FiatTrattori

FIAT

90 C
120 C

WORKSHOP MANUAL

D I R E Z I O N E S V I L U P P O P O S T - V E N D I T A

Reprinted

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FIAT

90 C
120 C

WORKSHOP MANUAL

QUICK REFERENCE INDEX

DIREZIONE SVILUPPO POST-VENDITA

FOREWORD

- *The manual is divided into separately numbered sections.*
- **Two-digit** *sections contain:*
  - *Tractor specification (00);*
  - *Tractor sub-assembly specification and data (10 - Engine; 20 - Power Train, etc.).*
- *A contents list is provided to facilitate retrieval of desired information.*
- *Each sheet carries the print number of the manual and the date of issue in the bottom right-hand corner of the front page.*
- *Revised sheets will carry the same print number followed by a capital letter (e.g. first revision 603.54.180-A; second revision 603.54.180-B; etc.) and new issue date.*
  Revised sheets will be accompanied by the updated contents sheet.
- *Wear limits recommended for some parts are not binding, being given for guidance only.*

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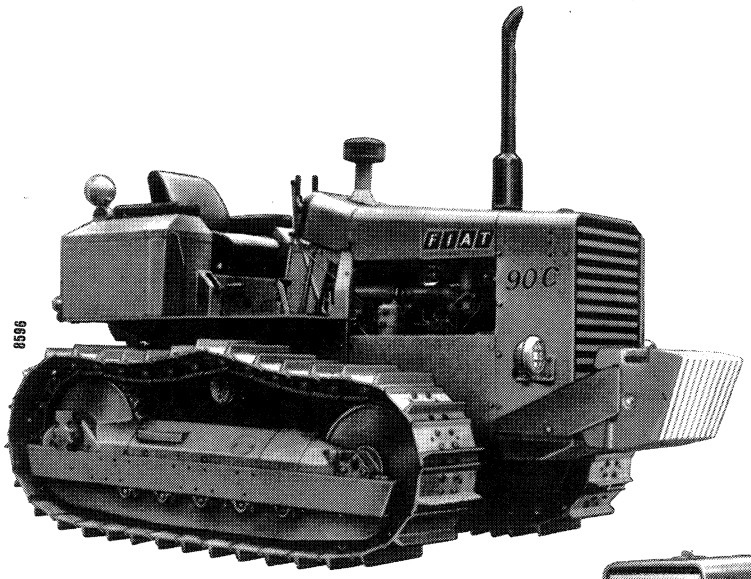
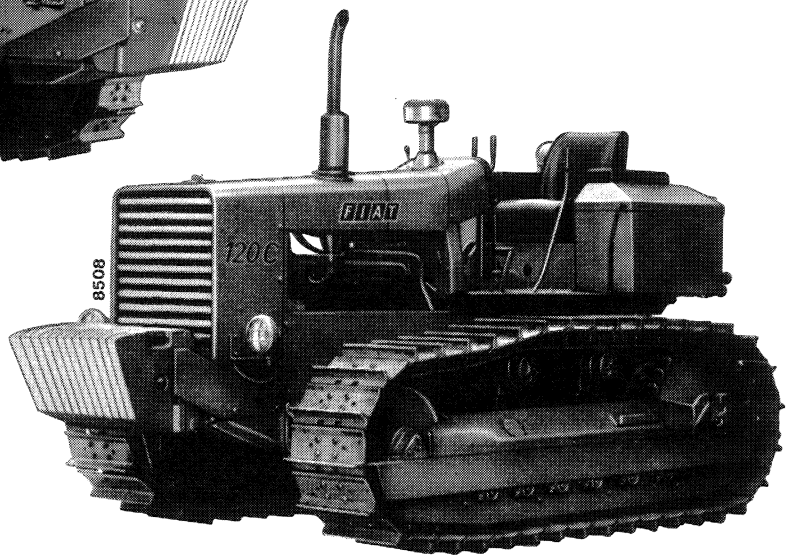
Print No. **603.54.180** - XII-1976 - 500

CONTENTS

Print **603.54.180** - XII-1976

	90 C	120 C
IDENTIFICATION DATA		
Marketing Code	90 C	120 C
Engineering Code	610.770	610.870
Engine type	FIAT-OM C03 130T Var. 2300	FIAT-OM CP3/100 Var. 21 FIAT fuel pump FIAT-OM CP3/100 Var. 22 BOSCH fuel pump
PERFORMANCE AND WEIGHT		
Output at flywheel, DGM/DIN	98 metric HP (72 kw)	120 metric HP (88 kw)
Operating weight (full ballast, no driver)	6950 kg (15325 lb)	7650 kg (16868 lb)
ENGINE		
Cycle	4 stroke Diesel, naturally aspirated	
Injection	Direct	
Number of cilinders	4	6
Bore and stroke	115 x 130 mm (4.53 in x 5.11 in)	110 x 130 mm (4.33 in x 5.11 in)
Total displacement	5401 cc	7412 cc





SPECIFICATION

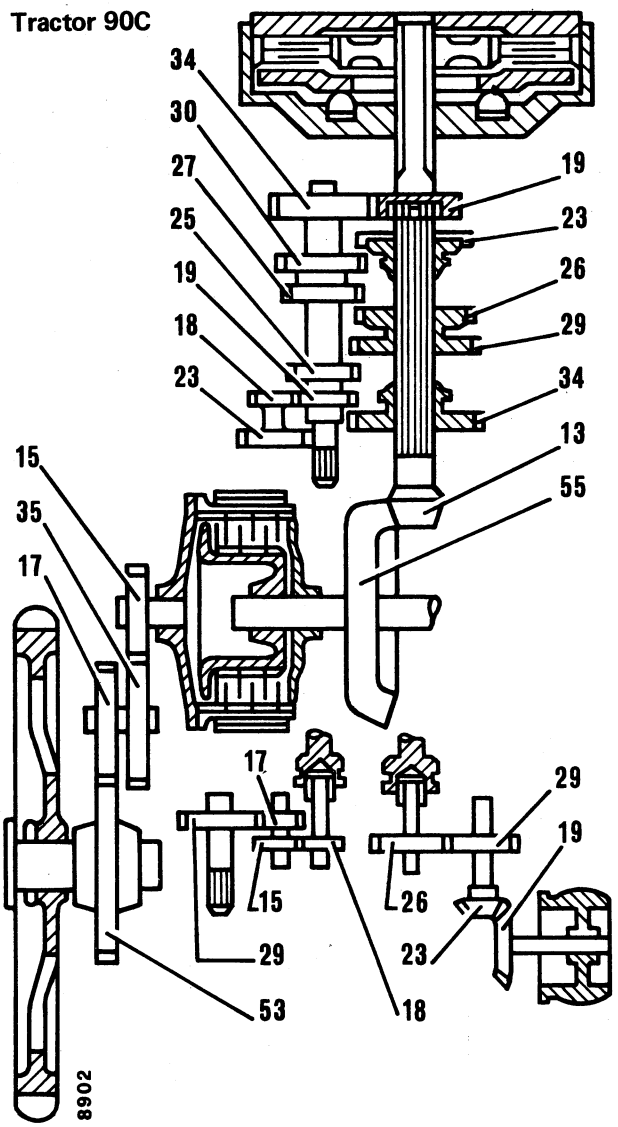
	90 C	120 C
Compression ratio	17.4 : 1	17.4 : 1
Engine speed, full load	2000 rpm	2000 rpm
Engine speed, full torque	1200 rpm	1400 rpm
No. of main bearings	5	7
Dynamic balancer	in sump	–
Valvegear	Pushrod operated OHV	
Inlet opens	8° BTDC	10° BTDC
Inlet closes	60° ABDC	54° ABDC
Exhaust opens	60° BBDC	54° BBDC
Exhaust closes	8° ATDC	10° ATDC
Valve clearance (for timing check)	.20 mm (.008 in)	.25 mm (.010 in)
Valve clearance:		
– Inlet	.30 mm (.012 in)	.25 mm (.010 in)
– Exhaust	.50 mm (.020 in)	.30 mm (.012 in)
Fuel System		
Air cleaner	Oil-bath or dry	
Precleaner	Centrifugal, self - cleaning	
Fuel filters	2 in - line cartridges, paper and cloth	
Supply pump	Double - diaphragm	
– Drive	Cam	
Injection pump	In - line	
– BOSCH	PES4A90D - 770931	PES6A90D
– FIAT	–	PES6A90B 410:L4/177
– Speed governor	All-speed, integral	
– Advance		
– BOSCH	26° 30′ ± 30′	25° ± 30′
– FIAT	–	25° ± 30′
Spray nozzles	4 orifice	4 orifice
Injectors	see page 9, section 10	see pages 11 and 13 section 10
Release pressure	200 ± 5 kg/cm² 2845 ± 71 psi	200 ± 5 kg/cm² 2845 ± 71 psi
Firing order	1-3-4-2	1-5-3-6-2-4
Lubrication	Forced feed, gear pump	
Pump drive	Crankshaft	

	90 C	120 C
Oil filter	Pump inlet strainer and outlet cartridge	
Relief valve	In filter	
— Lubricant pressure at governed speed	4 to 4.5 kg/cm² (57 to 64 psi)	
Cooling	Water, centrifugal pump	
Radiator	4 - deep, vertical tube	
Fan	Suction, sheet metal	
Temperature control	Thermostat	
Tractor Meter	Dash - mounted	
Function	Engine rpm and working hours	
Drive	Timing train	
Hourmeter speed	1700 rpm	
Drive ratio	1 : 2	
POWER TRAIN		
Master Clutch	Twin - plate, oil - bath, 14 in	
Type	Overcentre	
Control	Hand lever	
Pump	Lobe, integral	
Transmission	5 - speed, sliding spur gears	
Control	Hand lever	
Bevel Drive	Spiral	
Final Drives	Double reduction, spur	
Steering Clutches	Dry multiplate, hydraulic power assisted, lever controlled	
Brakes	Band, latched pedals, hand operated parking brake	

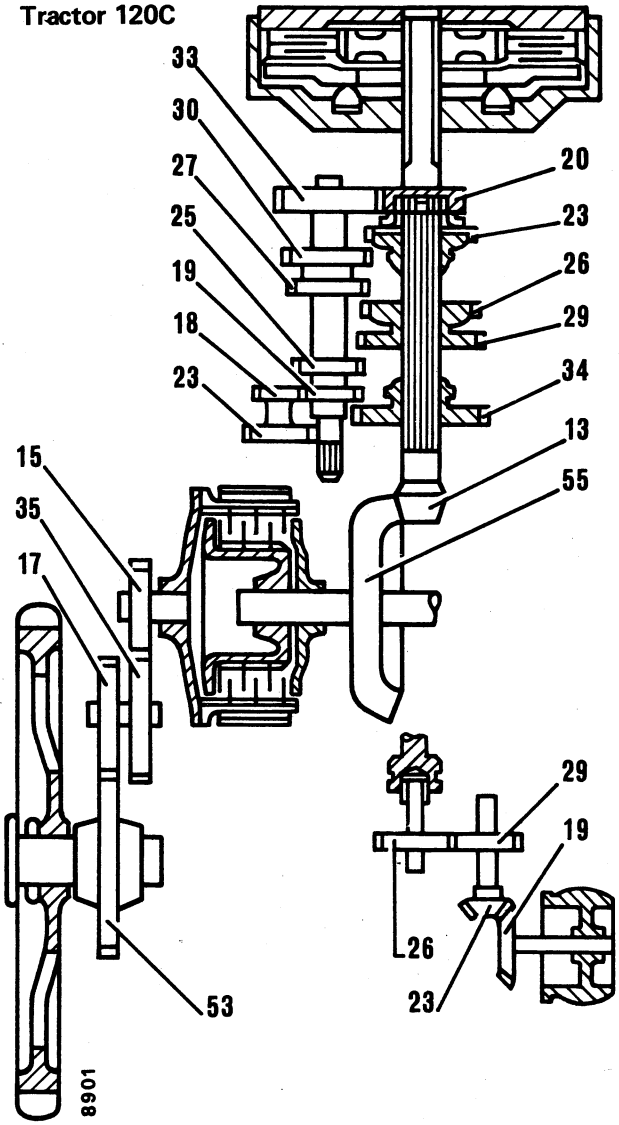
SPECIFICATION

POWER TRAIN SCHEMATICS

Tractor 90C



Tractor 120C



TRACTOR SPEEDS At governed speed	90 C		120 C	
	kph	mph	kph	mph
First	2.8	1.7	3.0	1.9
Second	4.3	2.7	4.7	2.9
Third	5.2	3.2	5.6	3.5
Fourth	6.5	4	7.1	4.4
Fifth	9.0	5.6	9.0	5.6
Reverse	3.6	2.2	3.9	2.4

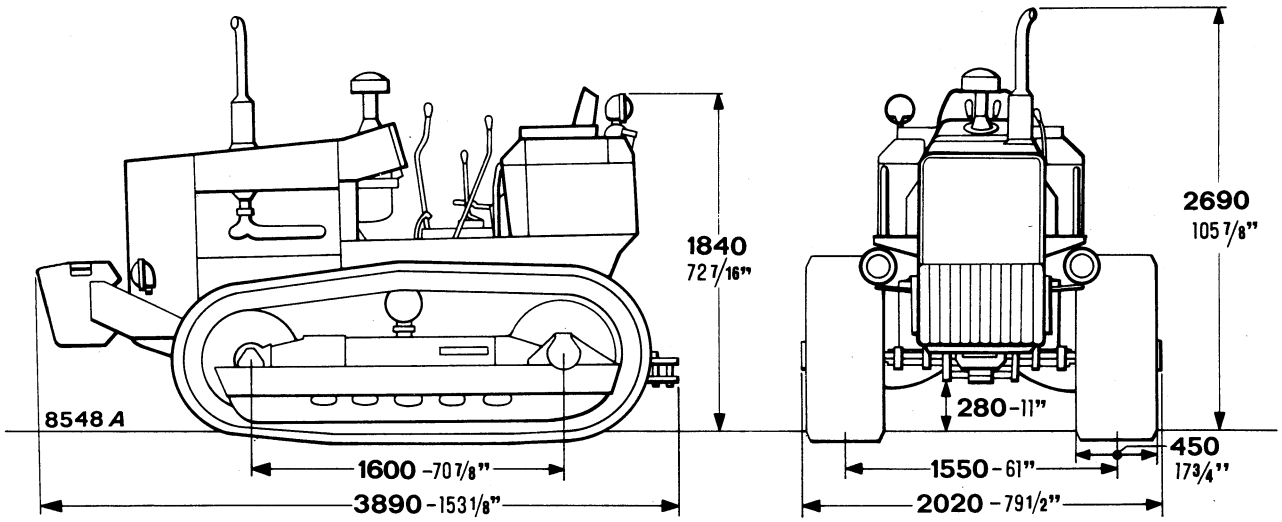
UNDERCARRIAGE — SUSPENSIONS	90 C	120 C
Track rollers	5	6
Carrier rollers	1	2
Idlers and rollers	Lubricated for life	
Track shoes per chain	34	38
Shoe width	mm 450 - 600 ($17^{3}/_{4}$ - $23^{5}/_{8}$ in)	450 - 600 mm ($17^{3}/_{4}$ - $23^{5}/_{8}$ in)
Track area		
— 450 mm shoes	16137 cm² (2501 in²)	19215 cm² (2978 in²)
— 600 mm shoes	21516 cm² (3335 in²)	25620 cm² (3971 in²)
Ground pressure		
— 450 mm shoes	.43 kg/cm² (6.1 psi)	.40 kg/cm² (5.7 psi)
— 600 mm shoes	.33 kg/cm² (4.7 psi)	.31 kg/cm² (4.4 psi)
Track release	Hydraulic	
Rear suspension	Track frame borne cross bar, lubricated for life track frame pivot bushes	
Front suspension	Transverse double leaf spring	
POWER TAKE - OFF	540 or 1000 rpm	1000 prm
Type	Independent	
Shaft		
— 540 rpm (90 C only)	$1^{3}/_{8}$ in 6 - spline	—
— 1000 rpm	$1^{3}/_{8}$ in 21 - spline	$1^{3}/_{8}$ in 21 - spline
Control	Hand lever	
Shaft speed	540 rpm	—
	1000 rpm	1000 rpm
Engine speed:		
— 90 C		
— 540 rpm	1374 rpm	—
— 1000 rpm	1789 rpm	—
— 120 C		
— 1000 rpm	—	1650 rpm
BELT PULLEY DRIVE	In transmission	
Rotation (from rear)	Clockwise	Clockwise
Speed (at full throttle)	1118 rpm	1212 rpm
BELT PULLEY		
Dia.	360 mm (14.17 in)	360 mm (14.17 in)

SPECIFICATION

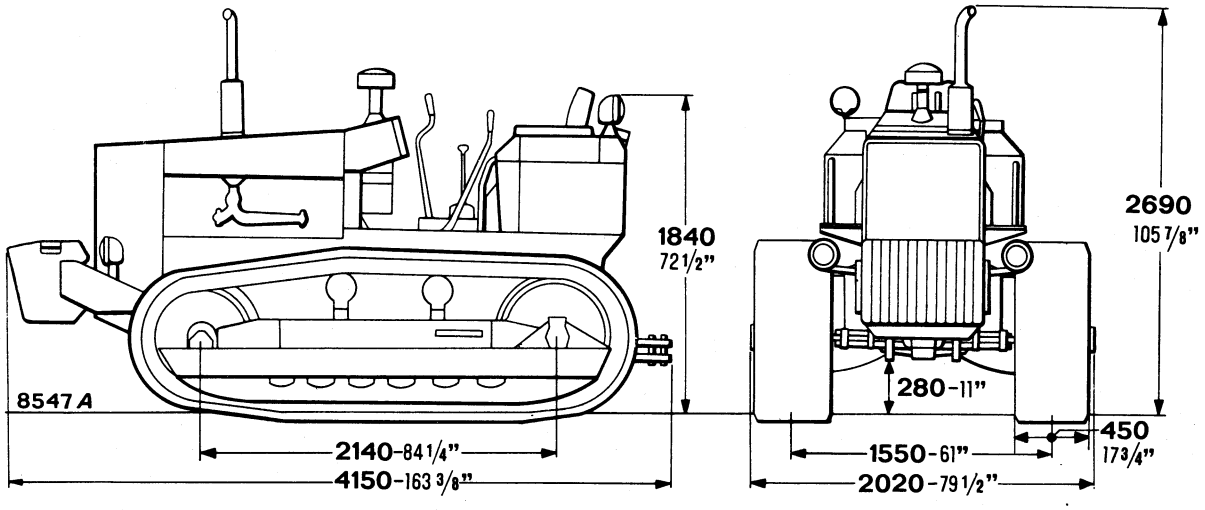
	90 C	120 C
Width	200 mm (7.9 in)	200 mm (7.9 in)
Speed (at full throttle)	1213 rpm	1316 rpm
Surface speed	22.9 m/sec (75 ft/sec)	24,8 m/sec (81 ft/sec)
REMOTE CONTROL HYDRAULICS		
Type	O.R.M.I., RH fender mounted	
Control valve	2, 3 or 4 sections with float position in No. 2	
Oil reservoir	Welded sheet metal	
Return oil filter	Strainer in tank	
Gear pump	Crankshaft driven	
– AM	SALAMI 3,5 P55/S	
– PM	SALAMI 3,5 PA42/S	
2, 3 or 4 pairs of female quick-connect half couplings, type	AEROQUIP, 1/2 in, for 3/4 in piping	
ELECTRICAL SYSTEM		
Voltage	24 V	
Alternator	FIAT A 12M 124/24/26	
Voltage regulator		
– AM	MARELLI RC 2/24	
– PM	MARELLI RTT 110 CT	
Starter	MARELLI MT 43 P	
Batteries (under hood)	Marelli 6ATM 15YB	Marelli 6ATP21 or Titano 6D E 10F
No. off	2	
Voltage	12 V	
Capacity	77 Ah	110 Ah
Head lamp dia	mm 130 (5.12 in)	
– Bulb	45/50 W	
Flood lamp / switch		
– Bulb	35 W	
Fuses (seven off, six in box)	8 A	
Panel light and charge indicator bulbs	10 W	
Charge warning relay	Fused	
Lighting / starter switch	Six - position	
Starter button	60 A	
Starter and alternator circuits	Not fused	

DIMENSIONS

90 C Tractor



120 C Tractor



SPECIFICATION

CAPACITIES

Description	Lubricant							
	FIAT Designation	Capacity						International Designation
		90 C			120 C			
		litres	kg	Pints	litres	kg	Pints	
Engine oil	AGERTER (1)							API "CD" Service Series 3 Single grade oil to "MIL-L-2104 C"
— Sump, filter and lines		13.9	12.5	24.5	20	18	35	
— Sump and filter		11.7	10.6	20.6	16.2	14.7	28.5	
— Sump only		11.1	10	19.5	15	13.5	26	
Fuel pump oil		—	—	—	.22	.2	.4	
Governor oil		—	—	—	.11	.1	.2	
Air cleaner oil (2)		2.4	2.2	4.2	2.1	1.9	3.7	
Twin plate clutch oil		17.7	16	31	17.7	16	31	
Track idler and roller oil	AGERTER30	—	—	—	—	—	—	
Starter oil (pinion end head)		—	—	—	—	—	—	
Transmission oil	AW 90/M	23.8	21.5	42	23.8	21.5	42	SAE 90 - EP oil to "MIL-L-2105B"
Final drive oil (each)		12.2	11	21.5	12.2	11	21.5	
Belt pulley oil		1.7	1.5	3	1.7	1.5	3	
PTO oil		.6	.5	1	.6	.5	1	
Steering clutch oil	AP51 above 0°C	2.8	2.5	5	2.8	2.5	5	SAE20W hydr. oil
Remote control oil	AP31 below 0°C	26.7	24	47	26.7	24	47	SAE10W hydr. oil
Lubricators	G9 grease	—	—	—	—	—	—	Lithium - calcium grease to NLGI 2

Coolant (water and **PARAFLU 11**, 50 — 50 mixture)	90 C, 18 Litres (4 Gall.) 120 C, 27 Litres (6 Gall.)
Fuel	Standard, 148 Litres (32.5 Gall.) Supplementary, 80 Litres (17.6 Gall.)

(1) **10W** below - 15°C, **20W** down to - 15°C, **30** up to 35°C and **40** above 35°C.

(2) Change oil when sediment is 1 cm or 1/2 in deep on bottom.

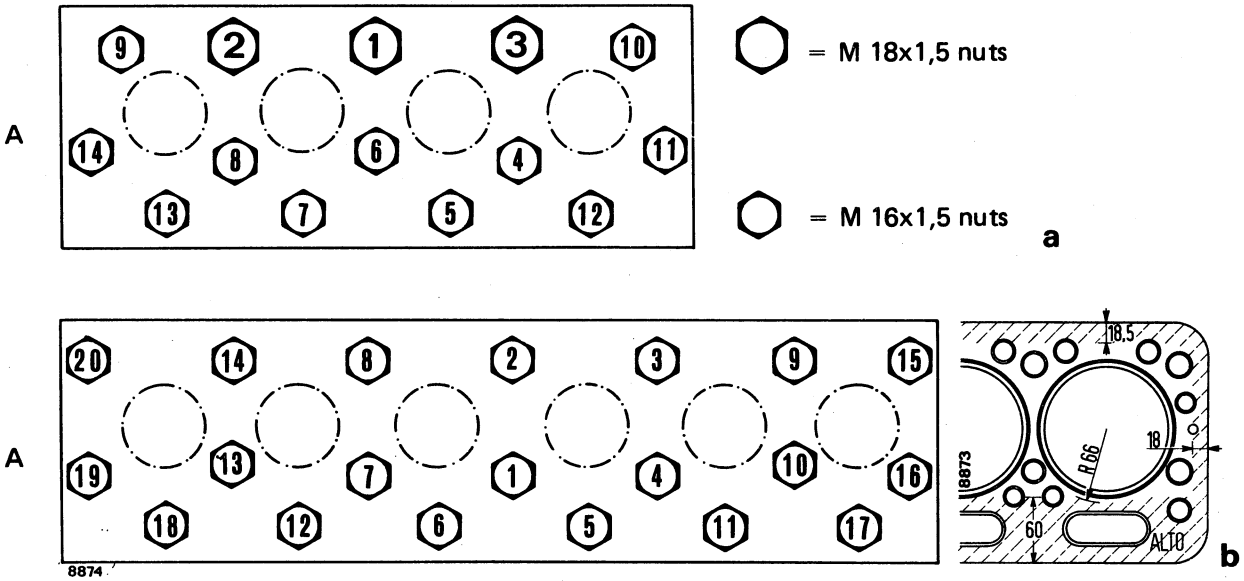
ENGINE BLOCK – CYLINDER HEAD

Engine Block	90 C		120 C	
	mm	in	mm	in
Block bore dia.	122.000 to 122.040	4.8031 to 4.8047	118.000 to 118.035	4.6456 to 4.6470
Liner O.D.	121.920 to 121.970	4.8000 to 4.8020	117.920 to 117.970	4.6425 to 4.6445
Liner fitted clearance in block	.030 to .120	.0012 to .0047	.030 to .115	.0012 to .0045
Liner I.D.	115.000 to 115.022	4.5275 to 4.5284	110.000 to 110.022	4.3307 to 4.3316
Max. liner ovality and taper (1)	.15	.006	.15	.006
Liner I.D. oversize	.6	.024	.6	.024
Liner protrusion	.130 to .160	.0051 to .0063	.150 to .180	.0060 to .0071
Max. liner top flatness error	.030	.0012	.030	.0012
Liner shim thickness	3.18 - 3.21 - 3.24 3.27 - 3.30 - 3.33	.1251 - .1264 - .1275 .1287 - .1299 - .1311	.05 - .075 - .10	.002 - .003 - .004
Camshaft housing bore dia. in block, 90 C	49.055 to 49.090	1.9313 to 1.9327	—	—
Camshaft bush housing bore dia . in block, 120 C			49.000 to 49.025	1.9291 to 1.9301
Tappet housing bore dia.	27.000 to 27.033	1.0630 to 1.0643	27.000 to 27.033	1.0630 to 1.0643
Tappet oversize	.2 - .4	.008 - .016	.2 .4	.008 - .016
Main bearing housing bore dia.	84.206 to 84.226	3.3152 to 3.3160	80.626 to 80.646	3.1742 to 3.1750
Cylinder Head				
Valve guide housing bore dia.	14.000 to 14.018	.5512 to .5519	14.000 to 14.018	.5512 to .5519
Guide oversize	.08	.0031	.08	.0031
Valve seat angle	90 ± 10′	90° ± 10′	90° ± 10′	90° ± 10′
Injector protrusion	3.30 to 3.90	.1299 to .1535	3.30 to 3.90	.1299 to .1535
Maximum	4.20	.1653	4.20	.1653
Valve fitted depth below head top				
– Inlet	.20 to .60	.008 to .024	.10 to .50	.004 to .020
– Exhaust	.40 to .80	.016 to .032	.10 to .50	.004 to .020
Maximum	.90	.036	.70	.028
Cylinder head height	99.780 to 100.000	3.9283 to 3.9370	99.80 to 100.20	3.9291 to 3.9449
Max. head skimming depth	.5	.020	.5	.020

(1) Over swept area parallel and at right angles to crankshaft centre line.

ENGINE: Data

ENGINE BLOCK – CYLINDER HEAD



Head tightening diagram and scrap view of head gasket.

a. 90 C Tractor – b. 120 C Tractor – A. Fan side

NOTE

- 90 C Tractor – Position gasket with "ALTO" mark uppermost on block top. Lower head and tighten hold-down screws to the prescribed torque adhering to the sequence shown.
- 120 C Tractor – Apply a coat of "WELLSEAL JOINTING COMPOUND" on block top. Clean grease marks off steel face of gasket and coat shaded area (b) with jointing compound. Lie on top of block with "ALTO" mark uppermost. Lower head in position and tighten hold-down nuts to the prescribed torque adhering to the sequence shown.
- Torque hold-down fasteners in three stages as indicated hereunder.

90 C Tractor

Stage		1	2	3
M16 x 1.5 nuts	kgm	10	18	25
	lb ft	72	130	181
M18 x 1.5 nuts	kgm	10	25	33
	lb ft	72	181	239

120 C Tractor

Stage		1	2	3
M16 x 1.5 nuts	kgm	10	16	23
	lbft	72	116	166

CRANKGEAR

	mm		in	
Crankshaft – Bearings	90 C	120 C	90 C	120 C
Main journal dia.	79.782 to 79.800	76.202 to 76.220	3.1410 to 3.1417	3.0000 to 3.0008
Main journal undersize	.254 – .508 – .762 – 1.016		.010 – .020 – .030 – .040	
Main bearing wall thickness	2.172 to 2.178		.0855 to .0857	
Main bearing undersize	.254 – .508 – .762 – 1.016		.010 – .020 – .030 – .040	
Main journal running clearance in bearing	.050 to .100		.002 to .004	
Max. clearance	.180		.0071	
Crankpin dia.	72.482 to 72.500	69.860 to 69.878	2.8536 to 2.8543	2.7504 to 2.7511
Crankpin undersize	.254 – .508 – .762 – 1.016		.010 – .020 – .030 – .040	
Big end bearing wall thickness	2.064 to 2.070	1.886 to 1.892	.0812 to .0815	.0742 to .0745
Big end bearing undersize	.254 – .508 – .762 – 1.016		.010 – .020 – .030 – .040	
Crankpin running clearance in bearing	.058 to .103		.0023 to .0040	
Max. clearance	.180		.0071	
Thrust washer thickness	2.31 to 2.36		.0910 to .0929	
Thrust washer oversize	.101 – .254 – .508		.004 – .010 – .020	
Width of main bearing housing over thrust washers	49.780 to 49.930		1.9598 to 1.9657	
Length of corresponding main journal	50.000 to 50.050		1.9685 to 1.9705	
Crankshaft end float	.07 to .27		.003 to .011	
Max. clearance	.40		.016	

ENGINE: Data

CRANKGEAR

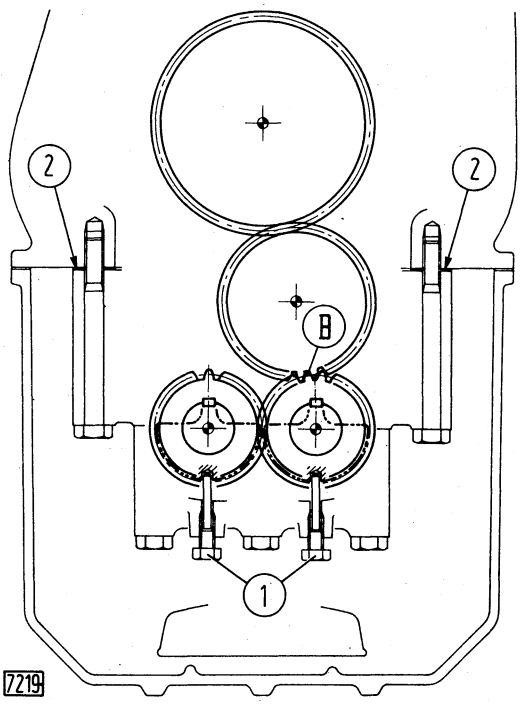
	90 C		120 C	
	mm	in	mm	in
Max. crankpin and main journal ovality and taper after grinding	.005	.0002	.005	.0002
Max. crankpin and main journal ovality and taper	.03	.0012	.03	.0012
Main journal misalignment (outer journals over V-blocks and cranks 1-6, 120 C tractor, vertical up) T.I.R.	.05	.002	.1	.004
Crankpin misalignment relative to main journals (in both directions)	.25	.010	.25	.010
Crankshaft flange runout on periphery (T.I.R.)	.025	.001	.025	.001
Crankshaft flance eccentricity (T.I.R.)	.04	.0016	.01 to .03	.0004 to .0012
Connecting Rods				
Small end bore dia.	44.000 to 44.025	1.7323 to 1.7333	44.000 to 44.025	1.7323 to 1.7333
Small end bush O.D.	44.069 to 44.120	1.7353 to 1.7370	44.078 to 44.117	1.7353 to 1.7369
Small end bush interference in rod	.044 to .120	.0017 to .0047	.053 to .117	.0021 to .0046
Small end bush fitted I.D. after reaming	40.025 to 40.035	1.5758 to 1.5762	40.025 to 40.035	1.5758 to 1.5762
Big end bore dia.	76.692 to 76.713	3.0194 to 3.0202	73.720 to 73.735	2.9024 to 2.9029
Conn. rod axis misalignment 125 mm (5 in) from rod centreline.	± .025	± .001	± .025	± .001
Max. rod weight allowance	gr 15	1/2 oz	gr 15	1/2 oz
Pistons				
O.D. 35 mm (1 in) above base of skirt at right angles to pin	114.820 to 114.840	4.5205 to 4.5212	109.838 to 109.858	4.3243 to 4.3251
Piston working clearance in liner	.160 to .202	.0063 to .0079	.142 to .184	.0056 to .0072
Max. clearance	.30	.012	.30	.012
Piston oversize	.6	.024	.6	.024

CRANKGEAR

	90 C		120 C	
	mm	in	mm	in
Gudgeon pin dia.	40.000 to 40.006	1.5748 to 1.5750	40.000 to 40.006	1.5748 to 1.5750
Gudgeon pin bore in piston	40.006 to 40.012	1.5750 to 1.5753	40.006 to 40.012	1.5750 to 1.5753
Pin clearance in piston	.000 to .012	.0000 to .0005	.000 to .012	.0000 to .0005
Pin oversize	.2 – .5	.008 – .020	.2 – .5	.008 – .020
Pin clearance in small end bush	.019 to .035	.0007 to .0014	.019 to .035	.0007 to .0014
Maximum clearance	.10	.004	.10	.004
Max. piston weight allowance	gr 10	1/3 oz	gr 10	1/3 oz
Ring clearance in piston groove				
Top	.065 to .092	.0025 to .0036	.055 to .082	.0022 to .0032
Second	.055 to .082	.0022 to .0032	.055 to .082	.0022 to .0032
Third	.045 to .072	.0018 to .0028	.045 to .072	.0018 to .0028
Fourth (120 C Tractor)	–	–	.045 to .072	.0018 to .0028
Max. clearance				
Top and second	.30	.012	.30	.012
Third (90 C Tractor), third and fourth (120 C Tractor)	.20	.008	.20	.008
Ring gap in liner				
Top	.40 to .60	.016 to .024	.40 to .60	.016 to .024
Second	.40 to .60	.016 to .024	.40 to .60	.016 to .024
Third	.30 to .45	.012 to .018	.40 to .60	.016 to .024
Fourth (120 C Tractor)	–	–	.30 to .45	.012 to .018
Max. gap	1.20	.047	1.20	.047

CRANKGEAR

Dynamic Balancer (90 C Tractor)	mm	in
Shaft dia.	34.920 to 34.935	1.3748 to 1.3754
Bearing housing bore dia.	38.626 to 38.646	1.5207 to 1.5215
Bearing wall thickness	1.816 to 1.822	.0715 to .0717
Shaft running clearance in bearing	.047 to .094	.0018 to .0037
Gear journal dia. on shaft	30.041 to 30.062	1.1827 to 1.1835
Gear bore dia.	30.000 to 30.021	1.1811 to 1.1819
Journal interference fit in gear	.020 to .062	.0008 to .0024
Balancer shim thickness	.05 – .10 – .15	.002 – .004 – .006
Oil pump gear backlash	.11 to .17	.0043 to .0067
Balancer gear backlash	.13 to .19	.0051 to .0075



BALANCER TIMING

- Position flyweights by means of screws **1** (290965) and ensure that both drive and driven balancer gears are correctly fitted. To do this check the position of the driving key relative to the teeth.
- Turn the crankshaft until piston No. 1 reaches T.D.C. on compression stroke.
- Fasten the housing to the caps with interposed shims **2** selected to obtain .11 to .17 mm (.0040 to .0067 in) backlash in position **B**.
- Remove screws **1**.

VALVEGEAR

	mm	in
Valve gear backlash	.04 to .12	.0016 to .0047
Camshaft bush O.D. (120 C Tractor)	49.098 to 49.136	1.9330 to 1.9345
Bush interference fit in block (120 C Tractor)	.073 to .136	.0029 to .0053
Bush fitted I.D. (120 C Tractor)	46.055 to 46.090	1.8132 to 1.8145
Camshaft journal dia.		
– 90 C tractor	48.950 to 48.975	1.9272 to 1.9281
– 120 C tractor	45.950 to 45.975	1.8090 to 1.8100
Camshaft journal clearance in block (90 C) or bushes (120 C)	.080 to .140	.0031 to .0055
Max. clearance	.25	.010
Thrust plate clearance in shaft recess	.060 to .110	.0024 to .0043
Max. tappet O.D.	26.939 to 26.960	1.0606 to 1.0614
Tappet clearance in block	.040 to .094	.0016 to .0037
Max. clearance	.15	.006
Tappet oversize	.2 – .4	.008 – .016
Idler gear jackshaft O.D.	29.959 to 29.980	1.1795 to 1.1803
Idler gear bush fitted I.D.	30.040 to 30.061	1.1827 to 1.1835
Jackshaft clearance in bush	.060 to .102	.0027 to .0040
Max. clearance	.25	.010
Bush interference fit in idler gear	.009 to .073	.0003 to .0029
Rocker shaft dia.	21.015 to 21.036	.8274 to .8282
Rocker bore dia.	21.040 to 21.070	.8283 to .8295
Shaft clearance in rocker	.004 to .055	.0001 to .0022
Max. clearance	.100	.004
Spacer spring length		
– Free	95	3.74
– Under 2.25 to 2.75 kg (5 to 6 lb)	62	2.44
Valve guide O.D.	14.028 to 14.039	.5523 to .5527
Valve guide oversize	.080	.0031
Guide interference fit in head	.010 to .039	.0004 to .0015
Valve guide protrusion		
– Inlet	2	.079
– Exhaust	9	.354
Valve stem dia.	7.945 to 7.960	.3128 to .3134
Valve guide fitted I.D. after reaming	7.990 to 8.010	.3145 to 3153
Valve stem clearance in guide	.030 to .065	.0012 to .0025
Max. clearance	.130	.0051

VALVEGEAR

	mm	in
Valve head dia.		
Inlet		
– 90 C	48.200 to 48.500	1.8976 to 1.9094
– 120 C	42.700 to 43.000	1.6811 to 1.6929
Exhaust		
– 90 C	40.700 to 41.000	1.6024 to 1.6142
– 120 C	36.200 to 36.500	1.4252 to 1.4370
Valve face angle	45° 15′ $^{0}_{+5'}$	
Max. valve eccentricity over one revolution with stylus on valve face	.04	.0016
Cam lift		
– 90 C	7.107	.2798
– 120 C	7.300	.2874
Valve lift		
– 90 C	12.255	.4825
– 120 C	12.441	.4898
Valve fitted depth	See page 1	
Valve spring length		
– Free	49.3	1.9409
– Under 22.5 to 24.9 kg. (50 to 55 lb)	42	1.6535
– Under 61.1 to 67.5 kg. (135 to 149 lb)	29.5	1.1614

LUBRICATION – COOLING

Oil pump		
Type	Gear	
Drive	Crankshaft	
Drive ratio		
– 90 C	1.45 to 1	
– 120 C	.71 to 1	
Warm oil pressure on full throttle	4 to 4.5 kg/cm²	57 to 64 psi
Relief valve crack - off setting	5 kg/cm²	71 psi
Relief valve spring length		
Free	69.7 to 71.3	2.74 to 2.81
Under 11 kg	48.5	1.91
Water pump		
Type	Centrifugal, vane	
Drive ratio	1.384 to 1	
Thermostat		
Make	SAVARA or Behr-Thomson	
Opening temperature		
– 90 C	83 ± 2° C	
– 120 C	79 ± 2° C	
Fully open at	94° C	
Valve travel when fully open		
– 90 C	7.5	.30
– 120 C	10	.40

Model 90C – BOSCH PUMP CALIBRATION DATA

Type PES4A90D . . . . – **770931**

PUMP DATA

Element: EPPK320P 10Z - 9003227; Dia. 9 mm (.35 in) ; Pitch: 15 mm (.59 in) Helix: L.H.

Check valve: 9009574 Valve spring: 9009576 Spring length: 32.1 to 32.5 mm (1.26 to 1.28 in)

Valve adapter: 9009577 Adapter torque: 4.5 to 5 kgm (32 to 36 lb ft)

GOVERNOR: EP/RSV 325 - 1000A 4B 1078DL

SUPPLY PUMP: FP/KF22A D23/2 Supply pressure : 1.8 to 2.5 kg/cm² (25.6 to 35.5 psi)

INJECTORS

FIAT	EPPZ 10F1 – 767407 (+)
BOSCH	8828484
C.A.V.	EPPZ 60F7 – 771024
OMAP	EPPZ 70F7 – 770944

Nozzle holder

FIAT	KB82 S1F11 – 767406
BOSCH	KBL82 S166/4 – 8828487
C.A.V.	BKBL 82S 5399 – 771030
OMAP	OKLL 82S 7850 – 770945

Nozzle

FIAT	DLL 150S 51F – 767404
BOSCH	DLLA 150S 527 – 8828488
C.A.V.	BDLL 150S 6694 – 771025
OMAP	OLL 150S 51F – 770945

orifice dia.: .30 mm (.012 in)
No. of orifices: 4

Release pressure { 195 to 205 kg/cm² / 2773 to 2916 psi } Spring: WSF 2044/6X –656829 (+) Spring length { 27 to 27.5 mm / 1.06 to 1.08 in }

Delivery pipes
- FIAT - 6 x 1.5 x 270/345 mm
- BOSCH - CAV - OMAP - 6 x 1.5 x 290/365 mm

DRIVE COUPLING: PZR7F 3X 4X 1X - 760566 770962 758116

ASSEMBLY DATA

Pump rotation (drive end): Clockwise Firing order: 1 - 3 - 4 - 2

Plunger lift to spill cut - off: 2.2 ± .05 mm (.086 ± .02 in)

Pump timing 26° to 27° BTDC

Max. fuel control travel: .1 mm (.004 in)

Governor spring adjustment: Screw in fully and back off through (2 turns).

ENGINE: Data

TEST PLAN

PROCEDURE A : BOSCH machine, WSF 2044/4X injector springs, EFEP 182 nozzles.
RABOTTI machine, FIAT 656829 injector springs, EFEP 182 nozzles.
Release pressure: 175 kg/cm² (2489 psi) Piping: 2 x 6 x 600 mm

PROCEDURE B : Machine equipped with production injectors as fitted on engine.
Release pressure: 195 to 205 kg/cm² (2773 to 2916 psi) Piping: 2 x 6 x 600 mm

Fuel data : Density at 37° to 43°C 820 to 840 gramme/litre.

THROTTLE	SPEED rpm	CONTROL ROD STROKE mm	PROCEDURE A		PROCEDURE B	
			Injector delivery	Pump output*	Injector delivery	Pump output*
			cm³ per 1000 shots		cm³ per 1000 shots	
Idling	325 $^{+0}_{-10}$	6 ± 0,5	16 ± 1	–	20 ± 1	–
Full	• 1000 $^{+0}_{-10}$	10 ± 0,1	87 ± 2	348 ± 3	82 ± 2	328 ± 3
Full (1)	500 ± 10	10,1 ± 0,1	77 ± 2	308 ± 3	79 ± 2	316 ± 3
Full (2)	100	–	120 min.	–	120 min.	–

• Governor cut - in range 1000 to 1010 rpm.
* Control rod stop adjustment.
(1) Maximum fuel control testing.
(2) Excess fuel testing.

ON-BENCH PERFORMANCE DATA

Test Plan:

- Engine on bench with fan, air cleaner and exhaust silencer removed;
- Barometric pressure: 740 ± 5 Hg at 239 metres (785 ft) above sea level;
- Ambient temperature 20° ± 3°C;
- Relative humidity 70% ± 5%;
- Fuel density 830 ± 10 grammes/litre.

Throttle	Engine rpm	Metric HP		Time to burn 250 cc (15 in³) of fuel (seconds)
		2 - hour run - in	50 - hour run - in	
Maximum, full load	2000	91 min.	93 min.	46 to 47,5
Maximum	1000	46 min.	47 min.	88,5 to 93,5
Maximum, no load	2170 ± 10	–	–	–
Minimum, no load	650	–	–	–

Model 120 C – FIAT PUMP CALIBRATION DATA

Type PES6A90B410 : L4/177 – 770977

PUMP DATA

Element: EPPK202 F 5Z - 766061 Dia.: 9 mm (.35 in) ; Pitch: 12 mm (.59 in) ; Helix: L.H.

Check valve: PVE161 S2Z - 755708 Valve spring: PSF 9S3X - 754799

Spring length: 32.4 to 32.9 mm (1.27 to 1.29 in) ; Valve adapter: PRV 122S1X – 746368 ; Adapter torque: 4.5 to 5 kgm (32 to 36 lbft)

GOVERNOR: RPVA 250 - 1000 F 144 – 768226

SUPPLY PUMP: FP/KS22A:L4/4 - 763150 – Supply pressure: 1.6 to 1.8 kg/cm² (22.7 to 25.6 psi)

INJECTORS	FIAT	EPPZ 10F1 – 767407 (+)
	BOSCH	8828484
	C.A.V.	EPPZ 60F7 – 771024
	OMAP	EPPZ 70F7 – 770944

Nozzle holder	FIAT	KB82 S1F11 – 767406
	BOSCH	KBL82 S166/4 – 8828487
	C.A.V.	BKBL 82S 5399 – 771030
	OMAP	OKLL 82S 7850 – 770942

Nozzle	FIAT	DLL 150S 51F – 767404	orifice dia.: .30 mm (.012 in)
	BOSCH	DLLA 150S 527 – 8828488	No. of orifices: 4
	C.A.V.	BDLL 150S 6694 – 771025	
	OMAP	OLL 150S 51F – 770945	

Release pressure { 195 to 205 kg/cm² / 2773 to 2916 psi } ; Spring: WSF 2044/6X –656829 (+) ; Spring length { 27 to 27.5 mm / 1.06 to 1.08 in }

Delivery pipes { FIAT - 6 x 1.5 x 345/280/310/345/440/500 mm
BOSCH - CAV - OMAP - 6 x 1.5 x 370/255/305/370/460/525 mm }

DRIVE COUPLING: PZR7F1X - 758116

ASSEMBLY DATA

Pump rotation (drive end): Clockwise Firing order: 1 - 5 - 3 - 6 - 2 - 4

Plunger lift to spill cut-off: 2.2 ± .05 mm (.020 ± .002 in)

Pump timing: 25° ± 30′ BTDC.

Governor spring pin protrusion above lock ring: .5 to 1.5 mm (.020 to .060 in)

Max. fuel control travel: .4 to .5 mm (.016 to .020 in)

ENGINE: Data

TEST PLAN

PROCEDURE A : BOSCH machine, WSF 2044/4X injector springs, EFEP 182 nozzles.
RABOTTI machine, FIAT 656829 injector springs, EFEP 182 nozzles.
Release pressure: 175 kg/cm² (2489 psi) Piping: 2 x 6 x 600 mm

PROCEDURE B : Machine equipped with production injectors as fitted to engine.
Release pressure: 195 to 205 kg/cm² (2773 to 2916 psi) Piping: 2 x 6 x 600 mm

Fuel data : Density at 37° to 43°C 820 to 840 gramme/litre.

THROTTLE	SPEED rpm	CONTROL ROD STROKE mm	PROCEDURE A		PROCEDURE B	
			Injector delivery	Pump output*	Injector delivery	Pump output*
			cm^3 per 1000 shots		cm^3 per 1000 shots	
Idling	$300\ ^{+0}_{-10}$	9 ± 0,5	23 ± 1	–	21 ± 1	–
Full	•$1000\ ^{-10}_{+0}$	12,2 ± 0,1	75 ± 2	450 ± 3	67 ± 2	402 ± 3
Full (1)	500 ± 5	–	–	408 ± 3	–	384 ± 3
Full (2)	200	–	120 min.	–	120 min.	–

● Governor cut-in range 1000 to 1010 rpm.
* Control rod stop adjustment.
(1) Maximum fuel control testing.
(2) Excess fuel testing.

ON - BENCH PERFORMANCE DATA

Test Plan:
– Engine on bench with fan, air cleaner and exhaust silencer removed;
– Barometric pressure 740 ± 5 Hg at 239 metres (785 ft) above sea level;
– Ambient temperature: 20° ± 3°C;
– Relative humidity: 70% ± 5%;
– Fuel density: 830 ± 10 grammes / litre.

Throttle	Engine rpm	Metric HP		Time to burn 250 cc (15 in^3) of fuel (seconds)
		2 - hour run - in	50 - hour run - in	
Maximum, full load	2000	111 min.	113 min.	37.4 to 39
Maximum	1000	59 min.	60 min.	73.8 to 77.8
Maximum, no load	2170 max.	-	–	–
Minimum, no load	550 to 600	–	–	–

Model 120 C – BOSCH PUMP CALIBRATION DATA
Type PES6A90D . . . . . – 770934

PUMP DATA

Element: EPPK320 P 10Z - 9003227 ; Dia.: 9 mm (.35 in) Pitch: 15 mm (.59 in) Helix: L.H.

Check valve: 9009574 ; Valve spring: 9009576 ; Spring length: 32.1 to 32.5 mm (1.26 to 1.28 in)

Valve adapter: 9009577 ; Adapter torque: 4.5 to 5 kgm (32 to 36 lbft)

GOVERNOR: RQV 325 - 1000

SUPPLY PUMP: FP/KS22A D23/2 – Supply pressure: 1.8 to 2.5 kg/cm² - (25.6 to 35.5 psi)

INJECTORS	FIAT	EPPZ 10F1 – 767407 (+)
	BOSCH	8828484
	C.A.V.	EPPZ 60F7 – 771024
	OMAP	EPPZ 70F7 – 770944

Nozzle holder	FIAT	KB82 S1F11 – 767406
	BOSCH	KBL82 S166/4 – 8828487
	C.A.V.	BKBL 82S 5399 – 771030
	OMAP	OKLL 82S 7850 – 770942

Nozzle	FIAT	DLL 150S 51F – 767404	orifice dia.:.30 mm (.012 in); No. of orifices: 4
	BOSCH	DLLA 150S 527 – 8828488	
	C.A.V.	BDLL 150S 6694 – 771025	
	OMAP	OLL 150S 51F – 770945	

Release pressure { 195 to 205 kg/cm² / 2773 to 2916 psi } ; Spring: WSF 2044/6X –656829 (+) ; Spring length { 27 to 27.5 mm / 1.06 to 1.08 in }

Delivery pipes:
FIAT - 6 x 1.5 x 345/280/310/345/440/500 mm
BOSCH - CAV - OMAP - 6 x 1.5 x 370/255/305/370/460/525 mm

DRIVE COUPLING: PZR7F1X - 758116

ASSEMBLY DATA

Pump rotation (drive end): Clockwise Firing order: 1 - 5 - 3 - 6 - 2 - 4

Plunger lift to spill cut-off: 2.2 ± .05 mm (.086 ± .002 in)

Pump timing: 25° ± 30' BTDC.

Max. fuel control travel: .3 to .4 mm (.012 to .016 in)

TEST PLAN

PROCEDURE A : BOSCH machine, WSF 2044/4X injector springs, EFEP 182 nozzles.
RABOTTI machine, FIAT 656829 injector springs,
EFEP 182 nozzles.
Release pressure: 175 kg/cm² - (2489 psi) Piping: 2 x 6 x 600 mm

PROCEDURE B : Machine equipped with production injectors as fitted to engine.
Release pressure: 195 to 205 kg/cm² - (2773 to 2916 psi) Piping: 2x6x600 mm

Fuel data : Density at 37° to 43° C: 820 to 840 gramme/litre.

THROTTLE	SPEED rpm	CONTROL ROD STROKE mm	PROCEDURE A		PROCEDURE B	
			Injector delivery	Pump output *	Injector delivery	Pump output *
			cm^3 per 1000 shots		cm^3 per 1000 shots	
Idling	325 $^{+0}_{-10}$	8 ± .5	20 ± 1	–	24 ± 1	–
Full	• 1000 $^{-10}_{+0}$	10,4 ± .1	75 ± 2	450 ± 3	67 ± 2	402 ± 3
Full (1)	500 ± 5	10,7 ± .1	–	408 ± 3	–	384 ± 3
Excess fuel (2)	100	15 ± .1 (o)	100 to 110	–	105 to 115	–

● Governor cut-in range 1000 to 1010 rpm.
* Control rod stop adjustment.
(o) Control rod stop adjustment on cap (pump drive side).
(1) Maximum fuel control testing.
(2) Excess fuel testing.

ON - BENCH PERFORMANCE DATA

Test Plan:
- Engine on bench with fan, air cleaner and exhaust silencer removed;
- Barometric pressure: 740 ± 5 Hg at 239 metres (785 ft) above sea level;
- Ambient temperature: 20 ± 3°C;
- Relative humidity: 70% ± 5%;
- Fuel density: 830 ± 10 grammes / litre.

Throttle	Engine rpm	Metric HP		Time to burn 250 cc (15 in^3) of fuel (seconds)
		2 - hour run - in	50 - hour run - in	
Maximum, full load	2000	111 min.	113 min.	37.4 to 39
Maximum	1000	59 min.	60 min.	73.8 to 77.8
Maximum, no load	2210 ± 10	–	–	–
Minimum, no load	650	–	–	–

TIGHTENING TORQUE DATA

DESCRIPTION	Thread Size	Reference	Torque	
			kgm	lb ft
Nut, cylinder head	M16 x 1.5	C_1, pages 17 and 18	25	181
– 90 C	M18 x 1.5		33	239
– 120 C	M16 x 1.5		23	166
Screw, fuel pump shaft to gear	M 8 x 1.25	–	2.5	18
Screw, idler gear jackshaft	M 8 x 1.25	C_2, pages 17 and 18	2.5	18
Screw, crankshaft pulley				
– 90 C	22 x 1.5	C_3, pages 17 and 18	40	289
– 120 C	22 x 1.5		57	412
Screw, main bearing cap				
– 90 C	M16 x 1.5	C_4, pages 17 and 18	21	152
– 120 C	M16 x 1.5		17	123
Screw, conn. rod cap				
– 90 C	M14 x 1.5	C_5, pages 17 and 18	15	108
– 120 C	M13 x 1.5		12.5	90
Screw, balancer housing (90 C)	M10 x 1.25	–	5	36
Screw, balancer housing to block (90 C)	M10 x 1.25	–	5	36
Screw, flywheel	M14 x 1.5	C_6, pages 17 and 18	15	108