

DIRECTORATE GENERAL BORDER ROADS

GENERAL REPAIR INSTRUCTION NO 140

ON

RUSTON YWA AIR COOLED DIESEL ENGINES  
INCLUSIVE MK III AND IV

TECHNICAL DATA, LUBRICATION AND VALVE TIMING

INTRODUCTION

Bro is holding various make and models of Ruston YWA Air cooled Diesel Engines. This GRI lays down the technical data, line diagram of engine lubrication system and valve timing of Ruston Air Cooled Diesel engine ( all models ) for the guidance and to carry out repair/overhaul by all GREF Workshops.

AIM

The aim of this instruction is to publish technical data to be utilised during inspection, repair, overhauling and maintenance of Ruston YWA air cooled diesel engine MK III & IV.

DETAILS

Technical data, line diagram of engine lubrication system and valve timing diagram in respect of Ruston YWA air cooled diesel engines (all models ) are given in Appendix 'A' 'B' & 'C' to this instruction.

Sd/xxx

(Hans Raj)

SE (E&M)

Director/E4-Inv

For Dir gen Border Roads

Dated : 30 Aug 89

APPENDIX 'A' TO GRI NO 140  
TECHNICAL DATA ( ALL ENGINES) : RUSTON YWA AIR  
COOLED DIESEL ENGINES: MAKE III AND IV

Bore		in,	4 ( 4 1/8 MK,4)
		Mm	102 ( 104.8 MK, 4)
Stroke		in,	4.125
		Mm,	104.8
Piston displacement ( per cyl)		cu.in	61.8 (55.16 MK.4)
		Cu. Cm	849 (904 MK.4)
Piston speed, at 2000 r.p.m		ft/min.	1374
		m/sec.	6.81
B.M.E.P.at 2000 r.p.m. (Continuous rating )		1b/sq.in.	97.4
		kg/cm.	6.85
Compression pressure		1b/sq.in.	575
		Kg/cm	40.4
Firing pressure		1b/sq.in	1000
		Kg/cm <sup>2</sup>	70.31
Injection pressure		1b/sq.in	2500
		Kg/cm <sup>2</sup>	176
Ump capacity		Pints	9(1YWA)
		Litters	5.1
		Pints	15 (2YWA)
		Litres	8.5
		Pints	20 ( 3/WA)
		Litres	11.44
Lubricating oil working Pressure		1b/sq.in.	35/40
		kg/cm <sup>2</sup>	2.5/2.8
Lubricating oil minimum pressure		1b/sq.in.	15
		Kg/cm <sup>2</sup>	1.05
<b>MAIN BEARINGS</b>			
Main	dia. X length	in.	3.1/8x2
		mm.	79.4x50.3
Centre (2YWA)	dia. X length	in	3.1/41.1/8
Interm ( 3 YWA )	mm.		82.6x28.6
Thrust facings	O.d. x i.d .	in.	4.1/16x3.3/8
		mm.	103.2.85.7
Large end	dia x length	in.	2.7/16x1.13/16
		mm.	61.9x46
Small end	dia. X length	in.	1.1/2x1.8/16
		Mm.	38.8 1x29.7

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APPENDIX 'A' TO GRI NO 140**SERVICE DATA**

Inlet and exhaust valve tappet Clearance (Engine cold)	In. mm.	.003 .076
Cylinder head bumping clearance	In. mm	.040=.003 - 1.029 + .089

**CLEARANCES**

		Designed maximum and minimum	Maximum permissible
Main bearing (wide)	In. mm.	.002/.00475 .051/.121	.006 .153
Main bearing (Centre)	In. mm.	.0035/.0055 .089/.140	.007(2YWA) .178
Main bearing (Intermediate)	In. mm.	.0025/.0045 .063/.114	.006(3YWA) .153
Grankshaft and fleat	In. mm.	.0035/.114 .089/.279	.016 .406
Connecting rod large end	In. mm.	.0015/.0025 .038/.064	.005 .127
Connecting rod small and	In. mm.	.001/.002 .025/.051	.003 .076
Piston ring gap (in position)	In. mm.	.016/.023 .406/.584	.034 .864
Piston ring groove-top (side clearance )	In. mm.	.0035/.0055 .089/.140	.007 .178
Piston ring groove 2 <sup>nd</sup> & 3 <sup>rd</sup> (Side clearance)	In. mm.	.0015/.0035 .028/.089	.006 .158
Piston ring groove rth & 5 <sup>th</sup> (side clearance)	In. mm.	.001/.003 .025/.076	.006 .153
Valve stem clearance	In. mm.	.002/.004 .051/.102	.008 .203
Cylinder barrel (max wear)	In. mm.	- -	.012 .30
<b>TIGHTENING TORQUE (Engine cold)</b>			
Cylinder head stud	1b.ft. Kg.m.	40-45 5.5-6.2	Y
Large end bearing bolt	1b.ft. Kg.m.	55-60 7.6-8.26	M P
Flywheel retaining screw	1b.ft. Kg.m.	200 27.6	O O
Injector nut	1b.ft. Kg.m.	15-18 2.9-2.5	T A N T

VALVLE TIMING	MK 3 & MK 4
Inlet valve opens	16 <sup>0</sup> B. T. D. C.
Inlet valve closes	36 <sup>0</sup> A.B. T. D. C
Exhaust valve opens	45 <sup>0</sup> B. B. D. C
Exhaust valve closes	15 <sup>0</sup> A. T. D. C
Injection commences	27 <sup>0</sup> B. T. D. C, for MK - 3
Injection commences	24 <sup>0</sup> B. T. D. C, for MK - 4

Injection setting must be correct. Other settings may however vary slightly without appreciably affecting engine performance.

**IMPORTANT**

The above valve timing is for engines at normal operating temperature to simulate running conditions on a cold engine, the tappets must be set to .018" ( .457 mm ) before the valve timing is checked. Re- set tappets to .003" (.076 mm ) before running the engine.

**UNDERSIZE BEARINGS**

The table below gives details of undersize bearings that should be fitted after the various shaft regrinds :-

Description	Normal size	USE WITH BEARING	
		Main	Large end
Standard	-	YWA . 17814A ( 1100178014 )	YWA . 14114 (1100141014)
1st regrind	.010	YWA . 17832 A (1100178032)	YWA . 14142 ( 110041042)
2 <sup>nd</sup> Re grind	.020	YWA . 17833A (1100178032)	YWA .14143 (1100141043)
3 <sup>rd</sup> regrind	.030	YWA .17834A (1100178034)	YWA . 14144 (1100141044)
		Centre 2 YWA	Intermediate 3 YWA
		3 YWA . 17816 (1130178016)	3 YWA . 17816 ( 1130178016)
		3 YWA . 17852 ( 11301178052)	3 YWA .17852 (1130178052)
		3 YWA .17853 (1130178053)	3YWA .17853 (1130178053 )
		3 YWA . 17854 (1130178054)	3 YWA .17854 (1130178054)

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The bearings should not under any circumstances be scraped before fitting.  
When it is necessary to fit .005" over width thrust washer, use No YWA . 17826

#### UNDERSIZE EXTENSION SHAFT AND BEARING

A reground extension shaft, part number 3YWA – 62018 and an undersize extension shaft bearing, part number YB . 62019 are available. These are .010" undersize.

#### REBORES AND OVERSIZE PISTONS

Provision has been made for rebores to be carried out upto a maximum oversize diameter of .060.

Each re bore should be arranged to accommodate the standard oversize pistons available.

A) The following table gives dimentional details for YWA MK.3

Rebore	Over size	Cylinder barrel Bore 'A'
1st	.020"	4.0235 4.0245
2 <sup>nd</sup>	.040"	4.0435 4.0445
3 <sup>rd</sup>	.060"	4.0635

B) The following table gives dimensional details for YWA MK.4 engines:-

Rebore	Over size	Cylinder barrel Bore 'A'
1 <sup>st</sup>	.020"	4.149 4.150
2 <sup>nd</sup>	.040"	4.169 4.170
3 <sup>rd</sup>	.060"	4.189 4.190

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APPENDIX 'A' TO GRI NO 140 ( Contd )

OVERSIZE PISTONS

A) The following table gives details of oversize pistons available after cylinder barrel rebores for YWA MK.3

Description	.020" oversize	.040" Oversize	.060" Oversize
Piston assy Comprising	3YWA.143208 (1130143020)	3YWA.143408 (1130143040)	3YWA.142508 (1130142050)
Piston	3YWA.14321 (1130143021)	3YWA. 14341 (1130143041)	3YWA.14251 (1130142051)
Chrome Comp ring	YWA. 14322 (1100143022)	YWA. 14342 (1100143042)	YWA .14255 (1100142055)
Internally stepped comp ring	YWA .14366 (1100143066)	YWA. 14367 (1100143067)	YWA .14368 (1100143067)
Scraper ring	YWA .14326 (1100143026)	YWA .14346 (1100143046)	YWA .14253 (1100142053)
Gudgeon pin	YWA .14047 (1100140047)	YWA .14047 (1100140047)	YWA .14047 (1100140047)
Circlip	500918 (0090500918)	500918 (0090500918)	500918 (0090500918)

APPENDIX 'A' TO GRI NO 140 ( Contd )

B) The following table gives details of oversize pistons available after cylinder barrel rebores for YWA MK.4 engines.

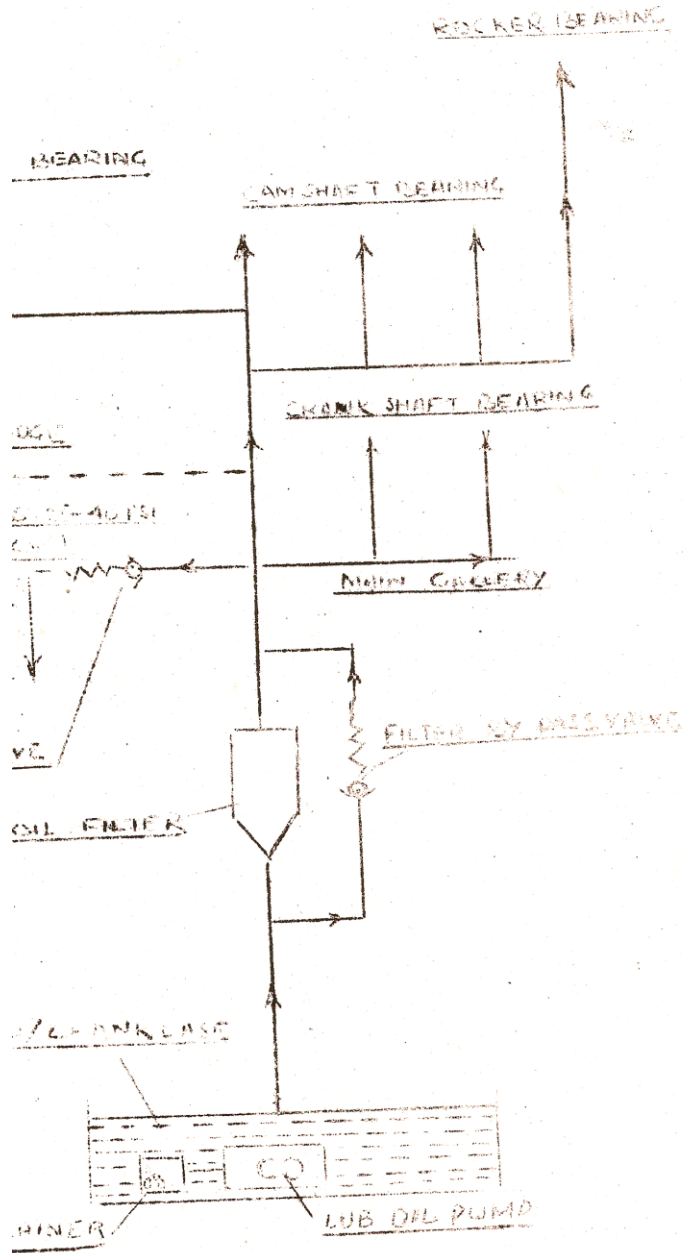
Description	.020" oversize	.040" Oversize	.060" Oversize
Piston assy Comprising	Y4WA . 14320 (4100143030)	Y4WA .14340 (4200143040)	Y4WA .14250 (4100142050)
Piston	Y4WA . 14321 (4100143021)	Y4WA .14341 (4100143041)	Y4WA .14251 (4100142051)
Chrome Comp ring	Y4WA . 14322 (4100143022)	Y4WA .14342 (4100143042)	Y4WA .14255 (4100142055)
Internally stepped comp ring	Y4WA . 14366 (4100143066)	Y4WA .14367 (4100143067)	Y4WA .14368 (4100143067)
Scraper ring	Y4WA . 14326 (4199143026)	Y4WA .14346 (4100143046)	Y4WA .14253 (4100142053)
Gudgeon pin	Y4WA . 14047 (4100140047)	YWA .14047 (1100140047)	YWA .14047 (1100140047)
Circlip	500918 (0090500918)	500918 (0090500918)	500918 (0090500918)

OVERWIDTH TOP COMPRESSION RINGS

.010" and .020" overwidth top chrome compression rings are available for standard and oversize diameter pistone to enable users to obtain the maximum usage of each rebore stage. The following table gives details of these overwidth rings.

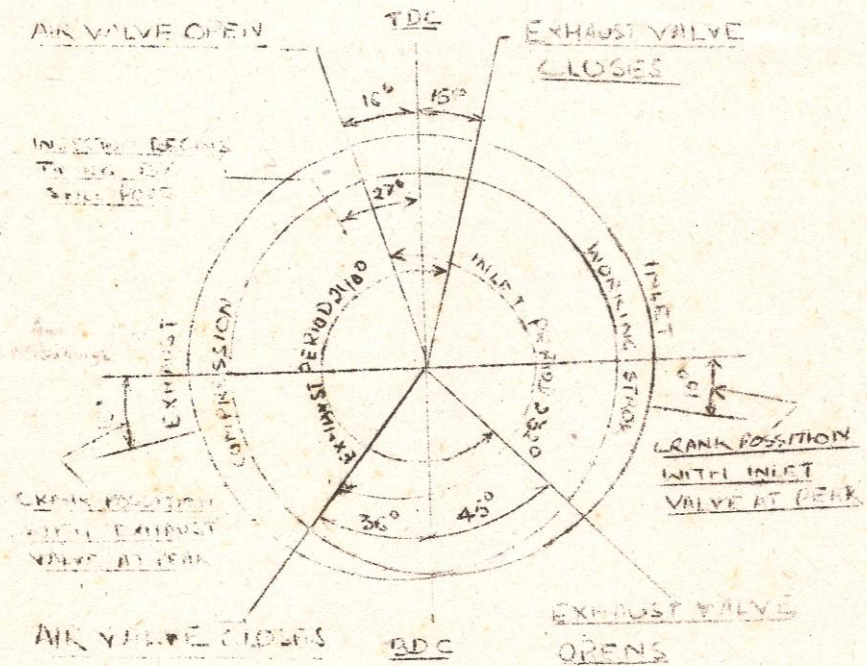
Ring Diameter	.010"	.020"
Standard	YWA .14044A (1100140044)	YWA .14045A (1100140045)
.20" Oversize	YWA .14317	YWA . 14318 (1100143018)
.040" Oversize	YWA .14337 (1100143037)	YWA .14838 (1100143038)
.60" Oversize	YWA .14096 (1100140096)	YWA .14097 (1100140097)

Appendix 'B' to GRI No 140



SCHEMATIC LAYOUT OF LUB  
OIL SYSTEM





VALVE TIMING DIAGRAM

YWA NIK III

INLET & EXHAUST VALVE TIMING

THE TIMING SHOWN IS OBTAINED UNDER RUNNING CONDITIONS I.E. ENGINE HOT. THESE CONDITIONS MAY BE SIMULATED BY SETTING THE CLEARANCE TO .018" AT THE VALVES FOR THE PURPOSE OF CHECKING THE TIMING.  
 CLEARANCE WITH ENGINE COLD = .043" AT VALVES