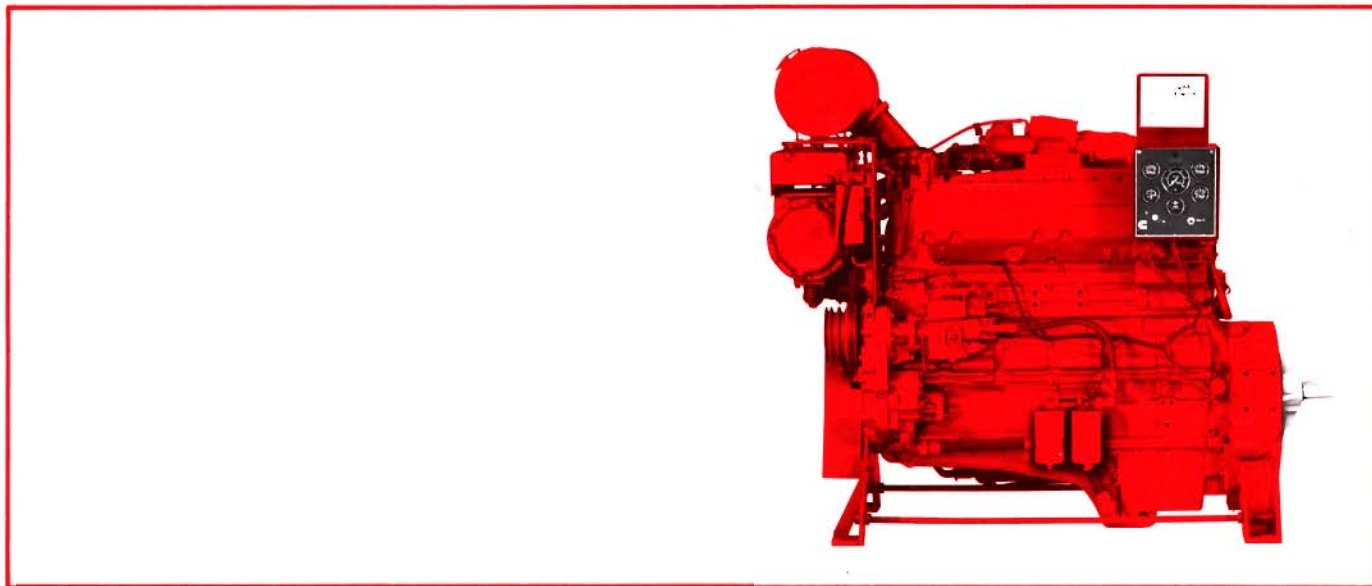




NTTA-855-F FIRE PUMP ENGINE



SPECIFICATIONS

Four Stroke Cycle, Twin Turbocharged-Aftercooled, In-Line, 6 Cylinder Diesel Engine.

Bore and Stroke	140 x 152 mm	(5½ x 6 in.)
Displacement	14 L	(855 cu. in.)
Lube System Oil Cap.	28.8 L	(7.6 U.S. gals.)
Engine Coolant Cap.	41.6 L	(11 U.S. gals.)
Net Weight, with Std. Accessories, Dry	1 525 kg	(3,360 lbs.)

INSTALLATION CONSIDERATIONS

Maximum raw water pressure must not exceed 345 kPa (50 PSI). Minimum acceptable raw water flow at 32°C (90°F) raw water temperature and 38°C (100°F) ambient air temperature should be at least 198 L/min. (55 G.P.M.) at the 2100 RPM listed rating.

Ventilation air required for engine combustion is 649 L/sec. (1375 CFM) at 2100 RPM rating. This is for engine air combustion only and does not take into consideration additional air required for normal room cooling.



This symbol on the nameplate means the product is Listed by Underwriters' Laboratories Inc.



This symbol on the nameplate means the product is approved by the Factory Mutual Research Corporation.



This symbol on the nameplate means the product is Listed by Underwriters' Laboratories of Canada.

LISTED AGENCY RATINGS

452 H.P. @ 1760 R.P.M.

481 H.P. @ 2100 R.P.M.

All of the above ratings are listed by the following agencies:

Underwriter's Laboratories

Factory Mutual

Underwriters' Laboratories of Canada

The agency-approved horsepower ratings published are already derated for fire pump service. The ratings show horsepower available for driving the fire pump at standard SAE J1349 conditions of 7 521 mm (29.61 in.) Hg barometer and 25°C (77°F) inlet air temperature (approximate 91.4 m [300 ft.] above sea level). The only additional deration necessary is for higher ambient temperatures and elevations as follows: 3% for each 305 m (1000 ft.) above 91.4 m (300 ft.) and 1% for each 5.6°C (10°F) above 25°C (77°F) in accordance with National Fire Association Pamphlet No. 20.

DESIGN FEATURES

Aftercooler: Large capacity aftercooler results in cooler, denser intake air for more efficient combustion and reduced internal stresses for longer life. Aftercooler is located in engine coolant system, eliminating need for special plumbing.

Bearings: Replaceable, precision type, steel backed inserts. Seven main bearings, 114 mm (4.5 in.) diameter. Connecting rod bearings 79 mm (3.125 in.) diameter.

Camshaft: Single large diameter camshaft precisely controls valve and injector timing. Lobes are induction hardened for long life. Seven replaceable precision type bushings 64 mm (2.5 in.) diameter.

Connecting Rods: Drop forged, I-beam section 305 mm (12 in.) center to center length. Rifle drilled for pressure lubrication of piston pin. Rod is tapered on piston pin end to reduce unit pressures.

Cooling System: Belt driven centrifugal water pump. Large volume water passages provide even flow of coolant around cylinder liners, valves, and injectors. Modulating by-pass thermostat regulates coolant temperature.

Crankshaft: Fully counterweighted high tensile strength steel forging with induction hardened fillets and journals.

Cylinder Block: Alloy cast iron with removable wet liners.

Cylinder Heads: Alloy cast iron. Each head serves two cylinders. Drilled fuel supply and return lines. Valve seats are replaceable corrosion resistant inserts. Valve guides and cross head guides are replaceable inserts.

Cylinder Liners: Replaceable wet liners.

Filters: Fleetguard. Spin-on type for fuel, lubricating oil, and coolant, for easy serviceability.

Fuel System: Cummins exclusive low pressure PT™ system with wear compensating pump and integral dual flyweight governor.

Lubrication: Large capacity gear pump provides pressure lubrication to all bearings. All pressure lines are internal drilled passages in block and heads.

Pistons: Aluminum alloy, cam ground and barrel shaped to compensate for thermal expansion assures precise fit at operating temperatures. CeCorr™ grooved skirt finish provides superior lubrication. Oil cooled for rapid heat dissipation. Three compression and one oil ring.

Turbocharger: Series boost arrangement provides more power, improved fuel economy, altitude compensation, and lower smoke and noise levels.

Valves: Dual 48 mm (1.875 in.) diameter poppet type intake and exhaust valves. Wear resistant face on exhaust valves.

STANDARD EQUIPMENT

Air Cleaner: Dry type element integral with casing.

Belt and Damper Shield Guard: Protection from alternator, accessory drive, and water pump belts and vibration damper.

Coolant Pump: Belt driven, centrifugal type.

Electrical Equipment: 24 volt negative ground system, including: a 24 volt starting motor; a 24 volt battery charging alternator; manually operable contactors; and a junction box with enclosed terminal strip.

Engine Support: Pedestal type, front and rear.

Exhaust Manifold: Dry and insulated.

Exhaust Outlet: 127 mm (5 in.) diameter, 90° elbow.

Flywheel: Machined for stub shaft mounting.

Flywheel Housing: SAE No. 1 with industrial supports.

Governor: Mechanical flyweight, mechanical variable speed type.

Heat Exchanger: Copper nickel tube bundle, mounted.

Instrument Panel: Mounted. Electrical instruments only.

Includes charge meter, tachometer, hour meter, water temperature gauge, lubricating oil temperature gauge, and lubricating oil pressure gauge.

Lubricating Oil Cooler: Tubular type, jacket water cooled.

Oil Pan: Cast aluminum, rear sump type, 26.5 litre (7 U.S. gallon) capacity. Provision for optional oil heater.

Oil Pressure Switch: Provides signal to activate alarm (not included) for low oil pressure.

Overspeed Switch: Mounted inside the instrument panel, overspeed shutdown with manual reset, stop crank contacts.

Stubshaft: Mounted on flywheel.

Throttle Control: Hydraulic, with no manual override.

Vibration Damper: Viscous type.

Water Jacket Heater: Mounted beside oil pan. 115 volt, 2500 watt.

Water Temperature Switch: Provides signal to activate alarm (not included) for high water temperature.

OPTIONAL EQUIPMENT

Oil Heater: Mounted in side of oil pan.



Cummins Engine Company, Inc.
Columbus, IN 47202
U.S.A.

Cummins has always been a pioneer in product improvement. Thus specifications may change without notice. Illustrations may include optional equipment. See specific proposal bill of material for actual equipment being furnished.

CUMMINS ENGINE COMPANY, INC.
Engine Data Sheet

Engine Model: FIRE PUMP NTTA855-F BIG CAM
Gross Power BHP (kW): 481 (359) @ 2100
Configuration Number: D093486FX02

Data Sheet: FR-1373
Date: 08Mar95
CPL Code: 0658

GENERAL ENGINE DATA

Type.....	4 cycle, Inline, 6 cylinder
Aspiration:	Turbocharged & Aftercooled
Bore - in. (mm).....	5.5 (140)
Stroke - in. (mm).....	6.0 (152)
Displacement - in. ³ (litre)	855 (14.0)
Compression Ratio	13.9:1
Valves per Cylinder: - Intake.....	2
- Exhaust.....	2
Engine Weight & Center of Gravity (With Standard Accessories)	
Reference Installation Diagram	3386665
Dry Weight - lb. (kg).....	3360 (1525)
Wet Weight - lb. (kg).....	3435 (1560)
C.G. Distance from F.F.O.B. - in. (mm).....	19 (483)
C.G. Distance Above Crankshaft Centerline - in. (mm).....	5 (127)
Maximum Allowable Bending Moment @ Rear Face of Block - lb.-ft. (N•m).....	1000 (1350)

AIR INDUCTION SYSTEM

Maximum Allowable Temperature Rise Between Ambient Air and Engine Air Inlet (Ambients 50°F [10°C] to 100°F [38°C]) - °F (°C)	30 (15)
Maximum Allowable Intake Restriction With a Dirty Air Filter Element - in. H ₂ O (mm H ₂ O)	25 (635)
Part Number of Standard Air Filter Element (Dry Type)	3039559
Minimum Allowable Ambient Air Temperature - °F (°C).....	50 (10)

LUBRICATION SYSTEM

Oil Pressure @ Rated Speeds - PSI (kPa).....	40 - 50 (276 - 345)
Oil Flow @ Maximum Rated Speeds (Nominal) - U.S. GPM (litre/s).....	33 (2.1)@1750/40 (2.5)@2100
Oil Pan Capacity (High - Low) U.S. gal. (litre)	7 - 6 (26 - 23)
Full Flow Lube Oil Filter Capacity - U.S. gal. (litre).....	7.6 (28.8)
Part Number of Standard Oil Pan.....	193631
Part Number of Standard Oil Filter Element	3889310

Application Note: When ambient temperatures will be lower than 70°F (21°C) an oil heater is required. The recommended heater wattage for this engine is 300 down to 50°F (10°C).

COOLING SYSTEM

Heat Exchanger Cooled (Shell & Tube Type)	
Part Number of Tube Bundle.....	3011326
Raw Water Working Pressure Range at Heat Exchanger - PSI (kPa)	45 (310) MAX
Recommended Minimum Water Supply Pipe Size to Heat Exchanger (Reference Only) - in. (mm) dia	1.5 (38.1)
Recommended Minimum Water Discharge Pipe Size From Heat Exchanger (Reference Only) - in. (mm) dia	2.0 (50.8)
Coolant Water Capacity (Engine Side) - U.S. gal. (litre).....	11.0 (42)
Standard Thermostat - Type.....	Modulating
- Range - °F (°C).....	175 - 197 (79 - 92)
Minimum Raw Water Flow with Water Temperatures to 90°F (32°C) - U.S. GPM (litre/s)	55 (3.3)

Note: Minimum raw water requirement is based on water flow required to minimize tube fouling in the heat exchanger tube bundle.

A jacket water heater is mandatory on this engine. The recommended heater wattage is 2500 down to 50°F (10°C).

EXHAUST SYSTEM

Maximum Allowable Back Pressure Imposed by Piping &
 Silencer - in. Hg (mm Hg) 3 (75)
 Exhaust Pipe Size Normally Acceptable - in. (mm) dia..... 5.25 (133.4)

FUEL SYSTEM

Supply Line Size - in. (mm)..... 0.625 (16) O.D. Tube
 Drain Line Size - in. (mm) 0.625 (16) O.D. Tube
 Maximum Fuel Height Above ^CL Crankshaft - in. (mm) 80 (2030)
 Part Number of Standard Fuel Filter 3315847
 Part Number of Standard Fuel Filter Element..... FF-105D
 Maximum Allowable Restriction to Fuel Pump with Dirty Filter - in. Hg (mm Hg) 8 (200)
 Maximum Allowable Return Line Restriction - in. Hg (mm Hg)..... 4 (100)

ELECTRICAL SYSTEM

Battery Voltage 24
 Battery Cable Size (Maximum Cable Length Not to Exceed 10 ft. (3.0 m) AWG) 00
 Wiring for Automatic Starting (Negative Ground)..... Standard
 Alternator (Standard) 24 Volt, Internally Regulated - Ampere..... 35 or 45
 Manually Operable Contactors Standard
 Minimum Recommended Battery Capacity Amp-hr. 0°F CCA
 70°F (21°C) Minimum Temperature 100 450
 32°F (0°C) Minimum Temperature 150 640
 Reference Wiring Diagram Number..... 3386665

PERFORMANCE DATA

All data is based on the engine operating with fuel system, water pump, lubricating oil pump, air cleaner, and alternator; not included are compressor, fan, optional equipment and driven components. Data is based on operation at SAE standard J816b conditions of 500 feet (150 m) altitude (29.00 in. [736 mm] Hg dry barometer), 85°F (29°C) intake air temperature and 0.38 in. (9.6 mm) Hg water vapor pressure, using No. 2 diesel or a fuel corresponding to ASTM D2. All data is subject to change without notice.

Altitude Above Which Output Should be Limited - ft.(m)..... 300 (90)
 Correction Factor per 1000 ft. (300 m) above Altitude Limit 3%
 Temperature Above Which Output Should be Limited -°F (°C)..... 77 (25)
 Correction Factor per 10°F (11°C) Above Temperature Limit 1% (2%)

FM Approved and UL Listed Ratings For: NTTA855-F

Listed/ Approved Ratings BHP (kW)	Engine Speed RPM	Ventilation Air Required for Combustion CFM (litre/s)	Heat Rejection to Coolant BTU/min (kW)	Heat Rejection to Ambient Air* BTU/min (kW)	Exhaust Gas		Fuel Consumption Gal/h (litre/h)
					<u>Flow</u> CFM (litre/s)	<u>Temp.</u> °F (°C)	
481 (359)	2100	1375 (649)	13300 (234)	4088 (72)	4054 (1913)	830 (443)	25.2 (95.4)
452 (337)	1760	1075 (507)	11065 (195)	3342 (59)	3243 (1531)	775 (413)	22.4 (84.8)

* - Does not include exhaust piping.

Cummins Engine Company, Inc.

Exhaust Emissions Data Sheet

Firepump
Pg. No.

F
45

Data Sheet: DS-1373

Date: 08Mar95

Engine

Model:	NTTA855-F	Application:	Firepump
Type:	4 cycle, In-Line, 6 Cylinder Diesel	Config. Number:	TBD
Aspiration:	Turbocharged and Aftercooled	Bore:	5.50 in. (140 mm)
Compression Ratio:	13.9:1	Stroke:	6.00 in. (152 mm)
Emissions Control Device:	Twin Turbo, Aftercooling	Displacement:	855 cu. in. (14.0 liters)

Performance Data

	<u>2100 RPM</u>	<u>1760 RPM</u>
BHP	481	452
Fuel Consumption (gallons/hour)	25.2	22.4
Air to Fuel Ratio	TBD	TBD
Exhaust Gas Flow (CFM)	4054	3243
Exhaust Gas Temperature (°F)	830	775

Exhaust Emissions Data

(All values are grams/hp-hour)

<u>Component</u>	<u>2100 RPM</u>	<u>1760 RPM</u>
HC (Total Unburned Hydrocarbons)	TBD	TBD
NOx (Oxides of Nitrogen as NO ₂)	TBD	TBD
CO (Carbon Monoxide)	TBD	TBD
PM (Particulate Matter)	TBD	TBD
SO₂ (Sulfur Dioxide)	TBD	TBD
CO₂ (Carbon Dioxide)	TBD	TBD
N₂ (Nitrogen)	TBD	TBD
O₂ (Oxygen)	TBD	TBD
H₂O (Water Vapor)	TBD	TBD

Test Conditions

Data was recorded during steady-state rated engine speed (± 25 RPM) with full load ($\pm 2\%$). Pressures, temperatures, and emission rates were stabilized.

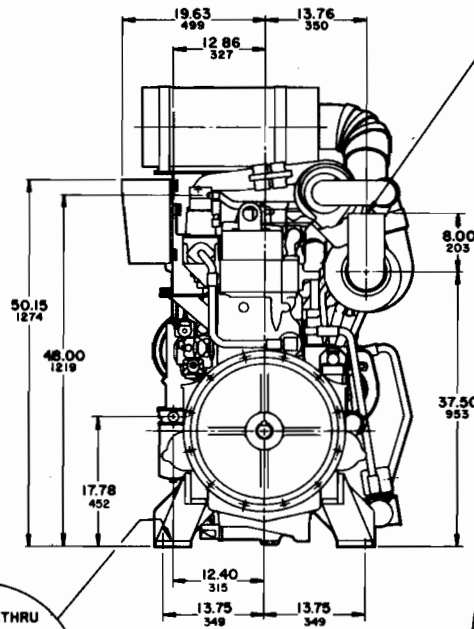
Fuel Specification:	ASTM D975 No. 2-D diesel fuel with 0.2% sulfur content (by weight) and 42-50 cetane number.
Fuel Temperature:	99° F \pm 9° (at fuel pump inlet)
Intake Air Temperature:	77° F \pm 9°
Barometric Pressure:	29.6 in. Hg \pm 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H ₂ O/lb. dry air

The HC, NOx, and CO emissions data tabulated here were taken from a single engine under the test conditions shown above. Data for the other components are estimates. This data is subject to instrumentation, measurement, and engine-to-engine variability. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

REVISIONS					
REV.	DESCRIPTION	DATE	APP'D	DATE	APP'D

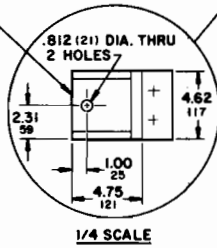
SERVICE CONNECTIONS

FUEL INLET CONN: 7/8-14UNF-2A TH'D. WITH 45° TIP
 FUEL RETURN TO TANK: 3/4-16UNF-2A TH'D. WITH 45° TIP
 OIL DRAIN: 1 NPTF
 CYLINDER BLOCK DRAIN: 1/4 NPTF
 EXHAUST OUTLET CONN: 5.00(127) O.D.
 RAW WATER INLET CONN.: 2 NPTF
 RAW WATER OUTLET CONN.: 2 1/2 NPTF
 OIL IMMERSION HEATER: 1 NPTF
 WIRING DIAGRAM NO. 3039565

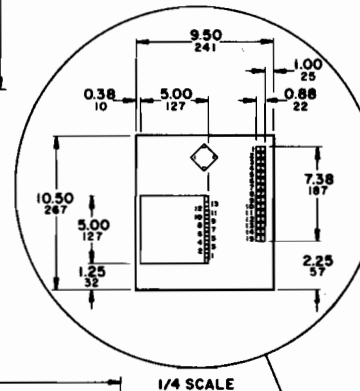


EXHAUST OUTLET CONNECTION

REAR MOUNTING CROSS SECTION

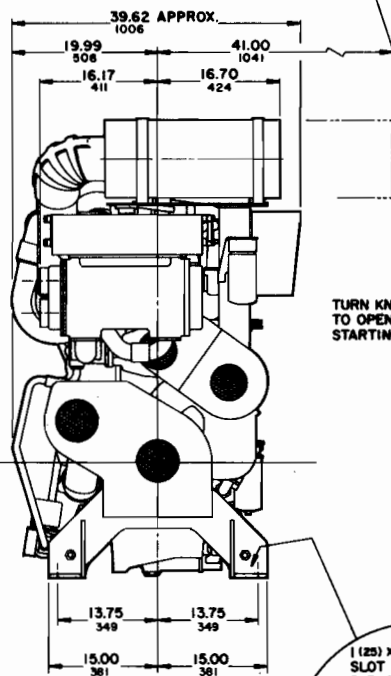


DISTANCE REQUIRED FOR AIR CLEANER ELEMENT REMOVAL

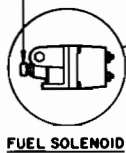


EXHAUST BLANKET

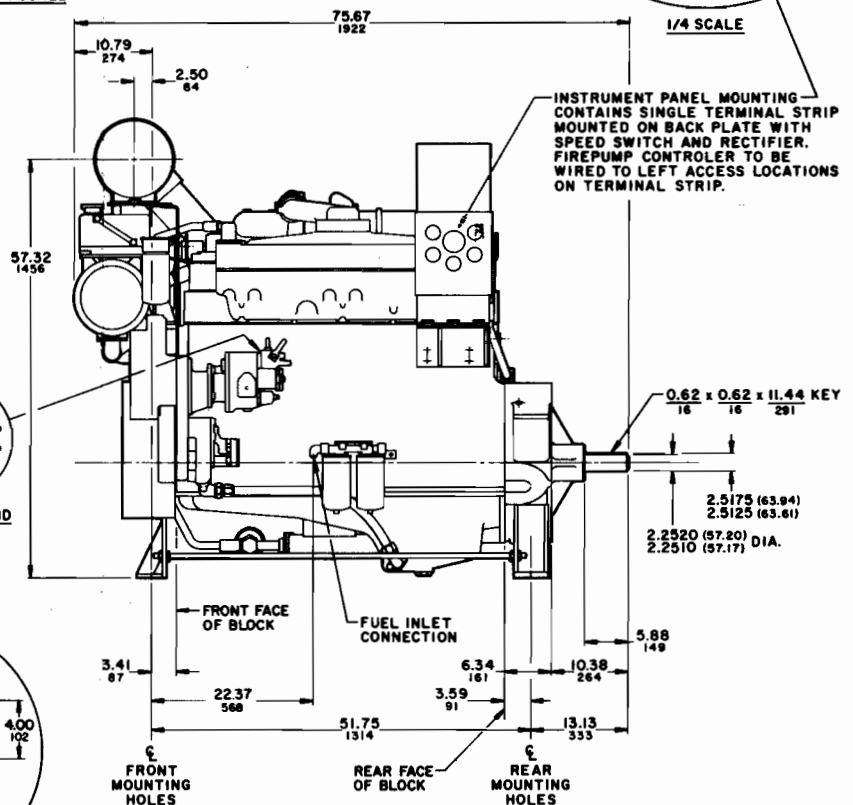
ENGINE (TOP TANK) WATER FILL
 RAW WATER OUTLET CONNECTION
 RAW WATER INLET CONNECTION



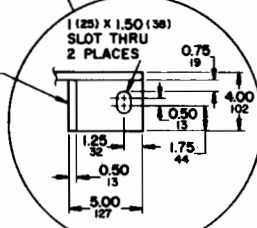
TURN KNOB CLOCKWISE TO OPEN FOR MANUAL STARTING



INSTRUMENT PANEL MOUNTING CONTAINS SINGLE TERMINAL STRIP MOUNTED ON BACK PLATE WITH SPEED SWITCH AND RECTIFIER. FIREPUMP CONTROLLER TO BE WIRED TO LEFT ACCESS LOCATIONS ON TERMINAL STRIP.



FRONT MOUNTING CROSS-SECTION



HOLES

DIV OIL PRESSURE SWITCH

KIMSTAT

WIRING DIAGRAM

NOTE: ALL DIMENSIONS IN INCHES AND MILLIMETERS.

DO NOT SCALE THIS DRAWING
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DATE	4/30/84
REV.	
APP'D	
DATE	

Cummins

NTTA-855-F

INSTALLATION DIAGRAM

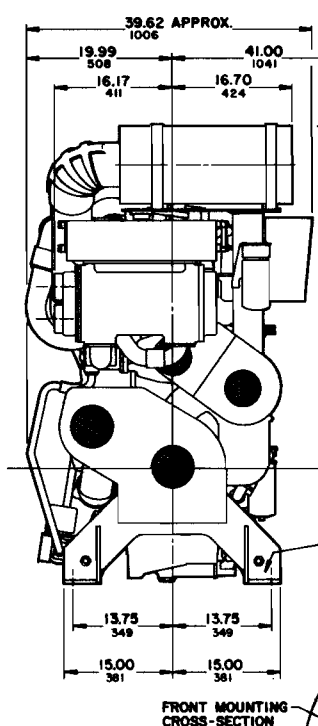
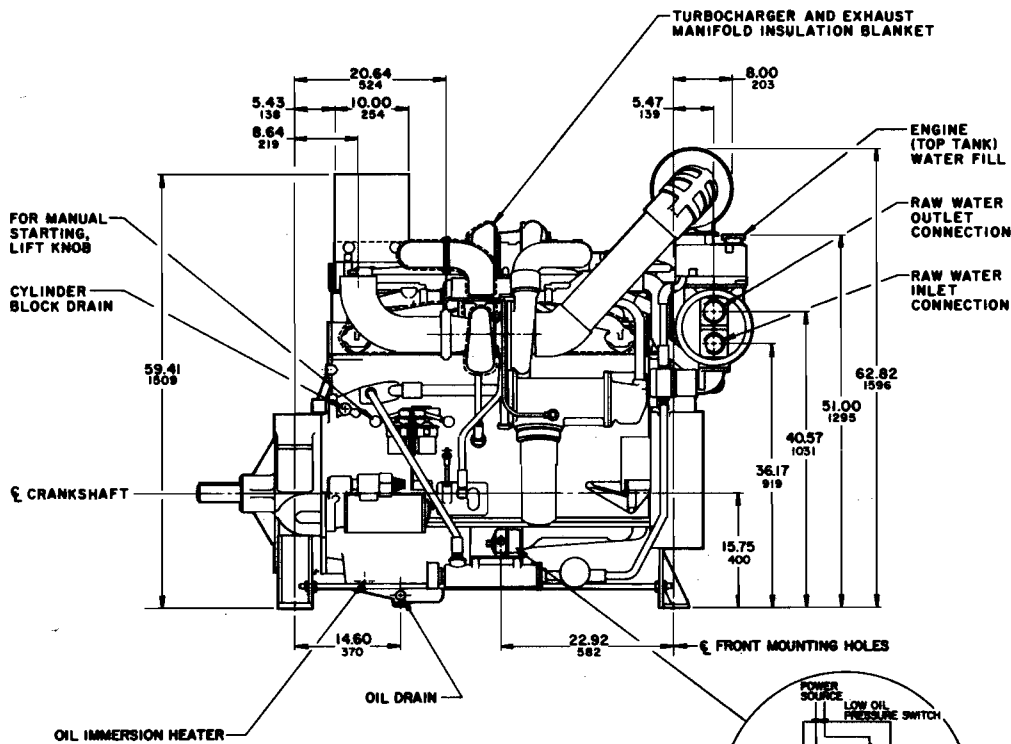
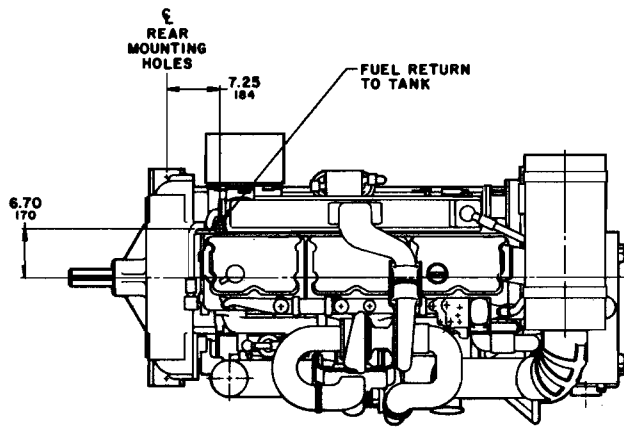
DATE: 4/30/84

SCALE: 1/4" = 1"

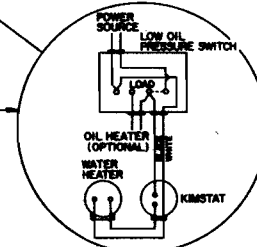
DRAWING CONTROL

SHEET 1 OF 1

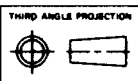
SERVICE CONNECTIONS
 FUEL INLET CONN: 7/8-14 UNF-2A TH'D. WITH
 FUEL RETURN TO TANK: 3/4-16 UNF-2A TH'D. V
 OIL DRAIN: 1 NPTF
 CYLINDER BLOCK DRAIN: 1/4 NPTF
 EXHAUST OUTLET CONN: 5.00 (127) O.D.
 RAW WATER INLET CONN.: 2 NPTF
 RAW WATER OUTLET CONN.: 2 1/2 NPTF
 OIL IMMERSION HEATER: 1 NPTF
 WIRING DIAGRAM NO. 3039565



POWER SOURCE IS 115V, OIL HEATER IS 115V AND 300W, AND KIM HOT START WATER HEATER IS 115V AND 2500W. KIMSTAT OPENS AT 100°F AND CLOSSES AT 120°F.



LOW OIL PRESSURE SWITCH WIRING DIAGRAM



NOTE: ALL DIMENSIONS IN INCHES AND MILLIMETERS.