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***FiatTrattori***  
**FIAT**

**805 C**

***SERVICE***  
***DIRECTIONS***

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**S E R V I Z I O   A S S I S T E N Z A   T E C N I C A   E   R I C A M B I**

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# **FiatTrattori**

## **FIAT**

# **805 C**

## **SERVICE DIRECTIONS**

### **SUBJECT INDEX**

Section

<b>INDEX</b>	—
<b>GENERAL SPECIFICATIONS</b>	00
<b>ENGINE</b>	10
<b>TRANSMISSION</b>	20
<b>UNDERCARRIAGE</b>	30
<b>HYDRAULIC LIFT PLANT</b>	40
<b>ELECTRICAL SYSTEM</b>	50
<b>SERVICE TOOLS</b>	90

**IMPORTANT**

**The wear limits shown for certain items are to be  
considered as recommended values and they are  
not binding.**

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## P R E F A C E

- This manual is divided in sections marked with two digits numbers (i.e. 00 - 10, etc.) and having an independent page numbering within each section.
- The subject matter can be easily located in the index reported below.
- Each page reports at the bottom right hand side the print number and printing date.
- The sheets object of future updating will be identified by the same print number followed by a capital letter (i.e. 1st up-dating No. 603.54.173/A, etc.) and the new date of issue.

These sheets will be sent together with the index reprint, suitably updated.

## I N D E X

<b>Page</b>	<b>30 - UNDERCARRIAGE</b>				
<b>00-GENERAL SPECIFICATIONS</b> 1-2-3-4	XI-1975	<b>General specifications</b>	<b>Page</b>		
Transmission layout . . . . .	2	Track chains . . . . .	1		
Fill-up data . . . . .	4	Track recoil system . . . . .	1		
<b>10 - ENGINE</b>					
<b>General specifications</b>					
Cylinder block - Cylinder head . . . . .	1	Idlers and track rollers . . . . .	2		
Crank gear . . . . .	2-3-4-5	Carrier rollers . . . . .	2		
Phasing of counterbalance weights . . . . .	5	Suspensions and track frame connections . . . . .	2		
Timing . . . . .	6-7	Torque specifications . . . . .	3		
Lubrication - Cooling . . . . .	7	<b>Illustrations and adjustments</b>			
Injection pump test data . . . . .	8	Wheels sections . . . . .	4		
Engine power output data . . . . .	9	Dimensions and profiles . . . . .	5		
Torque specifications . . . . .	10	<b>40 - HYDRAULIC LIFT PLANT</b>			
<b>Illustrations</b>					
Engine longitudinal section . . . . .	11	Hydraulic pump . . . . .	1		
Lubrication system diagram . . . . .	12	Power lift . . . . .	2		
<b>20 - TRANSMISSION</b>					
<b>General specifications</b>					
Master clutch . . . . .	1-2	Auxiliary control valve . . . . .	3		
Gearbox - Reduction unit . . . . .	3-4	Torque specifications . . . . .	3		
Bevel gear . . . . .	4	<b>Illustrations and adjustments</b>			
Steering clutches . . . . .	5-6	Lift leverage operation . . . . .	4		
Brakes . . . . .	6-7	Hydraulic lift adjustments . . . . .	4		
Final drives . . . . .	7	Hydraulic operation of the lift and auxiliary control valve . . . . .	5		
P.T.O. . . . .	7-8	<b>50 - ELECTRICAL SYSTEM</b>			
Belt pulley . . . . .	8	<b>General specifications</b>			
Torque specifications . . . . .	9	Battery charging plant . . . . .	1		
<b>Illustrations and adjustments</b>					
Transmission longitudinal section . . . . .	11	Starting motor . . . . .	2		
Master clutch diagram . . . . .	11	Battery . . . . .	3		
Master clutch adjustment . . . . .	11	Fuses . . . . .	3		
Setting of belt pulley bevel gear . . . . .	11	Lighting and warning equipment . . . . .	3		
Bevel gear setting . . . . .	12	Light and starting switch . . . . .	4		
Rear transmission section . . . . .	13	Starter and starting aid switch . . . . .	4		
Setting of the sprocket tapered roller bearings . . . . .	13	Wiring diagram . . . . .	5		
Setting of steering clutches . . . . .	14	<b>90 - SERVICE TOOLS</b>			
Brakes adjustment . . . . .	14	1-2-3	XI-1975		



**IDENTIFICATION DATA**

Technical designation . . . . . 607.700  
Engine type . . . . . CO 3/75 V.50

**PERFORMANCE AND WEIGHT**

Engine nominal output . . . . . 80 HP  
Weight in working order (with ballast) 5,150 kg  
(11,354 lb)

**Speeds**

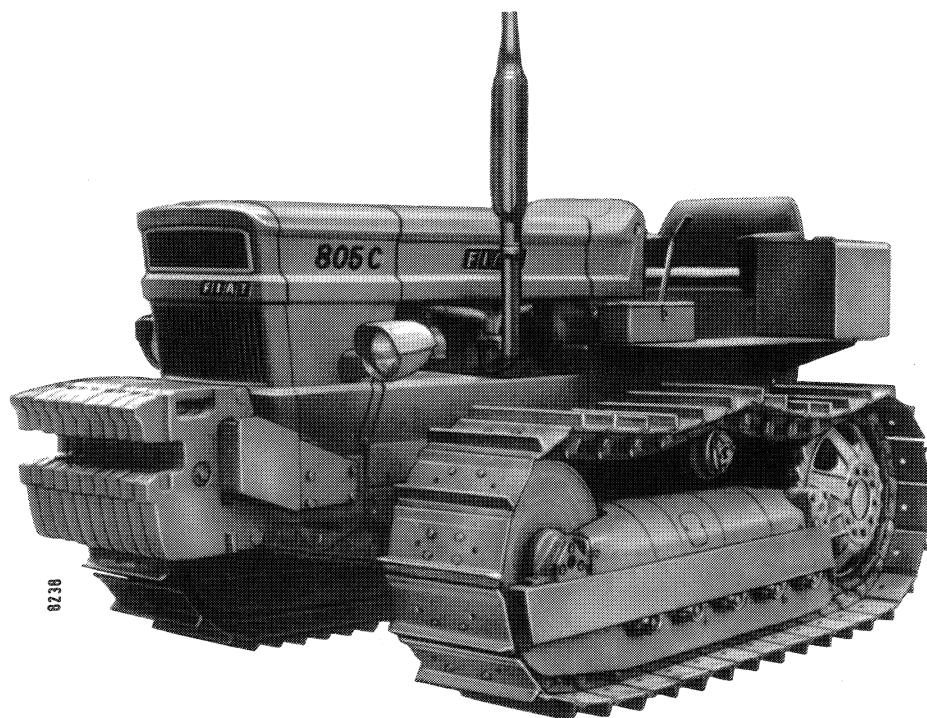
1st Forward . . . . .	2.5 KPH (1.55 MPH)
2nd » . . . . .	3.6 KPH (2.23 MPH)
3rd » . . . . .	4.5 KPH (2.79 MPH)
4th » . . . . .	5.5 KPH (3.41 MPH)
5th » . . . . .	7.9 KPH (4.90 MPH)
6th » . . . . .	10.1 KPH (6.27 MPH)
1st Reverse . . . . .	2.9 KPH (1.8 MPH)
2nd » . . . . .	6.5 KPH (4.03 MPH)

**ENGINE**

Diesel, 4-stroke cycle, direct injection.  
Number of cylinders . . . . . 4  
Bore and stroke . . . . . 110 x 120 mm  
(4.330 x 4.724 in)  
Piston displacement . . . . . 4,562 cm<sup>3</sup>  
(278.4 cu.in)  
Compression ratio . . . . . 17 : 1  
Maximum power speed . . . . . 2,100 rpm  
Quantity of main bearings . . . . . 5  
Counterbalance weights type vibration damper.

**Timing**

O.H.V. with camshaft in crankcase.  
Intake { beginning . . . . . 10° before T.D.C.  
end . . . . . 54° after B.D.C.  
Exhaust { beginning . . . . . 54° before B.D.C.  
end . . . . . 10° after T.D.C.  
Valve gap for timing check . . . 0.25 mm (.010 in)  
Operating valve gap (cold and hot engine):  
— intake . . . . . 0.25 mm (.010 in)  
— exhaust . . . . . 0.30 mm (.011 in)



**Feeding**

Air filtration is ensured by an oil-bath air filter fitted with centrifugal pre-cleaner.

Fuel feeding is ensured by:

- double diaphragm lift pump, cam actuated;
- CAV distributor type fuel injection pump, type DPA 3342 F 030 with in-built mechanical governor and automatic timing device;
- fuel supply pressure at pump inlet: 0.2 kg/cm<sup>2</sup> (2.8 psi).

Fuel filtration by means of a strainer on lift pump and two cartridge type filters in series on the delivery line to the injection pump (the first filter incorporates a water separator).

Fixed advance for beginning of injection before T.D.C. . . . . 18°

Injection order . . . . . 1-3-4-2

Pressure setting of injectors . 195 to 205 kg/cm<sup>2</sup> (2770 to 2915 psi)

**Lubrication**

Forced-flow system with gear pump and strainer on suction line; full-flow filtration on delivery line by paper cartridge filter, fitted with by-pass valve (differential pressure 1 to 1.2 kg/cm<sup>2</sup> (14 to 17 psi)).

A pressure relief valve is fitted on the filter body:

- lubricating pressure at rated speed 4.5 to 5 kg/cm<sup>2</sup> (64 to 71 psi)

Engine/oil pump rpm ratio . . . . . 1 : 1.454

A warning light (red) on the dash-board indicates abnormal lube oil pressure.

**Cooling**

Water forced flow circulated by centrifuge pump, vertical tubelets radiator and sucking fan.

Water temperature is controlled by a thermostat checking the water flow into the radiator.

Thermostat specifications:

- opening temperature . 83 ± 2° C (177 to 185° F)
- maximum opening temperature 94° C (201° F)

The temperature is shown by an electrical temperature gauge fitted on the dash-board.

**Tacho-hourmeter**

Mechanical type, controlled by timing gears:

- engine/P.T.O. ratio . . . . . 2 : 1
- engine speed referred to the hour-meter . . . . . 1,800 rpm

**TRANSMISSION**

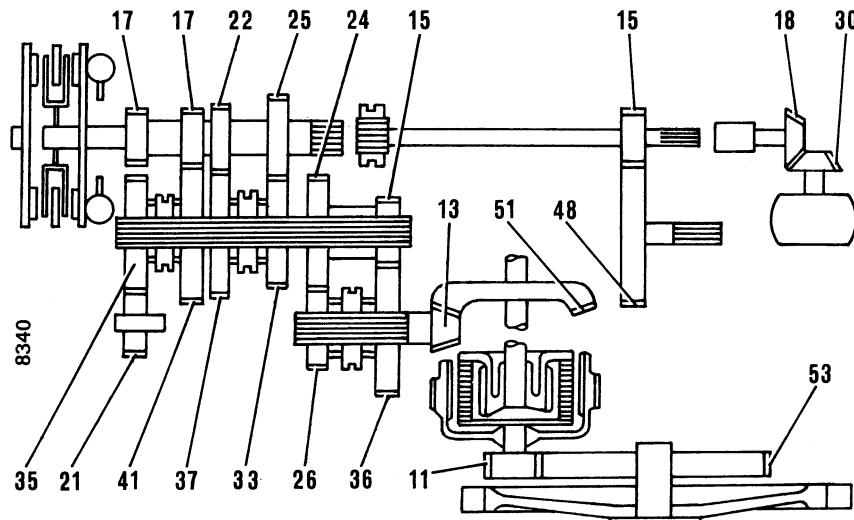
12" dual plate master clutch, oil bath over center type engagement with mechanical hand lever control.

Gearbox with reduction unit incorporated, constant mesh elliptic gears actuated by sliding sleeves: 6 forward and 2 reverse speeds.

Gearbox and reduction unit controlled by two separate levers.

Gearbox and P.T.O. lube oil pump fitted in the transmission housing.

Bevel gear type main reduction and single reduction spur gear final drives.

**Transmission layout**

Dry-type multiple disc steering clutches mechanically controlled, actuated by two hand levers.

Band type brakes actuated by two lateral pedals and parking brake actuated by a hand lever.

Overall speed reduction ratio at drive sprockets.

#### Overall speed reduction ratio at drive sprockets:

s p e e d s				
	1st	2nd	3rd	Reverse
Low range 1 :	109.410	76.296	59.882	99.399
Normal range 1 :	49.386	34.439	27.030	42.159

#### UNDERCARRIAGE - SUSPENSIONS

Track frames each fitted with 5 track rollers and 1 carrier roller.

Idlers, track rollers and carrier rollers life-time lubricated.

Quantity of shoes per track . . . . . 36

Shoes width . . . . . { 400 - 500 mm  
(15  $\frac{3}{4}$  - 19  $\frac{11}{16}$  in)

Ground contact area:

— with 15  $\frac{3}{4}$ " (400 mm) shoes 14,240 cm<sup>2</sup> (2,202 sq.in)  
— with 19  $\frac{43}{64}$ " (500 mm) shoes 18,300 cm<sup>2</sup> (2,831 sq.in)

Ground pressure:

— with 15  $\frac{3}{4}$ " (400 mm) shoes . 0.35 kg/cm<sup>2</sup> (4.9 psi)  
— with 19  $\frac{43}{64}$ " (500 mm) shoes 0.29 kg/cm<sup>2</sup> (4.1 psi)

Track tension adjustment . . . . . mechanical

Rear suspension by means of oscillating beam resting on track frames with lubricated bushes allowing for the independent oscillation of the track frames.

Front suspension by means of transversal leaf spring.

#### DRIVE TAKE OFF

Rotation (from rear end) . . . . . anticlockwise

Speed . . . . . same as engine

Control . . . . . hand lever

#### POWER TAKE-OFF (540 rpm)

Rotation . . . . . clockwise

Speed (with engine at 1,728 rpm) . . . . . 540 rpm

Speed (with engine at 2,100 rpm) . . . . . 656 rpm

Splined shaft { diameter . . . . . 1  $\frac{3}{8}$  in  
splines . . . . . 6

Hand lever control (same as for drive take-off).

#### BELT PULLEY

Pulley diameter . . . . . 280 or 320 mm (11.02 or 12.6 in)

Rim width . . . . . 175 mm (6.9 in)

Angular speed at engine maximum power speed (2,100 rpm) . . . . . 1260 rpm

Corresponding linear speed:

— with 280 mm (11.02 in) pulley diam.: 18.5 m/sec (60.7 ft.sec)

— with 320 mm (12.6 in) pulley diam.: 21.1 m/sec (69.22 ft.sec)

#### HYDRAULIC LIFT

With incorporated single effect cylinder.

Operation . . . . . position control

Gear type pump driven directly from timing gears, mod. Plessey A 25 X.

Independent hydraulic circuit.

Category of the three point linkage: 2nd and 3rd.

Nominal lifting capacity, max. stroke and max. lifting load at arm ends (see page 2, section 40).

#### ELECTRICAL SYSTEM

Voltage . . . . . 12 V

Alternator 32 Amp. max. current Fiat model . . . . . A 12 M 124/12/42 X

Voltage regulator FIAT model . . . . . RC 2/12 B

Starter motor, 4 HP Marelli model . . . . . MT 62 BA

No. 1 battery with following specifications:

— Marelli type . . . . . 6 ATP 27

— Titano type . . . . . 6 DE 12 F

— nominal tension . . . . . 12 V

— nominal capacity { Marelli . . . . . 143 amp. hr.  
Titano . . . . . 136 amp. hr.

Front head light, 130 mm (5  $\frac{1}{8}$  in) diameter, equipped with 45/40 W bulbs and rear flood light equipped with 35 W bulb and built-in switch.

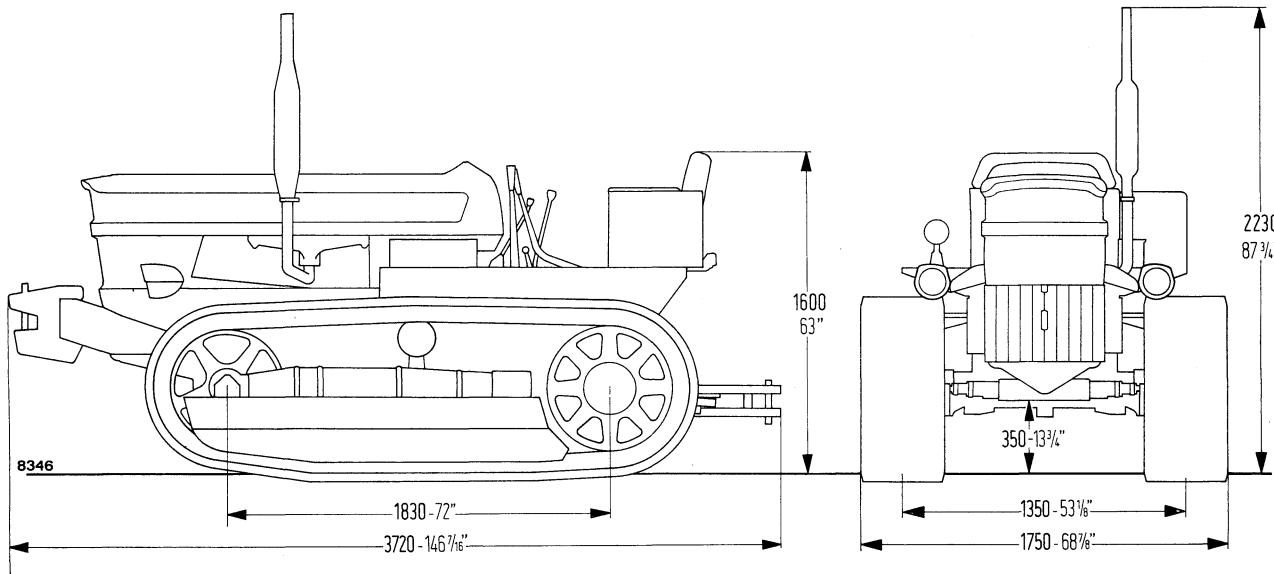
Circuit protection by 7, 8 Amp fuses.

One dash-board light and battery charge indicator light (5 W bulb).

Charge indicator relay protected by a fuse.

Six position light and starting switch and starter push button or 4 position pre-heater and starting switch.

The starter motor, alternator circuit and pre-heater plugs are unprotected.



## FILL UP DATA

ITEMS	FIAT type	LUBRICANTS		International Specifications
		kg	Imp. Gal.	
Engine sump, filter and lines		14	3.4	
Engine sump and filter . . .		12.1	2.7	
Engine sump only . . . . .	« <b>oliofiat AMBRA 20 W/40</b> » oil for temperature above 0° C (32° F)	11.5	2 3/4	multigrade de- tergent oil, level « <b>MIL-L-2104 B</b> » with characteri- stics « <b>EP</b> »
Air filter (*) . . . . .		0.75	.75 qt	
Master clutch . . . . .	« <b>oliofiat AMBRA 10 W/30</b> » oil for temperature below 0°C (32°F)	8	7 3/4 qt	
Hydraulic lift . . . . .		8	7 3/4 qt	
Auxiliary hydraulic system .		16.5	4	
Rollers and idlers . . . . .	« <b>oliofiat AMBRA 20 W/40</b> » oil	2	1/2	
Transmission housing . . .		21	5	oil level « <b>MIL-L-2105 B</b> » ( <b>SAE 90-EP</b> )
Final drives (each) . . . . .	« <b>oliofiat AW 90/M</b> » oil	4	.9	
Belt pulley . . . . .		0.9	1/4	
Grease nipples . . . . .	« <b>grassofiat G 9</b> » grease	—	—	consistency NLGI 2
Capacity of:				
— engine cooling system (water) . . . . .				
— fuel tanks { main . . . . .				17.6 lt (3.87 Imp. Gal.)
— fuel tanks { supplementary . . . . .				80 lt (17.6 Imp. Gal.)
				48 lt (10.5 Imp. Gal.)

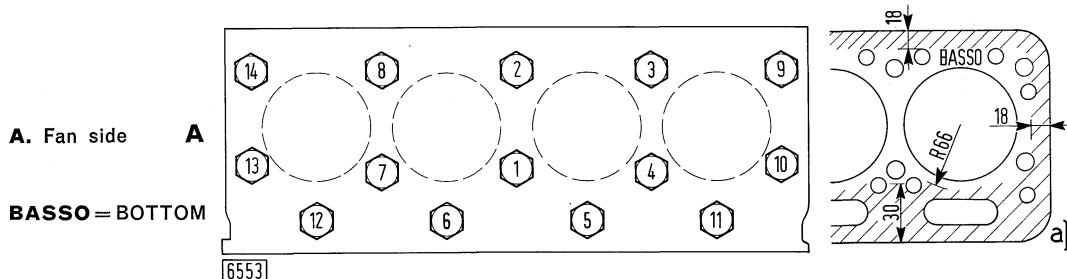
(\*) Replace the oil in the air cleaner should it be excessively dirty or a deposit about 1 cm (1/2 in) high be found in the bowl.

**CYLINDER BLOCK - CYLINDER HEAD**

DESCRIPTION	mm	in
<b>Cylinder block</b>		
Diameter of cylinder liner bores on cylinder block . . . . .	118.000 to 118.035	4.6456 to 4.6469
Outside diameter of liners . . . . .	117.920 to 117.970	4.6425 to 4.6444
Fit clearance between liners and their seats on cylinder block	0.030 to 0.115	.00118 to .0045
Bore of cylinder liners . . . . .	110.000 to 110.022	4.3307 to 4.3315
Max. admissible out-of-round or taper of liners due to wear (1)	0.15	.0059
Oversize on cylinder liner bore . . . . .	0.6	.0236
Extension of cyl. liners above cyl. block . . . . .	0.15 to 0.18	.0058 to .0070
Max. permissible difference of extension among liners . . .	0.03	.0011
Thickness of liner adjustment shims . . . . .	0.05-0.075-0.10	.0019-.0029-.0039
Diameter of camshaft journal seats on cyl. block . . . . .	49.555 to 49.590	1.9312 to 1.9326
Diameter of tappet seats . . . . .	27.000 to 27.033	1.0630 to 1.0643
Oversize range of spare tappets . . . . .	0.2-0.4	.0078-.0157
Diameter of crankshaft main bearing seats . . . . .	80.626 to 80.646	3.1742 to 3.1750
<b>Cylinder head</b>		
Diameter of standard valve guide seats on cyl. head . . . . .	14.000 to 14.018	.5512 to .5582
Oversize range of spare valve guides . . . . .	0.08	.0031
Valve seat angle on cyl. head . . . . .	89° 50' to 90° 10'	
Protrusion of injector with respect to cyl. head lower surface	3.3 to 3.9	.1299 to .1535
Max. permissible protrusion . . . . .	4.2	.16
Valve recession with respect to cyl. head . . . . .	0.1 to 0.5	.0039 to .0196
Max. admissible recession . . . . .	0.7	.0275
Nominal height of cyl. head between machined surfaces . . .	99.80 to 100.20	3.929 to 3.968
Max. admissible thickness of material to be grinded . . . . .	0.5	.0196

(1) Measure in the direction parallel and perpendicular to the crankshaft center line in the ring working area.

**Cylinder head tightening sequence and gasket detail (a)**



**Note**

- The cross-hatched part shows the metal surface to be smeared with collant Wellseal-Jointing before assembly.
- The tightening torque value of the nuts securing the cylinder head must be reached in the following three phases: 1st phase 9 kgm (65.1 lb.ft); 2nd phase 18 kgm (130.2 lb.ft); 3rd phase 23.5 kgm (169.9 lb.ft).

# ENGINE:

## General specifications

### CRANK GEAR

DESCRIPTION	mm	in
<b>Crank gear</b>		
Diameter of main journals:		
— standard . . . . .	76.202 to 76.220	3.0000 to 3.0007
— undersized { 0.254 mm (.0100 in) . . . . .	75.948 to 75.966	2.9900 to 2.9907
0.508 mm (.0200 in) . . . . .	75.694 to 75.712	2.9800 to 2.9807
0.762 mm (.0300 in) . . . . .	75.440 to 75.458	2.9700 to 2.9707
1.016 mm (.0400 in) . . . . .	75.186 to 75.204	2.9600 to 2.9607
Thickness of main bearings:		
— standard . . . . .	2.172 to 2.178	.0854 to .0856
— undersized on inner diameter { 0.254 mm (.0100 in) . . . . .	2.299 to 2.305	.0904 to .0906
0.508 mm (.0200 in) . . . . .	2.426 to 2.432	.0954 to .0956
0.762 mm (.0300 in) . . . . .	2.553 to 2.559	.1004 to .1006
1.016 mm (.0400 in) . . . . .	2.680 to 2.686	.1054 to .1056
Clearance between bearings and main journals . . . . .	0.050 to 0.100	.0019 to .0039
Max. admissible clearance due to wear . . . . .	0.180	.00707
Diameter of con-rod journals:		
— standard . . . . .	69.860 to 69.878	2.7503 to 2.7510
0.254 mm (.0100 in) . . . . .	69.606 to 69.624	2.7403 to 2.7410
— undersized { 0.508 mm (.0200 in) . . . . .	69.352 to 69.370	2.7303 to 2.7310
0.762 mm (.0300 in) . . . . .	69.098 to 69.116	2.7203 to 2.7210
1.016 mm (.0400 in) . . . . .	68.844 to 68.862	2.7103 to 2.7110
Thickness of con-rod bearings:		
— standard . . . . .	1.886 to 1.892	.0742 to .0745
— undersized on inner diameter { 0.254 mm (.0100 in) . . . . .	2.013 to 2.019	.0792 to .0794
0.508 mm (.0200 in) . . . . .	2.140 to 2.146	.0842 to .0844
0.762 mm (.0300 in) . . . . .	2.267 to 2.273	.0892 to .0894
1.016 mm (.0400 in) . . . . .	2.394 to 2.400	.0942 to .0944
Clearance between bearings and con-rod journals . . . . .	0.058 to 0.103	.00228 to .00405
Max. admissible clearance due to wear . . . . .	0.180	.00707
Thickness of crankshaft thrust washers:		
— standard . . . . .	2.310 to 2.360	.0908 to .0928
0.101 mm (.0039 in) . . . . .	2.411 to 2.461	.0948 to .0968
— oversized { 0.254 mm (.0100 in) . . . . .	2.564 to 2.614	.1008 to .1028
0.508 mm (.0200 in) . . . . .	2.818 to 2.868	.1108 to .1128
Width of main journal support with thrust washers . . . . .	49.780 to 49.930	1.9598 to 1.9657
Length of main journal . . . . .	50.000 to 50.050	1.9685 to 1.9704
End float of crankshaft . . . . .	0.070 to 0.270	.0027 to .0106
Max. admissible end float due to wear . . . . .	0.400	.0157

## CRANK GEAR

(continued)

DESCRIPTION	mm	in
Max. out-round and tapering of main and con-rod journals after grinding . . . . .	0.01	.00039
Max. out-of-round and tapering of main and con-rod journals due to wear . . . . .	0.03	.00118
Max. permissible disalignment of main journals with crankshaft supported by end journals (total reading on dial) . . . . .	0.05	.0019
Max. tolerance on con-rod journals alignment with the crank-shaft center line . . . . .	0.25	.0098
Flywheel mounting flange alignment: — max. permissible run-out with respect to crankshaft center line with dial plunger applied on a diameter of 148 mm (5.82 in) (total reading) . . . . .	0.25	.0098
Max. out-of-round of flywheel mating seat with crankshaft with respect to main journals (total reading on dial) . . . . .	0.04	.00157
<b>Connecting rods</b>		
Diameter of con-rod small end bush seat . . . . .	44.000 to 44.025	1.7323 to 1.7332
O.D. of con-rod small end bush . . . . .	44.078 to 44.117	1.7353 to 1.7368
Fit interference between bush and con-rod small end . . . . .	0.053 to 0.117	.0021 to .0045
Bore of con-rod small end bush (after press-fitting) . . . . .	40.025 to 40.035	1.5757 to 1.5761
Diameter of bearing housing bore on con-rod big end . . . . .	73.720 to 73.735	2.9023 to 2.9029
Max. deviation from parallelism between the con-rod center lines at 125 mm (4.921 in) . . . . .	± 0.025	± .00098
Max. permissible weight difference among con-rods . . . . .	15 gr	1/2 oz.
<b>Pistons</b>		
Diameter of standard piston measured at right angle with the pin center line at 30 mm (1.18 in) from the skirt base . . . . .	109.855 to 109.875	4.3249 to 4.3257
Clearance between piston and liner . . . . .	0.125 to 0.167	.0049 to .0065
Max. permissible clearance due to wear . . . . .	0.30	.0118
Oversize of spare piston . . . . .	0.6	.0236

# **ENGINE:**

## **General specifications**

### **CRANK GEAR**

*(continued)*

DESCRIPTION	mm	in
Diameter of standard piston pin . . . . .	40.000 to 40.006	1.5748 to 1.5750
Diameter of piston pin seats on piston bosses . . . . .	40.006 to 40.012	1.5750 to 1.5752
Fitting of piston pin on piston bosses . . . . .	0.000 to 0.012	.0000 to .00047
Oversizes of spare piston pins . . . . .	0.2-0.5	.0078-.0196
Clearance between piston pin and con-rod small end bushes	0.019 to 0.035	.00074 to .00137
Max. admissible clearance due to wear . . . . .	0.100	.0039
Max. permissible weight difference among pistons fitted on the same engine . . . . .	10 g	$\frac{1}{3}$ oz.
Fit clearance between rings and their grooves (vertically):		
— 1st ring . . . . .	0.055 to 0.082	.0021 to .0031
— 2nd ring . . . . .	0.055 to 0.082	.0021 to .0031
— 3rd ring . . . . .	0.045 to 0.072	.0017 to .0027
— 4th ring . . . . .	0.045 to 0.072	.0017 to .0027
Max. admissible clearance due to wear:		
— 1st and 2nd ring . . . . .	0.30	.0118
— 3rd and 4th ring . . . . .	0.20	.0078
Ring-end gap (measured with piston fitted on liners):		
— 1st ring . . . . .	0.40 to 0.60	.015 to .023
— 2nd ring . . . . .	0.40 to 0.60	.015 to .023
— 3rd ring . . . . .	0.40 to 0.60	.015 to .023
— 4th ring . . . . .	0.30 to 0.45	.011 to .017
Max. permissible gap due to wear . . . . .	1.20	.047

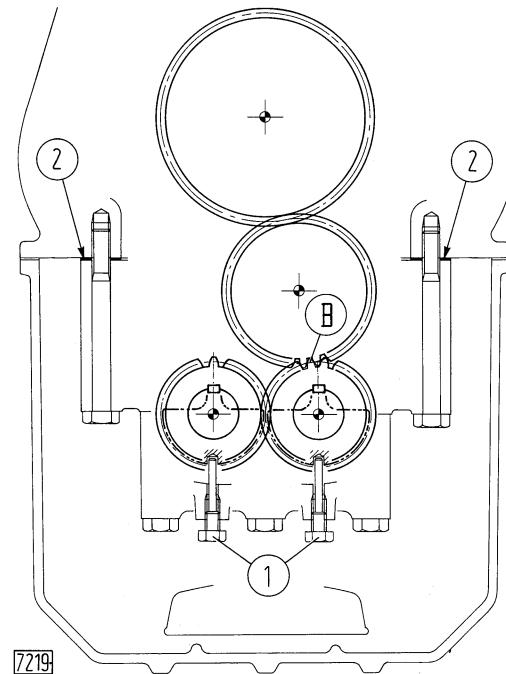
## CRANK GEAR

(continued)

DESCRIPTION	mm	in
<b>Vibration damper</b>		
Diameter of counterbalance weight pins . . . . .	34.920 to 34.935	.13748 to .13753
Diameter of bearing seats on counterbalance weights . . . . .	38.626 to 38.646	.15207 to .15215
Thickness of bearings . . . . .	1.815 to 1.822	.0714 to .0717
Clearance between counterbalance weight bearings and pins	0.047 to 0.094	.0018 to .0037
Inside diameter of counterbalance weight gears . . . . .	30.000 to 30.021	.11811 to .11819
Diameter of gear pins . . . . .	30.041 to 30.061	.11827 to .11835
Interference between pins and gears . . . . .	0.020 to 0.061	.0007 to .0024
Thickness of adjustment shims between cyl. block and weight housings . . . . .	0.05-0.10-0.15	.002-.0039-.0058
Backlash between driving weight, oil pump and crankshaft gear teeth . . . . .	0.11 to 0.17	.0043 to .0066
Backlash between counterbalance weight gear teeth . . . . .	0.12 to 0.18	.0047 to .0070

## PHASING OF COUNTERBALANCE WEIGHTS

- Position the weights with screws 1 (290965) and make sure that the weight driving and driven gears are correctly installed checking the position of the keys with respect to the teeth (driving gear key in register with an empty space of the teeth, driven gear key in register with a tooth).
- Rotate the crankshaft so as to bring No. 1 piston at T.D.C. in compression stroke.
- Secure the housing to the caps placing setting shims 2 so as to obtain a backlash of 0.11 to 0.17 mm (.0043 to .0066 in) in position B.
- Remove screws 1.



7219

## **TIMING**

**TIMING**

(continued)

DESCRIPTION	mm	in
Diameter of valve head: — intake . . . . . — exhaust . . . . .	42.700 to 43.000 36.200 to 36.500	1.6811 to 1.6929 1.4252 to 1.4370
Seating surface angle on valve . . . . .	$45^\circ 10' {}^{+0}_{-10'}$	
Max. out-of-round of valve head on one complete turn guiding the valve by the stem, with the indicator plunger set on center of sealing surface . . . . .	0.04	.0015
Min. cam lift: intake and exhaust . . . . . Real cam lift: intake and exhaust . . . . . Valve recession below cyl. head surface . . . . .	7.300 12.512 See page 1	.2874 .4925
Specifications of intake and exhaust valves spring: Free length . . . . . Test length under a load of 22.5 to 24.9 kg (50 to 55 lbs) . . . . . Test length under a load of 61.1 to 67.5 kg (134 to 150 lbs) . . . . .	49.3 42 29.5	1.940 1.653 1.161

**LUBRICATION AND COOLING**

<b>Oil pump</b>		
Make and type . . . . .		
Drive . . . . .		FIAT, gear crankshaft gears
Engine/pump ratio . . . . .		1 : 1.454
Normal lube pressure, with engine at operating temperature and max. rpm . . . . .	4.8 to 5.2 kg/cm <sup>2</sup> 5 kg/cm <sup>2</sup>	68.2 to 73.9 psi 71 psi
Pressure relief valve setting . . . . .	69.7 to 71.3 mm 48.5 mm	2.74 to 2.00 in 1.90 in
Specifications of the pressure relief valve spring: — free length . . . . . — test length under a load of 11 kg (24.2 lb) . . . . .		
<b>Water pump</b>		
Type . . . . .	centrifugal, vane	
Engine/pump ratio . . . . .	1 : 1.573	
Gap between impeller and pump body (1) . . . . .	0.2 to 0.8 mm	.0078 to .0314 in
<b>Thermostat</b>		
Type . . . . .	BEHR-THOMSON	
Starts opening at . . . . .	83 $\pm$ 2°C 94°C	178 to 185°F 201°F
Max. opening at . . . . .	7.5 mm	.2953 in
Min. valve stroke corresponding to final opening temp. . . . .		

(1) For pre-modification water pump.

# ENGINE:

## General specifications

### MASTER TEST PROCEDURE FOR C.A.V. INJECTION PUMP TYPE DPA 3342 F 030 - 770997

**Test A:**

- Bosch test rig equipped with injectors with pressure spring WSF 2044/4 X and nozzles EFEP 182.
- Rabotti test rig type equipped with standard rig graduated ring, pressure spring FIAT 656829 and nozzles EFEP 182.

Injector pressure setting . . . 175 kg/cm<sup>2</sup> (2489 psi)

Pressure pipes . . . . . 2 x 6 x 865 mm

**Test B:**

- Test ring with engine injectors (nozzle holders type KB 70 S 1 F 10 and nozzle type DLL 145 S 60 F).

Injector pressure setting . . . 195 to 205 kg/cm<sup>2</sup>  
(2775 to 2915 psi)

Pressure pipes . . . . . 1.5 x 6 x 700 mm

<b>Test fluid</b> . . . . .	FIAT CFB
<b>Temperature of test fluid</b> . . . . .	30° + 5° C
<b>Test rig supply pressure</b> . . . . .	0.2 kg/cm <sup>2</sup> (2.8 psi)
<b>Pump rotation looking from drive end</b> . . . . .	counterclockwise
<b>Injection sequence</b> . . . . .	1-3-4-2

**General data**

Distance measured between governor cover stud and metering valve pin . . . 53 to 54 mm (2.086 to 2.125 in)

Control spring mounting holes as indicated in sketch.

Distance between cam ring rollers . . . . . 49.93 mm (1.965 in)

TYPE OF TEST	Order No.	Throttle lever setting (°)	Pump rpm	Internal feed pressure kg/cm <sup>2</sup>	Advance (°) degrees	TEST A		TEST B
						Single element output cm <sup>3</sup> per 1000 strokes	Backleakage cm <sup>3</sup> per 100 strokes	Single element output cm <sup>3</sup> per 1000 strokes
Transfer pump	1-2	—	100	≥ 1	—	—	—	—
Advance setting	3	—	500	—	6.5 to 7.5	—	—	—
	4		1050	—	8 to 8.5	—	—	—
	5		180 max	—	1.8 to 2.5	—	—	—
Automatic advance cut-off (¹)	6	—	300	—	0	—	—	—
Full advance position (²)	7	—	—	—	—	—	—	—
Setting of pressure regulating valve	8-9-10 (³)	Max	1050 <sup>+0</sup> <sub>-20</sub>	—	—	60.5 to 62.5 (⁴)	≥ 14	66.5 to 68.5 (⁴)
Backleakage			500 <sup>±5</sup>	—	—	59.5 to 62.5 (⁴)	—	66 to 69 (⁴)
Max fuel delivery	11-12							
Fuel check for starting (⁵)	13	Max	100	—	—	≥ 57	—	—
Engine stop	14	Max	200	—	—	≤ 4	—	—
Throttle operation (low idle) (⁶)	15	Min	200	—	—	≤ 5	—	—
Governor setting (max speed) (⁷)	16	Max	1150	—	—	≤ 3	—	—
	17		1050 <sup>+0</sup> <sub>-20</sub>	—	—	60.5 to 52.5	—	—

(¹) Test to be carried out with the manual retard device actuated.

(²) Test necessary only on three cylinder engines.

(³) Throttle lever with max stop screw backed out, adjust the delivery by turning the adjusting plates.

(⁴) Throttle lever with min stop screw backed out.

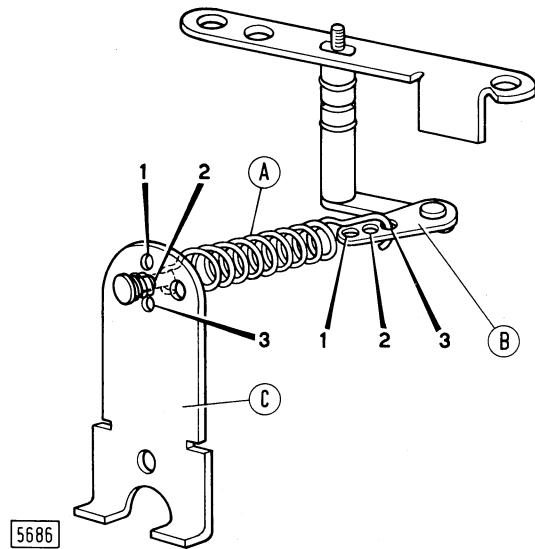
(⁵) Adjust the throttle lever max stop screw.

(⁶) Keep the stop control lever excluded and put it in stop position only for test No. 14.

(⁷) Verify with tool 290743 and adjust by means of shims.

(⁸) Spread between deliveries 2 mm<sup>3</sup>/cycle.

The diagram indicates clearly the hole numbers in the governor control arm (C) and the throttle lever link (B), in which the main governor spring (A) is assembled.



### ENGINE TEST DATA

#### TEST CONDITIONS

Engine without fan air cleaner and exhaust muffler.  
Pressure:  $740 \pm 5$  mm of mercury (Torino altitude).  
Ambient temperature:  $20 \pm 3^\circ$  C.

Relative humidity:  $70\% \pm 5$ .

Fuel specific weight:  $830 \pm 10$  gr/liter.

Fixed injection advance before TDC in cylinder No. 1  
in compression:  $14^\circ \pm 1^\circ$ .

Throttle lever setting	rpm		Power output of engine runned-in for a total of:				Fuel consumption time (250 cm <sup>3</sup> ) sec.	
	Engine	P.T.O.	2 hours HP		50 hours HP			
			On test rig	At P.T.O.	On test rig	At P.T.O.		
Max (under load) . . . . .	2100	656	$\geq 74$	$\geq 70.3$	$\geq 76$	$\geq 72.2$	55 to 58	
Max . . . . .	1000	313	$\geq 35.5$	$\geq 33.7$	$\geq 36.5$	$\geq 34.7$	115.4 to 121.8	
Max (no load) . . . . .	$2300 \pm 20$	$719 \pm 6$	—	—	—	—	—	
Low idle (no load) . . . . .	600 to 650	188 to 203	—	—	—	—	—	

# ENGINE:

## General specifications

### TORQUE SPECIFICATIONS

DESCRIPTION	Thread (M = metric)	References	Torque (*)	
			kgm	lb ft
Screw, engine to clutch housing . . . . .	M 12 x 1.25	—	10.5	75.9
Screw, clutch housing to sump . . . . .	M 10 x 1.25	—	6	43.4
Nuts for screws securing engine to clutch housing .	M 12 x 1.25	—	10.5	75.9
Screw, engine side supports . . . . .	M 14 x 1.5	—	16.5	119.3
Nut, cylinder head studs . . . . .	M 16 x 1.5	C <sub>1</sub> , page 11	23.5	169.9
Screw, rocker arm shaft supports . . . . .	M 10 x 1.25	—	5	36.2
Screw, injection pump drive gear . . . . .	M 8 x 1.25	—	2.5	18
Screw, timing idle gear shaft . . . . .	M 8 x 1.25	C <sub>2</sub> , page 11	3	21.6
Screw, crankshaft pulley . . . . .	M 18 x 1.5	C <sub>3</sub> , page 11	30	216.9
Screw, main bearing cap . . . . .	M 16 x 1.5	C <sub>4</sub> , page 11	14.5	104.9
Screw, con-rod cap . . . . .	M 13 x 1	C <sub>5</sub> , page 11	13	94
Screw, vibration damper housings . . . . .	M 10 x 1.25	—	5	36.2
Screw, vibration damper housings to cylinder block .	M 10 x 1.25	—	5	36.2
Screw, flywheel . . . . .	M 12 x 1.5	C <sub>6</sub> , page 11	9.5	68.7
Nut, splined bush on injection pump camshaft . . .	9/16" -18 UNF	—	8.3	60
Screw, injection pump to support . . . . .	M 8 x 1.25	—	2.5	18

(\*) Lubricate with engine oil.

## MASTER CLUTCH

Type . . . . .	dual plate oil-bath, over centre type			
Quantity of driven plates . . . . .	2			
Plate material . . . . .	steel with syntherized material lining on each face			
Control . . . . .	mechanical with hand lever			
Oil pump . . . . .	lobe type, incorporated in the clutch			
Pump feeding pressure with engine at rated speed . . . . .	0.1 to 0.5 kg/cm <sup>2</sup> (1.4 to 7.1 psi)			
Filter . . . . .	with metal mesh filter			
. . . . .				
mm      in				
O.D. of driven plates . . . . .	304.546 to 305.054	11.9899 to 12.0100		
Thickness of driven plates . . . . .	6.985 to 7.239	.2749 to .2850		
— wear limit . . . . .	5.5 (¹)	.2165 (¹)		
Nominal thickness of intermediate pressure plate . . . . .	14	.5512		
. . . . .				
Backlash between teeth of pressure plates and clutch support	0.10 to 0.40	.0039 to .0157		
Backlash between teeth of driven plates and clutch shaft . .	0.26 to 0.50	.0102 to .0196		
Backlash between brake inner hub splines and clutch shaft .	0.010 to 0.106	.00039 to .00417		
. . . . .				
O.D. of throw-out collar support . . . . .	57.970 to 58.000	2.2822 to 2.2834		
Inside diameter of throw-out collar . . . . .	58.300 to 58.400	2.2952 to 2.2991		
Clearance between throw-out collar and its support . . . . .	0.300 to 0.430	.0118 to .0169		
. . . . .				
O.D. of throw-out collar . . . . .	71.970 to 72.000	2.8333 to 2.8364		
Inside diameter of oil pump body front bush . . . . .	72.050 to 72.100	2.8365 to 2.8385		
Inside diameter of oil pump cover rear bush . . . . .	72.030 to 72.104 (²)	2.8377 to 2.8387 (²)		
. . . . .				
Clearance between throw-out collar and:				
— front bush . . . . .	0.050 to 0.130	.0019 to .0051		
— rear bush . . . . .	0.030 to 0.134	.0011 to .0052		
Max. clearance due to wear (front and rear bushes) . . . . .	0.25	.0098		

(1) Check that lube grooves are still visible.

(2) Dimension to be obtained after press-fitting of bush.

# **TRANSMISSION:**

## **General specifications**

### **MASTER CLUTCH**

*(continued)*

	mm	in
O.D. of oil pump driving gear . . . . .	83.965 to 84.000	3.3056 to 3.3070
Inside diameter of seat on oil pump body . . . . .	84.100 to 84.130	3.3109 to 3.3121
Clearance between oil pump body and driving gear . . . . .	0.100 to 0.165	.0039 to .0064
O.D. of oil pump driven gear . . . . .	131.960 to 132.000	5.1951 to 2.1968
Inside diameter of the relevant seat on oil pump body . . . . .	132.100 to 132.140	5.2007 to 5.2023
Clearance between driven gear and its seat on pump body . . . . .	0.100 to 0.180	.0039 to .0070
Thickness of oil pump gears . . . . .	6.985 to 7.000	.2749 to .2756
Axial play of oil pump on throw-out collar . . . . .	0.050 to 0.300	.0019 to .0118
Clearance between toggle levers and their hinging pins . . . . .	0.016 to 0.077	.0006 to .0030
Max. clearance due to wear between levers and pins . . . . .	0.20	.0078
Clearance between hinging pins and toggle links . . . . .	0.032 to 0.077	.0012 to .0030
Max. clearance due to wear . . . . .	0.15	.0058
Thickness of clutch brake lining . . . . .	6	.236
— wear limit . . . . .	4	.157
Specifications of pressure plate return springs:		
— free length . . . . .	58	2.283
— test length under a test load of 26.3 to 28.9 kg (56 to 64 lbs)	31	1.220
Adjustment of master clutch . . . . .	See page 11	

**GEARBOX - REDUCTION UNIT**

Type . . . . .	constant mesh, helical teeth gears controlled by sliding sleeves	
Speeds . . . . .	6 forward and 2 reverse	
Controls . . . . .	one lever for the gearbox and one for the reduction unit	
	mm	in
Backlash between the teeth of gearbox and reduction unit gears	0.15 to 0.25	.0058 to .0098
Backlash between the splines of gearbox and reduction unit shaft and the relevant gears . . . . .	0.03 to 0.11	.0011 to .0043
Backlash between the front engagement teeth of gearbox and reduction gears and the relevant sliding sleeves . . . . .	0.03 to 0.11	.0011 to .0043
Diameter of reverse shaft . . . . .	24.967 to 25.000	0.9829 to 0.9842
Inside diameter of reverse gear bush . . . . .	25.060 to 25.100 (¹)	0.9866 to 0.9881 (¹)
Clearance between bush and reverse shaft . . . . .	0.060 to 0.133	.0023 to .0052
— wear limit . . . . .	0.25	.0098
Clearance between gearbox driven gears and their bushes . . . . .	0.060 to 0.120	.0023 to .0047
Diameter of p.t.o. shaft front end . . . . .	19.967 to 20.000	.7860 to .7874
Inside diameter of relevant bush on driving gears shaft . . . . .	20.040 to 20.092 (²)	.7889 to .7910 (²)
Clearance between bush and p.t.o. shaft . . . . .	0.040 to 0.125	.0015 to .0049
— wear limit . . . . .	0.35	.0137
Clearance between speed shifting rods and their seats . . . . .	0.000 to 0.085	.0000 to .0033
Width of engagement control fork pads . . . . .	13.890 to 14.000	.5468 to .5512
Width of fork pad groove on engagement sliding sleeves . . . . .	14.400 to 14.600	.5669 to .5748
Clearance between fork pads and their grooves on engagement sleeves . . . . .	0.400 to .0710	.0157 to .0279
Specifications of gearbox, reduction unit and p.t.o. speed selector detent springs:		
— free length . . . . .	34.5	1.358
— test length under a load of 16.2 to 17.9 kg (36 to 39 lb) . . . . .	24	.944

(¹) Dimension to be obtained after press-fitting, with reaming.

(²) Dimension to be obtained after press-fitting, without reaming.

# TRANSMISSION:

## General specifications

### GEARBOX - REDUCTION UNIT

(continued)

Gearbox and p.t.o. lubrication oil pump type . . . . . Drive . . . . . Gearbox driving shaft/pump speed ratio . . . . . Filter of gearbox and p.t.o. lube oil . . . . .	gear driven by gearbox driving shaft 1 : 0.814 mesh type, on pump suction	
	mm	in
Backlash between oil pump drive gear teeth . . . . .	0.15 to 0.25	.0058 to .0098
Diameter of driving gear shaft seat on pump body . . . . . Diameter of driving gear shaft . . . . . Clearance between pump body and shaft . . . . . Max. clearance due to wear . . . . .	16.016 to 16.043 15.982 to 16.000 0.016 to 0.061 0.150	.6305 to .6315 .6292 to .6299 .0006 to .0024 .0058
Inside diameter of oil pump driven gear . . . . . Diameter of driven gear pin . . . . . Clearance between driven gear and its pin . . . . .	12.016 to 12.043 11.982 to 12.000 0.016 to 0.061	.4730 to .4740 .4717 to .4724 .0006 to .0024
Diameter of gear seats on pump body . . . . . Outside diameter of gears . . . . . Radial clearance between gears and their seats on pump body	32.520 to 32.555 32.461 to 32.500 0.020 to 0.094	1.2802 to 1.2816 1.2779 to 1.2795 .0007 to .0037
Max. clearance due to wear . . . . . Depth of gear seats on pump body . . . . . Thickness of pump gears . . . . . Gear end-float on pump body . . . . . Max. clearance due to wear . . . . .	0.150 12.000 to 12.043 11.973 to 12.000 0.000 to 0.070 0.150	.0058 .4724 to .4740 .4713 to .4724 .0000 to .0027 .0058

### BEVEL GEAR

Type . . . . . Bevel gear reduction ratio 13/51 . . . . .	spiral teeth 1 : 3.923
Bevel pinion shaft front and rear bearings . . . . . Adjustment of pinion roller bearings and axial adjustment of pinion with respect to the crown . . . . . Set of pinion tapered roller bearing adjustment shims . . . . .	tapered roller rings (see page 12) 1-1.5-1.7-1.75-1.8-1.9-2-2.2-2.25-2.3 mm (.0394-.0591-.0669-.0689-.0709-.0748-.0787-.0866-.0885-.0906 in)
Set of pinion position adj. shims with respect to the crown . . . . .	3.4-3.5-3.6-3.7-3.8-3.9-4-4.1-4.2-4.3-4.4-4.5-4.6-4.7-4.8-4.9-5-5.1-5.2 mm (.1339-.1378-.1417-.1457-.1496-.1535-.1575-.1614-.1654-.1693-.1732-.1772-.1811-.1850-.1890-.1929-.1969-.2008 in)
Normal backlash between the bevel gear teeth . . . . . Crown wheel shaft bearings . . . . . Setting of backlash between bevel gear teeth . . . . . Set of adj. shims for bevel crown wheel tapered roller bearings	0.20 mm (.0078 in) tapered roller rings (see page 12) 0.15-0.20-0.50 mm (.0058-.0078-.0196 in)

## STEERING CLUTCHES

<sup>(1)</sup> Should this limit be reached without any driven disc being near the wear limit, it is possible to re-establish the original thickness of the stack by adding a driving disc against the mobile pressure plate.

(2) Dimension to be obtained after press fitting without reaming.

# TRANSMISSION:

## General specifications

### STEERING CLUTCHES

(continued)

	mm	in
Diameter of deseng. lever pin . . . . .	27.967 to 28.000	1.1010 to 1.1023
Inside diameter of pin bush . . . . .	28.040 to 28.092 (¹)	1.1039 to 1.1059 (¹)
Clearance between pin and bush . . . . .	0.040 to 0.125	.0015 to .0049
Max. clearance due to wear . . . . .	0.25	.0098
Adjustments of steering clutches . . . . .	see page 14	

### BRAKES

Type . . . . .	band, acting on the steering clutch outer drums	
Control . . . . .	mechanical with independent pedals and simultaneous actuation of the brakes by hand lever	
	mm	in
Quantity of linings per band . . . . .	6	
Thickness of lining . . . . .	6.5	$\frac{1}{4}$
Min. thickness due to wear . . . . .	4	$\frac{5}{32}$
Width and developed length of one lining . . . . .	90 x 119	$3\frac{1}{2} \times 4\frac{11}{16}$
Outside diameter of drum . . . . .	295	$11\frac{5}{8}$
Diameter of interm. lever pin . . . . .	29.940 to 30.000	1.1797 to 1.1811
Bore od of interm. lever pin bush . . . . .	30.040 to 30.092 (¹)	1.1826 to 1.1847 (¹)
Clearance between bush and interm. lever pin . . . . .	0.040 to 0.152	.0015 to .0059
Max. clearance due to wear . . . . .	0.400	.0157
Diameter of brake control lever pin . . . . .	24.967 to 25.000	.9829 to .9843
Inside diameter of hole on band control levers . . . . .	25.000 to 25.130	.9843 to .9894
Clearance between band l. and r.h. control levers and theirs pins	0.000 to 0.163	.0000 to .0064
Diameter of brake control push-rod . . . . .	13.890 to 14.000	.5468 to .5512
Diameter of push-rod seat on control lever . . . . .	14.000 to 14.110	.5512 to .5555
Clearance between control lever and push-rod . . . . .	0.000 to 0.220	.0000 to .0086
Diameter of parking brake shaft . . . . .	19.870 to 20.000	.7822 to .7874
Bore of shaft bush . . . . .	20.040 to 20.092 (¹)	.7889 to .7910 (¹)
Clearance between bush and shaft . . . . .	0.040 to 0.222	.0015 to .0087

(¹) Dimension to be obtained after press-fitting, without reaming.

## BRAKES

	mm	in
Specifications of brake band return springs:		
— free length . . . . .	84	3 $\frac{5}{16}$
— test length under a load of 15.7 to 17.7 kg (34.5 to 39 lb) . . . . .	59	2 $\frac{21}{64}$
Adjustment of brakes . . . . .	see page 14	

## FINAL DRIVES

Type of reduction (each) . . . . .	one couple of spur gears	
Final reduction ratio (11/53) . . . . .	1 : 4.818	
Total reduction ratio (main and final) . . . . .	1 : 18.902	
Backlash between driving and driven gear teeth . . . . .	mm	in
	0.15 to 0.25	.0058 to .0098
Fitting between bull gear spline and its shaft:		
— max. interference . . . . .	0.050	.0019
— max. clearance . . . . .	0.048	.0018
<b>Sprockets</b>		
Quantity of teeth . . . . .		27
Pitch diameter . . . . .	694	27 $\frac{5}{16}$
Width of teeth . . . . .	52	2 $\frac{3}{64}$
Setting of sprocket tapered roller bearings . . . . .	See page 13	
Range of shims for setting the sprocket bearings . . . . .	0.1-0.2-0.5-1	.0039-.0078-.0197-.0394

## P.T.O.

Drive . . . . .	driven by the gearbox main shaft
Engagement . . . . .	sleeve controlled by hand lever
Reduction ratio between P.T.O. driving and driven gears . . . . .	15/48 = 1 : 3.2