

W8C, W9C, W10C LOADERS

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SECTION



SPECIFICATIONS FOR CASE

W8B-A 401 DIESEL ENGINE

W8B-A 377 GASOLINE ENGINE

W9B-A 401 DIESEL ENGINE

W9B-A 377 GASOLINE ENGINE

W10B-A 401 DIESEL ENGINE

W10B-A 377 GASOLINE ENGINE

W10-A 401 DIESEL ENGINE

W12-A 451 DIESEL ENGINE

The Specifications are the Same Unless Otherwise Indicated

diesel engines

CC-2 A401 AND A451 ENGINE SPECIFICATIONS

Type -----CASE Full Diesel, 6 Cylinder 4 Stroke Cycle Valve-in-Head Engine.

Cylinder Heads -----Multiple Cylinder Heads can be removed individually for Servicing(2 cylinders per head).

Firing Order ----- 1-5-3-6-2-4

Bore
A401 ----- 4-1/8 Inches
A451 ----- 4-3/8 Inches

Stroke ----- 5 Inches

Piston Displacement
A401 ----- 401 Cubic Inches
A451 ----- 451 Cubic Inches

Compression Ratio ----- 15 to 1

Oil Filter, Crankcase-----Replaceable Full Flow Element Type.

Method of Starting Diesel Engine ----- Engine Starts on Diesel Fuel (Electric Starting Motor).

Decompressor ----- Holds Exhaust Valves Open so Engine can be Cranked for Servicing.

Exhaust Valve Rotators ----- Positive Type

Maximum Compression Pressures ENGINE WARMED UP TO OPERATING TEMP. AND RUNNING AT 1600 RPM

Altitude	Sea Level	1000 ft.	2000 ft.	3000 ft.	4000 ft.	5000 ft.
Compression	480 to	455 to	435 to	415 to	395 to	375 to
Pressure	510 PSI	485 PSI	465 PSI	425 PSI	425 PSI	405 PSI

Allowable Variance Between Cylinders - 25 Pounds Pressure at 1600 RPM

CYLINDER SLEEVES

Type -----Replaceable Wet Type:Two Rubber O-Ring Seals carried on each sleeve.

Inside Diameter of Sleeve Bore
A401 ----- 4.125 to 4.126 Inches. Replace Sleeve when inside Diameter below Top Ring Ridge Exceeds 4.133.
A451----- 4.375 to 4.376 Inches. Replace Sleeve when inside Diameter below Top Ring Ridge Exceeds 4.383 Inches.

Piston Clearance in Sleeve(At Skirt)
A401----- .0045 to .0055 Inch
A451----- .0045 to .0065 Inch

PISTON AND PISTON PINS

Piston Material
A401 ----- Special Alloy Iron;Parco-Lubrized
A401(W9 Series B) ----- Aluminum
A451 ----- Aluminum

Piston Weight (Less Pin)
A401 ----- 4.742 to 4.758 Pounds
A401(W9 Series B)----- 3.400 Pounds
A451 ----- 3.937 to 3.939 Pounds

Diameter of Piston at Top
A401 ----- 4.106 to 4.109 Inches
A401(W9 Series B)----- 4.092 to 4.096 Inches
A451 ----- 4.341 to 4.345 Inches

Diameter of Piston at Skirt
A401 ----- 4.1205 to 4.1215 Inches
A401(W9 Series B)----- 4.1155 to 4.1201 Inches
A451 ----- 4.3675 to 4.3685 Inches

Piston Pins ----- Full Floating Type:Held in Position with Snap Rings in Piston. Replaceable Bronze Bushing in Connecting Rod.

Piston Pin Length
A401 ----- 3.395 to 3.405 Inches
A401(W9 Series B) ----- 3.485 to 3.490 Inches
A451 ----- 3.670 to 3.675 Inches

Piston Pin Diameter
A401----- 1.3583 to 1.3586 Inches

A401(W9 Series B) ----- 1.4994 to 1.4995 Inches
A451 ----- 1.4994 to 1.4995 Inches

Piston Pin Fit in Piston
A401 ----- .0007 to .0012 Inch. When Pin is lubricated with Light Engine Oil and held upright in Vise, Weight of Piston should allow it to slide slowly into position over Pin.
A401(W9 Series B) ----- .0000 to .0003 Inch
A451 ----- .0000 to .0003

Piston Pin Fit in Connecting Rod Bushing
A401 ----- .0004 to .0011 Inch
A401(W9 Series B) ----- .0009 to .0014 Inch
A451----- .0005 to .0010 Inch

PISTON RINGS

Rings Per Piston ----- 4- (3 Compression and 1 Oil).

Compression Rings (Top 3)

1st (Top) Ring ----- Chromium Plated; Tapered Face: Top Marked.

2nd and 3rd Rings ----- Relief Indicates Bottom Side

Width of Ring (All 3)----- .0930 to .0935 Inch

Ring End Gap(All 3)when Compressed in
4.125 Inch Cylinder A401 ----- .013 to .023 Inch
Ring End Gap(All 3) when Compressed in
4.375 Inch Cylinder A451 ----- .013 to .025 Inch

Side Clearance in Groove of 1st (Top)Ring
A401 ----- .003 to .0045 Inch
A451 ----- .0045 to .0060 Inch

Side Clearance in Groove of 2nd and 3rd Ring----- .0025 to .004 Inch

Oil Ring ----- To install Replacement Ring, Follow Instructions Packed with Rings.

Width of Rings (Original Equipment)
A401 ----- .2455 to .2485 Inch
A451 ----- .2470 to .2490 Inch

Replacement Ring ----- .2441 to .2474 Inch

Side Clearance in Groove(Original Equipment)
A401----- .0025 to .0065 Inch
A451----- .0025 to .0085 Inch

Replacement Ring
A401----- .0036 to .0079 Inch
A451----- .0025 to .0085 Inch

CONNECTING RODS

Connecting Rod Bushing ----- Replaceable Bronze Bushing Replacement Bushing must be Reamed.
A401----- Use 1.3590 to 1.3594 Reamer
A401 (W9 Series B)----- Use 1.5004 to 1.5008 Reamer
A451 ----- Use 1.5004 to 1.5008 Reamer

Piston Pin Hole Diameter in Rod (Without Bushing)
A401 ----- 1.483 to 1.485 Inches
A401(W9 Series B)----- 1.686 to 1.688 Inches
A451----- 1.686 to 1.688 Inches

Inside Diameter of Piston Pin Bushing in Rod
1.3590 to 1.3594 Inches; Install New Bushing if inside Diameter Exceeds 1.363 Inches.
1.5004 to 1.5008 Inches.Install New Bushing if inside Diameter Exceeds 1.504 Inches.

Connecting Rod Bearing ----- Replaceable, Precision, Steel Backed Copper Lead Alloy Liners.

Connecting Rod Capscrews -----Self Locking Type,No. Lock Wires Required May be used More Than Once.

Connecting Rod Length (Center to Center Between Pin Hole and Bearing Journal Hole)--- 10.499 to 10.501 Inches

Bearing Liner Width ----- 1-5/8 Inch

Diameter of Crankshaft Journal Hole in Rod(Without Liner)----- 2.9005 to 2.9010 Inches

Inside Diameter of Bearing Liner(Standard Liner in place in Rod and Capscrews Tight)----- 2.7503 to 2.7518 Inches

Diameter of Crankshaft Rod Journal ----- 2.748 to 2.749

Clearance Between Rod Bearing and
Crankshaft Journal ----- .0013 to .0038 Inch; Install
New Bearing Liners When Clearance Exceeds
.006 Inch.

Undersize Bearing Liners Available
for Service ----- .002, .010, .020, .030 Inch

Allowable Connecting Rod Bearing End Play ----- .005 to .012 Inch

CRANKSHAFT AND MAIN BEARINGS

Crankshaft ----- Balanced; Drilled to Provide Pressure Lubri-
cation to Main and Connecting Rod Bearings.

Type Main Bearings ----- Replaceable, Precision, Steel
Backed Copper - Lead Alloy Liners.

Bearing Capscrews ----- Self Locking Type, No Lock
Wires Required May Be Used More Than Once.

Bearing Taking End Thrust ----- 5th(Two Replaceable Bronze
Thrust Washers.)

Crankshaft End Play(Measured
at No. 5 Main Bearing) ----- .004 to .012 Inch; Install New
Thrust Washers if End Play Exceeds .020 Inch.

Oversize Thrust Washers for
End Play Available for Service ----- .006 Inch

Connecting Rod Bearing Journal Diameter ----- 2.748 to 2.749 Inches

Main Bearing Journal Diameter ----- 2.998 to 2.999 Inches

Crankshaft Main and Connecting
Rod Journal Bearings out of Round ----- Maximum .001 Inch

Inside Diameter of Main Bearing Liners
(In Place and Capscrews Tight) ----- 3.0006 to 3.0026 Inches

Clearance Between Main
Bearing Liner and Journal ----- .0016 to .0046 Inch; Install
New Bearing Liner when Clearance Exceeds
.0065 Inches.

Width of 1st, 3rd 5th and 7th
Main Bearing Liners ----- 2-7/32 Inches

Width of 2nd, 4th and 6th Main
Bearing Liners ----- 1-5/32 Inches

Width Between Crankshaft Main Bearing Cheeks

A 3rd, 7th ----- 2.620 to 2.630 Inches

B 2nd, 4th and 6th ----- 1.5575 to 1.5675 Inches

C 5th ----- 2.624 to 2.626 Inches

Width Between Crankshaft Rod
Bearing Journal Cheeks ----- 1.9975 to 2.0025 Inches

Undersize Main Bearing Liners
Available for Service ----- .002, .010, .020, .030 Inch

Crankshaft Main Bearing
Journals Should Be
2.988-2.989 Inches for .010 Inch Undersize Bearing
2.978-2.979 Inches for .020 Inch Undersize Bearing
2.968-2.969 Inches for .030 Inch Undersize Bearing

Undersize Connecting Rod Bearing
Shells Available for Service ----- .002, .010, .020, .030 Inch

Connecting Rod Crankshaft Journals Should
Be Ground to ----- 2.738-2.739 Inches for .010 Inch Undersize Bearing
2.728-2.729 Inches for .020 Inch Undersize Bearing
2.718-2.719 Inches for .030 Inch Undersize Bearing

CAMSHAFT BUSHINGS

Number of Bearing Surfaces on Camshaft ----- 5

Type Bushing ----- Replaceable, Precision, Steel Backed Babbitt

Bushing Lubrication ----- Pressure Lubricated from Oil Pump; Cam-
shaft Drilled to Provide Pressure Lubrication to
Valve Rocker Arm Assembly, and to Timing
Gear Train.

Diameter of Camshaft at Each Bearing Surface
A401 Camshaft No. 6310A
(use w/Welch type Camshaft Plug) ----- 2.121 to 2.122 Inches
A401 Camshaft No. A21428
(use w/Welch type Camshaft Plug) ----- 2.246 to 2.247 Inches

A401 Camshaft No. A23486
(use w/cup type Camshaft Plug) ----- 2.246 to 2.247 Inches
A401 Camshaft No. A23513
(use w/cup type Camshaft Plug) ----- 2.246 to 2.247 Inches
A451 ----- 2.246 to 2.247 Inches

Inside Diameter of Each Bushing

(Measured when in Place in Block)

A401 Camshaft No. 6310A
(use w/Welch Type Camshaft Plug) ----- 2.1234 to 2.1264 Inches
A401 Camshaft No. A21428
(use w/Welch type Camshaft Plug) ----- 2.2484 to 2.5414 Inches
A401 Camshaft No. A23486
(use w/cup type Camshaft Plug) ----- 2.2484 to 2.5414 Inches
A401 Camshaft No. A23513
(use w/cup Type Camshaft Plug) ----- 2.2484 to 2.5414 Inches
A451 ----- 2.2484 to 2.5414 Inches

No. 1(Front) Bushing Length ----- 1-21/32 Inches

No. 2, 3 and 4 Bushing Lengths ----- 1-7/16 Inches

No. 5 Bushing Length(w/Welch Type Camshaft Plug) ----- 1-7/16 Inches
No. 5 Bushing Length(w/cup type Camshaft plug) ----- 1-5/32 Inches

Camshaft End Play ----- Automatically Taken Up by Spring
Loaded Thrust Button in Front End of Cam-
shaft. Camshaft Washer Provided Between
Drive Gear and Front Bearing.

Camshaft Washer

Outside Diameter ----- 3.240 to 3.260 Inches

Inside Diameter

A401 Camshaft No. 6310A
(Use w/Welch type Camshaft Plug) ----- 2.125 to 2.135 Inches
A401 Camshaft No. A21428
(Use w/Welch type Camshaft Plug) ----- 2.250 to 2.260 Inches
A401 Camshaft No. A23486
(Use w/cup type Camshaft Plug) ----- 2.250 to 2.260 Inches
A401 Camshaft No. A23513
(Use w/cup type Camshaft Plug) ----- 2.250 to 2.260 Inches
A451 ----- 2.250 to 2.260 Inches

Thickness ----- .1225 to .1275 Inch

VALVE PUSH ROD LIFTERS

Type ----- Mushroom Type

Outside Diameter of End that Projects into Block

A401 Camshaft No. 6310A
(Use w/Welch type Camshaft Plug) ----- .8095 to .8105 Inches
A401 Camshaft No. A21428
(Use w/Welch type Camshaft Plug) ----- .8097 to .8102 Inches
A401 Camshaft A23513
(Use w/cup type Camshaft Plug) ----- .8097 to .8102 Inches
A451 ----- .8097 to .8102 Inch

Diameter of Bore in Block for Lifter ----- .8115 to .8130 Inch

Oversize Lifter Available for Service ----- .010 In. Oversize Lifter

Bore in Block Must Be Reamed to ----- .8215 to .8225 Inch for .010 Inch
Oversize Lifter.

VALVES

Valve Tappet Clearance

A401 Intake ----- .012 Inch, Engine Cold
Exhaust ----- .020 Inch, Engine Cold
A401(W9 Series B) ----- .025 In., Engine Cold (Both Intake and Exhaust)
A451 ----- .025 In., Engine Cold (Both Intake and Exhaust)

Exhaust Valves

Angle of Valve Face ----- 44 Degrees

Maximum Valve Face Runout ----- .002 Inch as Determined with a Dial
Indicator.

Diameter of Valve Stem --- .4000 to .401 Inch. Install New Valve if there
is More than .002 Inch Difference in Diameter
at any Point on Stem.

Inside Diameter of Valve Guide ----- .4045 to .4055 Inch (After Assem-
bly).

Valve Stem Clearance in Guide ----- .0035 to .0055 Inch

CC-4

Exhaust Valve Seat Insert

Seat Angle ----- 45 Degrees
Seat Width ----- .073 to .084 Inch
Insert Height ----- .312 to .317 Inch
Outside Diameter of Insert
A401----- 1.640 to 1.641 Inches
A451 ----- 1.722 to 1.723 Inches
Inside Diameter of Insert
A401 ----- 1.323 to 1.333 Inches
A451 ----- 1.401 to 1.411 Inches
Maximum Allowable Seat Runout ----- .003 Inch as Determined
with a Dial Indicator

Intake Valves

Angle of Valve Face ----- 44 Degrees
Maximum Valve Face Runout----- .002 Inch as Determined
with a Dial Indicator.
Diameter of Valve Stem ----- .402 to .403 Inch Install New Valve
if there is More than .002 Inch Difference in
Diameter at any Point on Stem.
Inside Diameter of Valve Guide ---- .4045 to .4055 Inch.(After Assembly)
Stem Clearance in Guide----- .0015 to .0035 Inch

Intake Valve Seat

Seat Angle ----- 45 Degrees.
Seat Width
A401----- .086 to .096 Inch
A451 ----- .070 to .086 Inch

Exhaust Valve Guides

Length ----- 3-7/32 Inches
Outside Diameter ----- .7510 to .7515 Inch
Inside Diameter ----- .4045 to .4055 Inch.(After Assembly)
Valve Stem Clearance in Guide ----- .0035 to .0055 Inch
Distance Above Head Guide Must Protrude---1-1/16 Inches, Press Fit

Intake Valve Guides

Length ----- 4-3/8 Inches
Outside Diameter ----- .7510 to .7515 Inch
Inside Diameter ----- .4045 to .4055 Inch.(After Assembly)
Valve Stem Clearance in Guide ----- .0015 to .0035 Inch
Distance Above Head
Guide Must Protrude ----- 1-1/16 Inches, Press Fit

VALVE SPRINGS

Free Length ----- Approximately 2.438 Inches
Spring Pressure at Compressed Height of
1-31/64 Inches (Valve Open)----- 102 Pounds; Install New Spring if
Pressure is Less than 92 Pounds.
Spring Pressure at Compressed Height of
1-15/16 Inches(Valve Closed)---45 Pounds; Install New Spring if Pres-
sure is Less than 41 Pounds.

ROCKER ARM ASSEMBLY

Rocker Arm Bushing ----- Replaceable Precision Bronze Bushing
Number of Bushings ----- 12
Lubrication ----- Pressure Lubricated; Crankcase Oil to
Rocker Arms Metered By Camshaft.
Oil Holes in Rocker Arm Shaft -----Oil Holes must Face Push Rod
Side of Engine Only. Shaft Cannot Be Rotated.
Positioning of Exhaust
Valve Rocker Arms ----- Spacer Washers Position Exhaust Valve
Rocker Arm and Eliminate End Play without Binding.

Outside Diameter of
Rocker Arm Shaft ----- .872 to .873 Inch

Inside Diameter of Rocker
Arm Bushing ----- .8745 to .8755 Inch

OIL PUMP

Type ----- Positive Displacement, Gear Type Pump;
Driven Off Camshaft.

Pressure Relief Valve -----Maintains 40 to 45 Pounds Full Pres-
sure(Oil Warm,Engine Operating at Full Gov-
erned Speed)Relief Valve is Adjustable.

WATER PUMP AND THERMOSTAT

Type of System -----Pressurized Thermostat Controlled
By-Pass Type; Forced Circulation(Pump)

Type Pump ----- Impeller Vane Type

Radiator ----- Heavy Duty Fin and Tube Type

Temperature Control ----- By-Pass Type Thermostat

FUEL SYSTEM

Injection Pump -----Robert Bosch,Type PES Multiple Plunger Pump

Direction of Pump Rotation ----- Counter-Clockwise

Pump Mounting ----- Left Hand Side of Engine

Pump Drive----- Gear Driven from Camshaft Gear at Camshaft Speed

Injection Pump Drive Lubrication ----- Pressure Lubricated From
Front Camshaft Bearing.

Injection Pump Drive Shaft Diameter ----- 1.3700 to 1.3705 Inches

Normal Clearance Between
Drive Shaft and Bushings ----- .001 to .002 Inch

Number of Drive
Shaft Bushings -----2- These Bushings are Not Re-
placeable. A Replacement Drive Housing with
Bushings in Place Aligned and Fine Bored is Provided.

Injection Pump Drive
Shaft End Play ----- Automatically Taken Up By a Spring
Loaded Thrust Button on Front End of Drive Shaft.
Thrust Washers Provided Between Front Drive Gear
and Drive Shaft Housing.

Thrust Washer

Outside Diameter ----- 2.085 to 2.105 Inches

Inside Diameter ----- 1.3725 to 1.3825 Inches

Thickness ----- .1225 to .1275 Inch

Timing Marks on Engine----- Timing Marks Located on Crankshaft
Pulley Flange(0 through 5 and 20 through 35
Degrees Before Top Dead Center). Pointer
Located on Timing Gear Cover.

Fuel Injectors ----- Robert Bosch Pintle Type;Opening Pressure
1950 to 2050 Pounds Per Square Inch.

Governor ----- Mechanical Variable Speed Fly-Weight Centrifugal
Type; Integral Part of Injection Pump.

Fuel Filters

Fuel Tank Breather Air Filter -----Located in Fuel Tank Filler Cap

Fuel Tank Water Trap ----- Located in Base of Fuel Tank

1st Stage Fuel Filter ----- Replaceable Element Type

2nd Stage Fuel Filter ----- Replaceable Element Type

Final Fuel Filter ----- Replaceable Sealed "Can"Type Filter.

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