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International BD-264 and BD-281 Engines

Service Manual

SM13

Reprinted

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SM-13
SERVICE MANUAL

INTERNATIONAL
BD-264 AND BD-281 SERIES
ENGINES

The black tabs shown on the right hand side of this page line up with the corresponding tabs in the manual

NOTE

Refer to the SUPPLEMENT AND CHANGE INDEX for a list of supplements, and to the end of the appropriate group for the latest instructions before carrying out work on the engine.

INTERNATIONAL HARVESTER COMPANY
OF GREAT BRITAIN LIMITED

259 CITY ROAD, LONDON, E.C.1

GROUP INDEX

GENERAL 1

MANIFOLDS, CYLINDER HEAD AND VALVES 2

CONNECTING RODS PISTONS AND CYLINDER SLEEVES 3

LUBRICATING SYSTEM 4

WATER PUMP AND THERMOSTAT 5

TIMING GEAR TRAIN, FRONT COVER AND CAMSHAFT 6

CRANKSHAFT, MAIN BEARINGS AND FLYWHEEL 7

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5. SPECIFICATIONS		264 SERIES	281 SERIES
GENERAL			
Number of cylinders		4	4
Stroke	inches	5-1/4	5-1/4
Bore	inches	4	4-1/8
Displacement	cubic inches	264	281
Compression ratio		16.3 : 1	17.25 : 1
Compression pressure:			
at 200 rpm	p.s.i.	300 to 325	
at 120 rpm	p.s.i.		330 to 350
Firing order		1 - 3 - 4 -2	1 - 3 - 4 - 2
Engine applications			
BTD-6 & B-100	h.p.	53	
	r.p.m.	1450	
B-450	h.p.	55	
	r.p.m.	1500	
BTD-8 & B-614	h.p.		62.5
	r.p.m.		1600
BH-30	h.p.		70.5
	r.p.m.		1800
Valve clearance	inches	0.022	0.022
VALVE LEVERS & SHAFT			
Shaft diameter	inches	0.748 to 0.749	0.748 to 0.749
Lever bushing inside dia.	inches	0.751 to 0.752	0.751 to 0.752
VALVE SPRINGS			
Free length	inches	2.885 +- 0.015	2.885 +- 0.015
Valve open	inches	1-3/4	1-3/4
Test load	pounds	105 to 115	105 to 115
Valve closed	inches	2-1/4	2-1/4
Test load	pounds	50 to 60	50 to 60
VALVE TAPPETS			
Diameter	inches	1.248 to 1.249	1.248 to 1.249
Bore in crankcase	inches	1.2495 to 1.2505	1.2495 to 1.2505
CRANKSHAFT			
Main journals			
Number		3	3
Diameter	inches	2.8075 to 2.8085	3.1200 to 3.1210
Running clearance	inches	0.002 to 0.003	0.002 to 0.003
End clearance	inches	0.006 to 0.010	0.006 to 0.010
Bore in crankcase	inches	3.0000 to 3.0010	3.3125 to 3.3135
Crankpins			
Diameter	inches	2.6225 to 2.6235	2.7475 to 2.7485
Running clearance	inches	0.002 to 0.003	0.002 to 0.003
CONNECTING RODS			
Crankshaft bearing diameter	inches	2.6246 to 2.6266	2.7496 to 2.7516
Running clearance	inches	0.002 to 0.003	0.002 to 0.003
Side clearance	inches	0.005 to 0.012	0.005 to 0.012

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2. BOLT IDENTIFICATION CHART

IH TYPE	BSS	MANUFACTURERS MARKINGS						
1	B	J	BEES 28 B 35		SPNB	NEWTON	SPARTS	TWLB
2	R	R45 - 55	BEES 45 R 55	NEWALL HITENSILE	SPNR	NEWTON R	SPARTS R	TWLR
	T	T55 - 65	BEES 55 T 65	NEWALLOY T or NEWALL HITENSILE T	SPNT	NEWTON T	SPARTS T	TWLT
4	V	U65 V 75	BEES 65 V 75	NEWALLOY "V"	SPNV	NEWTON V	SPARTS V	TWLV

3. STANDARD TORQUE DATA FOR NUTS AND BOLTS

Where no special torque data is specified, the following torque should be used on all nuts and bolts providing that the threads are lubricated with engine oil or chassis grease.

BOLT SIZE	TYPE 1		TYPE 2		TYPE 4	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
1/4	4	5	9	10	12	14
5/16	8	10	19	21	27	30
3/8	15	18	33	37	45	50
7/16	25	29	53	60	75	85
1/2	38	44	80	90	115	130
5/8	79	89	160	180	220	250
3/4	145	160	290	320	400	450
7/8	230	250	420	470	650	730
1	360	380	630	710	970	1090
1-1/8			850	950	1380	1550
1-1/4			1200	1350	1940	2180

NOTE: When re-using nuts and bolts in service; use the minimum torque figure.

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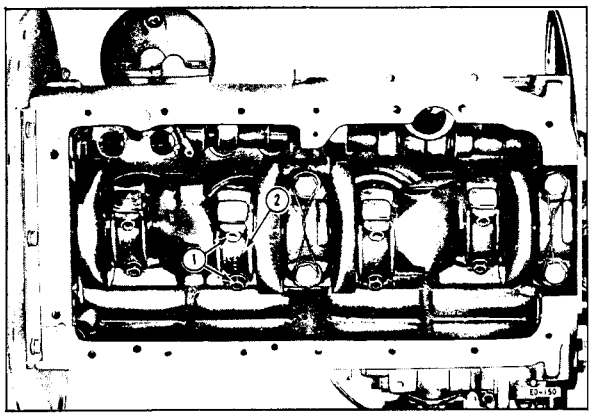


Fig. 1

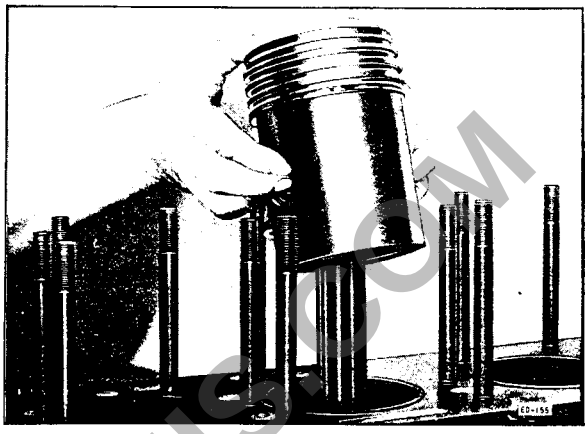


Fig. 2

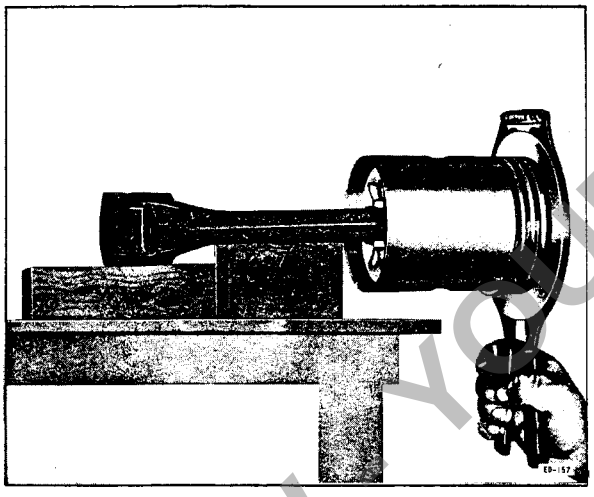


Fig. 3

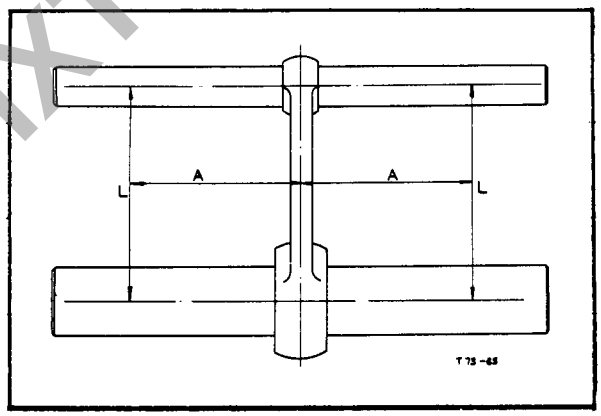


Fig. 4

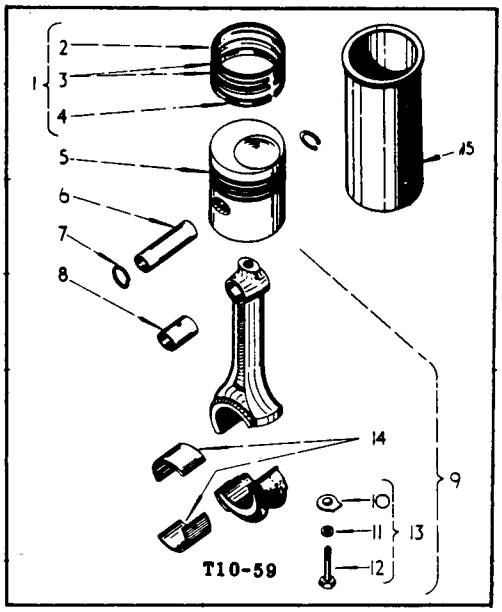


Fig. 5

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1. DESCRIPTION

1a. GENERAL

The cylinder head houses the valves, valve guides, injectors and glowplugs. The valve lever shaft assembly, thermostat housing, exhaust and inlet manifolds are mounted to it.

2. VALVE LEVER SHAFT ASSEMBLY

2a. REMOVAL

1. Disconnect the breather tube at the valve housing cover.

2. Remove the thermostat housing, exhaust and inlet manifolds.

3. Remove the valve housing cover and gasket.

4. Slacken the valve lever adjusting screws (5-1) until all valve levers are free.

5. Remove the valve lever shaft bracket capscrews in the sequence 1, 2, 3, 4 (Fig.1).

6. Remove the valve lever shaft assembly being careful not to damage the oil tube (6-1).

2b. DISMANTLING

1. Remove the snap rings (1-2) and washers from the ends of the shaft.

2. Slide the valve levers (2-2), brackets (3-2) and springs (4-2) from the shaft.

3. The two halves of the shaft should not be separated from the oil sleeve (5-2) unless either part has to be replaced. If separation is necessary, the shafts can be pressed out in either direction.

2c. INSPECTION & REPAIR

1. Check the valve lever shaft expansion plugs.

2. Check that the clearance between the valve lever bushes and shaft does not exceed .004 inch.

3. Stone or lightly grind the unworn area of the valve lever contact pad, maintaining the original profile, until the two surfaces are level.

4. Inspect the springs for breakage and loss of tension.

2d. ASSEMBLY

1. Assemble the shafts to the oil sleeve so that dimension A (Fig.3) is 9-29/32 and the centre lines of the capscrew holes are parallel to the centre line of the oil tube (B-3).

2. Assemble the levers, brackets and springs as in Fig.2 and secure with the washers and snap rings.

2e. INSTALLATION

1. Enter the oil tube, refit and tighten the bracket capscrews in the sequence 4, 3, 2, 1 (Fig.1).

2. Set No.1 piston at T.D.C. on the compression stroke by setting the T.D.C. mark on the pump gear (3-4) in line with the mark on the front cover (2-4).

3. Adjust the valve clearance of No.1 cylinder valves.

4. Turn the crankshaft one-half revolution at a time, in normal direction of rotation, and set the valve clearances on the remaining cylinders in firing order.

5. Refit the valve housing cover and gasket, the thermostat housing, exhaust and inlet manifolds and reconnect the breather tube.

3. CYLINDER HEAD

3a. REMOVAL

1. Remove the valve lever shaft assembly as detailed in para.2a.

2. Remove the valve push rods (1-5) and identify them so that they can be installed in their original positions.

3. Remove the injector spill pipes (2-5).

4. Disconnect the injector pipes (3-5) at the injectors.

5. Undo the cylinder head nuts, a little at a time in reverse order to the tightening sequence (Fig.6).

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rod on the same side as the off centre depression in the piston, position the connecting rod inside the piston and push the piston pin into place.

3. Install new circlips.

4. Install the expander ring (5-6) with its gap opposite the word FRONT marked on the piston crown.

5. Install a side rail (3-6) with its gap opposite the gap in the expander ring.

6. Install the slotted ring (4-6) with its gap at 90° to the piston pin.

7. Install the remaining side rail (3-6) with its gap at 180° to the gap in the first side rail.

8. Install the three compression rings (2 & 1-6) with their gaps 180° apart and the word TOP toward the piston crown.

2e. INSTALLATION

1. Install the piston ring compressor on the piston.

2. With the position number on the connecting rod to the camshaft side, enter the connecting rod and piston into the sleeve from the top.

3. Push down on the piston until it has fully entered the sleeve (Fig.7).

4. With "plastigage" or .005 inch virgin lead wire on the full width of the bearing insert (Fig.8) install the bearing cap and torque load the capscrews.

5. Remove the bearing cap and check the "plastigage" or lead wire to determine the bearing clearance. If the clearance is not within limits replace the bearings, using .003 undersize bearings if necessary, and repeat the check. Should the clearance still be excessive the crankshaft must be removed as detailed in GROUP 7, para. 4, ground and installed with undersize bearings. DO NOT turn the crankshaft during the checking operation.

6. Install the bearing caps, tighten and tab-lock the capscrews.

7. Repeat with remaining piston and connecting rod assemblies.

8. Install the oil pump as detailed in GROUP 4, para.2e.

9. Install the cylinder head as detailed in GROUP 2, para.3e.

3. CYLINDER SLEEVES

3a. REMOVAL

1. Remove the connecting rod and piston assemblies as detailed in para. 2a.

2. Remove the sleeves with a sleeve puller (Fig.9).

3b. INSTALLATION

1. Press new sleeves into place.

2. Check the cylinder sleeve flange stand out (Fig.10).

3. Install the connecting rod and piston assemblies as detailed in para. 2e.

4. CONDITIONING SCHEDULE

After the installation of new sleeves, pistons or piston rings, the engine must be "RUN IN" before operating at normal speeds and loads as follows:

1. Replenish the cooling and lubricating systems.

2. Start and run the engine at 1/4 rated speed, with no load, until normal operating temperatures are reached. Check all systems for leaks.

3. PERIOD 1

Operate the engine on 1/4 load at 3/4 rated speed for one hour.

4. PERIOD 2

Operate the engine on 1/2 load at 3/4 rated speed for two hours.

5. PERIOD 3

Operate the engine on 3/4 load at rated speed for one hour.

WARNING: DO NOT run the engine at low idle for long periods.

6. Recheck all systems for leaks, torque the cylinder head nuts and adjust the valve clearances.

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