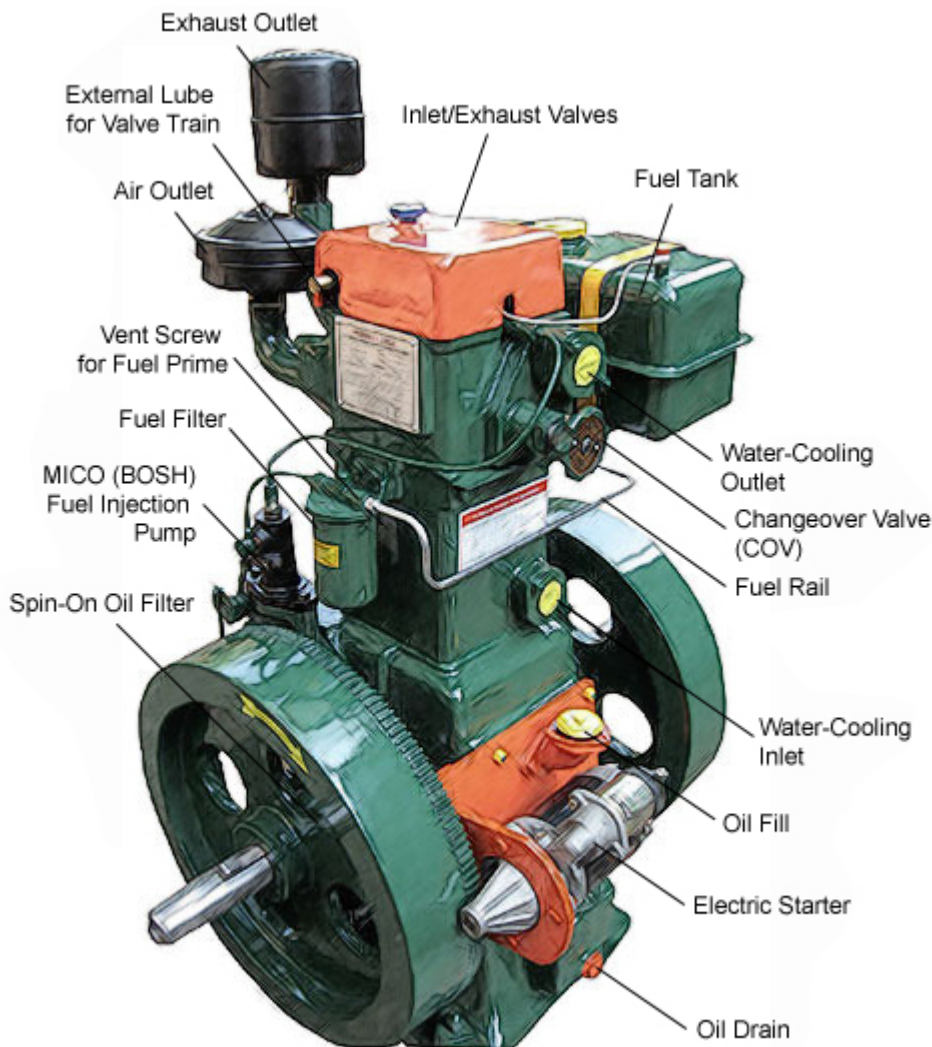


# Installation Data

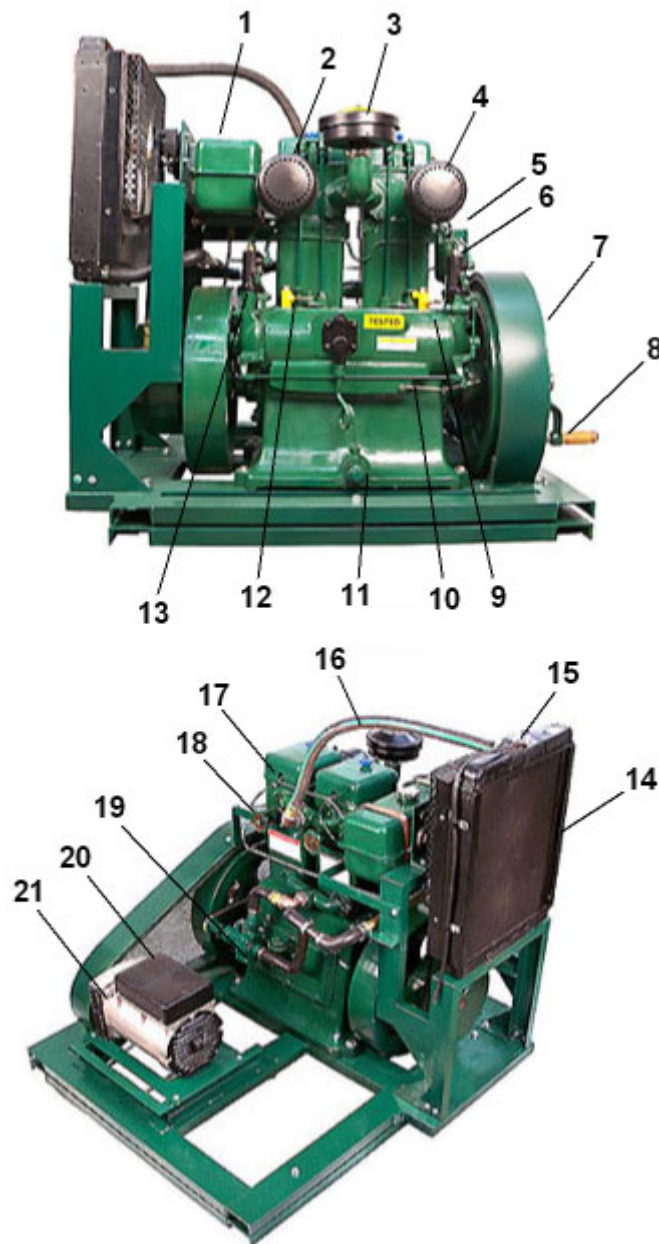


## Installation Data

Coolant System	Thermosiphon or Radiator
Coolant Hose Size	1-1/4" OD
Engine Oil Requirement	SAE 30
Exhaust Location and Direction (Facing Hand Crank Handle):	Left

Service Points	Facing Hand Crank Handle
Oil Fill	Right-Side
Oil Drain	Right-Side
Oil Dipstick	Right-Side
Air Intake	Left-Side
Fuel Filter	Front-Side
Vent Screw for Fuel Prime	Front-Side
Coolant Intake/Outlet	Right-Side
MICO (BOSCH) Fuel Injection Pump	Left-Side
Change Over Valve (COV)	Right-Side
Fuel Shut-Off Lever	Left-Side
External Lube for Valve Train	Front-Side
Rocker Arms	Left-Side
Intake & Exhaust Valves	Left-Side
Governor Spring Adjustment Nut	Left-Side
Lubricating Oil Pump	Left-Side
Spin-On Oil Filter	Left-Side
Electric Starter	Right-Side

# Identification



## Identification

1.	Fuel Tank
2.	Muffler
3.	Air Filter
4.	Muffler
5.	Fuel Filter
6.	Fuel Rack Lever
7.	Flywheel Guard
8.	Hand Crank
9.	Decompression Release
10.	Governor Adjustment Nut
11.	Oil Drain
12.	Decompression Release
13.	Fuel Injection Pump
14.	Radiator (OPTIONAL)
15.	Radiator Fill (OPTIONAL)
16.	Coolant Hose (OPTIONAL)
17.	Valve Cover
18.	Changeover Valve
19.	Water Pump (OPTIONAL)
20.	Power Output
21.	Generator

**INITIALLY NEW COMERS EXPERIENCE CERTAIN PROBLEMS IN LISTER ENGINE, AS THIS IS NOT ROCKET TECHNOLOGY ENGINE. YOU CANNOT DEMAND PERFORMANCE/SERVICE OF TOYATO, HONDA ENGINE. IT IS JUST LIKE RIDING A HORSE OR PLAYING PIANO FOR THE FIRST TIME.**

**EVERYONE HAS TO PRACTICE/FAMILIARIZE HIMSELF WITH THE GADGET. WE ARE PUTTING FORWARD SOME STEPS TO SOLVE SOME OF THE PROBLEMS.**

## **HOW TO STOP RUN-AWAY ENGINES**

When engines are new and runs without load, its Piston ring starts lifting oil from the Oil Chamber of Crank case. During that time lifted oil from chamber work as fuel for engine. Under this situation fuel received from the injector does not make any sense to the engine so you are not in a position to control speed of engine or stop the engine by discontinuing supply of fuel . The more engine runs, lifts up more oil leading to uncontrollable speed.

Under this situation, to stop the engine you have to cut off/disturb Breathing (air inlet) in Cylinder chamber. To do this immediately put a piece of cloth at Air Intake (the place we fix Air cleaner). Once Cylinder Chamber stops getting fresh air for firing, naturally engine stops.

You can also disturb this cycle by dis-engaging valve lifter but this might damage some spares.

Please visit [Lister Engine Forum](#) to know more ways to stop/control Run-away engines.

## **FOUNDATION FOR POWERLINE ENGINES**

Lister Engine is producing heavy power with sizeable torque. We may not be able to judge the strength of power produced by the engine. Explanation of amount of power is as below:

Try placing your palm on the body of a Horse and you will feel tremendous heat and vibration flowing through it. If one horse in an idle/standing condition can produce this power, imagine how much 6 running horses will produce. Similarly we can understand in our engines. Hence it is important to bolt the engines on a solid concrete base foundation. We have already mentioned this fact on name (data) plate fixed on cylinder head and in operating manual too. We can also understand this fact from photographs kept by technical experts on various websites like Lister forum and <http://f1-rocketboy.com/lister.html>

# TIMING OF POWERLINE LISTER ENGINE

- (a) Put the Piston to Top Dead Center of Compression stroke by keeping both Valves closed and set Governor into run position.
- (b) Remove Fuel Injector line 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 about one quarter of a turn forward until the flow of fuel stops. Replace the delivery valve holder only and lightly tighten.
- (d) Rotate the Flywheel in reverse until fuel starts to flow and then turn the flywheel in forward 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 on the Center line of the Cylinder Block. The timing mark is  $18^{\circ}$  to  $20^{\circ}$  before Top Dead Center.
- (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) Replace delivery valve and spring after cleaning thoroughly.
- (g) Replace the Fuel Injector line.
- (h) Take position of camshaft, Inlet valve open and exhaust valve closed
- (i) Take crankshaft position on top dead centre (BTDC -  $3^{\circ}$  to  $8^{\circ}$ )
- (j) Insert Idler Gear in between crank gear and camshaft gear for perfect timing.

The above is applicable for both Single and Twin Cylinder Engine.

## Oil Exhaust

1. When there is a new engine some times due to improper sit between wall surface of Cyl. Liner and Piston Ring, Engine started lifting oil. Under this situation please run the engine with normal load contentiously so that engine will achieve proper surface matching.
2. When engine run without load at that time this type of compliant is also experience. Please run the engine with full load'
3. Ensure that Lubricating oil in Crank case chamber is not more than **4 Liter for Any Single Cylinder & 10 Liter for Twin cylinder**. Excess Oil may create this problem.
4. Is engine running with ideal RPM? Too much slow RPM create this problem
5. Is engine mounted on proper concrete block? Proper foundation is must for vibration free smooth running. Too much vibration also vomiting excess oil.

One Technical expert in USA has put following comment regarding excess oil comming out from Silencer/Muffler which is self-explanatory.

"Slobber is liquid oil comming out of the exhaust, usually caused by rings not seating properly, too high an oil level causing excessive internal splash and not running the engine under enough load to keep the rings seated.

As for your oil situation, what condition is your breather check valve in? If it is working normally, any positive pressure should be vented thru that reed/plate valve and every time the piston rises, a slight vacuum should be pulled on the case, helping to keep any oil from leaking out at any of the seals. If that valve isn't flowing outward freely, positive pressure could be building up in the case, forcing oil out at any possible leak point

**TIGHTENING TORQUE VALUE OF VARIOUS SPARES FOR  
LISTER ENGINE**

<b>Sr. No.</b>	<b>Name of Parts</b>	<b>Torque Kg.m</b>	<b>Torque Lb/Ft</b>
01	Cylinder Head Nut	<b>24</b>	<b>175</b>
02	Crank Shaft Balance Weight	<b>12</b>	<b>85</b>
03	Connecting Rod Big End Nut	<b>8</b>	<b>60</b>
04	Main Bearing Housing Nut	<b>8</b>	<b>60</b>
05	Injector Holding Flange Nut	<b>5</b>	<b>35</b>
06	Side Cover & Lub. Pump	<b>3.5</b>	<b>25</b>
07	Big Window & Small window	<b>3</b>	<b>20</b>

**THE NOZZLE PRESSURE**

1. 6/1, 8/1, 12/2 & 16/2 HP = **150 Kg/Cm<sup>2</sup>**
2. 10/1, 12/1, 20/2 & 24/2 HP = **155 Kg/Cm<sup>2</sup>**

**VALVE TAPPET CLEARANCE VALUE**

1. IN LET VALVE : **0.254MM(0.010") TO 0.430MM(0.017")**
2. EXHAUST VALVE : **0.254MM(0.010") TO 0.430MM(0.017")**

**CYLINDER HEAD BUMPING CLEARANCE**      $\frac{0.070''}{0.080''} \left\{ \begin{array}{l} 1.75\text{mm} \\ 2.00\text{mm} \end{array} \right\}$

**RECOVERABLE HEAT FROM THE ENGINE**

COOLANT UNDER FULL LOAD.

- 1) 6/1 HP approx    3kW.     10,000 Btu/Hr.
- 2) 12/1 HP approx   5.5kW.    18,500 Btu/Hr.
- 3) 24/2 HP approx   11kW.    37,000 Btu/Hr.

THE EXHAUST GAS CONTAINS ROUGHLY THE SAME AMOUNT OF RECOVERABLE HEAT IN ADDITION TO THE ENGINE

- 1) INPUT TEMPERATURE OF COOLING WATER SHOULD NOT EXCEED 60°C
- 2) DIFFERENCE BETWEEN TEMPERATURE OF INPUT AND OUTPUT COOLING WATER SHOULD NOT EXCEED 15°C



<u>“POWER LINE ENGINE”</u>		Fuel Consumption Ltr/Hr	Fuel Consump tion US GLN/Hr
(A) LISTER TYPE <b>SINGLE CYLINDER</b> DIESEL OIL ENGINE WATER COOLED WITH STANDARD ACCESSORIES PACKED IN SOUND WOODEN CASES.			
HP	RPM		
6	650(CBW)	1.5	0.3963
8	850(CBW)	2.0	0.5284
10	1000(CBW)	2.5	0.6605
12	1000(CBW)	3.0	0.7926
(B) LISTER TYPE <b>TWIN CYLINDER</b> DIESEL OIL ENGINE WATER COOLED WITH STANDARD ACCESSORIES PACKED IN SOUND WOODEN CASES			
HP	RPM		
12/2	650(CBW)	3.0	0.7926
16/2	850(CBW)	4.0	1.0568
20/2	1000(CBW)	5.0	1.321
24/2	1000(CBW)	6.0	1.5852

(CBW) Counter Balance Weight on Crank shaft



## STEPS TO REMOVE TAPPER ROLLER BEARING FROM CRANKSHAFT



ADVANCED BEARING PULLER



TRADITIONAL BEARING PULLER

## **LIST OF SPANNERS REQUIRED FOR POWERLINE ENGINE REPAIRING**

### **(A) SPANNER:**

1. Box Spanner - 5/16 BS
2. Box Spanner -  $\frac{3}{8}$  BS
3. Box Spanner -  $\frac{1}{2}$  BS
4. Box Spanner -  $\frac{3}{4}$  BS
5. Ring Spanner - 5/16 BS
6. Ring Spanner -  $\frac{3}{8}$  BS
7. Ring Spanner - 7/16 BS
8. Ring Spanner -  $\frac{1}{2}$  BS
9. Ring Spanner -  $\frac{3}{4}$  BS
10. "T" Shape Handle for Box spanner
11. 6" Long Extension bar for box spanner
12. 12" Long Extension bar for box spanner
13. 12" Long screw driver
14. Nose Pliers
15. Hammer –  $\frac{3}{4}$  Pound
16. Flywheel Puller

\* Material: (1) Packing kit complete  
(2) Lub oil – 10 liter  
(3) Cotton waste

- Parts: As per Worn Out & Damage/Broken

## HAND CRANK STARTING BASICS: Single Cylinder and Twin Cylinder



### Step 1 – Lubricate/Check Oil

Lubricate valves & rocker arms with oil and throttle linkages with WD-40. Check the oil dipstick to confirm the correct amount of oil is in the sump. Fill accordingly.



### Step 2 – Set Compression Lever

Swing the compression release underneath exhaust tappet to prevent the cylinder's valve from opening and closing completely. Put governor handle in "STOP" position. Turn "IN" the high compression change over valve.



### Step 3 – Turn Engine Flywheel

Start turning the flywheel quickly. You should hear the fuel pump triggering with a 'clink' during every other wheel rotation. Several seconds later you should hear the fuel injector triggering with a 'clunk'.



### Step 4 – Compression Release

Continue turning with the flywheel with your right hand. With your left hand turn the fuel lever to the 'On' position to enable fuel to be injected and disengage the exhaust valve lifter as quickly as possible and lock in "OFF" position. Turn the flywheel though one more compression stroke and the cylinder should fire.



### Step 5 – Remove Crank Handle

Keep a firm grip on the start handle and walk it off the crankshaft.

### Step 6 – Set Changeover Valve

Turn "OUT" the high compression changeover valve.

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Fax: 91 - 281 - 2363 729



## PRIMING THE FUEL SYSTEM: Single Cylinder and Twin Cylinder



### Step 1 – Check Fuel Tank Valve

Fill the fuel tank and confirm the tank's fuel valve is in the down position.



### Step 2 – Prime Fuel Filter

Unscrew the vent screw located on top of the fuel filter until all air is released and fuel flows freely through the vent. Tighten up the vent screw as the system gets primed.



### Step 3 – Dismantle Delivery Valve Holder and Spring

Put governor hand level in "STOP" position and take out fuel injection pipe from delivery valve holder of fuel pump by disconnecting union nut. Dismantle delivery valve and spring.



### Step 4 – Remove Delivery Valve

Raise the delivery valve from the seating with your fingers. As soon this is done fuel should appear. Keep delivery valve off its seal until all air bubbles are out and a solid column of fuel appears.



### Step 5 – Reconnect Delivery Valve

Reconnect delivery valve holder and spring in its original position. Refit the fuel injector pipe again to the fuel pump and leave the injection nut loose slightly at the joint. Put the governor in the "START" position.



### Step 6 – Turn Engine Flywheel

Place starting handle on crankshaft and rotate engine until fuel flows freely from the union nut. Tighten down the union and rotate engine until injection "cracks" or a "buzz" is felt in the injection pipe.



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Maintenance Schedule	After first 25 operating hours	Every 8 hours or before use	Twice each month	Every 25 hours or 3 months	Every 100 hours or once a year	Every 250 hours or 6 months	Every 500 hours or once a year
● = Single Cylinder Engine ■ = Twin Cylinder Engine							
Check engine oil level		● ■					
Change oil	● ■				●	■	
Replace fuel filter					●	■	
Replace oil filter	● ■				●	■	
Replace air filter					●		■
Lubricate external parts		● ■					
"Exercise" the generator under load for 30 mins.			● ■				
Inspect cooling ventilation	● ■			● ■			
Inspect electrical system	● ■			● ■			
Clean & re-oil foam pre-cleaner				●			
Inspect exhaust system				● ■			
Clean exhaust manifold							● ■
Clean out muffler				● ■			
Clean air intake					●		
Replace engine coolant							■
Check coolant circulation		● ■					
Clean fuel pump delivery valve						● ■	
Clean fuel injector						● ■	
Check fuel injector spray						● ■	
Visually check belt tension			● ■				
Adjust valve clearance						● ■	
Check nuts & bolts for tightness					● ■		
Clean fuel and water tanks						●	■
Retorque cylinder head							● ■
Retorque intake manifold							● ■
Check engine compression							● ■
Check governor linkages							● ■
Decarbonise Engine							● ■
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## LUBRICATION TECHNIQUE FOR POWERLINE ENGINES



FUEL PUMP RACK



FUEL PUMP RACK



FUEL PUMP TAPPET



FUEL PUMP LEVER



FUEL PUMP LEVER



GOVERNOR LEVER



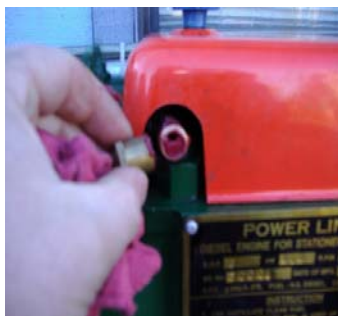
VALVE TAPPET GUIDE



VALVE TAPPET GUIDE



HOUSING OIL SEAL



GREASER CONNECTION



ROCKER SCREW TIP



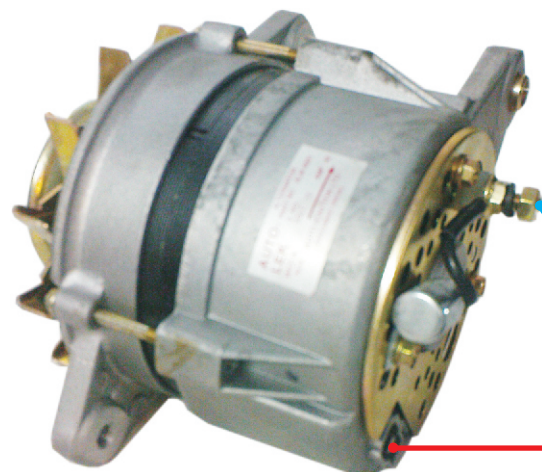
VALVE SPRING & GUIDE



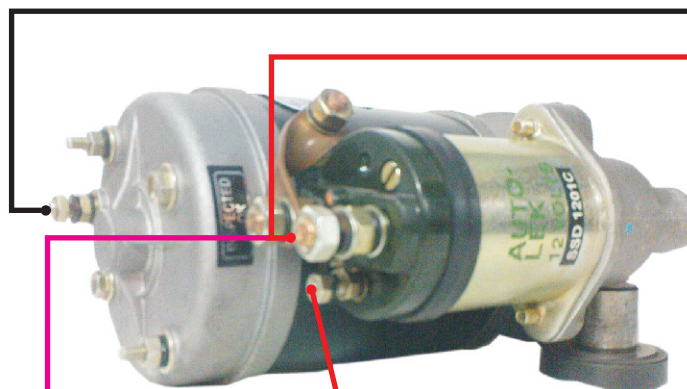
OIL CAN

# WIRE DIAGRAM FOR SELF START DIVISE

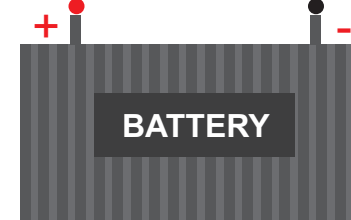
POWER LINE



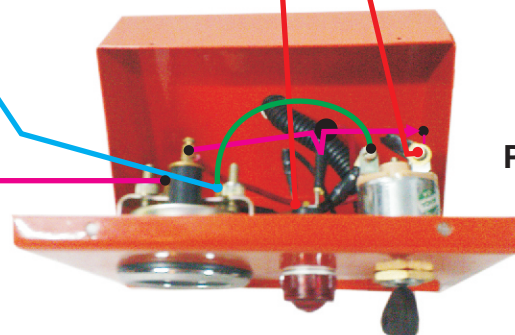
ALTERNATOR



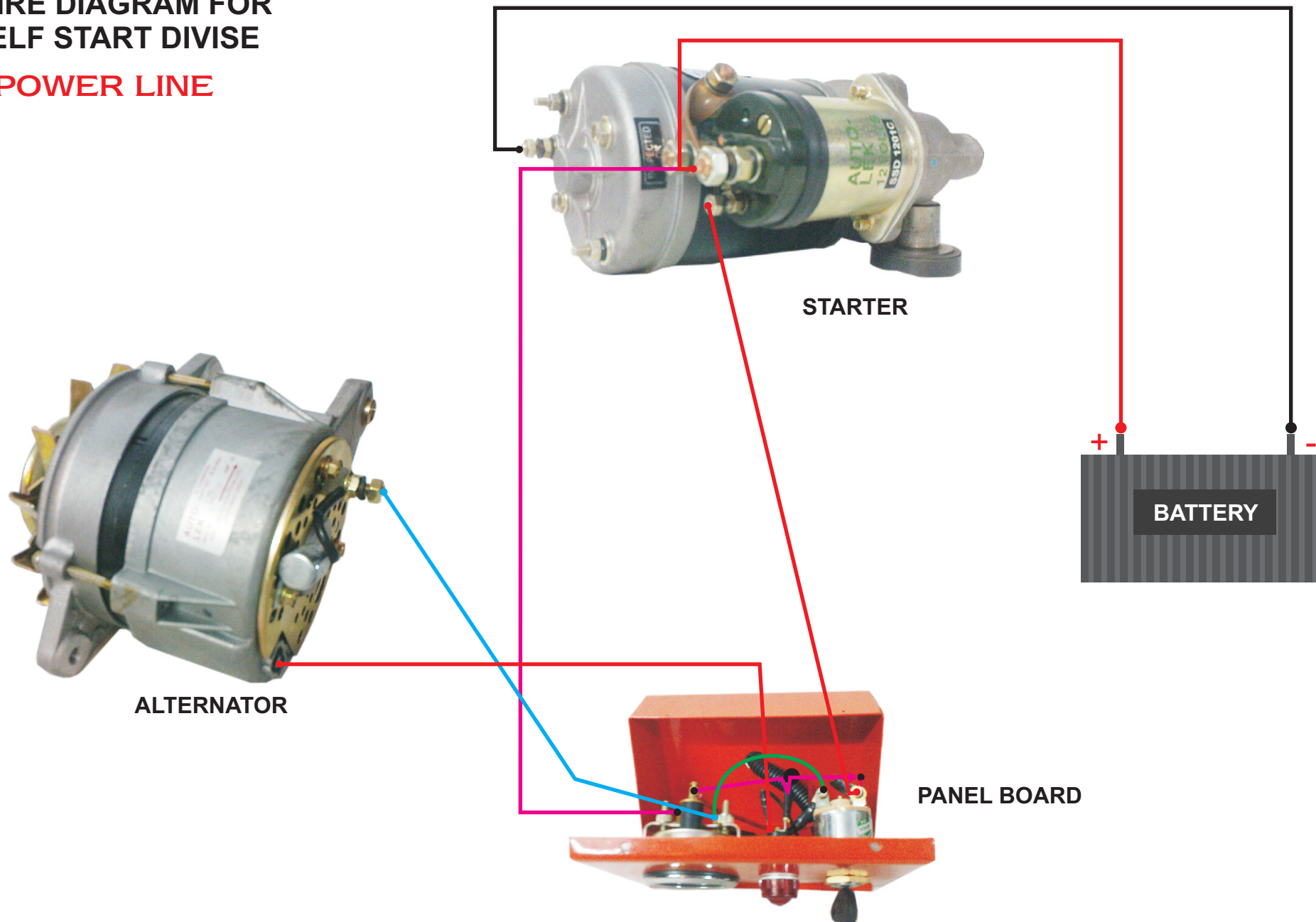
STARTER



BATTERY

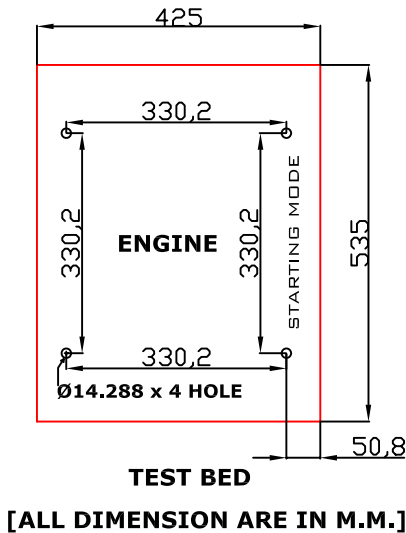


PANEL BOARD

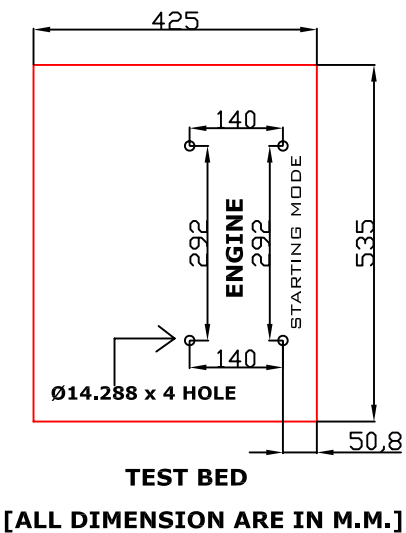




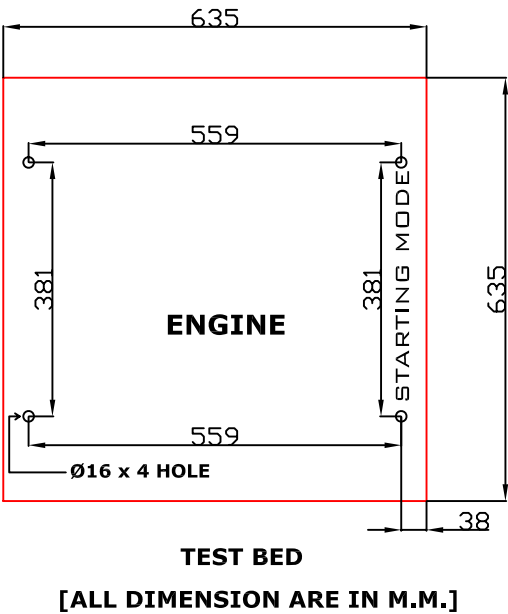
**LISTER "I" CYLINDER ENGINE**



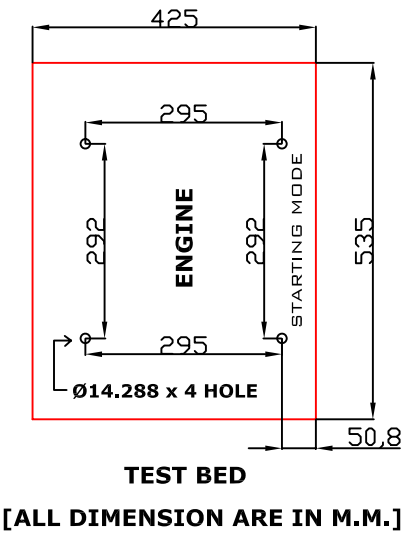
**PETTER "I" CYLINDER ENGINE**



**LISTER "II" CYLINDER ENGINE**



**PETTER "II" CYLINDER ENGINE**



12/2 HP-650 RPM-LISTER					
PERFORMANCE CHART OF SFC GR/KWHR					
Reading in Sec.	Load in Kg	RPM	Kw	HP	Sfcgr/Kwhr
270	0	685	0	0.0	#DIV/0!
185	9.5	675	1.84	2.5	438.9
124	19	670	3.65	5.0	330.1
101	28.5	665	5.43	7.4	272.4
79	38	655	7.13	9.7	265.2
64	47.5	650	8.84	12.0	264.1
57	52.5	645	9.7	13.2	270.2

## 12/2 HP-650 RPM-LISTER

