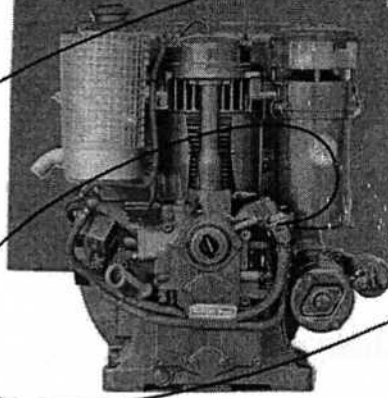


Technical Data



		14D	15D15B	15W (K34)	18D18B (K64)	18W	21A	29C	32A	32W	37E42E	43F	25E26E (L20/L28)	36A38A (A10/A12)	36E38E (A20/A22)	41A41E (A14/A24)	71A75A (R10/R12)	71W75W (R30/R32)	95A (S10)	95W (S30)
● Available		○	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○
Cooling system		Air																		
Number of cylinder		4																		
Bore		70	75	vertical		82	86	90	vertical		95	horizontal		vertical		horizontal		vertical/hor.		
Stroke		mm	mm	mm		mm	mm	mm	mm		mm	mm		mm		mm		mm		
Total displacement		231	242	250		348	470	470	524		708	708		582/618		582/618		678		
max. Output net		236	3,9	4,3	4,7	4,3/5,2	7,35	7,9	8,8	8,8	8,3/9,7	11,0	5,9/6,7	7,7/8,8	7,7/8,8	8,5	8,0/7,8	10,5/12,0	11,5	
DIN 6271, I-P-N-ISO		4,00	5,3	5,9	6,4	5,8/7,1	10,00	10,7	12,0	12,0	11,3/13,2	15,0	8,0/7,8	10,5/12,0	10,5/12,0	11,5	8,0/7,8	10,5/12,0	11,5	
max. Speed		mm ¹	mm ¹	3600	3600	1300	3600	3600	3600	3600	3000	3000/2500	3000	3000	2230	1860/2230				
Oiling capacity *		222	685	880	1100	860	1100	1300	1380	1380	1860	1860	2020	1860	2230	1860/2230				
Flywheel dia		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Values		mm																		
Inlet valve		29	20-25/28-32	12-17	20-25/28-32	12-17	25-30	24-30	14-20	103-114	103-114	30-35	35-45	45-55	35-45/45-55					
Exhaust valve		29	15-20	10-15	15-20	0-15	18-24	16-24	12-18	155-148	155-148	25-30	10-12	10-12	30-40	12/10				
End of delivery of injection pump with control edge located above		1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800				
End of delivery of injection pump with control edge located below		1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800				
Begin of delivery of injection pump PVE (0.004/2 with control edge located below		1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800				
Nucleic injection pressure		200	200	200	200	200	200	200	200	200	200	200	200	200	200	200				
Nucleic injection pressure (value + actual value)		200	200	200	200	200	200	200	200	200	200	200	200	200	200	200				
Intake valve		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Exhaust valve		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
piston		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Gap measurement		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Rins and gap		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Compressed pressure		bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar				
Crankshaft sliding		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Clearance		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Connecting rod		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Sliding clearance		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Oil pressure ***		bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar	bar				
Crankshaft and play		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Tightening torque		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Flywheel		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				
Speed governor		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				

* oil filter change : 1 - Cyl. - Engines + 80 g ** Engines for generator- and pump drive *** cold engine, valve seat 45° **** at 100 °C oil temperature 800 S3 84/01 2000



REPAIR MANUAL

DIESEL ENGINE

15 A/B/D
18 A/B/C/D
29 C/32 A



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PREFACE

This Manual is for workshop use only and intended for use by experienced mechanics.

Only the standard type of engine models 15B/D 18B/D 29C/32A are illustrated and dealt with.

Because there are, however, many different type variants which can differ to a greater or lesser degree from the standard type described, this Manual can and should be used only as a guideline. Because some work is very complicated, **we recommend that the Manual be completely read before starting repairs.**

The repair of **FARYMANN DIESEL** engines requires some special tools in addition to standard ones. Their use is strongly recommended.

All safety precautions are to be strictly observed, because otherwise:

- death or injury to the user or third parties can occur;
- the machine or other material assets of the user may be impaired;
- efficient operation of the machine may be jeopardized.

Every person in the user's business who is tasked with the installation, commissioning, operation, servicing or repair of engine must have read and understood the „Safety“ chapter of the Operating Instructions.

The engine may be serviced only by trained personnel. Any work procedure which impairs the safety of the engine is to be forbidden.

Modifications or changes to the engine or the use of non-original replacement parts without proper authority is not allowed on safety grounds and invalidates the liability of the **FARYMANN DIESEL COMPANY**.

This Workshop Manual is technically up-to-date at the time of going to press. Every care was taken in its compilation to avoid errors.

We are, however, not responsible for any errors in illustrations or descriptions or for any omissions. There may also be changes due to technical developments.

We reserve the right to make changes without prior notice

I.1. Introduction to Diesel Engines

Nowadays diesel engines are well known and quite common in all kinds of machinery and equipment as an alternative to the well established gasoline engine.

Most people who are fully familiar with gasoline engines are reluctant to deal with a Diesel. This is without any reason, in fact, **you already know more about a Diesel** than you may have thought. If you are already familiar with the gasoline 4-stroke engine, study the comparison below. It will show the differences between a 4-stroke Diesel and a 4-stroke gasoline engine.

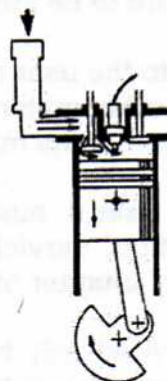
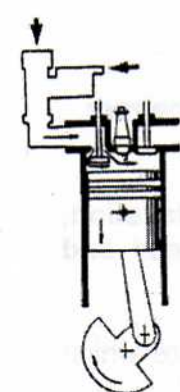
Gasoline

Diesel

I. Intake stroke

The downwards movement of the piston draws a mixture of gaseous fuel and air through the open inlet valve into the cylinder.

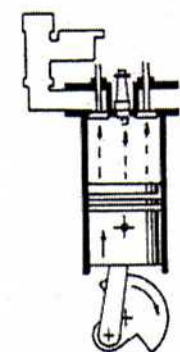
The downwards movement of the piston draws only air through the open inlet valve into the cylinder.



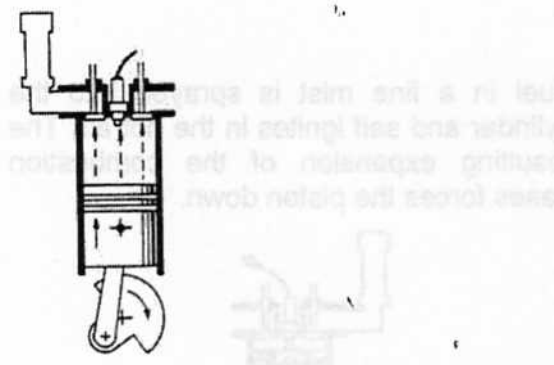
II. Compression stroke

The upwards movement of the piston compresses the fuel/air mixture. The temperature rises through the compression stays below the self-ignition point of the fuel.

The upwards movement of the piston compresses the air, which causes the temperature to rise above 500 C (932 F).

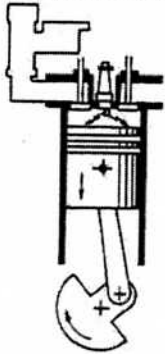


I. GENERAL INFORMATION

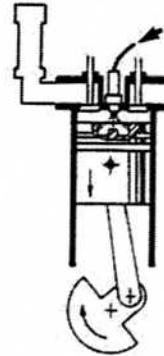


III. Power stroke

A spark created by a spark plug ignites the fuel. The resulting expansion of the combustion gases forces the piston down.

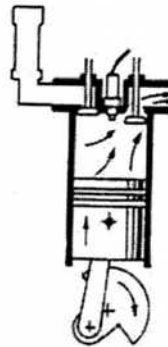
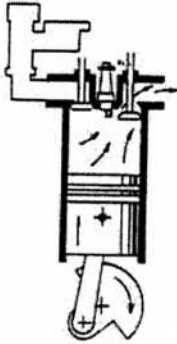


Fuel in a fine mist is sprayed into the cylinder and self ignites in the hot air. The resulting expansion of the combustion gases forces the piston down.



IV. Exhaust stroke

The upwards movement of the piston forces the exhaust gases through the open exhaust valve. This stroke is identical on both engines.



Both engines are of the internal combustion design because they burn fuel within the engine.

Both engines require fuel, air and a method of igniting the fuel.

Both engines can be of 2 - or 4 cycle design.

Both engines can be aircooled or watercooled.

The basic differences are:

The gasoline engine has an external mixture (carburetor) of the fuel and combustion air. It needs an electric source (spark plug) to ignite the fuel.

The diesel engine draws in only air. It has an internal mixture of fuel and combustion air. The fuel is self-ignited by the high temperature of the compressed air.

To ensure that the air temperature is high enough to ignite the fuel, a diesel engine has a very high compression ratio compared to a gasoline engine. The diesel engine does not need an ignition system, due to the self-ignition of the fuel. Needed are a injection pump, fuel lines and a fuel injector. The injector is often called the heart of the diesel engine. It is a precision manufactured assembly, built to rigid specifications and clearances. It performs almost the same duties as a carburetor. An injection pump delivers fuel to the injector where it is sprayed into the cylinder. Another difference between diesel and gasoline engines is that a diesel engine does not use a throttle valve. The governing is done by varying the amount of fuel injected into the cylinder.

Wherever sturdiness, reliability, fuel economy and long service life are required, the diesel engine is the right choice.

I. GENERAL INFORMATION

I.2. Farymann Diesel engine

All **Farymann Diesel** engines are 4 stroke, direct injection diesel engines. They are built as single cylinder engines in vertical and horizontal cylinder configuration. The direct injection guarantees an outstanding efficiency with low fuel consumption and excellent cold starting abilities. Robert Bosch fuel injection equipments are used on all engines. A high precision centrifugal governor totally enclosed in the crankcase links to the fuel injector pump and to the speed control lever. The flywheel fan cools the engine, eliminating troublesome V-belts. Air is drawn into the flywheel fan and routed through shrouding to the cooling fins of the cylinder head.

I.3. Engine identification

Until July 1982 the engine nomination system consisted of a 10 figure code.

For example:

35K54 0715 F

35 = code figure for the year of manufacture

K54 = engine type

0715 = serial number

F = code figure for month of manufacture

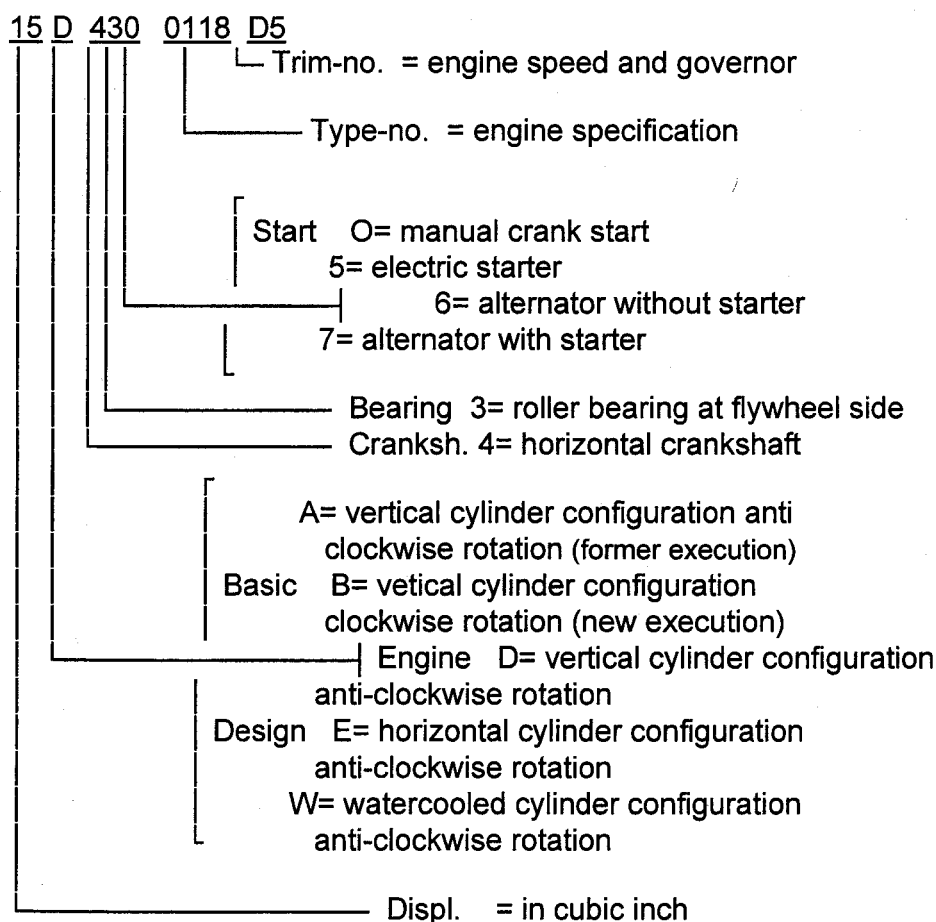
Effective July 1982 the new system consists of a 12 figure code system in addition to the serial number (see engine name plate).

For example:

15D430 0118 D5

86 03 20

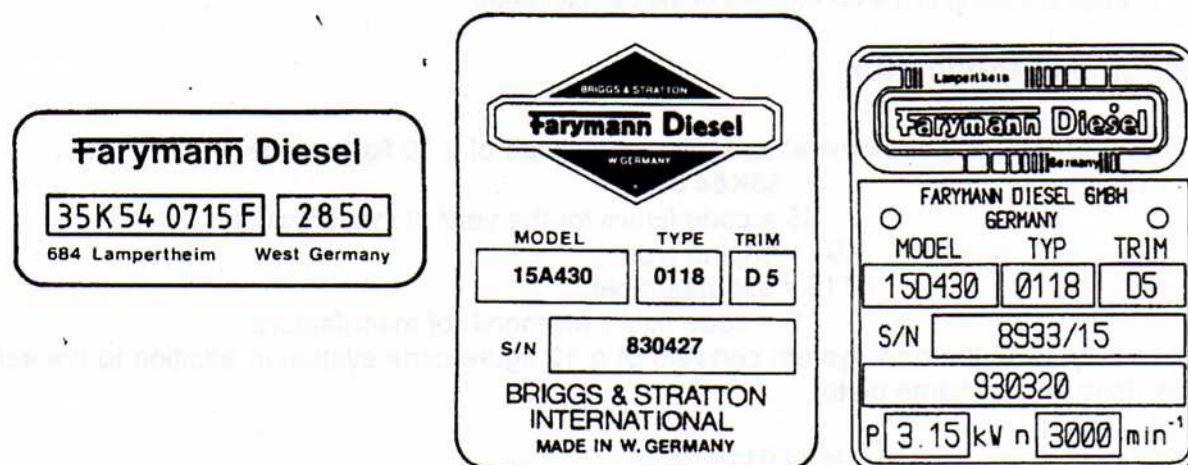
manufacturing date



I. GENERAL INFORMATION

I.3. Engine identification

An engine name plate is affixed to every engine. In addition to the name plate the engine order number and, effective July 1985, the running engine number are also stamped on the crankcase.



The complete engine code must be quoted when ordering spare parts in order to supply the correct parts for the engine.

I.4. Cross reference old - new engine type

up to 1982	since 1982
K54/15A	model range 15D
K55	model range 15B
K64/18A/C	model range 18D
K65	model range 18B
K34	model range 15W/18W
K10	model range 29C

II.1. General engine data

Specifications/engine type	15B/D	18B/D	29C	32A	
Number of cylinders	one, vertical				
Combustion	direct injection, 4 stroke				
Bore/Stroke	mm(inch)	75/55	82/55	90/74	95/74
Total displacement	cm3(inch)	242	290	470	524
Compression ratio		1:20	1:20	1:19	1:20
Direction of rotation	A+G+D: counter clockwise when viewed flywheel				
	B : clockwise when viewed flywheel				

Performance data (full load)

Working speed, max.	min ⁻¹		3600		
Idle speed, min.	min ⁻¹		900-1000		
Output „A“ DIN 6270	kW (Hp)	3.5 (4.8)	4.2 (5.7)	6.6 (9)	7.1 (9.7)
„B“ DIN 6270	kW (Hp)	3.9 (5.3)	4.7 (6.4)	7.35 (10)	7.9 (10.7)
„F“ DIN 70020	kW (Hp)	4.3 (5.8)	5.1 (6.9)	8.1 (11)	8.7 (11.8)
Mean piston speed	m/sec.	6.6	6.6	8.88	8.88
Torque („F“ output) (Nm / min ⁻¹)		12.5/2400	15.2/2500	24.5/2400	27.5/2400
Lub. oil pressure max.	bar	4.0	4.0	5.0	5.0
(at 100°C (220°F) oil temp.)					
Lub. oil pressure min.	bar	1.8	1.8	2.0	2.0
(at 100°C (220°F) oil temp.)					
Fuel consumption	g/kWh	330	310	295	300
Lub. oil consumption	g/kWh	1.0	1.0	1.0	1.0
Exhaust back pressure max.	kPa	5.0	5.0	5.0	5.0
Intake underpressure max.	kPa	2.0	2.0	2.0	2.0

Operation temperatures

Lub. oil max.	°C (°F)	130 (317)	130 (317)	130 (317)	130 (317)
Exhaust gas in manifold max.	°C (°F)	580 (1,415)	580	580	580
Entering cool. air max.	°C (°F)	50 (122)	50	50	50
At cooling air (at outlet cyl.-head)	°C (°F)	50 (122)	50	50	50

Capacity

Lub. oil	dm ³ (gal)	1.0 (0.264)	1.0	1.6	1.6
Fuel tank	dm ³ (gal)	4.0 (1.056)	4.0	6.8	6.8

Weight

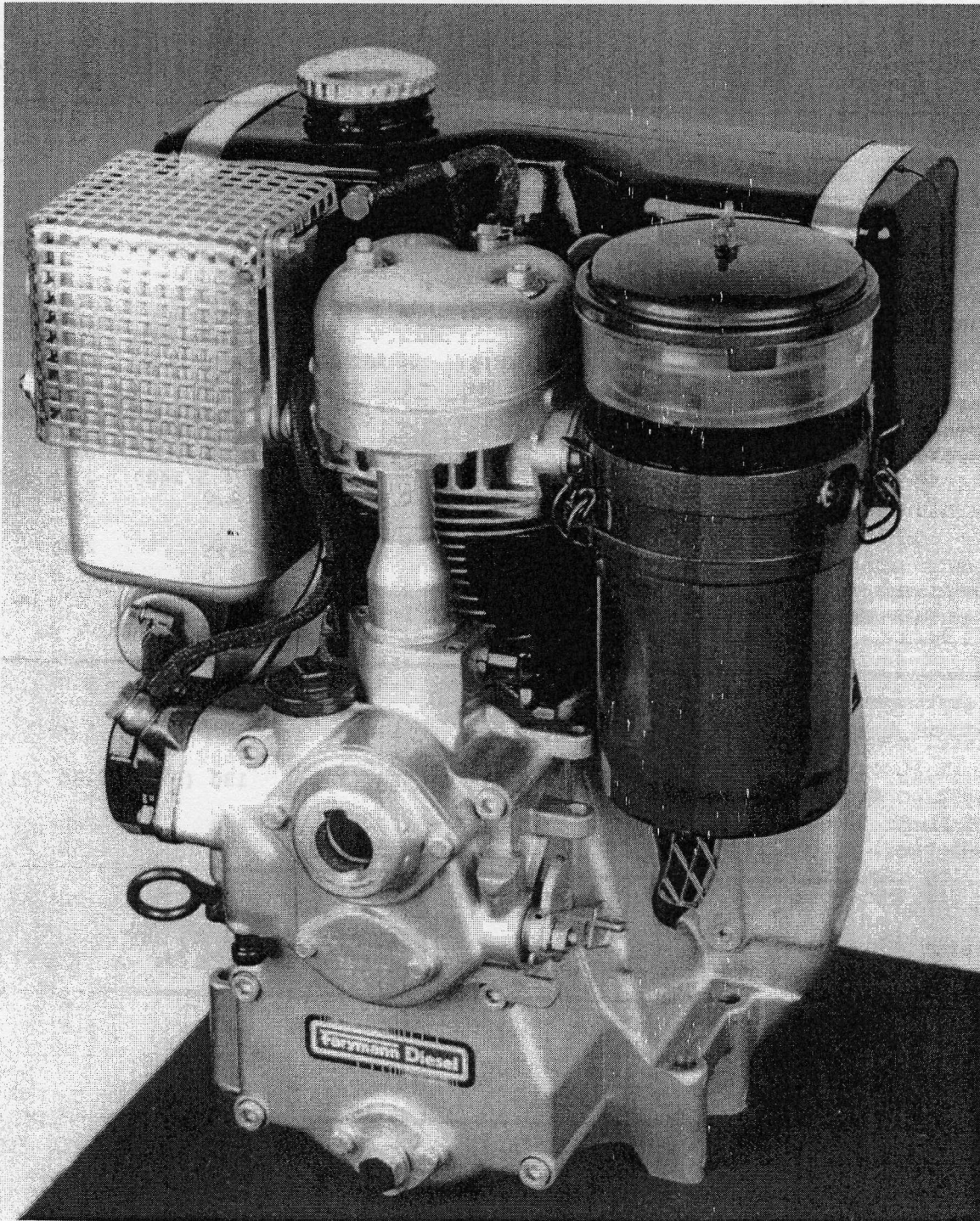
Engine (dry, standart, flywheel)	kg (lb)	39.5 (87)	41.0 (90)	70.0 (154)	72.0 (158)
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Setting data

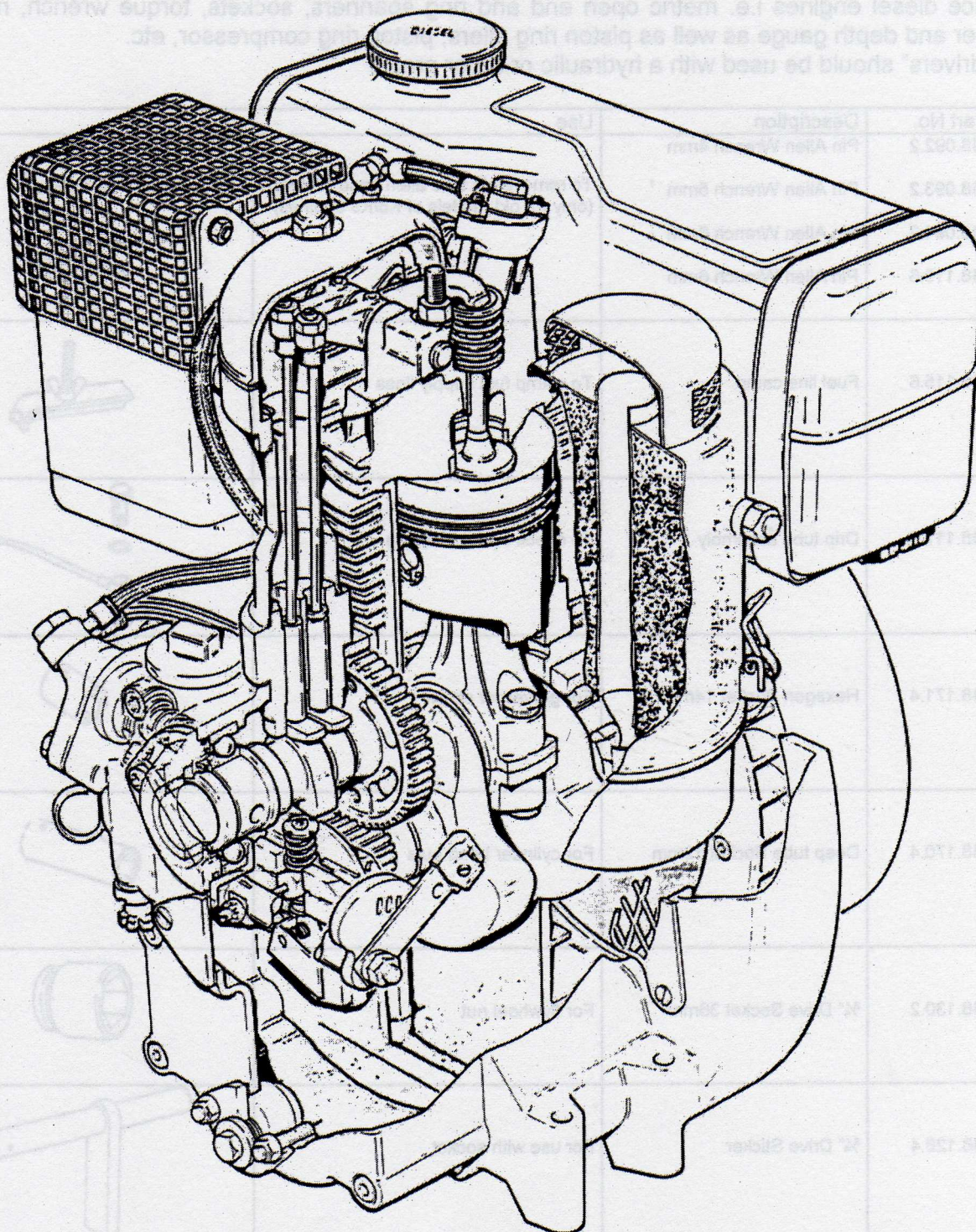
Valve clearance cold engine	mm (inch)	0.1 (0.004)	0.1	0.1	0.1
injection pressure	bar	200	200	175	175

Working angle (standart oilpan)

lengthwise	deg.	25	25	25	25
crosswise	deg.	25	25	25	25


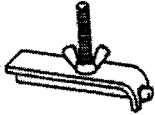
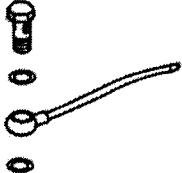


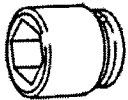
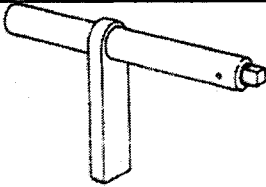



II. TECHNICAL DATA




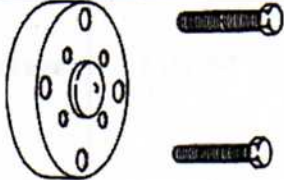








II.4. Special Tool List




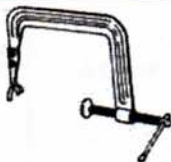



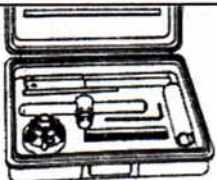
It is assumed that authorized **Farymann Diesel** Dealers have all of the common tools needed to service diesel engines i.e. metric open end and ring spanners, sockets, torque wrench, metric caliper and depth gauge as well as piston ring pliers, piston ring compressor, etc.
All "drivers" should be used with a hydraulic or arbor press.

Part No.	Description	Use	
748.092.2	Pin Allen Wrench 4mm	To remove pin type allen head screws (only for old models of K5/K6 engines)	
748.093.2	Pin Allen Wrench 5mm		
748.094.2	Pin Allen Wrench 6mm		
748.116.6	Pin Allen Wrench 6mm		
748.115.6	Fuel line clamp	To clamp fuel supply lines	
748.117.6	Drip tube assembly	To check injection timing	
748.171.4	Hexagon Socket 14mm	For governor screw	
748.170.4	Deep tube Socket 13mm	For cylinder head nuts	
748.130.2	3/4" Drive Socket 36mm	For flywheel nut	
748.128.4	3/4" Drive Sticker	For use with socket	
748.108.5	Governor spring tool	To adjust governor spring tension	

II. TECHNICAL DATA

748.132.6	Cranksh. Race Puller	Use with puller to remove crankshaft roller bearing race	
748.137.2	Crankshaft Gear Puller	Use with puller to remove crankshaft gear wheel	
748.136.2	Puller	For parts 148.132.6 and 748.137.2	
748.122.6	Flywheel Puller	To remove flywheel from crankshaft taper	
748.119.4	Bearing driver	To install crankshaft roller bearing outer race and radial oil sealing ring	
748.120.4	Bearing Driver	To remove and install crankshaft bearing bushing and to remove camshaft roller bearing	
748.121.4	Bearing Driver	To remove and install camshaft	
748.124.4	Bearing Driver	To remove crankshaft roller bearing outer race and to install camshaft roller bearing	
748.173.2	Oilfilter Socket	To remove oilfilter	
748.172.4	Bearing Driver	To remove and install conrod bearing bushing	

III. ENGINE REPAIR

748.129.4	Bearing Driver	To remove and install regulation shaft bushing	
748.123.4	Bearing Driver Handle	Treated handle for various bearing drives	
748.125.4	Valve Guide Driver	To remove and install valve guides	
748.131.5	Valve Spring Compr.	To remove and install valves	
748.135.2	Retaining Ring Pliers	To remove retaining rings	
748.126.2	Oil Pressure Gauge	To check engine oil pressure	
748.127.4	Gauge Adaptor	To connect oil pressure gauge at crankcase	
748.138.2	Valve reface kit	43 cutter to reface valve seats	
748.174.4	Holding device	To tighten and remove governor of partly assembled engine	