



Caterpillar

Service Manual

D353

Engine

S/n 46B3984 & Up

47B2731 & Up

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Service Manual

CT-S-ENG D353

D353 INDUSTRIAL AND MARINE ENGINES

SERIAL NUMBERS
46B3984-UP
47B2731-UP

SPECIFICATIONS

SYSTEMS OPERATION

TESTING AND ADJUSTING

ATTACHMENT SPECIFICATIONS

ATTACHMENTS

GENERAL INSTRUCTIONS (D & A)

DISASSEMBLY AND ASSEMBLY
(Industrial Engine 46B3984-UP)

7231 MARINE TRANSMISSION

MG-521 MARINE TRANSMISSION

CLICK ANYWHERE FOR MORE DETAILS

CLICK ANYWHERE FOR MORE DETAILS

INTRODUCTION

The specifications given in this book are on the basis of information available at the time the book was written. These specifications give the torques, operating pressure, measurements of new parts, adjustments and other items that will affect the service of the product.

When the words “use again” are in the description, the specification given can be used to determine if a part can be used again. If the part is equal to or within the specification given, use the part again.

When the word “permissible” is in the description, the specification given is the “maximum or minimum” tolerance permitted before adjustment, repair and/or new parts are needed.

A comparison can be made between the measurements of a worn part, and the specifications of a new part to find the amount of wear. A part that is worn can be safe to use if an estimate of the remainder of its service life is good. If a short service life is expected, replace the part.

NOTE: The specifications given for “use again” and “permissible” are intended for guidance only and Caterpillar Tractor Co. hereby expressly denies and excludes any representation, warranty or implied warranty of the reuse of any component.

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CLICK ANYWHERE FOR MORE DETAILS

FUEL INJECTION EQUIPMENT

Firing order (injection sequence) 1, 5, 3, 6, 2, 4
Injection timing before TC (top center) 12 ± 1°

- (1) Length of pump plunger 2.9834 ± .0015 in. (75.778 ± 0.038 mm)
Minimum permissible length 2.9769 in. (75.613 mm)
- (2) Timing dimension for the fuel injection pumps:
On engine (piston at top center) 2.090 ± .002 in. (53.09 ± 0.05 mm)
Off engine 2.1565 ± .0005 in. (54.775 ± 0.013 mm)
- (3) Torque for bolt* 32 ± 5 lb. ft. (43 ± 7 N·m)
*Put 8H5137 Sealer on bolt threads.
- (4) Diameter of the fuel rack6095 ± .0005 in. (15.481 ± 0.013 mm)
Bore in bearing for the rack6125 ± .0015 in. (15.558 ± 0.038 mm)
Maximum permissible clearance between bore in the bearings and the rack006 in. (0.15 mm)
- (5) 3S1252 Spring:
Length under test force 1.73 in. (43.9 mm)
Test force 19 to 21 lb. (85 to 95 N)
Free length after test 1.98 in. (50.3 mm)
Outside diameter 1.14 in. (29.0 mm)
- (6) Bore in bearings for the camshaft 2.4455 ± .0005 in. (62.116 ± 0.013 mm)
Diameter of bearing surface (journal) of the camshaft 2.4425 ± .0005 in. (62.040 ± 0.013 mm)
Maximum permissible clearance between bearing and bearing surface (journal) of camshaft006 in. (0.15 mm)
- (7) Torque for nut for camshaft 35 to 45 lb. ft. (45 to 60 N·m)
- (8) Torque for nut that holds fuel lines 30 ± 5 lb. ft. (40 ± 7 N·m)
- (9) Torque for nuts that hold nozzles 105 ± 5 lb. ft. (142 ± 7 N·m)
- (10) Body.
- (11) Torque for glow plugs 9 ± 1 lb. ft. (12 ± 1 N·m)
- (12) Tighten nozzle finger tight in body.
- (13) Torque for precombustion chamber (Apply 9M3710 Anti-Seize Compound on threads) 225 ± 15 lb. ft. (300 ± 20 N·m)



NOTE: See Glow Plug Positioning.

NOTE: FOR TORQUE VALUES NOT GIVEN, SEE THE FIRST PAGE OF SPECIFICATIONS FOR GENERAL TIGHTENING TORQUES

GOVERNOR (EARLIER)

- (1) Bore in spring retainer bearing $.747 \pm .001$ in. (18.97 ± 0.03 mm)

Diameter of bearing surface $.741 \pm .001$ in. (18.82 ± 0.03 mm)

- (2) 9F7651 Spring for governor:

Put force on spring of 25 lb. (110 N)

Then add more force to make spring shorter by $.625$ in. (15.88 mm)

Total test force 115.6 ± 2.5 lb. (514.5 ± 11.0 N)

Free length after test 2.625 in. (66.68 mm)

Outside diameter 2.121 in. (53.87 mm)

- (2) 1H5646 Spring for governor (3% Regulation at 1000 rpm):

Put force on spring of 25 lb. (110 N)

Then add more force to make spring shorter by $.625$ in. (15.88 mm)

Total test force 76.9 to 79.4 lb. (341.5 to 353.0 N)

Free length after test 2.75 in. (69.9 mm)

Outside diameter 2.086 in. (52.98 mm)

- (2) 4H7390 Spring for governor (3% Regulation at 1200 rpm):

Put force on spring of 25 lb. (110 N)

Then add more force to make spring shorter by $.625$ in. (15.88 mm)

Total test force 95.2 ± 1.70 lb. (423.0 ± 7.55 N)

Free length after test 2.689 in. (68.30 mm)

Outside diameter 2.099 in. (53.31 mm)

- (2) 9F7653 Spring for governor (10% Regulation at 1200 to 1250 rpm)

Put force on spring of 25 lb. (110 N)

Then add more force to make spring shorter by $.625$ in. (15.88 mm)

Total test force 101.2 to 105 lb. (450.3 to 467 N)

Free length after test $2.75 \pm .03$ in. (69.9 ± 0.8 mm)

Outside diameter 2.106 in. (53.49 mm)

- (2) 9F7650 Spring for governor:

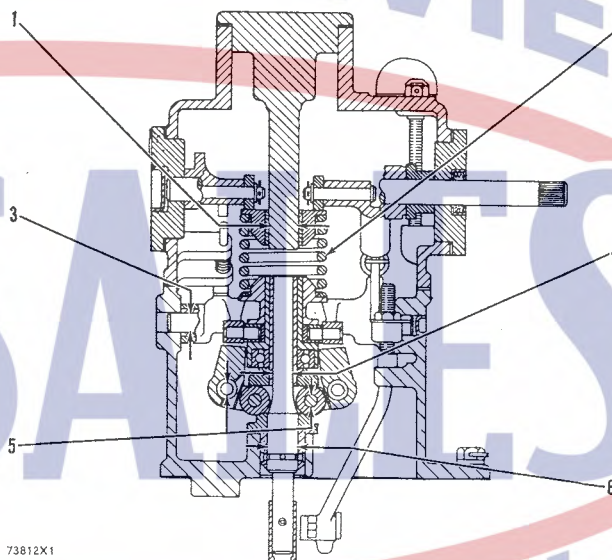
Put force on spring of 25 lb. (110 N)

Then add more force to make spring shorter by $.625$ in. (15.88 mm)

Total test force 128.7 to 133.7 lb. (572.5 to 595.5 N)

Free length after test 2.72 in. (69.1 mm)

Outside diameter 2.160 in. (54.86 mm)



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- (3) Diameter of shaft for rack lever $.5003 \pm .0002$ in. (12.708 ± 0.005 mm)

Bore in bearing for shaft for rack lever $.5040 \pm .0005$ in. (12.802 ± 0.013 mm)

Bore in bearing for shaft in opposite side of rack lever $.5027 \pm .0003$ in. (12.769 ± 0.008 mm)

- (4) Diameter of upper bearing surface of spindle $.4918 \pm .0002$ in. (12.492 ± 0.005 mm)

- (5) Diameter of the pins for the weights and rollers $.3126$ to $.3129$ in. (7.940 to 7.948 mm)

Diameter of rollers for the weights $.748$ to $.750$ in. (19.00 to 19.05 mm)

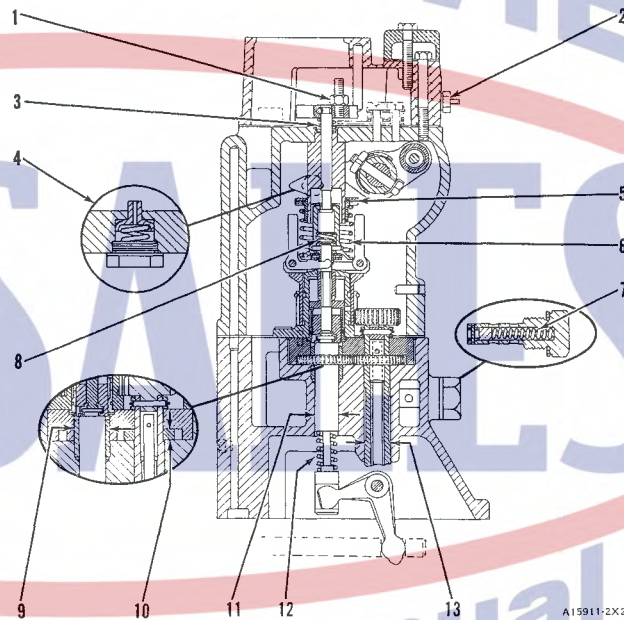
- (6) Diameter of spindle bearing surface for the lower bearing $.7493 \pm .0003$ in. (19.032 ± 0.008 mm)

Bore in lower bearing ... $.7507 \pm .0003$ in. (19.068 ± 0.008 mm)

NOTE: FOR TORQUE VALUES NOT GIVEN, SEE THE FIRST PAGE OF SPECIFICATIONS FOR GENERAL TIGHTENING TORQUES

GOVERNOR (LATER)

- (1) Torque for nut 9 ± 3 lb. ft. (12 ± 4 N·m)
- (2) Torque for nut 40 ± 5 lb. in. (4.5 ± 0.6 N·m)
- (3) 9L6422 Spring for collar guide:
 Length under test force $.430$ in. (10.92 mm)
 Test force $.35 \pm .03$ lb. (1.55 ± 0.11 N)
 Free length after test 1.12 in. (28.4 mm)
 Outside diameter $.370$ in. (9.40 mm)
- (4) Torque for plug 27 ± 5 lb. ft. (38 ± 7 N·m)
 7M7244 Spring for speed limiter:
 Length under test force $.49$ in. (12.4 mm)
 Test force $1.48 \pm .14$ lb. (6.6 ± 0.62 N)
 Free length after test 2.00 in. (50.8 mm)
 Outside diameter $.507$ in. (12.88 mm)
- (5) NOTE: 2P9556 Washer must be assembled between the two wave washers 2N828.
- (6) 9L6448 Spring for governor:
 Color code is one green and one yellow stripe
 Put force on spring of 6.5 lb. (29 N)
 Then add more force to make
 spring shorter by $.900$ in. (22.86 mm)
 Test force $16.6 \pm .30$ lb. (74 ± 1.35 N)
 Free length after test $2.24 \pm .03$ in. (56.9 ± 0.8 mm)
 Outside diameter $1.387 \pm .015$ in. (35.23 ± 0.38 mm)
- (7) 7L8696 Spring for bypass valve:
 Length under test force 1.13 in. (28.7 mm)
 Test force $7.22 \pm .4$ lb. (32.1 ± 1.8 N)
 Free length after test $1.370 \pm .010$ in. (34.80 ± 0.25 mm)
 Outside diameter $.290$ in. (7.37 mm)
- (8) 9M6303 Spring:
 Length under test force $.180$ in. (4.57 mm)
 Test force $10.0 \pm .5$ lb. (45 ± 2.2 N)
 Free length after test $.344$ in. (8.74 mm)
 Outside diameter $.480$ in. (12.19 mm)
- (9) Outside diameter
 of bearing $.8110 \pm .0003$ in. (20.599 ± 0.008 mm)
 Inside diameter
 of gear $.8130 \pm .0005$ in. (20.650 ± 0.013 mm)
- (10) Height of gears $.2500 \pm .0003$ in. (6.350 ± 0.008 mm)
 Depth of counterbore .. $.2515 \pm .0003$ in. (6.388 ± 0.008 mm)
- (11) Outside diameter of pin $.6235 \pm .0005$ in. (15.837 ± 0.013 mm)
 Diameter of bore $.6255 \pm .0005$ in. (15.888 ± 0.013 mm)

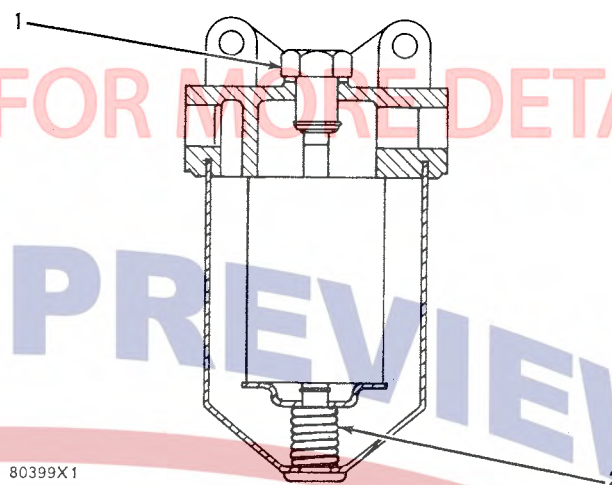


- (12) 7L8695 Spring for link:
 Length under test force 1.50 in. (38.1 mm)
 Test force $9.02 \pm .45$ lbs. (40.1 ± 2.0 N)
 Free length after test 2.32 in. (58.9 mm)
 Outside diameter $.46$ in. (11.7 mm)
- (13) Outside diameter
 of shaft $.6860 \pm .0005$ in. (17.424 ± 0.013 mm)
 Diameter of bore $.6880 \pm .0005$ in. (17.475 ± 0.013 mm)

NOTE: FOR TORQUE VALUES NOT GIVEN, SEE THE FIRST
 PAGE OF SPECIFICATIONS FOR GENERAL TIGHTENING TORQUES

PRIMARY FUEL FILTER

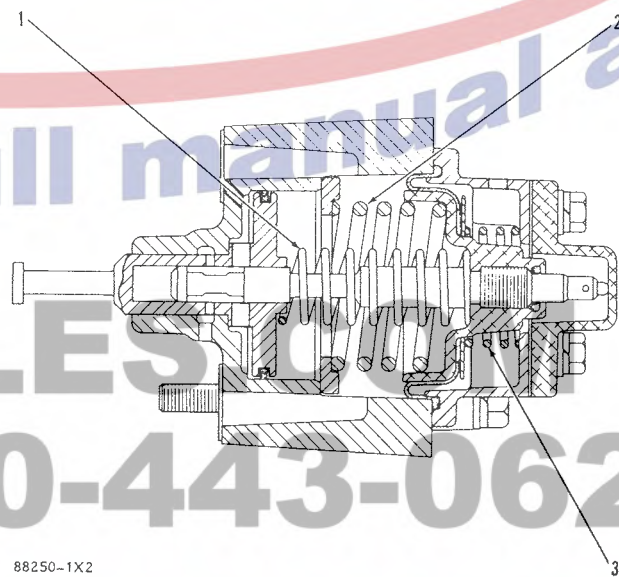
- (1) Tighten nut to 18 ± 3 lb. ft. (24 ± 4 N·m)
- (2) 7S9323 Spring:
- | | |
|-------------------------|---------------------------------|
| Length under test force | 1.10 in. (27.9 mm) |
| Test force | 27.7 to 32.3 lb. (123 to 144 N) |
| Free length after test | 1.68 in. (42.7 mm) |
| Outside diameter | .682 in. (17.32 mm) |



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HYDRAULIC AIR-FUEL RATIO CONTROL

- (1) 6N515 Spring:
- | | |
|-------------------------|---------------------------------------|
| Color code | One yellow stripe |
| Length under test force | 1.81 in. (46.0 mm) |
| Test force | $6.84 \pm .4$ lb. (30.5 ± 1.8 N) |
| Free length after test | 2.95 in. (74.9 mm) |
| Outside diameter | .810 in. (20.57 mm) |
- (2) 6N514 Spring:
- | | |
|-------------------------|--------------------------------------|
| Color code | One yellow stripe |
| Length under test force | 1.27 in. (32.3 mm) |
| Test force | 19.8 ± 2 lb. (88.0 ± 9.0 N) |
| Free length after test | 1.49 in. (37.8 mm) |
| Outside diameter | 1.788 in. (45.42 mm) |
- (2) 7N209 Spring:
- | | |
|-------------------------|--------------------------------------|
| Color code | Two yellow stripes |
| Length under test force | 1.27 in. (32.3 mm) |
| Test force | 19.8 ± 2 lb. (88.0 ± 9.0 N) |
| Free length after test | 1.49 in. (37.8 mm) |
| Outside diameter | 1.788 in. (45.42 mm) |
- (3) 6N513 Spring:
- | | |
|-------------------------|---------------------------------------|
| Color code | One yellow stripe |
| Length under test force | .55 in. (14.0 mm) |
| Test force | 26.9 ± 2 lb. (119.5 ± 9.0 N) |
| Free length after test | 1.22 in. (31.0 mm) |
| Outside diameter | 1.281 in. (32.54 mm) |



88250-1X2