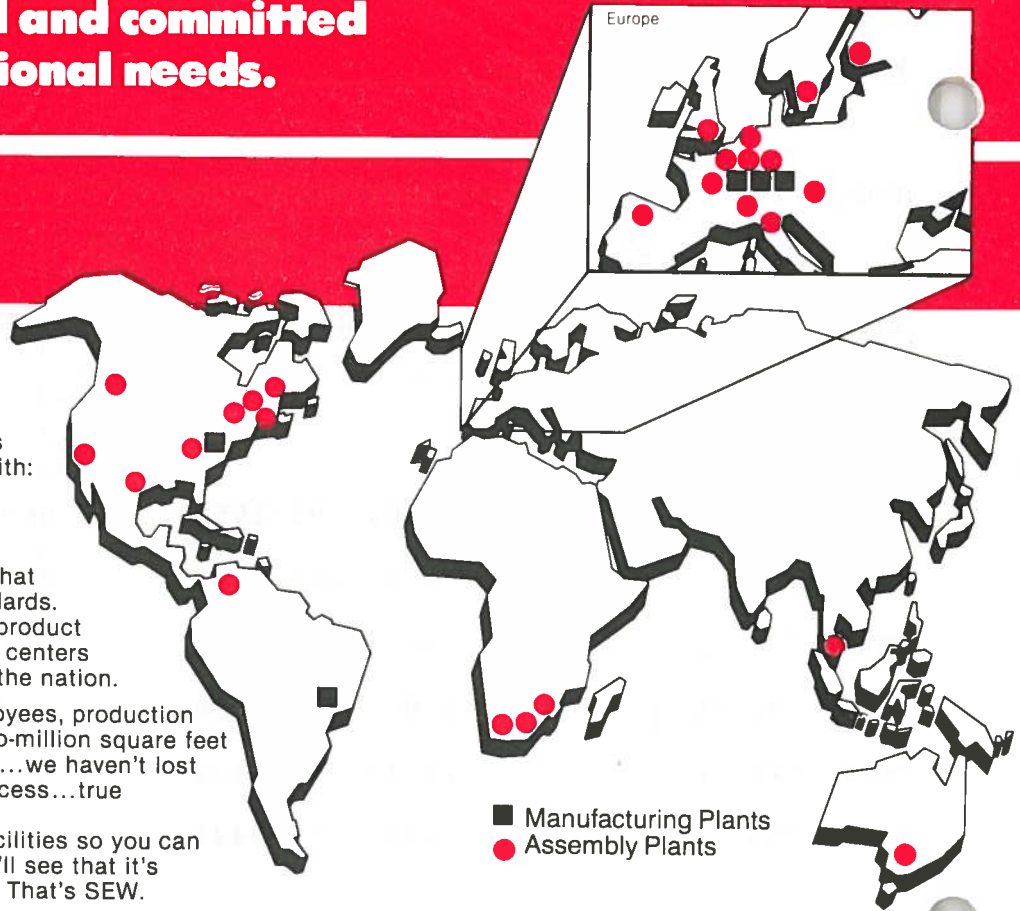
**A company structured and committed
to meet your international needs.**

SEW-EURODRIVE has created a worldwide organization, and a product line to meet your needs. No matter if you export, import or domestically use production equipment that requires drives ...SEW-EURODRIVE stands behind you with:

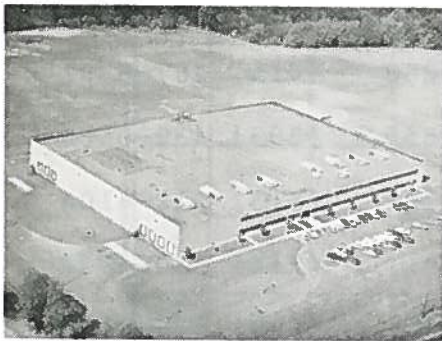
- International availability of *identical* products, parts and service... 30 locations in 19 countries.
- High quality, custom-built products that meet the world's most exacting standards.
- Nearby application engineering and product support...four assembly/engineering centers in the U.S.... sales locations across the nation.

Although we've grown to over 4,000 employees, production facilities which encompass more than two-million square feet and produce over 500,000 units each year...we haven't lost sight of the value that has fueled our success...true customer service.

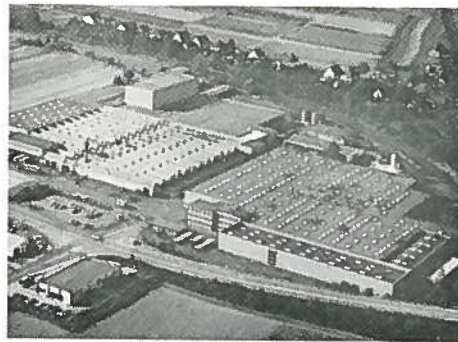
We invite you to tour any one of our facilities so you can see firsthand the true value we offer. You'll see that it's simple, effective and available worldwide. That's SEW.



■ Manufacturing Plants
● Assembly Plants



Lyman, South Carolina, USA Manufacturing Plant



Graben, West Germany Manufacturing Plant



Bruchsal, West Germany Manufacturing Plant

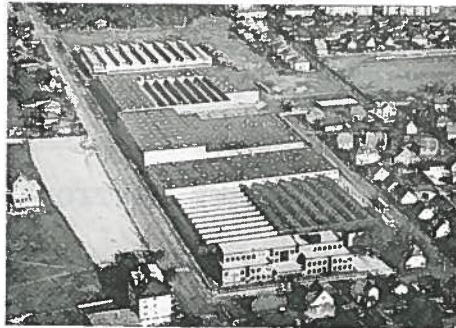
SEW-EURODRIVE

SOCIETE DU CANADA, LTEE
COMPANY OF CANADA, LTD.

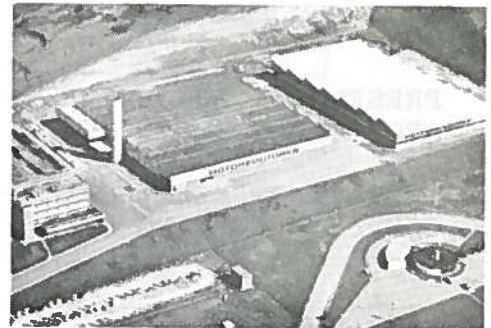
210 Walker Drive
Bramalea, Ontario L6T 3W1
(416) 791-1553

Assembly Centres

Toronto (416) 791-1553
Vancouver 1-(800) 972-5481
Montreal (514) 367-1124



Haguenau, France Manufacturing Plant



Sao Paulo, Brazil Manufacturing Plant

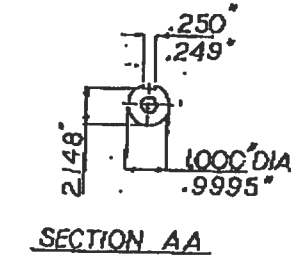
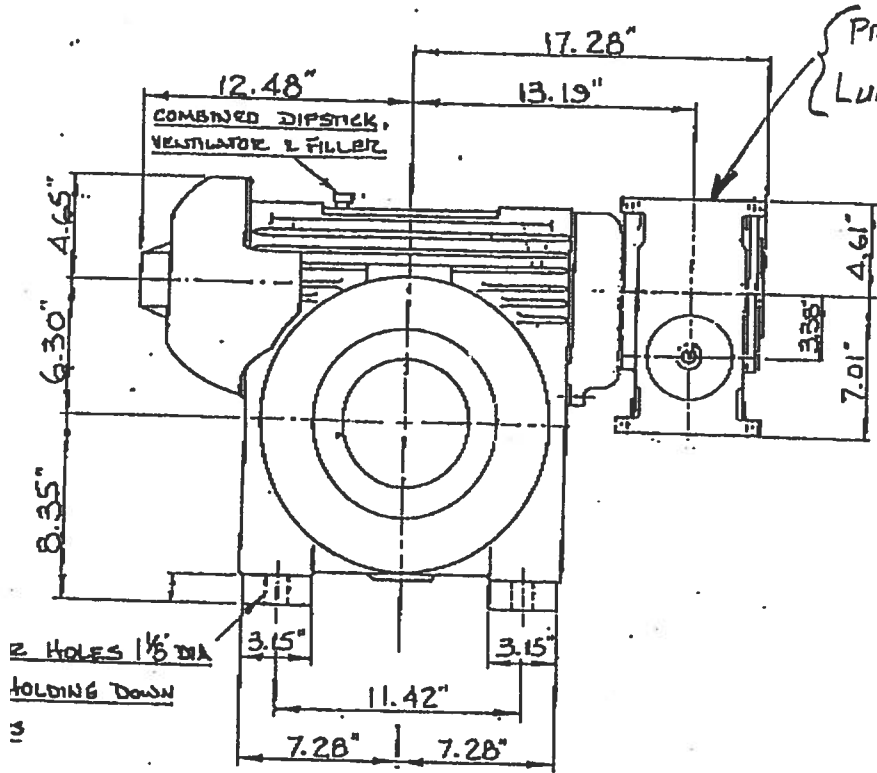
Technical Offices:

Edmonton - (403) 436-2174
Winnipeg - (204) 772-9441
Moncton - (800) 361-2928

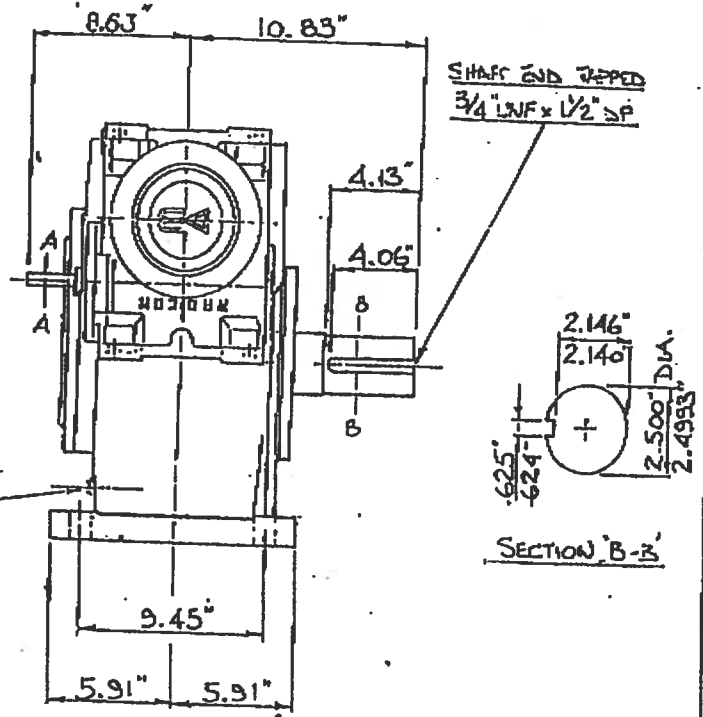
**SEW
EURODRIVE**

IF IN DOUBT, ASK

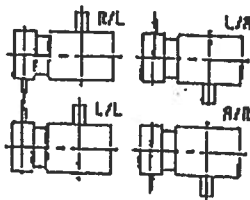
THIS CASE IS NOT DESIGNED TO TAKE ANY EXTERNAL LOADS OTHER THOSE SPECIFIED



SECTION AA
DRAIN PLUG
(OPPOSITE TO WHEEL SHAFT)



SECTION B-B



UNIT SIZE _____
 DRGT ORDER NO. _____
 RATIO _____
 QUANTITY _____ HANDLING _____

ARRANGEMENT OF RADICEN
 UNIVERSAL MAA/OD/1600
 MUST NOT BE SCALED SCALE N.T.S.

DAVID BROWN GEAR INDUSTRIES LIMITED

ALTERATIONS
 DRAWN H.C.
 CHECKED _____

5R 7600 08 A

DATE 26-10-88

DAVID BROWN GEAR INDUSTRIES LIMITED

UNLESS SPECIFIED OTHERWISE MACHINED DIMENSIONS ± _____ EXCEPT GEAR PARTICULARS