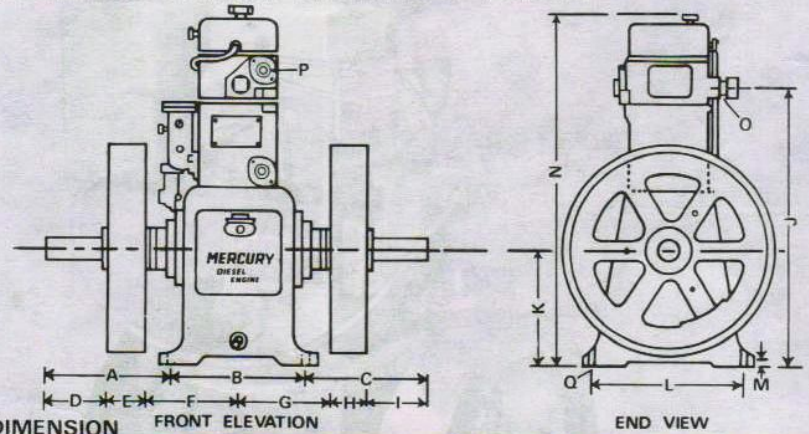


TECHNICAL DATA							
H.P.	KW	R.P.M.	Bore m.m.	Stroke m.m.	Fuel Consumption	Net Weight (Bare)	Gross Weight (Packing)
6	4.40	650	114.3	139.7	265	340	455
8	5.90	850	114.3	139.7	265	370	480
10 C.B.W.	7.35	1000	120.0	139.7	268	385	500
12 C.B.W.	8.80	1000	127.0	139.7	268	430	550
14 DI	10.30	1000	130	146	250	380	490
16 DI	11.80	1000	130	160	250	410	520

As Continuous improvements are Contemplated the illustration and description may not be latest or current.
 ★ C.B.W. Counter Balance Weight ★ DI Direct Injection

Standard Accessories : Exhaust Silencer, Air Cleaner, Fuel Tank with Bracket, Spanner Set, Screw Driver, Oil Can, Starting Handle and Instruction Book, Mercury Bag & Pulley.

DIMENSIONS AND OUTLINE DRAWING OF ENGINE



DIMENSION		FRONT ELEVATION		END VIEW	
NO	IN INCHES	IN C.M.	NO	IN INCHES	IN C.M.
A	11.50	29.21	G	8.75	22.22
B	13.00	33.02	H	3.50	8.90
C	11.50	29.21	I	5.75	14.60
D	5.75	14.60	J	31.50	80.00
E	3.50	8.90	K	12.50	31.75
F	8.75	22.22	L	13.00	33.00
			M	1.50	3.80
			N	39.00	99.06
			O	1 1/2 B.S.P.	—
			P	3/4 B.S.P.	—
			Q	1 1/2 BOLTS	12MM.



10 HP (7.35 kW)
 8 HP (5.8 kW)
 6 HP (4.4 kW)

Patel
 Engine
 (S.A.)
 Pvt. Ltd.
 Phone: 252700-4 (S.A.)
 Gram: PATLAD
 Fax: 0281-230777
 E-Mail: mercury@patel.com

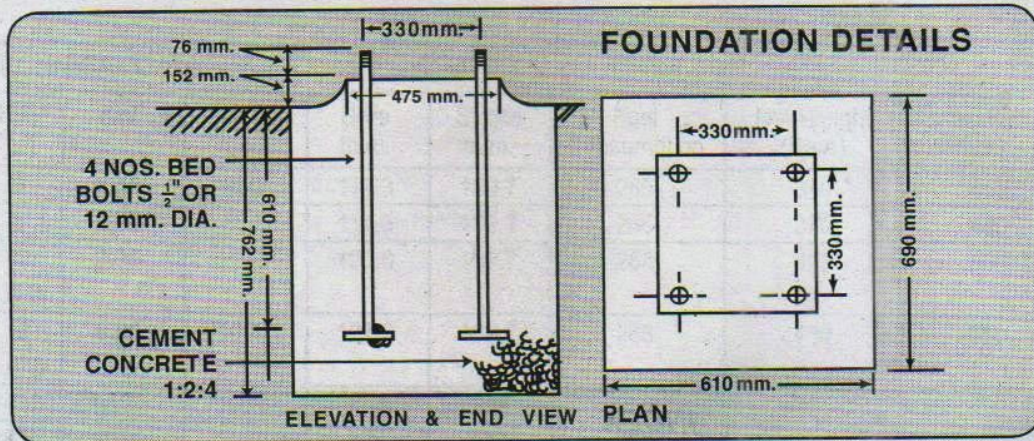
**instruction book
for
maintenance
and operation**

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INSTALLATION

(1) Your engine needs clean Diesel oil of standard make. (2) Your engine needs lubricating oil of correct grade. Maintain the correct oil level in sump. (3) Your engine needs abundant clean air. Engine Room should be well ventilated. Keep air cleaner clean. (4) Your engine needs genuine spare parts for its maintenance. (5) Your engine needs regular cleaning, oiling and attention. (6) Your engine needs tightening of all nuts after an initial run of 20 hours. Avoid overloading the engine.

FOUNDATIONS : The engine should always be installed on a good cement concrete foundation block. The composition for concrete mixture is 1:2:4. After pouring, the concrete should be allowed to set for at least three days before engine is bolted down, in very hot & dry climate, the block should be moistened with water during this setting period. Wit made up ground, soft water logged or poor sandy sub-soil, the size of the concrete block be suitably modified.

ERECTION : The Engine should be levelled up on foundation Block by placing thin metal strips under the engine feet just close to the foundation bolts.

In case of a coupled set, driven unit must be lined up with the engine and joined through a flexible coupling.

In case of belt driven unit the driving belt must run as close up to the Flywheel as possible to avoid undue strain on bearings and crankshaft. Where 'fast' and 'loose' pulleys are used, the 'fast' pulley must be nearest to the flywheel. An incorrectly installed engine may give endless trouble.

EXHAUST SYSTEM : A standard engine is fitted with an exhaust silencer. If the exhaust piping be extended to the out side of the building up to a length of 3 meters, the exhaust silencer can be fitted on the end of iron pipe screw 1 1/2" BSP.

If exhaust system is longer, following pipe size is recommended.

Pipe line :	Up to 3 meter	—	38.0 mm (1 1/2") Bore
	3 to 6 meter	—	50.8 mm (2") Bore
	6 to 10 meter	—	63.5 mm (2 1/2") Bore
	over 10 meter	—	76.0 mm (3") Bore

However, the exhaust system be as short as possible with a minimum number of bends and must be erected in easily detachable sections to facilitate cleaning during overhaul. Never embed in concrete. The faulty system can seriously reduce the power of the engine.

RUN THROUGH SYSTEM OF COOLING : Connect the inlet connection from the delivery of the pump to the water inlet on cylinder block. Connect suitable length of pipe to the water outlet on cylinder head for disposal of run through water.

FUEL SUPPLY :

(1) Type of fuel : Use clean High Speed Oil confirming the specification to B.S. No. 209-1947 class A or IS : 1460-1974. Insist on purchasing the fuel from authorized dealers of the oil companies Avoid supply

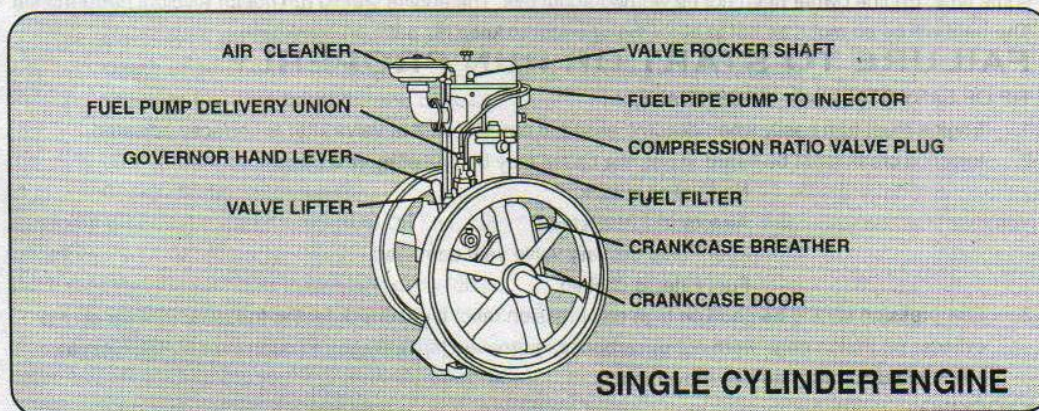
of residue oil or blend thereof Vaporising Oils are unsuitable as fuel for this engine, hence avoid add mixturing Kerosene or petrol with HSD.

- (2) The fuel oil system includes the following fitments for ensuring cleanliness and consequent dependable service of fuel injection equipments for a long period.
- (i) Fuel oil strainer with the tank is the primary filter to remove the foreign matters. Always make sure that the fuel oil strainer is in position. The fuel tank should be full at the end of the day's work to avoid the condensation of moisture from air in empty tank due to cold at night and to give time for settling any sediments before the engine is used again. Clean thoroughly the tank after every 250 hours (monthly) and strainer every alternate day by tapping on wooden block.
 - (ii) Fuel Oil Filter : The filter is fitted with 3 ply cotton braided element. Clean the element after every 250 hours run by washing in clean paraffin of fuel oil without removing from the cover.

Clean fuel is of the utmost importance in maintaining a high standard of performance.

LUBRICATION : The guarantee of the engine performance and durability is operative with the following or equivalent heavy duty Diesel Engine (Detergent) Lubricating oils of the standard oil company. For Guidance of the consumers, we give below the proprietary brands of Lubricating oil to be used according to different temperature conditions:

Brand oil	Below 4.4°	Bet 4.4° C to 30° C	Bet 30° C to 40° C	Over 40° C
Indian Oil	Delvac oil 910	Delvac oil 920	Delvac oil 930	Delac oil 940
Hindustan Petroleum	HP SAE 10	HP SAE 20	HP SAE 30	HP SAE 40
Burmah Shell	Rotella oil 10	Rotella oil 20	Rotella oil 30	Rotella oil 40
Esso	Esso Lub.	Esso Lub.	Esso Lub.	Esso Lub.
Caltex	SAE 10	SAE 20	SAE 30	SAE 40



Change of Lubricating Oil : (After every 250 hours run of the engine)

- (1) Drain the sump oil when the engine is hot and replace the drain plug.
- (2) Clean the sump chamber with clean cotton waste.
- (3) Pour the flushing oil of the standard company of 5 liters quantity.
- (4) Run the engine on the light load for about 15 minutes.
- (5) Drain the flushing oil. Clean the chamber.
- (6) Pour the correct grade of lub. oil in the sump of the crank case up to the top mark of 4.5 liters quantity.

The engine is now ready for operation.

Drained flushing oil should be stored neatly for reuse at the time of next change of lubricating oil.

IMPORTANT : Do not mix up the different grades of lub. oil. Cheap, unsuitable or dirty oil will cause trouble and does immeasurable harm to the engine.

Insist on the approved grade of oil in a sealed container from the authorised suppliers only.

BEFORE STARTING THE ENGINE : (1) Remove the crankcase door and fill the sump with Lubricating oil up to the top mark of the dip stick of 4.5 litre quantity. (2) Apply oil to each oil hole in the top of the big end bearing and to main bearings. (3) Close the crankcase door and fill the cylinder head valve sump, caps in push rod ends and tappet heads with lubricating oil as required. (4) Put oil on every oilholes, sliding parts such as rockers, tappets, governor and pump linkages and every auxiliary machinery driven from the engine. (5) Swing the valve lifter under exhaust tappet and crank the engine one dozen times to ensure the circulation of lub. oil to all the bearing points. (6) Swing the lubricating pump handle up & down one dozen times and check up to circulation of lub. oil to all the bearings.

STARTING & STOPPING

TO START ENGINE : (1) Always form a practice to check the lubricating oil level, the fuel level and water circulating system. (2) In case of the first starting of the Engine, ensure that all the above said points of Lubrication have been attended to and that fuel system is primed to remove air locks. (3) Swing valve lifter under exhaust tappet. (4) Check and tighten, if necessary, the foundation Bolts. (5) Disengage Governor hand lever by Pushing downward to enable fuel to be injected. (6) Put starting handle on the Engine Crankshaft extension and rotate it. Disengage exhaust valve lifter as quickly as possible and lock in off position, Engine should fire as soon as Exhaust valve is released, keep firm grip on starting handle and remove it slowly and carefully from crankshaft. (7) Check that cooling water is properly circulating. (8) Apply the load as soon engine attains full speed.

TO STOP ENGINE : (1) Lift Governor hand lever. (2) When Engine is about to stop engage valve lifter. (3) Engine should never be stopped by shutting the fuel supply or lifting the Exhaust valve alone.

SPEED REGULATION : To increase the speed turn the adjusting nut in clockwise direction. And to reduce the speed, turn nut in opposite direction. Users are advised not to increase the speed over the rated one.

WORKING TEMPERATURE : The lower portion of the engine (crankcase) will get hot after it has worked for some time. Engine owner need not be worried about this. The engine should run not for efficient performance.

The heat will be so much as not to allow the operator to keep his palm on crankcase.

FAILURE TO START OR RUN PROPERLY

TIP OF EASY STARTING: (ESSENTIALS)

1. Engine must turn easily when decompressed, if not, Check that valve lifter is correctly adjusted.
2. Injection creak must be heard. If not, the cause may be one or more as under:
 - No Fuel oil in tank.
 - Air lock in fuel system.
 - Fuel Pump delivery valve seat damaged.
 - Fuel Filter is choked.
3. Compression should be good on high compression ratio. If not check for the following (i) wear on the cylinder (ii) Piston rings worn out or carboned in grooves (iii) Leakages through inlet or Exhaust valve. (iv) Fuel pump rack has free movement.

KNOCKING :

This may be caused by the following

- (1) Valve probably Exhaust sticking in guide and hitting piston — Clean valve stem and guide. (2) Loose bearings — fit correctly. (3) Insufficient clearance between piston and cylinder head — Check and adjust. (4) Injection too early and or injection pressure high — check and adjust. (5) Loose flywheel on crankshaft — drive taper key tightly. (6) Improper fuel oil — check and renew.

CARBON DEPOSITION :

Excessive carbon deposition may be due to :

- (1) Cocked Exhaust system — dismantal and clean. (2) Running overcooled because of excessive supply of cooling water. (3) Fuel oil not of standard make. (4) Lubricating oil of lower grade. (5) Injection not spraying correctly — check and replace Nozzle. (6) Timings adjusted for late Injection of fuel. (7) Excessive exhaust back pressure.

SMOKY EXHAUST :

The exhaust should be clear at full load. If it is not, take step to clear it. Black smoke is due to incomplete combustion of fuel, caused by the following reasons.

(1) Excess load resulting into extra quantity of fuel to be injected. (2) Air intake choked. (3) Injector nozzle choked — Result : Poor spray. (4) Fuel oil not of standard grade. (5) When the faint black smoke is caused, which is generally due to low load or over load. Heavy blue smoke is the result of lubricating oil passing through the piston rings due to carboned in grooves or worn cylinder.

ENGINE STOPS :

(1) If fuel tank is empty. (2) If fuel injection system gets watered or air locked. If the fuel injection system is choked. (3) If over loaded. (4) If over heated due to shortage of cooling water or lubricating oil.

LOSS OF POWER :

May be due to the following reasons :

(1) Loss of compression. (2) Tappet clearance not correct. (3) Exhaust pipe choked. (4) Fuel injection system or fuel pump out of order or timings are not adjusted. (5) Air cleaner choked.

FAILURE TO OBTAINED NORMAL SPEED :

(1) Engine started with overload. (2) Bearing not properly fitted or too tight. (3) Insufficient fuel. (4) Injection retarded.

COOLING : In the place where the water is impure, the jacket, around the cylinder liner and inside the cylinder head should be freed from any deposits.

To remove hard deposit from cylinder water jacket, fill it with a solution of washing soda in the proportion of 1 Kg. of Soda to 5 Liters of water than wash out the Jacket with fresh water.

MAINTENANCE ROUTINE :

Daily :

Check Supply if fuel oil.

Check Leakages of oil, water and fuel.

Check the engine.

Check level and condition of lubricating oil.

Check Exhaust smoke.

Check oil around valve stems.

Check cooling water circulation.

Keep the fuel Tank full at the end of day's work.

Lubricate external parts with oilcan.

Check the lub. oil circulation.

JUST AFTER EVERY 100 HOURS RUN OF ENGINE : Clean oil Bath, Air cleaner thoroughly and refill the fresh lub. oil.

Make sure that the vent hole in fuel tank cap is clear.

Check tightness of all nuts. As the machine is liable to produce vibration while running, it is Most Essential that the users should check all the nuts and tighten according to requirement.

JUST AFTER EVERY 250 HOURS RUN OF ENGINE :

Thoroughly clean out fuel Tank.

Knock out soot from silencer & Exhaust piping.

Change the lubricating oil.

Apply oil to Auxiliary Machinery.

Adjust valve clearance.

Remove fuel injector clean & check fuel spray.

Clean delivery valve of fuel pump

Clean the fuel filter & sump filter.

JUST AFTER EVERY 500 HOURS RUN OF ENGINE :

Change the fuel filter element. Examine the valves and clean and "grind in" if necessary.

JUST AFTER EVERY 1000 HOURS RUN OF ENGINE :

Now your engine needs complete overhaul.

Decarbonise Engine.

Remove sediment from Main Fuel Tank.

In case when Gasket is changed.

Drain and clean fuel and water tanks.

Clearance should be checked.

Replace Fuel filter element.

Check and clean air and Exhaust Manifold.

Check injection nozzle for obstruction.

Check water jacket for scale.

wear in orifice.

Check free working of Governor linkages.

Check Big end Bearing.

Always deal immediately with any signs of defective running. Minor irregularities always become worse and in the end, your engine falls out of service. Hence the users are advised in their own interest to follow strictly the above maintenance schedule rather than to lose their valuable time to close the engine and get it repaired every now and then.

MAINTENANCE

CLEANING OF AIR CLEANER : Mount the air filter in a horizontal position and maintain the correct oil level as marked on the filter body. If the level is too high, the Engine will inhale the lubricating oil, which will cause excessive carbon deposits on the valves, piston etc. If too little oil is used, the cleaning action will not be efficient. Check the oil level weekly, and if necessary add fresh Lubricating oil as is used for the Engine. Change the oil and clean completely every 100 hours running, or more frequently, if there is any sign of the oil becoming impregnated with sand or dirt. To clean air cleaner remove it from Engine and dismount, Wash in kerosene and allow to dry. Examine rubber washer during dismantling and change, if necessary.

VACCUM BREATHER : The function of the vacuum breather on the crankcase door is to maintain partial vacuum in the crankcase so that the lubricating oil will not pass through the bearings and joints. In case the metal disc sticks with paints or grime, clean and scrap out the flat surface of the disc, while cleaning care should be taken not to kink or distort it.

Place the distance piece properly which supports the cover.

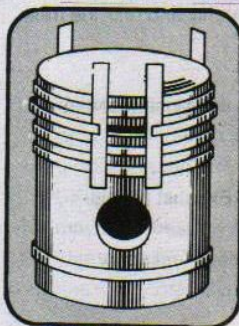
TO CHECK CYLINDER HEAD CLEARANCE : Place two small pieces of lead on top of piston above the line of Gudgeon Pin and not beneath the valve or Transfer port. Tighten down Cylinder Head and turn Piston Slowly past Top Dead Centre. Remove Cylinder Head and measure thickness of lead. If this does not fall between 2.0 to 2.5 mm or 80 in. or 100 in. set the clearance.

The clearance may be adjusted by the use of paper joints placed between the cylinder Block and the Crankcase.

If the clearance is too large, it may be due to worn bearings or a bent Connecting Rod.

TO REMOVE PISTON RINGS AND REPLACE : Remove cylinder head the cylinder block. Also remove crankcase door. Disconnect the big end bearing of the Connecting Rod and note which way the dipper faces and the manner in which the big end is marked so that it can be reassembled in its original position. Lift out Piston and connecting Rod. Reassemble Big end loosely and remove either Circlip, warm piston and drive out the gudgeon pin.

METHOD OF REMOVING PISTON RING



**METHOD OF
REMOVING PISTON RINGS**

Keep the piston on a flat surface and insert thin strips of metal between the top Ring and the Piston at four different places. This will make easy to take off ring over the strips of metal. Repeat the same process for the other Rings.

Piston rings are "SPRINGY" but will break if roughly handled.

After removing the rings, clean the Piston and Piston Ring grooves perfectly. If

Piston Rings to be used are new, it should be free from grease or any other deposits. While in case of old Rings, Roll each one round its own groove. Where the used Rings are slack and new one of in improvement, change the Piston itself. Place the Ring in lower part of the Cylinder and measure the close gap between the two ends with a feeler gauge. The correct close gap should be in between 0.008 or 10.02 mm. Assemble the rings in the grooves by sliding them over strips of metal as done in case of removal.

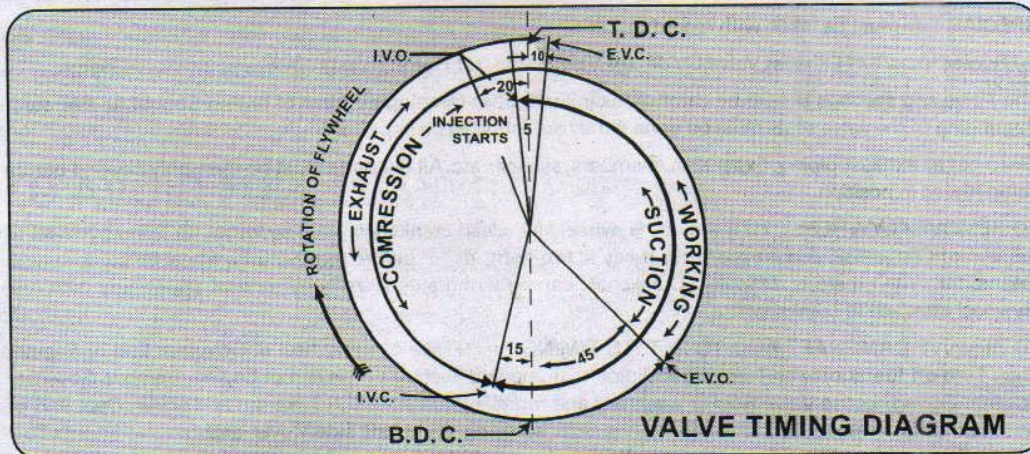
TO REASSEMBLE : (a) Refit Piston and Connecting rod, noting number marked on Big end bearing and direction the dipper faces. (b) Put paper Cylinder Block Joints equal to numbers removed. Place a flat bar across Crankcase close on Connecting Rod and bring Piston skirt firmly down on to it. (c) Apply oil to the piston rings and stagger the gaps. Place Piston Ring clamp in position and compress rings. The clamp should close quite easily. However when force is required to fit the rings. It is better to take it of and try again.

(d) Apply oil to the Cylinder bore, lift cylinder block over studs and lower into position pushing down Piston Rings as far as possible underneath the piston. (e) Rotate crankshaft to move Piston up into Cylinder. (f) Support Cylinder Block. Remove Piston Ring clamp and flat bar and allow Cylinder Block to drop into Position after removing support. (g) Assemble Cylinder Head.

CONNECTING ROD BIG END BEARING

These are steel back white metal lined bearings.

Care and Patience in fitting the Big End Bearing correctly is the main factor in obtaining satisfactory bearing life. The care should be taken to see that the backs are through out clean and that there is no interference between the bearing and the bore of the Connecting Rod.



VALVE ADJUSTMENT

The Tappet clearance of valves should be as under when cold:

For 6 — 1 Inlet 0.017" (0.43mm); Exhaust 0.032" (0.81mm)

For 8 — 1 Inlet 0.015" (0.38); Exhaust 0.015" (0.38mm)

For 9.5&10 — 1 Inlet 0.008" (0.20mm); Exhaust 0.008" (0.20mm)

To get this, loosen the locknut on the top of the valve Rocker, Turn the adjusting screw by a screwdriver, until the correct clearance is obtained between the valve Rocker and then tighten the locknuts. During this operation valve Tappet must be in the lower Position and Rocker pressed firmly down on the push Rod.

VALVE TIMINGS : On Crankshaft Rotation for Particular cylinder :

Type of engine	6-1	8-1 & 9.5 & 10-1	Position
Air Valve opens	4°-8°	5°-9°	Before Top Dead Centre
Air Valve closes	14°-18°	15°-19°	After Bottom Dead Centre
Exhaust Valve opens	42°-48°	51°-55°	Before Bottom Dead Centre
Exhaust Valve closes	6°-10°	15°-55°	After Top Dead Centre
Fuel starts	18°-20°	18°-20°	Before Top Dead Centre

TO REMOVE AND REPLACE VALVE : The Cylinder Head should be removed and lay the head upright in bench and depress Valve Spring Carrier.

Remove Valve Stem collets, Valve spring carrier and Valve spring. Then turn Cylinder Head over and remove the Valve.

While replacing the valves follow the same process in reverse and check valve clearance under the Cylinder Head.

POSITION OF VALVE HEAD : Inlet and Exhaust Valve Head must not be less than 0.055" in. or 1.4mm and not more than 0.100 in. or 2.54mm under the face of Cylinder Head to prevent valves from touching Piston when using valve lifter.

DECARBONISING

It is generally agreed that Decarbonising is beneficial in most cases. To get maximum efficient working throughout its life, **ENGINE SHOULD NOT BE RUN MORE THAN 1000 HOURS WITHOUT DECARBONISING.**

(a) Remove cylinder Head and dismantle. (b) Remove Piston and Rings.

ALL PARTS must be scraped clean of deposited carbon and washed with kerosene before reassembly.

SPECIAL care must be taken with regard to :

(a) Recess in bore of Exhaust Valve Guide. (b) Valve Ports. (c) Piston Ring grooves and interior of Piston.

The Valve and seatings should be carefully examined, after cleaning no trace of pitting should be tolerated, Regrinding of the valve seats must be done if they are found to be imperfect.

Clean out all exhaust piping. Expansion chambers, silencer etc. All the parts must be thoroughly cleaned before being placed in position.

TO REMOVE FLYWHEEL : (1) Take out Flywheel key, clean crankshaft and key-ways. (2) Bring flywheel to the end of Crankshaft and lift it off. (3) If key is too tight, drill it before removing Flywheel by some special means. (4) When there is difficulty, Crankshaft can be withdrawn from either end of the Engine with one Flywheel attached to crankshaft.

TO REMOVE CAMSHAFT AND TO SET ITS TIMINGS : (1) Take out Flywheel at Governor End of Engine. Then Turn off fuel supply and remove fuel pipe to pump and injector at this end of Engine. Remove Governor Speeder Spring, Loose Valve Rocker assembly and remove Push Rods. (2) Take out end cover (Opp. end of Governor) and Remove Coller. (3) Dismantle nuts securing Camshaft side Cover and remove it with Fuel Pump. Remove Crankcase Door also. (4) Withdraw camshaft. Remove Tappets as camshaft passes from underneath.

While reassembling repeat the same process in reverse order. Tappets may be held in position with thick grease.

While reassembling, the timings marked should be matched and care must be taken to ensure that crankarm does not strike with Idler gear Spindle when turning the shaft to match the timing marks.

FUEL INJECTION EQUIPMENT

TO PRIME FUEL SYSTEM : Prime the Fuel System by removing all air :

(a) After filling the fuel tank, prime filter by unscrewing vent screw given on top of Fuel filter till all air is released and fuel flow freely through the vent, Tighten up the vent screw as the system gets primed. (b) Start Engine turn by handle giving 5 to 15 turns by hand until Injection "Cracks" and then try to start the Engine. If Engine does not give response try the ways of priming as follows. (1) Put the Governor Hand Lever in, 'STOP' position, take out fuel Injection pipe from delivery valve holder of Fuel Pump by disconnecting union nut. (2) Dismantle delivery valve holder and spring and raise the delivery valve from the seating with the fingers. As soon as this is done fuel should appear. Keep delivery valve off its seal until all air bubbles out and a solid column of fuel appears. (3) Reconnect delivery valve holder and spring in its original position and tighten down the holder firmly applying normal force. (4) Refit the Fuel Injector pipe again to Fuel Pump and leave the Injection union nut slightly loose at the joint. (5) Put Governor Hand Lever in 'START' position i.e. in down position. (6) Place the starting handle and rotate the engine until fuel flows freely from union nut at Automiser end. (7) Tighten down the union and rotate engine until injection Cracks or a sound of "buzz" is felt in injection Pipe.

IMPORTANT

Apart from the attention given to the fuel pump delivery valve and the changing of defective Injector nozzle and valve. All other works on fuel injection equipments must be carried out by well equipped service depots.

FUEL PUMP

TO TIME INJECTION : (a) Put the Piston to Top Dead Centre Compression stroke keeping both Valves closed Swing Governor downwards. (b) Disconnect Fuel Injector pipe from delivery valve holder and remove delivery valve holder, delivery valve and spring. The fuel will now flow from the pump. (c) Rotate the Flywheel above quarter of a turn forward until flow of fuel stops. Replace the delivery valve holder only and tighten up lightly. (d) Rotate the Flywheel in reverse until fuel recommences to flow and now turn the same in the normal rotation until fuel stops to flow. Blow fuel from top of delivery valve holder to see that it has stopped.

At this time the mark on the Flywheel rim which shows Injection, should be immediately apposite the Center line of the Cylinder Block.

The timing mark is 18° to 20° before Top Dead Centre.

(e) If this Condition is not achieved adjust the tappet underneath the pump until this condition is satisfied. Raise Tappet to advance injection and lower to retard it. (f) Place delivery valve and spring after cleaning thoroughly. (g) Place Fuel Injector pipe.

TO AVOID FUEL PUMP'S DEFECTS

Defect	Probable cause.	Suggested Remedy.
Pump not delivering the fuel.	<ol style="list-style-type: none"> 1. Fuel Tank empty. 2. Pipe line chocked up. 3. Filter element dirty. 4. Air lock in fuel system. 5. Delivery valve remains open. 	<ol style="list-style-type: none"> 1. Fill the tank with fuel. 2. Clean the Pipe line. 3. Clean the element. 4. Prime the fuel system. 5. Remove and examine valve face seat & guide. Replace if either is damaged.
Pump not delivering the fuel uniformly.	<ol style="list-style-type: none"> 6. Insufficient fuel supply As per 2, 3, 4 & 5. 7. Delivery valve spring broken. 8. "Head" of fuel flow insufficient. 	<ol style="list-style-type: none"> 6. Proceed as above. 7. Replace. 8. Increase the 'head' by raising the level of fuel tank.
Pump delivering insufficient.	<ol style="list-style-type: none"> 9. Delivery valve leaky. 10. Leaking joints in the pressure system. 	<ol style="list-style-type: none"> 9. Replace delivery valve with seat. 10. Check, clean faces and tighten down.

FUEL INJECTOR

In case of trouble with fuel Injection, clean the nozzle. As the clean fuel ensures the trouble free functioning of the Engine. Injector be set at pressure shown against each engine in the Technical Data. A faulty Injection may result in one or more of the following.

(a) Smoky exhaust (Black) (b) Loss of Power (c) Overheating of Engine. (d) Knocking in the Cylinder. (e) Fuel consumption more.

Once the General principle of the diesel injection equipment has been grasped fault-tracing is easy. To detect the troubles, checking is essential.

To check the nozzle, remove it from Cylinder Head and connect it to fuel injection pipe. With the nozzle exposed, turn the engine until the nozzle spray into air away from the operator (As the working pressure of the fuel oil is quite sufficient to cause the spray to penetrate into the skin) when it will be seen if the spray is steaky or Dribbling. A perfect spray is in the form of fine mist.

The nozzle must only be cleaned with the necessary special tools and by a qualified service mechanic.