

SPECIFICATIONS
OF
MITSUBISHI DIESEL ENGINE
MODEL : S12H-PTA
FOR DIESEL GENERATOR SET

MITSUBISHI HEAVY INDUSTRIES,LTD
SAGAMIHARA MACHINERY WORKS

								APPROVED BY	DRAWN BY
				B	'99-5-31	OEM-A0041	Y.F		
				1	NOV.1998	OEM-A0019	Y.F		
				DATE		11 Mar. 1998			

1. GENERAL

Object and use	:	Diesel generator
Color of painting	:	Mansel No. 7.5BG6/1.5
Applicable conditions		
Ambient temperature	:	5°C ~ 40°C
Altitude	:	1500m above sea level
Max. humidity	:	85%
Place of installation	:	In door

Shop test

Diesel engine running tests shall be carried out by the following items.

Starting test

Load test	:	1/4, 2/4, 3/4 Load each	5min
	:	4/4 Load	20min

Governor test : Governor test should be done along with respective governor controller

Safety stop device test

Guarantee

The guarantee shall be valid for the period of either 1 year or 1000Hr (at Hr counter) after installation, whichever the shorter.

The guarantee shall cover against manufacturer defect, materials and workmanship only, and shall not be applicable to damage sustained through mishandling of the equipment.

Standard

All items, unless otherwise specified, are in accordance with JIS and manufacturer's standards.

2. PRINCIPAL PARTICULARS

Model	:	MITSUBISHI S12H-PTA
Type	:	4cycle stroke, water cooled diesel engine
Combustion chamber	:	Direct injection type
Aspiration	:	Turbocharged with after cooler
Number of cylinders	:	12-V
Bore × stroke	:	150mm × 175mm
Total displacement	:	37.11 liter
Compression ratio	:	14.0 : 1
Firing order	:	1 - 12 - 5 - 8 - 3 - 10 - 6 - 7 - 2 - 11 - 4 - 9
Direction of rotation	:	Counter clockwise as viewed from flywheel side
Engine dimensions (Approx.)	:	Length Apx. 2253mm (Fan to Flywheel Housing)
	:	Width Apx. 1515.5mm (After-cooler to Alternator-cover)
	:	Height Apx. 1693.5mm
Dry weight (Approx.)	:	4300kg (without accessories)
Fuel oil	:	ASTM D975 No. 2 - D or BS 2869 class A
Lubricating oil	:	API service CD class or CF class SAE No. 30 or No. 40
Output at ISO 3046 standard air conditions (25°C, 750mmHg, 30% Humid)		
Stand-by rating	:	1314Hp/1500rpm 1448Hp/1800rpm
Prime rating	:	1193Hp/1500rpm 1314Hp/1800rpm
Fuel consumption ratio at Prime rating (allowance +5%)	:	154g/Hp-hr at 1193Hp/1500rpm 156g/Hp-hr at 1314Hp/1800rpm
Lub, oil consumption ratio at Prime rating	:	within 0.6g/Hp-hr

3. DESIGN FEATURES

Cylinder head	: Individual type, Iron casting, Corrosion resistant inserts for intake and exhaust valves, Copper tube insert for center located unit injector, Two-entry intake-air port.
Valve mechanism	: Two intake and exhaust valves by each cylinder (with valve rotators).
Cam shaft	: High – tensile strength steel forging with carburizing. Swing follower.
Crank case (Cylinder block)	: Mono – block hanger type with side-bolt. High – tensile strength iron casting.
Cylinder liner	: Middle-supported replaceable wet sleeve type.
Main bearing	: Steel – backed tri – metal copper special alloy with thin lead – tin overlay.
Con-rod bearing	: Aluminium –bearing with thin lead-tin overlay.
Piston	: Aluminium alloy casting. Oil-jet cooling with cooling channel. Ni – resist top ring insert.
Piston ring	: Step cut-back, double-oval, taper type profile Two high-top, steel compression rings and one oil ring.
Piston pin	: Full floating type. High – tensile strength steel with carburizing.
Connecting rod	: High – tensile strength steel forging. I beam section stem. Taper shape small-end. Diagonally separated big-end with serration.
Crankshaft	: High – tensile strength steel forging. Induction hardened bearing journal, pin journal, pin fillet. Counter weights tightened with bolts.
Gear train	: Located at rear end of crankcase. Water pump drive train is located at front end of crankcase.
Turbocharger	: Exhaust gas turbine.
Lubricating system	: Forced lubricating by gear pump.

- Cooling system : Forced circulation of jacket water by centrifugal pump.
- Fuel injection pump : Unit injector.
- Starting system : Electric starting.
- Stopping system : Fuel cut type.

4. STANDARD EQUIPMENTS

(1) Power line system

Flywheel	:	DWG.NO.35B96-21001 SAE J620C 18in. except screw size
Flywheel housing	:	DWG.NO.35B96-21001 SAE J617b No.0, except screw size
Engine mounting	:	DWG.NO.35B96-14001 4 points mounting, C = 230mm
Torsional vibration damper	:	Viscous type × 2pcs

(2) Air intake system

Air cleaner	:	Not supply
Turbocharger	:	MITSUBISHI TD13 Type Model : 1500rpm : TD13L-41QV22(27.5) 1800rpm : TD13L-45QV22(30)
Air cooler	:	Jacket water cooled type Plated element type
Air heater	:	Not supply

(3) Exhaust system

Exhaust manifold	:	Air cooled type with heat insulator
Muffler	:	Not supply
Flexible pipe	:	Not supply
Companion flange	:	Not supply
Breather	:	Upside direction type For blow-off to outside of engine room

(4) Lubricating system

Oil pump	:	Gear pump type
Capacity of oil pump	:	1500rpm : 390 liter/min 1800rpm : 470 liter/min
Lub. oil pressure at main gallery	:	4.0 ~ 6.5kg/cm ²
Oil filler	:	Short neck type
Oil level gage	:	Full ~ Low : 20 liter
Quantity of oil (Approx.)	:	Oil pan full level : 180 liter low level : 160 liter Others (filter etc.) : 20 liter Total : 200 liter
Lub. oil filter (Full flow)	:	Paper element cartridge type × 4pcs Filter mesh : 20 μ with by - pass alarm switch
Lub. oil filter (By - pass flow)	:	Paper element cartridge type × 1pcs Filter mesh : 2 μ
Lub. oil cooler	:	Water cooled corrugated fin type with by - pass valve

(5) Cooling system

Water pump	:	Gear drive centrifugal type
Capacity of water pump	:	1500rpm : 1200 liter/min 1800rpm : 1450 liter/min
Thermostat	:	Wax pellet type × 4pcs Open at 71°C ~ 85°C
Fan	:	Pusher type steel fan 1524 diameter Fan speed ratio i = 0.67 for 1500rpm i = 0.57 for 1800rpm
Radiator piping	:	Not supply

(6) Fuel system

Fuel inlet pipings	:	DWG.NO.35B96-62101 With flexible hose (PT 1/2 joint)
Fuel return pipings	:	DWG.NO.35B96-61301 With flexible hose (PT 1/2 joint)
Fuel overflow of Unit Injector have to return to fuel tank		
Injection pump	:	Unit injector
Feed pump	:	Trochoid type
Injection Nozzle	:	Hole type 0.29mm × 10 holes for 1500rpm 0.31mm × 10 holes for 1800rpm
Fuel filter	:	Paper element cartridge type × 4pcs Filter mesh : 5 μ

(7) Control system

Governor	:	DWG.NO.35B96-63001 Electronic speed governor Speed droop : 0 ~ 5% adjustable
Actuator	:	DWG.NO.S13-1720 Supply voltage : DC24V ± 20% Current consumption At starting : 16A Normal operation : 0.5 ~ 2A Min. Supply voltage : DC16V50%ED
Controller	:	DWG.NO.S13-1041 loose supply Supply voltage : DC24V ± 20% Current consumption : 100mA
Connector	:	DWG.NO.S13-1020 loose supply From actuator to controller 5000mm length
Magnetic pick up	:	DWG.NO.S13-1400 With 2P - connector
Cable	:	DWG.NO.S13-1410 loose supply From magnetic pick up to controller 4000mm length

(8) Starting system

Starter switch	:	Not supply
Starting motor	:	DC24V, 7.5KW × 2pcs Reduction type with safety relay With 2 poles connetor (DWG.NO.S14-0320)
Safety relay	:	DWG.NO.S10-0150 loose supply For parallel running of starting motor
Current of starter	:	Rush 720A Cranking 380A (Ambient temp : 5°C, Lub. oil : SAE No. 30)
Alternator	:	DWG.NO.S10-0540 DC24V, 30A, with voltage regulator With 2 poles connector (DWG.NO.S10-0550)
Recommended battery capacity	:	DC24V, 300AH Not supply
Battery switch	:	Not supply

(9) Stopping system

Automatic stop	:	DWG.NO.35B96-87501 Automatically shut – down by stop solenoid and electronic governor power off simultaneously
Stop solenoid	:	DWG.NO.S13-0280 Energized to run type DC24V, 31.2A(pull), 0.57A(hold)
Manual stop	:	By stop lever

(10) Safety device

Alarm switches	:	DWG.NO.35B96-90204
Alarm and trip		
Low oil press. switch	:	DWG.NO.S11-0794 (04442-25201) Diaphragm type : 1.5kg/cm ² switch on
High water temp. switch	:	DWG.NO.S11-0551 (04442-34400) Wax type : 95°C switch on
Alarm		
Oil filter alarm switch	:	DWG.NO.S11-1350 Piston type : 1.5kg/cm ² switch on
Oil filter alarm lamp	:	Not supply
Air filter alarm indicator	:	Not supply

(11) Others

- Belt cover : DWG.NO.35B96-25101 for reference
For fan drive pulley
Not supply
- Service meter : Not supply
- Tools : DWG.NO.35B96-91002 loose supply
- Spare parts : DWG.NO.35B96-94006 for 1500rpm loose supply
DWG.NO.35B96-94008 for 1800rpm loose supply

5 . ACCESSORIES (Loose supply parts for standard)

No.	PARTS No.	PATRS NAME	Q'TY	DWG.No.	
33	04410-33100	CONTROLLER	1	S13-1041	35B96-63001
35	04410-32900	CONNECTOR	1	S13-1020	
36	04410-38500	CONNECTOR	1	S13-1410	
38	F8665-02100	CONNECTOR	2	S14-0320	for starter
39	04322-40100	RELAY, SAFETY	1	S10-0150	
40	32B90-00300	CONNECTOR	1	S10-0550	for alternator

6. TOOLS (Standard)

No.	PARTS NO.	PARTS NAME	Q' TY	DWG. NO.
	35B96-91002	S.T.D. TOOL KIT	1set	consists of NO.1~26
	(32591-00012)	(TOOL ASSY.)	(1set)	consists of NO.1~23
1	MC420-083	BOX. TOOL	1	
2	F9614-17000	SOCKET	1	
3	F9614-22000	SOCKET	1	
4	F9614-24000	SOCKET	1	
5	F9614-27000	SOCKET	1	
6	F9614-30000	SOCKET	1	
7	F9614-32000	SOCKET	1	
8	F9615-25000	BAR, EXTENTION	1	
9	F9617-10000	JOINT, UNIVERSAL	1	
10	F9618-30000	HANDLE, SLIDE	1	
11	F9600-07008	SPANNER, OPEN ENDED	1	
12	F9600-10012	SPANNER, OPEN ENDED	1	
13	F9600-14017	SPANNER, OPEN ENDED	1	
14	F9600-19022	SPANNER, OPEN ENDED	1	
15	F9600-24027	SPANNER, OPEN ENDED	1	
16	F9600-30032	SPANNER, OPEN ENDED	1	
17	F9600-36041	SPANNER, OPEN ENDED	1	
18	F9630-15000	PLIER	1	
19	91267-00201	SCREW DRIVER]	
20	64309-15300	GUN, GREASE	1	
21	30091-06501	GAGE, THICKNESS	1	
22	33491-03600	ADAPTER	1	
23	33491-13500	SOCKET	1	
24	37191-03300	HANDLE, TURING	1	
25	32591-22100	WRENCH, FILTER	1	for cartridge filter
26	58309-73100	SOCKET	1	for fan drive

7. SPARE PARTS (Standard)

No.	PARTS NO.	PARTS NAME	Q' TY	NOTE.
	35B96-94006	SPARE PARTS KIT	1set	consists of NO.2~7 and NO.9,10
	35B96-94008	SPARE PARTS KIT	1set	consists of NO.1 and NO.3~8,10
1	37561-07700	NOZZLE TIP ASSY.	6	ϕ 0.31/1800rpm
2	37561-07800	NOZZLE TIP ASSY.	6	ϕ 0.29/1500rpm
3	35C04-01500	GASKET, ROCKER COVER	4	
4	37561-16800	GASKET, NOZZLE	12	
5	35C40-01100	ELEMENT, L/O FILTER	4	
6	35A40-01800	ELEMENT, L/O BY-PASS	1	
7	32562-60300	ELEMENT, FUEL	4	
8	05910-44081	V-BELT	1	i = 0.55/1800rpm
9	05910-44076	V-BELT	1	i = 0.66/1500rpm
10	35B68-04100	V-BELT	1	for dynamo drive

8. DRAWINGS (Standard & Optional equipments)

No.	DWG. No.	DWG. NAME	REV.
1	35B96-00201	ENGINE OUTLINE	
2	35B96-01001	JOINT DETAIL	
3	35B96-04006	WIRING DIAGRAM	for reference
4	35B96-14001	MOUNTING	
5	35B96-21001	FLYWHEEL & HOUSING	
6	35B96-25101	BELT COVER	
7	35B96-61301	FUEL RETURN PIPING	
8	35B96-62101	FUEL INLET PIPING	
9	35B96-63001	GOVERNOR	
10	35B96-87501	STOP SOLENOID	
11	35B96-90204	ALARM SWITCH	
12	35B96-91002	TOOL	
13	35B96-94006	SPARE PARTS	for 1500rpm
14	35B96-94008	SPARE PARTS	for 1800rpm
15	S10-0150	SAFETY RELAY	
16	S10-0540	ALTERNATOR	
17	S10-0550	CONNECTOR	
18	S11-0551	THERMO SWITCH	
19	S11-0794	PRESSURE SWITCH	
20	S11-1350	FILTER ALARM SWITCH	
21	S13-0280	SOLENOID	
22	S13-1020	CONNECTOR	
23	S13-1041	CONTROLLER	
24	S13-1400	MAGNETIC PICK UP	
25	S13-1410	CONNECTOR	
26	S13-1720	ACTUATOR	
27	S14-0320	CONNECTOR	