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## VALVES

Material	
Intake	VMS 39/49
Exhaust	VMS 201/49
Valve Arrangement (Front to Rear)	I-E-I-E-I-E I-E-I-E-I-E
Valve Length Overall	
Intake	6.1735
Exhaust	6.1550
Valve Stem Runout - Maximum	0.0005
Valve Stem Diameter	
Intake	
Standard	0.4369-0.4361
Minimum	0.4356
Exhaust	
Standard	0.4352-0.4344
Minimum	0.4339
Valve Running Clearance in Guides	
Intake	
Standard	0.0015-0.0033
Maximum	0.0045
Exhaust	
Standard	0.0032-0.0050
Maximum	0.0062
Valve Face Angle	
Intake & Exhaust	45°
Valve Head Diameter	
Intake	2.012-2.002
Exhaust	1.727-1.717
Valve Timing	
Valve Clearance for Checking Valve Timing - Intake	0.009
- Exhaust	0.011
Intake Opens	8° BTDC
Intake Closes	38° ABDC
Exhaust Opens	50° BBDC
Exhaust Closes	8° ATDC
Valve Lift	
Intake	0.476
Exhaust	0.469
Valve Port Diameter	Refer to cyl. head specifications
Maximum Valve Face Runout	0.001
Maximum Valve Seat Runout	0.002
Valve Margin - Minimum	1/64
Valve Clearance (Cold)	
Intake	0.010
Exhaust	0.017

## VALVE GUIDES

Type	Straight
Material	Cast iron
Valve Guide Bore - Intake and Exhaust	0.4394-0.4404
- Maximum	0.4416
O. D.	0.689-0.688
Length	2.96
Valve Guide Height above Counterbore of Cylinder Head	0.760

## VALVE SPRINGS

Material	Spring steel
Free Length	
Intake	2.790
Exhaust	2.610
Compressed Length	
Valve Closed	
Intake	2.60 @ 45 ± 3 lb.
Exhaust	2.12 @ 65.7 ± 3 lb.
Valve Open	
Intake	2.13 @ 160 ± 5 lb.
Exhaust	1.67 @ 160.7 ± 7 lb.

## VALVE LIFTERS

Type	Straight
Diameter	
Standard	1.2480-1.2475
Minimum	1.2425
Lifter Guide Bore	
Standard	1.2513-1.2523
Maximum	1.2543
Running Clearance	0.0033-0.0048

## TORQUE WRENCH VALUES IN FOOT POUNDS (OILED)

Cylinder Head Stud Nuts (Tightening sequence diagram on page 5)	Initial 40; then 80; then 110; final 130
Main Bearing Cap Screws	100
Connecting Rod Cap Screws	100
Water Manifold Cap Screws	17-19
Manifold Nuts	25
Rocker Arm Shaft Bracket Cap Screws	35
Flywheel Cap Screws	115-120
Damper Cap Screws	35
Pulley Cap Screw	225-250

## FUEL SYSTEM

### INJECTOR NOZZLES

Opening Pressure	
New (Or Used Nozzle with New Spring)	2750
Used Nozzle Spring	2500
Spray Orifices (number)	2
Orifice Diameter	One 0.0157, One 0.0177
Torque Values	
Hold-Down Screw	12-14 ft-lbs

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## FUEL INJECTION PUMP (AMERICAN BOSCH)

Bosch Number	
2050	PSJ-90E-9020-B1
2150	PSJ-90E-9020-B2
Governor	
Idle Speed	600 ± 25
High No-Load Speed	2650
Rated Speed	2400
Timing (Static)	18° BTDC
Cam Nose Angle	
2050	80°
2150	60°
Plunger Diameter	9 mm.
Rotation	Clockwise
Automatic Advance	10-13° @ 2400 rpm
Transfer Pump Relief Valve Setting	60-75 psi
System Supply Pressure	27-32 psi
Torque Values	
Delivery Valve Retaining Screw (Loosen and Retorque)	65-70 ft-lbs
Retaining Screw Cap	55-60 ft-lbs
Head Retaining Screw	13-15 ft-lbs
Bridge Fastening Screws (Control Unit)	18-23 in-lbs
Head Discharge Fittings	50-55 ft-lbs

## TRANSMISSION, DIFFERENTIAL AND PLANETARY GENERAL

Transmission and Differential Oil Capacity	43 quarts (four wheel drive - 51 quarts)
Transfer Drive Oil Capacity	1 quart
Planetary Drive Oil Capacity (Each)	
2050	8 quarts
2150	6 quarts
Transmission, Differential, Transfer Case and Planetary Drive	
Oil Change Period	1000 hours
Lubrication System Filter Change Period	250 hours
Bearing Adjustment	
Input Shaft	5 in-lb preload (above oil seal drag) to 0.001 end play
Countershaft	0.001-0.003 end play
Bevel Pinion Shaft	10-15 in-lb preload (3-5 lbs. pull at teeth of 45 tooth gear)
Planetary Wheel Bearing (Pounds Pull on Scale at Hub Wheel Stud)	9-17 pounds (new bearings 21-28 pounds)
Differential	0.001-0.003 end play
Differential Bevel Gear Roller Bearing (Adjust only after obtaining correct differential end play and pinion shaft/bevel drive gear backlash)	Use dial indicator to determine highest point on differential gear surface next to roller bearing. Rotate bearing support shaft until bearing roller contacts high point. Tighten bearing support shaft lock nut and bend locking clip over nut.
Pinion Shaft and Bevel Drive Gear Backlash	As marked on bevel gear
Bevel Pinion Shaft Mounting Sleeve End Play	0.001-0.017 (four wheel drive - 0.001-0.027)

## GENERAL (Continued)

### Torque Values (Foot Pounds)

Input Shaft Nut	90-100
Countershaft Nut	150
Bevel Pinion Shaft Lock Nut (Two Wheel Drive)	150 min.
Differential Nut	77-82 (oiled)
Bull Gear Cover and Frame Rear Cover Cone Head Screw	135-150
Lubrication Pump (2400 engine rpm)	
Bypass Valve Pressure	8-14 psi
Capacity	
High Transmission Range - Direct Drive and Overdrive	3 gpm
Low Transmission Range - Underdrive	1/2 gpm

## DIMENSIONS

Bypass Valve Spring	
Free Length	2-15/32
Spring Pressure	2 ± .3 lbs. at 1-25/32
Differential Spider Hole	0.530-0.532 ream
Reverse Idler Gear Inside Diameter	1.751-1.750
Reverse Idler Shaft Diameter	1.3750-1.3745
Input Shaft Gear Inside Diameter	
Front	2.3755-2.3745
Rear	1.7505-1.7497
Input Shaft Gear Journal Diameter	
Front	2.3725-2.3715
Rear	1.7477-1.7467
Bevel Pinion Shaft Gear Inside Diameter	2.812-2.811
Bevel Pinion Shaft Gear Mounting Sleeve Diameter	
Front	2.809-2.808
Remaining Sleeves	2.8085-2.8080
Oil Collector Ring Seal Ring	
Width	0.0935-0.0920
Depth	0.104-0.094
Gap	
Standard	0.003-0.008
Maximum	0.020

## BRAKES – NON-PLANETARY FINAL DRIVES

Adjust brake housing inner supports with shim thickness equal to dimension stamped on top surface of rear main frame.

## CLUTCH

Diameter	
2050	13
2150	14
Pedal Free Travel (Measured at Pedal Pad)	3/4
Clutch Release Lever Adjustment	
2050	
Key Stock Thickness	0.398
Dimension from Tip of Levers to Flywheel	2-7/32
2150	
Dimension from Cover to Flat Surface	0.724
Dimension from Top of Lever Adjusting Screw to Flat Surface	1.897-1.927

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## OVER/UNDER HYDRAUL SHIFT

### GENERAL

Weight of Unit Dry (w/o Clutch Housing)	205 pounds
Lubrication and Hydraulic System	
Type	Self-contained, pressurized, filtered
Lubricant	Automatic Transmission Fluid, Type "A" or Dexron
Capacity (Reservoir)	3-1/2 quarts
Check Interval	Daily or every 10 hours
Change Interval	500 hours
Cooling	Oil-to-air heat exchange
Filter	
Type	Full-flow
Change Interval	After first 50 hours, thereafter every 250 hours
Breather	
Type	Micronic
Change Interval	Yearly
Clutches	
Multiple Disc	Wet type - hydraulically applied
Overrunning	Sprag - one way
Pump Output (2400 Engine RPM)	5.5 gpm
Clutch Circuit Pressure	140-160 psi
Lubrication Circuit Pressure	
Maximum	60 psi
Minimum	20 psi
Maximum Oil Temperature	225 <sup>o</sup> F.
Speed Increase, Under Drive to Direct Drive	20%
Speed Increase, Direct Drive to Overdrive	20%
Pull Power Increase	
Overdrive to Direct Drive	20%
Direct Drive to Underdrive	20%
Planet Gear Carrier Cap Screw Torque	48-52 ft-lbs
Input and Output Shaft Grease	Molybdenum disulphide

### DIMENSIONS

Overdrive Clutch Plate Thickness	0.078-0.073
Overdrive Separator Plate Thickness	0.082-0.077
Overdrive Piston Return Spring	
Free Length	1.320
Spring Pressure	10 pounds @ 1.159
Overdrive Clutch Piston	
Outside Diameter	4.686-4.684
Width	13/16
Bore Diameter	3.385-3.383
Ring Groove (Outside)	
Width	0.132-0.128
Depth	0.197-0.195
Ring Groove (Inside)	
Width	0.132-0.128
Depth	0.152-0.151
Overdrive Clutch Housing	
Piston Bore	
Outside Diameter	4.691-4.687
Inside Diameter	3.382-3.379

### DIMENSIONS (Continued)

Direct Clutch Plate Thickness	0.084-0.076
Direct Separator Plate Thickness	0.093-0.087
Direct Pressure Plate Thickness	0.252-0.248
Pressure Plate Return Spring	
Free Length	2.270
Spring Pressure	230 pounds @ 1.750
Direct Clutch Piston	
Outside Diameter	5.244-5.242
Width	1
Bore Diameter	2.380-2.378
Ring Groove (Outside)	
Width	0.162-0.156
Depth	0.194-0.193
Ring Groove (Inside)	
Width	0.132-0.128
Depth	0.128-0.137
Output Shaft	
Piston Bore	
Outside Diameter	5.256-5.250
Inside Diameter	2.370-2.368
Sprag Clutch	
Inner Race Diameter	1.9578-1.9573
Outer Race Diameter	2.6140-2.6130
Sun Gear Shaft	
Length	5.678-5.673
Diameter	
Planetary End	2.917-2.913
Overdrive End	3.515-3.505
Sun Gear Shaft Thrust Washer	
Thickness	
Front and Rear	0.063-0.060
Countershaft	
Length	7.432-7.429
Bearing Bore Inside Diameter	1.7509-1.7503
Countershaft Thrust Washer	
Thickness	0.062-0.060
Countershaft Support Shaft Outside Diameter	1.3750-1.3745
Bypass Valve Spring	
Free Length	3-1/2
Spring Pressure	5-1/2 - 6-1/2 pounds @ 2-7/16
Pressure Regulator Spring	
Free Length	3-5/8
Spring Pressure	55-57 pounds @ 2-3/4
Outside Diameter	5/8
Detent Ball Spring	
Free Length	1-9/32
Spring Pressure	15.3-18.7 pounds @ 7/8
Outside Diameter	15/64
Pressure Regulator Spool Diameter	0.6869-0.6865
Clutch Control Spool Land Diameter	0.6869-0.6865
Housing Cover	
Pressure Regulator Spool Bore Inside Diameter (3-7/16 Distance)	0.6883-0.6875
Clutch Control Spool Bore Inside Diameter (6-9/32 Distance)	0.6883-0.6875
Pump Drive Gear and Idler Gear Assemblies	
Gear Width	0.9980-0.9975
Shaft Diameter	0.6250-0.6247

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## 6,000-LB.-LIFT HITCH (CATEGORY 3)

Capacity	6000 pounds @ 24 inches rear of hitch points
Hydraulic Rams	
Diameter	3
Stroke	8

## ELECTRICAL SYSTEM

### ALTERNATOR

Delco Remy Model Number	1100063
Rotation	Clockwise
Field Current - 80° F.	2.2-2.6 amps @ 12 volts
Field Resistance - 80° F.	4.7-5.3 ohms
Cold Output	
Approximately 2000 RPM*	33 amps @ 14 volts
Approximately 5000 RPM*	58 amps @ 14 volts
Rated Hot Output	61 amps

\* Alternator-to-engine speed ratio — approx. 2.25:1.

### STARTING MOTOR

Drive End Bushing Running Clearance	0.002-0.005
Pinion Clearance	23/64 ± 1/32

## STEERING

### STEERING CYLINDER - TWO-WHEEL DRIVE

Diameter	2-1/2
Stroke	7-3/4