

Medium & Heavy Duty Gas

INTERNATIONAL HARVESTER

GENERAL SPECIFICATIONS						
Engine	Net HP At RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke	Displ. Cu. Ins.
345"①	282@2200	154@3600	8.28:1	3.880"	3.66"	345.00"
392"	302@2800	185@3600	8.00:1	4.120"	3.66"	390.90"
404" 2V②	326@2200	189@3600	8.00:1	4.125"	3.74"	399.80"
404" 4V	336@2600	206@3600	8.00:1	4.125"	3.74"	399.80"
446"③	385@2600	227@3600	8.00:1	4.125"	4.18"	446.89"
478"	384@2200	209@3400	7.60:1	4.500"	3.75"	477.20"
537" 2V	410@1800	203@3200	7.50:1	4.625"	4.00"	537.60"
537" 4V	236@3200	429@2200	7.50:1	4.625"	4.00"	537.20"
549"	227@3200	446@2000	7.60:1	4.500"	4.31"	548.70"

- ① - Calif. models 115 HP, 281 ft. lbs. torque.
- ② - Calif. models 183 HP, 323 ft. lbs. torque.
- ③ - Calif. models 221 HP, 380 ft. lbs. torque.

VALVES							
Engine & Valve	Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift
345"							
Int.	45°	45°	.063-.094"	.3720-.3730"	.0010-.0035"	.440"
Int.	45°	45°	.078-.109"	.3715-.3725"	.0015-.0040"	.395"
392"							
Int.	30°	30°	.063-.094"	.3720-.3730"	.0010-.0035"	.440"
Exh.	45°	45°	.078-.109"	.4140-.4150"	.0015-.0040"	.395"
404"							
Int.	45°	45°	.060-.090"	.37215-.37285"	.00115-.00285"	.435"
Exh.	45°	45°	.085-.105"	.37165-.37265"	.00165-.00235"	.435"
446"							
Int.	45°	45°	.060-.090"	.37215-.37285"	.00115-.00285"	.435"
Exh.	45°	45°	.085-.105"	.37165-.37235"	.00165-.00235"	.435"
478"							
Int.	15°	15°	.063-.094"	.4340-.4350"	.0015-.0040"	.....
Exh.	45°	45°	.094-.125"	.4330-.4340"	.0025-.0050"	.....
537"							
Int.	15°	15°	.060-.090"	.4341-.4349"	.0016-.0034"	.465"
Exh.	45°	45°	.090-.120"	.4338-.4345"	.0020-.0037"	.465"
549"							
Int.	15°	15°	.063-.094"	.4340-.4350"	.0015-.0040"	.....
Exh.	45°	45°	.094-.125"	.4330-.4340"	.0025-.0050"	.....

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS							
Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam.	Clearance	Thrust Bearing	Crankshaft End Play	Journal Diam.	Clearance	Side Play
345"	2.7484-2.7494"	.0010-.0040"	No.3	.0044-.0094"	2.3730-2.3740"	.0011-.0036"	.008-.016"
392"	2.7484-2.7494"	.0010-.0040"	No.3	.0044-.0094"	2.3730-2.3740"	.0011-.0036"	.008-.016"
404"	3.1228-3.1236"	.0010-.0036"	No.3	.0025-.0085"	2.4980-2.4990"	.0011-.0036"	.008-.020"
446"	3.1228-3.1236"	.0010-.0036"	No.3	.0025-.0085"	2.4980-2.4990"	.0011-.0036"	.008-.020"
478"	3.1230-3.1240"	.0014-.0044"	No.3	.0040-.0090"	2.6230-2.6240"	.0017-.0042"	.010-.018"
537"	3.1235-3.1245"	.0015-.0035"	No.3	.0060-.0120"	2.6230-2.6240"	.0011-.0036"	.008-.018"
549"	3.1230-3.1240"	.0014-.0044"	No.3	.0040-.0090"	2.6230-2.6240"	.0017-.0042"	.010-.018"

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INTERNATIONAL HARVESTER (Cont.)

PISTONS, PINS, RINGS						
Engine	PISTONS	PINS		RINGS		
	Clearance	Piston Fit	Rod Fit	Rings	End Gap	Side Clearance
345"	.0035"	.0005-.0009"	.0006-.0012"	1&2 3	.010-.020" .015-.055"	.0015-.0030" .0000-.0084"
392"	.0035"	.0005-.0009"	.0006-.0012"	1&2 3	.013-.023" .013-.028"	.0015-.0030" .0020-.0035"
404"	.0012-.0017"	.0002-.0006"	.0004-.0008"	1&2 3	.013-.023" .013-.023"	.0020-.0040 .0020-.0040"
446"	.0012-.0017"	.0002-.0006"	.0004-.0008"	1&2 3	.013-.023" .013-.023"	.0020-.0040" .0020-.0040"
478"	.0020"	.0001-.0004"	.0008-.0011"	1&2 3	.013-.025" .013-.028"	.0035-.0050" .0010-.0030"
537"	.0012-.0022"	.0001-.0004"	.0008-.0011"	1 2 3	.012-.022" .014-.024" .012-.022"	.0020-.0040" .0020-.0040" .0020-.0040"
549"	.0020"	.0001-.0004"	.0008-.0011"	1,2&3 4	.013-.025" .013-.028"	.0035-.0050" .0010-.0030"

VALVE SPRINGS			
Engine	Free Length	PRESSURE (LBS.)	
		Valve Closed	Valve Open
345"	2.065"	.....	188.1@1.429"
392"	2.065"	.....	188.1@1.429"
404"	2.065"	.....	188.1@1.429"
446"	2.065"	.....	188.1@1.429"
478"			
Inner	2.281"	.....	79-87@1.538"
Outer	2.563"	.....	112-121@1.663"
537"	2.075"	.....	200@1.397"
549"			
Inner	2.281"	.....	79-87@1.538"
Outer	2.563"	.....	112-121@1.663"

CAMSHAFT			
Engine	Journal Diam.	Clearance	Lobe Lift
345" & 392"	.....	.0015-.0035"	.....
No. 1	2.0990-2.1000"		
No. 2	2.0890-2.0900"		
No. 3.	2.0790-2.0800"		
No. 4	2.0690-2.0700"		
No. 5	2.0590-2.0600"		
404"	2.0990-2.1000"	.0010-.0035"	.....
446"	2.0990-2.1000"	.0010-.0035"	.....
478" & 549"	.....	.0010-.0030"	.....
No. 1	2.3470-2.3480"		
No. 2	2.3160-2.3170"		
No. 3	2.2900-2.2910"		
No. 4	2.2470-2.2480"		

OIL PUMP SPECIFICATIONS			
345" & 392"		404" & 446"	
Gear End Play .....	.0015-.0060"	Body Gear End Clearance .....	.0015-.0065"
Gear Side Clearance .....	.0007-.0027"	Body-to-Gear Clearance .....	.0014-.0054"
Shaft Clearance .....	.0010-.0025"	Pump Shaft Diameter .....	.4885-.4890"
Gear Backlash .....	.0107"	Shaft Clearance in Body .....	.0010-.0025"
Pressure Regulator Spring	1.812" @13.33lbs.	Body Gear Backlash .....	.0107" Max.
		Idle Shaft Diameter .....	.4845-.4855"
		Idle Gear Clearance on Shaft .....	.0015-.0040"

INTERNATIONAL HARVESTER (Cont.)

OIL PUMP SPECIFICATIONS (Cont.)

537"

478" & 549"

Body-to-Gear End Clearance .....	.0030-.0045"
Body-to-Gear Clearance .....	.0007-.0027"
Gear Backlash .....	.0005-.0065"

Body Gear End Clearance .....	.0015-.0090"
Pump Body-to-Gear Clearance .....	.0046-.0086"
Pump Shaft Diameter .....	.4905-.4910"
Pump Shaft Clearance in Bore .....	.0015-.0030"
Body Gear Backlash .....	.0030-.0150"

TIGHTENING SPECIFICATIONS

345" & 392"

404" & 446"

Application	Ft. Lbs.
Cylinder Head Bolts ^①	90-100
Main Bearing Cap Bolts	75-85
Connecting Rod Cap Nuts	②45-55
Crankshaft Pulley Bolt	100-110
Flywheel Bolts	45-55

Application	Ft. Lbs.
Cylinder Head Bolts ^①	②90-100
Main Bearing Cap Bolts	90-110
Connecting Rod Cap Nuts	38-44
Crankshaft Vibration Damper	80-100
Flywheel Bolts	45-60

- ① - See cylinder head tightening sequence.
- ② - Tighten V-392 engine to 40-45 ft. lbs.

- ① - See cylinder head tightening sequence.
- ② - On engines below serial number 38949, tighten to 80-90 ft. lbs.

478" & 549"

537"

Application	Ft. Lbs.
Cylinder Head Bolts ^①	80-90
Main Bearing Cap Bolts	100-110
Connecting Rod Cap Nuts	60-70
Flywheel-to-Crankshaft	90-100

Application	Ft. Lbs.
Cylinder Head Bolts ^①	80-90
Main Bearing Cap Bolts	125-130
Connecting Rod Cap Nuts	65-70
Crankshaft Pulley	260-290
Flywheel-to-Crankshaft	110-120
Idler Pulley	70-85

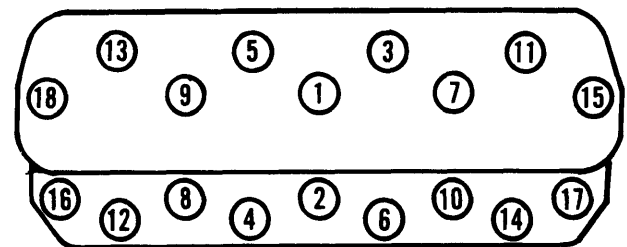
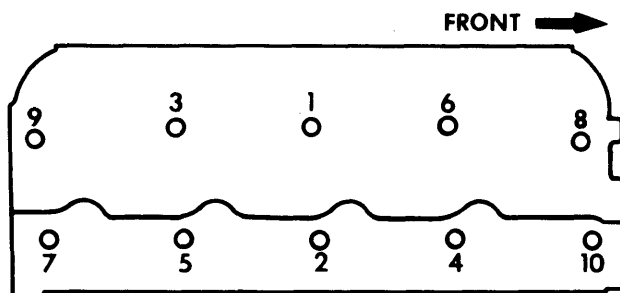
- ① - See cylinder head tightening sequence.

- ① - See cylinder head tightening sequence

CYLINDER HEAD TIGHTENING SEQUENCE

345" & 392"

478" & 549"



404" & 446"

537"

