

Fiat Trattori
FIAT

805 C

SERVICE
DIRECTIONS

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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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.

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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

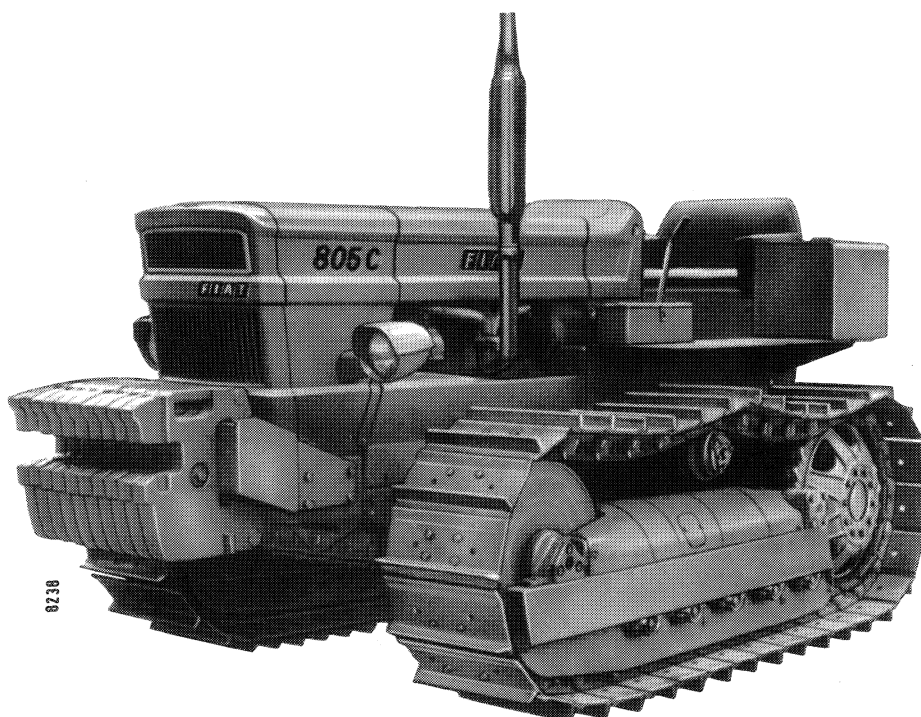
1st Forward 2.5 KPH (1.55 MPH)
2nd » 3.6 KPH (2.23 MPH)
3rd » 4.5 KPH (2.79 MPH)
4th » 5.5 KPH (3.41 MPH)
5th » 7.9 KPH (4.90 MPH)
6th » 10.1 KPH (6.27 MPH)
1st Reverse 2.9 KPH (1.8 MPH)
2nd » 6.5 KPH (4.03 MPH)

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 cm³
(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)



GENERAL SPECIFICATIONS

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/cm² (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/cm² (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/cm² (14 to 17 psi).

A pressure relief valve is fitted on the filter body:

- lubricating pressure at rated speed 4.5 to 5 kg/cm² (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.

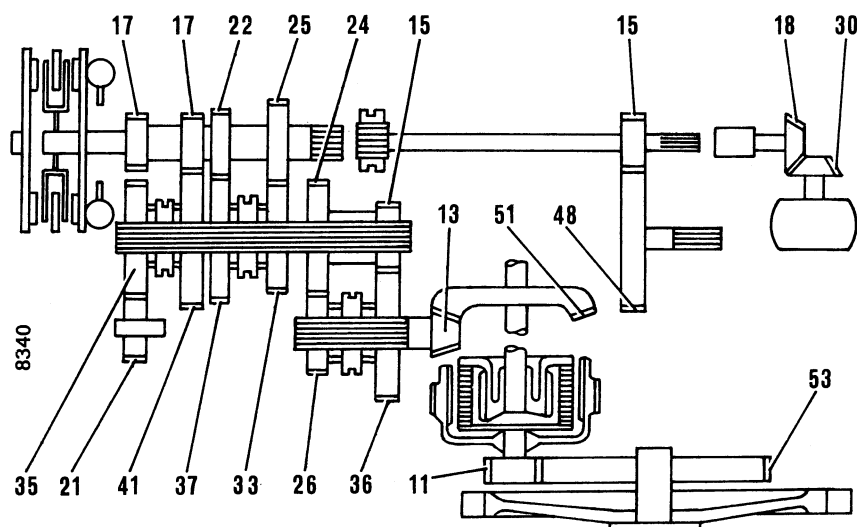
Gearbox with reduction unit incorporated, constant mesh elliptic gears actuated by sliding sleeves: 6 forward and 2 reverse speeds.

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 ³/₄ - 19 ¹¹/₁₆ in)

Ground contact area:

— with 15 ³/₄" (400 mm) shoes 14,240 cm² (2,202 sq.in)

— with 19 ¹¹/₁₆" (500 mm) shoes 18,300 cm² (2,831 sq.in)

Ground pressure:

— with 15 ³/₄" (400 mm) shoes . 0.35 kg/cm² (4.9 psi)

— with 19 ¹¹/₁₆" (500 mm) shoes 0.29 kg/cm² (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 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 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.

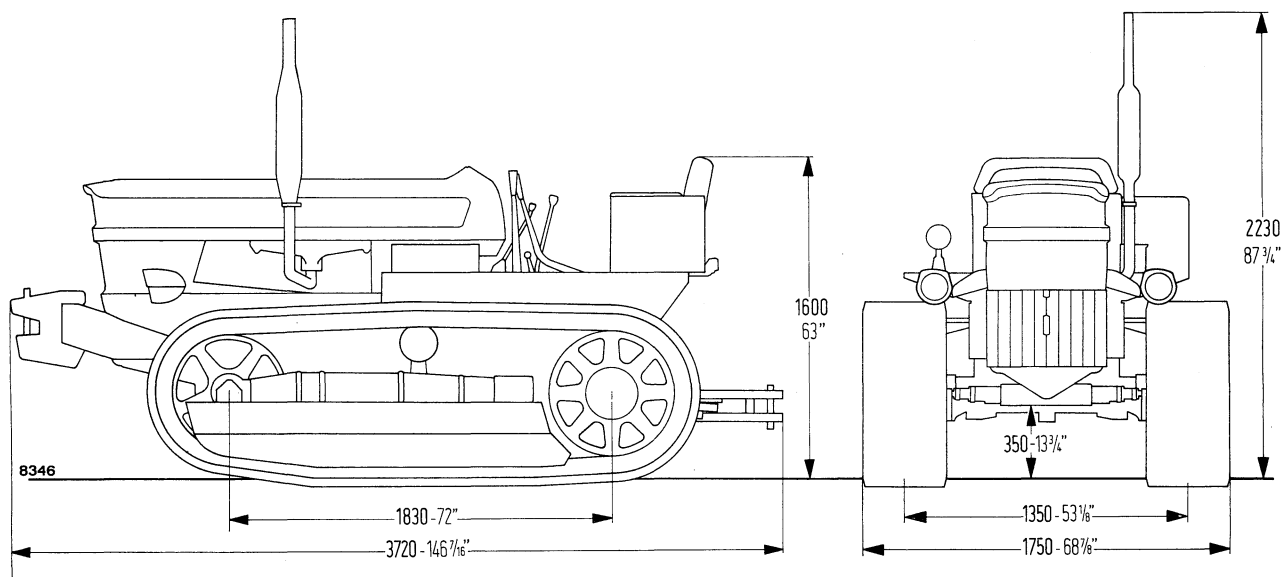
One dash-board light and battery charge indicator light (5 W bulb).

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.

GENERAL SPECIFICATIONS



FILL UP DATA

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

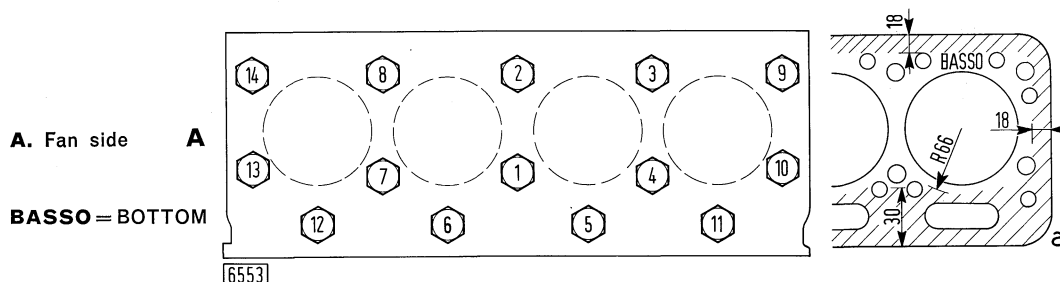
(*) Replace the oil in the air cleaner should it be excessively dirty or a deposit about 1 cm (1/2 in) high be found in the bowl.

CYLINDER BLOCK - CYLINDER HEAD

DESCRIPTION	mm	in
Cylinder block		
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
Cylinder head		
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	0.16
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
Crank gear		
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 { 0.254 mm (.0100 in)	2.299 to 2.305	.0904 to .0906
inner diameter 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
— undersized { 0.254 mm (.0100 in)	69.606 to 69.624	2.7403 to 2.7410
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 { 0.254 mm (.0100 in)	2.013 to 2.019	.0792 to .0794
inner diameter 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
— oversized { 0.101 mm (.0039 in)	2.411 to 2.461	.0948 to .0968
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 crankshaft 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
Connecting rods Diameter of con-rod small end bush seat O.D. of con-rod small end bush Fit interference between bush and con-rod small end Bore of con-rod small end bush (after press-fitting)	44.000 to 44.025 44.078 to 44.117 0.053 to 0.117 40.025 to 40.035	1.7323 to 1.7332 1.7353 to 1.7368 .0021 to .0045 1.5757 to 1.5761
Diameter of bearing housing bore on con-rod big end Max. deviation from parallelism between the con-rod center lines at 125 mm (4.921 in)	73.720 to 73.735 ± 0.025	2.9023 to 2.9029 ± .00098
Max. permissible weight difference among con-rods	15 gr	1/2 oz.
Pistons Diameter of standard piston measured at right angle with the pin center line at 30 mm (1.18 in) from the skirt base Clearance between piston and liner Max. permissible clearance due to wear Oversize of spare piston	109.855 to 109.875 0.125 to 0.167 0.30 0.6	4.3249 to 4.3257 .0049 to .0065 .0118 .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 Max. admissible clearance due to wear	0.019 to 0.035 0.100	.00074 to .00137 .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 — 2nd ring — 3rd ring — 4th ring Max. admissible clearance due to wear: — 1st and 2nd ring — 3rd and 4th ring	0.055 to 0.082 0.055 to 0.082 0.045 to 0.072 0.045 to 0.072 0.30 0.20	.0021 to .0031 .0021 to .0031 .0017 to .0027 .0017 to .0027 .0118 .0078
Ring-end gap (measured with piston fitted on liners): — 1st ring — 2nd ring — 3rd ring — 4th ring Max. permissible gap due to wear	0.40 to 0.60 0.40 to 0.60 0.40 to 0.60 0.30 to 0.45 1.20	.015 to .023 .015 to .023 .015 to .023 .011 to .017 .047

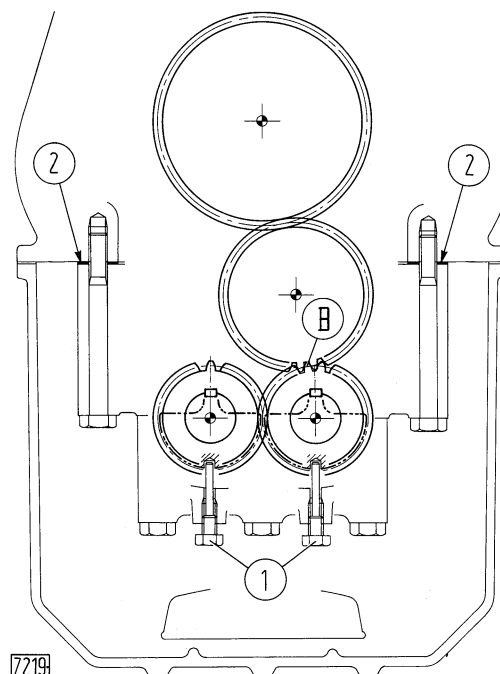
CRANK GEAR

(continued)

DESCRIPTION	mm	in
Vibration damper		
Diameter of counterbalance weight pins	34.920 to 34.935	1.3748 to 1.3753
Diameter of bearing seats on counterbalance weights	38.626 to 38.646	1.5207 to 1.5215
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	1.1811 to 1.1819
Diameter of gear pins	30.041 to 30.061	1.1827 to 1.1835
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**.



ENGINE:

General specifications

TIMING

DESCRIPTION	mm	in
Backlash between timing gear teeth	0.04 to 0.12	.0015 to .0047
Diameter of camshaft journals	49.450 to 49.475	1.9467 to 1.9477
Fit clearance between camshaft journals and their seats on cyl. block	0.080 to 0.140	.0031 to .0055
Max. permissible clearance due to wear	0.25	.0098
End float between camshaft thrust plate and the relevant seat on camshaft	0.030 to 0.080	.0011 to .0031
O.D. of standard tappets (in correspondance with max. diam.)	26.939 to 26.960	1.0605 to 1.0613
Max. clearance between tappets and their seats on cyl. block	0.040 to 0.094	.0015 to .0037
Max. admissible clearance due to wear	0.15	.0058
Range of oversized spare tappets	0.2-0.4	.0078-.0157
Diameter of idle gear pin	29.959 to 29.980	1.1794 to 1.1802
Inside diameter of idle gear bush (press-fitted and reamed) .	30.040 to 30.061	1.1826 to 1.1835
Fit clearance between idle gear pin and bush	0.060 to 0.102	.0023 to .0040
Max. admissible clearance due to wear	0.25	.0098
Fit interference between idle gear pin and its seat	0.009 to 0.073	.0003 to .0028
Diameter of rocker arm shaft	21.015 to 21.036	.8273 to .8286
Inside diameter of rocker arm	21.040 to 21.070	.8283 to .8285
Clearance between rocker arms and shaft	0.004 to .055	.0001 to .0021
Max. clearance due to wear	0.150	.0058
Specifications of rocker arm spacer springs:		
— free length	95	3.74
— test length (test load 2.3 to 2.9 kg - 5 to 6.3 lbs)	62	2.44
O.D. of standard valve guides	14.028 to 14.039	.5523 to .5529
Fit interference between standard valve guides and their seats on cyl. head	0.010 to 0.039	.00039 to .00153
Protrusion of valve guide from cyl. head upper surface { intake .	2	.078
{ exhaust	9	.354
Oversize of outside diameter of spare valve guides	0.08	.0031
Bore of valve guides (press-fitted and reamed)	7.990 to 8.010	.3145 to .3153
Diameter of valve stem	7.945 to 7.960	.3127 to .3133
Fit clearance between valve stem and valve guide	0.030 to 0.065	.0011 to .0025
Max. admissible clearance due to wear	0.130	.0051

TIMING

(continued)

DESCRIPTION	mm	in
Diameter of valve head:		
— intake	42.700 to 43.000	1.6811 to 1.6929
— exhaust	36.200 to 36.500	1.4252 to 1.4370
Seating surface angle on valve	45° 10' $\begin{smallmatrix} -0 \\ +10 \end{smallmatrix}$	
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	7.300	.2874
Real cam lift: intake and exhaust	12.512	.4925
Valve recession below cyl. head surface	See page 1	
Specifications of intake and exhaust valves spring:		
Free length	49.3	1.940
Test length under a load of 22.5 to 24.9 kg (50 to 55 lbs) . .	42	1.653
Test length under a load of 61.1 to 67.5 kg (134 to 150 lbs) .	29.5	1.161

LUBRICATION AND COOLING

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

(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/cm² (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/cm²
(2775 to 2915 psi)
Pressure pipes 1.5 x 6 x 700 mm

Test fluid FIAT CFB
Temperature of test fluid . . 30° + 5° C
Test rig supply pressure . . 0.2 kg/cm² (2.8 psi)
Pump rotation looking from
drive end counterclockwise
Injection sequence 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 ²	Advance (°) degrees	TEST A		TEST B
						Single element output cm ³ per 1000 strokes	Backleakage cm ³ per 100 strokes	Single element output cm ³ 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 (°)	6	—	300	—	0	—	—	—
Full advance position (°)	7	—	—	—	—	—	—	—
Setting of pressure regulating valve	8-9-10 (°)	Max	1050 ⁺⁰ ₋₂₀	—	—	60.5 to 62.5 (°)	≥ 14	66.5 to 68.5 (°)
Backleakage								
Max fuel delivery	11-12		500 ± 5	—	—	59.5 to 62.5 (°)	—	66 to 69 (°)
Fuel check for starting (°)	13	Max	100	—	—	≥ 57	—	—
Engine stop	14	Max	200	—	—	≤ 4	—	—
Throttle operation (low idle) (°)	15	Min	200	—	—	≤ 5	—	—
Governor setting (max speed) (°)	16	Max	1150	—	—	≤ 3	—	—
	17		1050 ⁺⁰ ₋₂₀	—	—	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.

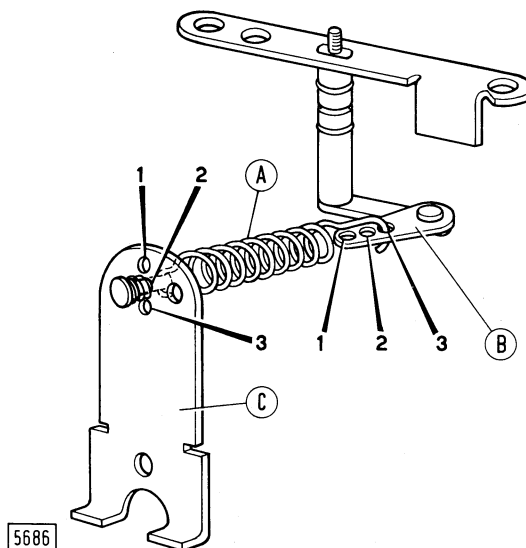
(5) Adjust the throttle lever max stop screw.

(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 mm³/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 ± 5 mm of mercury (Torino altitude).
Ambient temperature: $20 \pm 3^\circ \text{C}$.

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

Fuel specific weight: 830 ± 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 cm³) 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	≥ 74	≥ 70.3	≥ 76	≥ 72.2	55 to 58
Max	1000	313	≥ 35.5	≥ 33.7	≥ 36.5	≥ 34.7	115.4 to 121.8
Max (no load)	2300 ± 20	719 ± 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 ₁ , 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 ₂ , page 11	3	21.6
Screw, crankshaft pulley	M 18 x 1.5	C ₃ , page 11	30	216.9
Screw, main bearing cap	M 16 x 1.5	C ₄ , page 11	14.5	104.9
Screw, con-rod cap	M 13 x 1	C ₅ , 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 ₆ , page 11	9.5	68.7
Nut, splined bush on injection pump camshaft . . .	$\frac{9}{16}$ " -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 ² (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 5.1968
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	gear	
Drive	driven by gearbox driving shaft	
Gearbox driving shaft/pump speed ratio	1 : 0.814	
Filter of gearbox and p.t.o. lube oil	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	16.016 to 16.043	.6305 to .6315
Diameter of driving gear shaft	15.982 to 16.000	.6292 to .6299
Clearance between pump body and shaft	0.016 to 0.061	.0006 to .0024
Max. clearance due to wear	0.150	.0058
Inside diameter of oil pump driven gear	12.016 to 12.043	.4730 to .4740
Diameter of driven gear pin	11.982 to 12.000	.4717 to .4724
Clearance between driven gear and its pin	0.016 to 0.061	.0006 to .0024
Diameter of gear seats on pump body	32.520 to 32.555	1.2802 to 1.2816
Outside diameter of gears	32.461 to 32.500	1.2779 to 1.2795
Radial clearance between gears and their seats on pump body	0.020 to 0.094	.0007 to .0037
Max. clearance due to wear	0.150	.0058
Depth of gear seats on pump body	12.000 to 12.043	.4724 to .4740
Thickness of pump gears	11.973 to 12.000	.4713 to .4724
Gear end-float on pump body	0.000 to 0.070	.0000 to .0027
Max. clearance due to wear	0.150	.0058

BEVEL GEAR

Type	spiral teeth
Bevel gear reduction ratio 13/51	1 : 3.923
Bevel pinion shaft front and rear bearings	tapered roller
Adjustment of pinion roller bearings and axial adjustment of pinion with respect to the crown	rings (see page 12)
Set of pinion tapered roller bearing adjustment shims	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	0.20 mm (.0078 in)
Crown wheel shaft bearings	tapered roller
Setting of backlash between bevel gear teeth	rings (see page 12)
Set of adj. shims for bevel crown wheel tapered roller bearings	0.15-0.20-0.50 mm (.0058-.0078-.0196 in)

STEERING CLUTCHES

Type	multiple dry discs	
Control	mechanical actuation by hand lever	
Quantity of pressure spring per clutch	6	
Specifications of springs: — free length — test length under a test load of 141 to 155 kg (310 to 340 lb)	mm	in
	113 73	4 ⁷ / ₁₆ 2 ⁷ / ₈
Quantity of discs { driving (steel) driven (asbestos compound)	11 11	
Thickness of each driving disc	2.35 to 2.65	.0924 to .1042
Thickness of each driven disc	4.90 to 5.10	.1929 to .2008
— min. thickness due to wear	4.5	.1772
Total thickness of the complete stack	79.75 to 85.25	3 ¹ / ₈ to 3 ¹¹ / ₃₂
— min. thickness of the stack due to wear	74 ⁽¹⁾	2 ²⁹ / ₃₂ ⁽¹⁾
Backlash between the inner drum and driving disc teeth . .	0.10 to 0.40	.0039 to .0157
Backlash between the outer drum and driven disc teeth . .	0.10 to 0.40	.0039 to .0157
Backlash between the inner splines of the driving and driven drums and the splines of the relevant shafts	0.03 to 0.11	.0011 to .0043
Diameter of disengagement fork pin	29.967 to 30.000	1.1798 to 1.1811
Bore of relevant bush	30.040 to 30.092 ⁽²⁾	1.1826 to 1.1847 ⁽²⁾
Clearance between bush and fork pin	0.040 to 0.125	.0015 to .0049
— max. clearance due to wear	0.3	.0118
Diam. of diseng. sleeve seats on the bevel gear wheel shafts supports	68.954 to 69.000	2.7146 to 2.7165
Inside diam. of disengagement sleeves	69.030 to 69.104	2.7177 to 2.7206
Clearance between diseng. sleeves and the relevant supports	0.030 to 0.150	.0011 to .0059
— max. clearance due to wear05	.0196
Diameter of diseng. sleeve pins	19.967 to 20.000	.7860 to .7874
Diameter of pin seats on fork lever	20.020 to 20.072	.7881 to .7902
Clearance between sleeve pins and fork lever	0.020 to 0.105	.0007 to .0041

⁽¹⁾ 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 (*)	1.1039 to 1.1059 (*)
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 (*)	1.1826 to 1.1847 (*)
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 (*)	.7889 to .7910 (*)
Clearance between bush and shaft	0.040 to 0.222	.0015 to .0087

(*) 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	
	mm	in
Backlash between driving and driven gear teeth	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
Sprockets		
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 . .	$15/48 = 1 : 3.2$