PISTON PINS

	DIESEL
Type	Full floating
Installation	Fit pin at room temperature with thumb pressure
Pin Held in Position by	Retaining Rings
Outside Diameter (Standard Pin)	
Coded Red	1.2495-1.2494
Coded Blue	1.2497-1.2496
Running Clearance in Piston	
Standard	0.0002-0.0008
Running Clearance in Rod	
Standard	0.0004-0.0009
Maximum	0.0019
Rockwell "C" Hardness	60-63

PISTON PIN BUSHING

Type	Slotted and split
Material	Steel backed bronze
Inside Diameter	
Standard	1.2501-1.2503
Length	0.551-0.537

PISTON RINGS

Material	
Compression Rings	Cast iron - chrome faced
Oil Rings	Cast iron - chrome faced
Compression Rings for Piston	2
Compression Ring Width	
Top	0.1145-0.1137
2nd	0.0935-0.0927
Compression Ring Side Clearance	
Maximum	0.006
End Gap	
Standard	0.014-0.020
Maximum	0.045
Oil Ring End Gap	
Standard	0.010-0.023
Maximum	0.045

PUSH RODS

Length	12 $\pm$ 0.015
Maximum Runout	0.020

ROCKER ARMS

Rocker Arm Shaft Spring	
Free Length	2-1/2
Compressed Length	5/8 at 10 lbs.
Rocker Arm Running Clearance	
Standard	0.003-0.001
Maximum	0.0045

ROCKER ARM SHAFT

	DIESEL
Shaft Diameter	
Standard	0.7435-0.7425
Minimum	0.740

SLEEVES

Type	Wet
Material	Cast iron
Brinell Hardness	212-277
Bore	
Standard	3.8750-3.8765
Maximum (Measured at Top of Ring Travel)	3.8775
Out-of-Round	
Maximum	0.002
Taper	
Maximum	0.004
Overall Length	7-7/16
Projection above Crankcase (for Gasket Crush)	0.001-0.004
Crankcase Sleeve Lower Bore	4.281-4.282
Crankcase Sleeve Upper Bore	4.370-4.380
Crankcase Sleeve Counterbore	4.562-4.563
Sleeve Counterbore Depth in Crankcase	0.250-0.248
Sleeve Flange Thickness	0.251-0.252
Sleeve Outer Diameter	
Upper Flange	4.5600-4.5585
Packing Ring Lands	4.2800-4.2785
Sleeve Upper Flange Clearance in Crankcase	0.002-0.0045

TIMING GEARS

Type	Helical
Material	Steel forging
Back Lash	
Idler Gear to Crankshaft Gear	0.004-0.006
Maximum for Wear	0.007
Camshaft Gear to Crankshaft Gear	0.004-0.006
Maximum for Wear	0.007

VALVES

Material	
Intake	Silcrome #1
Exhaust	EMS-10/57
Valve Arrangement (Front to Rear)	I-E-I-E-I-E-I-E-I-E-I-E
Valve Length Overall — Intake & Exhaust	6-13/16
Valve Stem Runout - Maximum	0.002
Valve Stem Diameter	
Intake	
Standard	0.3725-0.3720
Minimum	0.3690
Exhaust	
Standard	0.3720-0.3715
Minimum	0.3680

(Valves Continued)

VALVES (Continued)

	DIESEL
Valve Running Clearance in Guides	
Intake	
Standard	0.002-0.0005
Maximum	0.004
Exhaust	
Standard	0.0025-0.001
Maximum	0.0055
Valve Face Angle	
Intake	29-1/2°
Exhaust	45-1/2°
Valve Head Diameter	
Intake	1-23/32
Exhaust	1-1/2
Valve Timing	
Valve Clearance for Checking Valve Timing - Intake & Exhaust	0.035
Intake Opens	15° BTDC
Intake Closes	35° ABDC
Exhaust Opens	35° BBDC
Exhaust Closes	15° ATDC
Valve Lift	
Intake & Exhaust	0.405
Valve Port Diameter	Refer to Cylinder Head Specifications
Maximum Valve Face Runout	0.001
Maximum Valve Seat Runout	0.002
Valve Margin - Minimum	1/64
Valve Clearance (Cold)	
Intake	0.030
Exhaust	0.030

VALVE GUIDES

Type	Straight
Material	Cast iron alloy, Brinell hardness 269-302
Valve Guide Bore	
Spiral Groove End	0.373-0.374
Plain End	0.3745-0.3757
O.D.	0.6260-0.6255
Length	3-1/2
Valve Guide Height above Counterbore of Cylinder Head	7/8

VALVE SPRINGS

Material	Spring steel
Part Number	
Intake & Exhaust	106 573-A
Free Length	2.562
Compressed Length	
Valve Closed	1.906 at 59 lbs. ± 4 lbs.
Valve Open	1.506 at 95 lbs. ± 4 lbs.

VALVE LIFTERS

	DIESEL
Type	Mushroom
Diameter	
Standard	0.6245-0.6240
Minimum	0.619
Maximum Allowable Out-of-Round	0.0003
Lifter Guide Bore	
Standard	0.625-0.626
Maximum	0.631
Running Clearance	0.0005-0.002

TORQUE WRENCH VALUES IN FOOT POUNDS (OILED)

Cylinder Head Cap Screws	
Numbers 1 thru 8, 11 & 12 on Tightening Diagram (Page 4)	180
Numbers 9, 10, 13 & 14 on Tightening Diagram (Page 4)	133
Main Bearing Cap Screws	129-133
Connecting Rod Cap Screws	46-50
Manifold Nuts	25-27
Rocker Arm Shaft Bracket Nuts	25-27
Flywheel Cap Screws	67-69
Damper Cap Screws	31-34
Pulley Cap Screw	75-85

FUEL SYSTEM

INJECTOR NOZZLES

Opening Pressure	
New (or Used Nozzle with New Spring)	3000 psi
Used Nozzle Spring	2800 psi
Spray Orifices (Number)	Four
Orifice Diameter	0.012
Valve Lift Adjusting Screw	1/2 turn open
Return Oil Leakage	5-8 drops per 30 seconds @ 1500 psi after first drop falls
Torque Values	
Pressure Adjusting Screw Locknut	70-75 in. lbs.
Hold-down Screw	20 ft. lbs.

FUEL INJECTION PUMP (ROOSA MASTER)

Roosa Number	DBGFC 637-11DH
Governor	
Idle Speed	800
High No-Load Speed	2650
Rated Speed	2400
Timing (Static)	$2^{o}\ ^{+1^{o}}_{-0^{o}}$ BTDC
Distributor Rotor Diameter	0.920 nominal
Drive Shaft Tang Width	0.3105-0.3095
Drive Shaft Bushing	0.8755-0.8765
Governor Control Arm Fork Wear	0.003 maximum wear. Fork tip to back side when new: 0.216-0.226

FUEL INJECTION PUMP (ROOSA MASTER) (Continued)

	DIESEL
Plunger Diameter	0.330-0.3299
Basic Cam Dimension	1.900
Rotation	Clockwise from drive end
Torque Values	
Delivery Valve Retainer Screw	85-90 inch pounds
Head Locking Screw	15 foot pounds
Cam Advance Screw	33 foot pounds
Head Locating Screw	25 foot pounds
End Plate Screws	25-30 inch pounds

TEST SPECIFICATIONS

NOTE: All speeds are in engine rpm.

TEST STAND	
1. Injection Lines	3/32" I.D. by 20" long
2. Test Oil Temperature	110-115° F.
3. Nozzles	12SD12
4. Nozzle Opening Pressure	2500 psi
5. Calibrating Oil	Roosa Master
PUMP OPERATING SPEED	Half Engine Speed
Pump Accessories	Delivery valve, speed advance, by-pass system
PUMP SETTINGS	
1. Roller to Roller Dimension	1.958 ± 0.0005
2. Governor Linkage Gap (Use Roosa Gage No. 13389)	0.125" to 0.165"

3. Operate Pump at 1000 RPM (Wide Open Throttle) for 10 Minutes to Bring to Operating Temperature and Clear Air from System.
4. Check for Minimum 18" HG Transfer Pump Lift at 400 RPM with By-Pass Hose Pinched.
5. Adjust Transfer Pump Pressure (Wide Open Throttle)
6. Check for Minimum Cranking Speed Delivery (See Step 14)
7. Auto Advance — Speed Responsive
   a. Advance Movement 7°

RPM	Cam Movement
b. 950-1250	Set 3°
c. 1400-1700	Finish

	RPM ± 10	MM3 PER STROKE	MAX. VAR. BET. CYL.	TRANS. PUMP PRESS-PSI
8. Check Point	2400			74-76
9. Check Point	1000	69-73	5	
10. Set Torque Screw	2400	64-66	4	72-76 Hold
11. High Idle (Wide Open Throttle)	2640	12-15	5	
12. Recheck Point	1400	71-75	5	
13. Low Idle	675	9-12		
14. Minimum Cranking Speed Delivery	100	31 Min.		7 Min.