COVINGTON
P.O. BOX 18949
GREENSBORO, N.C.
27419-8949

Telephone: 919/292-9240
TWX: 510/922-7396

Charlotte
New Bern
Wilmington
Wilson

Generator Systems

Submittal Data

PROJECT: New River Air Station

CUSTOMER: Harris Electric Company

DATE : March 12, 1984

P. O. # : 15841

Bill of Materials

Covington Model CD 425, diesel generator set rated 300 (375 KVA), prime 0.8 PF, 480 volts, 3 phase, 4 wire, 60 hertz. Voltage Regulation ± ½% no load to full load. Frequency Regulation: 3 hertz droop. Frequency stability 0.25% steady state.

Description	Data Ref.	Description	Data Ref.
Typical Assembly	840702-1 840902-1	Generator	Lima Ser Bulletin Lima Performance Letter Letter Dept. of Navy
Certification Letter	Covington Letterhead		
Engine	5SA107		
BMEP Calculation	Covington Letterhead	Regulator	SB-3 SPD-3
Cranking Time	Covington Letterhead	Engine H.P. Curve Standby	E4-7125-32-4
Governor	F-18080 F-18087-1	Engine H.P. Curve, Prime	E4-7125-32-2
Manufacturer's Data	Covington Letterhead	Speed Calculations	Torsonial Anal.
Fuel Filter	AC (Pg. 1-3)	Manual Voltage Control	SRK-1
Silencer	Nelson Bulletin	Control Panel	847-0183-2 847-0183-3 9906200 843-0182-3
Flex Exhaust Connector	Dwg. #SK-32180		
Block Heater	EBH-1-4-82	Remote Control Panel	842-0184-2 842-0184-3
Vibration Isolators	PTVI-3-16-82 Bulletin K23E	Interconnection Dwg. #	842-0184-4

Description	Data Ref.
Circuit Breaker	843-0182-2
Instrument Data	1956600 1962000 1961000 1963000 Kratos Bulletin
Batteries with Rack	Delco Bulletin Bara-1-1-82
Battery Charger	Bulletin 374-2
Weatherproof Housing	SME-3-1-82
Transfer Switch	G11-005B, Previously submitted
Day Tank	TCA-81
Fuel Plumbing Typical	832904-3
Fuel Tank	Xerxes Bulletin Accessories (Pg. 1-7)
	Covington Letterhead

HARRIS ELECTRIC CO.
OF
WILMINGTON
BOX 4487, WILM., N.C. 28406

APPROVED ~

DISAPPROVED _____

APPROVED AS NOTED _____

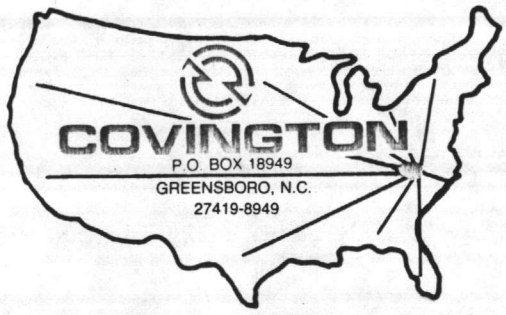
RESUBMITTAL (IS) (IS NOT) REQUIRED

CHECKED BY MEH DATE 3-14-84

CONT. 5840 SPEC 5840

P.O. Box 2179
1019 N. 3rd St.
Wilmington, N.C. 28402
(919) 763-0944

P.O. Box 2626
Hwy. 17 South
New Bern, N.C. 28560
(919) 638-3161



(919) 292-9240

P.O. Box 26653
1912 Cottonwood St.
Charlotte, N.C. 28213
(704) 596-8000

P.O. Box 2166
1303 Highway 301 South
Wilson, N.C. 27893
(919) 237-2833

FOR DETAILED LOCATIONS, SEE REVERSE

THE POWER PROFESSIONALS

ENGINES

- ☐ 10 to 5800 HP
- ☐ Air cooled & Water cooled
- ☐ Diesel, Gasoline, LP, Natural gas
- ☐ Over the Road Truck Power
- ☐ Light Truck Power
- ☐ Construction, Industrial Power
- ☐ Marine Power
- ☐ Logging Power
- ☐ Custom Designed Power Systems
- ☐ Repowers
- ☐ Alco
- ☐ AVCO VM
- ☐ Detroit Diesel
- ☐ Minneapolis Moline
- ☐ MWM - Murphy
- ☐ Nissan
- ☐ Hydroforce Marine Engines
- ☐ North American
- ☐ White/Hercules

SPECIALIZED PRODUCTS

- ☐ High Performance Marine Power
- ☐ Kent Moore Engine & Transmission Tools
- ☐ Gleason Weather Caps
- ☐ AC Filters
- ☐ Kim Hotstart Engine Heaters
- ☐ Parker - Hannifin Hose & Fittings
- ☐ Rockford Fans
- ☐ Lyon Metal Products - Racks, Bins
- ☐ Delco Batteries
- ☐ Ingersoll-Rand Air Starters
- ☐ Salvaged Engines, Parts

GENERATOR SETS

- ☐ .5 to 4000 KW
- ☐ Prime and Standby
- ☐ Diesel, Gasoline, LP, Natural gas
- ☐ Portable
- ☐ Marine
- ☐ Homeowner
- ☐ Uninterruptible Power Systems
- ☐ Switchgear
- ☐ Peak Shaving & Co-Generation
- ☐ Service Contracts
- ☐ Alco — 750 to 4000 KW
- ☐ Detroit Diesel — 40 to 1200 KW
- ☐ Kohler — .5 to 1000 KW
- ☐ Minneapolis Moline — 50 to 200 KW
- ☐ MWM - Murphy — 5 to 50 KW
- ☐ Nissan — .6 to 175 KW
- ☐ White/Hercules — 25 to 150 KW

REMANUFACTURED PRODUCTS

- ☐ *reliabilt* Components - 10 major items
- ☐ Morco Crankshafts
- ☐ Cylinder Heads
- ☐ Cummins Turbos
- ☐ Caterpillar Turbos
- ☐ Complete Engines
- ☐ Complete Transmissions

TRANSMISSIONS

- ☐ Truck
- ☐ Construction, Industrial
- ☐ Specialized Applications
- ☐ Regears
- ☐ Allison Automatics
- ☐ Allison Powershift
- ☐ ZF Marine Gears
- ☐ Allison Marine Gears

PUMP SETS

- ☐ Irrigation
- ☐ Contractor
- ☐ Stationary, Portable
- ☐ ASM Pacer
- ☐ Custom Designed

SPECIALIZED SERVICES

- ☐ Specification Consultation
- ☐ Field Diagnostic Service
- ☐ Extended Warranty Plans
- ☐ Engine Dynamometer Testing
- ☐ Chassis Dynamometer Testing
- ☐ Transmission Valve Body Testing
- ☐ Transmission Dynamometer Testing
- ☐ Gen Set Load Bank Testing

TRAINING

- ☐ Engine, Transmission Overhaul
- ☐ Parts
- ☐ Mobile Unit for Field Training
- ☐ Custom Tailored Training

24 HOUR
PARTS AND SERVICE ON ALL PRODUCTS

Detroit Diesel Engines **Allison Transmissions**

ALCO® AVCO VM DIESELS HYDROFORCE DIESEL MARINE ENGINES KOHLER GENERATOR

MWM murphy MM MINNEAPOLIS·MOLINE NISSAN ENGINES WHITE ENGINES

Name _____

Company Name _____

Address _____

_____

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 1299 GREENSBORO, N.C.

POSTAGE WILL BE PAID BY ADDRESSEE

COVINGTON DIESEL, INC.

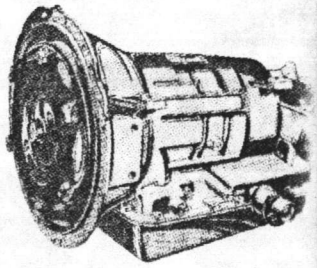
P.O. Box 18949

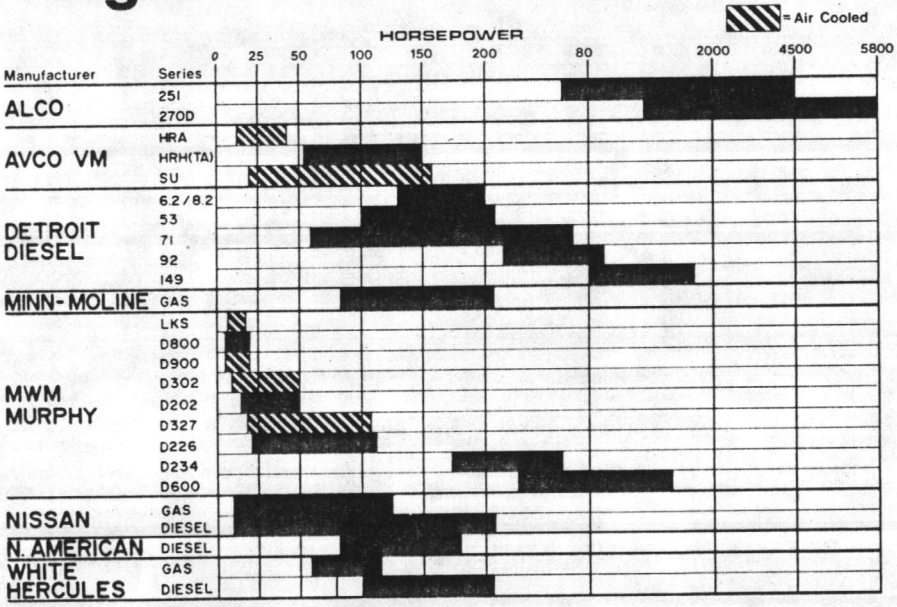
Greensboro, N.C. 27419-8949

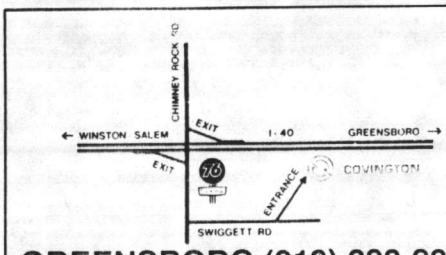
Attn: T. F. Lanier, *President*

IF YOU DESIRE FURTHER INFORMATION ON OUR PRODUCTS OR SERVICES, PLEASE CHECK THE APPROPRIATE BOX ON REVERSE; PROVIDE YOUR NAME & ADDRESS, FOLD, STAPLE AND MAIL

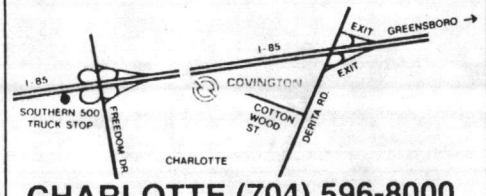
Covington Power Selection Chart



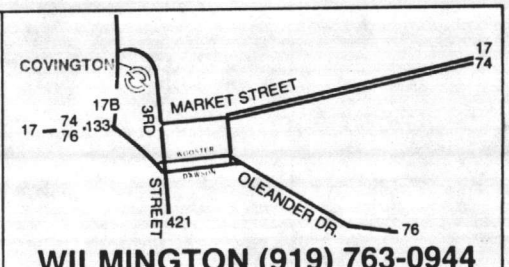




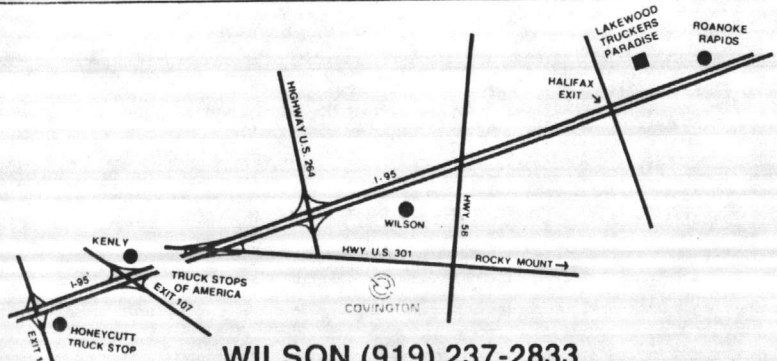
GREENSBORO (919) 292-9240



CHARLOTTE (704) 596-8000



WILMINGTON (919) 763-0944

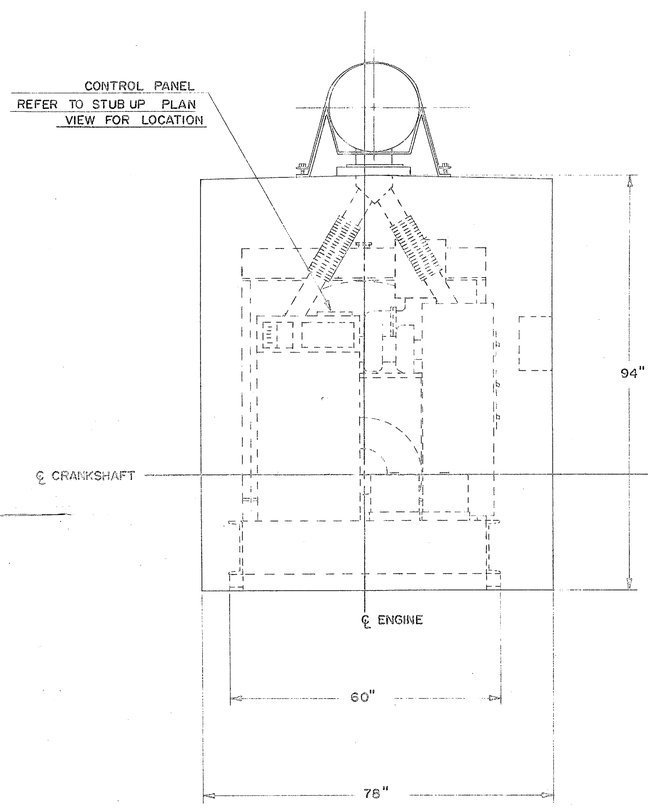


WILSON (919) 237-2833

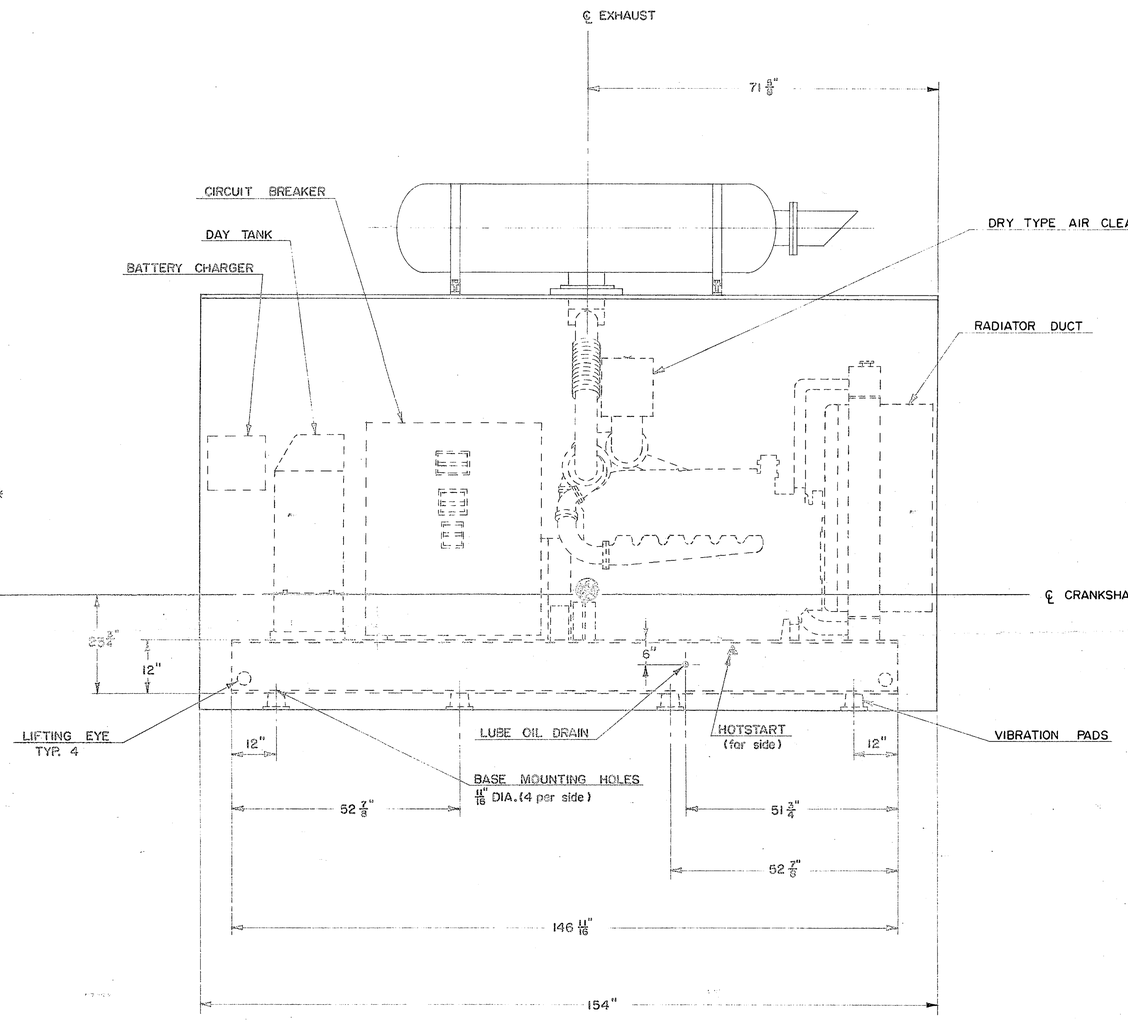
FROM JACKSONVILLE: HIGHWAY 17 SOUTH TO NEW BERN (WE ARE ABOUT 5 MILES OUTSIDE NEW BERN).

NEW BERN (919) 638-3161

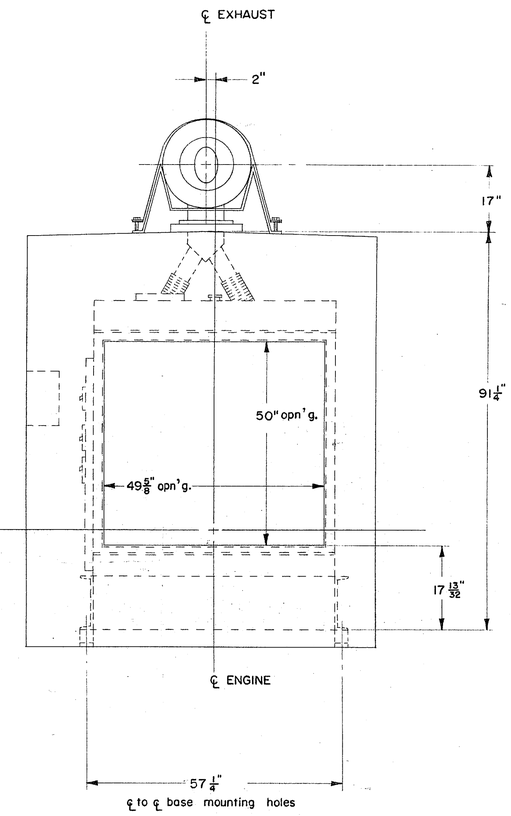
REAR ELEVATION



RIGHT SIDE ELEVATION



FRONT ELEVATION



NEW RIVER

APPROXIMATE UNIT WEIGHT - 9137 lbs.

NOTE
HEIGHT DIMENSIONS ARE FROM BASELINE AND DO NOT INCLUDE VIBRATION PADS.

※ EXCEPTION
OVERALL HEIGHT DIMENSION OF SLIP OVER HOUSE IS FROM CONCRETE PAD.

REFER TO STUB UP PLAN VIEW FOR INTERIOR COMPONENT LOCATIONS

STUB UP DWG. NO. 840902-1

COVINGTON
GREENSBORO, N.C.

CHARLOTTE
NEW BERN
WILMINGTON
WILSON

NO.	REVISION	BY	DATE
1			
2			
3			
4			
5			
6			

TOLERANCES
DECIMAL ± .031
FRACTIONAL ± 1/64
ANGULAR ± 0°-5'

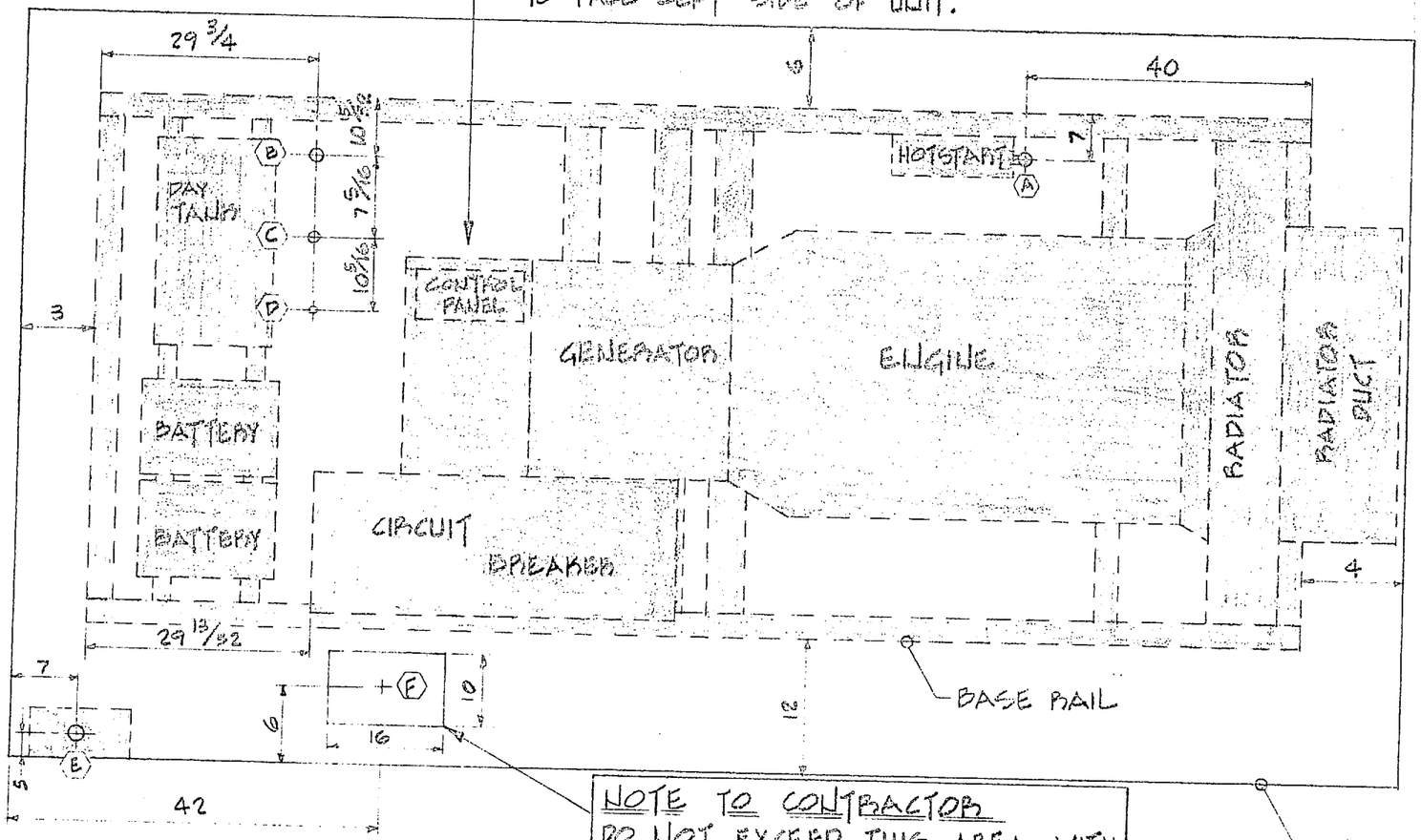
300 KW
TYPICAL ASSEMBLY
DETROIT DIESEL 12V-71T ENGINE
LIMA MODEL 818 (680 FRAME) GENERATOR

DRAWN BY D.ROUTH	MATERIAL	SHEET 1 OF 1
DATE FEB 7,1983	CHK'D.	DRAWING NO.
SCALE NONE	APP'D.	840702-1

ALCO · AVCO DIESELS · DETROIT DIESEL ALLISON · KOHLER GENERATORS · MURPHY · WHITE

DUNCAN-PARNELL, INC., WINSTON-SALEM 153

NOTE
CONTROL PANEL INSTRUMENTS TO FACE LEFT SIDE OF UNIT.



STUB UP LEGEND

Ⓐ ELECTRICAL CONNECTIONS TO HOTSTART
Ⓑ ELECTRICAL CONNECTIONS TO DAY TANK
Ⓒ DAYTANK FUEL RETURN (1" NPT)
Ⓓ DAY TANK FUEL SUPPLY (3/8" NPT)
Ⓔ BATTERY CHARGER
Ⓕ CIRCUIT BREAKER

△ ALL DIMENSIONS ARE IN INCHES.

COVINGTON

GREENSBORO, N.C.

CHARLOTTE
NEW BERN
WILMINGTON
WILSON

NO.	REVISION	BY	DATE
1			
2			
3			
4			
5			
6			

TOLERANCES
DECIMAL ± .031
FRACTIONAL ± 1/32
ANGULAR ± 0°-5'

STUB UP PLAN VIEW

NEW RIVER

DRAWN BY D. BOUTH | MATERIAL | SHEET 1 OF 1
DATE FEB 9, 1984 | CHK'D. | DRAWING NO. 840902-1
SCALE NONE | APP'D.

ALCO | AVCO DIESELS | DETROIT DIESEL ALLISON | KOHLER GENERATORS | MYERS Supership | WHITE

DUNCAN-PARNELL, INC., WINSTON-SALEM 283

COVINGTON
P.O. BOX 18949
GREENSBORO, N.C.
27419-8949

Telephone: 919/292-9240
TWX: 510/922-7396

Charlotte
New Bern
Wilmington
Wilson

Certification Letter

A. 1- V.A. Hospital
2- Seymour Johnson AFB

B. 1- V.A. Hospital - Fayetteville, N. C.
2- Seymour Johnson AFB - Goldsboro, N. C.

C. 1- V.A. Hospital - March 1977
2- Seymour Johnson A.F.B. - April 1977

D. These units have been in operation for standby purposes since the above dates. I have no record of KW hours available.

E. 1- 498.46 H.P. - 350 KW - 1800 RPM
2- 445.45 H.P. - 300 KW - 1800 RPM

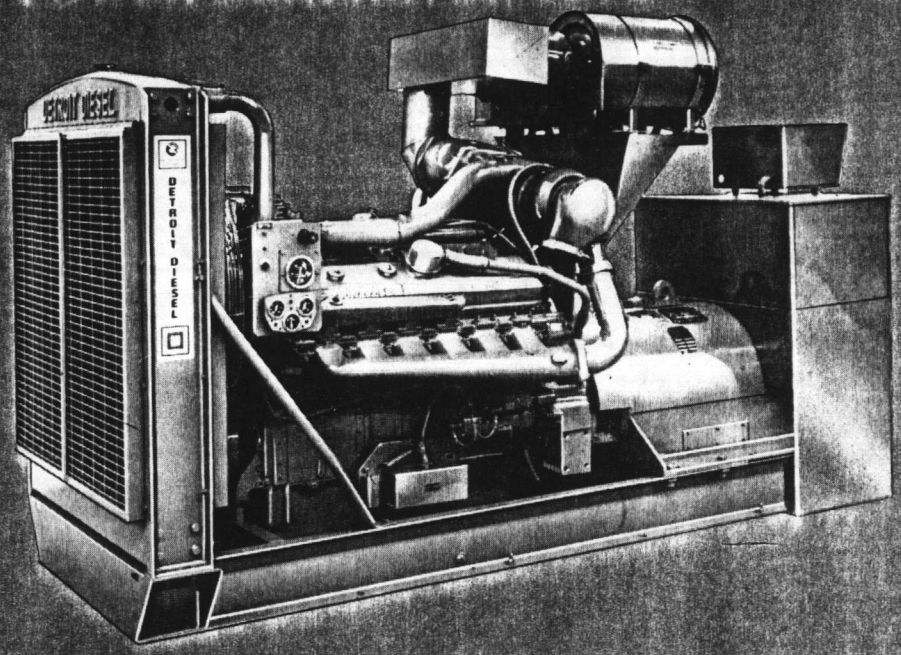
F. 1- 128.7 BMEP
2- 115BMEP

G. 4.25 x 5 - 12 cylinder - VEE
4.25 x 5 - 12 cylinder - VEE

Detroit Diesel Allison

PRIME POWER GENERATOR SETS

12V-71T



Detroit Diesel Allison

GM

STANDARD EQUIPMENT:

Air cleaner: Dry Type.
Automatic Voltage Regulator: Regulation from no load to full load plus/minus 1%.
Base: Fabricated channel steel base.
Electrical Equipment: 24 volt starting motor.
Engine Cooling Pump: Centrifugal type, gear driven.
Exhaust: Exhaust Manifold and outlet flange.
Fan: Axial blower type with wire guard.
Fuel Oil Filter: Replaceable full flow, spin-on paper element type.
Fuel Pump: Gear type.
Generator: AC Brushless, class F insulation or better throughout; meets NEMA, IEEE, ANSI and British Standards.
Governor: Woodward hydraulic SG external vernier throttle control for engine speed adjustment.
Harness: Wiring harness, switches, terminal block and enclosure.
Injectors: Needle valve, cam operated unit injectors.
Instrument Panel: Includes lube oil pressure gauge, water temperature gauge and starter switch.
Lifting Brackets: Adequate eye brackets provided.
Lube Oil Filter: Replaceable full flow, spin-on paper element type.
Lube Pump: Gear type.
Radiator: Heavy duty type designed for 110°F (43.3°C) ambient.
Shutdown: Automatic for high water temperature, low oil pressure and overspeed.

Optional Equipment Available Upon Request

SPECIFICATIONS:

	60 Hertz	50 Hertz
Prime Power Output*		
With Fan:		
kW at 0.8 PF	360	315
kVA	450	393.75
Without Fan:		
kW at 0.8 PF	380	325
kVA	475	406.25
Governed RPM	1800	1500
Engine Type	Two Cycle	Two Cycle
Number of Cylinders	12	12
Bore & Stroke in.	4.25 x 5	4.25 x 5
mm	107.95	107.95
	x 127	x 127
Piston Displacement cu. in.	851.2	851.2
litres	14.0	14.0
Compression Ratio	17:1	17:1
Net Weight (Dry) with Standard Equipment		
lbs.	10,040	10,150
kg	4554	4604
Shipping Volume cu. ft.	325	325
cu. m.	9.21	9.21

*The ratings apply for conditions specified in the following International Standards for Declaration of Power: ISO 3046, BS 5514, DIN 6270, BS649-1958, JIS D1005-1976.

The "prime power" ratings apply to utility type diesel generator set systems with normally varying load factors. In this application the unit may be operated continuously (24 hours per day) with no deration.

The rating provides for a nominal 15% reserve overload capability (under the above International Standards) which can be used continuously for an intermittent power requirement.

Telephone: 919/292-9240
TWX: 510/922-7396

Charlotte
New Bern
Wilmington
Wilson

APPLICATION DATA:

	60 Hertz	50 Hertz
Basic Engine (only)		
Coolant Capacity: gals.	13.75	13.75
litres	52.00	52.00
Engine Coolant Flow: gpm	213	178
litres/min.	806	673
Max. Static Head at Fresh Water Pump Inlet ft. H_2O	30	30
kPa	89.58	89.58
Heat Rejection to Coolant: BTU/min.	16680	14000
kW	293	246
Coolant Capacity Heat Exchanger plus Engine: gals.	25.25	25.25
litres	95.57	95.57
Max. Suction Pressure (raw water):		
in. Hg.	5	5
kPa	16.88	16.88
Max. Discharge Pressure:		
psi (raw water)	10	10
kPa (raw water)	68.95	68.95
Heat Exchanger Raw Water Flow:		
gpm	88	75
litres/min.	333	284
Crankcase Oil Capacity: gals.	8.5	8.5
litres	32.17	32.17
Fuel Supply Line, min., I.D. in.	.5	.5
mm	12.70	12.70
Fuel Return Line, min., I.D. in.	.3125	.3125
mm	7.94	7.94
Suction at Fuel Transfer Pump,		
in. hg.	6	6
kPa	20.26	20.26

	60 Hertz	50 Hertz
Air for Combustion: cfm	1860	1480
m^3/min.	53	42
Air for Radiator Cooling: cfm	30,000	25,000
m^3/min	850	708
Heat Rejection to Room:		
BTU/min.	2130	2020
kW	37.5	35.5
Generator Heat Radiated to Room		
BTU/min	1215	1100
kW	21.4	19.3
Exhaust Flow		
cfm	4300	3280
m^3/min.	122	93
Exhaust Temp. (After Turbocharger):		
°F	790	730
°C	421	388
Exhaust Back Pressure (max. allow):		
in. hg.	2.0	1.4
kPa	6.75	4.73
System Voltage	24V D.C.	24V D.C.
Starter Rolling Current @ 32°F (0°C)	880	880
Starter Breakaway Current @ 32°F (0°C)	2000	2000

Detroit Diesel Allison | GM

Detroit Diesel Allison
Division of General Motors

13400 West Outer Drive, Detroit, Michigan 48239 U.S.A.

 Specifications and information contained in this brochure subject to change without notice. LITHO IN U.S.A.

COVINGTON
P.O. BOX 18949
GREENSBORO, N.C.
27419-8949

Telephone: 919/292-9240
TWX: 510/922-7396

Charlotte
New Bern
Wilmington
Wilson

BMEP Calculation

$$\frac{KW}{.746 \times Eg} = \text{Required H.P. + Parasitic (Fan)}$$

4.26

$$\frac{300}{.746 \times 94.3} + 426.45 + 19 = 445.45 \text{ H.P. Required}$$

$$\frac{BHP \times 396000}{CID \times RPM} = BMEP$$

$$\frac{445.45 \times 396000}{852 \times 1800} = \underline{115.02 \text{ BMEP}}$$

Cranking Time

$$\frac{\text{Amp Hr} \times 60}{\text{Starter Rolling Current}} = \text{Total crank minutes}$$

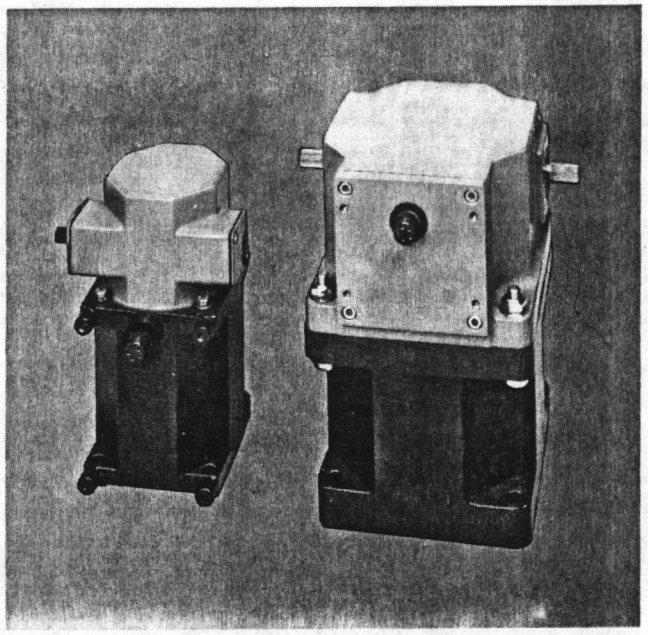
$$\frac{205 \times 60}{880} = 13.97 \text{ Minutes}$$

Plus 1 or Plus 4 Actuator

General

The DYNA Plus 1 or Plus 4 actuator can be operated with any of the DYNA controllers to provide an engine governor for speed and power control of piston and gas turbine engines or steam and water turbines. The actuators can also be used in remote positioning and load control systems.

The actuator is basically a simple, proportional electric solenoid having a sliding armature whose magnetic force is proportional to input coil current. Balanced between the force of its return spring and the magnetic force, the armature glides on anti-friction bearings, providing a hysteresis-free linear movement. Linear motion is converted to an output shaft rotation by a bell crank.



Typical Applications

- Speed governing
- Tandem engine governing
- No-break engine governing
- Fuel, smoke, torque limiting
- Tailshaft governing
- Remote throttle control
- Test stand throttle control
- Remote valve control
- Remote damper control
- Remote propeller pitch control

Standard Actuator Features

- All-electric
- All engine compatibility
- Mounts in any position
- Engine mounted
- High reliability due to few moving parts
- Proportional actuator
- No hydraulic or oil line
- No special maintenance
- Spring returns output shaft to minimum position on removal of power or loss of magnetic pickup signal
- Precise repeatability

Available Actuator Models

- **Plus 1 units with clockwise output shaft rotation:**
  DYNC 11000 Standard
  DYNC 11001 Actuator head rotated 180°
  DYNC 11002 Actuator head rotated 90° counterclockwise
- **Plus 1 units with counterclockwise output shaft rotation:**
  DYNC 11004 Standard
  DYNC 11005 Actuator head rotated 90° clockwise
  DYNC 11006 Actuator head rotated 180°
- **Plus 4 unit with through output shaft:**
  DYNC 14000

Specifications

- **Operating Voltages**
  Plus 1: 12, 24 or 32 VDC; ±20%.
  Plus 4: 24 or 32 VDC; ±20%.
- **Ambient Operating Temperature**
  −65°F (−55°C) to +255°F (+125°C).
- **Mechanical Vibration** Tested 5 to 500 Hz @ 25G's
- **Sealing** Unit is oil, water and dust tight.

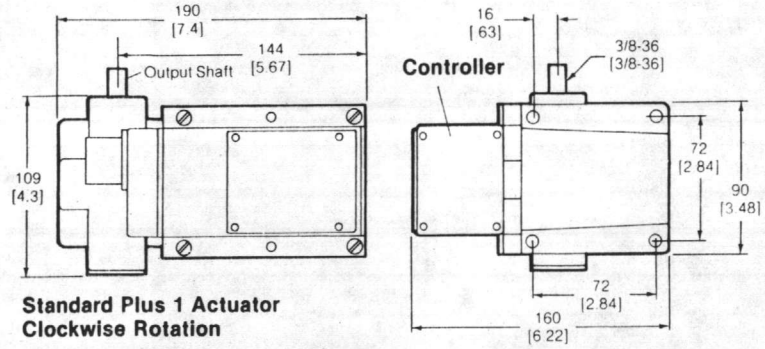
ACTUATOR		Plus 1	Plus 4
Work	Joules	1.6	5.8
	Foot-pounds	1.2	4.3
Torque	Newton-Meters	1.9	7.3
	Pound-foot	1.4	5.4
Output	Rotary	45°	45°
Weight	Kilograms	5	12.2
	Pounds	11.0	27
Current @12 Vdc	Maximum Amperes@Stall	11.0	—
	Nominal Steady State Amperes	2.5	—
Current @24 Vdc	Maximum Amperes@Stall	13.5	13.0
	Nominal Steady State Amperes	2.6	2.0
Current @32 Vdc	Maximum Amperes@Stall	12.5	11.5
	Nominal Steady State Amperes	2.0	1.8
Nominal Response Time for 63% of Stroke (Seconds)		0.045	0.104

Caution

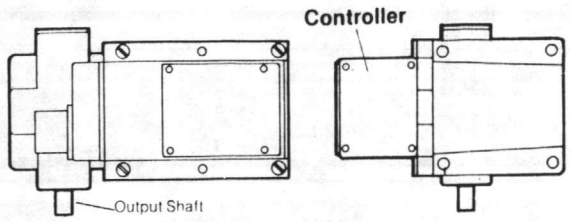
As a safety measure, Barber-Colman Company recommends that all engines and turbines be equipped with an independent overspeed shutdown device.

Dimensions

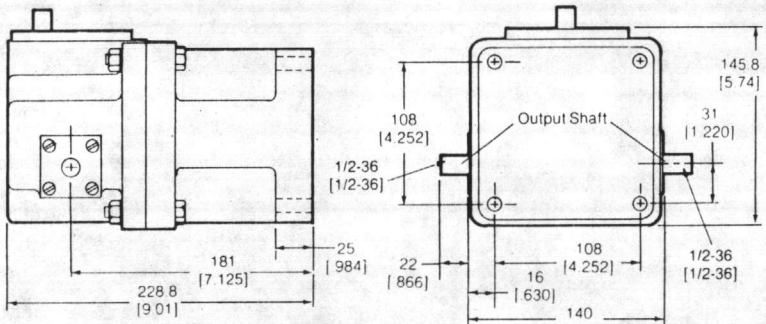
Dimensions in Millimeters
Inches in Brackets [ ]



Standard Plus 1 Actuator
Clockwise Rotation

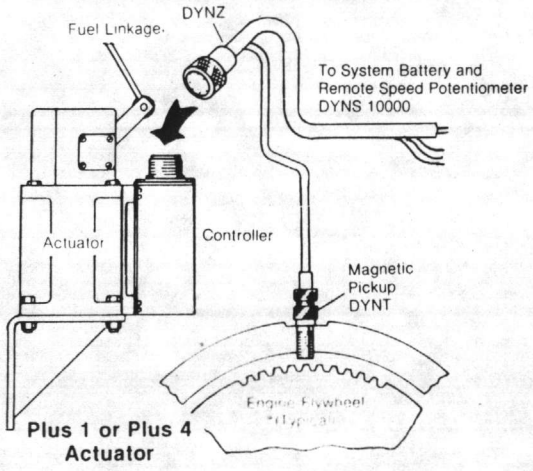


Standard Plus 1 Actuator
Counterclockwise Rotation



Plus 4 Actuator

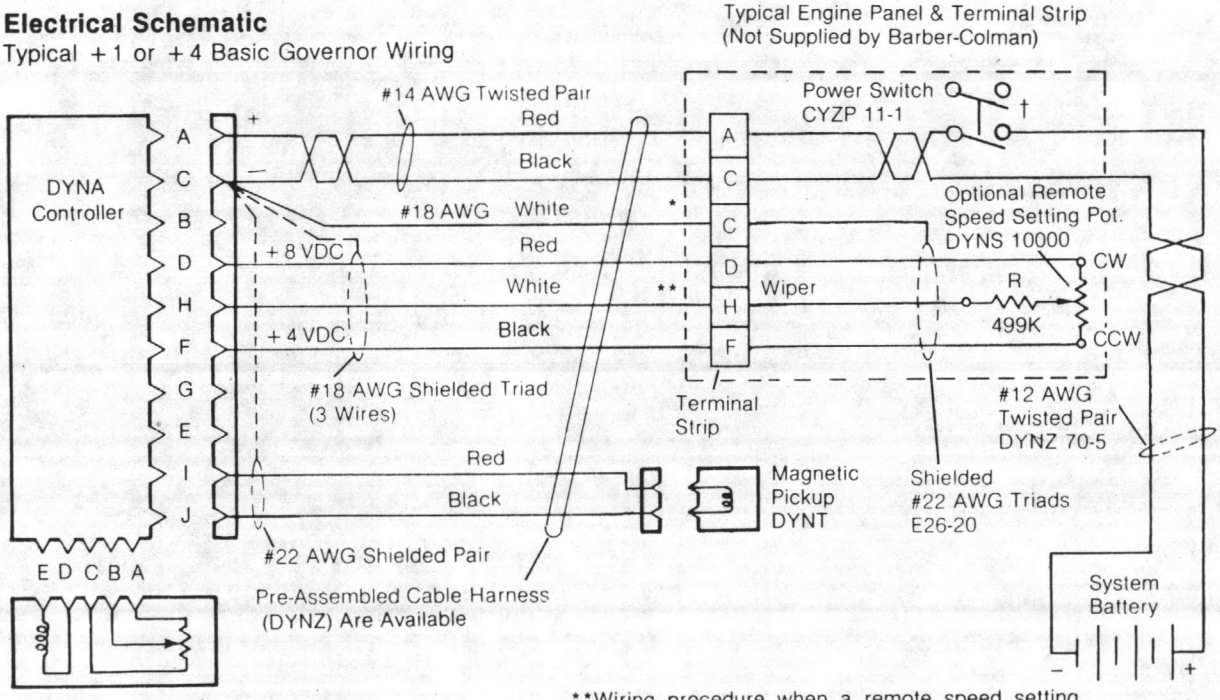
Typical Installation Diagram



Plus 1 or Plus 4
Actuator

Electrical Schematic

Typical +1 or +4 Basic Governor Wiring



**Wiring procedure when a remote speed setting potentiometer is not used.

*The white wire from Pin C must not be connected to the same terminal as the black wire from Pin C.

†Power switch wiring is shown for a negative ground system. When a positive ground system is being wired, the installer should switch (break) both the positive and negative leads.

1. If a terminal strip is not used, then isolate and tape the ends of the wires from Pin D, F and H to keep them from touching each other or other leads.

In Europe contact: Colman Nederland B.V.,
Maalderij 30, 1185 ZC Amstelveen, The Netherlands.
Phone: (020) 45 51 57, Telex: 15419 COL NE NL.

Barber-Colman Company
PRECISION DYNAMICS DIVISION
1300 Rock Street, Rockford, Illinois, U.S.A., 61101
Phone: (815) 877-0241, Telex: 257 419

DYNA Controllers

GENERAL

The controllers for the DYNA governor series are all solid state design that measures three parameters to provide precise engine control. Separate circuits measure the proportional (amount of offspeed), integral (time of offspeed) and derivative (rate of change of offspeed) values. These three circuits provide control that results in fast, stable engine response to offspeed changes and precise speed regulation.

To provide a governing system these controllers must be used with one of the following DYNA actuators. The actuator specification can be obtained from the product information sheet.

Plus 1 or Plus 4 ..... F-18080
Plus 6 (Standard and Explosion-proof) F-18081
Plus 8 or Plus 16 ..... F-18082

SPEED SENSING

The DYNA all-electric governor requires a frequency signal to read engine speed. Typically, a hole is drilled and tapped in the flywheel housing perpendicular to the crankshaft, and a magnetic pickup is inserted into it so it senses the teeth on the flywheel. Many other techniques may be used to obtain a speed reference signal.

SPEED CONTROL RANGE

The governed speed control range for the DYNA I Controller can be as much as 10 to 1. The actual range attainable depends upon the type of engine, controller and load.

REMOTE SPEED ADJUSTMENT

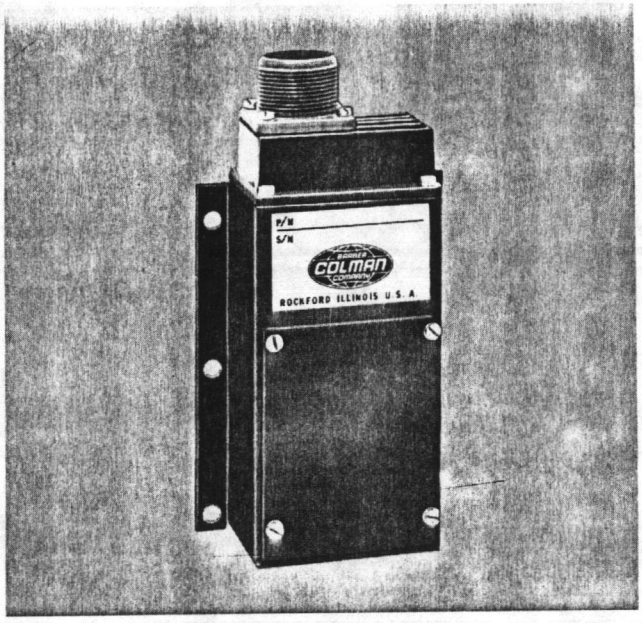
A remote speed adjustment can be added to any DYNA controller by simply connecting a remote speed potentiometer to the three electrical wires provided in the Barber-Colman standard wiring harness. The Barber-Colman part number for the remote speed potentiometer is DYNS-10000.

FAILSAFE

The DYNA Governor has two failsafe modes: 1) If d-c power to the governor is interrupted, the armature spring automatically moves the output shaft to the "minimum fuel" position. 2) If the speed reference signal is lost, a failsafe circuit in the control instantly removes d-c power from the governor actuator, returning the output shaft to the "minimum fuel" position.

CAUTION

As a safety measure, Barber-Colman Company recommends that all engines and turbines be equipped with an independent overspeed shutdown device.



TYPICAL APPLICATIONS

Speed governing
Tandem engine governing
No-break engine governing
Propulsion engine governing
Tandem propulsion governing
Wide speed range governing
Tailshaft governing

STANDARD CONTROLLER FEATURES

All-electric
All engine compatibility
Mounts in any position
Engine mounted or can be off mounted
High reliability
No special maintenance
Temperature stable

ALL-ENGINE COMPATIBILITY

Since the DYNA all-electric governor requires no mechanical drive or oil supply, it can be used on any engine, even if the engine never had a precision governor before or, for that matter, never had a governor at all. Newly-built engines may be ordered without a governor drive for a substantial savings.

DIRECT ENGINE INSTALLATION

The DYNA governor and control mount directly on the engine, usually with a simple bracket, and withstand the temperatures usually common to this environment. Since no mechanical drive or hydraulic oil lines are needed, simple electrical wiring permits mounting the governor in any location in any position convenient to connect to the fuel control linkage.

SPECIFICATIONS

Available Operating Voltages 12, 24 or 32 volts, ±20%. Other voltages on special request.

Input Signal Frequency

$$\text{Input Signal Frequency in Hertz} = \frac{\text{Engine RPM} \times \text{Number of Gear Teeth on Flywheel}}{\text{60 Seconds}}$$

Select your controller for the correct input signal frequency range generated by the magnetic pickup at the maximum engine operated (RPM) speed.

Steady State Speed Band
±0.2 percent, isochronous control.

Ambient Operating Temperature
-65°F (-55°C) to +200°F (+95°C).

Temperature Stability Better than ±0.5 percent over a temperature range of -55 to 95°C (-65° to 200°F)

Speed Regulation (Droop) Adjustable from 0 to 15 percent. Remote adjustment optional.

Mechanical Vibration Tested 5 to 500 Hz @ 25 G's (peak level on the governor).

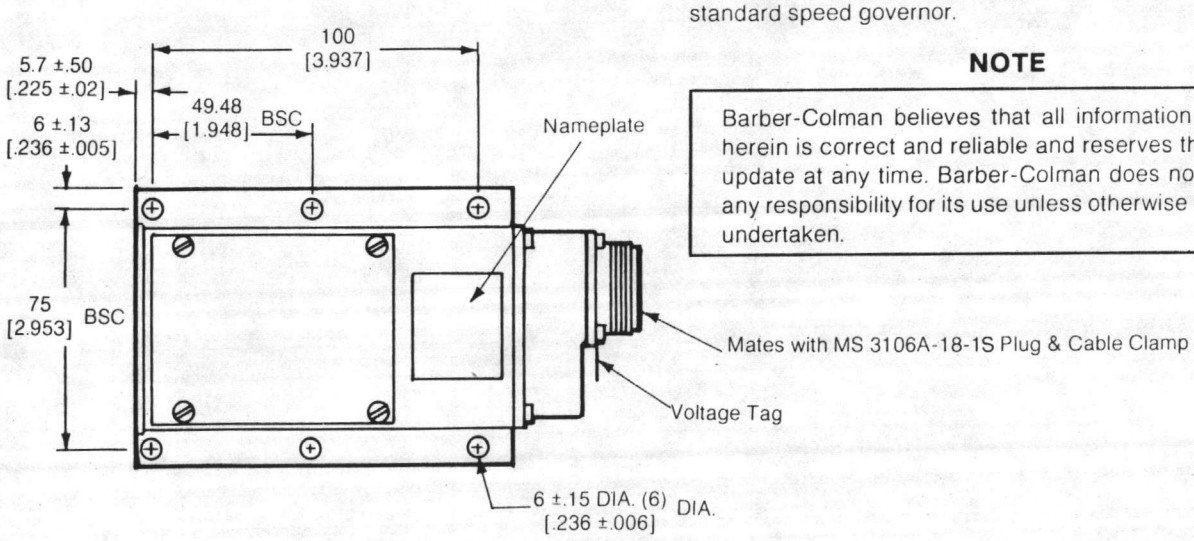
Output Signal Pulse width modulated current to DYNA actuator. Maximum output current is 14 amperes.

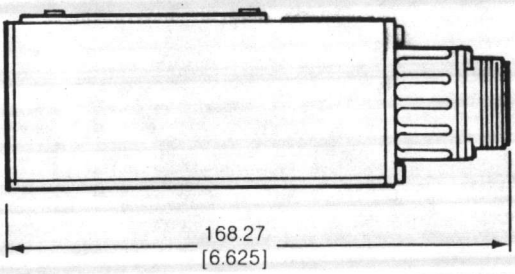
Circuit Boards Boards are covered with a heavy conformal coating for moisture and vibration protection.

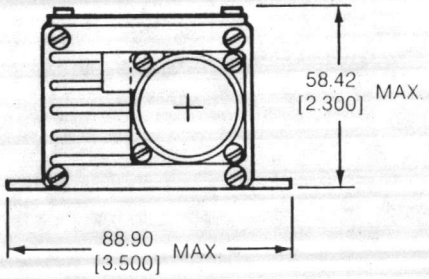
Enclosure Aluminum extrusion.

Weight 635 grams (1.4 lbs.).

DIMENSIONS







Dimensions in mm
Inches in Brackets [ ]

SPEED GOVERNING

DYNA controllers are available for engine governing for speed and power control of piston and gas turbine engines where the fuel is controlled by the governor's output shaft. The controllers are also applicable for controlling steam and water turbines.

TANDEM ENGINE GOVERNING

DYNA controllers are available for tandem engine operation. The controller provides the precise positioning required for accurate tracking of two governor actuators used for controlling tandem-coupled engines.

NO-BREAK ENGINE GOVERNING

DYNA controllers are available for no-break operation. The controller is designed to provide dual-mode operation. The controller functions with fixed gain when the engine is declutched and with an adjustable high gain when the engine is coupled to the load.

PROPULSION GOVERNING

DYNA controllers are available for engine governing of propulsion engine applications. The control has an adjustable low limit feature which is required to maintain correct engine operation due to the loading characteristics of the propeller. The same controller should be used on tandem-coupled propulsion engine applications.

WIDE SPEED RANGE GOVERNING

DYNA controllers are available for wide speed range governing for speed and power control of piston and gas turbine engines where the fuel is controlled by the governor's output shaft. The controller is designed to provide improved governor performance and control over a wider speed range than the standard speed governor.

NOTE

Barber-Colman believes that all information provided herein is correct and reliable and reserves the right to update at any time. Barber-Colman does not assume any responsibility for its use unless otherwise expressly undertaken.

AVAILABLE DYNA CONTROLLER PART NUMBERS

Specify voltage 12, 24 or 32 volt d-c when ordering.

Speed Controllers — Configuration A

Part Number	Input Signal Frequency
DYN1 10002-2	250 to 1200 Hz
DYN1 10003-2	1200 to 2500 Hz
DYN1 10004-2	2500 to 5000 Hz
DYN1 10006-2	5000 to 9500 Hz

Adjustments available: A, Gain, D, I, L, Droop and Speed (under controller cover).

Tandem Controller — Configuration A

Part Number	Input Signal Frequency
DYN1 10008-2	2500 to 5000 Hz

No-Break Controller — Configuration A

Part Number	Input Signal Frequency
DYN1 10010	2500 to 5000 Hz

Propulsion Controllers — Configuration B

Part Number	Input Signal Frequency
DYN1 10024-2	250 to 1200 Hz
DYN1 10025-2	1200 to 2500 Hz
DYN1 10026-2	2500 to 5000 Hz

Adjustments available: A, Gain, D, I, Droop, High Limit, Low Limit and Speed (under controller cover).

Speed Controllers — Configuration C

Part Number	Input Signal Frequency
DYN1 10112-0	250 to 1500 Hz
DYN1 10113-0	1200 to 3000 Hz
DYN1 10114-0	2500 to 6000 Hz
DYN1 10116-0	5000 to 10000 Hz

Adjustments available: I, Droop and Speed (under controller cover); Stability and Speed Trim (on side of controller).

Speed Controllers — Configuration D

Part Number	Input Signal Frequency
DYN1 10212-0	250 to 1500 Hz
DYN1 10213-0	1200 to 3000 Hz
DYN1 10214-0	2500 to 6000 Hz
DYN1 10216-0	5000 to 10000 Hz

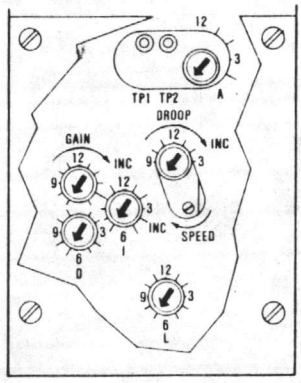
Adjustments available: Gain, I, Droop and Speed (under controller cover).

Wide Speed Range Controllers — Configuration E

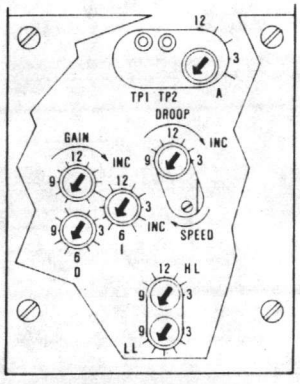
Part Number	Input Signal Frequency
DYN1 10312-0	250 to 1500 Hz
DYN1 10313-0	500 to 3000 Hz
DYN1 10314-0	1000 to 6000 Hz
DYN1 10316-0	2000 to 12000 Hz

Adjustments available: Gain, D, I, Droop and Speed (under controller cover).

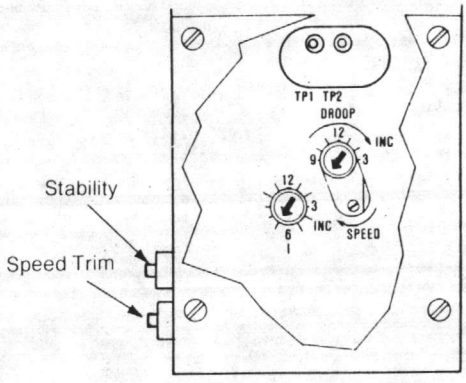
ADJUSTMENT CONFIGURATIONS



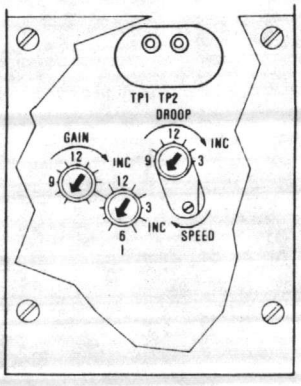
Configuration A



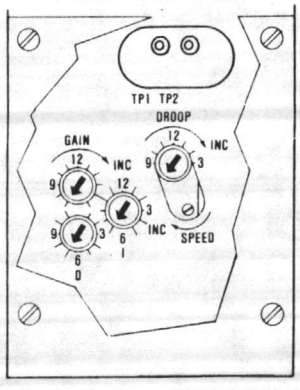
Configuration B



Configuration C

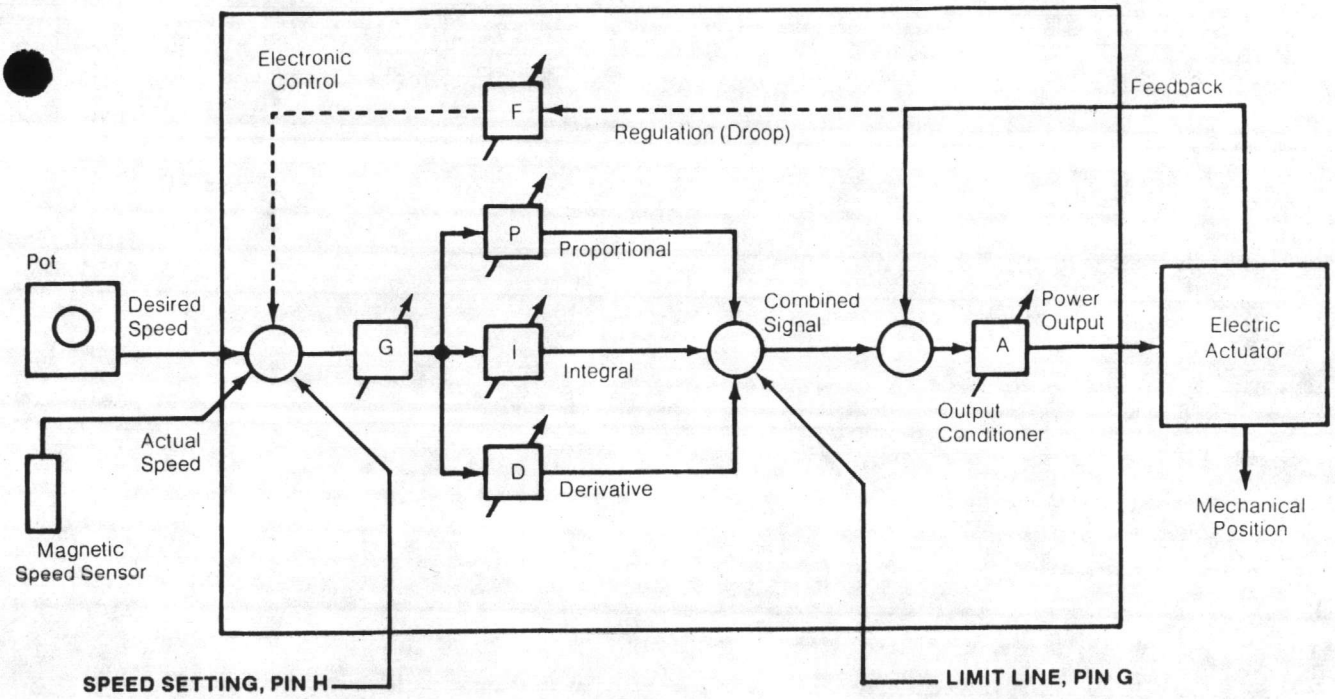


Configuration D



Configuration E

DYNA Controller Inputs



Modify speed with respect to:
Remote Speed Setting
Time (Ramp Generator)
Electrical Load Change (Load Pulse)
Electrical Load (Isochronous Load Sharing)
Electrical Phase Angle (Synchronizer)

On Pump Applications:
Output Pressure
Output Temperature
Liquid Level
(Controller/Recorder Output)

Limit fuel (rack or throttle position) with respect to:
Maximum Fuel Permitted (Load Limit)
Temperature (Exhaust)
Manifold Pressure (Smoke Limit)
Oil Pressure
Time (some ramp generator applications)
Requested Speed (Torque Limit)
Actual Speed (Torque Limit)

FEATURES ARE EASY TO ADD

It is easy to add features to the electric governor to provide benefits the customer needs. Remote speed setting, isochronous load sharing, automatic synchronizing, ramp generator, single phase load pulse and KW limits can be added at the time of initial governor installation or, just as easily, added later when the need arises. No modification to the basic governor is required when these features are added. In fact, if the prewired harness is used, the wires necessary to add these features are often already provided, so it is indeed easy to add features.

AUXILIARY CONTROL MODULES

Four auxiliary control modules are available: Isochronous Load Sharing Control, Auto-Synchronizer, Ramp Generator, and Single Phase Load Pulse Control. These and other auxiliary functions can be installed at the time of the initial governor installation or, just as easily, added later when the need arises. No modification is required to the basic governor when these modules are added.

In Europe contact: Colman Nederland B.V.,
Maalderij 30, 1185 ZC Amstelveen, The Netherlands.
Phone: (020) 45 51 57, Telex: 15419 COL NE NL.

Barber-Colman Company
PRECISION DYNAMICS DIVISION
1300 Rock Street, Rockford, Illinois, U.S.A. 61101
Phone: (815) 877-0241, TELEX: 257-419

LITHO IN U.S.A.

F-18087-1 BK

COVINGTON
P.O. BOX 18949
GREENSBORO, N.C.
27419-8949

Telephone: 919/292-9240
TWX: 510/922-7396

Charlotte
New Bern
Wilmington
Wilson

Manufacturer's Data

1. No foot valve will be furnished in the underground tank.

   A solenoid valve will be furnished on the inlet side of the day tank.

2. The 12V-71T engine has a primary and secondary A.C. fuel filter. See attached for additional information.

3. Battery charger will operate on 277 volt single phase.

FUEL STRAINER AND FUEL FILTER

(Spin-On Type)

A spin-on type fuel strainer and fuel filter (Fig. 5) is used on certain engines. The spin-on filter cartridge consists of a shell, element and gasket combined into a unitized replacement assembly (Fig. 6). No separate springs or seats are required to support the filters.

The filter covers incorporate a threaded sleeve to accept the spin-on filter cartridges. The word "Primary" is cast on the fuel strainer cover and the word "Secondary" is cast on the fuel filter cover for identification.

No drain cocks are provided on the spin-on filters. Where water is a problem, it is recommended that a water separator be installed. Otherwise, residue may be drained by removing and inverting the filter. Refill the filter with clean fuel oil before reinstalling it.

Filter Replacement

A 1" diameter twelve-point nut on the bottom of the filter is provided to facilitate removal and installation.

Replace the filter as follows:

1. Unscrew the filter (or strainer) and discard it.

2. Fill a new filter replacement cartridge about two-thirds full with clean fuel oil. Coat the seal gasket lightly with clean fuel oil.

3. Install the new filter assembly and tighten it to one-half of a turn beyond gasket contact.

4. Start the engine and check for leaks.

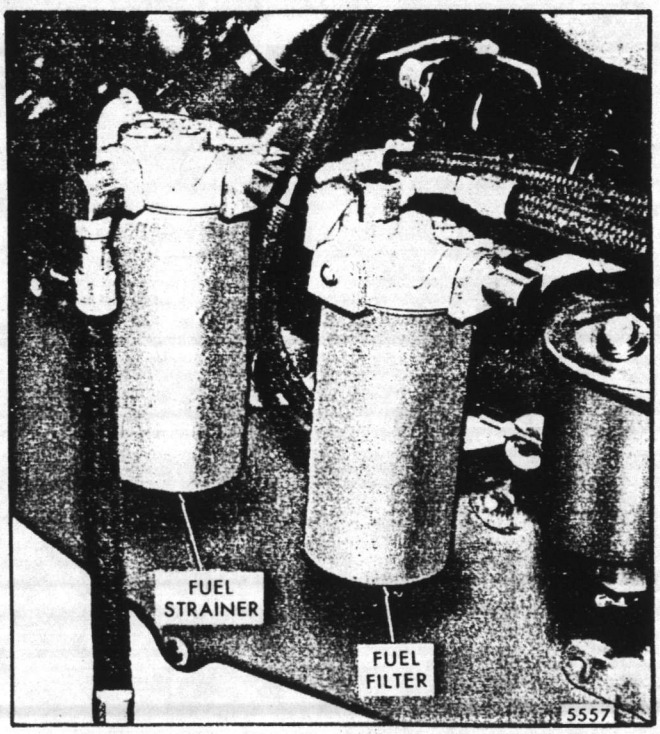


Fig. 5 - Typical Spin-On Filter Mounting

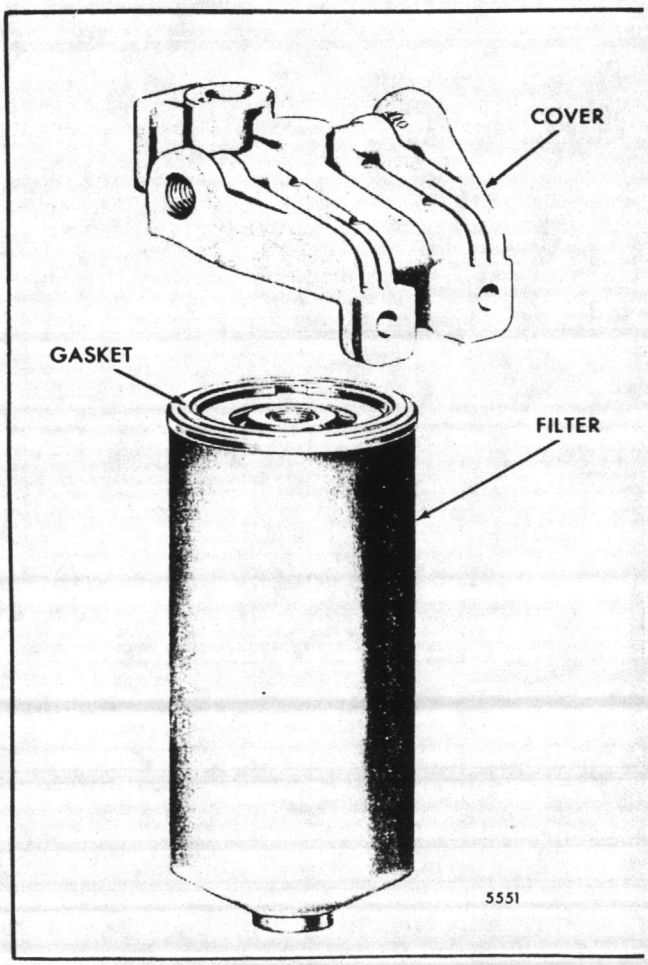


Fig. 6 - Spin-On Filter Details

and supply has reached all of the turbocharger moving parts. A good indicator that all the moving parts are getting lubrication is when the oil pressure gage registers pressure (10 psi - 69 kPa at idle speed).

CAUTION: Do not hold the compressor wheel, for any reason, while the engine is running. This could result in personal injury.

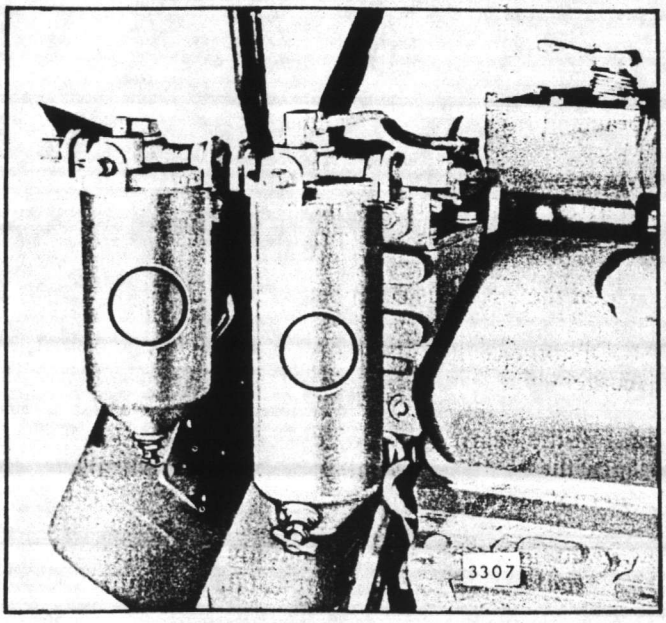
If the engine is equipped with a governor oil filter, change the element every 1,000 hours or 30,000 miles.

Check for oil leaks after starting the engine.

Item 13 - Fuel Strainer and Filter

Install new elements every 300 hours or 9,000 miles or when plugging is indicated.

A method of determining when elements are plugged to the extent that they should be changed is based on the fuel pressure at the cylinder head fuel inlet manifold and the inlet restriction at the fuel pump. In a clean system, the maximum pump inlet restriction must not exceed 6 inches of mercury (20.3 kPa). With 6 and 8V non-turbocharged engines, at normal operating speed and with .080" restriction fittings, the fuel pressure is 45-70 psi (310-483 kPa). With 16V non-turbocharged engines, at normal operating speeds and with .070" restriction fittings, the fuel pressure is 30-65 psi (207-448 kPa). With turbocharged engines, at normal operating speeds and with either .080" or .070" restriction fittings, the fuel pressure is 50-70 psi (345-483 kPa). Change the fuel filter elements whenever the inlet restriction (suction) at the fuel pump reaches 12 inches of mercury (41 kPa) at normal operating speeds and whenever the fuel pressure at the inlet manifold falls to the minimum fuel pressure shown above. Refer to the chart.



Item 13

Item 14 - Coolant Filter

If the cooling system is protected by a coolant filter and conditioner, the filter element should be changed every 500 hours or 15,000 miles. Select the proper coolant filter element in accordance with the instructions given in *Engine Coolant* in this section. Use a new filter cover gasket when installing the filter element. After replacing the filter and cover gaskets, start the engine and check for leaks.

Item 15 - Starting Motor

The electrical starting motor is lubricated at the time of original assembly. Oil can be added to the oil wicks, which project through each bushing and contact the armature shaft, by removing the pipe plugs on the outside of the motor. The wicks should be lubricated whenever the starting motor is taken off the engine or disassembled.

The Sprag overrunning clutch drive mechanism should be lubricated with a few drops of light engine oil whenever the starting motor is overhauled.

Item 16 - Air System

Check all of the connections in the air system to be sure they are tight. Check all hoses for punctures or other damage and replace, if necessary.

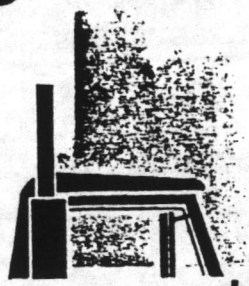
Item 17 - Exhaust System

Check the exhaust manifold retaining nuts, exhaust flange clamp and other connections for tightness. Check for proper operation of the exhaust pipe rain cap, if one is used.

Item 18 - Air Box Drain Tube

With the engine running, check for flow of air from the air box drain tubes every 1,000 hours or 30,000 miles. If the tubes are clogged, remove, clean and reinstall the tubes. The air box drain tubes should be cleaned periodically even though a clogged condition is not apparent.

If the engine is equipped with an air box drain tank, drain the sediment periodically.



AC FILTER APPLICA
FOR DE DIE
EN S

AC Spark Plug

SPIN-ON

ENGINE	HP RANGE	LUBE OIL		FUEL FILTER						LUB
				PRIMARY			SECONDARY			
		TYPE	PART NO.	TYPE	PART NO.	ASSEMBLY*	TYPE	PART NO.	ASSEMBLY*	TYPE
3-53	92	PF-947	25011106	T-936	25011011	T-94	TP-928	25010959	T-95	PF-147
3-53T	131	PF-947	25011106	T-936	25011011	T-94	TP-928	25010959	T-95	PF-147
4-53	127-170	PF-911	25010495	T-936	25011011	T-94	TP-928	25010959	T-95	PF-132
4-53T	175	PF-911	25010495	T-936	25011011	T-94	TP-928	25010959	T-95	PF-132
6V-53	197	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
6V-53T	233	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
2-71	64	PF-911	25010495	T-936	25011011	T-94	TP-928	25010959	T-95	PF-132
3-71	109	PF-911	25010495	T-936	25011011	T-94	TP-928	25010959	T-95	PF-132
4-71	152	PF-911	25010495	T-936	25011011	T-94	TP-928	25010959	T-95	PF-132
4-71T	190	PF-911	25010495	T-936	25011011	T-94	TP-928	25010959	T-95	PF-132
6-71	228-240	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
6-71T	275-285	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
6-71TT	210-230	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
6-71TAC	270	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
6-71TTAC	230	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
6V-71	228	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
6V-71T	262-277	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
6V-71N	160-190	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
8V-71	304-318	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
8V-71T	350-362	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
8V-71TA	370	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
8V-71TTA	305	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
8V-71N	245-304	PF-911	25010495	T-915	25010776	T-92	TP-916	25010778	T-93	PF-132
12V-71	437-456	PF-911(2)	25010495	T-958	25011024	T-96	TP-959	25011026	T-97	PF-132
12V-71T	525-553	PF-911(2)	25010495	T-958	25011024	T-96	TP-959	25011026	T-97	PF-132
16V-71	583-608	PF-911(2)	25010495	T-958	25011024	T-96	TP-959	25011026	T-97	PF-132
16V-71T	700-725	PF-911(2)	25010495	T-958	25011024	T-96	TP-959	25011026	T-97	PF-132

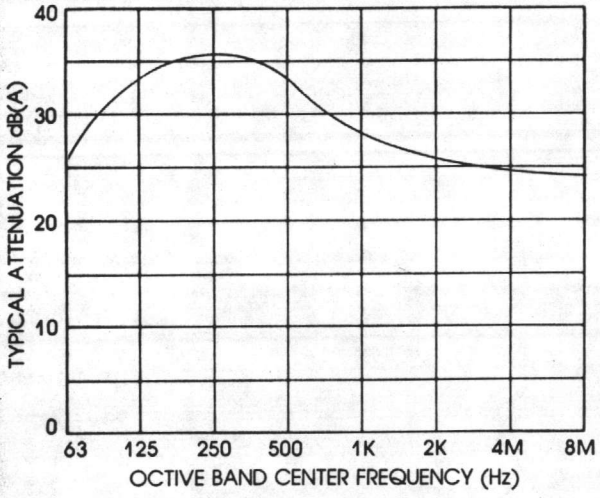
*Assembly includes Spin-On filter & housing adapter

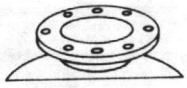
**Assembly

Residential "200" Level Exhaust Silencers

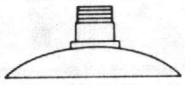
NELSON

TYPICAL ATTENUATION CURVE dB(A)





"F" Mounting Flange
Standard in sizes 4" to 14". Drilling matches 125/150# ASA standard.



"P" Pipe Ends
NPT ends offered in sizes 3/4" through 4".

Companion flanges available for 4" to 14". Threaded flanges available for 3/4" through 4".

Application:
Nelson Residential Level Silencers are designed to reduce total engine exhaust noise 18-25 dB(A). These silencers are recommended where moderate silencing is required.

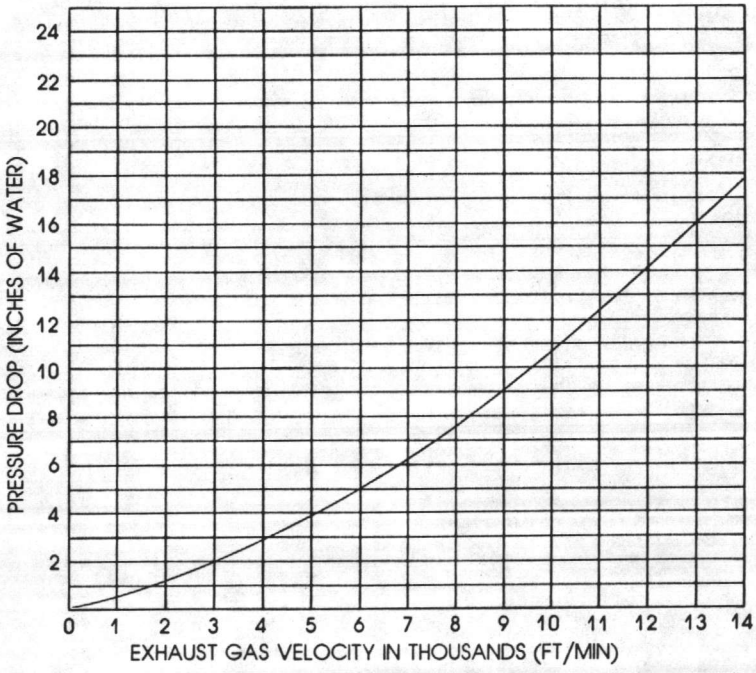
Construction:
Mild Steel: Nelson silencers over 26.1 O.D. are fabricated of mild steel as standard material. Maximum operating temperature is 1100°F.

Aluminized Steel: Nelson silencers through 26.1 O.D. are fabricated of aluminized steel as standard materials. This material has superior corrosion resistance as compared to mild steel. Maximum operating temperature is 1250°F.

Silicon Aluminum Paint: Nelson silencers through 26.1 O.D. are given a coat of high heat resisting silicon aluminum paint.

Gray Primer: Nelson silencers over 26.1 O.D. are given a coat of high heat resisting gray primer as standard paint.

PRESSURE DROP:

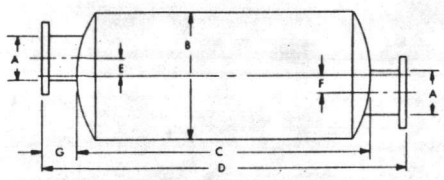


Sample Specification:
The silencer is to be a Nelson Residential "200" Level Silencer constructed of aluminized steel (26.1 inch body diameter and smaller) or mild steel (larger than 26.1 inch body diameter) with all welded construction and suitable for mounting in any position. The silencer shall be complete with the following Nelson accessories: _____

_____

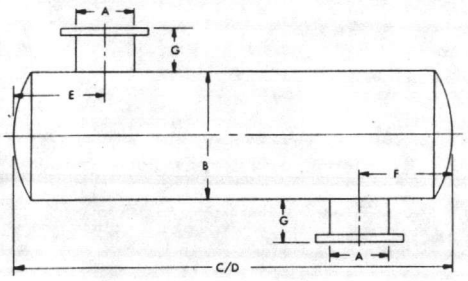
_____

TYPE 1



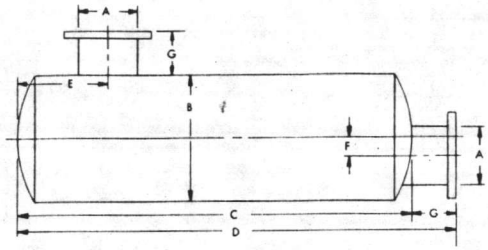
Model Number	A. Nominal Inlet Dia.	B. Body Dia. O.D.	C. Body Length	D. Over All Length	E. Offset To C/L	F. Offset To C/L	G Inlet Length
41207	¾″	4.2	14.3	17.3	0	0	1.5
41210	1″	5.0	16.0	20.0	0	0	2.0
41213	1¼″	5.6	20.8	24.8	0	0	2.0
41215	1½″	7.6	22.6	26.6	0	0	2.0
41220	2″	8.1	31.6	35.6	1.3	1.3	2.0
41225	2½″	9.0	37.8	42.8	1.5	1.5	2.5
41230	3″	10.1	38.0	44.0	2.8	2.8	3.0
41235	3½″	10.1	44.0	50.0	2.1	2.8	3.0
41240	4″	10.1	49.0	55.0	2.5	2.5	3.0
41250	5″	14.1	43.4	51.4	3.6	3.6	4.0
41260	6″	14.1	57.4	65.4	3.6	3.6	4.0
41280	8″	22.1	56.0	64.0	0	0	4.0
41282	10″	22.1	84.0	92.0	0	0	4.0
41284	12″	26.1	79.0	87.0	0	0	4.0
41286	14″	36.1	94.0	101.0	0	0	4.0
41288	16″	42.1	107.0	115.0	0	0	4.0
41299	18″	42.1	107.0	115.0	0	0	4.0
41221	20″	48.3	133.0	140.0	0	0	4.0
41222	22″	54.3	135.0	143.0	0	0	4.0

TYPE 2



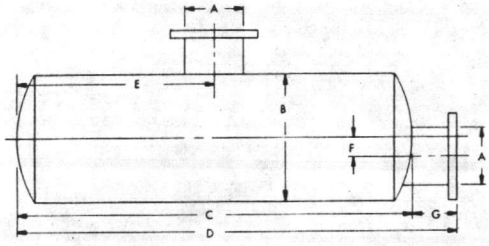
Model Number	A. Nominal Inlet Dia.	B. Body Dia O.D.	C. Body Length	D. Over All Length	E. Offset To C/L	F. Offset To C/L	G. Inlet Length
42207	¾″	4.2	14.3	14.3	1.9	1.9	1.5
42210	1″	5.0	15.9	15.9	2.0	2.0	2.0
42213	1¼″	5.6	20.7	20.7	2.2	2.2	2.0
42215	1½″	7.6	22.6	22.6	2.6	2.6	2.0
42220	2″	8.1	31.6	31.6	3.3	3.3	2.0
42225	2½″	9.0	37.8	37.8	3.9	3.9	2.5
42230	3″	10.1	38.0	38.0	4.0	4.0	3.0
42235	3½″	10.1	44.0	44.0	4.5	4.5	3.0
42240	4″	10.1	49.0	49.0	5.0	5.0	3.0
42250	5″	14.1	43.4	43.4	5.7	5.7	4.0
42260	6″	14.1	57.4	57.4	6.7	6.7	4.0

TYPE 3



Model Number	A Nominal Inlet Dia.	B Body Dia O.D.	C Body Length	D Over All Length	E Offset To C/L	F Offset To C/L	G Inlet Length
43207	¾″	4.2	14.3	15.8	1.9	0	1.5
43210	1″	5.0	15.9	17.9	2.0	0	2.0
43213	1¼″	5.6	20.7	22.7	2.2	0	2.0
43215	1½″	7.6	22.6	24.6	2.6	0	2.0
43220	2″	8.1	31.6	33.6	3.3	0	2.0
43225	2½″	9.0	37.8	40.3	3.9	1.5	2.5
43230	3″	10.1	38.0	41.0	4.0	1.8	3.0
43235	3½″	10.1	44.0	47.0	4.5	2.1	3.0
43240	4″	10.1	49.0	52.0	5.0	0	3.0
43250	5″	14.1	43.4	47.4	5.7	2.5	4.0
43260	6″	14.1	57.4	61.4	6.7	3.0	4.0
43280	8″	22.1	56.0	60.0	11.0	0	4.0
43282	10″	22.1	84.0	88.0	11.0	0	4.0
43284	12″	26.1	79.0	83.0	12.5	0	4.0
43286	14″	36.1	93.7	102.3	14.8	0	4.0
43288	16″	42.1	102	106	16	0	4.0
43299	18″	42.1	107	110	19	0	4.0
43221	20″	48.3	133	137	20	0	4.0
43222	22″	54.3	135	139	21	0	4.0

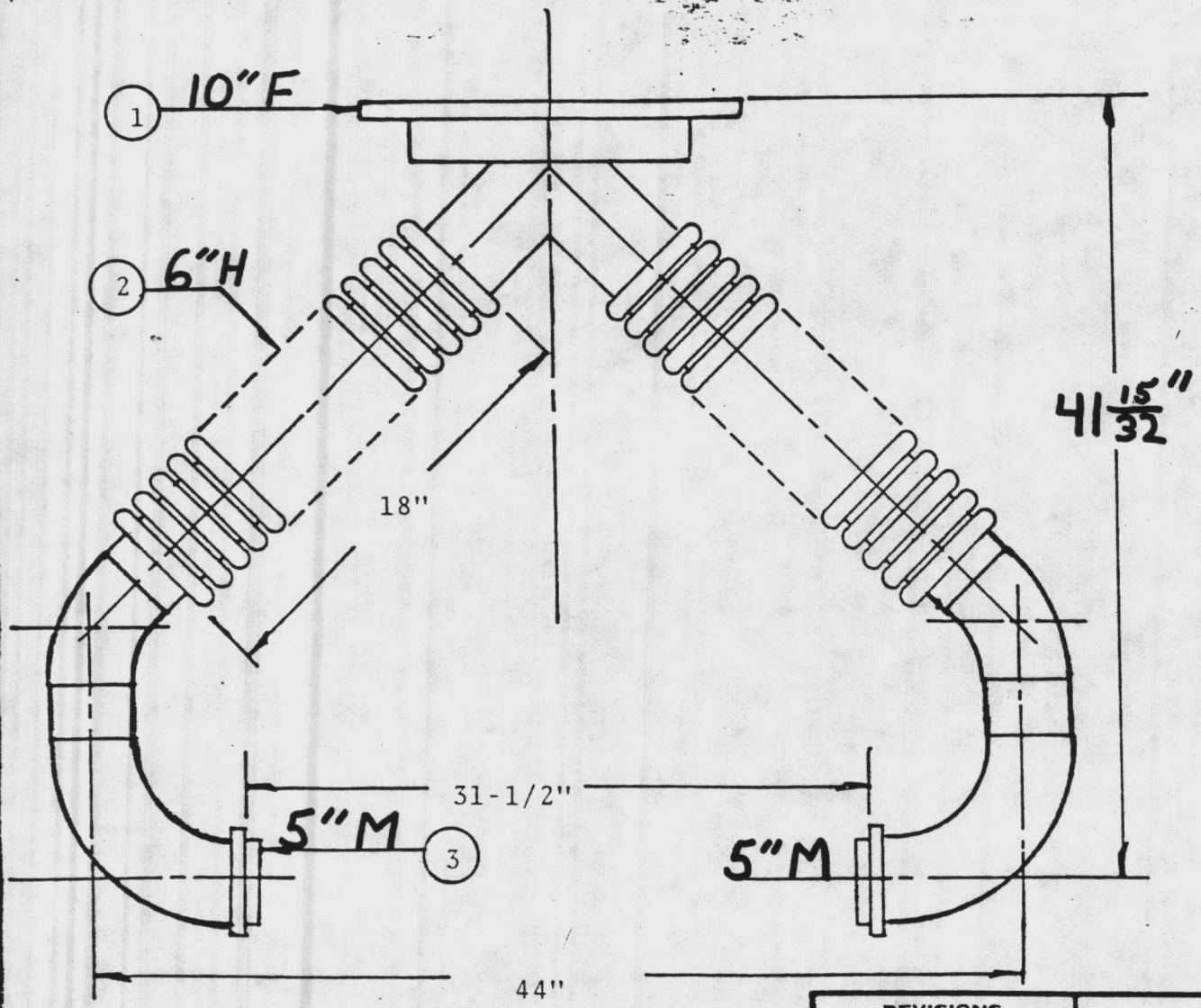
TYPE 4



Model Number	A. Nominal Inlet Dia.	B. Body Dia O.D.	C. Body Length	D. Over All Length	E. Offset To C/L	F. Offset To C/L	G. Inlet Length
44640	4″	10.1	49.7	52.4	24.9	0	3.0
44650	5″	14.1	43.8	47.6	21.9	2.6	4.0
44660	6″	14.1	57.8	61.6	28.9	0	4.0
44680	8″	22.1	55.9	60.0	28.0	0	4.0
44682	10″	22.1	84.0	88.0	42.0	0	4.0
44684	12″	26.1	79.0	83.0	39.5	0	4.0
44686	14″	36.1	87.7	91.3	43.8	0	4.0

NELSON

Nelson
P.O. Box 428 - HWY 51 West
Stoughton, WI 53589
Area (608) 873-4200
Telex 265-433



REVISIONS		
NO.	DATE	BY
1	8/6/80	dm
2		
3		
4		
5		

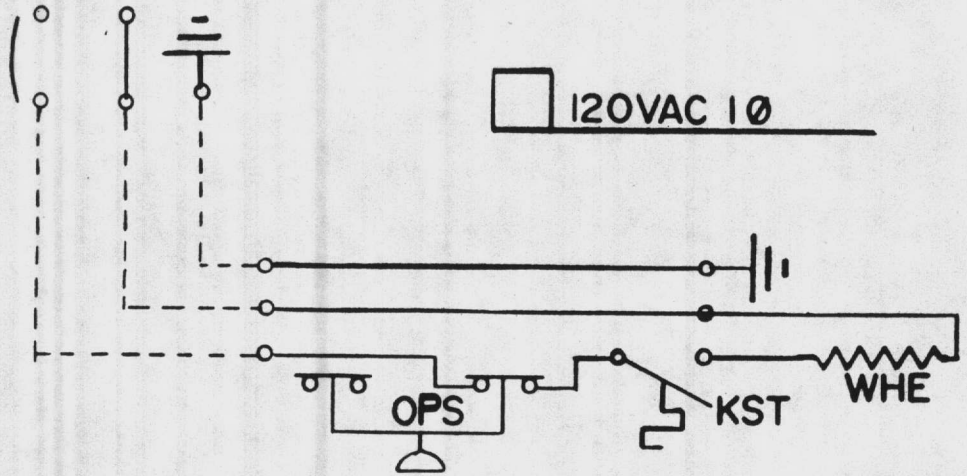
DETROIT 12V-71T,92T WYE ASSY
WITH TURBO FLANGE 90 ELLS

DRAWN BY: dm	SCALE: none	MATERIAL: noted
CHK'D: mm	DATE: 8/6/80	DRAWING NO.: SK-32180
TRACED	APP'D	

NOTE: DASHED LINES = WIRING BY OTHERS

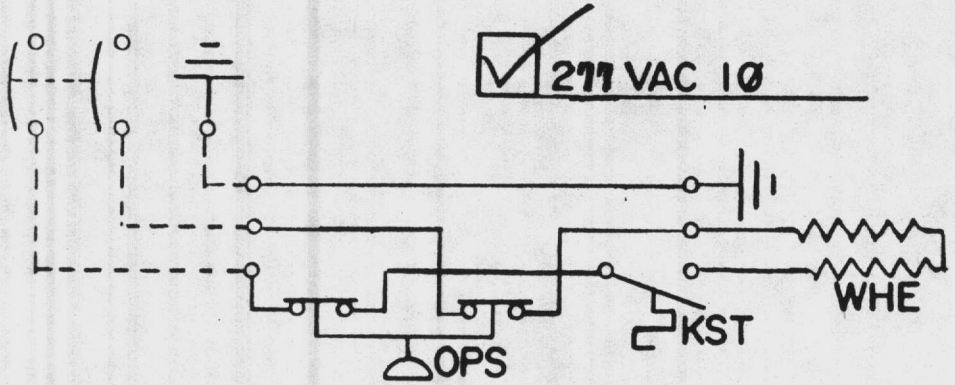
LEDGEND	
SYM	DESCRIPTION
CMC	COIL-MAGNETIC CONTACTOR
KST	KIM STAT. THERMOSTAT
OPS	OIL PRESSURE SWITCH
TXM	TRANSFORMER 230/480-120V
WHE	WATER HEATER ELEMENTS

☐ 120VAC 1Ø

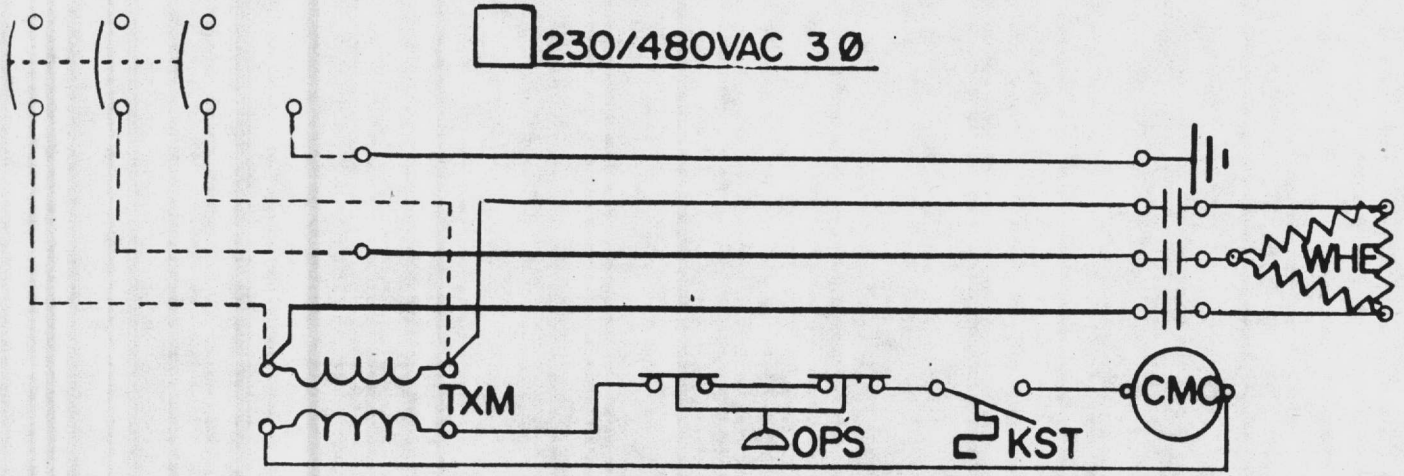


☑ 277 VAC 1Ø

WATTS 1-4000



☐ 230/480VAC 3Ø



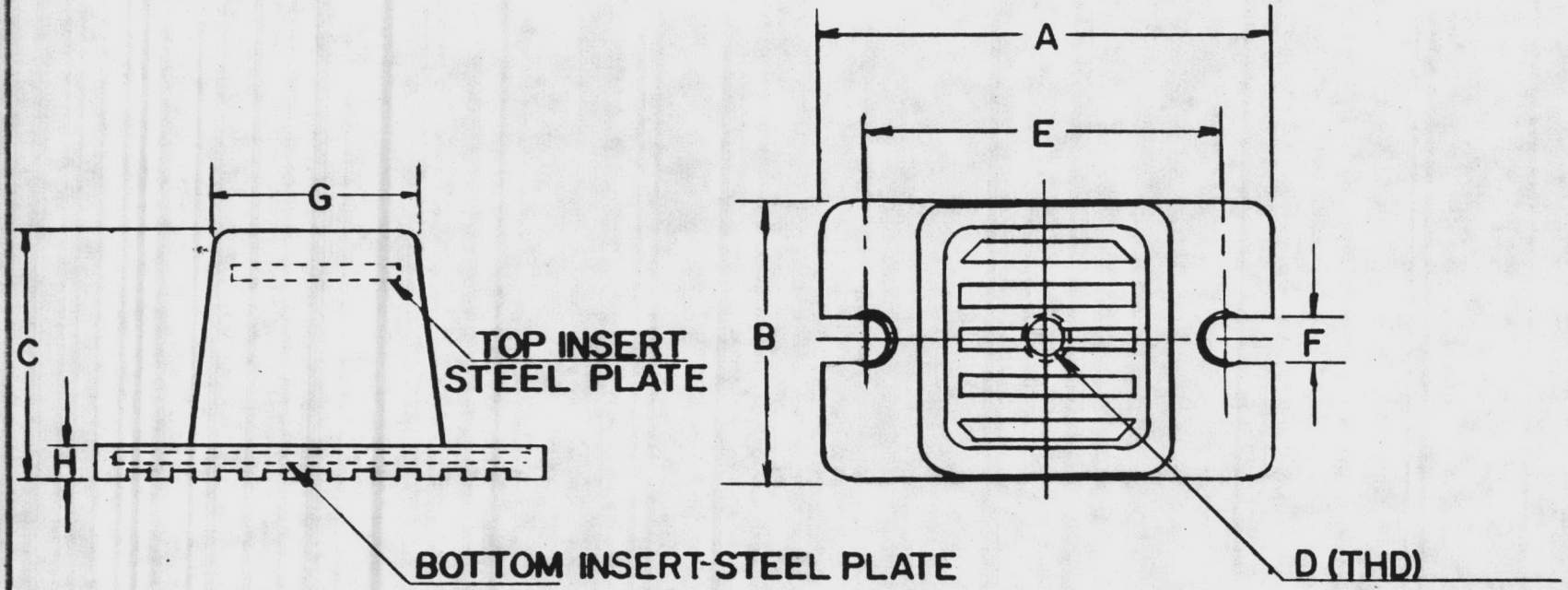
COVINGTON
GREENSBORO, N.C.

ENGINE BLOCK HEATER

EBH-1-4-82

JOB: NEW RIVER

DATE: 3-7-84



MOUNT MODEL	COLOR CODE	MAX LOAD lbs	✓	DIMENSIONS									QUANTITY REQUIRED
				A	B	C STD	C DBL	D	E	F	G	H	
FC500	YELLOW	500		5"	3 1/16"	1 5/8"	2 3/4"	1/2"-13	4"	9/16"	2 5/16"	3/8"	
FC720	RED	720		"	"	"	"	"	"	"	"	"	
FC1120	WHITE	1120		"	"	"	"	"	"	"	"	"	
FCC720	RED	720		"	"	"	"	"	"	"	"	"	
FCC1120	WHITE	1120		"	"	"	"	"	"	"	"	"	
FDD1800	YELLOW	1800	✓	7 1/8"	4 5/8"	1 5/8"	2 3/4"	5/8"-11	5 7/8"	9/16"	3 7/8"	3/8"	8
FDD3000	RED	3000		"	"	"	"	"	"	"	"	"	

SINGLE LETTER DENOTES STD DEFLECTION
DOUBLE LETTER DENOTES DBL DEFLECTION

JOB: NEW RIVER

DATE: 2-10-84

PAD TYPE ISOLATOR

PTVI 3-16-82

COVINGTON
GREENSBORO, N.C.

BULLETIN K23E

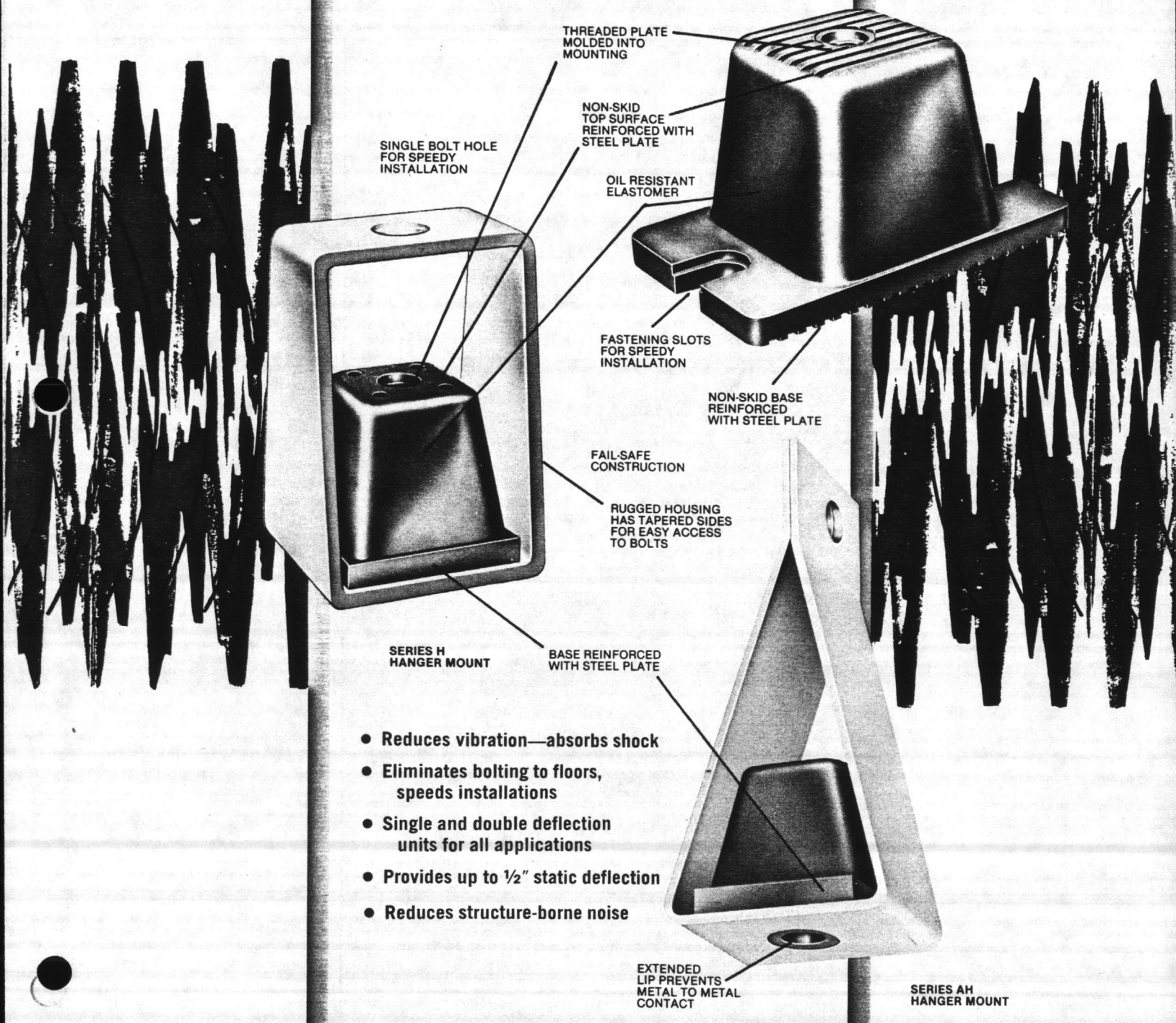
KORFUND

ELASTOMER VIBRATION ISOLATORS

SERIES F, H, & AH

10-5000 lb. LOAD RANGE

FLOOR MOUNTINGS & HANGER MOUNTINGS



- Reduces vibration—absorbs shock
- Eliminates bolting to floors, speeds installations
- Single and double deflection units for all applications
- Provides up to ½" static deflection
- Reduces structure-borne noise

KORFUND
DYNAMICS CORPORATION

WHY USE ELASTOMER* VIBRATION ISOLATORS?

Korfund Elastomer isolators provide low cost vibration isolation. Standard deflection designs provide up to ¼" deflection, and double deflection designs provide up to ½" deflection. Most dynamic machines generate high frequency disturbances which we perceive as noise; these isolators are excellent in preventing structural noise transmission.

Korfund mounts are neoprene which is resistant to oils, acids and alkalis commonly encountered in industry. Normal temperature tolerance −10°F to +180°F. These mounts are so designed as to provide features of shear and compression for highest isolation efficiency, and for protection against shock overload. In addition, steel plates are molded in the mount's top and bottom surfaces to distribute loads more efficiently.

The basic resilient element of Korfund Elastomer mounts is available in both a floor-mounted design (SERIES F) and in a hanger mounted design (SERIES H), with all dimensions, loading, and deflection characteristics being the same in both design series. Each series is available in two static deflection ranges which are a function of mounting height, and in a broad range of loading capacities which are a function of mount size and elastomer durometer.

SERIES F mountings (floor mounts) are used in the same manner as vibration isolating pad-type materials, beneath a very wide variety of air conditioning, industrial, and business machines. In addition to providing isolation, they also speed machine installations by eliminating, in most cases, bolting to floors, due to the very effective ribbed construction of the non-skid base plate.

SERIES H mountings (hangers) are used to eliminate the transmission of vibration and structure-borne noise from suspended equipment and piping. The hangers may be fastened to the ceiling, or inserted in the hanger rods. A special feature (sizes A, AA, B & BB) is the tapering of the housing sides, permitting easier access to fastening bolts.

SERIES AH ceiling hangers have been designed specifically for use with suspended ceilings. They control impact noise, vibration and sound transmitted through floor-ceiling constructions by decoupling and isolating ceilings from floors. They also reduce the possibility of developing cracks in the ceiling by allowing relative movement between ceiling and floor. Optional fastening devices such as hook rods, eye straps or eye rods are offered to meet varying installation requirements.

HOW TO SELECT KORFUND ELASTOMER MOUNTS

Example: Select isolators for a floor-mounted compressor located in a basement on a heavy concrete floor. SPEED: 1200 rpm. WEIGHT: 2400 pounds.

1) Assuming uniform weight distribution at four points, load per mount is 600 pounds.
2) From Table 1, select the mount with the required load capacity (Load capacity shown is maximum for static load; not to be exceeded. Dynamic load application requires reduction of load capacity.) Example: FCC-720 (Red) or FC-720 (Red) can be used.
3) To determine deflection of isolator under static load, divide load per mount by the mount static constant. Example: FCC-720 (Red) 600 ÷ 1440 = 0.416" or for FC-720 (Red) 600 ÷ 2880 = 0.208".
4) To determine isolation efficiency, use this formula:

$$\% \text{ efficiency} = 100 + \frac{100}{1 - \left(\frac{fd}{188}\right)^2 \frac{\triangle_s}{C}}$$

fd = disturbing frequency (rpm)
$\triangle_s$ = static deflection (see step 3)
C = dynamic conversion coef. (from Table II)

Example:

$$\text{FCC-720: \% Eff.} = 100 + \frac{100}{1 - \left(\frac{1200}{188}\right)^2 \frac{0.416}{1.75}} = 88.5\%$$

$$\text{FC-720: \% Eff.} = 100 + \frac{100}{1 - \left(\frac{1200}{188}\right)^2 \frac{0.208}{1.75}} = 74\%$$

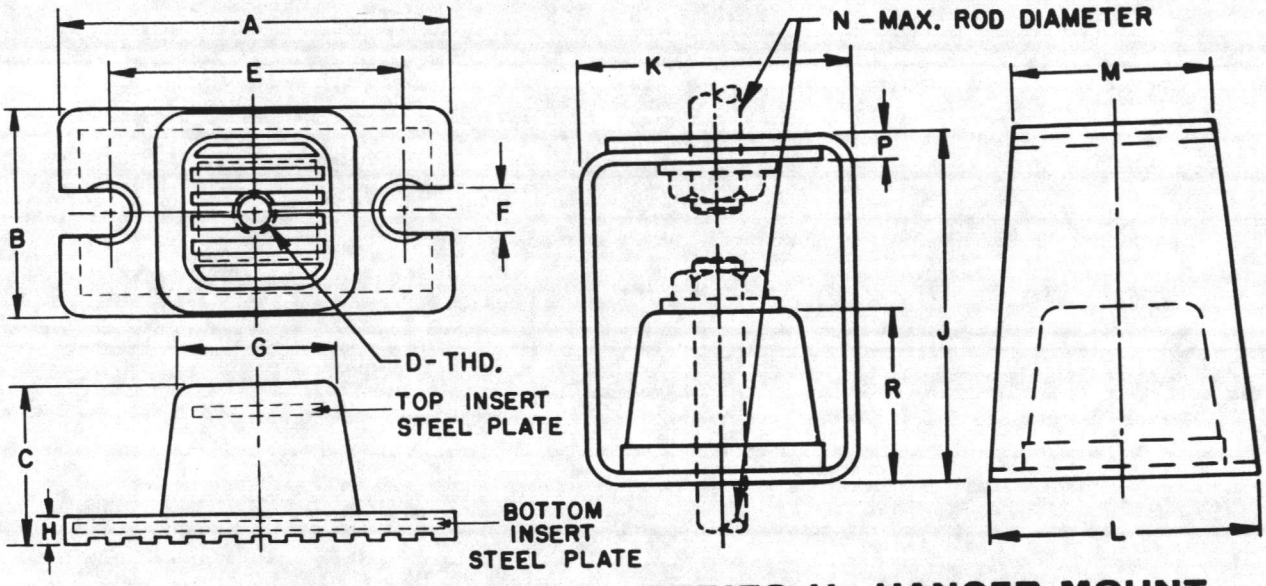
Do not use mounts whose efficiency is negative or greater than 100%.

HOW TO SPECIFY KORFUND ELASTOMER MOUNTS

SERIES F: The isolation mountings shall consist of a one-piece elastomeric unit having all metallic surfaces covered with elastomer material to resist corrosion. (Threads excluded). A non-skid tread shall be integrally molded into the top and bottom contact surfaces of all units (not on top surfaces for A and AA size) for maximum frictional effect when bolting is not required. Mountings shall have slotted base mounting holes to allow for misalignment of anchor bolts. They shall be capable of static deflections not less than ..... inches at rated load. (Insert pertinent deflection from Korfund Bulletin K23). Mountings shall be Korfund Series F Elastomer Vibration Isolators.

SERIES H: The isolation hangers shall consist of a steel housing and a one-piece elastomeric isolation unit having all metallic surfaces covered with elastomer material to resist corrosion. They shall be capable of static deflections not less than ..... inches at rated load. (Insert pertinent deflection from Korfund Bulletin K23). Hangers shall be Korfund Series H Elastomer Vibration Isolators.

*Elastomers are resilient materials such as neoprene, butyl, silicone, polyurethane, natural and buna rubber, etc.



SERIES F - FLOOR MOUNT

SERIES H - HANGER MOUNT
(NUT, WASHER, & ROD BY OTHERS)

TABLE I

Mount Size and Loading Code	Color Code	Maximum Recommended Load Pounds	Maximum Static Deflection Std.	Maximum Static Deflection Dbl.	Mount Static Constant lbs. (#/in.) Std.	Mount Static Constant lbs. (#/in.) Dbl.	A	B	C Std.	C Dbl.	D	E	F	G	H	Weight Pounds Std.	Weight Pounds Dbl.	J	K	L	M	N	P	R Std.	R Dbl.	Weight Pounds Std.	Weight Pounds Dbl.
35	Green	35	0.12"		292		3	1 1/16	7/8	1 1/2	3/16-18	2 1/4	11/32	1 1/16	3/32	.19	.25	3 3/8	2	1 3/4	1 1/4	3/8	3/32	1	1 5/8	.56	.63
60	Blue	60			500																						
95	Yellow	95			792																						
60	Green	60	—	0.3"		200																					
80	Blue	80				267																					
160	Yellow	160				533																					
110	Green	110			550	275																					
190	Blue	190			950	475																					
260	Yellow	260	0.20"	0.40"	1300	650	3 3/4	2 1/8	1 1/8	1 7/8	3/8-16	3	3/8	1 5/16	1/4	.38	.50	4 1/8	2 3/8	2 1/8	1 1/2	5/8	7/16	1 3/8	2 1/8	1.2	1.3
470	Red	470			2350	1175																					
300	Blue	300			1200	600																					
500	Yellow	500			2000	1000																					
720	Red	720	0.25"	0.50"	2880	1440	5	3 1/16	1 5/8	2 3/4	1/2-13	4	5/16	2 5/16	3/8	1.4	1.6	5 5/8	3 3/4	3 3/16	3 3/16	1	7/16	1 7/8	3	3.3	3.6
1120	White	1120			4480	2240																					
1800	Yellow	1800			7200	3600																					
3000	Red	3000	0.25"	0.50"	12000	6000	7 1/8	4 3/8	1 5/8	2 3/4	5/8-11	5 7/8	7/16	3 7/8	3/8	2.9	3.9	7	5 1/2	5	5	1	1/2	2 1/8	3 1/4	12.7	13.6
5000	White	5000			20000	10,000																					

DYNAMIC CONVERSION TABLE II

MOUNTING COLOR CODE	GREEN	BLUE	YELLOW	RED	WHITE
DYNAMIC CONVERSION COEF. (C)	1.1	1.2	1.5	1.75	2.2

HOW TO ORDER KORFUND ELASTOMER MOUNTS

A complete designation for ordering mounts consists of: USE-CODE, SIZE-CODE and LOADING-CODE.
(The COLOR CODE — not needed when ordering — refers to the color in which the full designation is stamped on the mounting.)

F
USE-CODE
F = Floor Mount
H = Hanger Mount

DD
SIZE-CODE
Single letter denotes standard deflection; double letter denotes double deflection.

5000
LOADING-CODE
Denotes maximum allowable loading.

WHITE
COLOR-CODE
For convenience in the field.

CONDEC Lima Energy Products

The Lima Electric Co., Inc.
A Condec Company
P. O. Box 918
Lima, OH 45802
(419) 227-7327
TWX: 810-447-2730

LIMA SER GENERATOR PERFORMANCE DATA

DATE: JAN. 1983

Winding Card No: 818 **Frame Size:** 680 **Voltage:** 240/480

Phase: 3 **RPM:** 1800 **Hertz:** 60 **No. of Leads:** 12

Insulation Class: F Stator; H Rotor **Armourtisseur Winding:** Full

Ratings at 0.8 Power Factor [PF], 40°C Ambient Temperature

80°C RISE:	300	KW	375	KVA
105°C RISE:	400	KW	500	KVA
130°C RISE:	450	KW	562	KVA

Efficiencies

LOAD	VOLTAGE	300 KW	400 KW	450 KW
FULL LOAD	240/480	94.3	93.7	93.2
3/4 LOAD	240/480	94.2	94.1	93.8

Load Acceptance/Rejection Data

	KW	VOLTAGE	LOAD	%VOLTAGE DIP (L.B.O.)	RECOVERY TIME (Sec.)
ACCEPTANCE W/ STANDARD VOLTAGE REGULATOR	300	240/480	Full	15.2	.5
	400	240/480	Full	19.4	.5
	450	240/480	Full	21.2	.6
REJECTION W/ STANDARD VOLTAGE REGULATOR	300	240/480	Full	16.0	.5
	400	240/480	Full	20.5	.5
	450	240/480	Full	22.0	.6

L.B.O. -Light Beam Oscillograph Measurement.

Exciter Data

Type: ROTATING BRUSHLESS

Rectifier: : 3 PHASE-FULL WAVE BRIDGE NUMBER OF POLES: 6

EXCITATION@	VDC N.L	VDC F.L.	AMPS N.L.	AMPS F.L.
300 KW	28.5	114.2	.73	2.28
400 KW	28.5	142.2	.73	2.84
450 KW	28.5	163.6	.73	3.27

Resistances: (OHMS 20°C)

Main Stator: .007 **Exciter Stator:** 38

Main Rotor: .777 **Exciter Rotor:** .101

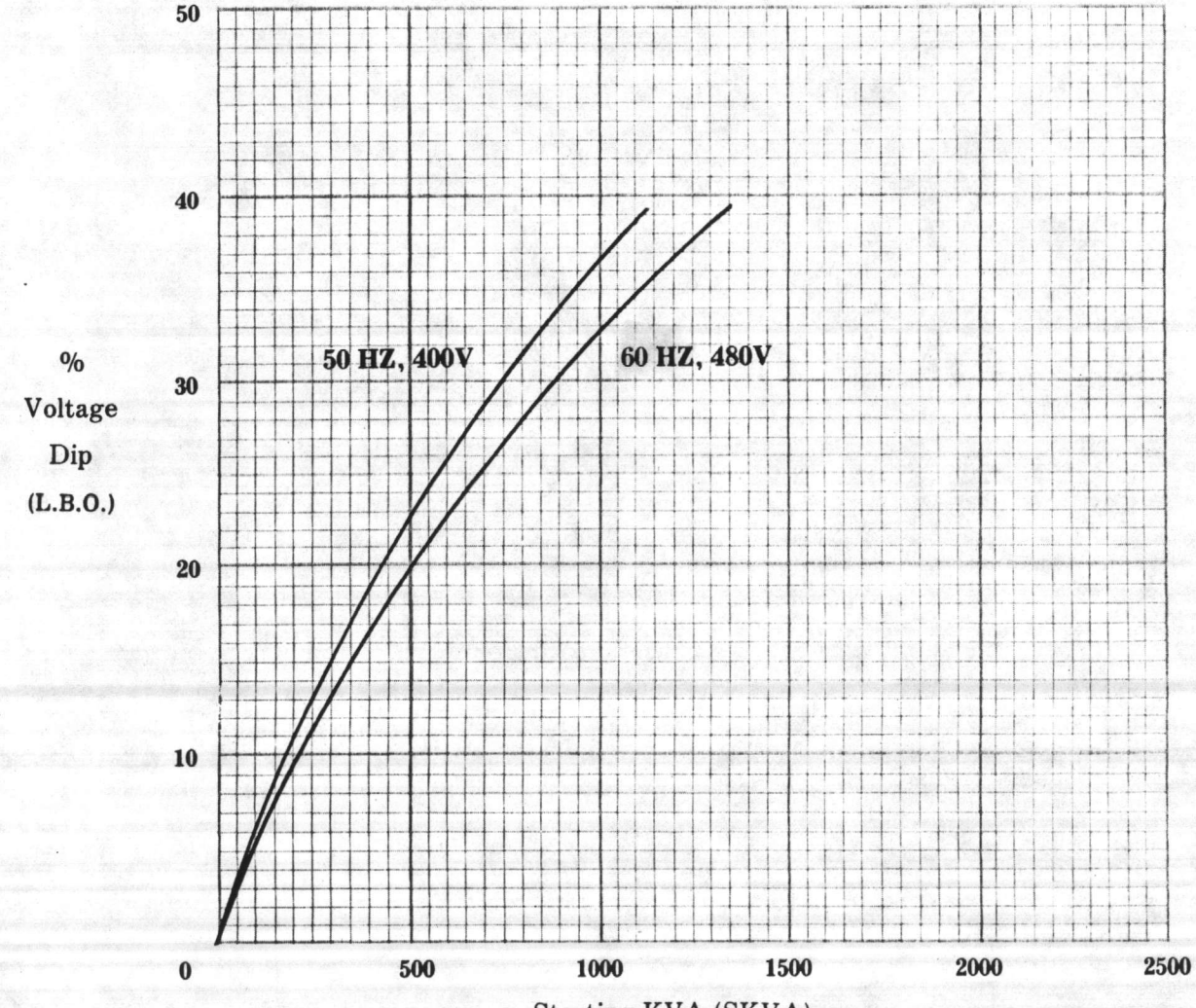
Usable Voltage Regulators: KR7F, KR7FF, SR8 or H9000

Machine Constants @ 240/480 Volts

W.C. 818

	300 KW 80°C RISE	400 KW 105°C RISE	450 KW 130°C RISE
SHORT CIRCUIT RATIO	.673	.505	.449
TELEPHONE INFLUENCE FACTOR OPEN CIRCUIT (1960 WEIGHTINGS)	LESS THAN 50	LESS THAN 50	LESS THAN 50
MAXIMUM TOTAL RMS HARMONIC DISTORTION WYE CONNECTED, LINE TO LINE, FULL LOAD, 0.8 PF	5%	5%	5%
MAXIMUM SINGLE HARMONIC, WYE CONNECTED LINE TO LINE, FULL LOAD, 0.8 PF	3%	3%	3%
DIRECT AXIS REACTANCES: Per Unit (PU)			
SYNCHRONOUS (Xd)	2.202	2.935	3.302
TRANSIENT (X'_d)	.180	.240	.270
SUBTRANSIENT (X''_d)	.106	.141	.159
NEGATIVE SEQUENCE (X_2)	.107	.143	.160
ZERO SEQUENCE (X_o)	.012	.016	.018

Note: This data is "typical" and may vary slightly for a specific unit.



CONDEC Lima Energy Products

The Lima Electric Co., Inc.
A Condec Company
P.O. Box 918
Lima, OH 45802
(419) 227-7327
TLX 24-2433 LIMA ELEC LIM

January 10, 1984

Mr. Dean Lankford
COVINGTON DIESEL, INC.
I40 & Sampson Road
P.O. Box 9418
Greensboro, NC 27408

REFERENCE: Dept. of the Navy, New River
Contract N62470-83-B-5840

Dear Mr. Lankford:

The Lima generator, Model 818 type SER, quoted for the above referenced contract meets or exceeds the performance and quality requirements of the solicitation and conforms to the below listed specification.

ITEM 1 - Lima model 0818, type A.C. Electrical Generator-300 KW, 375 KVA, 0.8 PF, 3/60, 480V, 40°C ambient/80°C rise, Class F insulation, 1800 RPM, single bearing, open enclosure, Lima 680 frame generator is capable of 10% overload as required without exceeding 80° temperature rise.

ITEM 2 - Voltage Regulator & Accessory Package
* Basler SR-8F automatic regulator, 1/2% voltage regulation, single phase sensing, remote rheostat, and EMI Suppressed conforming to MIL-STD-461B radiated and conducted.
* Basler UFOV260 under frequency over voltage module complete with breaker.
* Basler MVC-300 manual voltage control for remote mounting as required.

Lima Electric generators in lieu of fused diodes utilize a"state of the art" rectifier design oversizing diodes so that exciter cannot excite beyond diode rating.

Lima's Quality Procedures are based on MIL-I-45208A as approved by resident in-house DCAS representative.

Lima Electric's approval letter by the Naval Sea Systems Command, Washington, D.C. for the utilization of type SER generators in Naval installations is attached.

Thank you for quoting Lima. We look forward to being of future service.

Sincerely,

Michael Spees

Michael E. Spees
REGIONAL MANAGER
GOVERNMENT SALES

MES:dak

CC: Don Swartz
Swartz Sales

Attachment

DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
WASHINGTON, D.C. 20362

IN REPLY REFER TO
SEA 0215:MMH
Serial: 08

Gentlemen:

Your application for the Naval Sea Systems Command's Master Bidders List has been under review by the cognizant engineering offices for the items you selected.

Listed on the reverse are those items that our engineers believe your firm to be qualified for as a potential source. Also listed are any items rejected by our engineers, together with any comments provided to this office. You may request re-evaluation of any rejected item or evaluation of new selection by supplying further documentation of your capabilities to fulfill such requirements. Insufficient information to determine capabilities is the most common reason provided for rejection.

We are currently in the process of putting our Master Bidders List (MBL) on a new Automated Data Processing (ADP) system, which will cause some delay in your firm being placed on our permanent Master Bidders List. Due to the large number of firms that may be listed for certain commodity areas, it is sometimes necessary for us to rotate our lists. Therefore we cannot guarantee that your firm will receive a copy of every solicitation. It is strongly recommended that your firm still review solicitations that are posted in our office or that are synopsized in the Commerce Business Daily.

Your interest in being of service to the Naval Sea Systems Command is appreciated. If you have any further questions please contact the undersigned or Mrs. Cheryl Treires.

Martie M. Hankins

MARTIE M. HANKINS
HEAD, INDUSTRY LIAISON
AND BIDDERS LIST BRANCH
CONTRACTS DIRECTORATE
By Direction of Commander
NAVAL SEA SYSTEMS COMMAND

Telephone: 202-692-7505
202-692-7508

ADDRESS FOR SOLICITATIONS

REPORT IS:

X FINAL

_____ PARTIAL

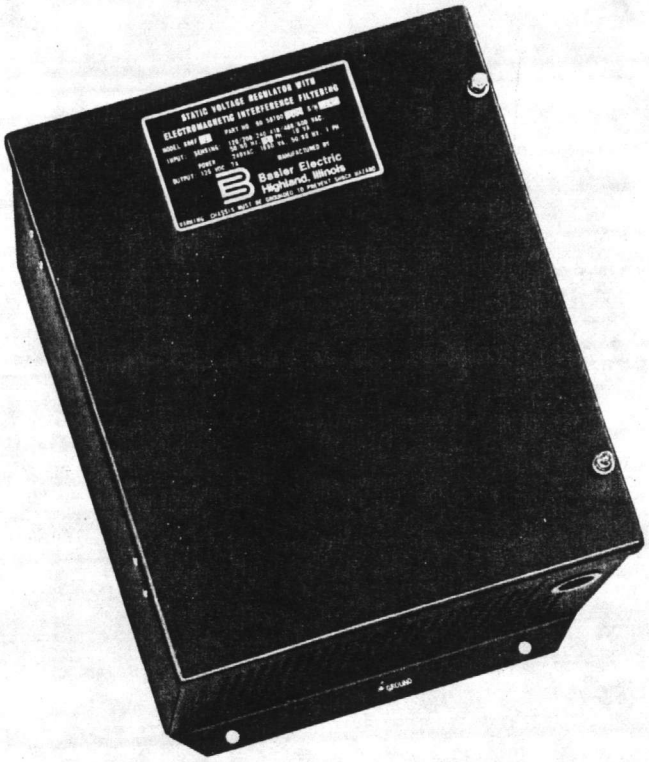
Lima Electric Company, Incorporated
P.O. Box 918
200 E. Chapman Road
Lima, Ohio 45802

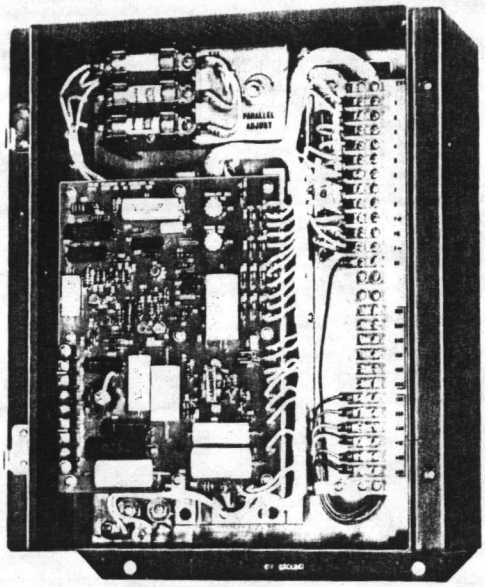
DATE: 06 May 1983

Your current, complete listing on our Master Bidders List is as follows:

ITEM: 0017, Lima Electric Co., Inc. Type Ser and Mac Electrical Generators

Class 100 Equipment
SR-F
STATIC VOLTAGE REGULATORS





SR-F Series Voltage Regulators are applicable to any size or type of alternator system where extremely precise regulation and ultra reliable operation is required.

FEATURES:

- Designed for ultra-reliable operation.
- Incorporates advanced semi-conductor technology.
- Undamaged by most installation wiring errors.
- Integrated circuit error detector stage.
- Extremely conservative semi-conductor ratings.
- Solid-state "build-up" circuit.
- Inherent overvoltage limiting.
- Withstands extended under-frequency operation.
- Shorting output does not damage regulator.
- Thermally protected power semi-conductors.
- Fully adjustable, wide range stability circuit.
- Built in electro-magnetic interference (EMI) suppression.
- All sensing voltages through 600 volts brought to terminal board.
- Shock tested to 20G.
- Vibration tested at 5G up to 260 Hz.
- Mount in any plane without derating.
- Very low thermal drift.
- Precise regulation.
- Class 100, utility type regulator.
- Designed for 30 years operating life.
- CSA Approved.

DESCRIPTION:

Performance and reliability are the terms by which any power system is measured. As the requirements for reliable and quality power become more stringent, the demands on the control system, particularly the voltage regulator, become very difficult to meet. Basler Electric Company has developed the SR-F series of regulators to fulfill the need for ultra-reliability and extreme precision.

The SR-F series utilizes advanced electronic components to achieve performance levels unmatched by any other commercially available equipment.

New concepts in component selection and derating have been applied during the design stages to assure the ultimate in reliability at reasonable cost. In addition, the design incorporates integral features for the protection of both the regulator and the generating system. SR-F regulators are available for 62.5 and 125 volt exciter fields and are applicable to either 50 or 60 Hertz operation (see Table 1).

Basler Electric
Highland, Illinois

SB-3
11-77

REGULATOR SPECIFICATIONS:

TABLE 1

MODEL	POWER INPUT (1)			OUTPUT RATING				SENSING (2)		PARALLEL COMP.		FIELD RESISTANCE OHMS	
				MAX. CONT.		MAX. FORCING							
	VOLT	FREQ. (Hz)	VA*	VOLT	AMP	VOLT	AMP	VOLT	VA BURDEN PER Ø	AMPS (INPUT)	VA BURDEN	MIN.	MAX.
SR4F1	120	50/60	840	63	7.0	90	10	NEMA-STD.	10	5	5	9	400
SR4F3	120	50/60	840	63	7.0	90	10	120/208/	10	5	5	9	400
SR8F1	240	50/60	1680	125	7.0	180	10	240/416/	10	5	5	18	400
SR8F3	240	50/60	1680	125	7.0	180	10	480/600	10	5	5	18	400

NOTES: * INPUT VA IS EQUAL TO THE DC OUTPUT CURRENT TIMES INPUT VOLTAGE.

(1) IF CORRECT VOLTAGE IS NOT AVAILABLE FOR POWER INPUT, A SUITABLE POWER TRANSFORMER MUST BE SELECTED. (SEE BULLETIN SP-2)

(2) LAST DIGIT IN MODEL NUMBER (1 OR 3) DENOTES EITHER SINGLE OR THREE PHASE SENSING.

- **REGULATION ACCURACY:** Less than ± ¼%.
- **REGULATOR RESPONSE:** Less than 17 milli-seconds.
- **REGULATOR DRIFT:** Less than ± ½% for 50°C (90°F) temperature change (including warm-up).
- **REGULATOR SENSING:** Both single and three phase sensing models are available.
- **VOLTAGE ADJUST RANGE:** Minimum ± 10% of nominal voltage.
- **EMI SUPPRESSION LEVEL:** MIL-STD-461, Class III B, conducted or radiated.
- **AMBIENT OPERATING TEMPERATURE:** From –67°F to +158°F (–55°C to +70°C) without derating.
- **STORAGE TEMPERATURE RANGE:** From –85°F to +212°F (–65°C to +100°C) with no degradation of components.
- **POWER DISSIPATION:** Less than 60 watts at continuous rating.
- **PARALLEL COMPENSATION:** 5 amps at 5 VA, droop adjustable to approximately 5%.
- **MOUNTING:** Designed to operate when mounted directly on electric motor, gasoline, diesel or turbine-driven generator systems.
- **VIBRATION:** Tested to withstand 1.3 G's from 5 to 26 Hz, 0.036" displacement, from 26 to 52 Hz and 5 G's from 52 to 260 Hz.
- **WEIGHT:** 50 pounds.

ACCESSORY DEVICES:

- **POWER ISOLATION TRANSFORMERS:** Basler Electric Company has available power isolation transformers designed specifically for use with power generating systems. Table 2 gives the proper transformer for each SR-F regulator model for application on alternators of 600 volts or less. Complete power isolation transformer information is given in Bulletin SP-2.
- **SERIES BOOST OPTION (SBO):** Many applications require the support of higher than normal output regulator currents for either motor starting (inrush) or selective tripping of circuit breakers under fault conditions. The Basler patented Series Boost Option (U.S. Patent No. 3,316,479) is an all static device which provides the regulator with a relatively constant input voltage from both the alternator output voltage and current. Table 2 gives the proper reservoir assembly for each SR-F regulator. Power Current transformers are available for virtually all alternator-exciter-regulator combinations. Bulletin SP-1 contains further information on the Series Boost Option.
- **UNDERFREQUENCY/OVERVOLTAGE PROTECTION:** Basler has developed underfrequency/overvoltage protective modules for use with the SR-F series of Regulators. These devices operate through the sensing stage of the regulator and automatically protect the regulator-exciter-alternator combination from the effects of underfrequency operation. Overvoltage protection is provided by installing the circuit breaker in the input power lines of the regulator. Underfrequency can occur during engine adjustment or engine warm-up and cool-down. Further description and characteristics are given in Bulletin SPD-3.
- **MANUAL VOLTAGE CONTROL:** In applications where manual voltage control is required Basler has available a complete line of these controls for use with the SR-F series of regulators. These modules contain the correct switching arrangement to completely isolate and protect the regulator during manual control operation. For further information on the Manual Voltage Control Modules, see Bulletin SPC-2.
- **LOW VOLTAGE PARALLEL LOAD DIVISION CURRENT TRANSFORMERS:** Basler has available, from stock, a complete line of low voltage parallel load division current transformers for use with the SR-F series of regulators controlling three phase paralleled generators. These CT's have been selected to satisfy most of the parallel load division requirements of the generating systems. Bulletin SPB-3 contains further information on the current transformers.

DESCRIPTION OF OPERATION:

Each of the SR-F series of voltage regulators operates in the same basic manner. The individual regulators differ in power output levels from the power stage. The operation of these regulators is described by the following block diagram.

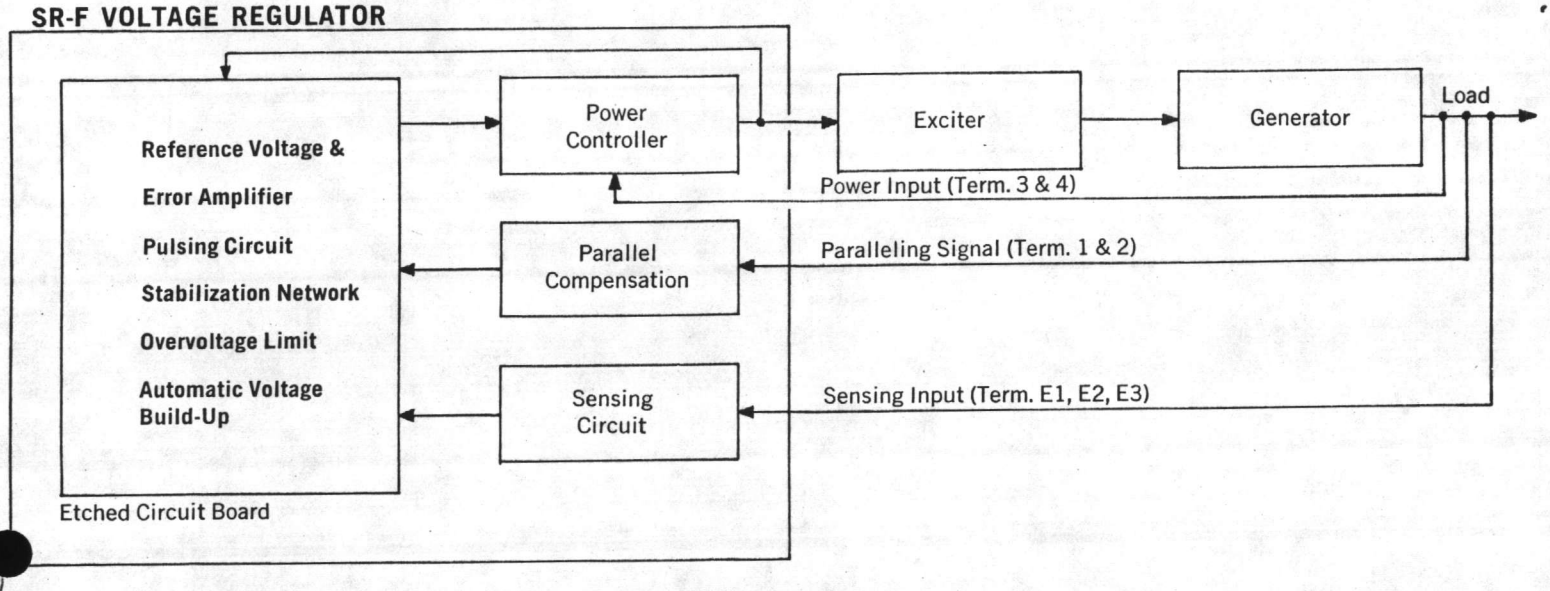


FIGURE 1

The regulator continuously monitors the output voltage of the alternator via the sensing leads. The sensing stage provides a DC signal, proportional to this voltage, to the integrated circuit (error detector stage) on the etched circuit board. Additional circuitry on the board utilizes this signal to control the phase angle at which the firing signal is applied to the SCR's. The output from the power controller provides the exciter field current and thereby controls the alternator output voltage. A feedback signal, taken from the power controller, provides system voltage stability. During parallel operation, a signal proportional to load current is injected into the sensing stage to provide reactive load compensation.

SAMPLE SPECIFICATION:

The voltage regulator shall be a completely static device utilizing thyristors (SCR's) and diodes as the power control stage and an integrated circuit employed as a combination reference-error detector-error amplifier. The regulator will control the generator exciter field as required to maintain a constant and stable generator output voltage within ± ¼ of 1% of nominal for all steady state loads from no load to full load including a 5% variation in frequency and the effects of field heating. The regulator shall have (single) (three) phase sensing with the sensing input isolated from the power stage internally in the regulator. Paralleling provisions will be an integral part of the regulator and will operate with the external current transformer wired for either droop or cross-current compensation mode. Electromagnetic interference suppression shall be an integral part of the regulator. Thermal protection for power semi-conductors, inherent over-voltage protection and fuse protection for extreme over current shall be provided internally in the regulator. Stability and voltage range adjustments shall be provided on the circuit board. No electrolytic capacitors, vacuum tubes or electro-mechanical relays will be permitted.

The regulator shall be a Basler type SR-F or approved equal.

CHOOSE FROM A COMPLETE LINE OF ACCESSORIES FOR SR-F REGULATORS

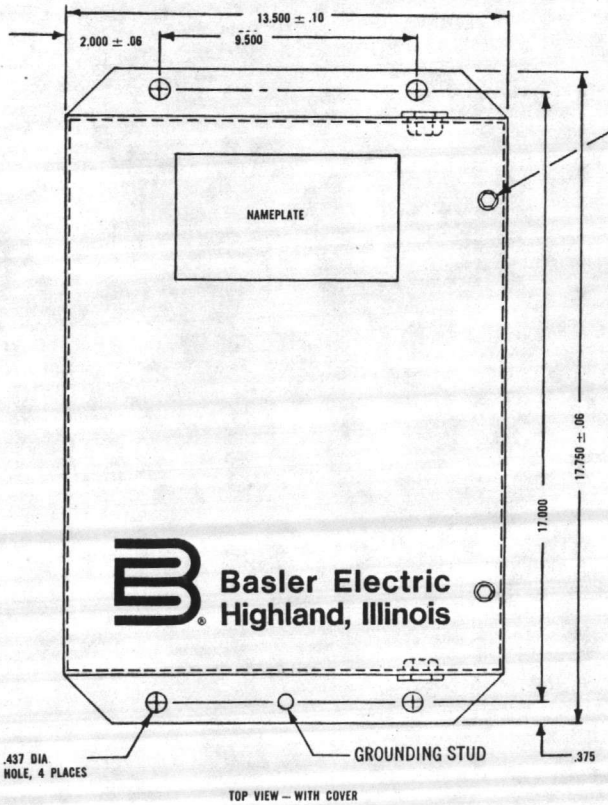
ACCESSORIES / REGULATORS	Available from Stock: Power Isolation Transformer (1)	Underfreq./ Overvoltage Protective Modules (2)	Parallel Current Transformer (3)	Series Boost Options (4)	Manual Voltage Control Modules (5)	Available Upon Special Request: Volts-Per-Cycle Module	Wide Range Voltage Adjust Modules	60 Hz Power 400 Hz Sensing Modules	DC Sensing Modules
SR4F1	BE-11049 BE-13616 BE-10493	UFOV-260 & UFOV-250	(See Product Bulletin SPB-2)	SBO-241 thru SBO-246	MVC-104	(Consult Factory)	(Consult Factory)	(Consult Factory)	(Consult Factory)
SR4F3									
SR8F1	BE-10494 BE-11050 BE-13487			SBO-181 thru SBO-186	MVC-108				
SR8F3									

Load

For further information ask for:

(1) Product Bulletin SP-2
(2) Product Bulletin SPD-3
(3) Product Bulletin SPB-3
(4) Product Bulletin SP-1
(5) Product Bulletin SPC-2

TABLE 2



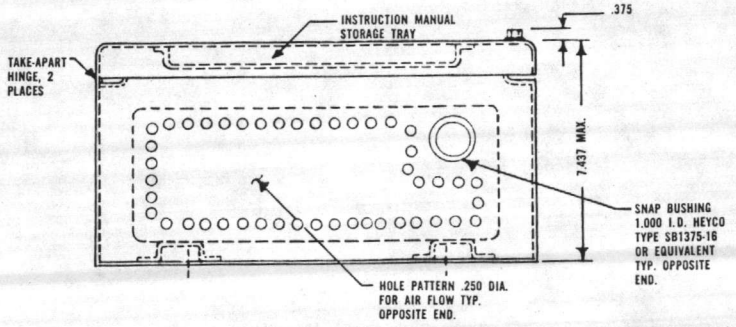


FIGURE 2 – SR-F VOLTAGE REGULATOR – OVERALL DIMENSIONS

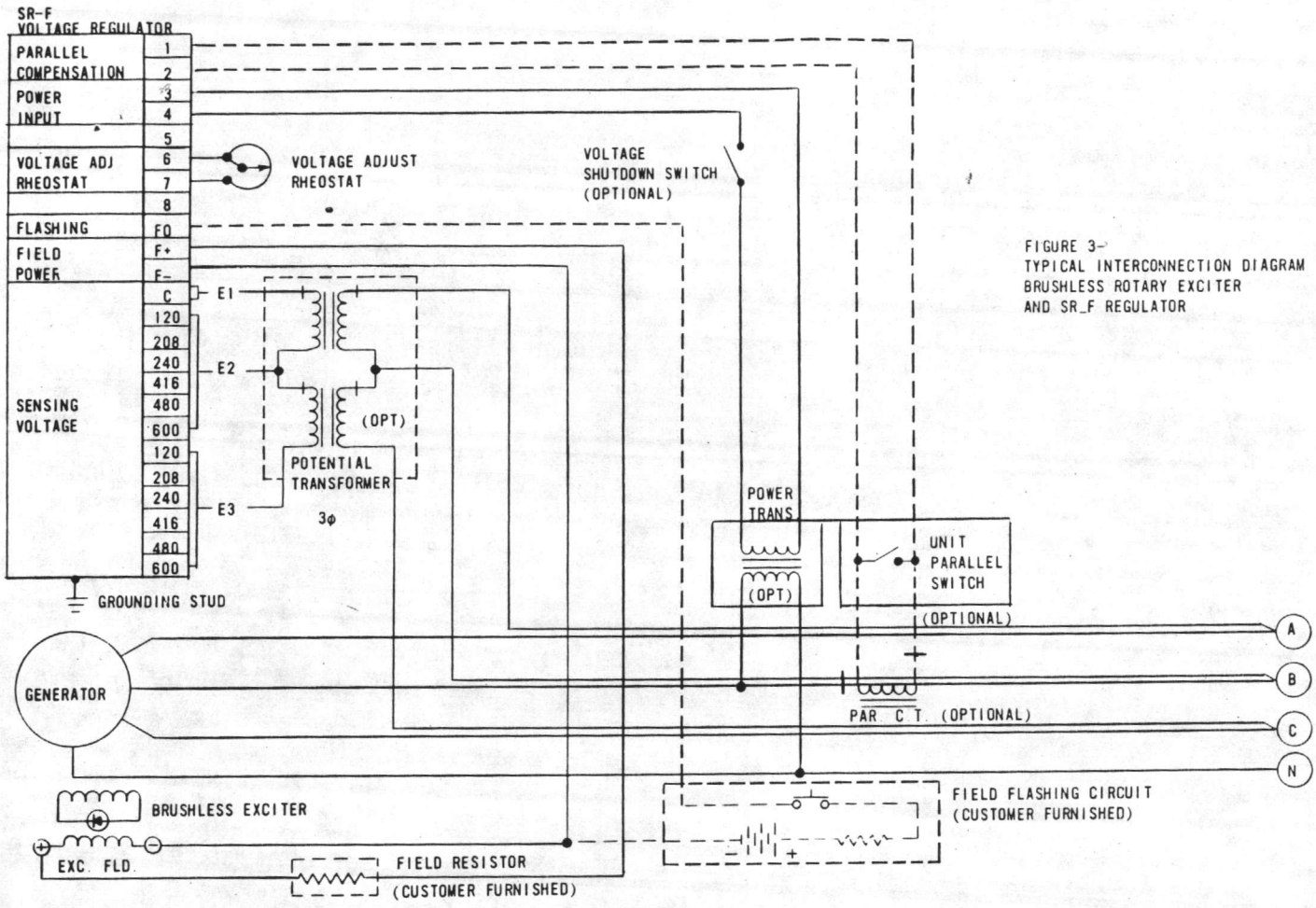


FIGURE 3-
TYPICAL INTERCONNECTION DIAGRAM
BRUSHLESS ROTARY EXCITER
AND SR_F REGULATOR

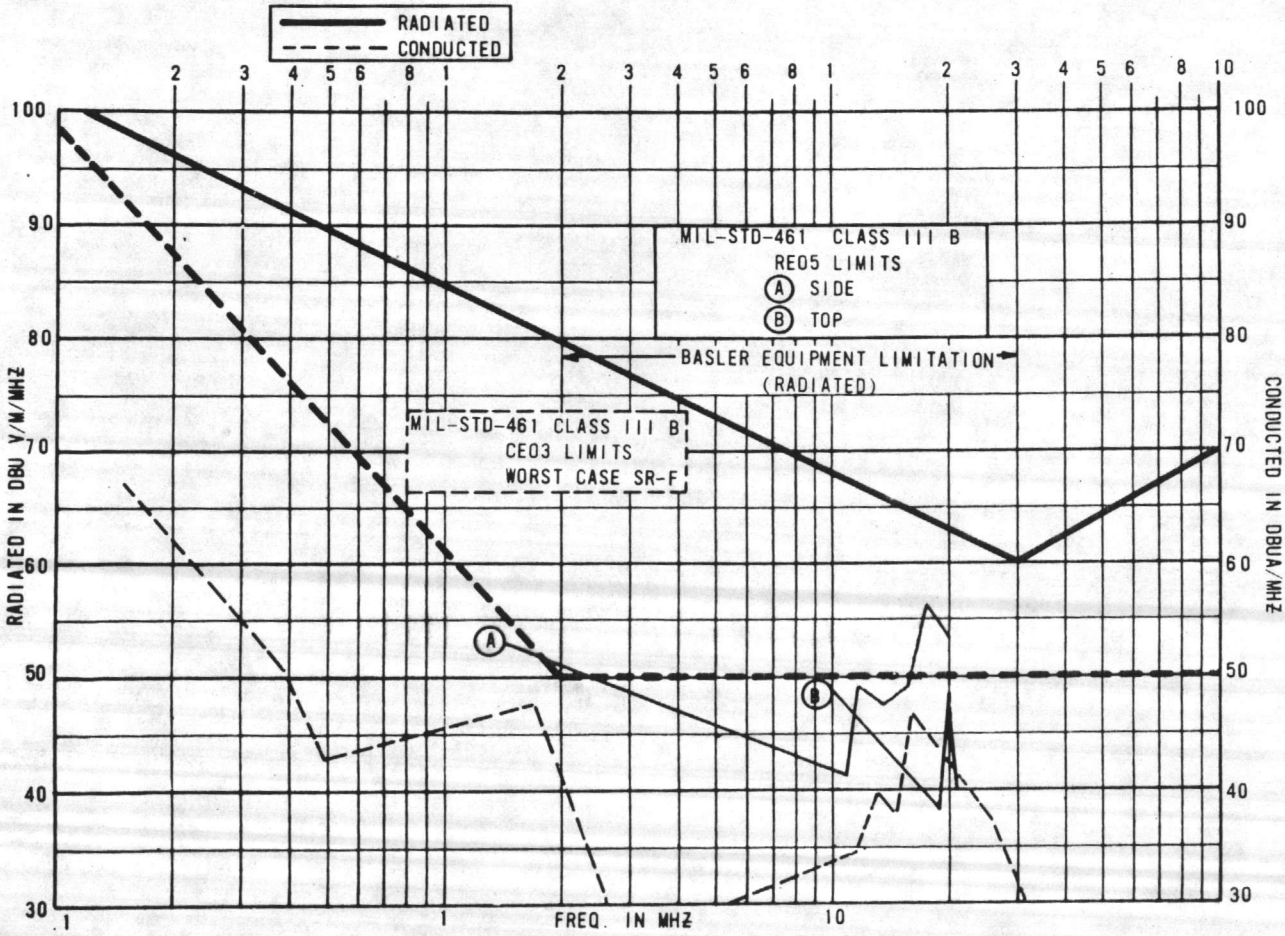
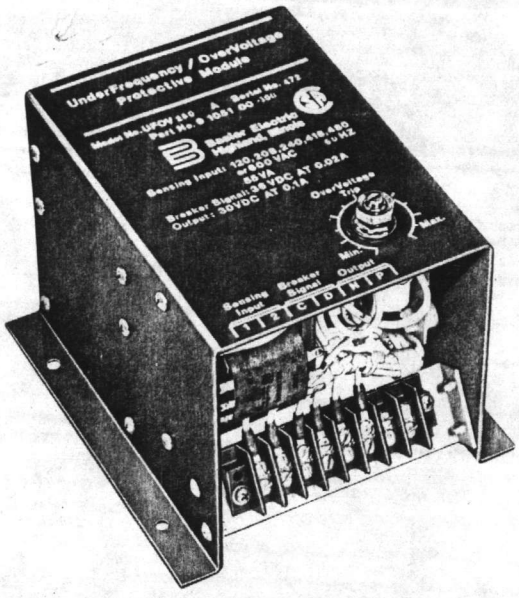


FIGURE 4 TYPICAL SUPPRESSION LEVELS - SR_F

Class 200 Equipment
UFOV 250A/260A
UNDERFREQUENCY/OVERVOLTAGE PROTECTIVE MODULES



FEATURES:

- Designed for use with Basler SR-A, SR-F, and SR-H families of voltage regulators.
- Protects generator, voltage regulator, and associated equipment against underfrequency/ overvoltage* conditions.
- Models for both 50 and 60 Hz operation.
- Operates on NEMA standard voltages to 600 VAC.
- Overvoltage trip adjust.
- Compact, reliable, economical.
- Mechanically rugged.
- Available from stock.
- CSA approved.

*Overvoltage protection provided when companion circuit breaker is used.

APPLICATIONS:

It is not unusual for power generating systems to operate below rated speed during periods of warm-up or prime mover maintenance. If the resultant underfrequency condition persists, damage may result to the electrical system as the SR voltage regulator attempts to maintain rated generator output voltage. The Basler UFOV 250 and UFOV 260 have been designed to protect the generating system against sustained low speed operation by reducing regulator output, and thereby generator voltage. By adding the optional overvoltage circuit breaker the generator-regulator system can be protected against overvoltage conditions. A typical application is presented pictorially in Figure 1.

DESCRIPTION:

The UFOV 250 and UFOV 260 prevent the voltage regulator from maintaining rated generator output voltage when generator frequency decreases more than 4 to 7 Hertz below nominal value. When the underfrequency circuit assumes control, the reduction in generator output is proportional to the degree of the underfrequency condition. When the frequency returns to nominal the output of the SR regulator is automatically increased, thereby increasing generator output to nominal. To provide overvoltage protection, a circuit breaker is added to trip when the applied voltage exceeds a predetermined, adjustable value (125%-150% of nominal). The circuit breaker contacts are connected in series with the voltage regulator power input lines so that the SR regulator AC power (terminals 3 and 4) is removed when the breaker trips.

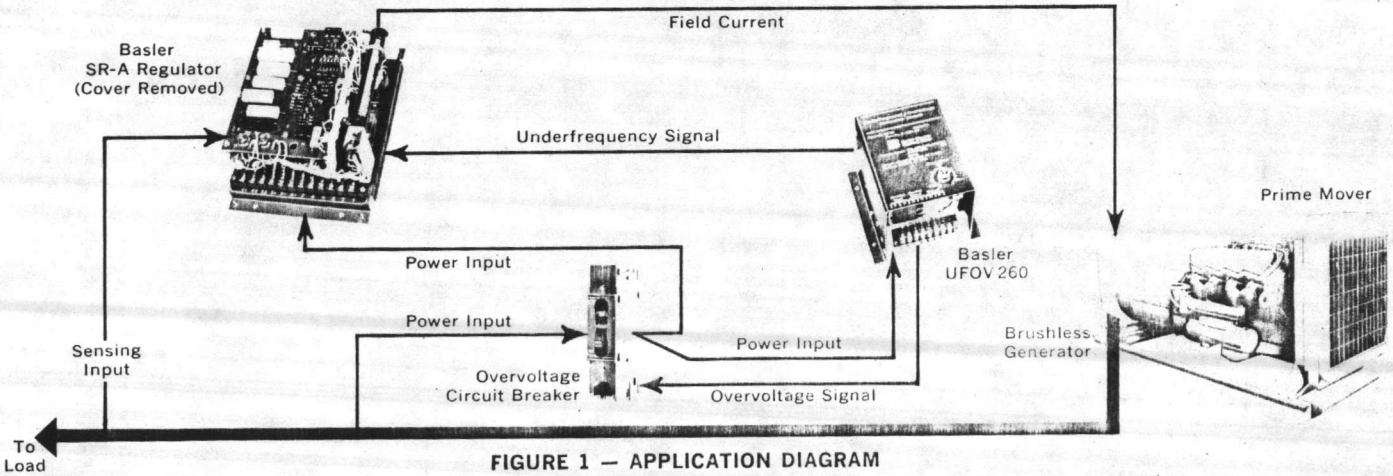


FIGURE 1 — APPLICATION DIAGRAM

Basler Electric
Highland, Illinois

SPD-3
2-77

SPECIFICATIONS:

INPUT POWER:

Voltage.....120, 208, 240, 416, 480 or 600 VAC

Frequency.....Model UFOV 250 - 50 Hertz
Model UFOV 260 - 60 Hertz

Phase.....Single

UNDERFREQUENCY OPERATIONAL THRESHOLD:
4 to 7 Hz below nominal.

UNDERFREQUENCY OPERATIONAL PARAMETERS:
See Figure 2.

OVERVOLTAGE ADJUST LIMITS: 125-150% of nominal.

CIRCUIT BREAKER CONTACT RATING:
P/N 05390 - 50 amp @ 480 VAC
P/N 05391 - 50 amp @ 250 VAC

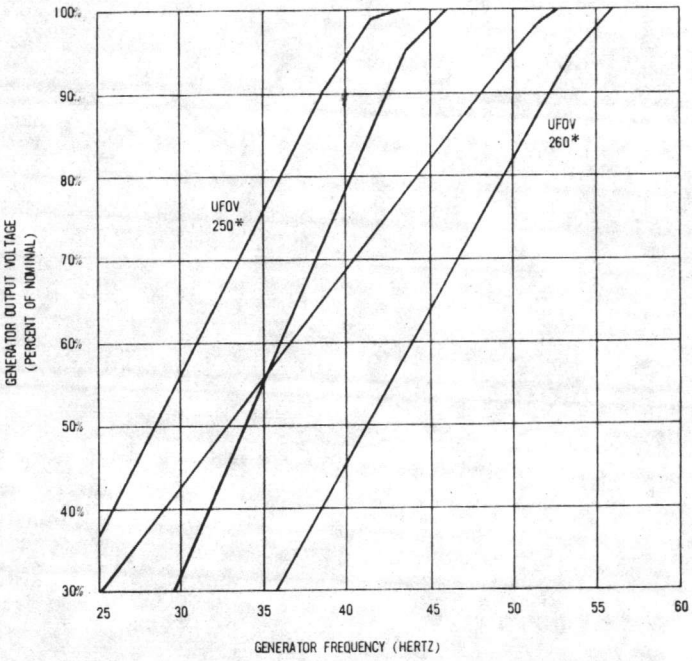
AMBIENT OPERATING TEMPERATURE: −40°C to + 70°C (−40°F to +158°F).

SHOCK: 15 G's in any plane.

DIMENSIONS: See Figures 3 and 4.

FINISH: Dark brown, lusterless, textured, baked enamel.

WEIGHT: 10 pounds net; 12 pounds shipping.



If the generator is operated at less than rated speed, regulator output current to the exciter field is reduced and generator output voltage is proportionately decreased. The graph indicates the percentage of generator output voltage that will be obtained for a specific reduction in frequency. As an example, if a 60 Hz generator is operating at 50 Hz, generator output voltage will be between 82% and 95% of nominal. The "spread" in the envelope (shaded area) is a function of operational temperature and normal tolerance in components.

*Data applies to Part Numbers 9 1051 00 100 (UFOV 260A) and 9 1051 00 101 (UFOV 250A). Similar units of earlier design (Part numbers 9 0400 00 100 and 9 0400 00 104), were also identified with Model Numbers UFOV 260/250. Those units have an underfrequency operational threshold of 10 Hz below nominal. For further information regarding such units, contact the factory.

FIGURE 2 — UNDERFREQUENCY OPERATIONAL PARAMETERS

HOW TO ORDER:

Refer to the following chart to determine your requirements.

When using any of these Basler voltage regulators	And desiring this protection	In a 60 Hertz power system, ORDER	In a 50 Hertz power system, ORDER
SR4A SR8A SR4F SR8F SR32A SR32H SR63H SR125H SR250H	Underfrequency only	Model UFOV 260A protective module	Model UFOV 250A protective module
	Underfrequency and overvoltage	Model UFOV 260A protective module AND P/N 05390 circuit breaker (single pole) OR P/N 05391 circuit breaker (double pole)*	Model UFOV 250A protective module AND P/N 05390 circuit breaker (single pole) OR P/N 05391 circuit breaker (double pole)*

*Select the double pole breaker if (1) terminal A- on the SR-A regulator is utilized or (2) if terminal FO on the SR-F and SR-H regulators is utilized.

SAMPLE SPECIFICATION:

A device is required to protect the power generating system against underfrequency and overvoltage conditions. The unit shall have the capability of reducing regulator output when generator frequency decreases 4 to 7 Hertz below nominal. When the frequency returns to its nominal value the regulator output shall automatically increase to provide adequate field current for nominal generator output voltage. The device shall automatically open a circuit breaker controlling power input to the voltage regulator if generator output voltage exceeds 140% of nominal. The module must be capable of 240 VAC, 60 Hertz operation. Environmentally, the device shall be capable of satisfactory operation in the temperature range of −40°C to + 70°C (−40°F to + 158°F).

The device shall be a Basler Model UFOV 260A Underfrequency/Overvoltage Protective Module with P/N 05390 Circuit Breaker.

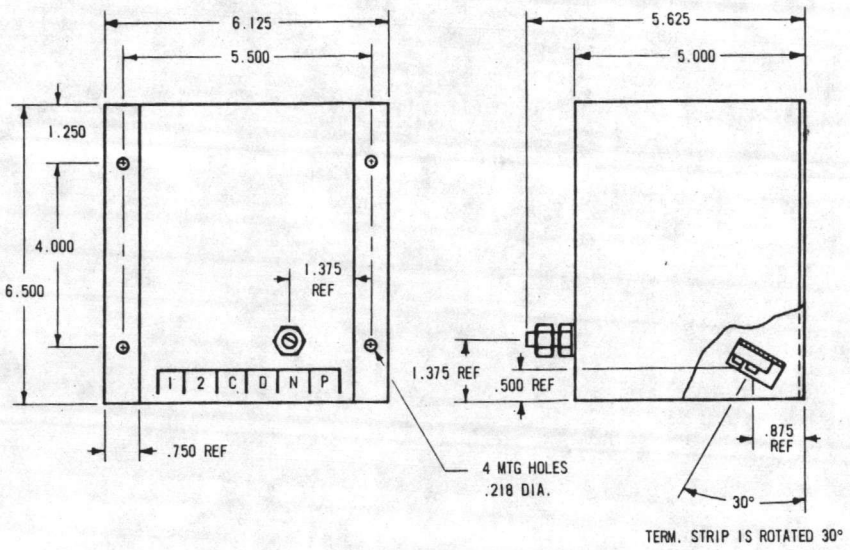


FIGURE 3 — UFOV 250/260 OUTLINE DRAWING

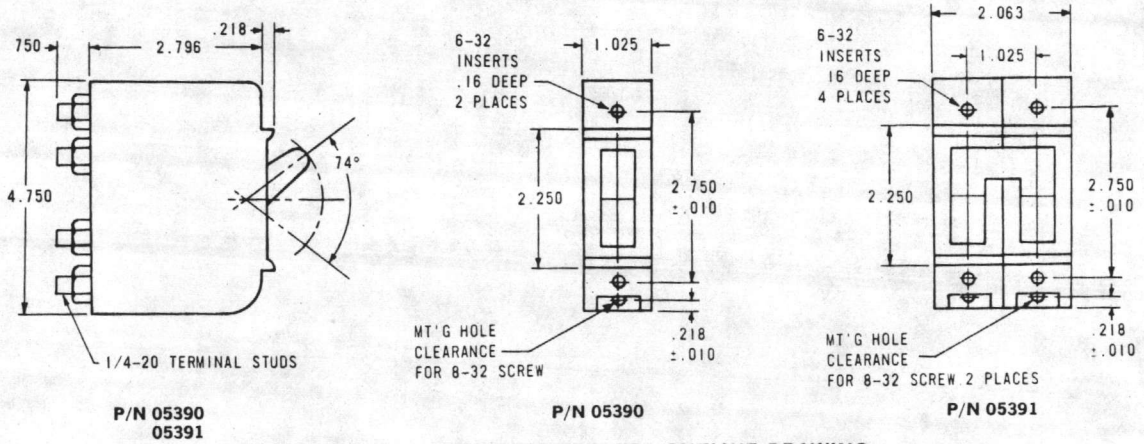


FIGURE 4 — CIRCUIT BREAKER OUTLINE DRAWING

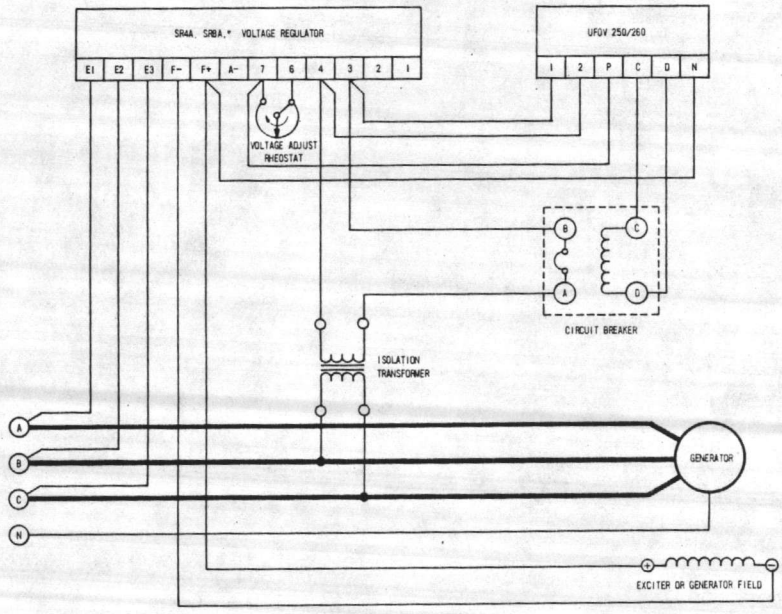


FIGURE 5 — TYPICAL INTERCONNECTION FOR UFOV AND SR4A/SR8A VOLTAGE REGULATOR

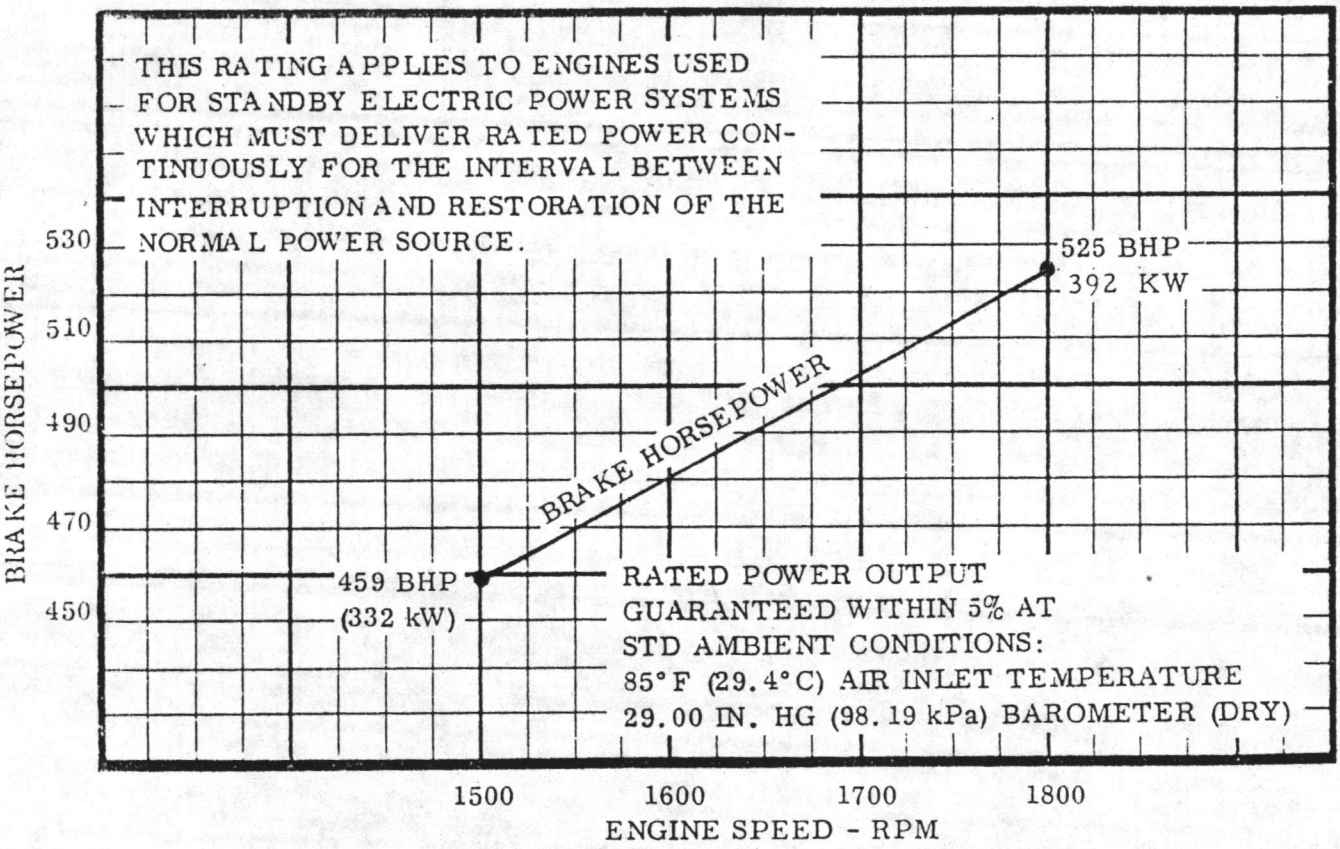
*Refer to instruction manual for proper interconnection of UFOV 250/260 with SR-F, SR-H, and SR-32A voltage regulators.

"All drawings and data subject to change without notice."

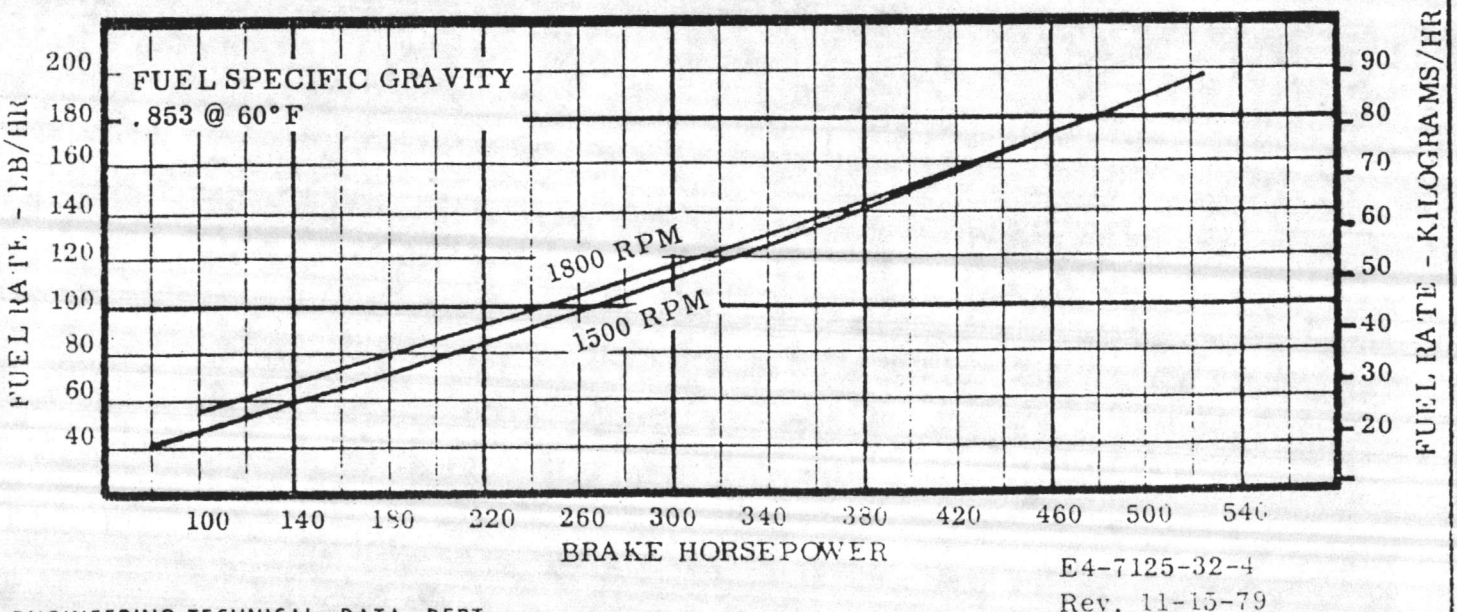
Detroit Diesel Allison
Division of General Motors Corporation

GENERATOR ENGINE PERFORMANCE

MODEL: 12V-71T
APPLICATION: STANDBY POWER
INJECTOR: ~~N80 (1.460 TIMING)~~
TURBOCHARGER: TV7101 (1.39 A/R HSG.)
RATING: WITHOUT FAN



AVERAGE FUEL CONSUMPTION



E4-7125-32-4
Rev. 11-15-79

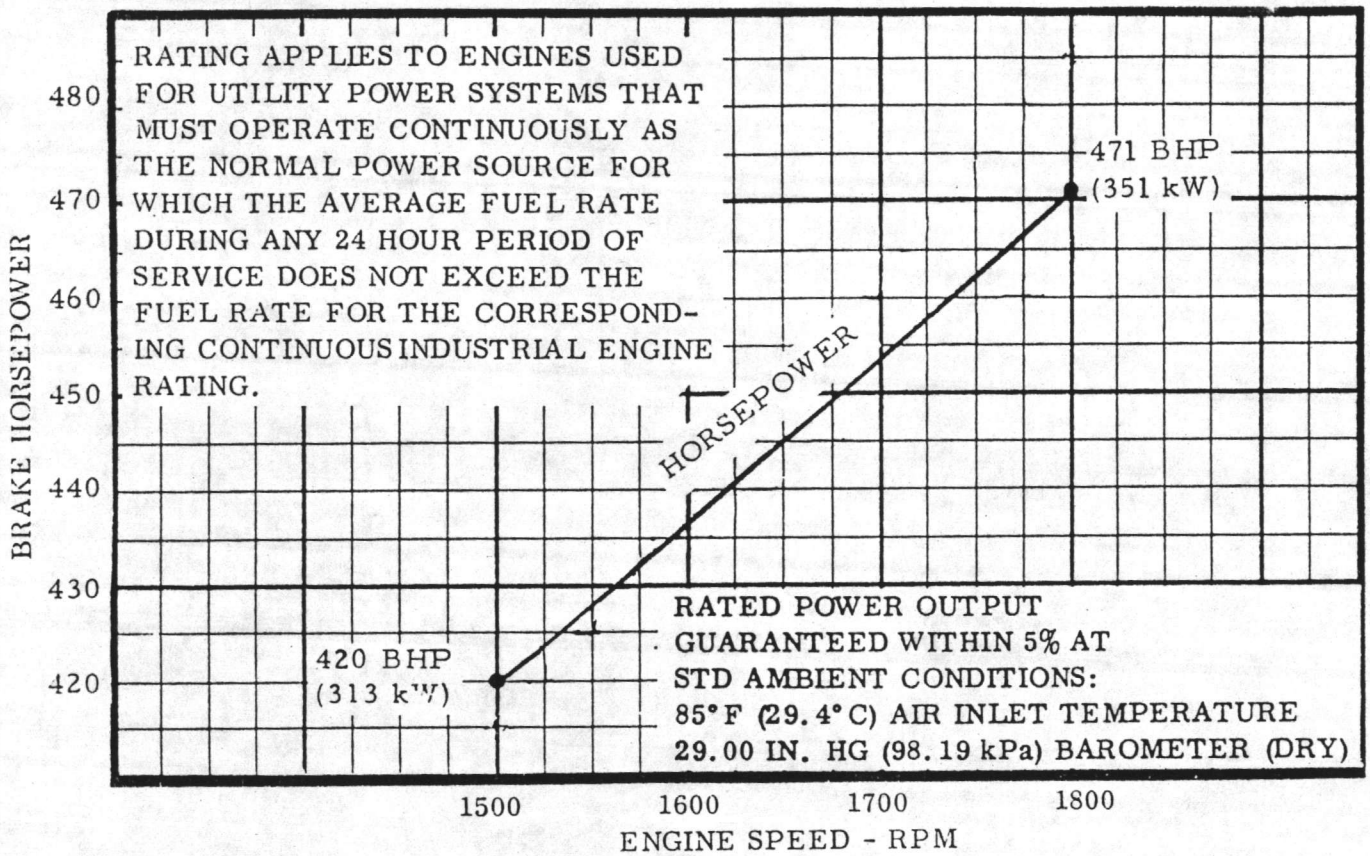
ENGINEERING-TECHNICAL DATA DEPT.

DE 4033

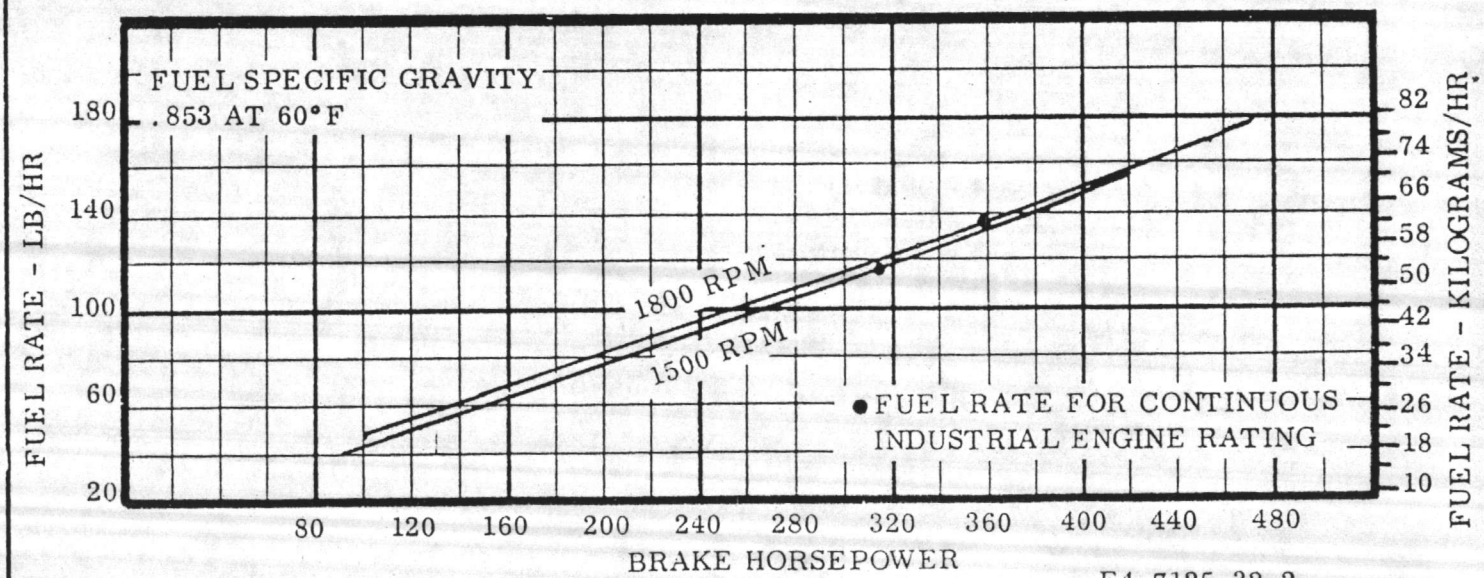
Detroit Diesel Allison
Division of General Motors Corporation

GENERATOR ENGINE PERFORMANCE

MODEL: 12V-71T
APPLICATION: Electric Prime Power
INJECTORS: N70(1.460 Timing)
TURBOCHARGER: TV7101(1.39 A/R HSG)
RATING: Without Fan



AVERAGE FUEL CONSUMPTION



E4-7125-32-2
Rev. 10-28-80

ENGINEERING-TECHNICAL DATA DEPT.

DE 4033

DETROIT DIESEL/LIMA ELECTRIC GEN-SET TORSIONAL ANALYSIS

DATE

ENGINE MODEL NUMBER	LIMA TYPE	ALTERNATOR MODEL NUMBER	KW (80°C)	HZ	PH.	FRAME	SAE NO.	FLEX DISC	TORSIONAL (TAR) NO. & DATE		REMARKS
12V-71 (7123-7005)	SER	2839 0 816	200	60	3	580	½	D.D.	499	7/8/76	
12V-71 (7123-7005)	SER	2839 0 817	250	60	3	580	½	D.D.	186	11/8/74	
12V-71T (7123-7305)	SER	2848 0 818	300	60	3	80	½	D.D.	114 307	7/5/74 7/7/75	
12V-71T (7123-7305)	SER	2848 0 819	350	60	3	80	½	D.D.	277	4/15/75	
12V-71T											
16V-71	SER	3079 0 819	350	60	3	680	1	14"	432	3/4/76	
16V-71 (7163-7305)	SER	2907 0 820	400	60	3	680	0	D.D.	127	8/27/74	
16V-71											
8V-92T (8083-7305)	SER	3128 0 815	175	60	3	580	0	D.D.	557	11/30/76	
8V-92T (8083-7305)	SER	3169 0 817	250	60	3	580	1	14"	785	2/3/78	
16V-92T (8163-7305)	SER	3155 0 821	525	60	3	680X	0	18"	879	7/20/78	
16V-92T											

DISTRIBUTION PANEL
SEE DWGS.
843-0182-3
843-0182-2
842-0184-4

0002 0003 0004 0200 0201 0202 0203 0 4 0 1 0 2 0 3 0000 0001 0024 GND

0011 0010 0009 0200 0201 0202 0203 0000 0001 0012 0013 0014 0015 GND

REMOTE MONITOR/CONTROL PANEL
SEE DWGS. 842-0184-3, 842-0184-2,
842-0184-4

NOTE: ——— = FIELD WIRING BY OTHERS

0080 0070 0104 0103 0105 0060 0050 0101 0100 0102 0040 0030 0020 0000

ENGINE/GENERATOR
CONTROL PANEL
SEE DWGS.
847-0183-3
847-0183-2
9906200
842-0184-4

GND 0024 0023 0000 0112 0111 0100 0109 0002 0004 0005 0006 GRR

→TO B- BAT. CHGR.

→TO B+ BAT. CHGR.

LOCATED IN GENERATOR 'U' BOX.
SEE DWG 840208-2

0001 0000 8 9 10 11 12 13 4 5 GND

CT6 CT5 CT4 N T3 T2 T1

0203 0202 0201 0200 0103 0102 0101

0 16 0 18 0 17 0 0104A 0103A 0105A

TRANSFER SWITCH #2

SEE OPERATIONS MANUAL
TP-5087
DWG. 841008-1-A
841008-B
295074
295078

0 16 0 18 0 17 0 0101A 0100A 0102A

TRANSFER SWITCH #1

320 330 B+ TO 001 GEN. CONTROL PAN. B- TO 000

BATTERY CHARGER

T7 T8

SEE DWG 841408-1

FUEL TANK

COVINGTON
GREENSBORO, N.C.

CHARLOTTE
NEW BERN
WILMINGTON
WILSON

NO.	REVISION	BY	DATE
1			
2			
3			
4			
5			
6			

TOLERANCES
DECIMAL ± .031
FRACTIONAL ± 1/32
ANGULAR ± 0°-5'

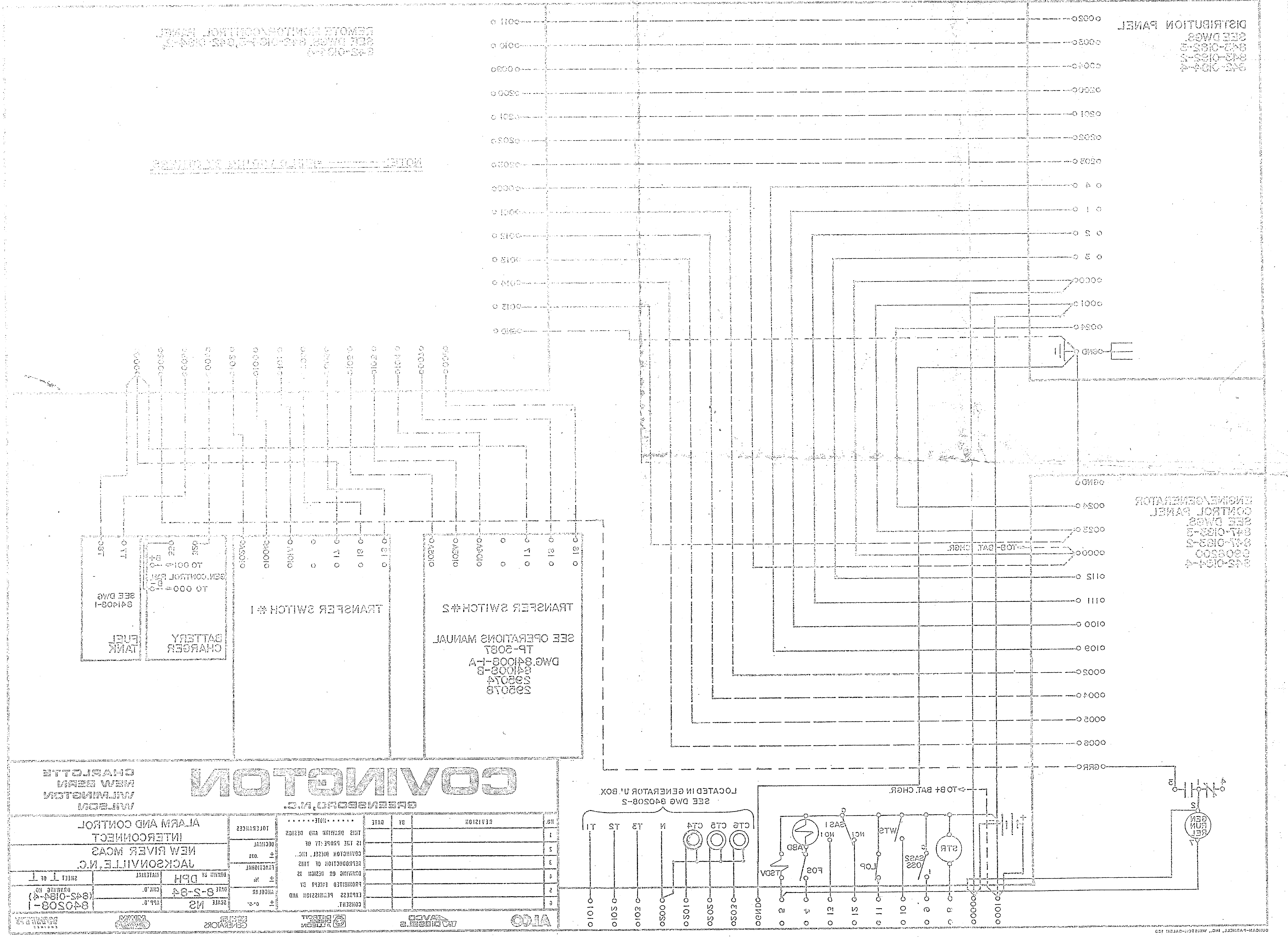
ALARM AND CONTROL INTERCONNECT
NEW RIVER MCAS
JACKSONVILLE, N.C.

DRAWN BY DPH	MATERIAL	SHEET 1 OF 1
DATE 8-2-84	CHK'D.	DRAWING NO. (842-0184-4) 840208-1
SCALE NS	APP'D.	

ALCO · AVCO DIESELS · DETROIT DIESEL ALLISON · KOHLER GENERATORS · MWM murphy · WHITE ENGINES

DUNCAN-PARNELL, INC., WINSTON-SALEM 183

Bldg AS-110



DISTRIBUTION PANEL
SEE DWGS.
REMOTE MONITOR/CONTROL PANEL
ENGINE/GENERATOR CONTROL PANEL
FUEL TANK
SEE DWG 841008-1
BATTERY CHARGER
TRANSFER SWITCH #1
TRANSFER SWITCH #2
SEE OPERATIONS MANUAL
TP-5087
LOCATED IN GENERATOR J. BOX
SEE DWG 840208-2
TO B+ BAT. CHGR.
COVINGTON
GREENSBORO, N.C.
CHARLOTTE
NEW BERN
WILMINGTON
WILSON
ALARM AND CONTROL
INTERCONNECT
NEW RIVER MCAS
JACKSONVILLE, N.C.
DPH
8-2-84
840208-1

Class 300 Equipment
MVC-300
ELECTRONIC MANUAL VOLTAGE CONTROL

FEATURES:

- Designed to operate with all Basler voltage regulators rated at 7 amperes continuous and below
- All solid state
- 120-240 Vac operation in a single unit
- Multiple field output ratings
- Automatic voltage build-up circuit
- Compact and economical
- CSA approved

DESCRIPTION:

The Electronic Manual Voltage Control MVC-300 is a solid-state device enclosed by a wrap-around metal chassis designed to be mounted through a panel with controls accessible to an operator from the front of the panel. A terminal strip located on the rear of the device facilitates its installation. A manual voltage adjust potentiometer and a voltage control mode switch are provided.

The MVC-300 is designed to operate with Basler voltage regulators powered from 120 or 240 volt nominal ac sources. The output of the MVC-300 is designed to operate with 32, 63 or 125 volt fields.

APPLICATION:

The Electronic Manual Voltage Control MVC-300 allows generator output voltage to be controlled manually or switched to the automatic voltage regulator. It is used as a back-up system to the automatic voltage regulator to provide manual voltage control in the event of voltage regulator failure. The unit can be mounted on a control panel in ground vehicles, stationary equipment or shipboard locations.

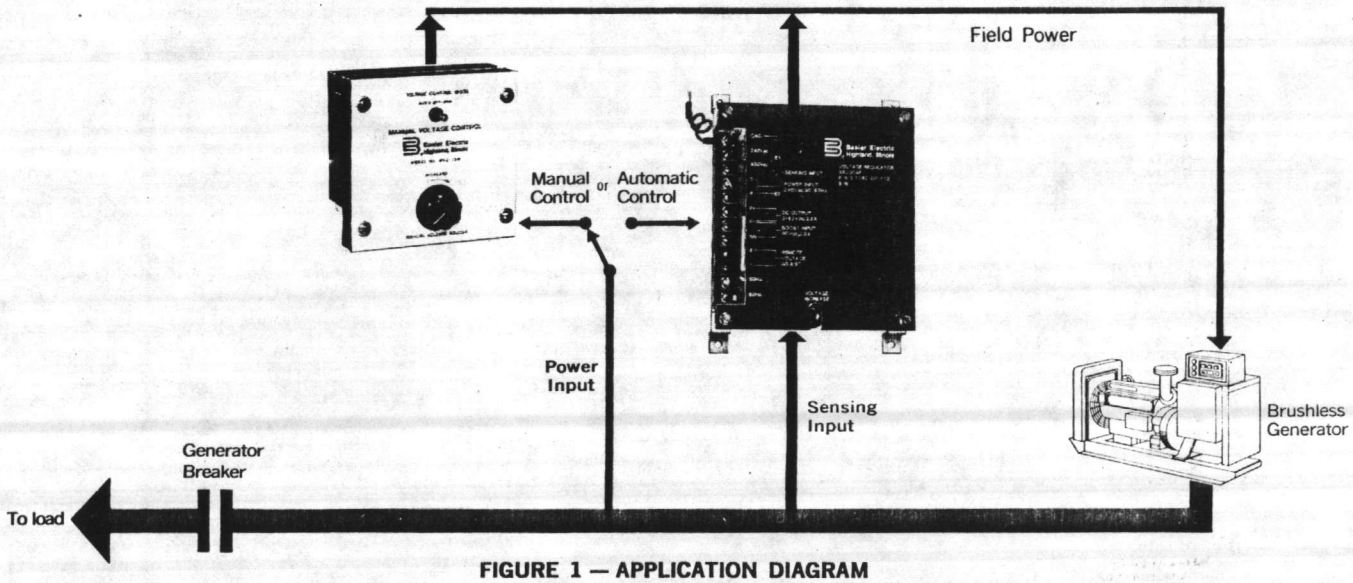


FIGURE 1 — APPLICATION DIAGRAM

Basler Electric
Highland, Illinois

SRK-1
9/82

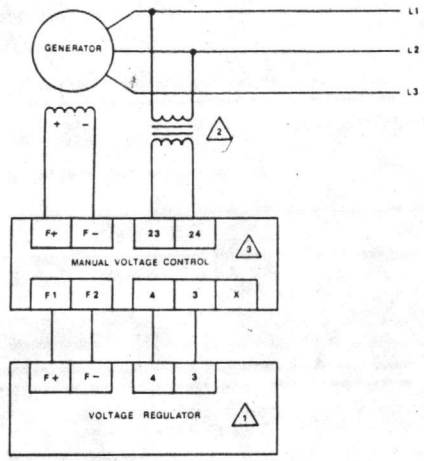
SPECIFICATIONS:

MVC-300 RATINGS

TABLE 1

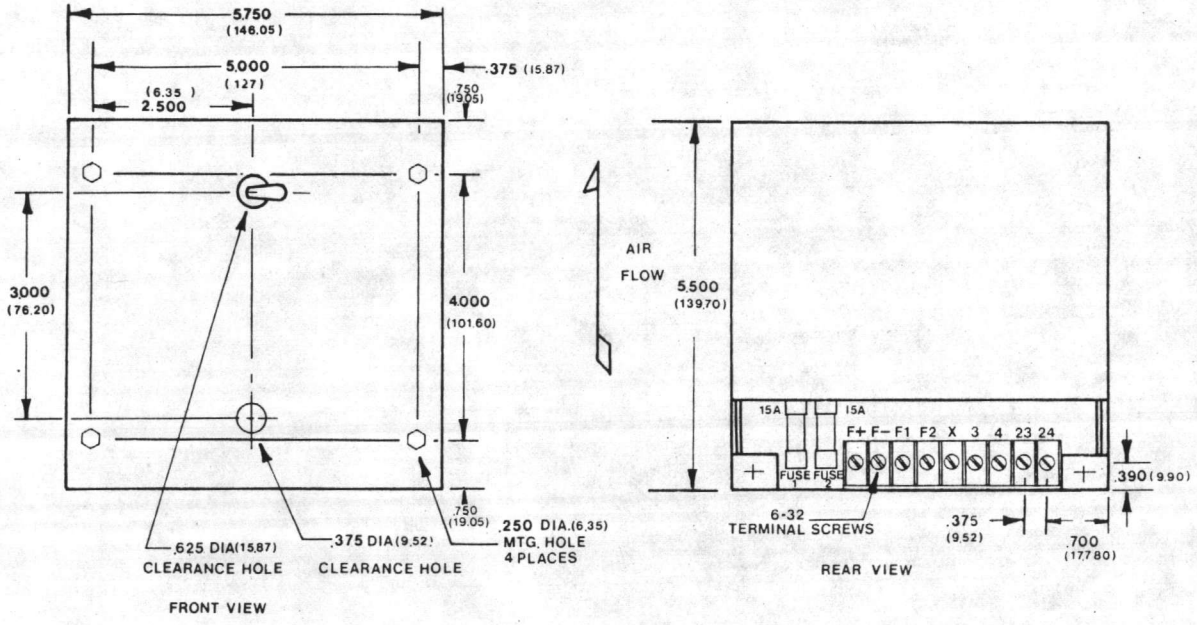
Voltage Regulator Model	Nominal Output	Apply MVC Input Voltage to MVC Terminals 23 and 24	Jumper Selection
XR2001, XR2004	63V	240 Vac	Terminal X
KR7F, KR7FF, SR8A, SR8F	125V	240 Vac	Terminal 3
SR4A, SR4F, KR4F, KR4FF	63V	120 Vac	Terminal 3
KR2F, KR2FF	32V	120 Vac	Terminal X

Watts Dissipated	30 Watts Maximum
Minimum Residual Voltage for Build-Up	6 Vac
Ambient Operating Temperature	-40°F (-40°C) to +158°F (+70°C)
Storage Temperature	-85°F (-65°C) to +212°F (+100°C)
Shock	Withstands up to 15 G's in each of three mutually perpendicular axes
Vibration	Withstands 5 to 27 Hz @ 1.3 G's; 27 to 52 Hz @ 0.036" double amplitude; 52 to 500 Hz @ 5 G's



1. Refer to Table 1
2. Input voltage to Terminals 23 and 24 must be the same as required for the voltage regulator per Table 1
3. Connection of internal jumper wire must be selected in accordance with Table 1

FIGURE 2 — TYPICAL INTERCONNECTION DIAGRAM



3 lbs. (1.360 Kg) Net
5 lbs. (2.260 Kg) Shipping

NOTE: NUMBERS IN PARENTHESES ARE IN MILLIMETERS

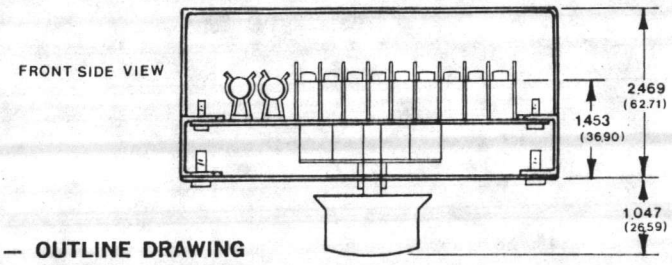


FIGURE 3 — OUTLINE DRAWING

Basler Electric
Highland, Illinois

BOX 269 HIGHLAND, ILLINOIS 62249 PHONE 618-654-2341 TWX 910-996-2522

Printed in U.S.A.

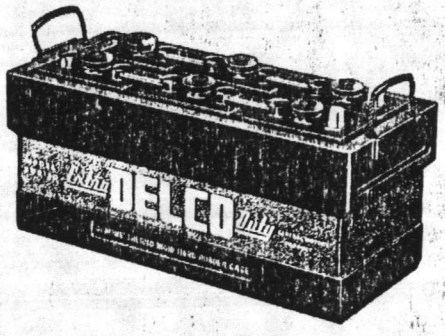
DELCO BATTERIES Designed for Diesel Cranking

Additional Delco Batteries for Commercial Applications – Designed for commercial applications where the service requirements do not demand the long-life features provided by the famous DC-250 High-Duty Series.

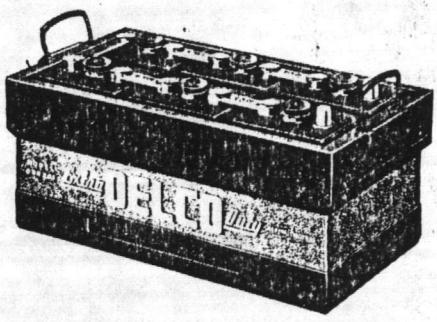
No. 713

No. 717

No. 719



No. 759



No. 761

Features

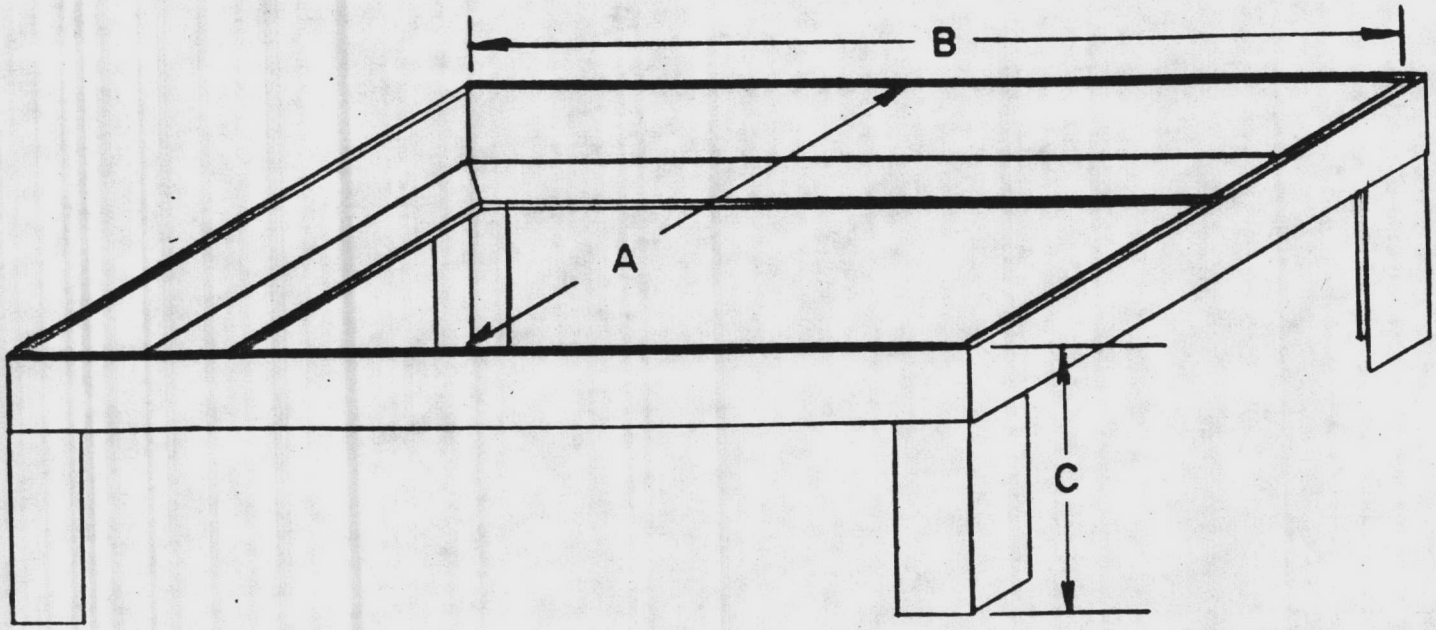
- **HIGH PERFORMANCE PLATES**
  –maximum cranking power and long life.
- **DELCOLOY GRIDS**
  –outstanding resistance to corrosion and overcharge damage.
- **POLY-LIFE SEPARATORS**–Pure Microporous Polyvinyl Chloride–best in the industry for long, reliable service.
- **THERMO-RIGID HARD RUBBER CASE**
  –heat and impact resistant.
- **FLAME ARRESTOR VENT CAPS**
  –reduce electrolyte loss, and resist breakage.
- **FLUID LEVEL INDICATION**
  –makes servicing easy.
- **PRECISION MANUFACTURING**
  –highest uniform quality.

SPECIFICATION CHART

Dry Cat. No.	DIMENSIONAL GROUP SIZE		Volts	Plates Per Cell	■ Type of Separator	Cranking Power @ 0° F	Amps for Load Test	Reserve Capacity (Minutes)	COLD CRANKING CURRENT S.A.E. SPEC. J537h		MAXIMUM DIMENSIONS (INCHES)*			APPROXIMATE WEIGHT (LBS.)		Qts. Electrolyte Req.
	B.C.I.	Delco S.A.E.							@ 0°F (In Amps.)	@ −20°F (In Amps.)	Length (Incl. Flanges)	Width	Height (Incl. Top Post)	Wet	Dry	
713	3	1M3	6	19	PL	**2250**	440	245	550	440	$11\frac{5}{8}$	$7\frac{5}{8}$	$9\frac{1}{16}$	54	40	5.2
717	4	1M4	6	21	PL	**2500**	450	270	660	530	$13\frac{1}{16}$	$7\frac{1}{16}$	$9\frac{1}{16}$	59	44	6.0
719	7D	6T3	6	27	PL	**2950**	450	430	900	650	$15\frac{15}{16}$	$7\frac{1}{16}$	$9\frac{1}{16}$	73	55	7.2
725	5D	2H5	6	27	PL	**2800**	450	340	830	650	$13\frac{9}{16}$	$7\frac{1}{16}$	$9\frac{3}{8}$	61	47	5.6
759	4D	20T4	12	19	PL	**4500**	450	285	640	450	$20\frac{7}{8}$	$8\frac{11}{16}$	$9\frac{1}{2}$	115	86	10.8
761	8D	20T8	12	27	PL	**5900**	450	430	900	650	$20\frac{7}{8}$	11	$9\frac{1}{2}$	153	117	14.0
769	4D	20T4A	12	19	PL	—	450	285	640	450	$21\frac{13}{16}$	$8\frac{3}{4}$	$9\frac{1}{2}$	118	90	10.8
771	8D	20T8A	12	27	PL	—	450	430	900	650	$21\frac{13}{16}$	11	$9\frac{1}{2}$	154	118	14.0

■ PL—POLY-LIFE—Pure Microporous Polyvinyl Chloride

*Dimensions Given to the Next Largest 1/16 Inch.



SYSTEM VOLTAGE	DIM. A	DIM. B	DIM. C	MATERIAL	PAINT
12 VOLT	11"	20"	5½"	1¼"X1¼"X3/16" L	1 COAT PRIME, 1 COAT BLK EN
24VOLT	11"	42"	5½"	1¼"X1¼"X3/16" L	SAME AS ABOVE

MILD STEEL CONSTRUCTION, WELDED
A & B DIMENSIONS ARE INSIDE DIMENSION

COVINGTON
GREENSBORO, N.C.

8D BATTERY RACK

BARA-1-1-82

JOB: NEW RIVER

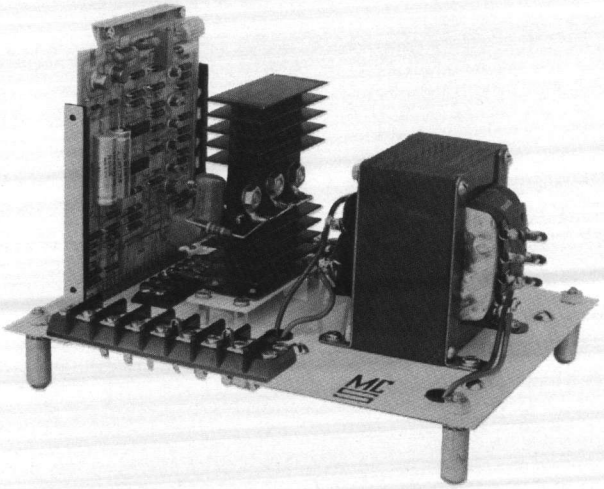
DATE: 1-30-84

MASTER CONTROL SYSTEMS, INC.

MODEL MBC7

PRECISION-AUTOMATIC FLOAT BATTERY CHARGER

This Charger has been specifically designed for unattended applications requiring a highly regulated float charger. It will carry continuous or intermittent loads up to 100% of the charger rating.



Chassis Mounted

These Chargers provide:

- **Automatic Float Operation—output is accurately regulated to meet battery demand.**
- **Current Limiting at rated capacity**
- **A.C. Line Voltage compensation**
- **D.C. Voltage regulation**
- **Two Rate, float-equalize toggle switch**
- **Completely solid state control**

FLOAT CHARGER SERVICE

A battery which is continuously connected to a bus, is said to "float" when the voltage of the charger is only slightly greater than the open-circuit voltage of the battery.

Chargers used for this type of service are termed "Float Chargers." When there is no load on the system, they supply only enough current to replace the power lost thru the internal leakage of the battery. When a load is applied to the system, a properly designed float charger will pick up this load, up to 100% of its rating. Any excess load will be supplied by the battery, but when the excess load is removed, the charger will continue to operate at a higher rate so as to recharge the battery.

Properly floated batteries provide an un-interruptable power supply for protective equipment, such as fire alarms, switch gear, etc. In the event of A.C. power failure, the battery will supply the total demand. Upon power restoration, the charger will supply the total demand with any excess, up to maximum charger rating, going toward charging the battery.

In order for a system of this type to operate at maximum efficiency, the voltage output of the charger must be very carefully controlled. The Model MBC7 Charger meets all of the above criteria.

MODEL MBC7

PRECISION-AUTOMATIC FLOAT BATTERY CHARGER

CHARGER OPERATION

The model MBC7 is a completely solid state device, utilizing SCR control for regulating the charge current.

The voltage control monitors battery voltage and compares it to a double regulated reference voltage. This results in output voltage regulation of ± 0.2% with line variations of ± 10%. Operational amplifiers are of the high gain type so that output voltage regulation is within ± 0.2% from no load to full load. A current amplifier monitors the output current and compares it to a reference voltage so as to give precise current limiting.

REMOTE SENSING

To utilize the full capabilities of the MBC7 Charger, remote sense terminals are provided so that the exact battery terminal voltage can be monitored. This eliminates charge lead voltage drop errors, increasing accuracy and reducing charge time.

CURRENT LIMITING

Overloads or even short circuits on the output of the charge will not damage the charger since it current limits at rated capacity. Charger is polarity protected so that it will not be damaged if battery polarity is accidently reversed.

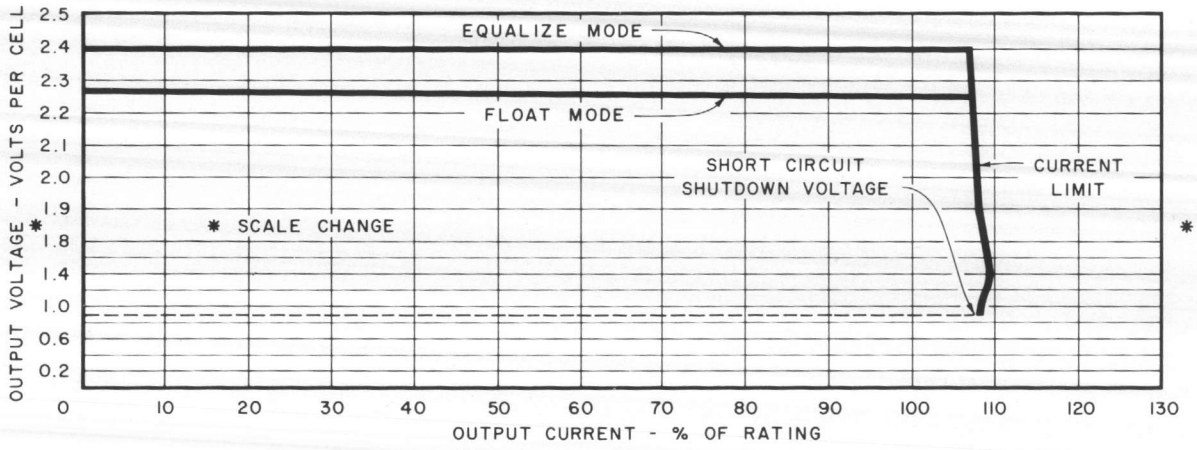
EQUALIZING FEATURE

Floated batteries have a tendency to develop differences (inequalities) in the charge level among the individual cells. This condition can be corrected by applying an "equalizing" charge at periodic intervals by raising the charger output voltage by several tenths of a volt per cell for a specified time. A manual toggle switch is provided for this purpose.

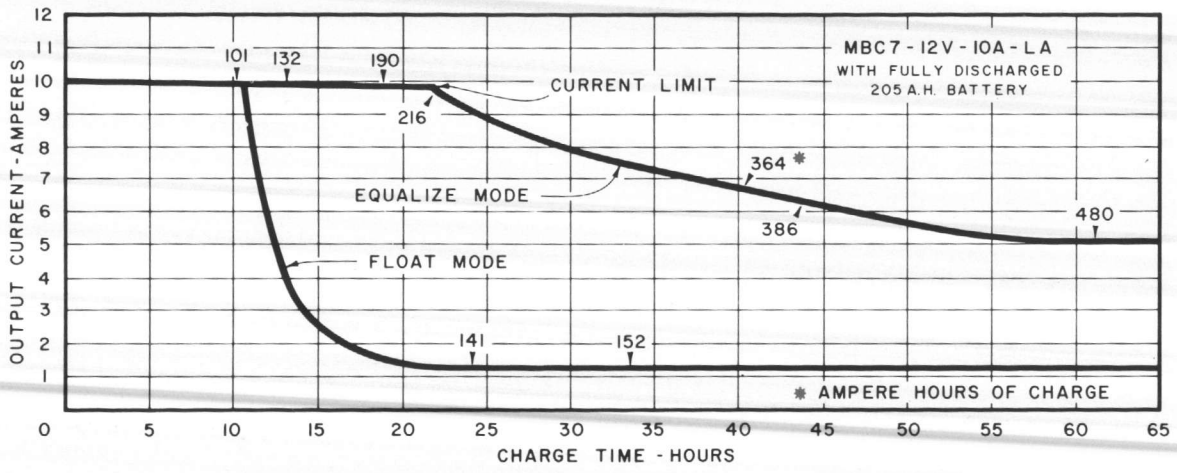
POWER FAILURE

The charger will not discharge the battery, even on extended periods of power failure.

TYPICAL REGULATION CURVE



TYPICAL CHARGE CURVE



MASTER CONTROL SYSTEMS, Inc.

MODEL MBC7

PRECISION-AUTOMATIC FLOAT BATTERY CHARGER

Construction Features:

- **Voltmeter and Ammeter are standard**
- **Both A.C. and D.C. Fuses are provided**
- **All semiconductors and integrated circuits are silicon and hermetically sealed**
- **Modular construction (Plug-in printed circuit regulator board)**
- **Remote sensing terminals are provided**
- **Float and equalize voltage levels are factory preset for the specific battery type.**
- **No transformer tap settings are required**
- **Charge output is completely isolated from A.C. power**

CHARGER PERFORMANCE SPECIFICATIONS

MODE SWITCHING: Front—Panel Toggle Switch.

INPUT LINE REQUIREMENTS: Nominal 117V. A.C. at 60 Hertz. Range of input voltage: 105-125V. A.C.

RECOMMENDED BATTERY CAPACITY: 5.0 to 23.0 Times rated current.

The following specifications apply at 117-125V. A.C. input at 25°C in either mode.

MAXIMUM OUTPUT CURRENT: Current limited at rated current ± 10%.

TEMPERATURE STABILITY: 0.088%/°C. Maximum.

OPEN CIRCUIT LEAKAGE: 50mA Maximum.

OUTPUT VOLTAGE LIMITS: Nominal Value (Factory Set)

BATTERY TYPE:	LA (1.275 S.G.)	FL (1.220 S.G.)	NC (High rate)
EQUALIZE:	2.40 V/Cell	2.29 V/Cell	1.55 V/Cell
FLOAT:	2.25 V/Cell	2.17 V/Cell	1.42 V/Cell

VOLTAGE REGULATION—LOAD: ± 0.2% Maximum—No Load to Full Load.

VOLTAGE REGULATION—LINE: ± 0.2% Maximum for 10% line change.

OUTPUT DRAIN (A.C. INPUT OFF): 10mA Maximum.

OUTPUT TERMINAL VOLTAGE FOR CHARGER SHUTDOWN (WITH SHUTDOWN OPTION): + 4.0 Volts Maximum.

MALFUNCTION ALARMS

Master Controls low voltage alarm option (LVA) provides a set of dry contacts, rated for 10 amperes @ 115V. A.C. which transfer in event of power failure, low battery voltage and loss of charger output. The low voltage sensing point is below the normal float voltage but above the normal full charged open circuit voltage. Upon loss of charge current the battery voltage will drop from float circuit to open circuit voltage causing the relay contacts to transfer. There will be some delay in sensing loss of charger output, depending on the battery load. Sensing A.C. power failure or blowing of the input fuse(s) is instantaneous. This scheme is recommended where battery loads are normally less than charger rated output. Larger loads will cause an alarm.

Master Controls alarm option CFA operates in the same manner as the LVA above except that the low voltage sensing circuit is locked out during periods of high charge currents, thus preventing false alarms under these conditions. This scheme is recommended where battery loads occasionally exceed charger rated output and are not to cause an alarm.

High voltage alarm (HVA) can also be supplied where the application necessitates its use.

Sample Specifications

The battery charger shall be a Master Control's Model MBC7 or approved equal. It shall be a completely solid state device, utilizing SCR control for regulating the charge current. The charger shall have two ranges (equalize and float). Voltage setting for both ranges shall be factory preset for the specific battery type and shall not be field adjustable. It shall maintain its rated output voltage within ± 0.2% with A.C. input variation of ± 10%. Output voltage regulation between no load and full load shall be within ± 0.2%.

The Charger shall have:

- Automatic Overload Protection (Current Limiting)
- Semiconductors and integrated circuits to be silicon and hermetically sealed
- D.C. Voltmeter and Ammeter
- Fused A.C. input and D.C. output
- Shutdown when battery is fully charged

Ordering Information:

- State Master Control's Model number
- A.C. input voltage, frequency and phase
- Number and type of battery cells
- For Nickel Cadmium specify whether high or low rate type
- Specific gravity of lead acid battery
- Ampere Hour Capacity of Battery
- Continuous D.C. load
- Allowable Recharging Time from full discharge
- Indicate application i.e. Stationary, Mobile or Marine

MODEL DESIGNATION

CHARGER						BATTERY	
MODEL NUMBER	U.L. Listed	Nominal Output D.C. Volts	Rated Output D.C. Amp.	Max. A.C. Amps. Input at 120 VAC	Approx. Weight Lbs. (KG)	No. of LA or FL Cells	Recommended Capacity Range (A.H.)
MBC7-12-5 (*)	X	12	5	1.5	24 (11)	6	25-115
MBC7-12-10 (*)	X	12	10	3	35 (16)	6	50-230
MBC7-12-20 (*)		12	20	6	36 (16)	6	100-460
MBC7-24-5 (*)	X	24	5	3	35 (16)	12	25-115
MBC7-24-10 (*)	X	24	10	6	36 (16)	12	50-230
MBC7-24-20 (*)	X	24	20	12	38 (17)	12	100-460
MBC7-30-5 (*)		30	5	4	30 (14)	15	25-115
MBC7-30-10 (*)		30	10	8	38 (17)	15	50-230
MBC7-32-5 (*)		32	5	4	30 (14)	16	25-115
MBC7-32-10 (*)		32	10	8	38 (17)	16	50-230
MBC7-36-5 (*)		36	5	5	30 (14)	18	25-115
MBC7-36-10 (*)		36	10	9	40 (18)	18	50-230
MBC7-48-2 (*)		48	2 1/2	3	26 (12)	24	12-65
MBC7-48-5 (*)		48	5	6	36 (16)	24	25-115
MBC7-48-10 (*)		48	10	12	38 (17)	24	50-230
MBC7-130-2 (*)		130	2 1/2	7	39 (18)	60	12-65
MBC7-130-5 (*)		130	5	15	46 (21)	60	25-115
MBC7-130-10(*)		130	10	30	121 (55)	60	50-230
MBC7-130-20(*)		130	20	—	186 (84)	60	100-460

(*) Add Suffix (LA) to model number when charger is for use with automotive lead acid batteries having 1.265-1.285 sp. gr.
(*) Add Suffix (FL) to model number when charger is for use with float service lead acid batteries having 1.200-1.220 sp. gr.
(*) Add Suffix (NC) to model number when charger is for Nickel Cadmium Batteries.

Most battery manufacturers recommend that the equalizing current of the charger be not less than C/20 with C representing the ampere hour capacity of the battery. As an example, a 200 ampere hour battery would require that the charger have the capability of providing an equalizing current of 10 amperes. Charger output recommendations are based on this premise.

Consult factory for acceptability of charger applications for battery size outside the recommended range.

Specifications subject to change without notice.

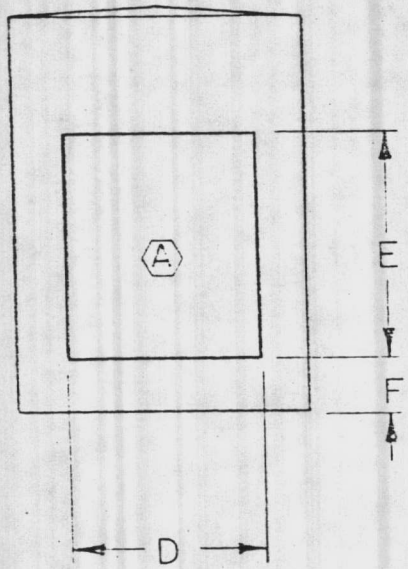
MASTER CONTROL SYSTEMS, Inc.
910 NORTH SHORE DRIVE, LAKE BLUFF, ILLINOIS 60044, U.S.A.
Telephone: Area Code 312/295-1010 Telex: 25-4636

LOUVER SELECTION	PANEL Ⓐ	Ⓑ	Ⓒ	Ⓓ
EXPANDED METAL	✓			
GRAVITY				
MOTOR OPERATED				
FIXED		✓	✓	✓
SOLID PANEL				
HINGED DOOR		✓	✓	✓

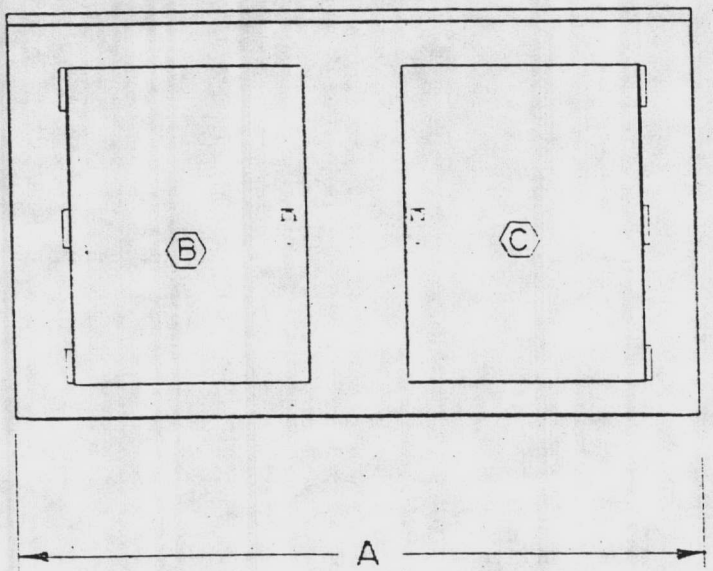
NOTES:

1) ALL MATERIAL 14 GA. [redacted]
2) PAINT: ZINC CHROMATE PRIMER - POLYURETHANE FINISH
3) WELDED CONSTRUCTION (UNITIZED)

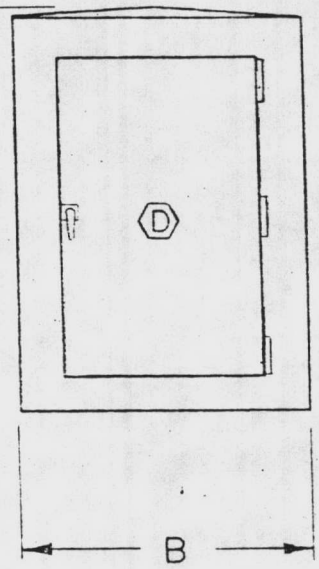
RADIATOR END



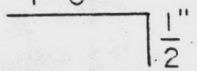
SIDE (Typical)



GENERATOR END



ROOF PITCH



DIMENSION SCHEDULE					
A	B	C	D	E	F
154	78	94	49 5/8	50	20 5/32

COVINGTON

GREENSBORO, N.C.

TYPICAL SHEET METAL ENCLOSURE

SME-3-1-82

JOB: NEW RIVER

DATE: 2-10-84

TRAMONT DAY TANK SYSTEMS feature advanced, innovative design, both electrical and mechanical to achieve high reliability.

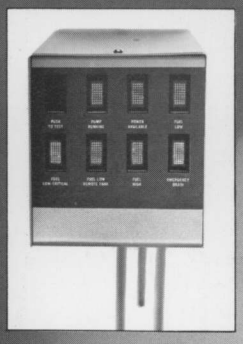
Tramont engineers designed their Day Tanks to permit a wide choice of options which can easily custom specify a Day Tank to the specific application.

At Tramont, assembly is more than putting parts together—much more! The best design is no better than the skill and care used in manufacture. After final test each unit is fully inspected before shipment.

Not only are standard Day Tanks readily available, but custom units are designed and manufactured quickly. We've got what it takes!

EXCLUSIVE ELECTRICAL CONTROL MODULE (ECM)
The ECM offers complete system flexibility. All electrical controls are provided within the NEMA/1 type enclosure. This means field modifications may be made quickly and easily.

All level controls and alarms are actuated using totally vertical switches. The most positive control system ever available—a TRAMONT design.



TRAMONT

Tramont Corporation
200 South Water Street
Milwaukee, Wisconsin 53204
Telephone: (414) 272-4601
Telex No. 26-0027

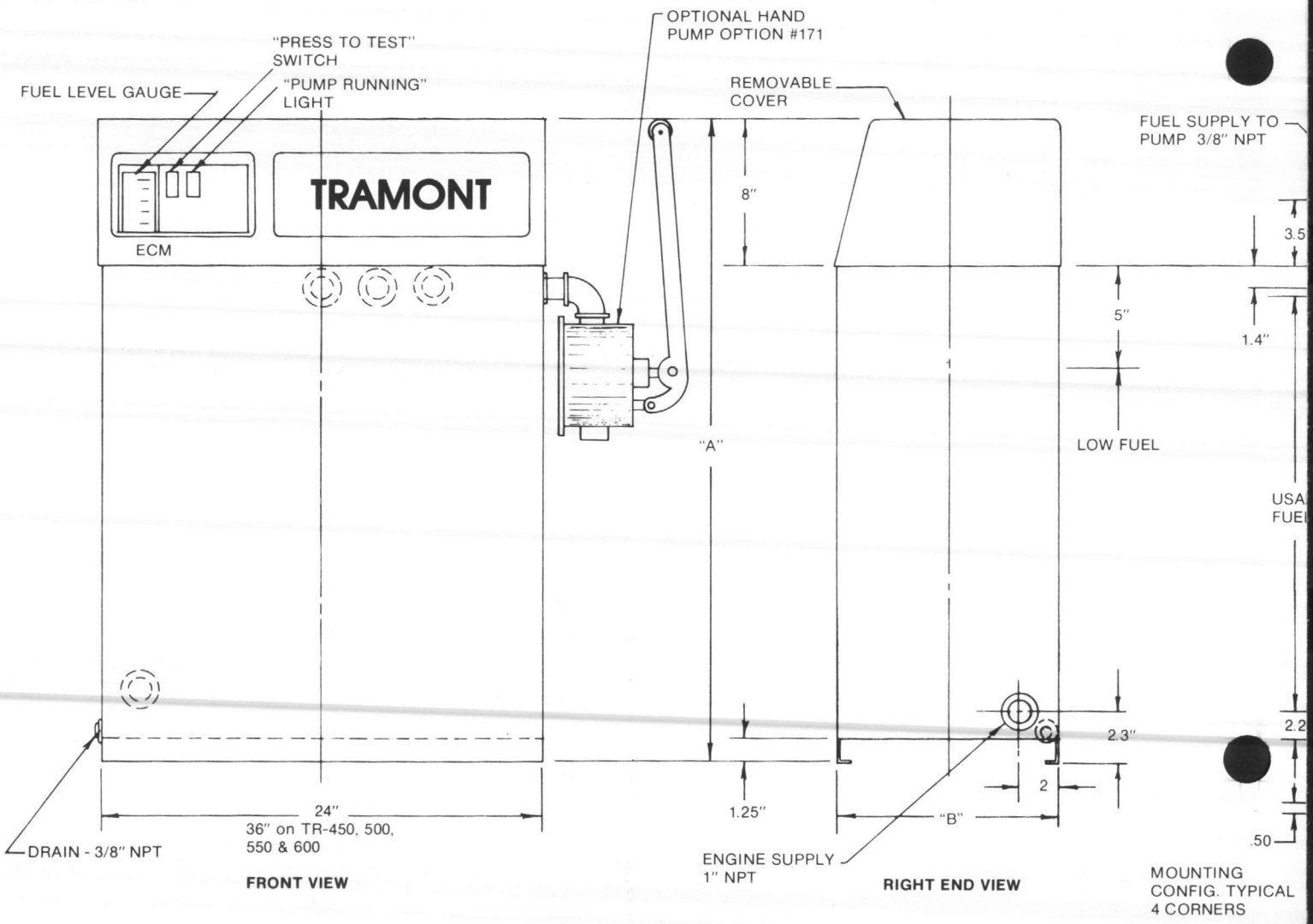
STANDARD FEATURES

Heavy gauge steel tank epoxy-coated inside, red oxide primer and finish painted outside in ASA No. 61 grey, removable top cover, fuel level gauge, 1/3 HP, 115 VAC, 1 phase, 60 Hz thermally protected motor with 2 GPM high-lift gear pump, tank drain, five 1" NPT threaded pipe connections plus fuel inlet and 4½" square inspection port. Also standard is Tramont's Electrical Control Module (ECM) containing heavy-duty float switch. Press-To-Test switch, pump running indicator light and terminal strip. All plumbing and wiring pre-connected and marked.

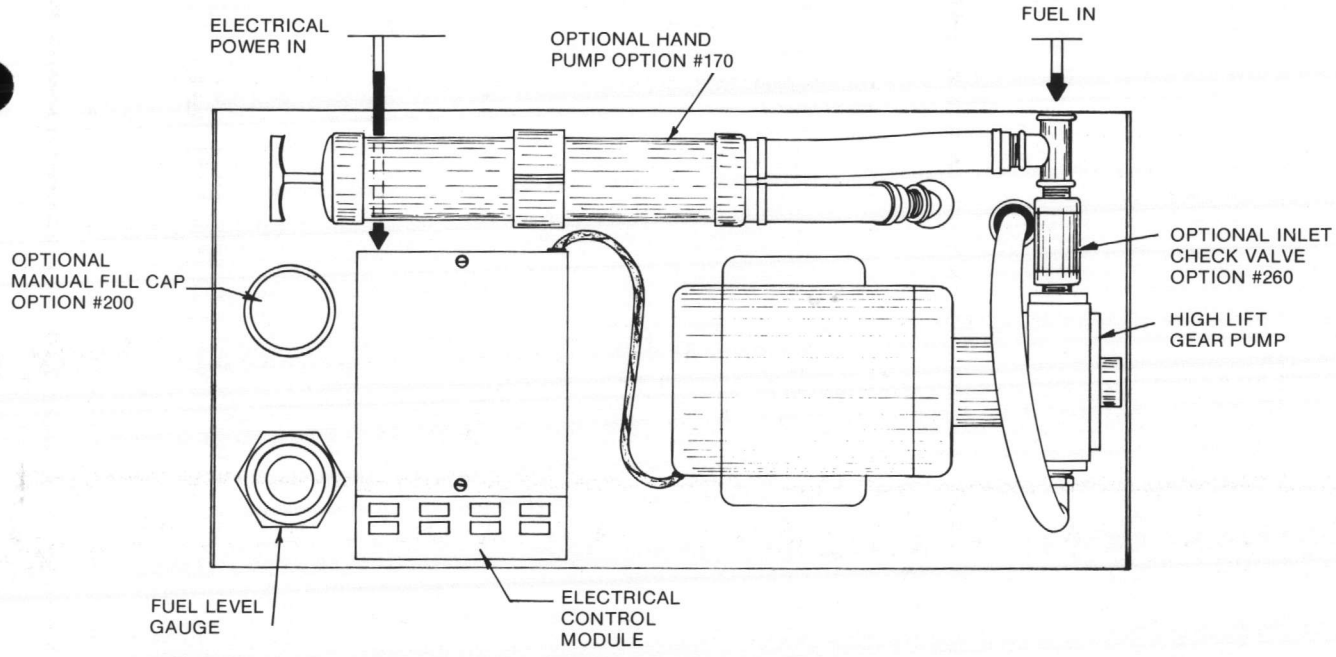
MODELS

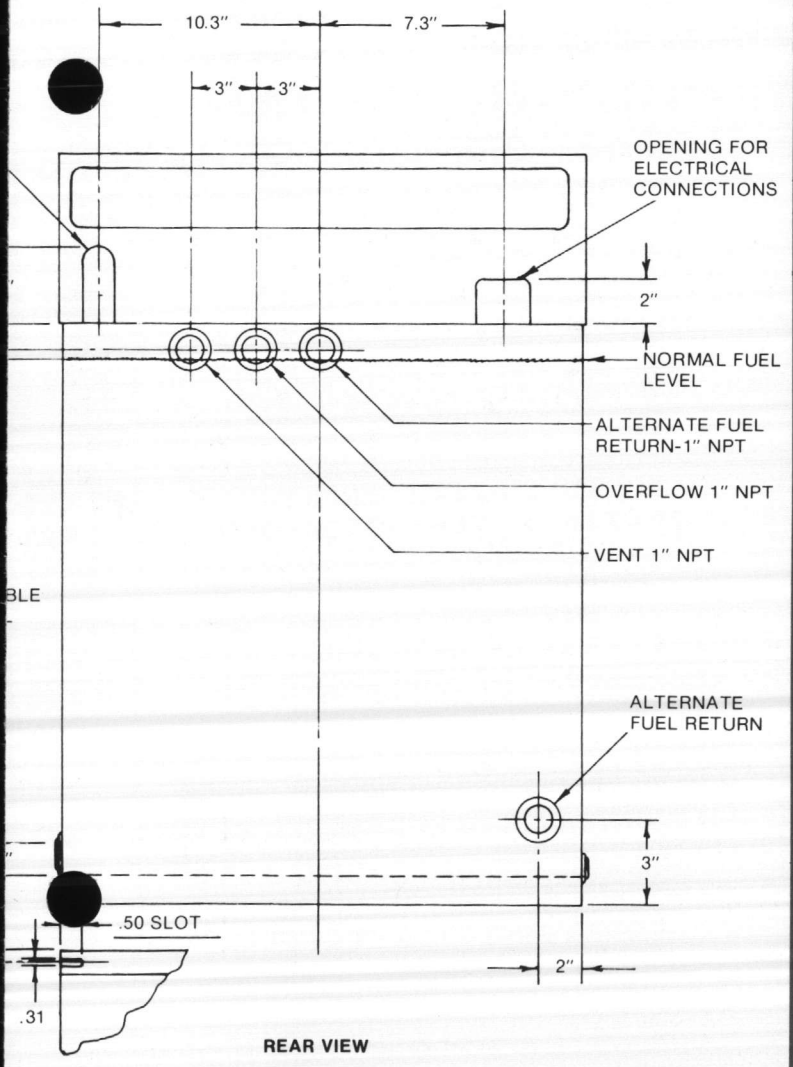
			Mat'l.	A		B		Wgt.	
Model	gal.	lit.	ga.	in.	cm.	in.	cm.	lb.	kg.
TR-10	10	38	14	20	51	12	30	70	31.7
TR-25	25	95	14	32	81	12	30	105	47.6
TR-50	50	189	12	39	99	18	46	150	68
TR-75	75	284	12	52	132	18	46	190	86
TR-100	100	379	12	52	132	24	61	230	1043
TR-150	150	568	12	52	132	36	91	260	1179
TR-200	200	757	12	52	132	40	102	275	1247
TR-275	275	1041	12	52	132	66	168	375	1564
TR-350	350	1325	12	52	132	84	213	455	2064
TR-400	400	1514	12	60	152	81	206	494	2240
TR-450	450	1703	12	60	152	61	155	503	2282
TR-500	500	1893	12	60	152	68	173	521	2363
TR-550	550	2082	10	60	152	74	188	768	3485
TR-600	600	2271	10	60	152	81	206	816	3701

GENERAL DIMENSIONS



COMPONENT LAYOUT





REAR VIEW

ACCESSORIES

PUMPS AND MOTORS

Part No. Description

100 7 GPM Pump. Requires a ½ HP motor (options 150-163) Replaces standard 3 GPM pump.

101 4 GPM Pump. Replaces standard 3 GPM pump.

110 Transformer, Step Down. 480 VAC to 115 VAC, 1 phase, 60 Hz For use with all 115 VAC motors.

120 ¼ HP, 12 VDC Motor

121 ¼ HP, 24-28 VDC motor

122 ¼ HP, 32-36 VDC Motor

123 ¼ HP, 115 VAC, single phase, 60 Hz explosion-proof Motor

130 ⅓ HP, 12 VDC Motor

131 ⅓ HP, 24-28 VDC Motor

132 ⅓ HP, 24-28 VDC explosion-proof Motor

133 ⅓ HP, 32-36 VDC Motor

134 ⅓ HP, 115 VAC, single phase, 60 Hz Motor, totally enclosed, fan cooled

135 ⅓ HP, 115 VAC, single phase, 60 Hz, explosion-proof Motor

136 ⅓ HP, 115 VAC, single phase, 50 Hz Motor

138 ⅓ HP, 230 VAC, single phase, 60 Hz Motor

139 ⅓ HP, 230 VAC, single phase, 50 Hz Motor

140 ⅓ HP, 230/460 VAC, three phase, 60 Hz Motor (see 143)

141 ⅓ HP, 230/460 VAC, three phase, 60 Hz Motor, totally enclosed, fan cooled (see 143)

143 Motor Starter and Control Transformer for option 140, 141

150 ½ HP, 12 VDC Motor

151 ½ HP, 24-28 VDC Motor

152 ½ HP, 24-28 VDC explosion-proof Motor

153 ½ HP, 32-36 VDC Motor

154 ½ HP, 115 VAC, single phase, 60 Hz Motor

PUMPS AND MOTORS (continued)

Part No. Description

155 ½ HP, 115 VAC, single phase, 60 Hz Motor, totally enclosed, fan cooled

156 ½ HP, 115 VAC, single phase, 60 Hz, explosion-proof Motor

157 ½ HP, 115 VAC, single phase, 50 Hz Motor

158 ½ HP, 230 VAC, single phase, 60 Hz Motor

159 ½ HP, 230 VAC, single phase, 50 Hz Motor

160 ½ HP, 230/460 VAC, three phase, 60 Hz Motor (see 163)

161 ½ HP, 230/460 VAC, three phase, 60 Hz Motor, totally enclosed, fan cooled (see 163)

163 Motor Starter and Contol Transformer for option 160, 161

170 Hand Pump, piston type. Top mounted 10 gallons/100 strokes. Normal rate of 50 strokes/minute = 5 gpm.

171 Hand Pump, piston type. Side mounted 20 gallons/100 strokes. Normal rate of 50 strokes/minute = 10 gpm.

172 Hand Pump/rotary type. Side mounted 10 gallons/100 revolutions. Normal rate of 100 revolutions/minute = 10 gpm.

175 Remote Pumping Unit Enclosure (NEMA/3R)
1. For Single Pump/Motor
2. For Duplex Pump/Motor

190 Second Standard Pump/Motor. 1/3 HP, 115 VAC, 1 phase, 60 Hz motor with 3 gpm pump. Includes second float switch

192 Automatic Duplex Controller System. Automatically switches each pump/motor into the lead starting position. Includes a DPDT 3 position HOA switch, second 1/3 HP, 115 VAC. 1 phase 60 Hz motor with 3 gpm pump, two check valves, second float switch and second pump running indicator light

194 Manual Duplex Controller System. Manual Switch to transfer each pump/motor into the lead starting position. Includes second 1/3 HP, 115 VAC, 1 phase, 60 Hz motor with 3 gpm pump, two check valves, second float switch and second pump running indicator light. Also includes two time running meters

MECHANICAL

Part No. Description

200 Manual Fuel Fill Cap, 2" diameter

205 Auxiliary Inspection Port. Gasketed, 4½" square

210 Wall Mounting Brackets. 10 and 25 gallon tanks

215 Pipe Stand, adapter only
1. TR 10, TR 25
2. TR 50, TR 75, TR 100

220 Fuel Filter, cartridge type (shipped loose)

225 Vent Cap. 1" NPT, for outdoor vent, screened plus sheds water

226 Vent Cap, Flame Arrestor type. 1" NPT, for outdoor vent

230 Sight Glass (plastic) with valve at lower end, includes guard

235 Extra 1" NPT Pipe Connections on tank

240 Weatherproof Cover

245 Drain, Petcock Valve. Replaces threaded plug in bottom of tank

Part No. Description

250 Drain, nominal 10 gallons per minute. Manual valve to gravity drain day tank to main tank using existing plumbing

255 Drain, Emergency, for remote actuation. Nominal 10 gallons per minute. Signaled valve gravity drains day tank to main tank using existing plumbing. Indicator light on tank illuminates and pump motor disconnects

260 Check Valve. Installed on pump intake to prevent loss of pump prime

261 High Temperature Fuel Return. One inch NPT check valve and "T" for fuel return to main tank

265 Solenoid Valve, AC Systems. Installed on pump intake to prevent loss of pump prime or tank flooding
1. Standard solenoid valve (½" NPT)
2. Solenoid valve with manual operator (½" NPT)

270 Solenoid Valve, DC Systems, specify voltage. Installed on pump intake to prevent loss of pump prime or tank flooding
1. Standard solenoid valve (½" NPT)
2. Solenoid valve with manual operator (⅜" NPT)

275 Cut Off Valve, manual, mounted on fuel inlet for gravity fed day tanks

278 Float Valve, for gravity fed day tanks. Replaces basic float switch

280 Foot Valve, to prevent loss of pump prime. 1" NPT

285 Pressure Relief Valve for any Tramont motor driven pump

290 Rupture Basin. Open top
1. TR 10
2. TR 25
3. TR 50
4. TR 75
5. TR 100
6. TR 150
7. TR 200
8. TR 275

293 Rupture Basin Float Switch. Stops day tank pump/motor. Includes single form "C" contacts for remote annunciation

298 Earthquake Day Tank Systems (factory)

ELECTRICAL

Part No. Description

300 Pilot Light, green. Indicates power available

301 Pilot Light, red. To indicate low fuel level in the remote main storage tank. Others to supply signal, specify voltage

303 "Pump Run-Off-Automatic" three position selector switch. Replaces Press-To-Test Switch. Includes option 300

311 Low Fuel Level Alarm. Separate float switch activates red light on control panel. Includes two form "C" contacts, rated 10 amps, 120 VAC, for remote annunciation (Specify Other Voltage)

313 Critical Low Fuel Alarm—engine shut down. Separate float switch activates red light on control panel, provides signal for remote annunciator. Prevents loss of engine fuel prime. Operates from engine starting battery. Specify voltage and engine type

316 High Fuel Level Alarm. Separate float switch activates red light on control panel. Includes two form "C" contacts, rated 10 amps, 120 VAC, for remote annunciation (Specify Other Voltage)

326 Explosion-proof Float Switch. Replaces basic float switch

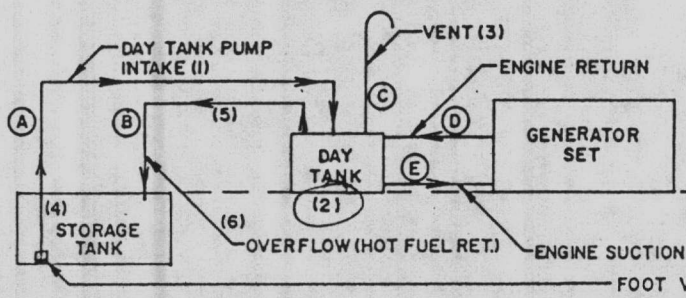
335 Circuit Breaker mounted on day tank
1. DC motors
2. Single-phase AC motors
3. Three-phase AC motors

Printed in U.S.A. TCA-81

DIESEL FUEL PLUMBING TYPICAL

NOTE: A SUBMERSIBLE PUMP TO BE USED IN LIEU OF DAY TANK PUMP

DAY TANK FUEL SYSTEM ☒



NOTES:

(1) DAYTANK SHOULD NOT BE MORE THAN 20' ABOVE FUEL LEVEL OF MAIN TANK IF LIFT EXCEEDS 10' VERTICAL OR HORIZONTAL RUN EXCEEDS 100', A CHECK VALVE MUST BE INSTALLED IN DAYTANK INLET LINE.

(2) IF FUEL LEVEL OF MAIN TANK IS HIGHER THAN DAYTANK, A SOLENOID VALVE MUST BE INSTALLED IN DAYTANK PUMP INTAKE.

(3) DAYTANK VENT LINE MUST BE A MINIMUM OF 5' HIGHER THAN ANY OTHER LINE IN THE SYSTEM. VENT SHOULD BE RUN TO THE OUTSIDE AND BE PROTECTED FROM RAIN AND FOREIGN MATERIAL.

(4) BOTTOM END OF SUCTION LINE SHOULD BE A MINIMUM OF 6" ABOVE BOTTOM OF MAIN STORAGE TANK AND FITTED WITH A FOOT VALVE.

(5) ENGINE RETURN AND SUCTION LINES MUST ALWAYS BE CONNECTED TO THE GENERATOR SET WITH FLEXIBLE LINES.

(6) WHEN REQUIRED, THE OVERFLOW LINE ALSO SERVES AS THE HOT FUEL RETURN.

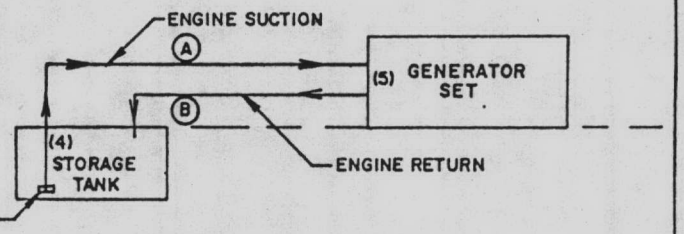
PIPE SIZE CHART

LINE DESCRIPTION	ALL CWD MODELS	CD-40 TO 315 CD-425, 500	CD-385, 565, 655	CD-765 TO 1200 CD-515
(A) PICK UP (INTAKE)	1"	1"	1"	1"
(B) OVERFLOW	1 1/2"	1 1/2"	1 1/2"	1 1/2"
(C) VENT	1"	1"	1"	1"
(D) RETURN LINE	3/8"	1/2"	3/4"	1"
(E) SUCTION LINE	3/8"	1/2"	3/4"	1"

CAUTION!!

LOCAL, STATE AND FEDERAL REGULATIONS CONTROL FUEL SYSTEM INSTALLATIONS. USE THIS DRAWING AS A GUIDE FOR MINIMAL REQUIREMENTS ONLY.

STANDARD FUEL SYSTEM ☐



NOTES:

(1) MAXIMUM LIFT OF STANDARD ENGINE FUEL PUMP:
CD MODELS — 36" @ 1500 ABOVE SEA LEVEL
CWD MODELS — 24" @ 1500' ABOVE SEA LEVEL
IF VERTICAL LIFT EXCEEDS THESE LIMITS, A HIGH LIFT PUMP OR A DAYTANK MUST BE USED.

(2) HIGH LIFT PUMP MAXIMUM LIFT:
CD MODELS — 15' @ 1500' ABOVE SEA LEVEL
CWD MODELS — 13' @ 1500' ABOVE SEA LEVEL
IF VERTICAL LIFT EXCEEDS THESE LIMITS, A DAYTANK SYSTEM IS REQUIRED.

(3) IF HORIZONTAL RUN EXCEEDS 50', A DAYTANK SYSTEM IS REQUIRED

(4) BOTTOM END OF SUCTION LINE SHOULD BE A MINIMUM OF 6" ABOVE BOTTOM OF MAIN STORAGE TANK AND FITTED WITH A FOOT VALVE.

(5) ENGINE RETURN AND SUCTION LINES MUST ALWAYS BE CONNECTED TO THE GENERATOR SET WITH FLEXIBLE LINES.

PIPE SIZE CHART

LINE DESCRIPTION	ALL CWD MODELS	CD-40 TO 315 CD-425, 500	CD-385, 565, 655	CD-765 TO 1200 CD-515
(A) SUCTION 13 TO 15' LONG	3/8"	1/2"	3/4"	1"
(B) RETURN 13 TO 15 LONG	3/8"	1/2"	3/4"	1"
(A) SUCTION 14' TO 50' LONG	1/2"	3/4"	1"	1 1/2"
(B) RETURN 14' TO 50' LONG	1/2"	3/4"	1"	1 1/2"

COVINGTON
GREENSBORO, N.C.

CHARLOTTE
NEW BERN
WILMINGTON
WILSON

NO	REVISION	BY	DATE
1			
2			
3			
4			
5			
6			

TOLERANCES
DECIMAL ± .xx
FRACTIONAL ± 1/x
ANGULAR ± 0°0'

DIESEL FUEL PLUMBING TYPICAL

PIPE SIZING CHART

DRAWN BY — PATTERN — SHEET 1 OF 1
DATE 4-29-83 — CHK'D — DRAWING NO. 832904-3
SCALE NS — APP'D

ALCO | JAVCO DIESELS | DETROIT DIESEL ALLISON | KOHLER CO-GENERATORS | MTU | WHITE

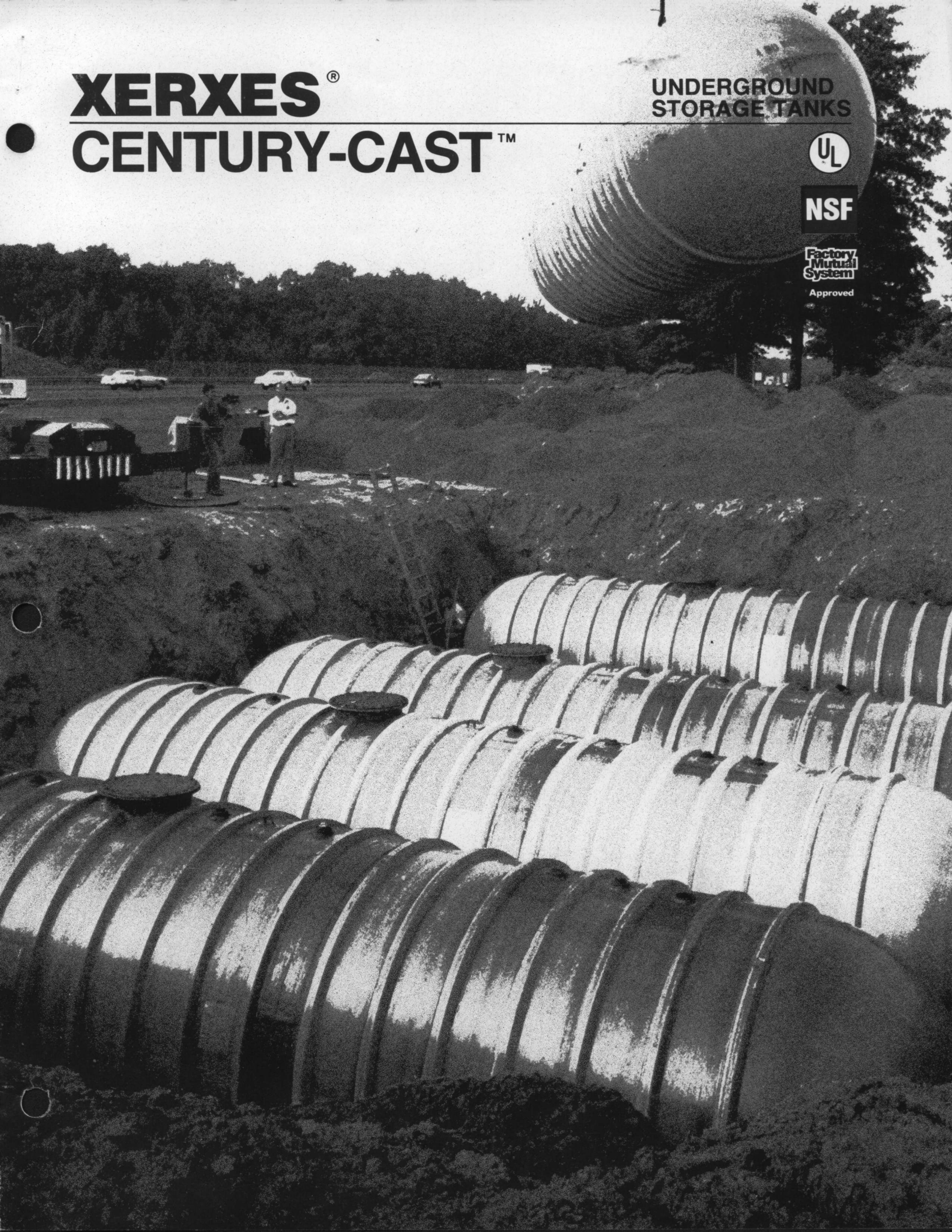
XERXES®
CENTURY-CAST™

UNDERGROUND
STORAGE TANKS

UL

NSF

Factory Mutual System
Approved



FIBERGLASS TANKS ARE LESS EXPENSIVE THAN STEEL TANKS BECAUSE THEY WON'T CORRODE

Major factors in the selection of underground storage tanks include tank durability and total cost. Don't be misled by lower initial cost of steel tanks. They can cost far more in the long run. It's much less expensive to prevent corrosion in the first place than to correct its costly consequences.

Xerxes Century-Cast fiberglass underground tanks are the answer to durable, cost effective storage of petroleum products and most corrosive and non-corrosive chemical compounds.

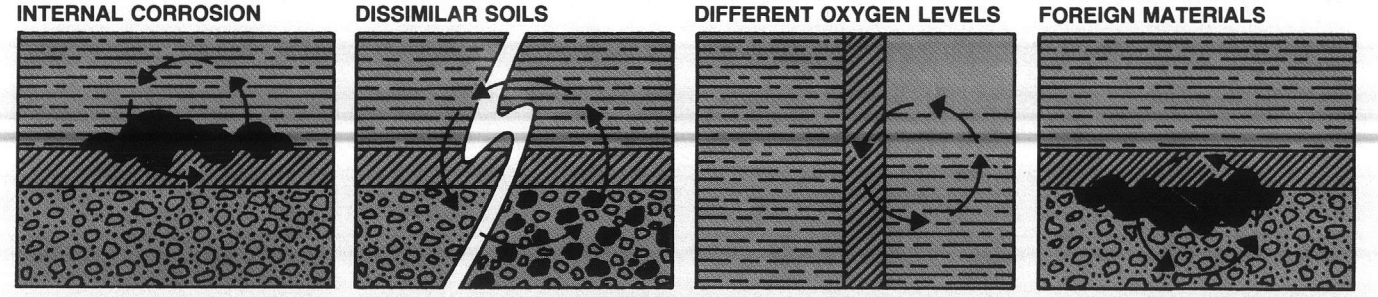
NATURAL FACTORS CAUSE STEEL TANKS TO CORRODE . . . BUT FIBERGLASS IS UNAFFECTED

Natural Factors That Cause Buried Steel Tanks To Corrode Are Difficult And Expensive To Detect Until The Damage Is Done.

INTERNAL CORROSION Even though steel tanks may have external protective coating, about ⅓ of steel tank failures are due to internal corrosion. A variety of conditions can cause internal corrosion. Some examples are: fuel detergents, humidity, bacteria, pollutants, salt, corrosive chemicals formed from sulpher and water in the fuel storage.

GALVANIC ACTION Metal particles are actually stripped from the external surface of steel tanks due to electrical currents through surrounding soil. Some conditions generating this current are: dissimilar soils, different concentrations of oxygen around the buried tank, or even a new steel tank installed next to an old one.

OTHER NATURAL FACTORS Corrosion of steel tanks can occur because of very acidic or alkaline soils, water collection due to poor drainage, or road salts that attack tank walls.



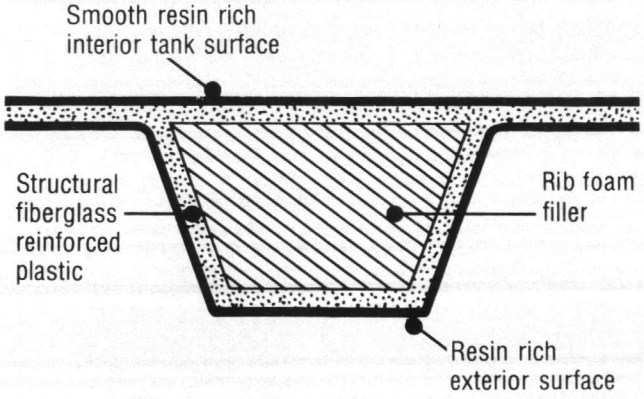
XERXES CENTURY-CAST FIBERGLASS UNDERGROUND STORAGE TANKS — DESIGNED AND MANUFACTURED FOR DURABILITY

Selection of the right tank is critical when you are faced with potentially high costs due to corroding tanks. The superior corrosion resistance of structural fiberglass reinforced plastic is a major reason you can rely on the durability of Xerxes Century-Cast fiberglass tanks. Of equal importance are the Xerxes Century-Cast tank design and manufacturing process.

Design

We have been designing corrosion resistant, durable underground tanks for almost a decade for storage of petroleum products and most corrosive and non-corrosive chemical compounds.

Xerxes Century-Cast standard fiberglass tanks are designed to provide a superior corrosion barrier for both internal and external tank surfaces. The tank fabrication process insures effective and durable laminate structure. Tank reinforcing ribs are designed to be integral to the tank body for greater structural rigidity. Tanks are manufactured in two sections with only an extra reinforced single bond to assure maximum strength and reliability.



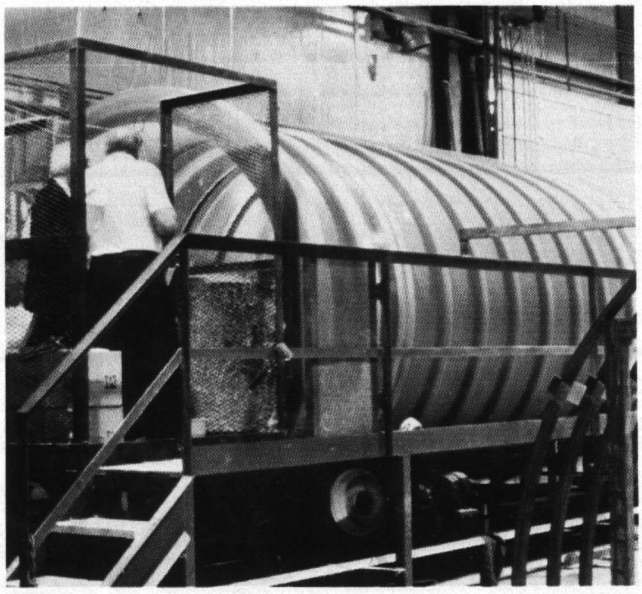
Manufacturing

The manufacturing process underscores our commitment to quality. Each stage of the tank fabrication is accomplished in accordance with our carefully engineered manufacturing procedures and monitored using digital resin flow meters.

The resin rich exterior tank wall corrosion barrier is applied to the inside of a constantly rotating contact mold as the first step of the continuous manufacturing process. Next, the structural fiberglass reinforced plastic is added, molding the reinforcing ribs intergally into the tank body. The final resin rich interior corrosion barrier is applied to assure a smooth interior surface. The tank wall is formed as a non layered laminate assuring maximum interior and exterior corrosion protection and structural strength.

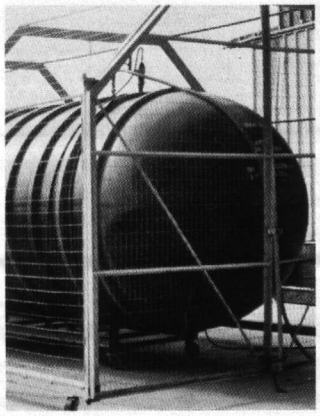
Piping connections and lifting lugs are carefully fabricated into the tank to make them an integral part of the tank body. Tank section bonding (centered between the ribs) is a precise process carried out to achieve a unitized tank body.

TANK BEING FABRICATED INSIDE OF ROTATING MOLD



Quality and reliability are the primary considerations throughout the various stages of the manufacturing process. Tank walls are monitored for designed thickness by sonic testing. Hardness testing indicates tank wall resistance to damage.

VACUUM TESTING IN PROTECTION CAGE



SONIC TESTING FOR WALL THICKNESS

Final testing for structural integrity and internal load is carried out prior to acceptance of each tank. Standard tanks are tested to 11.5 inches of mercury and 5 psi internal air pressure.

FIBERGLASS TANKS ARE MAINTENANCE FREE

Xerxes Century-Cast fiberglass tanks do not lose their corrosion resistance while buried in the ground. Steel tanks, on the other hand, require sacrificial anodes to divert the effects of galvanic action. When sacrificial anodes have spent their life, they must be removed and replaced or the tank will corrode and fail. Costs can be high to remove overbearing and concrete pads.

Since fiberglass tanks do not corrode, they can be placed in the ground permanently without ongoing maintenance worries. With steel tanks, there must be a monitoring test station at the surface to determine whether the sacrifical anode is working.

Xerxes Century-Cast fiberglass underground storage tanks have a hard resin rich corrosion exterior barrier. No additional protective coating is required. Steel tanks, however require protective coatings to survive an extended period of time. These coatings can be scarred or chipped when steel tanks are transported or when they are put into the ground, allowing corrosion to occur at an accelerated rate.

Approximately 1/3 of steel tank failures result from inside corrosion because most steel tanks are uncoated on the inside. Fiberglass tanks have a resin rich barrier on both inside and outside to prevent such corrosion.

Tank Availability

Xerxes Century-Cast fiberglass storage tanks are available in standard capacities from 550 to 50,000 gallons.

Our five plants are located in major regional sections of the United States —

Anaheim, California;

Bartow, Florida;

North Ridgeville, Ohio;

Penns Grove, New Jersey;

Seguin, Texas.

We can significantly reduce your transportation costs and shorten delivery time by delivering your tanks from our plant nearest your installation site.

XERXES CENTURY-CAST FIBERGLASS TANKS IN SERVICE

Durability and total cost effectiveness are the reasons why so many Xerxes Century-Cast fiberglass underground storage tanks are being installed each year.

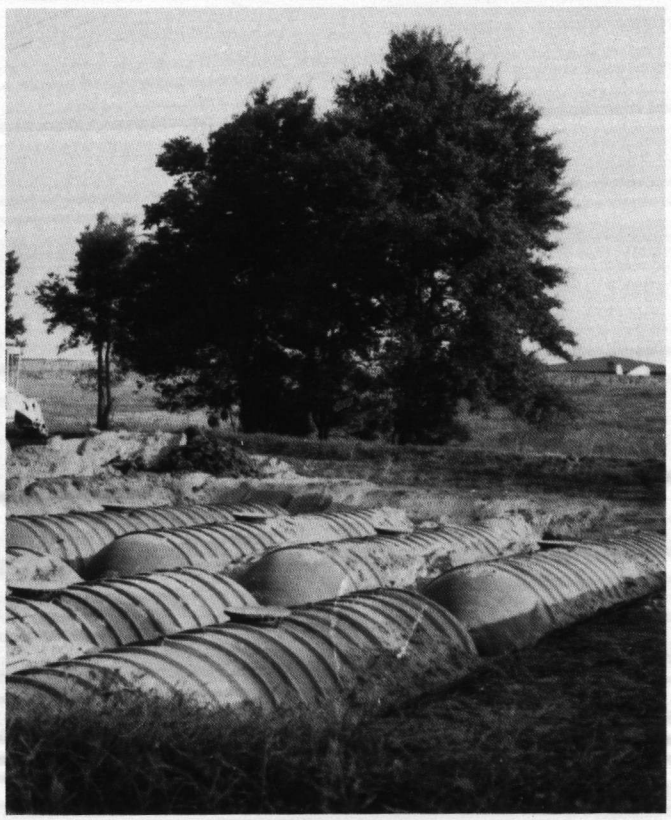
Whether soil conditions create an extreme corrosion risk or only a moderate risk, it makes sense to be sure by specifying Xerxes Century-Cast fiberglass tanks.

An extreme risk environment was encountered in Miami, Florida at a truck rental facility. A brackish water condition exists twelve to twenty four inches below ground surface. In this installation, seven Xerxes Century-Cast fuel storage tanks ranging from 1,000 to 6,000 gallon capacities were floated into position, then partially filled with water to sink them into place. The tanks were then secured by straps and clamped cables to concrete deadmen.

Not all soil conditions are that severe. Many times a decision to purchase Xerxes Century-Cast fiberglass tanks is based mainly on total cost effectiveness. The Ohio Turnpike Authority purchased 112 tanks on bid as part of their long range program to replace aging steel tanks before corrosion problems created higher maintenance costs and interruptions in service.

EXTREME RISK ENVIRONMENT/BRACKISH WATER

FIBERGLASS TANKS REPLACE CORRODED STEEL TANKS



CENTURY-CAST UNDERGROUND STORAGE TANKS . . .
STANDARD TANK DATA

CAPACITY (GALLONS)		Standard NPT Fittings					No. of Straps Optional
Nominal	Actual	Quantity	Fitting Location	Nominal Wt (lbs)	Tank Diameter	Tank Length	
20,000	20,022	2-6" Fittings 2-4" Fittings	3,11 4,10,15,16	4,600	10' 4"	37' 8-3/4"	6
15,000	15,226	2-6" Fittings 4-4" Fittings	3,8 4,6,7,11	3,700	10' 4"	29' 5-3/4"	4
12,000	12,090	6-4" Fittings	2,3,4,7,8,9	3,300	10' 4"	24' 1/4"	4
12,000	11,681	6-4" Fittings	2,4,10,11,17,19	3,000	8'	37' 1/2"	4
10,000	10,590	6-4" Fittings	2,3,4,5,6,7	2,900	10' 4"	21' 5-1/4"	4
10,000	9,816	6-4" Fittings	2,4,8,9,14,15	2,500	8'	31' 6-1/2"	4
8,000	7,950	6-4" Fittings	2,4,6,7,10,11	2,000	8'	26' 1/2"	4
6,000	6,085	6-4" Fittings	2,3,4,5,6,7	1,500	8'	20' 6-1/2"	2
6,000	5,712	6-4" Fittings	2,4,6,9,12,13	2,300	6'3-1/2"	29' 5"	4
4,000	4,219	4-4" Fittings	1,2,3,4	1,200	8'	15' 1/2"	2
4,000	4,150	6-4" Fittings	1,3,5,6,9,10	1,700	6'3-1/2"	21' 11-1/8"	2
2,000	2,184	4-4" Fittings	SEE DIAGRAM	850	8'	9' 1/2"	2
2,000	2,200	4-4" Fittings	1,2,3,4	1,000	6'3-1/2"	12' 0"	2
1,000	1,055	4-4" Fittings	Within 6" Radius From Center of Mounting Plate	320	Spherical	6' 6"	3 cl
1,000	1,010	4-4" Fittings	1,2,3,4	400	4' 4"	11' 3-7/8"	2
550	550	4-4" Fittings	1,2,3,4	265	4' 4"	6' 5-5/8"	2

NOTES - STANDARD TANKS

1. Gauge plate (12"x12" 12 gauge) - Two plates are furnished on 6,000 through 20,000 gallon tanks. One plate on 550 through 4,000 gallon tanks. Locations are indicated.
2. Standard fittings are 4" NPT on 8' dia. tanks. 10' dia. tanks have four-4" NPT fittings and two-6" NPT fittings.
3. Hold down straps, if required, must be located over ribs indicated by manufacturer ▶◀.
4. Spherical tank has optional hold down clips as shown. Straps are not available.

MADE TO ORDER TANKS

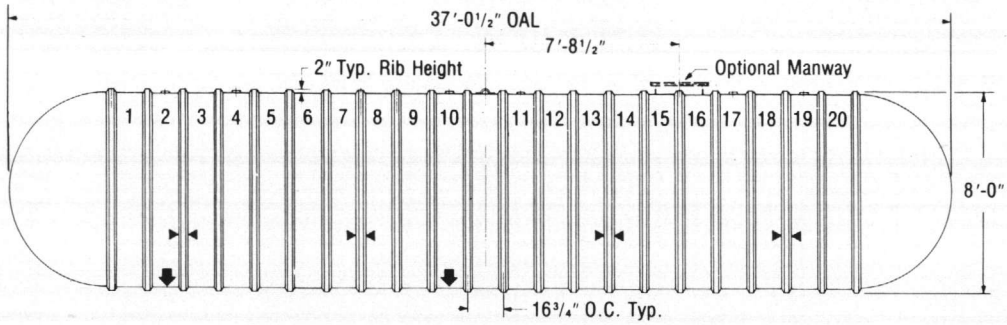
CAPACITY NOMINAL	(GALLONS) ACTUAL	NOMINAL WT (LBS)	TANK DIAMETER	TANK LENGTH	REQUIRED NO. OF STRAPS
25,000	25,970	10,800	12' 5-1/2"	32' 3-3/4"	8
30,000	30,623	12,100	12' 5-1/2"	37' 9-3/4"	10
35,000	34,994	13,400	12' 5-1/2"	42' 11-3/4"	12
40,000	40,846	15,200	12' 5-1/2"	49' 10-3/4"	12
48,000	48,390	17,100	12' 5-1/2"	58' 9-3/4"	16
50,000	50,082	17,800	12' 5-1/2"	60' 9-3/4"	16

12' Diameter made to order tanks

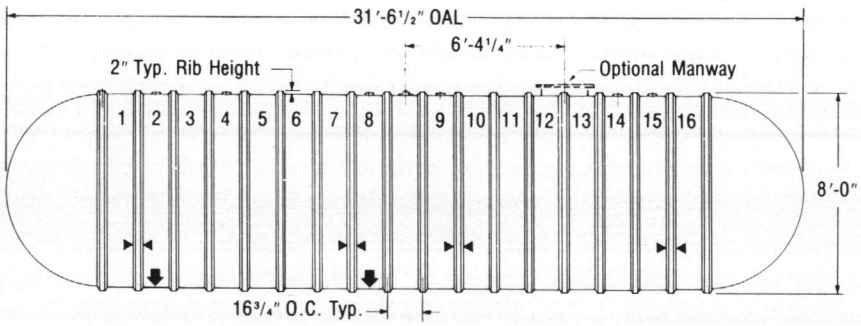
1. All 12' diameter tanks must have manways and FRP holddown straps.
2. Fittings, gauge/deflector plates and other accessories must be specified.
3. Fittings not allowed on sections denoted with a ■.

. . . . TECHNICAL DATA AND SPECIFICATIONS
8′ DIAMETER TANKS

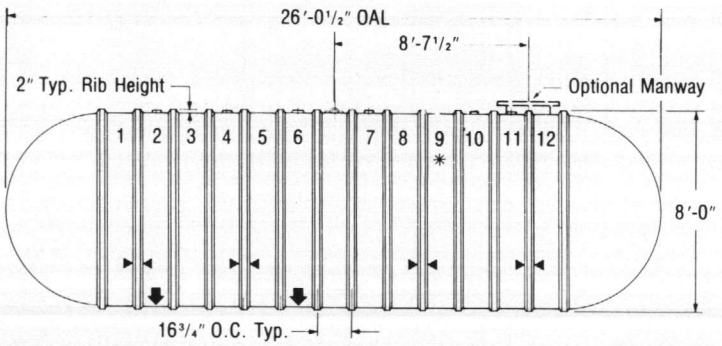
12,000 GALLONS



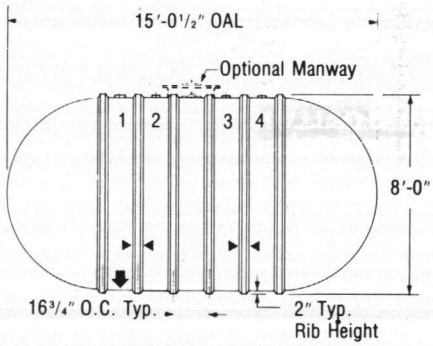
10,000 GALLONS



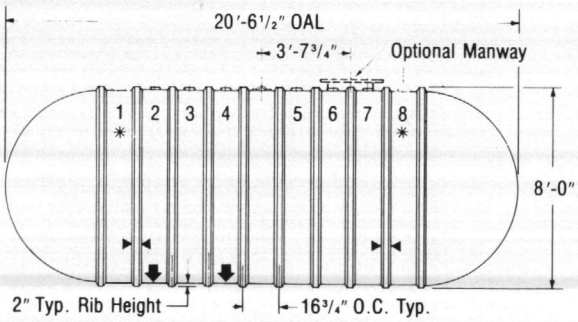
8,000 GALLONS



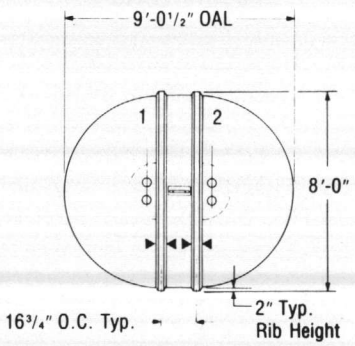
4,000 GALLONS



6,000 GALLONS



2,000 GALLONS



SYMBOL IDENTIFICATION:

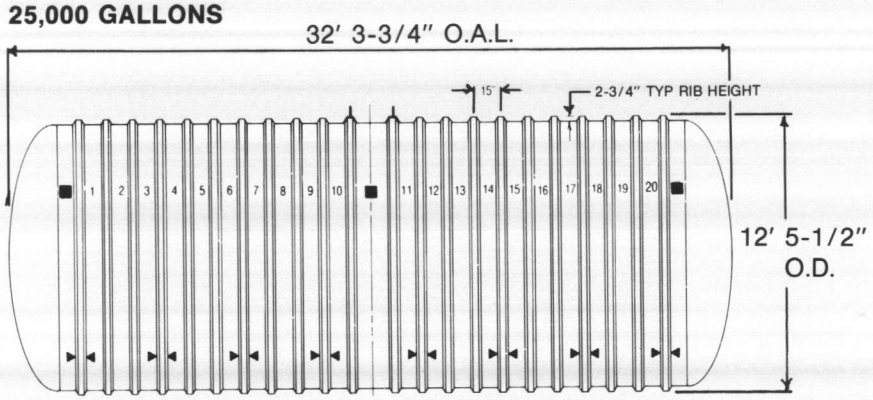
⬇ Location of 12″ Sq. x 12 Ga. plate

▶|◀ Location of holdown straps on ribs

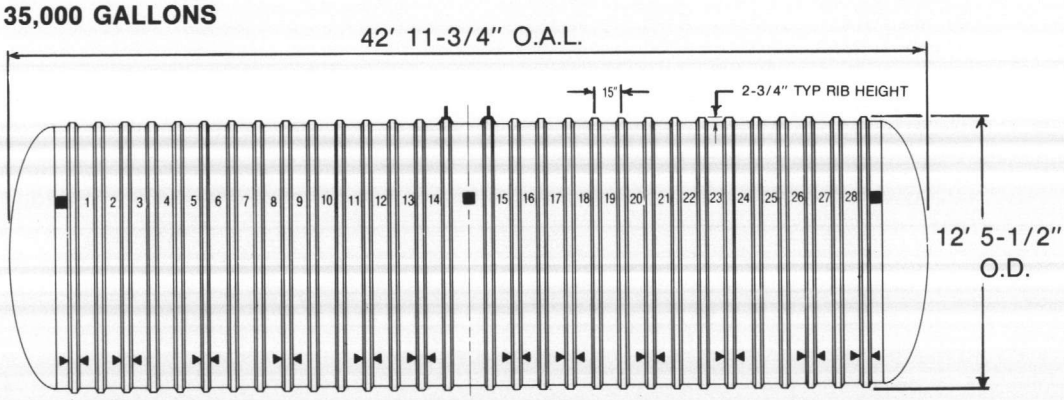
*Alternate fitting location when using optional manway.

CENTURY CAST UNDERGROUND STORAGE TANKS . . . .

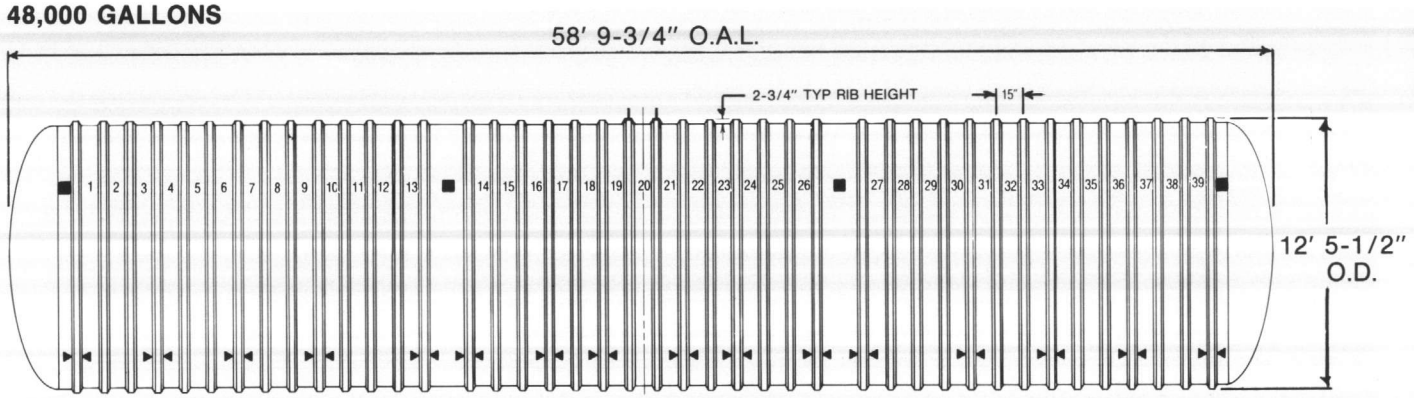
25,000 GALLONS



35,000 GALLONS



48,000 GALLONS



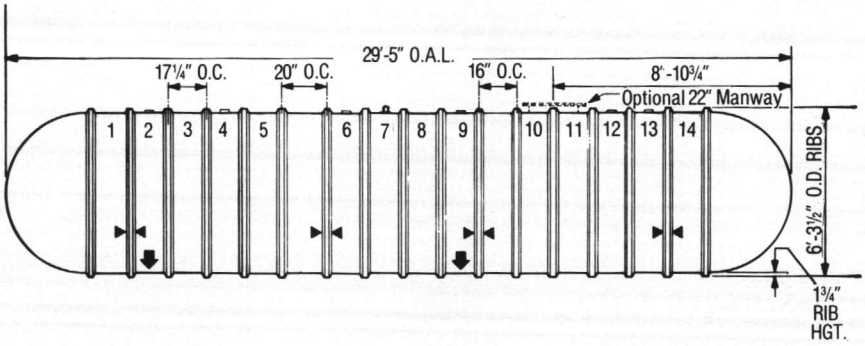
SYMBOL IDENTIFICATION:

▸|||◂ Location of holdown straps on ribs

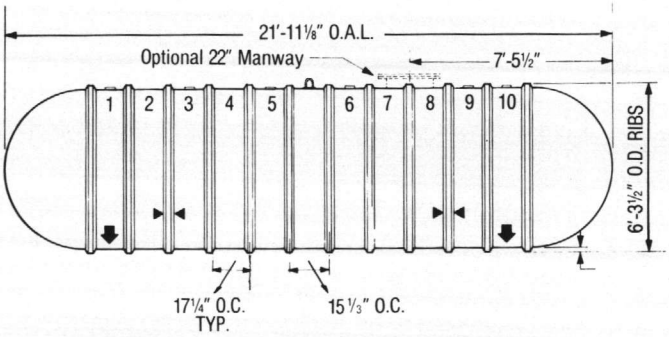
Fittings cannot be installed on locations marked ■ .

. . . . TECHNICAL DATA AND SPECIFICATIONS
6′ AND 4′ DIAMETER TANKS

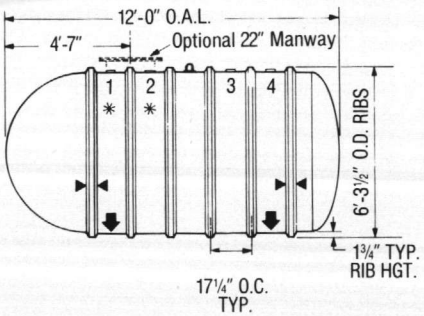
6,000 GALLONS



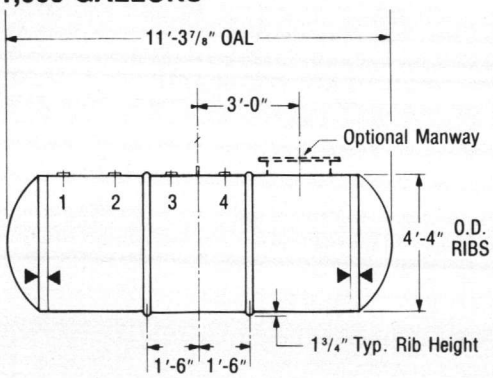
4,000 GALLONS



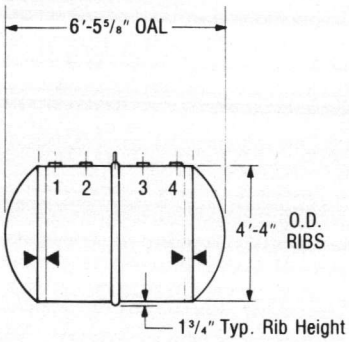
2,000 GALLONS



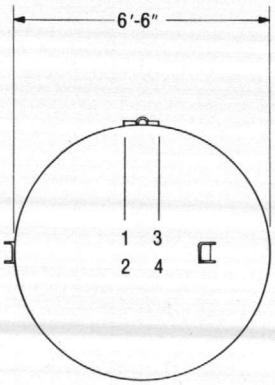
1,000 GALLONS



550 GALLONS



1,000 GALLONS SPHERICAL TANK



SYMBOL IDENTIFICATION:

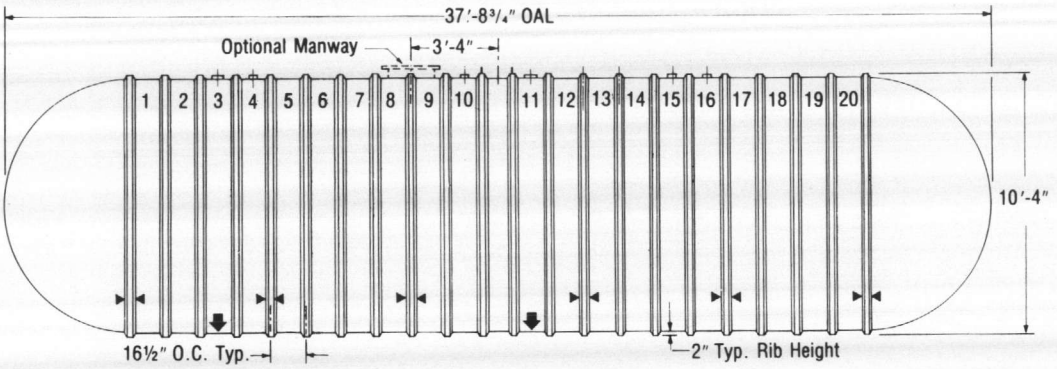
⬇ Location of 12″ Sq. x 12 Ga. plate

▶|◀ Location of holdown straps on ribs

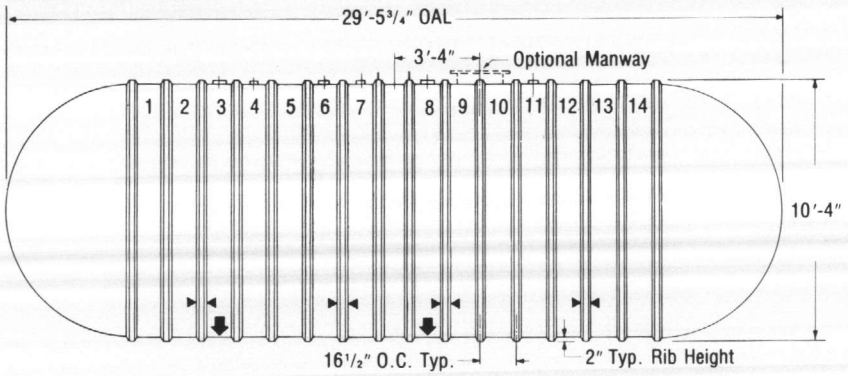
*Fitting location when using optional manway

. . . TECHNICAL DATA AND SPECIFICATIONS
10' DIAMETER TANKS

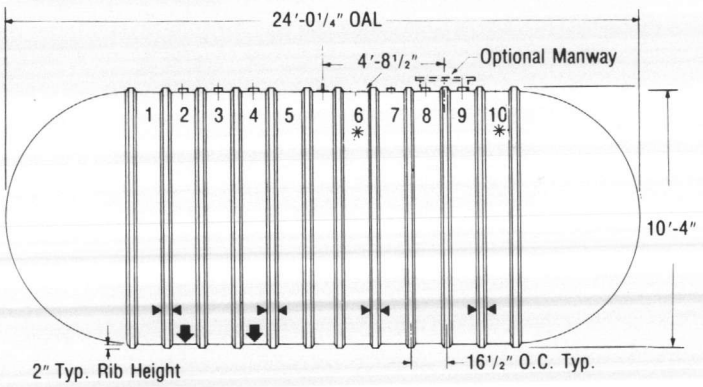
20,000 GALLONS



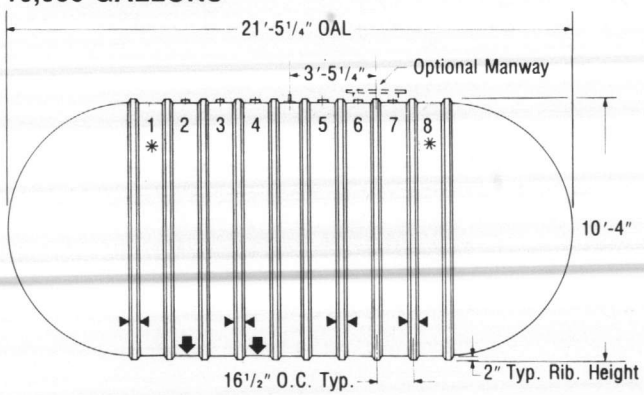
15,000 GALLONS



12,000 GALLONS



10,000 GALLONS



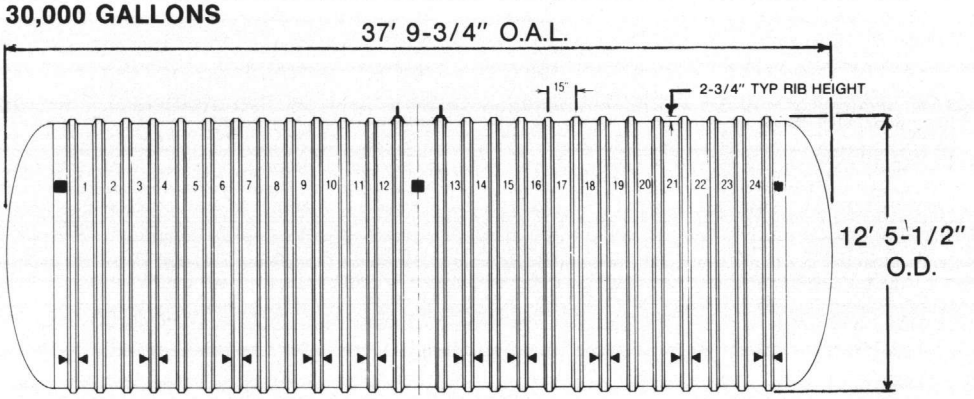
SYMBOL IDENTIFICATION:

- Location of 12" Sq. x 12 Ga. plate
- Location of holdown straps on ribs

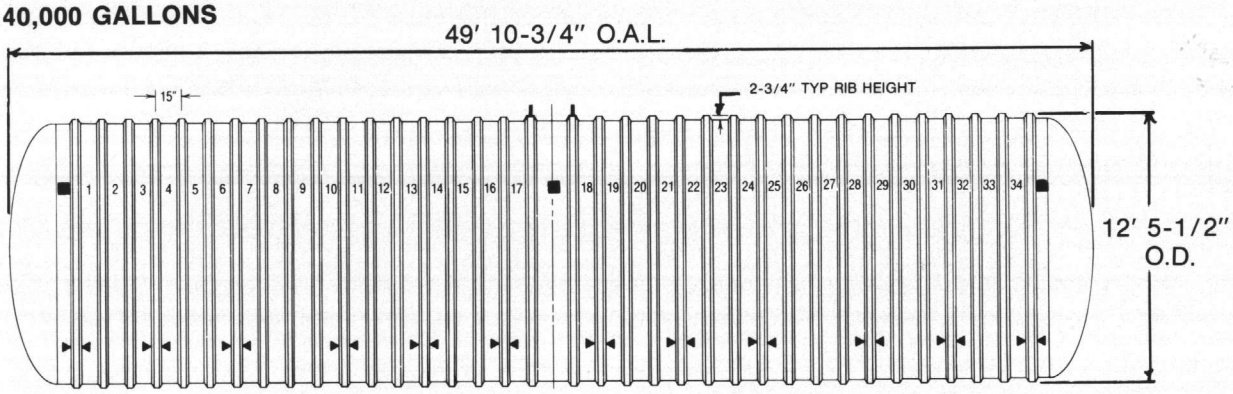
*Alternate fitting location when using optional manway.

. . . . TECHNICAL DATA AND SPECIFICATIONS
12′ DIAMETER TANKS

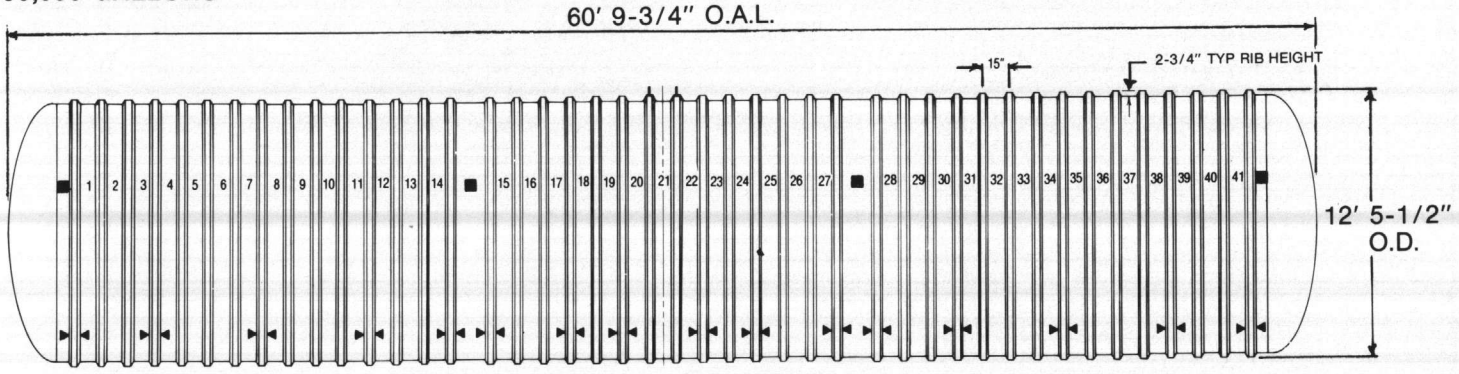
30,000 GALLONS



40,000 GALLONS



50,000 GALLONS



SYMBOL IDENTIFICATION:

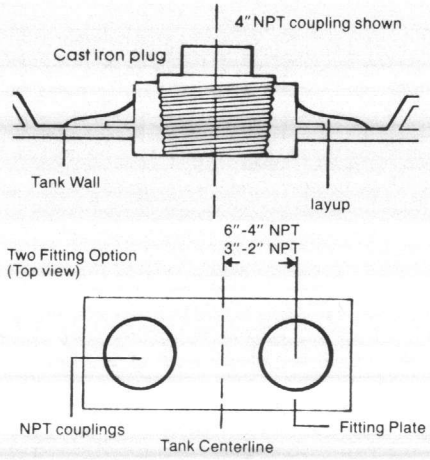
▶|◀ Location of holdown straps on ribs

Fittings cannot be installed on locations marked ■.

CENTURY-CAST FIBERGLASS TANK ACCESSORIES

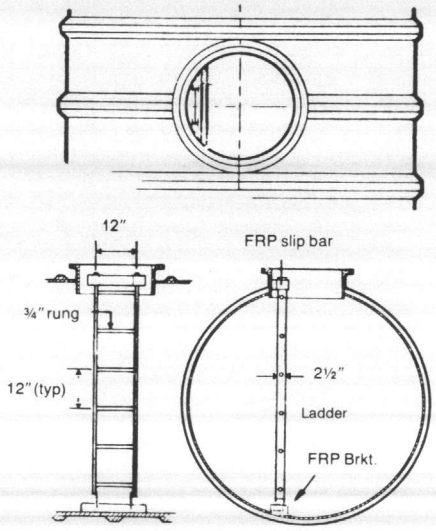
STEEL NPT FITTINGS

Steel NPT fittings are available in 2", 4", 6", and 8" coupling sizes. The 2" size is a full coupling while the other sizes are half couplings. Two 2" or 4" fittings may be located between the same two ribs and on an axis that is perpendicular to the top longitudinal centerline of the tank. All other fittings are located on the centerline. Any deviation will void the UL label.



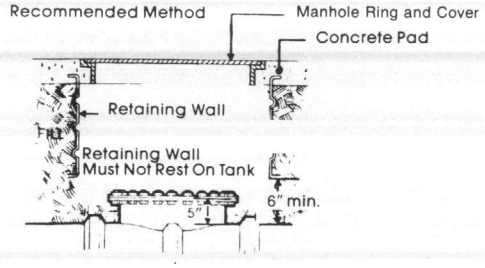
TANK LADDERS

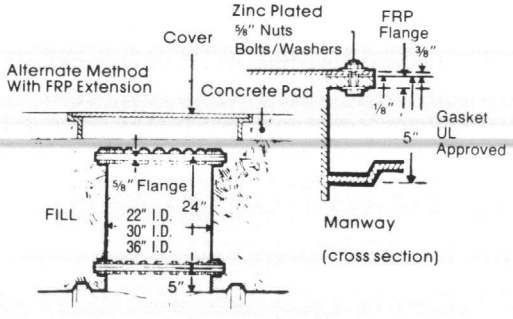
Fiberglass tanks are available with a factory installed aluminum, fiberglass, or carbon steel ladder(s). Attached to the tank bottom with FRP brackets, the ladder is retained at the top with an FRP bar strapped to the manway. The ladder floats freely behind the FRP bar to allow for expansion.



FIBERGLASS FLANGED MANWAYS

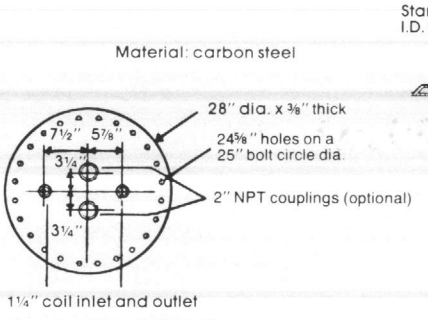
Manways can be located over any of the ribs except for the end ribs, lifting lug or hold-down strap ribs. The manways are 22", 30" and 36" inside diameter with carbon steel covers. Covers include gaskets and 24 plated ⅝" x 2½" bolts, nuts and washers on a 22" dia. manway; 30 plated ⅝" x 4" bolts, nuts and washers on a 30" dia. manway; and 32 plated ⅝" x 3½" bolts, nuts and washers on a 36" dia. manway. FRP or painted steel extensions are available in two foot lengths and include the necessary gasket, nuts, bolts and washers.

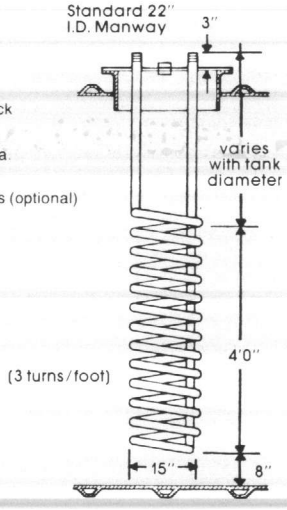




HELICAL HEATING COILS

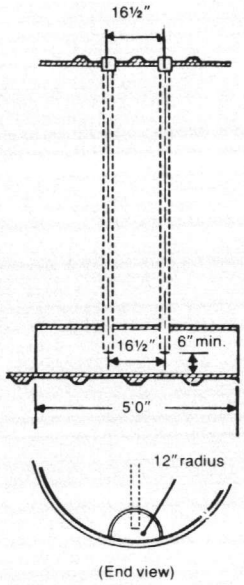
For viscous products, helical heating coils are available. Attached to a standard painted carbon steel 22" I.D. manway cover, the 1¼" Schedule 40 carbon steel heating coil is installed to leave 8" clearance from the bottom of the tank. Suction and return couplings can be installed in the manway lid (not included with heating coil).





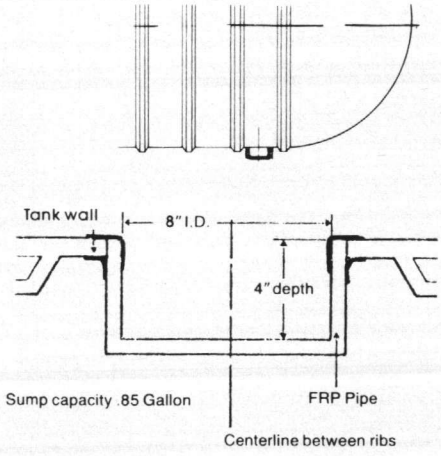
HOTWELLS

Hotwells consist of half sections of 24″ fiberglass pipe bonded longitudinally to the bottom wall of the fiberglass tank. The hotwell accommodates suction and return lines spaced 16½″ apart and having a minimum 6″ clearance from bottom surface of hotwell. Manway required if hotwell is used. (Suction and return lines and couplings not furnished with hotwell.)



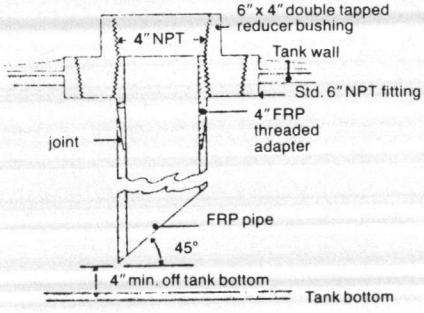
FIBERGLASS SUMPS

Fiberglass sumps are available to facilitate condensation removal. Materials and thickness for sumps are the same as for the tank. Special installation procedures must be followed when installing tanks with sumps. Manway required if sump(s) ordered.



4″ FIBERGLASS FILL TUBE

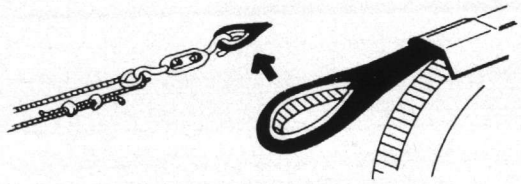
Fiberglass fill tubes screw into the bottom of a 6″ X 4″ double-tapped reducer bushing which is inserted in a standard NPT fitting. The fill tube bottom is located a minimum of 4″ above the bottom of the tank with the end slanted 45°. A cast iron plug seals the top of the tube to facilitate shipment and testing.



FRP HOLD DOWN STRAPS

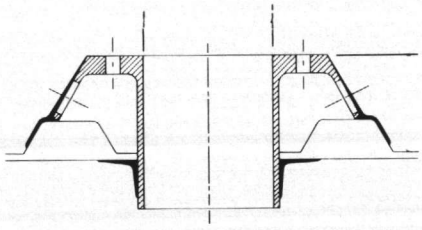
Xerxes Century-Cast fiberglass preshaped FRP straps are available when a tank must be anchored. Tanks should be anchored in locations with high water tables, or in installations where water could enter the hole.

Nominal Tank Size	Tank O.D./Dia.	No. of Straps
550; 1,000	4′	2
2,000; 4,000	6′	2
6,000	6′	4
2,000- 6,000	8′	2
8,000-12,000	8′	4
10,000-15,000	10′	4
20,000	10′	6
25,000	12′	8
30,000	12′	10
35,000	12′	12
40,000	12′	12
48,000; 50,000	12′	16



FLANGED AND GUSSETED NOZZLE

Fiberglass flanged and conically gusseted nozzles are available in 4″, 6″ and 8″ diameters. It is rated at 1500 ft. lbs. for bending loads and 2000 ft. lbs. for torque loading. The nozzle has a standard 150# ANSI flange and comes with required bolts, nuts, washers and a full-faced 40-50 durometer gasket complete for mounting.



INSTALLATION SUMMARY

(see Xerxes Century-Cast fiberglass tank installation instructions for complete information)

- Though fiberglass tanks are rugged, care should be taken to avoid dropping tanks or damaging them with sharp objects.
- Use lifting lugs when hoisting tanks; do not roll.
- Above ground testing against leaks to 5 psig (35 KPa) prior to installation is required. (3 psig on 12′ dia.)
- Backfill material must be either pea gravel or stone crushings that meet ASTM C-33 para. 9.1 requirements. Backfill must be worked to assure no voids exist around the tank.
- For wet hole installation, tanks must be anchored to either a concrete base or to deadmen.
- All internal piping should be at least 4″ from the bottom of tank.

FIBERGLASS TANKS ARE LESS EXPENSIVE THAN STEEL TANKS BECAUSE THEY WON'T CORRODE

High leakage risk due to corroding metal tanks translates into potentially severe liability for all concerned with fuel and other petroleum products storage systems. When health hazards, property damage and product loss or contamination are the results of corroded metal tanks that leak product into surrounding soil, these factors must heavily influence tank selection.

Where the life of the tank needs to approach the effective life expectancy of the facility, the excellent chemical and corrosion resistant properties of Structural Fiberglass Reinforced Plastic must be considered. Also, where expensive maintenance costs such as sacrificial anode protection systems are a factor, the security of knowing you can bury a Xerxes Century-Cast fiberglass tank and virtually forget it is easily converted into cost savings.

For maximum tank durability and overall cost effectiveness, the choice is clear ---------- Xerxes Century-Cast fiberglass tanks.

PERFORMANCE WARRANTY

Xerxes Corporation warrants that our underground storage tanks, when properly installed in accordance with our instructions, will:

(1) Meet our published specifications and will be free from material defects in materials and workmanship for a period of one (1) year following date of original shipment;

(2) Will not fail for a period of thirty (30) years from date of original shipment due to external corrosion;

(3) Will not fail for a period of thirty (30) years from date of original purchase due to internal corrosion, provided the tank is used solely for gasoline, gasohol (90% gasoline and 10% ethanol mixture), jet fuel, diesel fuel or potable water at ambient underground temperature; or used for fuel oil at temperatures not to exceed 150° F.

Xerxes Corporation's sole liability for any defect, which it determines in its sole reasonable discretion to be covered by the above warranty, shall be, at Xerxes' option, to repair the tank, to replace the tank F.O.B. place of original delivery or to refund the original purchase price. In no event, shall Xerxes' liability under this warranty extend to labor, installation costs, or incidental or consequential damages or losses suffered or incurred in connection therewith.

This warranty is void if oral or written installation instructions are not followed or if the tank is abused or misused in any manner.

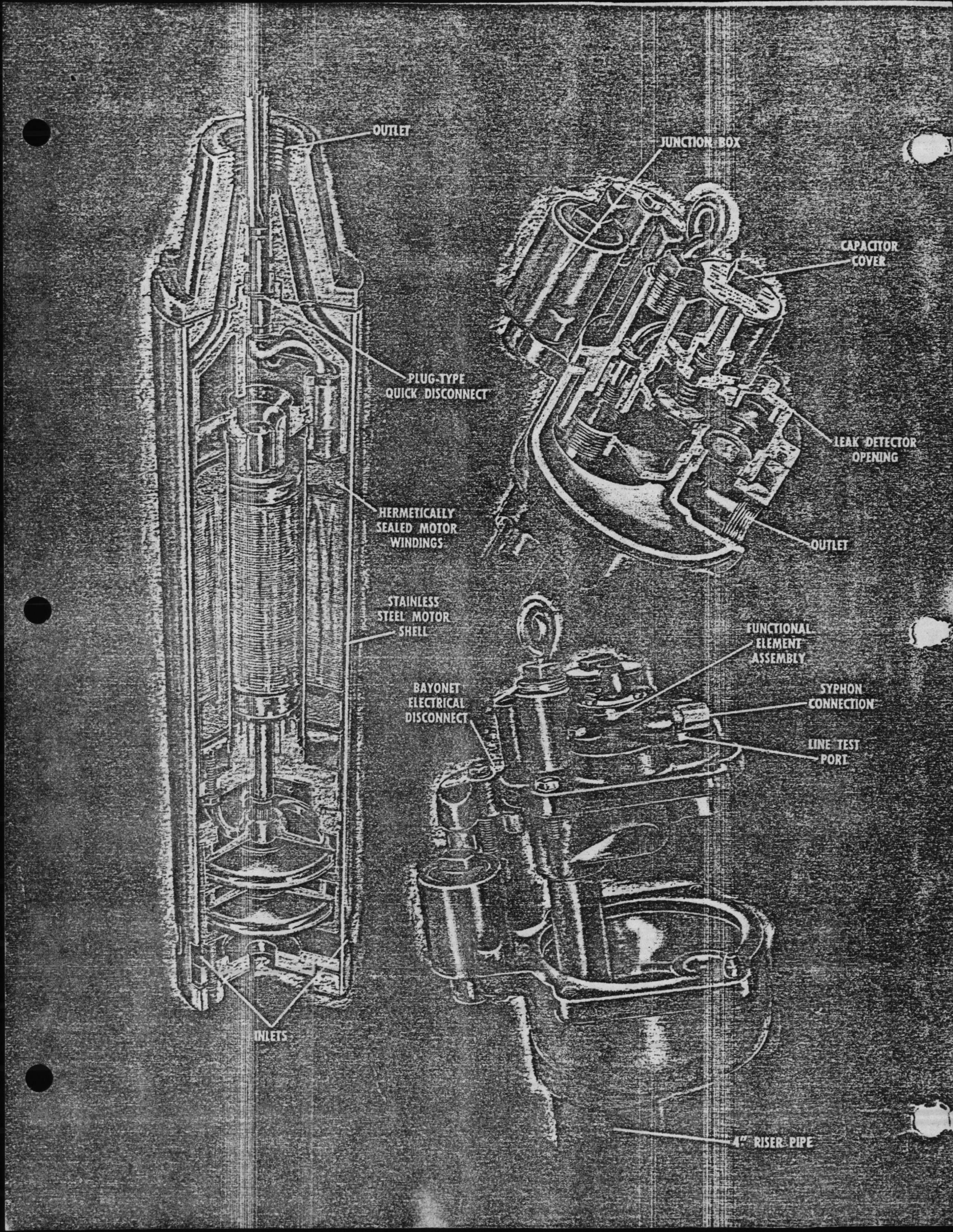
THE WARRANTIES STATED HEREIN SHALL BE IN LIEU OF ALL OTHER WARRANTIES BY XERXES CORPORATION, EITHER EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PARTICULAR PURPOSE INTENDED, ALL OF WHICH ARE HEREBY SPECIFICALLY DISCLAIMED BY XERXES. NO PERSON ACTING OR SELLING ON BEHALF OF XERXES MAY AUTHORIZE ANY WARRANTIES OTHER THAN THOSE SPECIFIED HEREIN.

XERXES® CORPORATION

CENTURY FIBERGLASS™
HEIL PROCESS EQUIPMENT™
SFRP* STORAGE TANKS

7901 XERXES AVENUE SOUTH, MINNEAPOLIS, MINNESOTA 55431 • PHONE (612) 887-1890

CF-126-83


OUTLET
PLUG-TYPE QUICK DISCONNECT
HERMETICALLY SEALED MOTOR WINDINGS
STAINLESS STEEL MOTOR SHELL
INLETS
JUNCTION BOX
CAPACITOR COVER
LEAK DETECTOR OPENING
OUTLET
FUNCTIONAL ELEMENT ASSEMBLY
BAYONET ELECTRICAL DISCONNECT
SYPHON CONNECTION
LINE TEST PORT
4" RISER PIPE

RED JACKET "EXTRACTA" PUMPS

1/3 H.P. Model P33RI & 3/4 H.P. Model P75SI

A new concept in simplicity of design

These submersible pumps from Red Jacket . . . in 1/3 and 3/4 H.P. models . . . offer a wholly new design concept . . . *Engineered Simplicity*. From top to bottom. Fewer moving parts, efficiency, reliability, convenience, and safety. To the user it means all these plus . . . substantial savings in installation, operating and maintenance costs.

INSTALLATION SIMPLICITY

A Red Jacket Extracta Pump arrives at the job site completely assembled, ready for fast easy installation. Remove it from the carton and screw it into a 4" tank opening. No confusion or delays because all models are shipped complete with built-in syphon at no extra cost. By making a motor control box unnecessary, *Engineered Simplicity* further cuts installation time and costs.

SERVICE SIMPLICITY

Engineered into a single assembly, small enough to hold in one hand, are all of the functional elements of the Extracta Pump. The check valve, air eliminator, expansion relief valve, syphon nozzle and venturi, syphon check valve and the pressure test screw can all be removed as a unit by removing two machine screws. The oil-filled capacitor, the electrical disconnect, and the optional leak detector are all located on top of the discharge manifold, not on the side. For maximum convenience in servicing, all of these can be reached by simply removing the manhole cover.

If it should be necessary to remove the pump assembly, backing out one machine screw separates the bayonet type electrical connector in its explosion proof housing. Removing two more machine screws frees the extractable portion for removal. Simple, quick, and no electrician required to remove or replace the unit.

These new Extracta Pumps, like all previous Red Jacket Extracta Pumps, are covered by an exchange plan which remains in effect for the life of the pump.

MOTOR SIMPLICITY

Engineered Simplicity has resulted in a new motor which runs smoother, draws less current and has a lower heat rise. This permanent split-capacitor motor does not require a motor starting relay or starting capacitor, the two chief causes of service problems. This in turn eliminates the need for a motor control box resulting in lower installation and wiring costs.

The motor windings are hermetically sealed in stainless steel. For maximum protection, the overload protector is mounted within the windings. A real "plus" in protection is offered by this device which shuts off the motor, if there is no liquid in the tank.

The motors, available for single phase, 60 cycle, 208-250 volts, carry the Underwriters' Laboratories approval. The 1/3 H.P. model is suitable for most service stations and similar applications. The 3/4 H.P. model is for use in large stations, airports, small bulk plants, marinas, and similar higher volume operations.

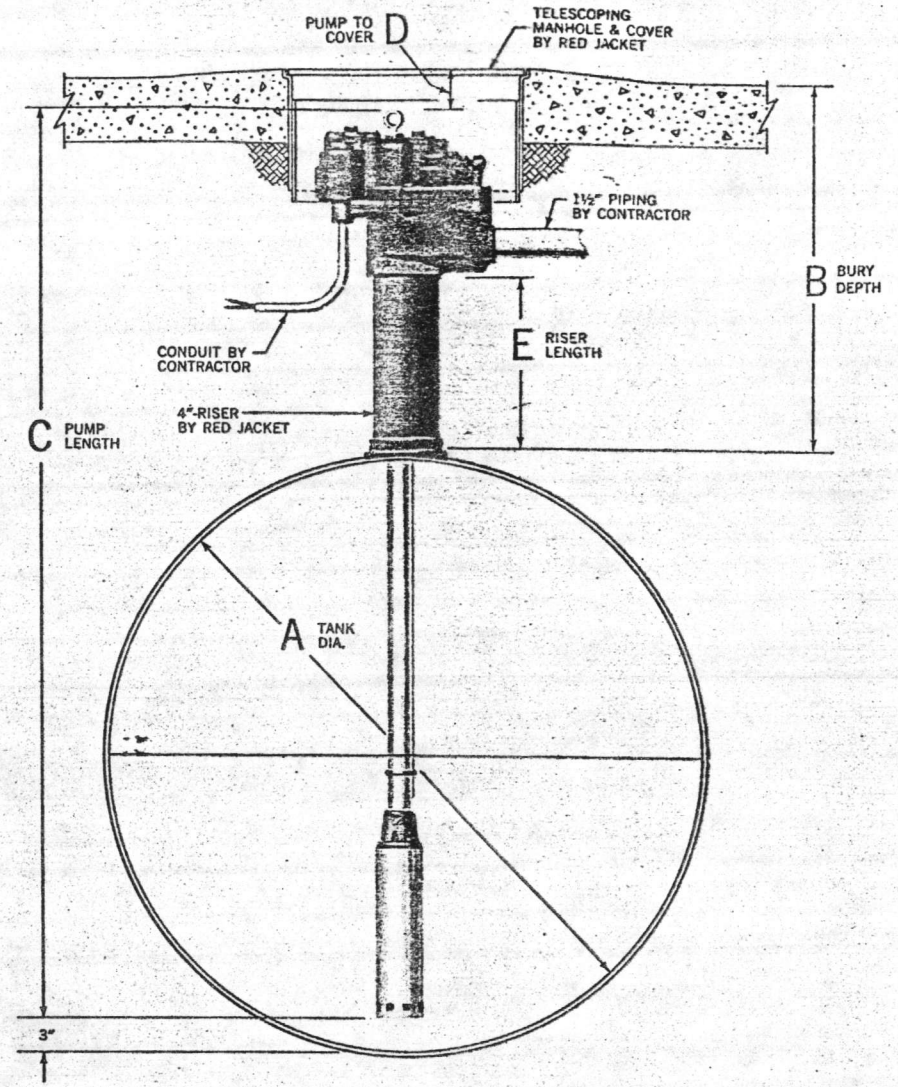


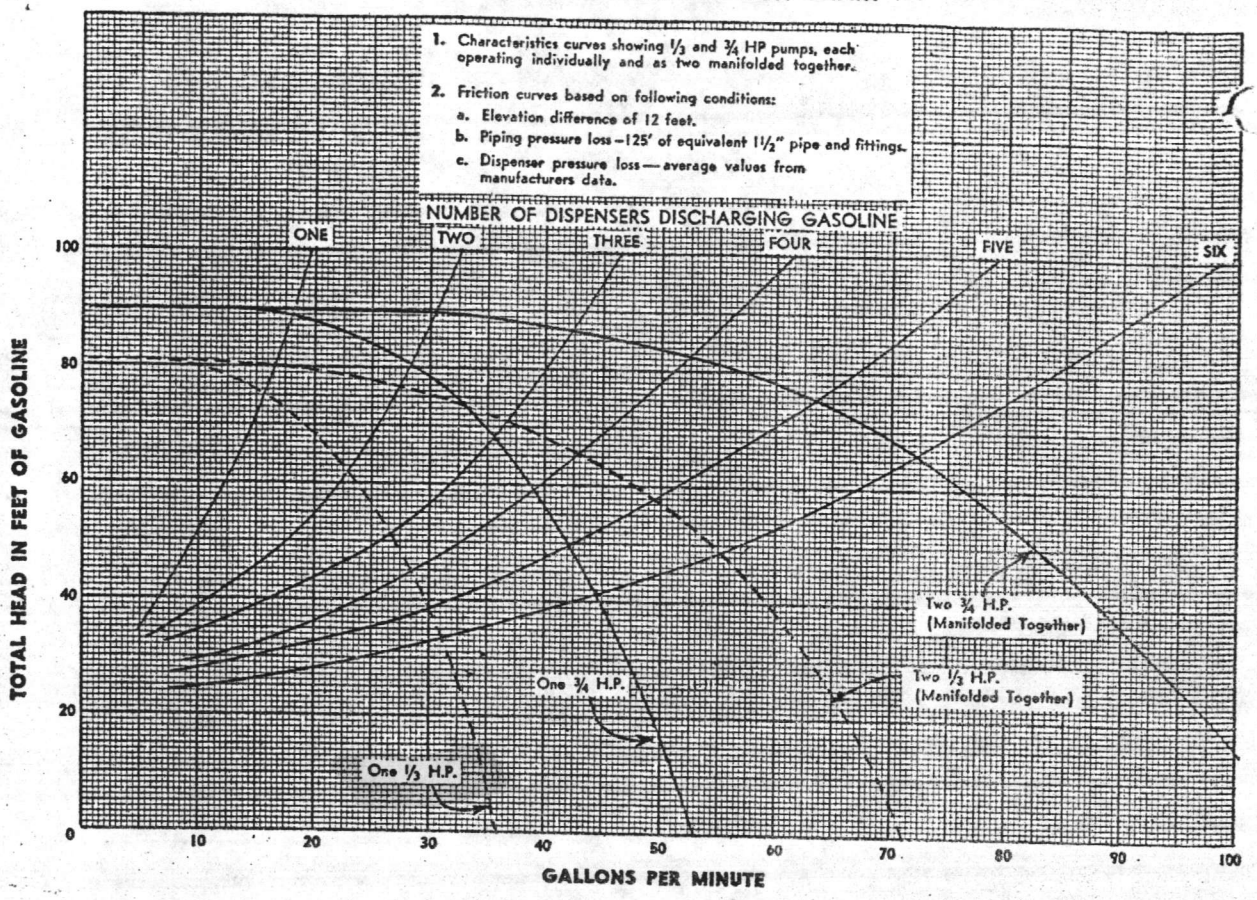
Table of dimensions and pump selection

"B" BURY DEPTH	"A" TANK DIAMETER	3'-6"	3'-10"	4'-0"	5'-4"	6'-0"	6'-3½"	7'-0"	7'-6"	7'-11"	8'-0"	8'-3½"	9'-0"	10'-0"	10'-6"
	"C" Pump Length ...	0409	0501	0501	0609	0701	0709	0801	0809	0901	0901	0909	1001	1101	1109
2'-0"	"D" Pump to Cover ..	5	5	7	3	7	3	7	5	6	7	3	7	7	5
	"E" Riser Length	8	8	6	10	6	10	6	8	7	6	10	6	6	8
	"C" Pump Length ...	0501	0509	0509	0701	0709	0801	0809	0901	0909	0909	1001	1009	1109	1201
2'-6"	"D" Pump to Cover ..	7	3	5	5	5	5	5	7	4	5	5	5	5	7
	"E" Riser Length	12	16	14	14	14	14	14	12	15	14	14	14	14	12
	"C" Pump Length ...	0509	0601	0601	0709	0801	0809	0901	0909	1001	1001	1009	1101	1201	1209
3'-0"	"D" Pump to Cover ..	5	5	7	3	7	3	7	5	6	7	3	7	7	5
	"E" Riser Length	20	20	18	22	18	22	18	20	19	18	22	18	18	20
	"C" Pump Length ...	0601	0609	0609	0801	0809	0901	0909	1001	1009	1009	1101	1109	1209	1301
3'-6"	"D" Pump to Cover ..	7	3	5	5	5	5	5	7	4	5	5	5	5	7
	"E" Riser Length	24	28	26	26	26	26	26	24	27	26	26	26	26	24
	"C" Pump Length ...	0609	0701	0701	0809	0901	0909	1001	1009	1101	1101	1109	1201	1301	1309
4'-0"	"D" Pump to Cover ..	5	5	7	3	7	3	7	5	6	7	3	7	7	5
	"E" Riser Length	32	32	30	34	30	34	30	32	31	30	34	30	30	32
	"C" Pump Length ...	0701	0709	0709	0901	0909	1001	1009	1101	1109	1109	1201	1209	1309	1401
4'-6"	"D" Pump to Cover ..	7	3	5	5	5	5	5	7	4	5	5	5	5	7
	"E" Riser Length	36	40	38	38	38	38	38	36	39	38	38	38	38	36

Note: Pumps in yellow areas are ⅓ H.P. Pumps in stock. Pumps in crossed areas are ⅓ and ¾ H.P. pumps in stock. All other pumps are special and are built to order.

RED JACKET® PUMPS
P.O. BOX 3888 • DAVENPORT, IOWA 52808
TEL. AREA CODE 319 • 322-3543
DIVISION WEIL-McLAIN

PERFORMANCE AND SELECTION CHART



HOW TO ORDER YOUR RED JACKET SUBMERSIBLE PUMP

1. Select correct model from performance chart above.
2. Specify tank diameter.
3. Specify top of tank bury depth.

All models are single phase, 60 cycle, 208-250 volt, shipped complete with built-in syphon assembly, No. 65149 riser, and require 4" tank opening.

OPTIONAL ACCESSORIES

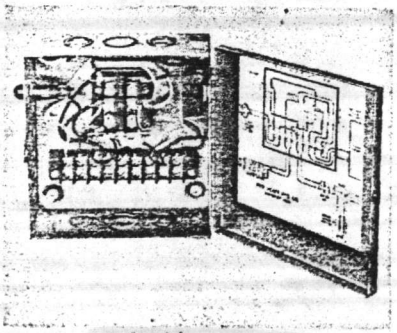
880-029 Control Box
Available as an optional accessory where a convenient central wiring terminal is desired or required. Contains: disconnect switch with locking hasp, pilot light, connections for external pilot light, provision for 115 volt control circuit to the island dispensers, and a magnetic contactor-type relay. Dimensions: 7⅜" high x 7⅛" wide and 3" deep.

No. 116-11 Leak Detector
Heavy cast iron construction. Detects leaks between pump and dispensers. Can be mounted on top of Red Jacket models P33R1 and P75S1 pumps.

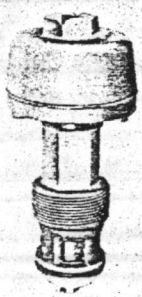
No. 60327 Manhole
Rectangular in shape, this manhole and cover is of heavy welded steel designed to carry the weight of fully loaded transports. The manhole is 10" deep and has a telescoping inner liner* which extends its depth to 19". No. 60327 is 20" x 20" x 10".

Shipping Weight: 87 pounds.

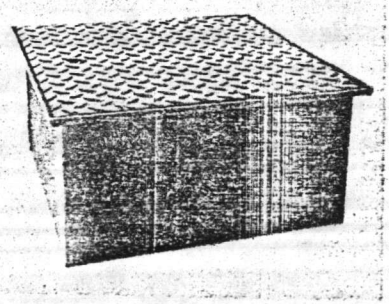
*Optional Accessory — Extra



No. 880-0 Control Box



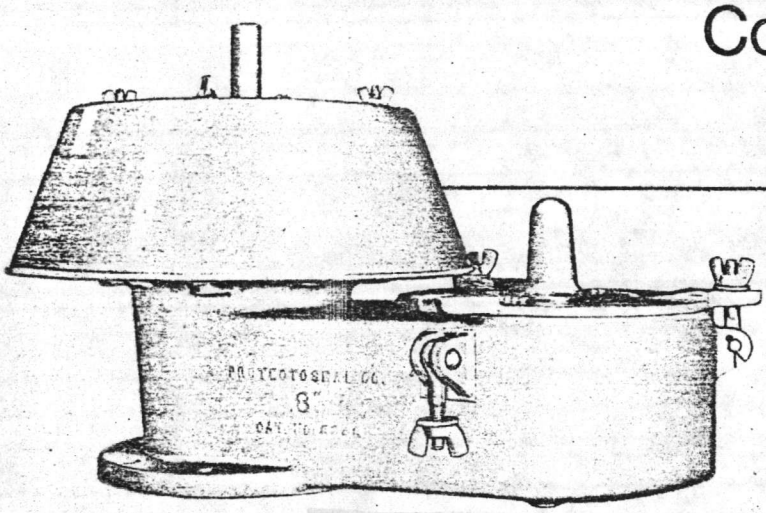
No. 116-11 Leak Detector



No. 60327 Manhole

Conservation Breather Vent

PROTECTOSEAL SERIES No. 8540

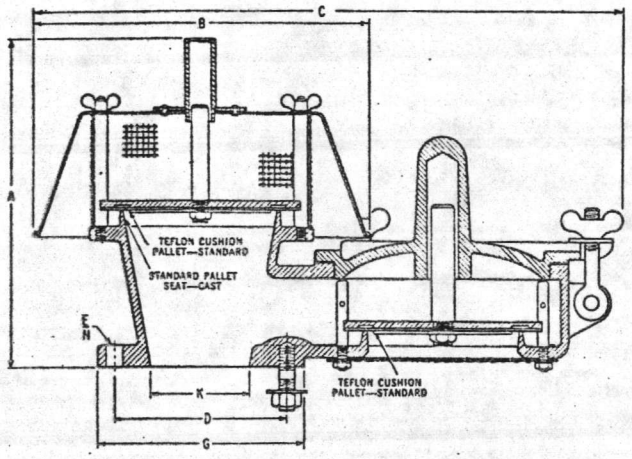


SERIES NO. 8540

END-OF-LINE CONSERVATION BREATHER VENT

Protectoseal Series No. 8540 End-of-Line Breather Vents are intended for use where pressure and vacuum relief is required, but the fire protection afforded by flame arresters is not considered necessary. Pallets in the vent housing retard intake of air and escape of vapors as the tank normally breathes in and out. Pallets open and close to permit only that intake or outlet relief necessary to remain within permissible working pressures and avoid damage to tank.

Select the correct size vent to relieve the operating and thermal pressure buildups and provide adequate vacuum relief. Observe the Protectoseal air-flow curves for Protectoseal No. 8540 Vents on Pages 5, 6, and 7.



Protectoseal Series 8540 Valve Pallets with Teflon Air Cushion Seat provide superior performance and replace the former standard metal-to-metal.

A flat, smooth film of FEP Teflon, the thickness depending upon the diameter of the valve pallet and its pressure loading, is supported on both sides of annular channel forming floating air seal with valve seat. Outer support rim assures proper seating and wrinkle-free film. Leakage on valve pallets at ½ oz./sq. in. is less than 1 cu. ft. of standard air per hour at 90% of valve opening. Teflon minimizes freezing and sticking due to atmospheric moisture and resinous vapors.

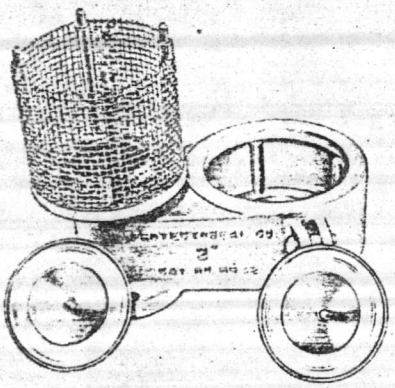
Features of Construction

Standard construction is lightweight low copper content Aluminum. Series 8540 can also be furnished with ductile iron housing stainless steel valves, and painted steel weatherhood. Other materials of construction available upon request.

Protectoseal's unique Air Cushion Seating (Patented) is featured. Teflon is standard (see below); rubber or metal-to-metal seating can be furnished on special request. The pallets have peripheral guiding and center stabilizing stem to insure proper alignment and tight seating. Each unit is factory tested prior to shipment to Protectoseal's high standards.

The vent is protected from freezing, binding and clogging by self-draining housing body and drip rings which keep condensate away from seating surfaces. Design and lightweight of entire unit permits convenient easy handling for inspection and maintenance.

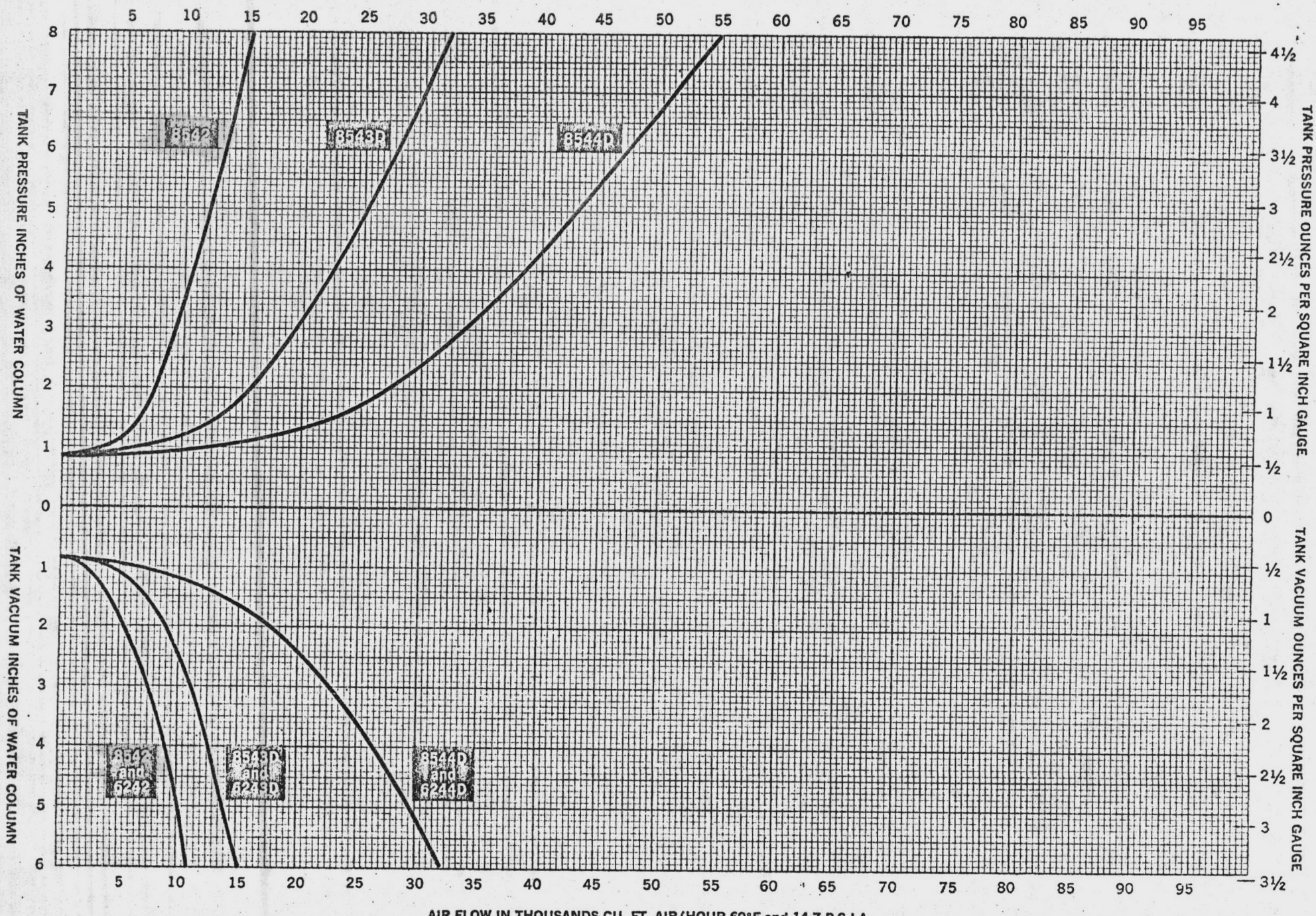
Standard pallet settings are ½ oz. Units may be pressure loaded however, for use on blanketed tanks or other installations requiring higher settings.



Cat. No.	K Dia.	A Ht.	B Width	C Length	D B.C.	G Dia.	E Dia.	No. N Holes	Approx. Ship. Wt., Lbs.
8542	2¼"	12"	9½"	15½"	4¾"	6"	¾"	4	22
8543D	3¼"	13¼"	11½"	17½"	6"	7½"	¾"	4	25
8544D	4½"	14"	13"	20¼"	7½"	9"	¾"	8	35
8546D	6¼"	19¼"	17"	26½"	9½"	11"	⅞"	8	50
8548D	8⅜"	20¾"	19½"	31¼"	11¾"	13½"	⅞"	8	65
8550D	10⅜"	22¼"	23¼"	37¼"	14¼"	16"	1"	12	100
8552D	12"	26½"	25½"	41"	17"	19"	1"	12	133

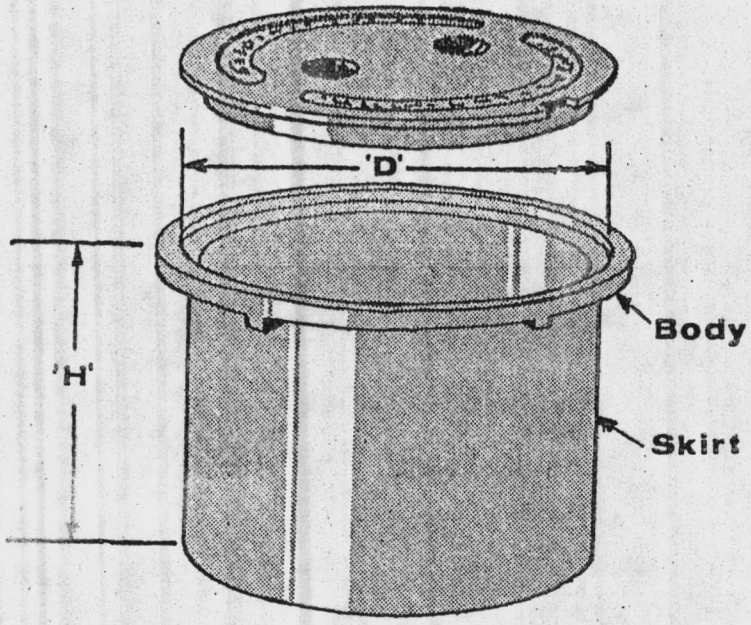
Add prefix "E" for Aluminum Housing with Stainless Steel Pallets.
Add prefix "C" for Ductile Iron Housing with Stainless Steel Pallets.
Add prefix "F" for Stainless Steel Housing and Stainless Steel Pallets.

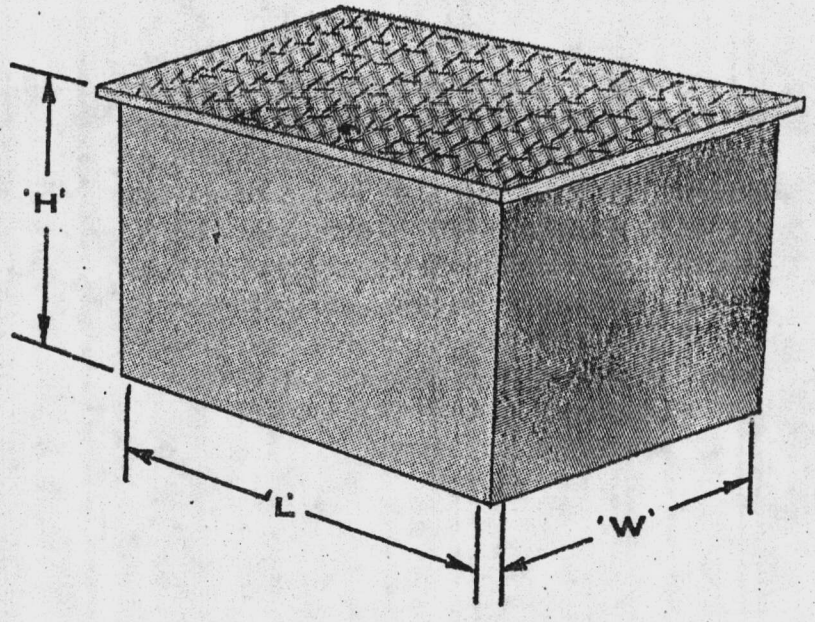
AIR FLOW THROUGH PROTECTOSEAL SERIES 8540 BREATHER VENTS



FILL BOXES

PLATE 1





Type 'A'

Type 'B'

MODEL NO.	TYPE	'D'	'H'	'L'	'W'	COVER NO.	SKIRT NO.	BODY NO.	
MH0008	'A'	8"	7-9/16"			R7825	R7860	R7824	
MH001A01	'A'	9-3/8"	7¾"			R10091-01	R10092	R10090-21	with product Identifier plate.
MH0115A01	'A'	11½"	9-5/16"			*N20852-03	R12264	T07378-10	with product Identifier plate.
MH0020	'B'		10"	20"	20"	R12668-02	T07944	–	
MH0024	'B'		10-1/8"	24"	24"	*N18895-01	T08414	–	
MH0020A*	'B'		10"	18½	18½	R12668-02	4-T09102-01	–	
MH0024A*	'B'		10"	24"	24"	N18895-02	4-T09102-02	–	
MH0024-30	'B'		10-1/8"	30"	24"	2-N19495-02	T09275	–	with 1-K87377 'I' Beam.

*unassembl

IMPORTANT: Specify Symbol Number and Name of Part and the Model and Serial Number of The Unit

COVINGTON
P.O. BOX 18949
GREENSBORO, N.C.
27419-8949

Telephone: 919/292-9240
TWX: 510/922-7396

Charlotte
New Bern
Wilmington
Wilson

Underground Tank Information

1. Length of fuel transfer pump depth tube is 3" from tank bottom.

2. Tank access ports consist of 4-4" threaded female openings.

3. The protectoseal pressure/vacuum vent meets the requirements of the specifications.

4. A piece of 20" x 20" x ½" Diamond Plate Steel will be provided.

AC CIRCUIT

AM	AMMETER
AVS	AMMETER/VOLTMETER SWITCH
CT	CURRENT TRANSFORMER
F	FUSE
FM	FREQUENCY METER
FVR	FREQUENCY VOLTAGE RELAY
PT	POTENTIAL TRANSFORMER
VAR	VOLTAGE ADJUST RHEOSTAT
VM	VOLTMETER
WM	WATTMETER
WMT	WATTMETER TRANSDUCER

NOMENCLATURE NOTES

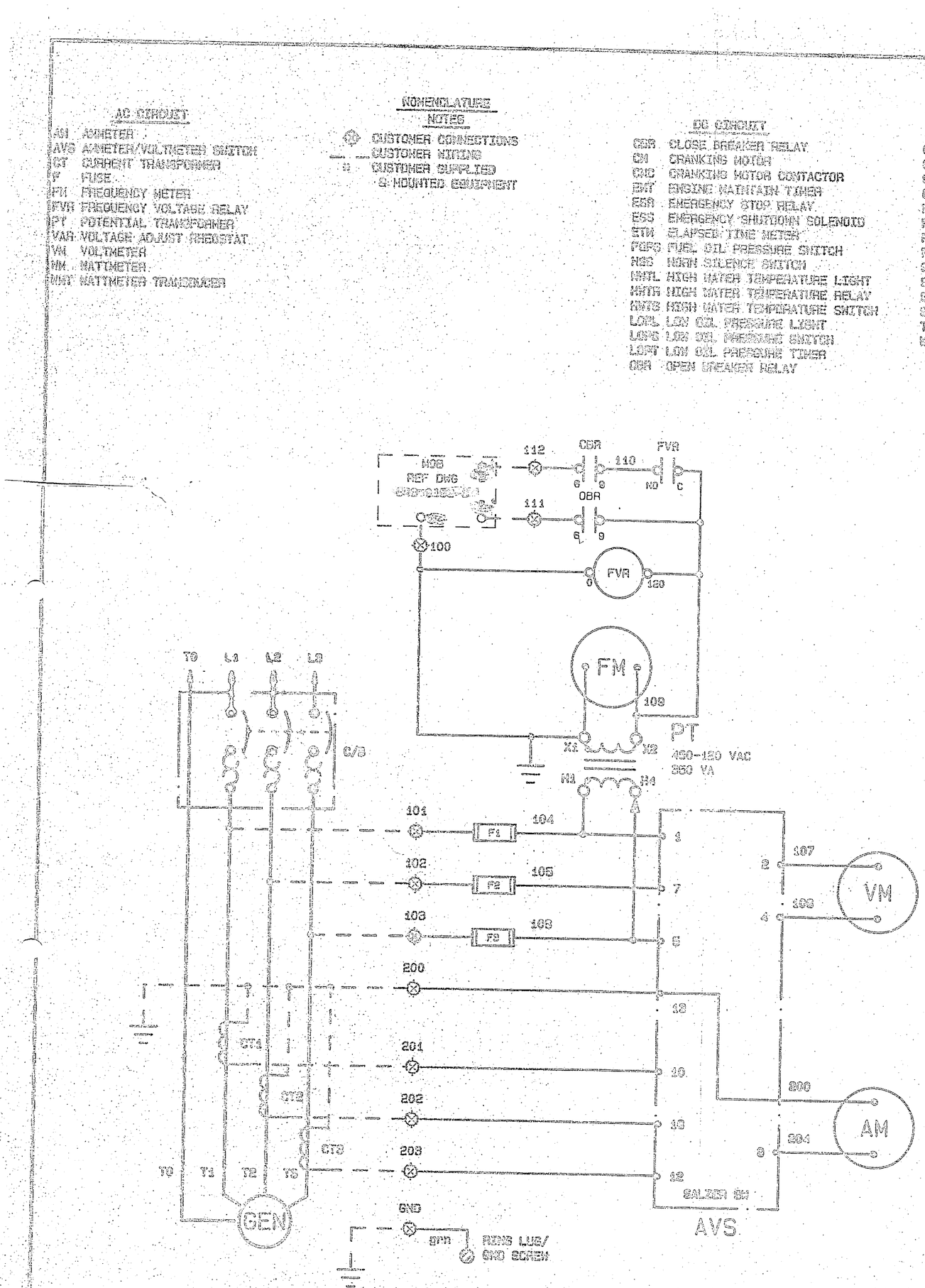
- CUSTOMER CONNECTIONS
- CUSTOMER WIRING
- CUSTOMER SUPPLIED & MOUNTED EQUIPMENT

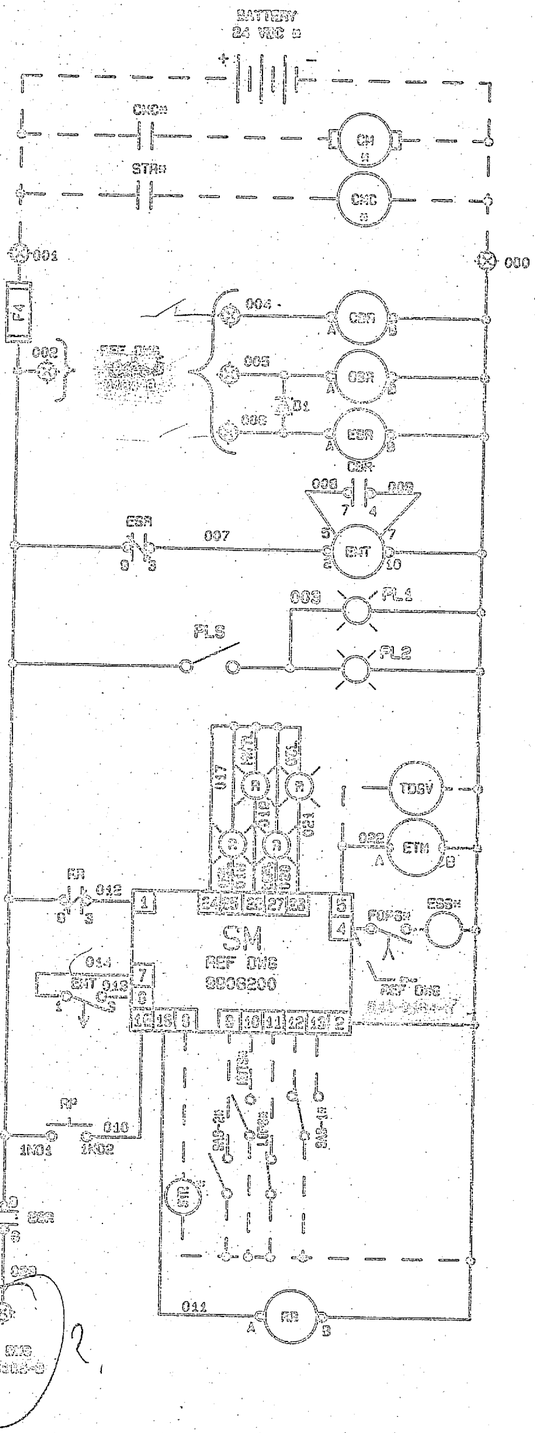
DC CIRCUIT

CBR	CLOSE BREAKER RELAY
CM	CRANKING MOTOR
CMC	CRANKING MOTOR CONTACTOR
EMT	ENGINE MAINTAIN TIMER
ESR	EMERGENCY STOP RELAY
ESS	EMERGENCY SHUTDOWN SOLENOID
ETM	ELAPSED TIME METER
FOPS	FUEL OIL PRESSURE SWITCH
HSS	HORN SILENCE SWITCH
HWTL	HIGH WATER TEMPERATURE LIGHT
HWTR	HIGH WATER TEMPERATURE RELAY
HWTS	HIGH WATER TEMPERATURE SWITCH
LOPL	LOW OIL PRESSURE LIGHT
LOPS	LOW OIL PRESSURE SWITCH
LOPT	LOW OIL PRESSURE TIMER
OBR	OPEN BREAKER RELAY

DC CIRCUIT

OCL	OVERCRANK LIGHT
OSL	OVERSPEED LIGHT
OSR	OVERSPEED RELAY
OSS	OVERSPEED SWITCH
PL	PANEL LIGHT
PLS	PANEL LIGHT SWITCH
RP	RESET PUSHBUTTON
RR	RESET RELAY
SASN	MIN. SPEED CRANK DISCONNECT
SASS	OVERSPEED ACTIVATED SWITCH
SM	START-MASTER
STR	STARTER RELAY
TSOV	THROTTLE SOLENOID DROP VALVE
WTG	WATER TEMPERATURE GAUGE





FOR APPROVAL ONLY

☐ APPROVED

☐ APPROVED AS NOTED

DATE .....

BY .....

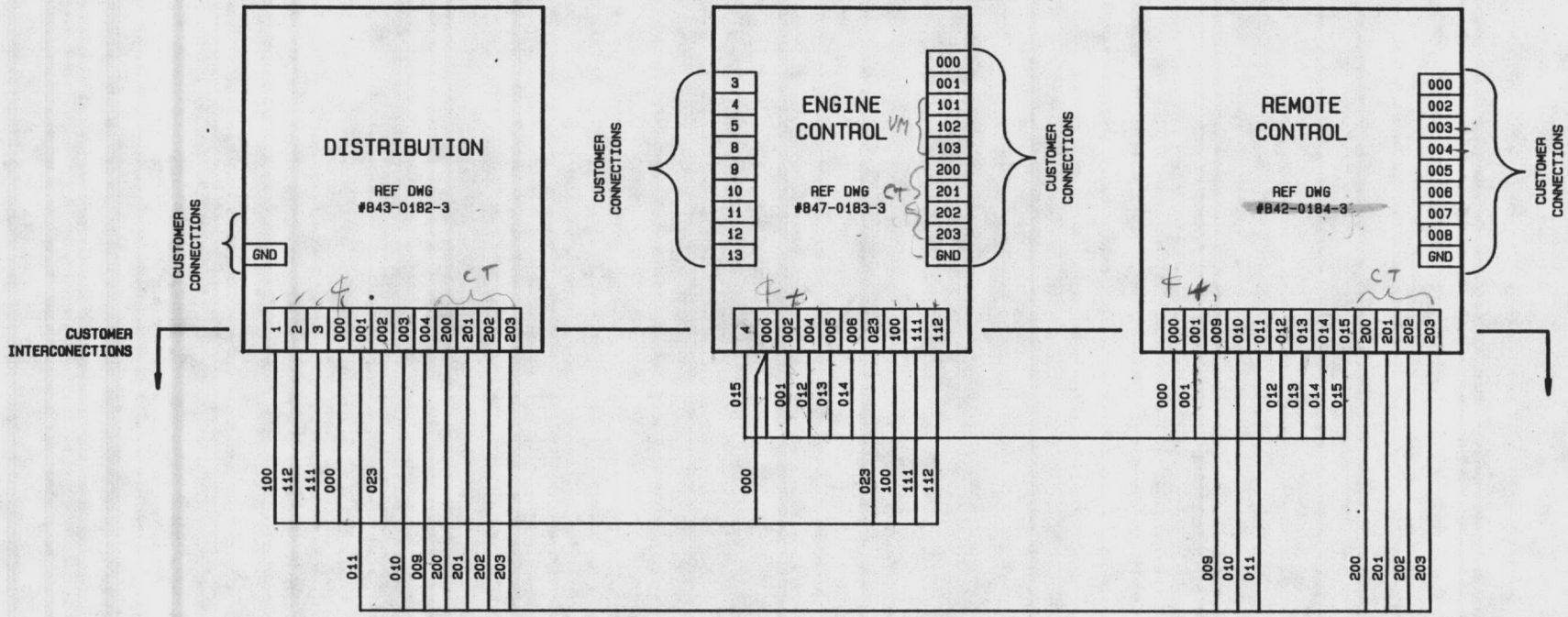
MAR 9 1994

CUSTOMER
COVINGTON DIESEL

LAKE SHORE ELECTRIC CORPORATION
Bedford, Ohio U.S.A.

SCALE	NONE	REVISIONS	BY	DATE
DATE	02/10/94			
DR	TL	CKD		
APVD		1 | CLARIFY DWG - ADD NOMENCLATURE	TL	030694

TITLE: ENGINE CONTROL SCHEMATIC
NO. 847-0183-3



FOR
APPROVAL ONLY

☐ APPROVED

☐ APPROVED AS NOTED

DATE .....

BY .....

LAKE SHORE ELECTRIC
CORPORATION
Bedford, Ohio U.S.A.

SCALE	NONE	REVISIONS	BY	DATE
DATE	03/08/84			
DR'N	TL	CK'D		
AP'VD				

CUSTOMER
COVINGTON DIESEL

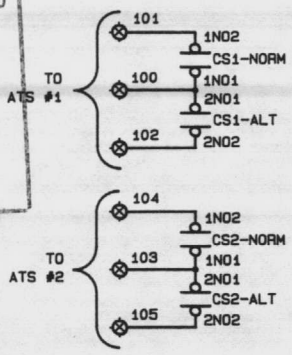
TITLE
INTERCONECTION DIAGRAM

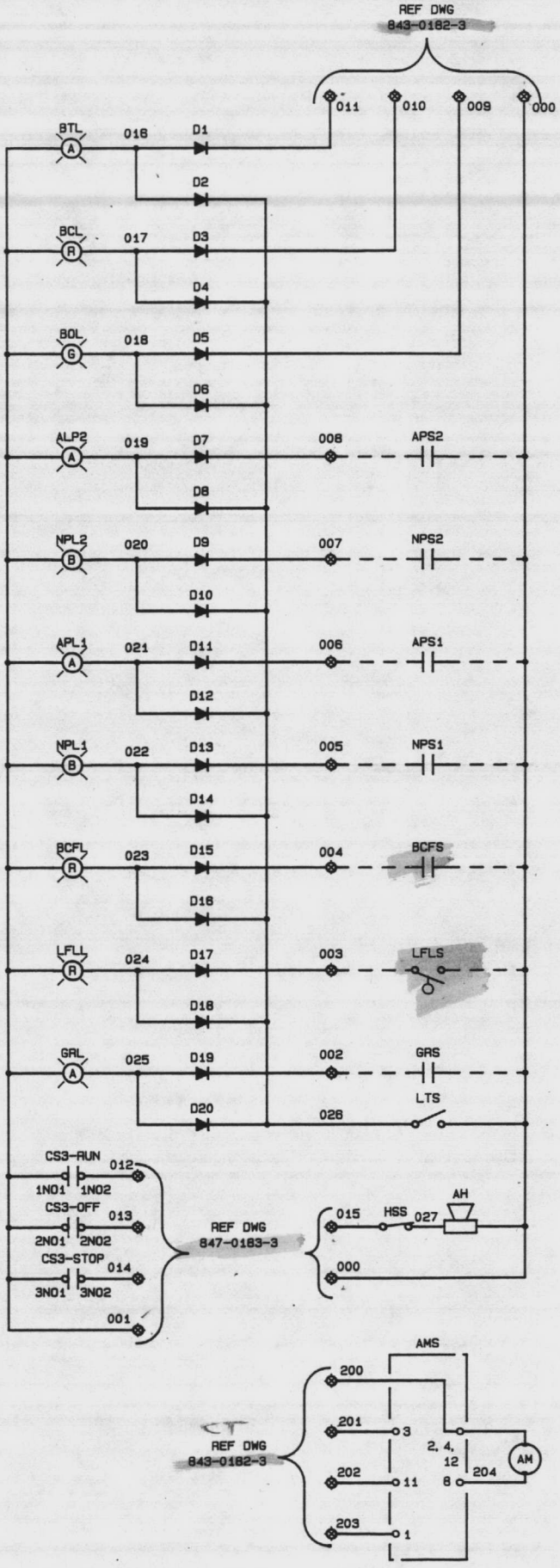
NO.
842-0184-4

MAR 8 1984

FEB 10 1984

FOR APPROVAL ONLY
☐ APPROVED
☐ APPROVED AS NOTED
DATE
BY





NOMENCLATURE

AH	ALARM HORN
AM	AMMETER
AMS	AMMETER SWITCH
APL	ALTERNATE POWER ON LIGHT
APS	ALTERNATE POWER SWITCH
BCFL	BATTERY CHARGER FAILURE LIGHT
BCFS	BATTERY CHAGER FAILURE SWITCH
BCL	BREAKER CLOSED LIGHT
BOL	BREAKER OPEN LIGHT
BTL	BREAKER TRIPPED LIGHT
CS	CONTROL SWITCH
D	DIODE
GRL	GENERATOR RUNNING LIGHT
GRS	GENERATOR RUNNING SWITCH
HSS	HORN SILENCE SWITCH
LFLL	LOW FUEL LEVEL LIGHT
LFLS	LOW FUEL LEVEL SWITCH
LTS	LAMP TEST SWITCH
NPL	NORMAL POWER ON LIGHT
NPS	NORMAL POWER SWITCH

NOTES

⊗ CUSTOMER CONNECTIONS
_ _ _ CUSTOMER WIRING
1) REFER TO INTERCONNECTION WIRING DIAGRAM #842-0184-4

CUSTOMER
COVINGTON DIESEL

TITLE
REMOTE CONTROL SCHEMATIC

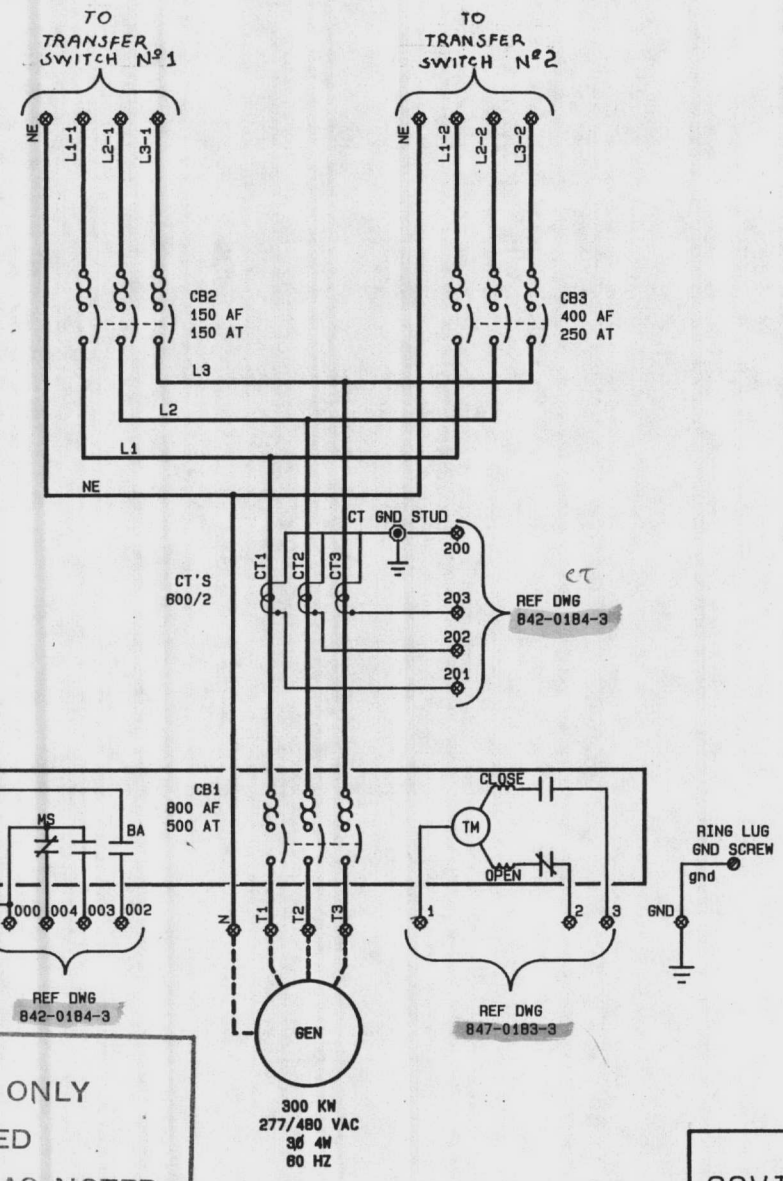
NO. 842-0184-3

LAKE SHORE ELECTRIC CORPORATION
Bedford, Ohio U.S.A.

SCALE	NONE
DATE	02/09/84
DR'N	TL
CKD	
APVD	

REVISIONS

BY	DATE



NOMENCLATURE

BA	BELL ALARM
CB	CIRCUIT BREAKER
CT	CURRENT TRANSFORMER
GEN	GENERATOR
MS	MICRO SWITCH
ST	SHUNT TRIP
TM	TRANSFER MOTOR

NOTES

- ⊗ CUSTOMER CONNECTIONS
- _ _ _ CUSTOMER WIRING
1) REFER TO INTERCONNECTION WIRING DIAGRAM #842-0184-4

FEB 10 1984

FOR APPROVAL ONLY

☐ APPROVED

☐ APPROVED AS NOTED

DATE

BY

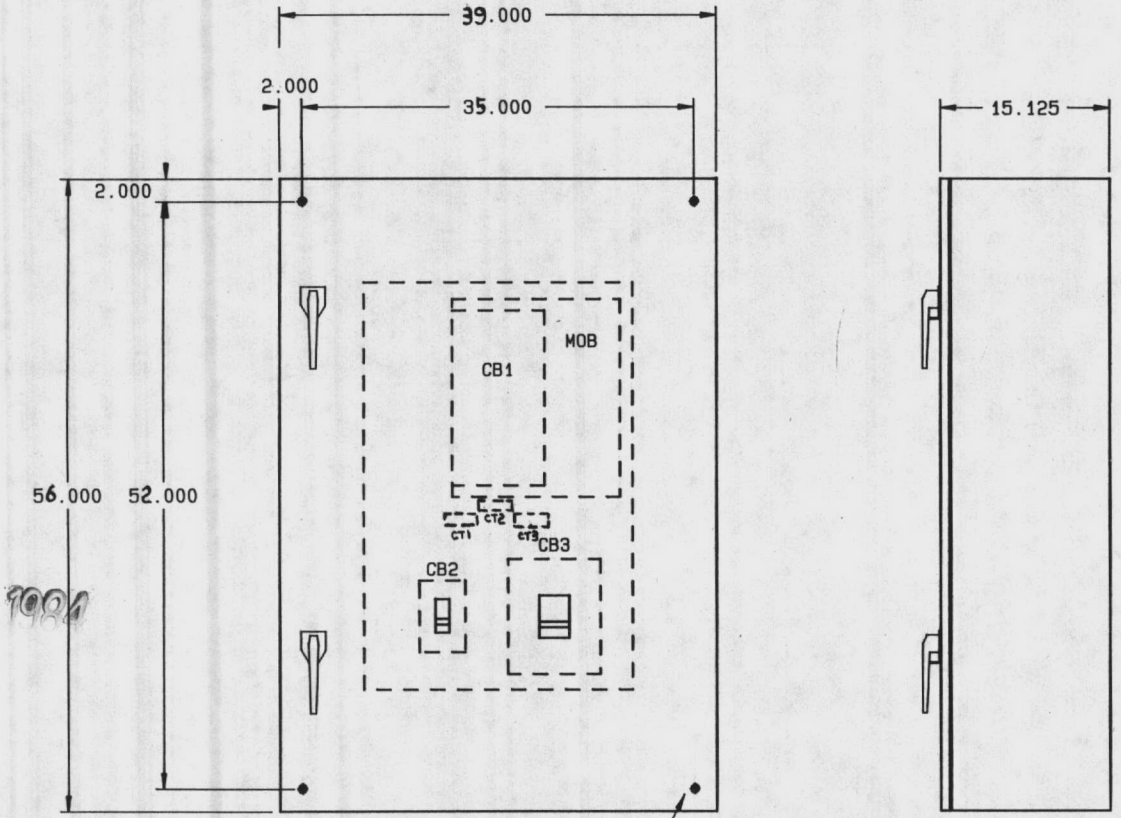
LAKE SHORE ELECTRIC CORPORATION
Bedford, Ohio U.S.A.

SCALE	NONE	REVISIONS	BY	DATE
DATE	02/09/84			
DR'N TL	CKD			
APVD				

CUSTOMER: COVINGTON DIESEL

TITLE: DISTRIBUTION SCHEMATIC

NO. 843-0182-3



NOTES

1) ENCLOSURE TO BE CONSTRUCTED OF 14 GA. SHEET METAL.
2) CB1 TO BE MOTOR OPERATED.
3) CB2 AND CB3 TO BE OPERABLE WITH DOOR CLOSED.
4) 2 PADLOCKABLE HANDELS.
5) PRIMED AND PAINTED ANSI-61 LIGHT GRAY.

FEB 10 1984

FOR APPROVAL ONLY

☐ APPROVED

☐ APPROVED AS NOTED

DATE .....

BY .....

MOUNT HOLES
.56 DIA.-4 HOLES
BACK OF ENCLOSURE

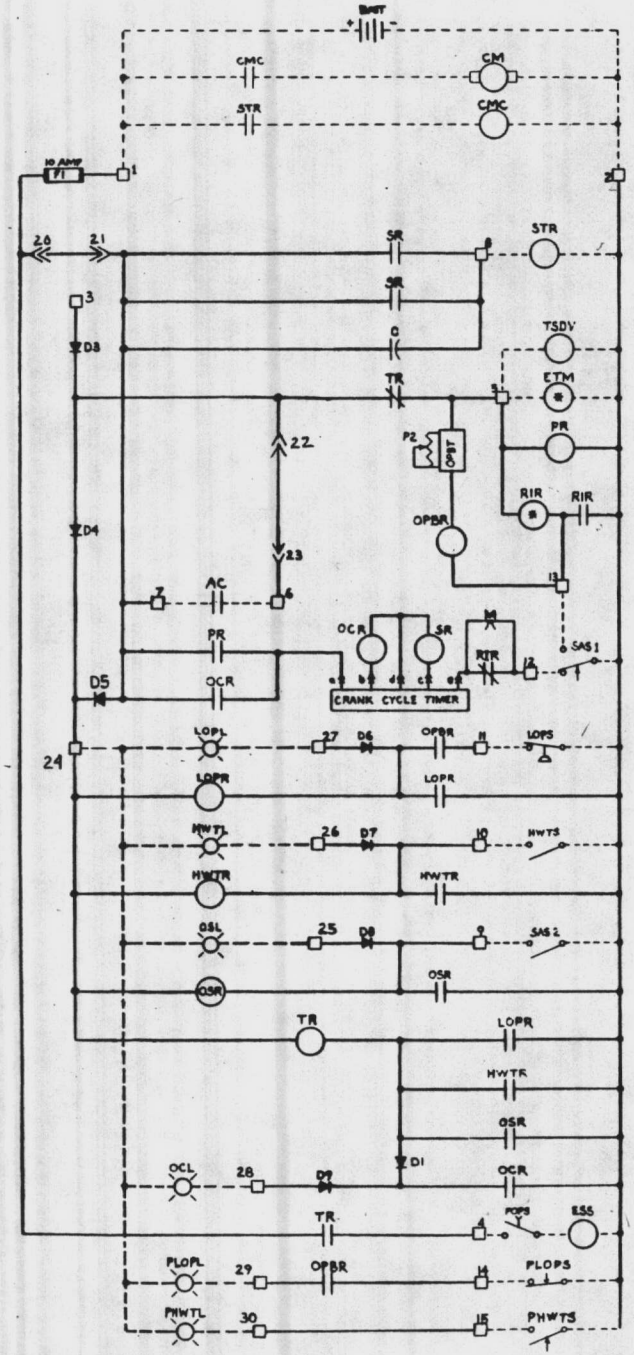
LAKE SHORE ELECTRIC
CORPORATION
Bedford, Ohio U.S.A.

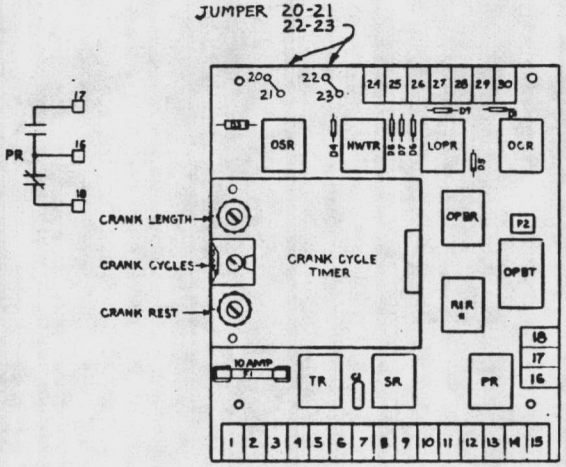
SCALE	NONE	REVISIONS	BY	DATE
DATE	02/09/84			
DR'N	TL	CKD		
APVD				

CUSTOMER
COVINGTON DIESEL

TITLE
DISTRIBUTION ENCLOSURE

NO.
843-0182-2





NOMENCLATURE

SYMBOL	DESCRIPTION
C	CAPACITOR
D	DIODE
F1	FUSE
ETM	ELAPSED TIME METER
P2	ADJ. DELAY TIME OPBR
SS-1	SELECTOR SWITCH MAN-OFF-ON
SS-2	SELECTOR SWITCH AUTO-TEST
TR	TROUBLE RELAY
SR	START RELAY
PR	PILOT RELAY
RIR	RECRANK INHIBIT RELAY
OPBR	OIL PRESSURE BYPASS RELAY
OPBT	OIL PRESSURE BYPASS TIMER
LOPR	LOW OIL PRESSURE RELAY
LOPL	LOW OIL PRESSURE LIGHT
OCR	OVERCRANK RELAY
OCL	OVERCRANK LIGHT
OSR	OVERSPEED RELAY
OSL	OVERSPEED LIGHT
HWTR	HIGH WATER TEMP. RELAY
HWTL	HIGH WATER TEMP. LIGHT
PHWTL	PRE HIGH WATER TEMP. LIGHT
PLOPL	PRE LOW OIL PRESSURE LIGHT

ENGINE

AC	ACTUATING CONTACT
BATT	BATTERY
CM	CRANKING MOTOR
CMC	CRANKING MOTOR CONTACTOR
STR	STARTER RELAY
ESS	EMERGENCY SHUTDOWN SOLENOID
TSDV	THROTTLE SOLENOID DUMP VALVE
CPB	CRANK PUSHBUTTON
SAS-1	MIN. SPEED CRANK DISCONNECT
SAS-2	OVERSPEED ACTIVATED SWITCH
LOPS	LOW OIL PRESSURE SWITCH
HWTS	HIGH WATER TEMP. SWITCH
PLOPS	PRE LOW OIL PRESSURE SWITCH
PHWTS	PRE HIGH WATER TEMP. SWITCH
FOPS	FUEL OIL PRESSURE SWITCH

NOTES

* OPTIONAL
≪ FLAT CABLE CONNECTOR
□ PC BOARD CONNECTIONS

NOTE: CUSTOMER CONNETIONS & LIGHTS SHOWN FOR REFERENCE ONLY FOR ACTUAL CONNECTIONS REFER TO D.C. SCHEMATIC

MAR 9 1984

LAKE SHORE ELECTRIC
CORPORATION
Bedford, Ohio U.S.A.

SCALE	NONE	REVISIONS	BY	DATE
DATE	3-9-84			
DR TL	CKD			
APVD				

TITLE: START MASTER (Multi-Crank)
NO. 9906200

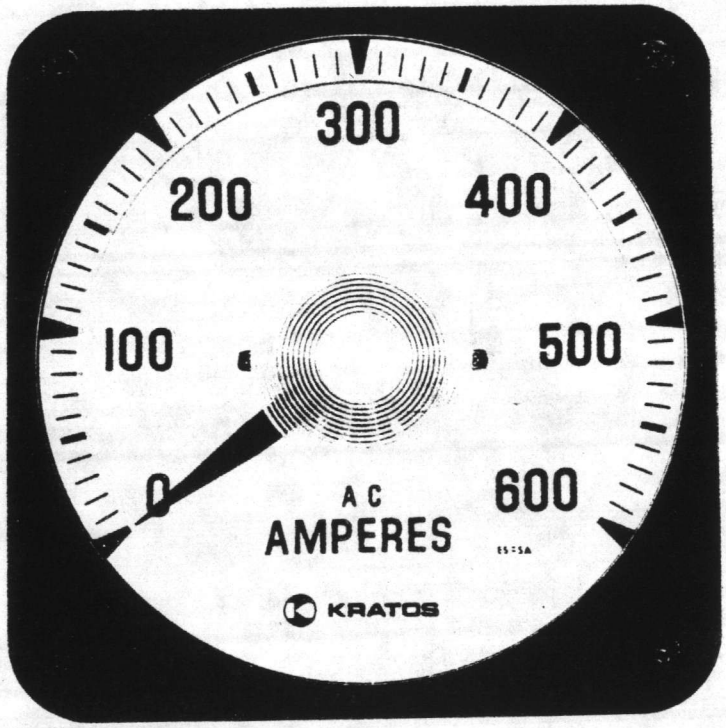
AC Ammeters, self-contained

Part No.	Range	Scale Divisions	Approx. VA Loss
A4A.001	1 A	50	0.6 VA
A4A.002	5 A	50	0.6 VA
A4A.003	10 A	50	0.6 VA

AC Ammeters, for use with external current transformer

Part No.	Rating	Full Scale Marking	Scale Divisions
A4A.101		15 A	75
A4A.102		20 A	40
A4A.103		30 A	60
A4A.104		40 A	40
A4A.105		50 A	50
A4A.106		60 A	60
A4A.107		75 A	75
A4A.108	5 A	100 A	50
A4A.109		150 A	75
A4A.110		200 A	40
A4A.111		250 A	50
A4A.112		300 A	60
A4A.113		400 A	40
A4A.114		500 A	50
A4A.115		600 A	60
A4A.002-030		700 A	70
A4A.116		750 A	75
A4A.117		800 A	40
A4A.118		1000 A	50
A4A.119		1200 A	60
A4A.120		1500 A	75
A4A.121		2000 A	40
A4A.134		2500 A	50
A4A.133		3000 A	60
A4A.135		4000 A	40
A4A.136		5000 A	50
A4A.175		6000 A	60
A4A.002-021		8000 A	40
A4A.002-034		10,000 A	50

AC Ammeters, Type A4A

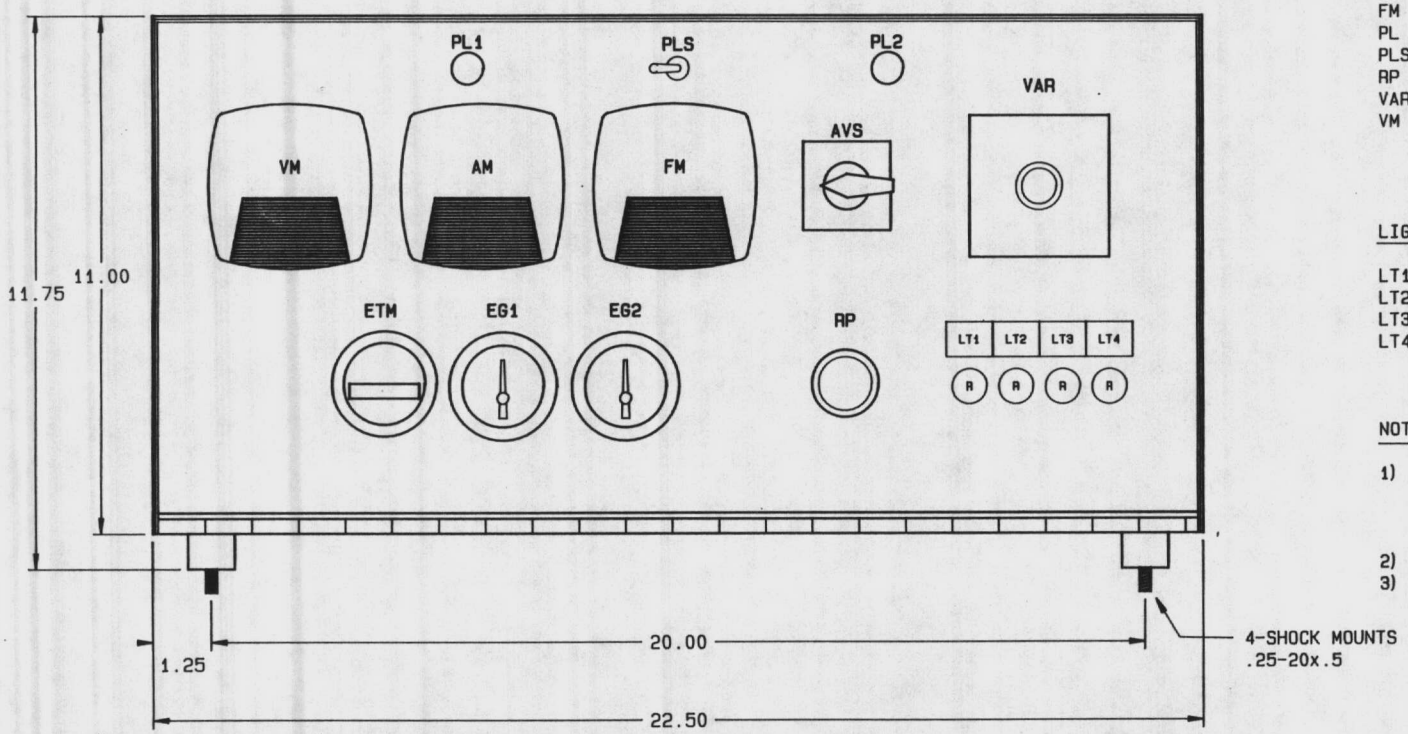


Principle of Operation

Rectifier type circuits are used for AC current measurements that provide improved linearity, frequency characteristics, temperature influence.

These circuits employ an RMS non-linear converting circuit to improve the linearity of DC output with respect to AC input. These circuits combined with a moving coil-type instrument movement result in uniform scale graduations and eliminate the need for specially calibrated scales to compensate for movement-circuit non-linearity.

FEB 10 1984



NOMENCLATURE

AM	AMMETER
AVS	AMMETER VOLTMETER SWITCH
EG	ENGINE GAUGE
ETM	ELAPSED TIME METER
FM	FREQUENCY METER
PL	PANEL LIGHT
PLS	PANEL LIGHT SWITCH
RP	RESET PUSHBUTTON
VAR	VOLTAGE ADJUST RHEOSTAT
VM	VOLTMETER

LIGHTS

LT1	HWTL-HIGH WATER TEMPERATURE LIGHT (RED)
LT2	LOPL-LOW OIL PRESSURE LIGHT (RED)
LT3	OCL-OVERCRANK LIGHT (RED)
LT4	OVERSPEED LIGHT (RED)

NOTES

1) ENCLOSURE TO BE 9.5" DEEP
   WITH 4 SHOCK MOUNTS,
   2 LOCATED 1.25" FROM REAR,
   2 LOCATED 1.5" FROM FRONT.
2) CONSTRUCTED OF 14 GA SHEET METAL.
3) PRIMED AND PAINTED ANSI-61
   LIGHT GRAY.

FOR
APPROVAL ONLY

☐ APPROVED

☐ APPROVED AS NOTED

DATE .....

BY .....

CUSTOMER

COVINGTON DIESEL

LAKE SHORE ELECTRIC
CORPORATION
Bedford, Ohio U.S.A.

SCALE	.375"=1.0"	REVISIONS	BY	DATE
DATE	02/09/84			
DR'N TL	CKD			
AP'VD				

TITLE: ENGINE CONTROL PANEL

NO: 847-0183-2

FEB 10 1984

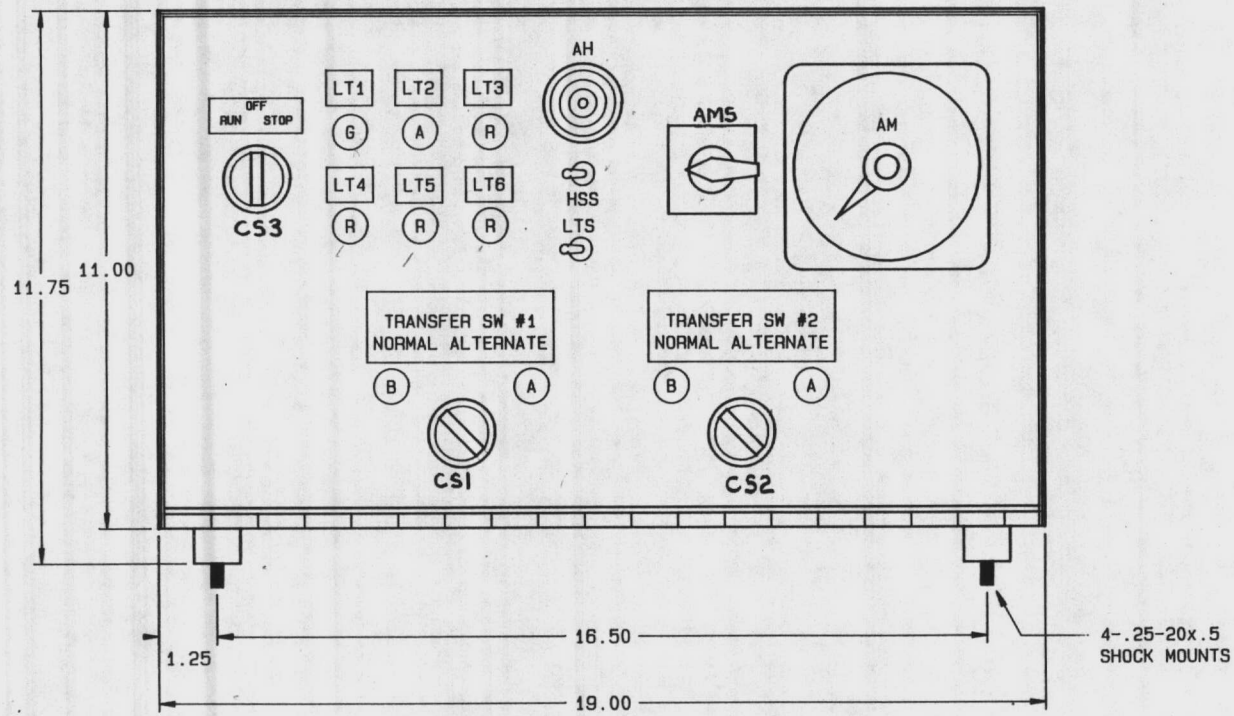
FOR APPROVAL ONLY

☐ APPROVED

☐ APPROVED AS NOTED

DATE .....

BY .....



NOMENCLATURE

AH	ALARM HORN
AM	AMMETER
AMS	AMMETER SWITCH
HSS	HORN SILENCE SWITCH
LTS	LAMP TEST SWITCH
CS	CONTROL SWITCH

LIGHTS

LT1 BOL-BREAKER OPEN LIGHT (GREEN)
LT2 BTL-BREAKER TRIPPED LIGHT (AMBER)
LT3 BCL-BREAKER CLOSED LIGHT (RED)
LT4 GRL- GEN. RUNNING LIGHT (RED) AMBER
LT5 LFLL-LOW FUEL LEVEL LIGHT (RED)
LT6 BCFL-BATTERY CHARGER FAILURE LIGHT (RED)

NOTES

1) ENCLOSURE TO BE 9" DEEP WITH 4 SHOCK MOUNTS, 2 LOCATED 1.625" FROM REAR, 2 LOCATED 1.875" FROM FRONT.
2) CONSTUCTED OF 14 GA SHEET METAL.
3) PRIMED AND PAINTED ANSI-61 LIGHT GRAY.

LAKE SHORE ELECTRIC CORPORATION
Bedford, Ohio U.S.A.

SCALE	.375"=1.0"
DATE	02/09/84
DR'N	TL
CKD	
APVD	

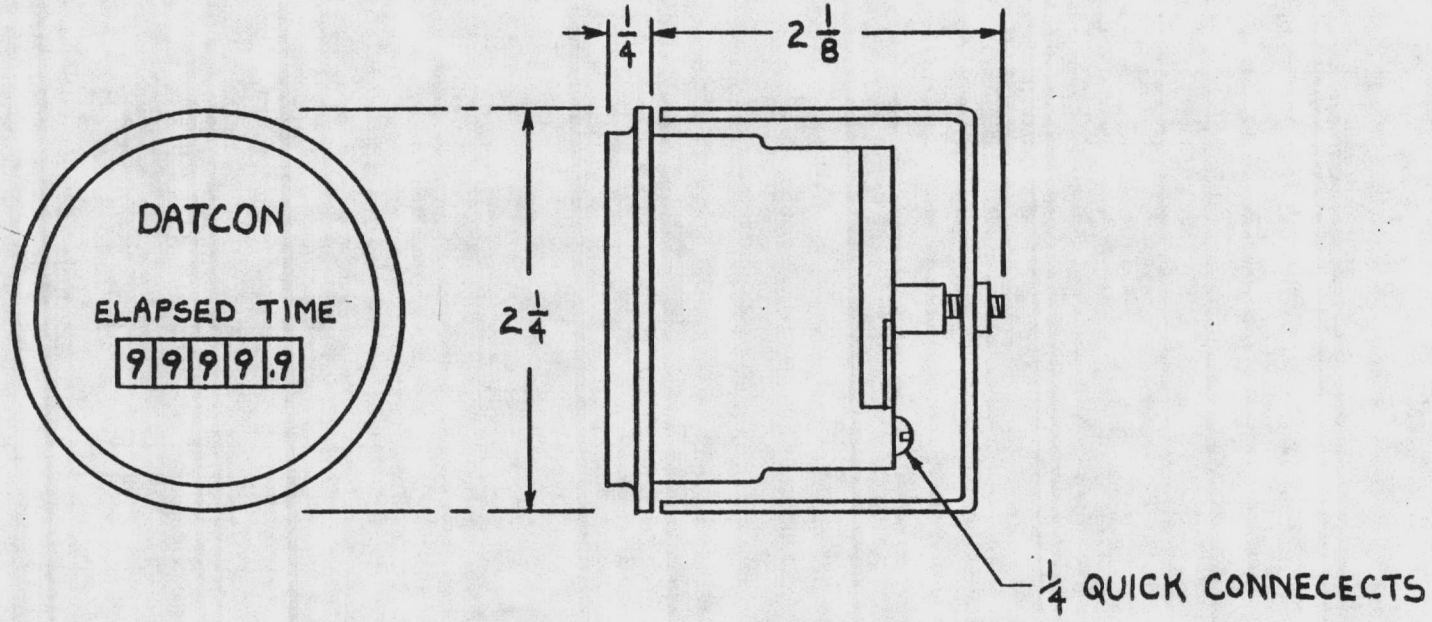
REVISIONS	BY	DATE

CUSTOMER: COVINGTON DIESEL

TITLE: REMOTE CONTROL PANEL

NO: 842-0184-2

APPROVED VENDOR
DATCON 776-8/50VDC



MAR 9 1984

LAKE SHORE ELECTRIC CORPORATION, Bedford, Ohio U.S.A.				
SCALE ~		REVISIONS	BY	DATE
DATE 8-27-81				
DR'N. TH CKD.				
APV'D.	1	NEW STYLE METER	TH	8/27/81
TITLE: DC ELAPSED TIME METER			NO.: 1956600	

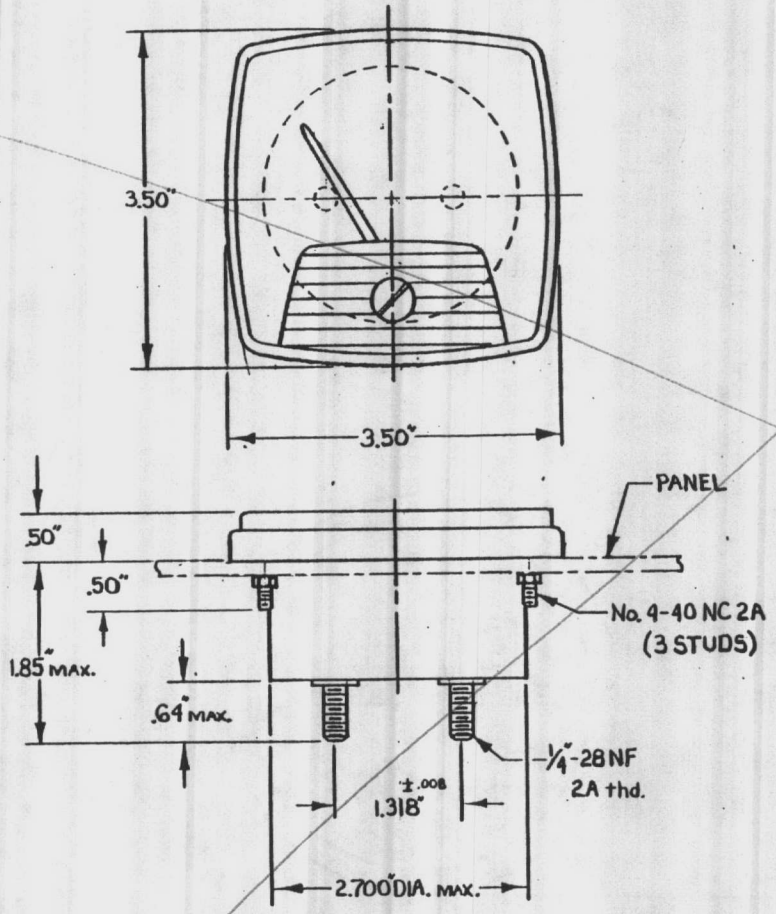
CUSTOMER

STD. PUNCH
2 1/16 DIA

APPROVED VENDOR

G.E. MODEL* 50-250-344 ☐
25-400 HZ MAX.
60 HZ NOMINAL
0-300 VAC
±2% ACCURACY
BURNEN

SCALE VOLTAGE	L.S. PART No.	GE MODEL No.	TERMINAL RESISTANCE
0-150	1961300	50-250-344 PZ PZ	15,000Ω
0-300	1961030	50-250-344 RX RX	70,260Ω
0-600	1961060	50-250-344 SJ SJ	140KΩ
0-300 RANGE 0-600 SCALE	1961036	50-250-344 RX RX	
0-300 RANGE 0-600, 0-300 SCALE	1961063	50-250-344 RX RX	



PUNCH PER L.S. STD
EC-03

LAKE SHORE ELECTRIC
CORPORATION
Bedford, Ohio U.S.A.

SCALE	REVISIONS	BY	DATE
DATE 9-15-78			
DR'N JJS CK'D			
AP'VD			

TITLE: METER VOLTAGE
NO. 1961000

APPROVED VENDOR

GE MODEL* 50-250-340 ☐

TRANSFORMER-RATED

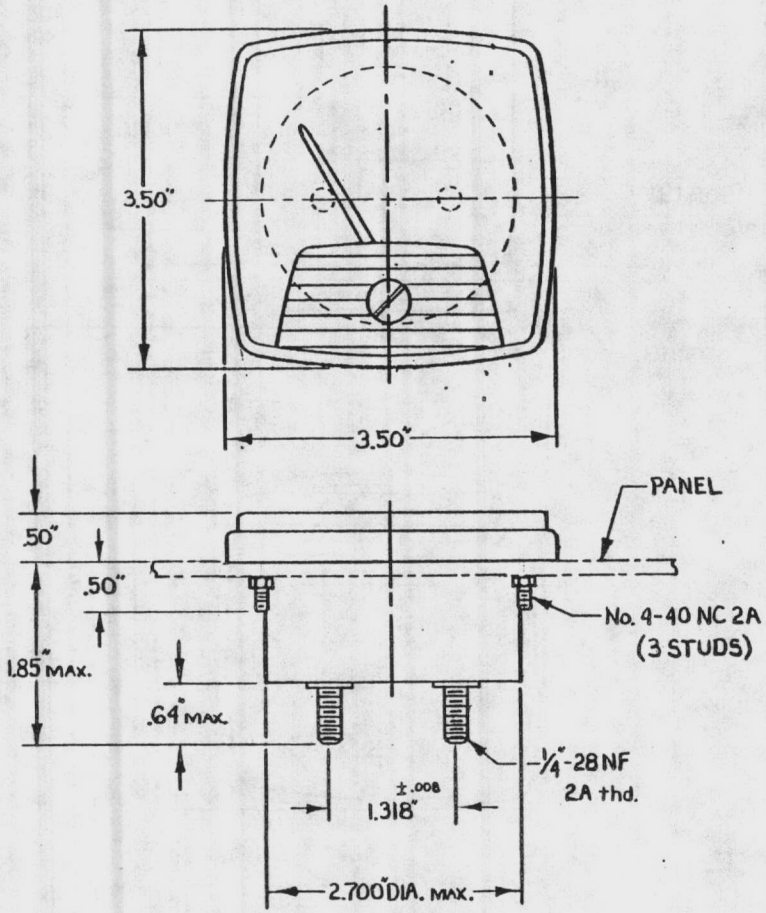
25-400 HZ 60 HZ NOMINAL

0-5 AMPERES

PIVOT & JEWEL, IRON VANE

BURDEN DATA 0.5VA 05 POWER-FACTOR LAGGING

SCALE AMPS	LS. PART No.	G.E. MODEL No.
0-50	1962005	50-250-340 LSNT
0-75	1962075	50-250-340 LSPB
0-100	1962010	50-250-340 LSFK
0-200	1962020	50-250-340 LSRL
0-300	1962030	50-250-340 LSRX
0-400	1962040	50-250-340 LSSC
0-500	1962050	50-250-340 LSSF
0-600	1962060	50-250-340 LSSJ
0-800	1962080	50-250-340 LSSN
0-1000	1962100	50-250-340 LSVA
0-1200	1962120	50-250-340 LSVB
0-1500	1962150	50-250-340 LSVC
0-2000	1962200	50-250-340 LSVE
0-3000	1962300	50-250-340 LSVJ



PUNCH PER LS STD.

EC-03

LAKE SHORE ELECTRIC
CORPORATION
Bedford, Ohio U.S.A.

SCALE	REVISIONS	BY	DATE
DATE 9-19-78			
DR'N JJS CK'D			
AP'VD			

TITLE METER AMPERS

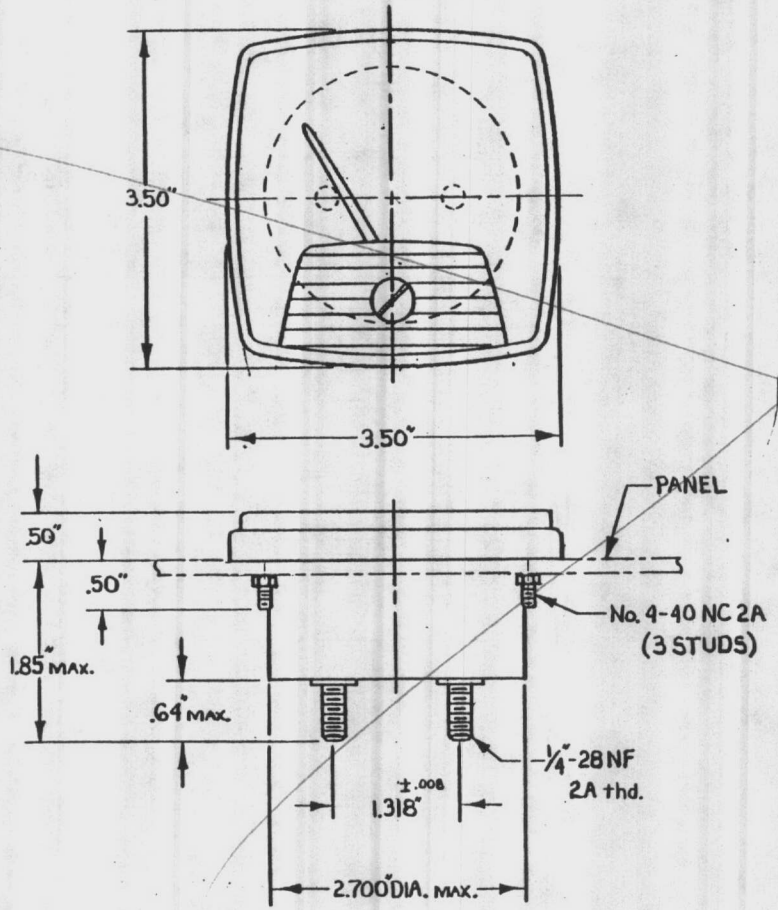
NO. 1962000

APPROVED VENDOR

G.E. MODEL* 50-254-350 ☐

ACCURACY ±3% OF SPAN

INPUT VOLTAGE	SCALE FREQ.	LS PART No	GE MODEL No.
120 VAC	55-65 HZ	1963060	50-254-350 ANAN
	45-55 HZ	1963050	50-254-350 AGAG
	45-65 HZ	1963055	50-254-350 AJAJ
240 VAC	45-65 HZ	1963255	50-254-350 DJDJ



PUNCH PER L.S. STD

EC-03

LAKE SHORE ELECTRIC
CORPORATION
Bedford, Ohio U.S.A.

SCALE	REVISIONS	BY	DATE
DATE 9-15-78			
DR'N JJS CKD			
APVD			

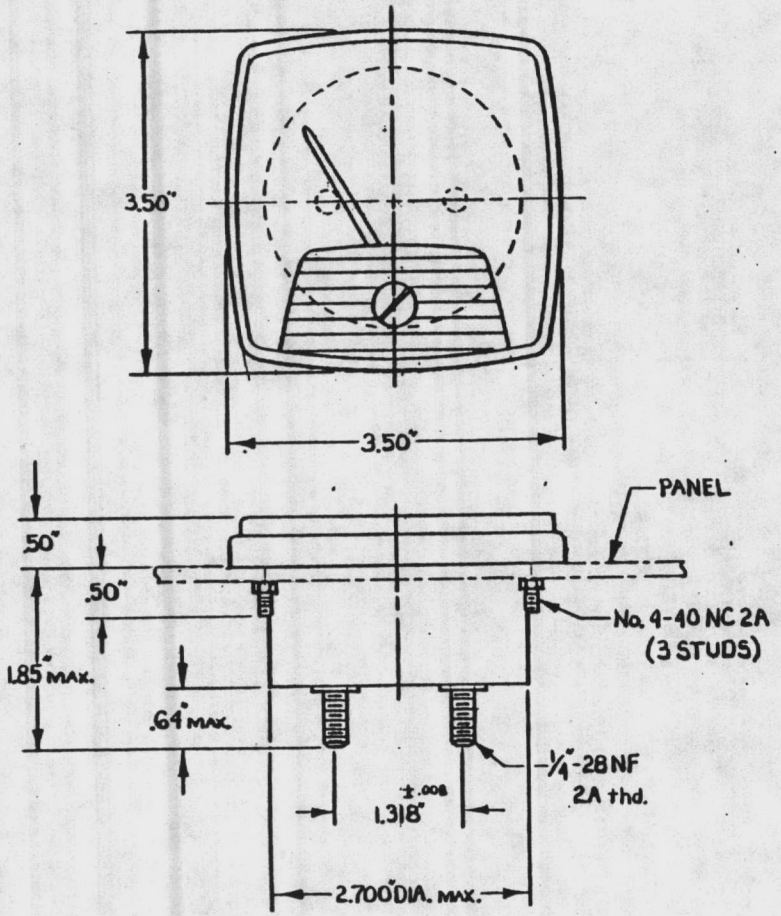
TITLE: METER FREQUENCY

NO. 1963000

APPROVED VENDOR

G.E. MODEL* 50-250-344 ☐
25-400 HZ MAX.
60 HZ NOMINAL
0-300 VAC
±2% ACCURACY
BURNEN

SCALE VOLTAGE	L.S. PART No.	GE MODEL No.	TERMINAL RESISTANCE
0-150	1961300	50-250-344 PZ PZ	15,000Ω
0-300	1961030	50-250-344 RX RX	70,260Ω
0-600	1961060	50-250-344 SJSJ	140KΩ
0-300 RANGE 0-600 SCALE	1961036	50-250-344 RX RX	
0-300 RANGE 0-600, 0-300 SCALE	1961063	50-250-344 RX RX	



PUNCH PER L.S. STD
EC-03

LAKE SHORE ELECTRIC
CORPORATION
Bedford, Ohio U.S.A.

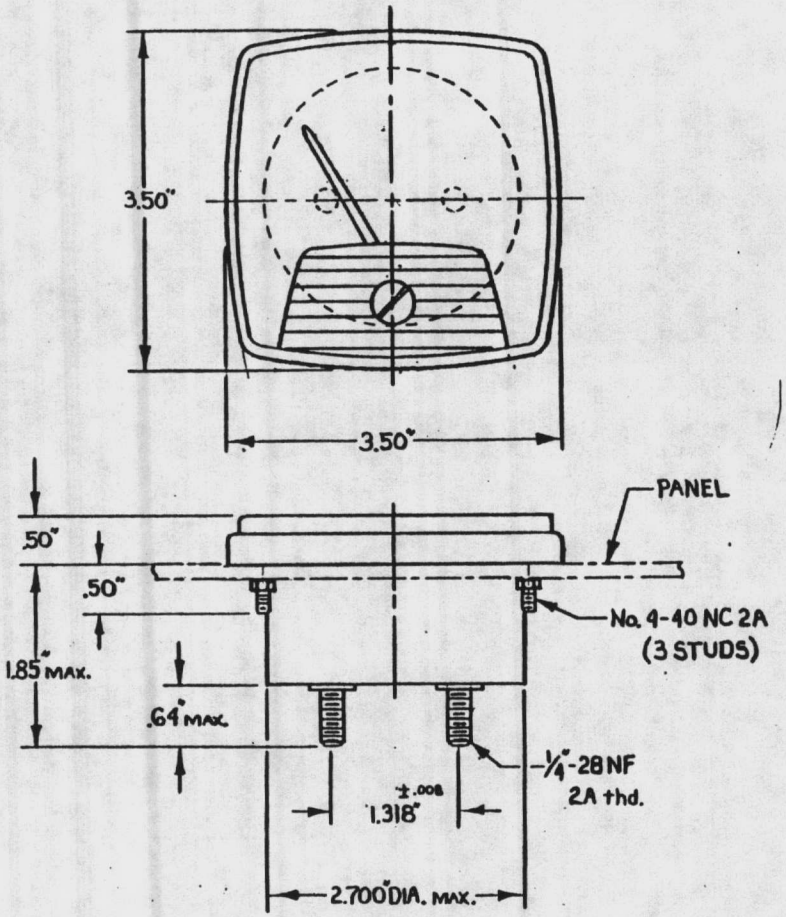
SCALE	REVISIONS	BY	DATE
DATE 9-15-78			
DR'N JJS CKD			
AP'VD			

TITLE: METER VOLTAGE
NO. 1961000

APPROVED VENDOR

G.E. MODEL* 50-254-350 ☐

ACCURACY ±3% OF SPAN



INPUT VOLTAGE	SCALE FREQ.	LS PART No	GE MODEL No.
120 VAC	55-65 HZ	1963060	50-254-350 ANAN
	45-55 HZ	1963050	50-254-350 AGAG
	45-65 HZ	1963055	50-254-350 AJAJ
240 VAC	45-65 HZ	1963255	50-254-350 DJDJ

PUNCH PER LS. STD

EC-03

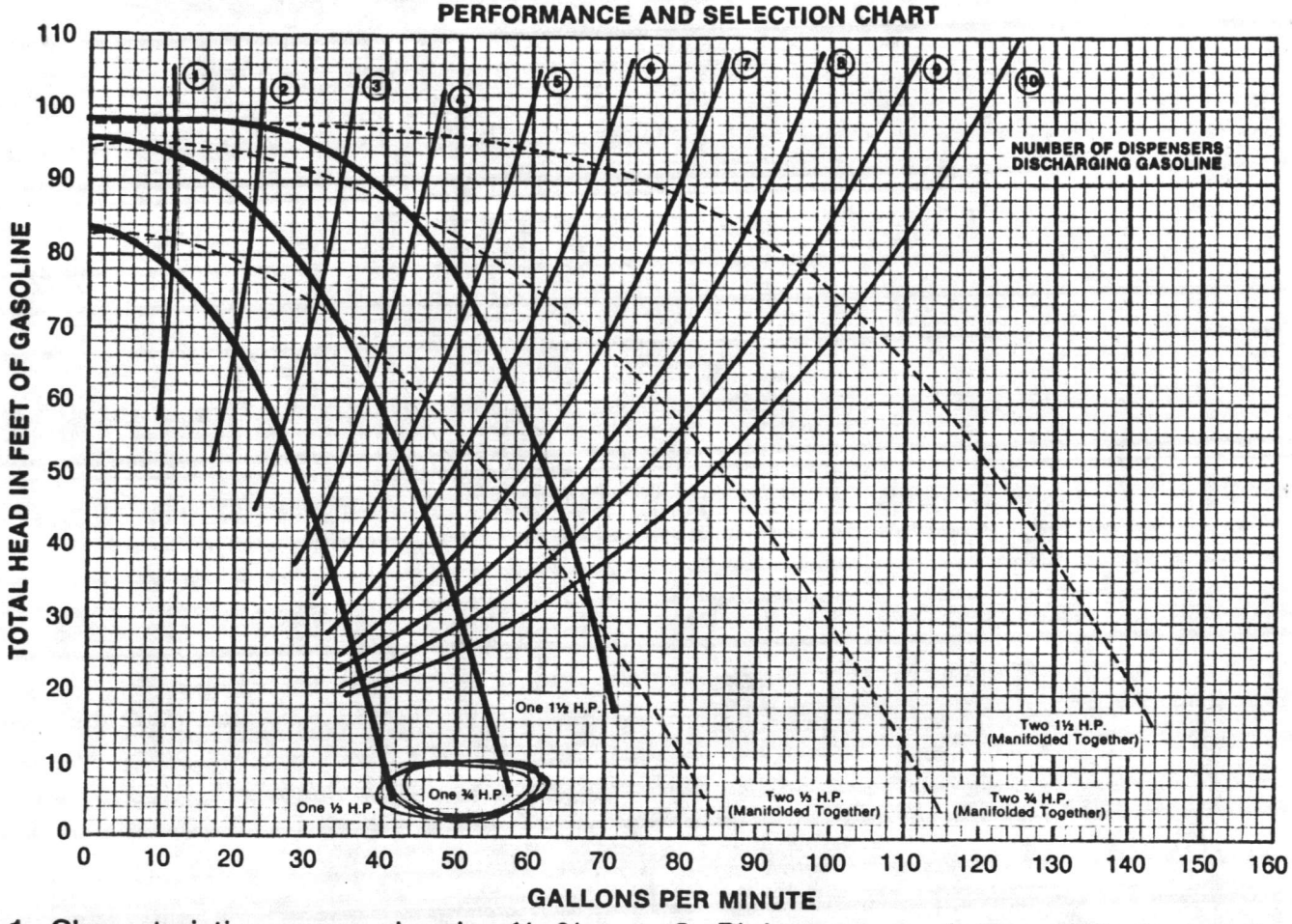
LAKE SHORE ELECTRIC CORPORATION
Bedford, Ohio U.S.A.

SCALE	REVISIONS	BY	DATE
DATE 9-15-78			
DR'N JJS CKD.			
APVD			

TITLE: METER FREQUENCY

NO. 1963000

PERFORMANCE AND SELECTION CHART



1. Characteristics curves showing ⅓, ¾ and 1½ H.P. pumps, each operating individually and as two manifolded together.
2. Piping pressure loss — 125′ of equivalent 2″ pipe and fittings.
3. Curves are based upon use of a typical automatic nozzle at middle setting.

HOW TO ORDER YOUR RED JACKET SUBMERSIBLE PUMP

1. Select correct model from performance chart above.
2. Specify tank diameter.
3. Specify fiberglass or steel tank.
4. Specify top of tank bury depth.

OUTSTANDING REPLACEMENT PROGRAM

Red Jacket gives you the best pump/motor replacement program in the industry. Red Jacket replacement motors are directly interchangeable with all currently designed competitive submersible pumps. It is unnecessary to carry a large stock of different replacement units. You need to stock only a ⅓ H.P. UMP33R1 or a ¾ H.P. UMP75S1. And all replacement units are entirely new — not rebuilt.

What's more, stock in our field warehouses assures a ready supply of units and you have the advantage of the industry's largest network of trained service personnel.

RED JACKET®
PUMPS
A Division of Wylain, Inc.

P.O. Box 3888 Davenport, Iowa 52808

Form No. 5169

DISTRIBUTOR GRAYBAR ELECTRIC COMPANY
WILMINGTON, NC

DIST. ORDER NO.

FACTORY NO.

TYPE OF EQUIPMENT TRANSFORMER, SAFETY SWITCHES

JOB	REPLACE AUXILLIARY GENERATOR
LOCATION	NEW RIVER AIR STATION, NC
ARCHITECT	
ENGINEER	
ELEC. CONTRACTOR	HARRIS ELECTRIC

FIELD ENGINEER L. WILSON

HEADQUARTERS ENGINEER S. NIZINSKI

HARRIS ELECTRIC CO.
OF
WILMINGTON
BOX 4487, WILM., N.C. 28406

APPROVED ✓

DISAPPROVED

APPROVED AS NOTED

RESUBMITTAL (IS) (IS NOT) REQUIRED

CHECKED BY MEH DATE 12-2-83

CONT. 5840 SPEC 5840

8 COPIES OF DRAWINGS FOR

[XX] APPROVAL [ ] RECORD

DATES SUBMITTED:

SQUARE D COMPANY

STD-2-R2

TRANSFORMER SCHEDULE

DRY TYPE TRANSFORMERS

PAGE 1 OF 1

DESIGNATION	DRAWING NO.	NO. REQ'D	KVA	PHASE	VOLTS		PRIMARY TAPS	MTG.	CATALOG NUMBER	TEMP. RISE	DB SOUND LEVEL	ENCL.	NOTES
					PRIMARY	SECONDARY							
	DM2R12	1	225	3	480	208Y/120	6-2½%	Floor	225T3H	150	55		
									WITH WEATHERSHIELD				
									WS 366				

DATE DECEMBER 2, 1983

JOB NAME REPLACE AUX. GENERATOR - NEW RIVER AIR STATION, NC

SQUARE D COMPANY

SORGEL TRANSFORMERS

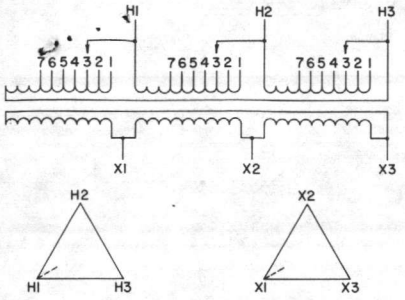
AJR 4/80

CIRCUIT BREAKER AND SAFETY SWITCH SCHEDULE

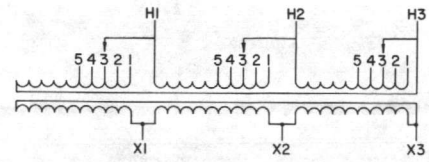
B

PAGE 1 OF 1

MARKING	NO. REQ'D	DRAWING NUMBER	TYPE								ENCLOSURE—NEMA TYPE							MTG	CATALOG NUMBER	SYSTEM	AMPS.	VOLTS
			CKT. BKR.		SAFETY SWITCH																	
			IND.	S.E.	H	HU	D	DU	DT	DTU	1	3R	4&5	4X	7	9	12					
	1	SSD60G					X					X							D222NRB $84	2PSN	60	240
	2	SSD30G						X				X							DU321RB $75	3P	30	" "
																			$234			
			FUEL TRANSFER PUMP - 30/2P, 240V																DU321RB $75			
			BATT. CHARGER - 30/2P, 277V																HU361RB $126			
			WATER HTR - 60/2P, 277V																HU 362 RB $223			
																			$424			
																			INCREASED $190			
															$223				HU 362 RB			
															$126				HU361 RB			



SECONDARY 240 V. DELTA
6 TAPS
15 KVA THRU 300 KVA



SECONDARY 240 V. DELTA
4 TAPS
500 KVA ONLY

15 KVA
THRU
75KVA

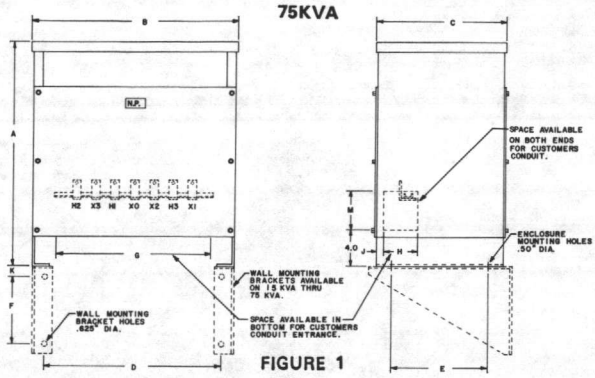
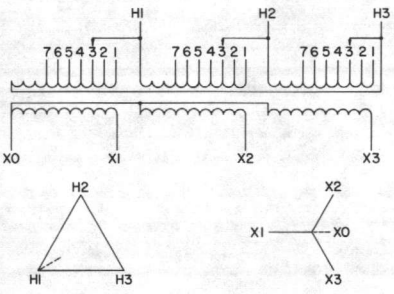
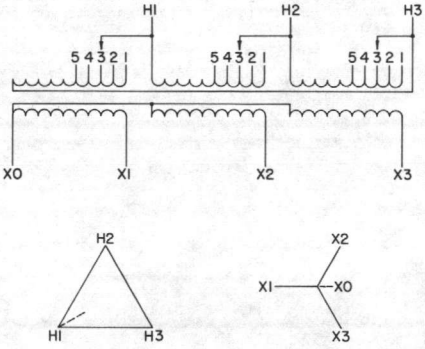


FIGURE 1



SECONDARY 208Y/120 V.
6 TAPS
15 KVA THRU 300 KVA



SECONDARY 208Y/120 V.
4 TAPS
500 KVA ONLY

112.5 KVA
THRU 500 KVA

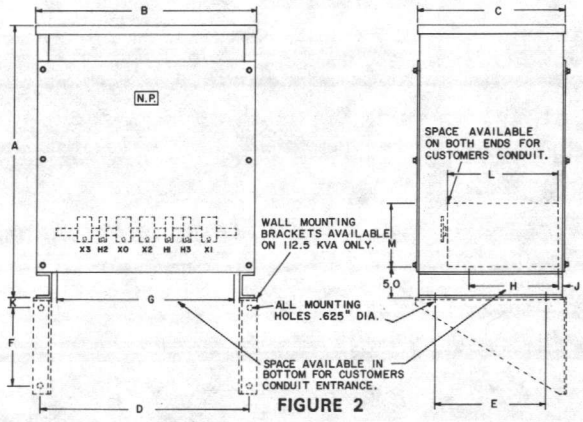


FIGURE 2

	In Each Phase Connect to Taps	
PRIMARY VOLTS	2-2.5% FCAN 2-2.5% FCBN	2-2.5% FCAN 4-2.5% FCBN
504	1	1
492	2	2
480	3	3
468	4	4
456	5	5
444	—	6
432	—	7

480 VOLTS DELTA PRIMARY, 3 PHASE, 60 HERTZ, 150°C. RISE ABOVE 40°C. AMBIENT

KVA	CATALOG NUMBER		DIMENSIONS IN INCHES												Guar. Sound Level in DB'S	Fig.	Wgt.	Av. % Z
	208Y/120 V. Secondary	240 V. Delta Secondary	A	B	C	D	E	F	G	H	J	K	L	M				
15	15T3H	15T6H	23	22.25	15	20	11	8	17	4	.625	1.125	—	4.5	45	1	230	3.6
30	30T3H	30T6H	23	22.25	15	20	11	8	17	4	.625	1.125	—	4.5	45	1	285	5.5
45	45T3H	45T6H	26	24	15	22	11	8	18	4	.625	1.125	—	4.5	45	1	369	5.7
75	75T3H	75T6H	30	30	20	28	15	11.25	24	9	5.5	1.125	—	5.0	50	1	590	5.2
112.5	112T3H	112T6H	37	30	20	28	15	11.25	24	10.5	1.250	1.125	—	7.5	50	2	690	6.9
150	150T3H	150T6H	42	36	24	33	22	—	28	11	5	—	14	8.5	50	2	1050	6.7
225	225T3H	225T6H	42	36	24	33	22	—	28	11	5	—	14	8.5	55	2	1350	6.6
300	300T3H	300T6H	48	48	29.5	45	28	—	40	13	5.75	—	13	10	55	2	2000	3.7
500	500T68H	500T63H	58	48	29.5	45	28	—	40	13	5.75	—	13	10	60	2	2700	6.2

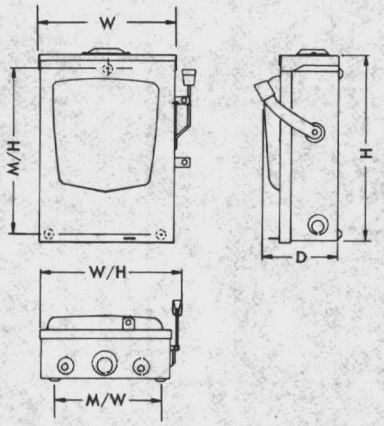
Dry-Type Transformers

480 Volts Delta Primary
Three Phase 60 HERTZ
15 to 500 KVA

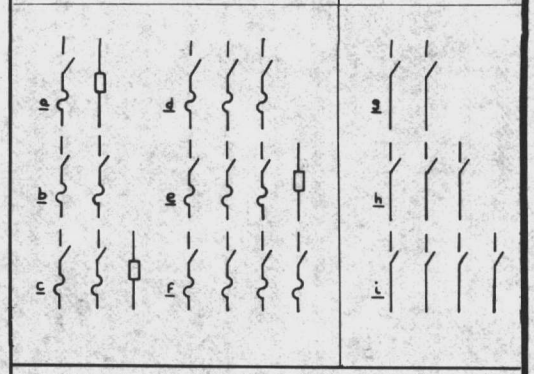
UL Listed

SORGEL TRANSFORMERS
SQUARE D COMPANY

DM-2-R12 **DATE: JULY, 1983**



WIRING DIAGRAMS



TERMINAL LUGS

Amps.	Max. Wire	Min. Wire	Type
60	2	14	Al or Cu

CATALOG NO.	Amps.	Volts A.C.	Wir. Dig.	HORSEPOWER RATING 240 V. A.C. Std. 1Ø	Std. 3Ø	Max. 1Ø	Max. 3Ø	OVERALL DIMENSIONS INCHES To Within (±) 1/16 H	W	W/H	D	M/H	M/W	CONDUIT SIZES KNOCKOUTS Bottom	Sides and Back
D222N	60	240	c	3	7½	10	15	11¼	7⅞	8⅜	4¾	8½	5⅜₁₆	2-½, ¾, 1; 1-1, 1¼, 1½, 2	2-½, ¾, 1, 1¼
D222NRB	60	240	c	3	7½	10	15	12¼	7⅞	8¹⁵⁄₁₆	5	9¼	5¼	2-½, ¾, 1; 1-1, 1¼, 1½, 2	1-½, ¾, 1, 1¼
D322	60	240	d	3	7½	10	15	11¼	7⅞	8⅜	4¾	8½	5⅜₁₆	2-½, ¾, 1; 1-1, 1¼, 1½, 2	2-½, ¾, 1, 1¼
D322N	60	240	e	3	7½	10	15	11¼	7⅞	8⅜	4¾	8½	5⅜₁₆	2-½, ¾, 1; 1-1, 1¼, 1½, 2	2-½, ¾, 1, 1¼
D322NRB	60	240	e	3	7½	10	15	12¼	7⅞	8¹⁵⁄₁₆	5	9¼	5¼	2-½, ¾, 1; 1-1, 1¼, 1½, 2	1-½, ¾, 1, 1¼
D322RB	60	240	d	3	7½	10	15	12¼	7⅞	8¹⁵⁄₁₆	5	9¼	5¼	2-½, ¾, 1; 1-1, 1¼, 1½, 2	1-½, ¾, 1, 1¼
DU222RB	60	240	g	—	—	—	—	12¼	7⅞	8¹⁵⁄₁₆	5	9¼	5¼	2-½, ¾, 1; 1-1, 1¼, 1½, 2	1-½, ¾, 1, 1¼
DU322	60	240	h	—	—	10	15	11¼	7⅞	8⅜	4¾	8½	5⅜₁₆	2-½, ¾, 1; 1-1, 1¼, 1½, 2	2-½, ¾, 1, 1¼
DU322RB	60	240	h	—	—	10	15	12¼	7⅞	8¹⁵⁄₁₆	5	9¼	5¼	2-½, ¾, 1; 1-1, 1¼, 1½, 2	1-½, ¾, 1, 1¼

NOTES: FINISH — BLUE-GRAY ENAMEL
ALL NEUTRALS — INSULATED GROUNDABLE
APPROVAL — U/L FILE E-2875

Meets NEMA KS1-1975 For Type LD & Federal Spec. WS-865C For Type LD

■ 2Ø RATING

GENERAL DUTY SAFETY SWITCHES

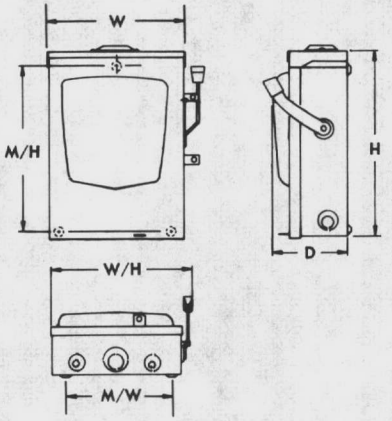
60 AMPERE

ENCLOSURE — NEMA 1 GENERAL PURPOSE
NEMA 3R RAINPROOF

SQUARE D COMPANY
DISTRIBUTION EQUIPMENT DIV.

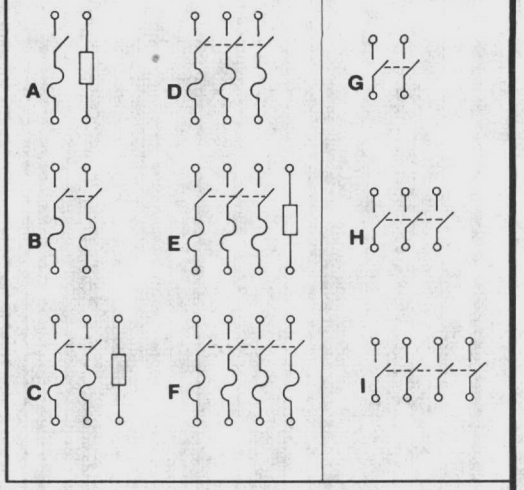
SSD-60G

3-78 Replaces SSD-60G dated 9-70



NEMA 3R illustrated. NEMA 1 has two mounting holes at top — same dimensions as bottom mounting holes.

WIRING DIAGRAMS



TERMINAL LUGS				
Amps.		Max. Wire	Min. Wire	Type
30	Line	#6 AWG #6 AWG	#12 AWG #14 AWG	Al Cu
	Load	#8 AWG	#14 AWG	Al or Cu

Catalog Number	Voltage Ratings	Diag.	Horsepower Ratings								Overall Dimensions (Inches) To Within (±) 1/16						Knockouts	
			120V. ac				240V. ac											
			Std.		Max.		Std.		Max.									
			1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	H	W	W/H	D	M/H	M/W	Top & Bottom▲	Sides & Back
D111N	120V. ac	A	½	—	2	—	—	—	—	—	7⅞	5⅛	5½	4	5¹⁵/₁₆	3	1—½, ¾, 1, 1¼ 2—½, ¾	2—½, ¾, 1
D111NRB	120V. ac	A	½	—	2	—	—	—	—	—	9⅜	5½	6	4½	5½	3	1—½, ¾, 1, 1¼ 2—½, ¾	1—½, ¾, 1
D121N	120V. ac	A	1½	—	2	—	—	—	—	—	7⅞	5⅛	5½	4	5¹⁵/₁₆	3	1—½, ¾, 1, 1¼ 2—½, ¾	2—½, ¾, 1
D121NRB	120V. ac	A	1½	—	2	—	—	—	—	—	9⅜	5½	6	4½	5½	3	1—½, ¾, 1, 1¼ 2—½, ¾	1—½, ¾, 1
D211	240V. ac	B	—	—	—	—	½	—	2	—	7⅞	5⅛	5½	4	5¹⁵/₁₆	3	1—½, ¾, 1, 1¼ 2—½, ¾	2—½, ¾, 1
D211N	240V. ac	C	½	1½●	2	3●	—	—	—	—	7⅞	5⅛	5½	4	5¹⁵/₁₆	3	1—½, ¾, 1, 1¼ 2—½, ¾	2—½, ¾, 1
D211NRB	240V. ac	C	½	1½●	2	3●	—	—	—	—	9⅜	5½	6	4½	5½	3	1—½, ¾, 1, 1¼ 2—½, ¾	1—½, ¾, 1
D211NWH	240V. ac	C	½	1½●	2	3●	—	—	—	—	8	5⅛	5¹³/₁₆	4¼	5¹⁵/₁₆	3	1—½, ¾, 1, 1¼ 2—½, ¾	2—½, ¾, 1
D221	240V. ac	B	—	—	—	—	1½	—	3	—	7⅞	5⅛	5½	4	5¹⁵/₁₆	3	1—½, ¾, 1, 1¼ 2—½, ¾	2—½, ¾, 1
D221N	240V. ac	C	—	—	—	—	1½	3●	3	7½●	7⅞	5⅛	5½	4	5¹⁵/₁₆	3	1—½, ¾, 1, 1¼ 2—½, ¾	2—½, ¾, 1
D221NRB	240V. ac	C	—	—	—	—	1½	3●	3	7½●	9⅜	5½	6	4½	5½	3	1—½, ¾, 1, 1¼ 2—½, ¾	1—½, ¾, 1
D321	240V. ac	D	—	—	—	—	1½	3	3	7½	8	6⁹/₁₆	7¼	4¼	5¹⁵/₁₆	4½	3—½, ¾, 1, 1¼	2—½, ¾, 1, 1¼
D321N	240V. ac	E	—	—	—	—	1½	3	3	7½	8	6⁹/₁₆	7¼	4¼	5¹⁵/₁₆	4½	3—½, ¾, 1, 1¼	2—½, ¾, 1, 1¼
D321NRB	240V. ac	E	—	—	—	—	1½	3	3	7½	8¹¹/₁₆	7	7⅜	4½	5½	4½	3—½, ¾, 1, 1¼	2—½, ¾, 1, 1¼
D321RB	240V. ac	D	—	—	—	—	1½	3	3	7½	8¹¹/₁₆	7	7⅜	4½	5½	4½	3—½, ¾, 1, 1¼	2—½, ¾, 1, 1¼
DU221RB	240V. ac	G	—	—	—	—	—	—	3	—	9⅜	5½	6	4½	5½	3	1—½, ¾, 1, 1¼ 2—½, ¾	1—½, ¾, 1
DU321	240V. ac	H	—	—	—	—	—	—	3	7½	8	6⁹/₁₆	7¼	4¼	5¹⁵/₁₆	4½	3—½, ¾, 1, 1¼	2—½, ¾, 1, 1¼
DU321RB	240V. ac	H	—	—	—	—	—	—	3	7½	8¹¹/₁₆	7	7⅜	4½	5½	4½	3—½, ¾, 1, 1¼	2—½, ¾, 1, 1¼

NOTES: Finish—Gray Baked Enamel
All Neutrals—Insulated Groundable
UL listed - File E-2875

Suitable for use as service equipment.
Short Circuit Rating: 10,000 Amperes with Class H or K fuses.
100,000 Amperes with Class R fuses.

▲ Top of NEMA 3R switches have provisions for maximum 2½" bolt-on hub.
● For grounded "B" phase systems only.

GENERAL DUTY SAFETY SWITCHES

Visible Blade Type
30 Ampere
Enclosure—NEMA 1 General Purpose
NEMA 3R Rainproof

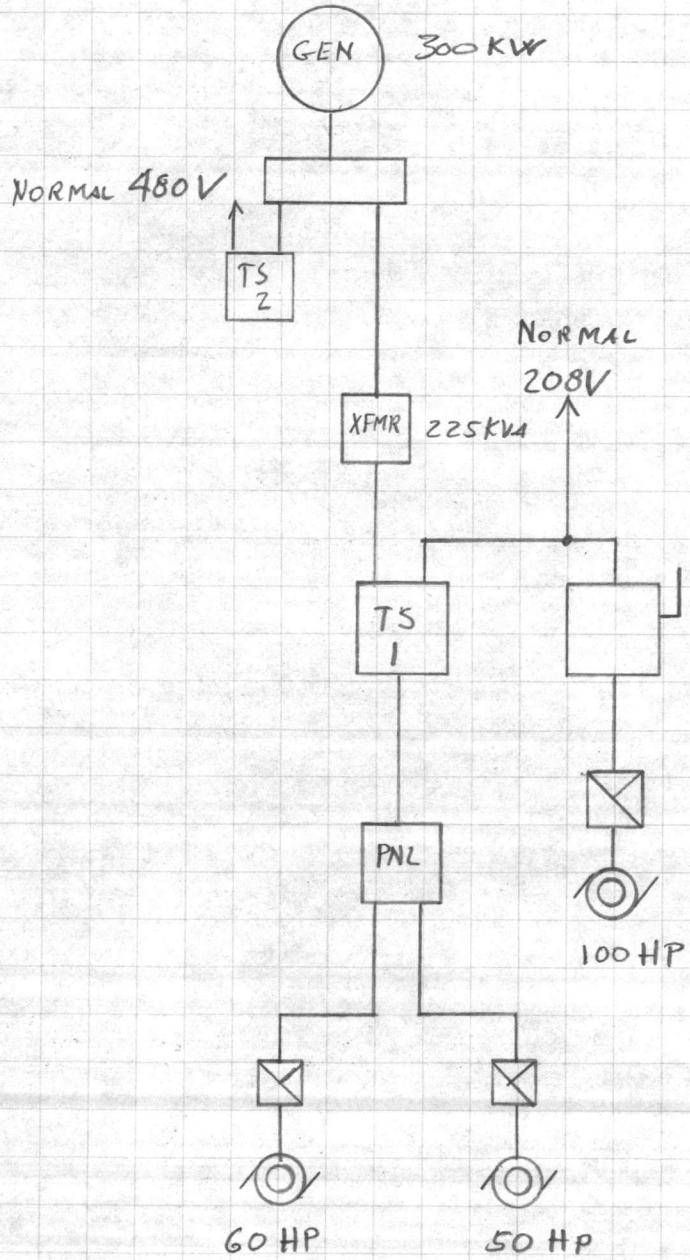
SQUARE D COMPANY
DISTRIBUTION EQUIPMENT DIVISION

DWG. NO. **SSD-30G** RP

12-82 Replaces SSD-30G dated 12-77

83-5840

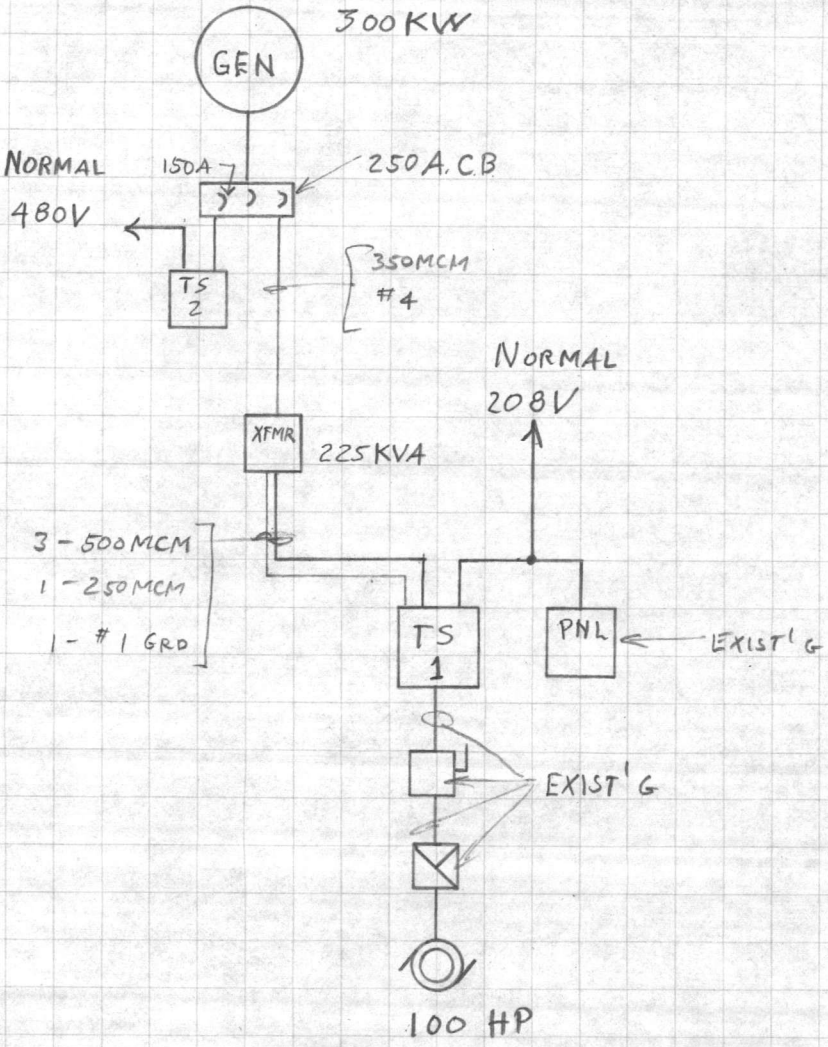
WATER PLANT DIRECTOR REQUESTED 60 HP & 50 HP LIFT PUMPS BE CONNECTED TO GENERATOR. IN LIEU OF 100 HP.



REVISED WIRING DIAGRAM – BLDG AS-110

404
3/16/83 A YOUNG

83 - 5840



WIRING DIAGRAM - AS-110

WATER PLANT -

KOHLER
Transfer Switches

(3)

30 through 800 amperes

single coil solenoid actuator, solid state logic

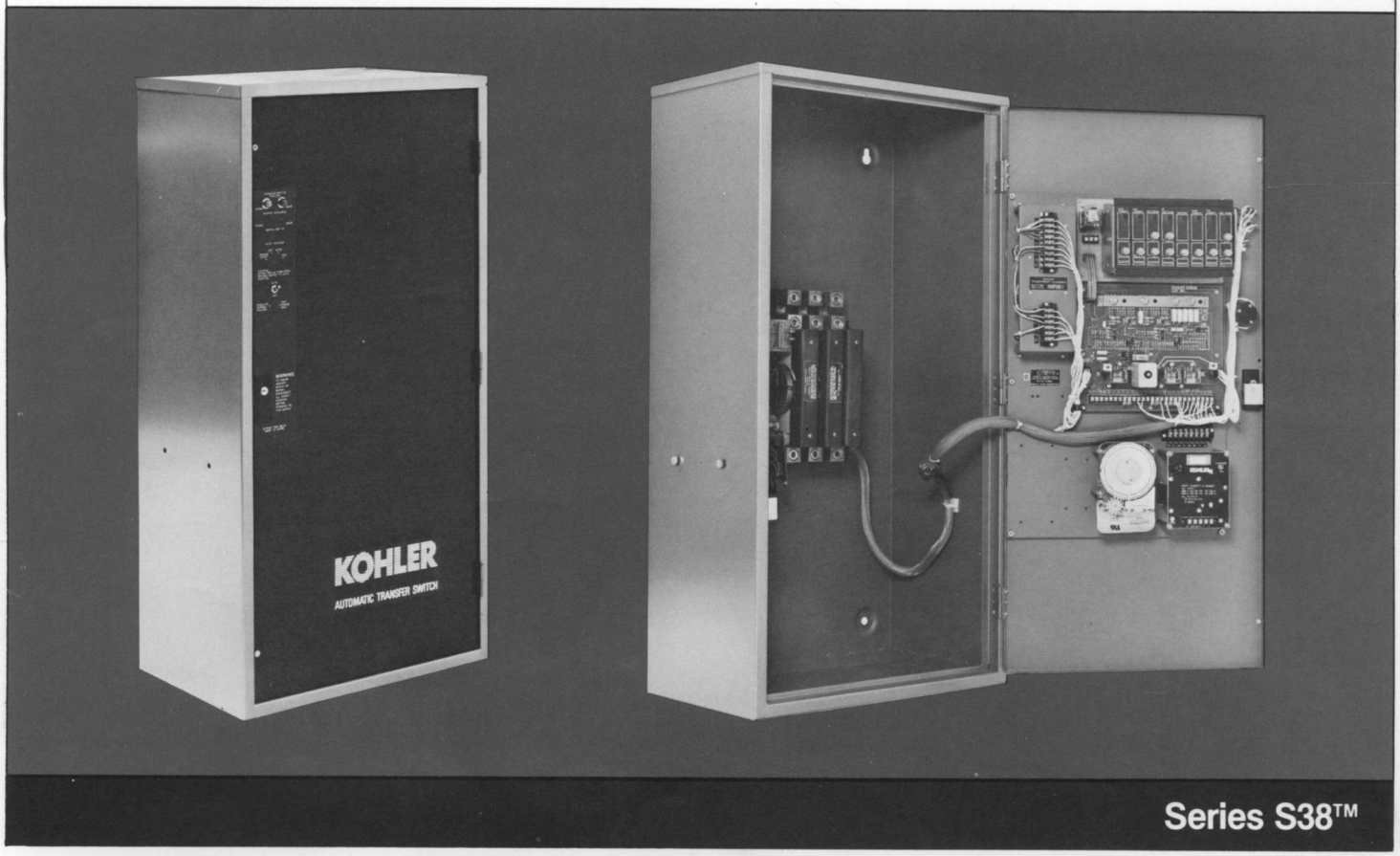
Series S38™ automatic transfer switches

standard features

- All Kohler transfer switches are UL-listed through 480 volts AC and CSA certified through 600 volts AC. They meet the voltage impulse withstand test in accordance with the proposed NEMA standard 1CS1-109 and voltage surge withstand capability in accordance with ANSI/IEEE C37.90-1978.
- Rated for all classes of load, both inductive and non-inductive.
- 100% equipment rated. Suitable for continuous duty at the rated current, either open or enclosed, without derating.
- Adjustable close differential normal phase voltage sensing from 72 to 100% of nominal for pickup and 70 to 98% for dropout.
- Mechanically held on normal or emergency.
- True double throw construction, inherently mechanically and electrically interlocked.
- High speed transfer, 1/6 second or less, including relay operating time for all capacities.
- Engine start contacts (close on power failure). Gold flashed contacts.
- LEDs (Light Emitting Diodes) indicate switch status. They light as each monitored function is complete. The LEDs also serve as a diagnostic aid.
- UL components recognized accessories available for field installation or factory installed.
- Accessory card rack with plug-in connector provides capacity for one additional timing and seven source monitoring functions. Accessory plug-in cards are key interlocked to prevent incorrect insertion.
- All relays, either standard or accessory, are of the plug-in type with spring retaining clips.

standard accessories

☐ For complete listing of standard accessories, see page 3.



Series S38™

Series S38™ Kohler Part Number Key

This diagram explains the Kohler Transfer Switch part numbering code system. The sample number shown is for a solid state logic Automatic Transfer Switch, 480 volt, 60 hertz, 3 phase, 3 pole, 4 wire, 150 ampere model in a NEMA 1 enclosure.

SAMPLE PART NUMBER

K-166341-0150

VOLTAGE & FREQUENCY PHASE TO PHASE

240V AC MAX
Available in 30-100 ampere sizes only.

21 — 110V 50/60HZ
22 — 120V 50/60HZ
23 — 220V 50/60HZ
24 — 240V 50/60HZ
27 — 190V 50/60HZ
28 — 208V 50/60HZ

600V AC MAX

60 — 600V 50/60HZ
61 — 110V 50/60HZ
62 — 120V 50/60HZ
63 — 220V 50/60HZ
64 — 240V 50/60HZ
65 — 550V 50/60HZ
66 — 480V 50/60HZ
67 — 190V 50/60HZ
68 — 208V 50/60HZ
69 — 440V 50/60HZ
71 — 380V 50/60HZ
73 — 416V 50/60HZ

NUMBER OF POLES

2 — 2 pole 1Ø
3 — 3 pole 3Ø
4 — 3 pole 1Ø
5 — 3 pole 3Ø with overlapping neutral contacts

NUMBER OF WIRES

2 — 2 Wire
3 — 3 Wire
4 — 4 Wire

TYPE OF ENCLOSURE

0 — Open
1 — NEMA 1
3 — NEMA 3R

AMPERES

0030 — 30 amperes
0070 — 70 amperes
0100 — 100 amperes
0104 — 104 amperes
0150 — 150 amperes
0225 — 225 amperes
0260 — 260 amperes
0400 — 400 amperes
0600 — 600 amperes
0800 — 800 amperes

USE PART NUMBER CODE TO SPECIFY TYPE AND CAPACITY OF SWITCH

The code number for the Kohler switch you have chosen is (fill in the boxes). . .

Voltage and frequency (See code above)		Number of poles (See above)	Number of wires (See above)	Type of Enclosure (See above)		Amperage Code (See above)			
K	- 1	6	6	5	4	1 (3)	-	0	2	2	5

SELECTION OF OPTIONAL ACCESSORIES

To complete the above specification, note the standard accessories described, select the desired optional accessories from pages 3-4, and enter in the blanks below.

(Name of specifier) Harris Electric

(Firm) New River

(Job)

standard accessories

supplied with Kohler switches S38™ Series

All Kohler switches with solid state controls, 30 to 800 amperes, have the following accessories supplied as standard:

KA-01-A (TDNE) Time Delay Normal to Emergency (adjustable 0.6 to 60 seconds).

KA-02-E (TDES) Time Delay on Engine Starting (fixed at 3 seconds).

KA-03-C (TDEN) Time Delay Emergency to Normal (adjustable 1 to 30 minutes).

KA-05-B Frequency voltage relay for emergency source, non-adjustable. Monitors 1 phase only.

KA-06-A or Test pushbutton for separate mounting. The momentary test switch will interrupt power to the normal source relay and simulate a power failure on normal as long as the switch is held in the test position.

KA-06-B Test pushbutton. Identical to 06-A except mounted on the enclosed door.

KA-09-C Disconnect plug to prevent automatic operation.

KA-15-A Main shaft auxiliary contact closed on normal (for 600 volt maximum switches).

optional accessories

Series S38™ automatic transfer switches

Accessory Number	Description
KA-02-AS†	(TDES) Time Delay on Engine Starting (adjustable 3-20 seconds). TDES delays initiation of the engine start circuit in order to ignore momentary power outages or fluctuations. This timer begins timing when the normal source fails. It is intended for use when the emergency source is an engine generator, and does not affect the transfer switch's ability to transfer from normal to emergency.
KA-04-CS	(TDEC) Time Delay for Engine Cool-off (adjustable 1-30 minutes). TDEC permits the generator to run under a no-load condition after transfer from emergency to normal. This timer begins timing when the switch transfers to normal.
KA-05-AS†	Under frequency card for emergency source (adjustable 45-60 hertz). Monitors emergency source frequency (one phase only) and prevents transfer until that source reaches the preset level. If the emergency source fails or is outside of the card setting and normal is available, the switch will immediately transfer to normal.
KA-05-CS†	Over-frequency card for emergency source (adjustable 50-65 Hz) monitors generator frequency (one phase only). Similar in operation to accessory KA-05-AS.
KA-05-ES†	Over-voltage card for emergency source (adjustable, from 100 to 115%, nominally set at 115% dropout unless otherwise specified). Monitors emergency source voltage (one phase only) and prevents transfer until that source reaches the preset level. If the emergency source fails or is outside of the card setting and normal is available, the switch will immediately transfer to normal.
KA-05-FS†	Under-voltage card for emergency source. Monitors three phases, adjustable 70-100%. Similar in operation to accessory KA-05-E. *See Table 5 for voltage suffix.*
KA-05-GS†	Over-voltage card for emergency source. Same as KA-05-E except monitors three phases. *See Table 5 for voltage suffix.*
KA-06-C†	Maintained test switch for separate mounting. Not UL listed.
KA-06-DS	Maintained test switch. Identical to accessory KA-06-C except mounted on enclosure door.
KA-07-C	Four position selector switch (selector switch with white light, for separate mounting). Permits four modes of switch operation: Test, Auto, Off and Engine Start. The Off position de-energizes the control circuitry and opens the engine start circuit. The transfer switch will not operate nor will the engine start on power failure. The Test position simulates a normal power failure. The Auto position returns the transfer switch to automatic operation. The Engine Start position closes the engine start circuit. The switch will not transfer unless the normal source fails. A white lamp will light in all positions except the Auto position. (Accessory 6 is omitted if accessory 7 is selected.)
KA-07-DS	Four position selector switch, same as accessory KA-07-C, installed. (Accessory 6 is omitted if accessory 7 is selected.)
KA-08-A†	Pushbutton override to normal. Bypasses accessory KA-03-C and allows manual transfer at any time after normal power is restored. (For separate mounting.) See accessory 29 for pushbutton operation.
KA-08-CS	Pushbutton retransfer to normal. (Same as KA-08-A except installed.)

Accessory Number	Description
KA-10-A	Two-position selector switch permits selection of either the normal or emergency source as the preferred power source. The preferred source is the one the switch will always transfer to if that source is available. For use with one commercial power and one engine-generator, or two commercial power sources. (For separate mounting.)
KA-10-BS	Two-position selector switch. (Identical to KA-10-A except mounted on the enclosure door.)
KA-10-C	Two-position selector switch for separate mounting. (Same as KA-10-A except used when both sources are engine-generators.)
KA-10-DS	Two-position selector switch. Identical to KA-10-C, except installed.
KA-12-A†	Pilot light normal supply for separate mounting. Green lamp indicates transfer switch in normal position and normal power is supplying load. Up to four pilot lights can be paralleled. Does not require accessory 15.
KA-12-B†	Pilot light emergency supply for separate mounting. Red lamp indicates transfer switch in emergency position and emergency power is supplying load. Up to four pilot lights can be paralleled. Does not require accessory 15.
KA-12-CS	Pilot light normal supply. Identical to KA-12-A, installed.
KA-12-DS	Pilot light emergency supply. Identical to KA-12-B, installed.
KA-12-E†	Pilot light normal supply for separate mounting. White lamp indicates normal power is present. Up to four pilot lights can be paralleled. Does not require accessory 15.
KA-12-F†	Pilot light emergency supply for separate mounting. White lamp indicates emergency power is present. Up to four pilot lights can be paralleled. Does not require accessory 15.
KA-12-GS	Pilot light normal supply. Identical to KA-12-E, installed.
KA-12-HS	Pilot light emergency supply. Identical to KA-12-F, installed.
KA-14-C†	Relay auxiliary contact (normal source 2 NO and 2 NC). Relay coil is energized as soon as the switch transfers to normal power.
KA-14-D†	Relay auxiliary contact (emergency source 2 NO and 2 NC). Relay coil is energized as soon as emergency power is available. Suitable for use in operating louvers.
KA-15-E	One additional main shaft auxiliary contact rated 10 amperes at 480 V (closed on normal). Not available on 240 volt maximum switches. *See Table 6 for amperage suffix.*
KA-15-F	One main shaft auxiliary contact rated 10 ampere at 480 V (closed on emergency). Not available on 240 volt maximum switches. *See Table 6 for amperage suffix.*
KA-15-G	Two additional main shaft auxiliary contacts rated 10 ampere at 480 V (closed on normal). Not available on 240 volt maximum switches. *See Table 6 for amperage suffix.*
KA-15-H	Two main shaft auxiliary contacts rated 10 ampere at 480 V (closed on emergency). Not available on 240 volt maximum switches. *See Table 6 for amperage suffix.*
KA-15-J	Three additional main shaft auxiliary contacts rated 10 ampere at 480 V (closed on normal). Not available on 240 volt maximum switches. *See Table 6 for amperage suffix.*

† Also available as a field installable kit.

Accessory Number	Description
KA-15-K	Three main shaft auxiliary contacts rated 10 ampere at 480 V (closed on emergency). Not available on 240 volt maximum switches. *See Table 6 for amperage suffix.*
KA-18-G	Frequency meter mounted in enclosure door (not available with NEMA 3R enclosure).
KA-18-H	Running time meter mounted in enclosure door (not available with NEMA 3R enclosure).
KA-18-J	Voltmeter, ammeter and selector switch mounted in enclosed door (not available with NEMA 3R enclosure).
KA-18-K	Padlockable enclosure NEMA 1 or 3R
KA-21-A	Non-standard terminals (refer to wire terminal data, page 4).
KA-23-C	Plant exerciser for periodic exercising of the emergency generator set. Timer is adjustable over a 336 hour (14 day) period in increments of 30 minutes. Timer does not simulate a normal source failure. The automatic transfer switch is not affected. The generator set is signalled to run unloaded for the set time period. *See Table 1 for voltage suffix.*
KA-23-D	Plant exerciser for periodic exercising under load. Identical to accessory KA-23-C except simulates normal power failure. Includes override circuit to provide immediate retransfer to normal if emergency fails. *See Table 1 for voltage suffix.*
KA-23-G†	Plant exerciser. Identical to accessory KA-23-C except that a two position selector switch is included marked (Load/No Load) that permits either accessory KA-23-C or KA-23-D operation. *See Table 1 for voltage suffix.*
KA-24	Solid state battery charger. 3 ampere maximum charge rate with automatic adjustable float. Field convertible from 12 to 24 VDC. *See Table 2 for voltage suffix.*
KA-26-C	Over voltage protection for the normal source. Plug in printed circuit card. Adjustable from 100 to 115%; nominally set at 115% unless otherwise specified. Monitors one phase only.
KA-26-CS2	Identical to accessory KA-26-CS1 except monitors three phases.
KA-26-DS	Area protection with override circuit. For use with an external area protection panel. Transfers the load to emergency upon receiving an open contact signal from the area protection panel. In the event the emergency source fails and the normal source is present, the override circuit will bypass the area protection panel signal and retransfer the switch to the normal source.
KA-26-GS	Over frequency protection for the normal source. Adjustable from 50-65 hertz monitors one phase only. Plug-in printed circuit card.
KA-26-HS	Under frequency protection for the normal source. Adjustable from 45-60 hertz monitors one phase only. Plug-in printed circuit card.
KA-27-A	Non-standard voltages. Used when the listed voltages are not sufficient (i.e. if the normal voltage is 208 and the emergency is 240).
KA-28-A	Intelligence circuit fuses. Provides fuses for all non-essential circuitry.
KA-29-B	Pushbutton operation from emergency to normal and normal to emergency. For separate mounting, PBEN & PBNE provide automatic engine starting. Not UL listed.
KA-29-C	Pushbutton operation from emergency to normal. For separate mounting. PBEN provides automatic engine starting and transfer to emergency. Not UL listed.
KA-29-DS	Pushbutton operation. Identical to accessory KA-29-B except mounted in the enclosure door.
KA-29-ES	Pushbutton operation. Identical to KA-29-C except mounted in the enclosure door.
KA-29-F	Pushbutton operation. Identical to KA-29-B plus a two-position selector switch marked automatic/manual that provides either automatic or manual operation. For separate mounting. Not UL listed.
KA-29-GS	Pushbutton operation. Identical to KA-29-F except mounted on the enclosure door.
KA-29-H	Pushbutton operation. Identical to KA-29-C plus a two-position selector switch marked automatic/manual that provides either automatic or manual operation. For separate mounting. Not UL listed.
KA-29-JS	Pushbutton operation. Identical to KA-29-H except mounted on the enclosure door.
KA-30-A	Cranking limiter. Opens the engine start circuit after its time delay is completed. It is initiated by an engine start contact closure. Adjustable from 30-200 seconds.
KA-31-A	Audible alarm. Sounds alarm when the automatic transfer switch is in the emergency position. A silencing switch is included. For separate mounting. *See Table 3 for voltage suffix.*
KA-31-B	Audible alarm. Identical to accessory KA-31-A except mounted in the enclosure. *See Table 3 for voltage suffix.*
KA-34-A	Inphase monitor. Monitors the normal and emergency sources and will not permit transfer in either direction until the phase voltages are within ±15° and have a frequency difference within ±2 cycles. If the source supplying the load fails or drops below 70%, the monitor will override itself and permit immediate tranfer. *See Table 4 for voltage suffix.*
KA-35-A	Load shedding contacts. Provides 1 NO and 1 NC contacts that operate 3 seconds before the automatic transfer switch transfers in either direction.
KA-35-B	Load shedding contacts. Identical to accessory KA-35-A except that 2 NO and 2 NC contacts are furnished.
KA-36-A	Overlapping neutral contact. Provides switched neutral contact for applications requiring a four-pole switch. Normal and emergency source neutrals are both connected to load during transfer for 100 milliseconds or less. *To specify accessory KA-36-A, refer to the "Number of Poles" section in the Part Number Key on page 2.*
KA-37-A	Five (5) foot extender wire harness for intelligence circuit.
KA-37-B	Ten (10) foot extender wire harness for intelligence circuit.
KA-37-C	Twenty (20) foot extender wire harness for intelligence circuit.
KA-50-A	CSA nameplate identification (bilingual).
KA-70-A	Non-standard accessories. This number is reserved for accessories specified for applications requiring a Kohler engineered system.
	Bag of 5 dummy cards. The solid state accessory mounting board has seven slots. If all are not used, dummy cards should be inserted in the unused slot.

† Also available as a field installable kit.

VOLTAGE AND AMPERAGE SUFFIXES

The following tables present the suffix code numbers needed in some instances to complete the accessory part numbers. Refer to Tables 1 through 5 for the correct suffix indicating the phase-to-phase voltage and frequency you require, or Table 6 for the amperage code. Where applicable, the above accessory descriptions tell which table to use. Normally the voltage suffix should be the same as the switch voltage. If an accessory 23-plant exerciser, an accessory 24-battery charger or an accessory 31-audible alarm is required to be activated from a source other than the switch voltage, select the desired voltage from the table and add a note to the order stating: **Do not factory wire input.** All other accessories must have the switch voltage suffix.

TABLE 1

Suffix	Voltage	Frequency
A	110-120	60 HZ
B	208-240	60 HZ
C	550-660	60 HZ
D	440-480	60 HZ
E	380-440	50 HZ
F	110-120	50 HZ
G	208-240	50 HZ

TABLE 2

Suffix	Voltage	Frequency
C	110-120	50/60 HZ
D	220-240	50/60 HZ
E	208	50/60 HZ
F	480-600	50/60 HZ
G	190-220	50 HZ
H	380	50 HZ
J	416	50 HZ

TABLE 3

Suffix	Voltage	Frequency
A	110-120	50/60 HZ
B	190-208	50/60 HZ
C	220-240	50/60 HZ
D	380-416	50/60 HZ
E	440-480	50/60 HZ
F	550-600	50/60 HZ

TABLE 4

Suffix	Voltage	Frequency
B	208	60 HZ
C	240	60 HZ
D	480	60 HZ
E	220	50 HZ
F	380	50 HZ
G	416	50 HZ
H	440	50 HZ

TABLE 5

Suffix	Voltage	Frequency
1	208	50/60 HZ
2	480	50/60 HZ
3	550-600	50/60 HZ
4	110/120 240	50/60 HZ
5	220/380	50/60 HZ
6	240/416	50/60 HZ

TABLE 6

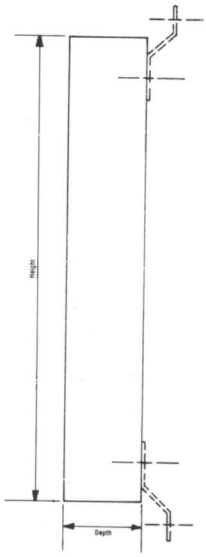
Amperage
Add suffix A for 30-150 amperes
Add suffix B for 225-400 amperes
Add suffix C for 600-800 amperes

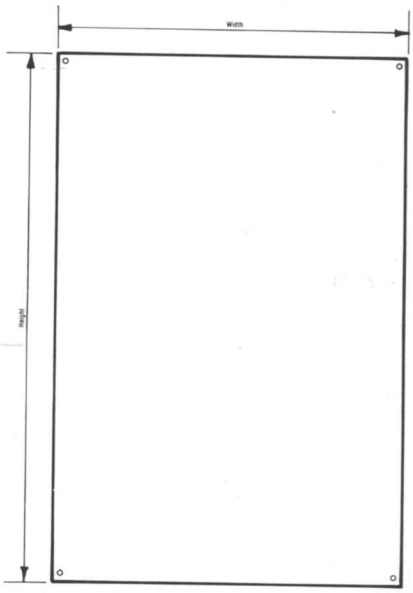
wire terminal data

Sizes of AL-CU listed solderless screw type terminals for external power connections.

Switch Rating (Amperes)	Range of Wire Sizes	Switch Rating (Amperes)	Range of Wire Sizes
30	One #14 to #6	400	Two #1/0 to 250 MCM or One #4 to 600 MCM
70	One #14 to 1/0	600	Two #2 to 600 MCM
100-104	One #14 to 2/0	800	Three #2 to 600 MCM
150	One #8 to 3/0		
225-260	One #4 to 400 MCM		

dimensions and weights





		Dimensions in Inches (Millimeters)										
		Measurement of Contactor Only Open**			Measurements of NEMA 1 Enclosure Enclosed (NEMA 1)			Measurements of Outdoor Enclosure Outdoor (NEMA 3R)			Nominal Weight Lbs. (kg)	
Switch Rating in Amperes	Number of Poles	Height	Width	Depth	Height	Width	Depth	Height	Width	Depth	Switching Device Plus Intelligence Circuit Open	NEMA 1 or NEMA 3R Enclosed
30	2	8⅞ (222)	6 15/16 (173)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
30	3	8⅞ (222)	7 1/16 (177)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
30	3*	8⅞ (222)	7 13/16 (195)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
70	2	8⅞ (222)	6⅛ (160)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
70	3	8⅞ (222)	7¼ (179)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
70	3*	8⅞ (222)	7 5/16 (198)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
100	2	8⅞ (222)	6⅛ (160)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
100	3	8⅞ (222)	7¼ (179)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
100	3*	8⅞ (222)	7 5/16 (198)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
104	2	8⅞ (222)	6⅛ (160)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
104	3	8⅞ (222)	7¼ (179)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
104	3*	8⅞ (222)	7 5/16 (198)	4¾ (121)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
150	2	9¾ (248)	6 13/16 (170)	5 (127)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
150	3	9¾ (248)	7 13/16 (195)	5 (127)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
150	3*	9¾ (248)	8¾ (222)	5 (127)	33¾ (857)	22⅜ (584)	13 15/16 (348)	36 (913)	23⅞ (597)	14½ (368)	61 (28)	120 (55)
225	2,3	15½ (394)	11 (279)	5⅞ (149)	47 1/16 (1177)	23⅜ (584)	15¼ (396)	49⅛ (1254)	23⅞ (597)	16¾ (425)	77 (35)	160 (73)
225	3*	15½ (394)	13 (330)	5⅞ (149)	47 1/16 (1177)	23⅜ (584)	15¼ (396)	49⅛ (1254)	23⅞ (597)	16¾ (425)	77 (35)	160 (73)
260	2,3	15½ (394)	11 (279)	5⅞ (149)	47 1/16 (1177)	23⅜ (584)	15¼ (396)	49⅛ (1254)	23⅞ (597)	16¾ (425)	77 (35)	160 (73)
260	3*	15½ (394)	13 (330)	5⅞ (149)	47 1/16 (1177)	23⅜ (584)	15¼ (396)	49⅛ (1254)	23⅞ (597)	16¾ (425)	77 (35)	160 (73)
400	2,3	15½ (394)	11 (279)	6¾ (172)	47 1/16 (1177)	23⅜ (584)	15¼ (396)	49⅛ (1254)	23⅞ (597)	16¾ (425)	77 (35)	160 (73)
400	3*	15½ (394)	14 (356)	6¾ (172)	47 1/16 (1177)	23⅜ (584)	15¼ (396)	49⅛ (1254)	23⅞ (597)	16¾ (425)	77 (35)	160 (73)
600	2,3	26¾ (680)	19¼ (489)	11 (279)	64¼ (1606)	32½ (813)	19⅞ (497)	68 (1726)	32 5/16 (825)	21 (534)	172 (78)	425 (193)
600	3*	26¾ (680)	22¾ (578)	11½ (292)	64¼ (1606)	32½ (813)	19⅞ (497)	68 (1726)	32 5/16 (825)	21 (534)	172 (78)	425 (193)
800	2,3	26¾ (680)	19¼ (489)	11 (279)	64¼ (1606)	32½ (813)	19⅞ (497)	68 (1726)	32 5/16 (825)	21 (534)	172 (78)	425 (193)
800	3*	26¾ (680)	22¾ (578)	11½ (292)	64¼ (1606)	32½ (813)	19⅞ (497)	68 (1726)	32 5/16 (825)	21 (534)	172 (78)	425 (193)

*3 pole with overlapping neutral (accessory 36).

**The intelligence circuit is 18(457) wide by 27.5(699) high and 6(15) deep.

5 steps to proper selection

To select the proper switch, only five simple steps are required.

1. Determine the proper phase-to-phase voltage, frequency, and number of poles.
2. Determine the current rating by totaling all lighting, motor, and other loads. With Kohler switches, lights can be tungsten, fluorescent, or other types such as sodium vapor. (The load may be 100% tungsten for switches rated through 400 amperes, or 30% or 400 amperes — whichever is greater — for switches rated 600 amperes and larger.) Motor loads are evaluated on the basis of full load running current only.
   Note: The switch should match the capacity of the larger of the normal and emergency source protective devices.
3. Based on the above, and considering the system voltage, select the catalog number of the switch, adding desired optional accessories.
4. Determine the operating environment of the switch, whether indoors, outdoors, under dusty conditions, in an explosive atmosphere . . . and specify the appropriate cabinetry.
5. Check for conformance to the available withstand, closing and interrupting ratings that the switch must handle during a possible short circuit on the system, and other specification requirements.

UL requirements

Industry has long observed and benefitted from the high standards established by Underwriters Laboratories for the performance and safety of electric equipment. It is therefore reassuring to specifiers to know that all Kohler Automatic Transfer Switches meet or exceed test requirements of UL standards for public safety. Kohler switches far surpass UL standards, as indicated by the chart below.

Series S38™ withstand, closing, and interrupting ratings

Switch Rating				Withstand Rating* and Closing Rating at 480 vac and X/R ratio of 6.6 or less Symmetrical amperes				
				When Used with Current Limiting Fuses**		When used with Molded-Case Circuit Breakers		
Volts	Amps	UL Standards Withstand and Closing	UL Standards Interrupting	WCR	Max. Fuse Size (Amps)	WCR	Max. Breaker Size (Amps)	Interrupting Rating
250	30	5,000	180	100,000	60	10,000	50	450
250	70	5,000	420	200,000	200	10,000	150	1,050
250	100	5,000	600	200,000	200	10,000	150	1,000
600	104	10,000	624	200,000	200	10,000	150	1,560
600	30	5,000	180	100,000	200	10,000	50	450
600	70	5,000	420	200,000	200	10,000	150	1,050
600	150	10,000	900	200,000	200	22,000	225	2,250
600	225	10,000	1,350	200,000	600	22,000	600	3,375
600	260	10,000	1,560	200,000	600	22,000	600	3,900
600	400	10,000	2,400	200,000	800	35,000	1,200	6,000
600	600	12,000	3,600	200,000	1,200	42,000	2,500	9,000
600	800	16,000	4,800	200,000	1,200	42,000	2,500	12,000

* Design improvements have permitted higher withstand ratings for certain size switches. For specific requirements consult Kohler Co. for certified ratings.
** Current limiting fuses may be of the Class J, K1, K5, R and L types.

This guide assumes proper application of the source protective device and the worst case conditions, i.e., zero impedance between the source protective device and the transfer switch and the short circuit currents would be those produced by a "bolted fault" connected directly to the switch's load terminals, and that the available fault current is maximum possible with source protective selected. The fuses are listed based upon the maximum "umbrella" values permitted in the UL classification shown. Refer to your Kohler Co. Distributor for other applications.

DISTRIBUTOR NETWORK

The availability of a broad range of service and immediate shipment of parts are vitally important in both standby and prime power installations. The sales and service of Kohler generator sets and transfer switches are handled by some 60 distributors and hundreds of dealers located throughout the United States and Canada. Kohler products are also sold internationally and backed up by a world-wide network of sales and service outlets. Single source supply covered by one overall warranty.

DISTRIBUTOR EXPERIENCE

The knowledge a distributor can bring to a standby or prime power installation establishes him as an important adjunct to the architect/engineer/contractor team. The distributor's knowledge and experience benefits the specifier intent on providing reliable electricity. The distributor has studied performance through regular servicing of many different types of generator installations and is an expert in this area. His reputation as a professional is backed up by long experience in standby power systems and regular participation in factory service schools.

WARRANTIES

Kohler Co. warrants each transfer switch it manufactures for one (1) year from date of purchase. Warranty language differs depending on whether the product is for personal, family, or household use applications or commercial-industrial applications. Copies of these warranties are available from Kohler Co., Kohler, Wisconsin 53044.

KOHLER CO., KOHLER, WISCONSIN 53044 PHONE 414 565-3381 TELEX 26888 TWX 910 264 3877

G11-005B-(383)
Printed in U.S.A.

KOHLER Transfer Switches

COVINGTON
P.O. BOX 18949
GREENSBORO, N.C.
27419-8949

Telephone: 919/292-9240
TWX: 510/922-7396

Charlotte
New Bern
Wilmington
Wilson

October 4, 1984

Harris Electric Co. of Wilmington
P. O. Box 4487
Wilmington, N. C. 28406

Attn: Mr. Gene Harris

Dear Mr. Harris:

In response to your inquiry regarding, bolting the vibration isolators to the floor, we have not found it necessary, on stationary units, due to the construction of the base of the isolator.

I have enclosed a brochure from Korfund Dynamics Corp. with the pertinent data high lighted.

If we can be of further assistance do not hesitate to call.

Sincerely,

COVINGTON DIESEL, INC.

David Hiester

David Hiester
Power Systems Engineer

ap

cc: B. Troutman

RECEIPT ACKNOWLEDGED
29 OCT 84

BULLETIN K23E

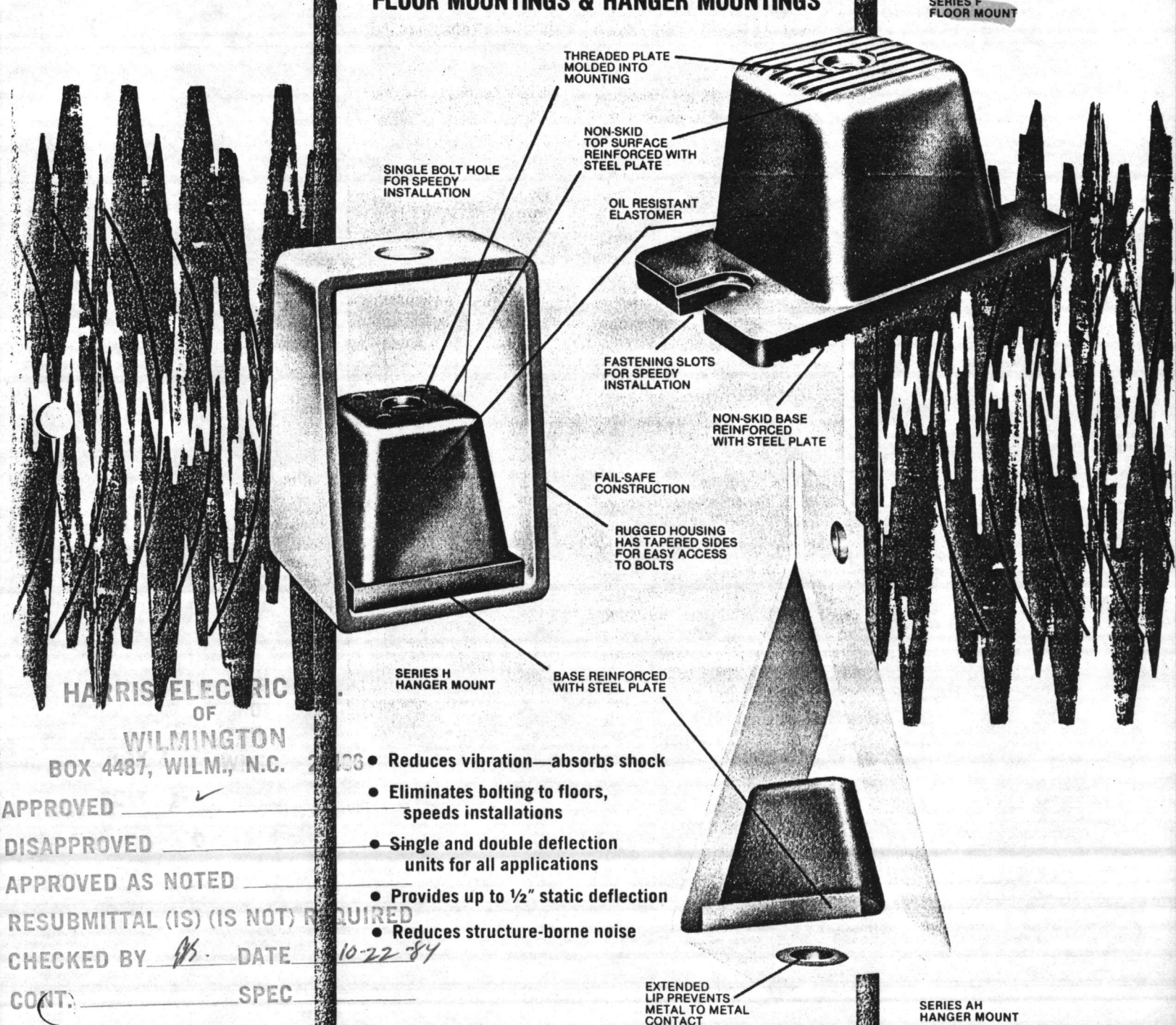
KORFUND

ELASTOMER VIBRATION ISOLATORS

SERIES F, H, & AH

10-5000 lb. LOAD RANGE

FLOOR MOUNTINGS & HANGER MOUNTINGS



- Reduces vibration—absorbs shock
- Eliminates bolting to floors, speeds installations
- Single and double deflection units for all applications
- Provides up to ½" static deflection
- Reduces structure-borne noise

HARRIS ELECTRIC
OF
WILMINGTON
BOX 4487, WILM., N.C. 2[illegible]

APPROVED ✓
DISAPPROVED
APPROVED AS NOTED
RESUBMITTAL (IS) (IS NOT) REQUIRED
CHECKED BY [illegible] DATE 10-22-84
CONT. SPEC

KORFUND
DYNAMICS CORPORATION

WHY USE ELASTOMER* VIBRATION ISOLATORS?

Korfund Elastomer isolators provide low cost vibration isolation. Standard deflection designs provide up to ¼" deflection, and double deflection designs provide up to ½" deflection. Most dynamic machines generate high frequency disturbances which we perceive as noise; these isolators are excellent in preventing structural noise transmission.

Korfund mounts are neoprene which is resistant to oils, acids and alkalis commonly encountered in industry. Normal temperature tolerance −10°F to +180°F. These mounts are so designed as to provide features of shear and compression for highest isolation efficiency, and for protection against shock overload. In addition, steel plates are molded in the mount's top and bottom surfaces to distribute loads more efficiently.

The basic resilient element of Korfund Elastomer mounts is available in both a floor-mounted design (SERIES F) and in a hanger mounted design (SERIES H), with all dimensions, loading, and deflection characteristics being the same in both design series. Each series is available in two static deflection ranges which are a function of mounting height, and in a broad range of loading capacities which are a function of mount size and elastomer durometer.

SERIES F mountings (floor mounts) are used in the same manner as vibration isolating pad-type materials, beneath a very wide variety of air conditioning, industrial, and business machines. In addition to providing isolation, they also speed machine installations by eliminating, in most cases, bolting to floors, due to the very effective ribbed construction of the non-skid base plate.

SERIES H mountings (hangers) are used to eliminate the transmission of vibration and structure-borne noise from suspended equipment and piping. The hangers may be fastened to the ceiling, or inserted in the hanger rods. A special feature (sizes A, AA, B & BB) is the tapering of the housing sides, permitting easier access to fastening bolts.

SERIES AH ceiling hangers have been designed specifically for use with suspended ceilings. They control impact noise, vibration and sound transmitted through floor-ceiling constructions by decoupling and isolating ceilings from floors. They also reduce the possibility of developing cracks in the ceiling by allowing relative movement between ceiling and floor. Optional fastening devices such as hook rods, eye straps or eye rods are offered to meet varying installation requirements.

HOW TO SELECT KORFUND ELASTOMER MOUNTS

Example: Select isolators for a floor-mounted compressor located in a basement on a heavy concrete floor. SPEED: 1200 rpm. WEIGHT: 2400 pounds.

1) Assuming uniform weight distribution at four points, load per mount is 600 pounds.
2) From Table 1, select the mount with the required load capacity (Load capacity shown is maximum for static load; not to be exceeded. Dynamic load application requires reduction of load capacity.) Example: FCC-720 (Red) or FC-720 (Red) can be used.
3) To determine deflection of isolator under static load, divide load per mount by the mount static constant. Example: FCC-720 (Red) 600 ÷ 1440 = 0.416" or for FC-720 (Red) 600 ÷ 2880 = 0.208".
4) To determine isolation efficiency, use this formula:

$$\% \text{ efficiency} = 100 + \frac{100}{1 - \left(\frac{fd}{188}\right)^2 \frac{\Delta_s}{C}}$$

fd = disturbing frequency (rpm)
Δ_s = static deflection (see step 3)
C = dynamic conversion coef. (from Table II)

Example:

$$\text{FCC-720: \% Eff.} = 100 + \frac{100}{1 - \left(\frac{1200}{188}\right)^2 \frac{0.416}{1.75}} = 88.5\%$$

$$\text{FC-720: \% Eff.} = 100 + \frac{100}{1 - \left(\frac{1200}{188}\right)^2 \frac{0.208}{1.75}} = 74\%$$

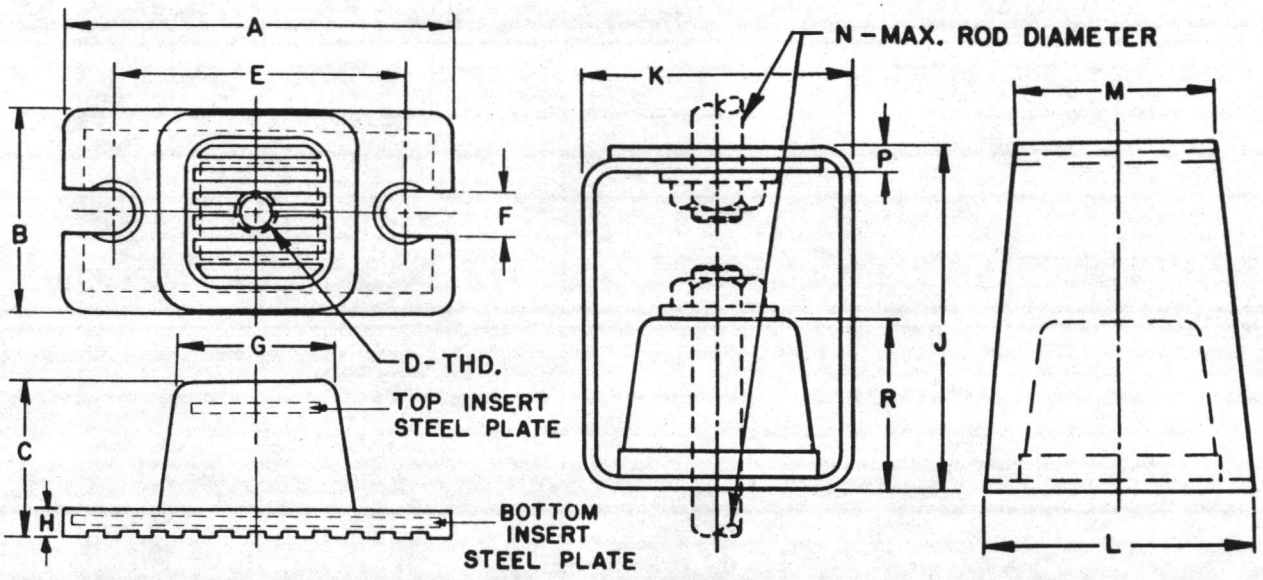
Do not use mounts whose efficiency is negative or greater than 100%.

HOW TO SPECIFY KORFUND ELASTOMER MOUNTS

SERIES F: The isolation mountings shall consist of a one-piece elastomeric unit having all metallic surfaces covered with elastomer material to resist corrosion. (Threads excluded). A non-skid tread shall be integrally molded into the top and bottom contact surfaces of all units (not on top surfaces for A and AA size) for maximum frictional effect when bolting is not required. Mountings shall have slotted base mounting holes to allow for misalignment of anchor bolts. They shall be capable of static deflections not less than inches at rated load. (Insert pertinent deflection from Korfund Bulletin K23). Mountings shall be Korfund Series F Elastomer Vibration Isolators.

SERIES H: The isolation hangers shall consist of a steel housing and a one-piece elastomeric isolation unit having all metallic surfaces covered with elastomer material to resist corrosion. They shall be capable of static deflections not less than inches at rated load. (Insert pertinent deflection from Korfund Bulletin K23). Hangers shall be Korfund Series H Elastomer Vibration Isolators.

*Elastomers are resilient materials such as neoprene, butyl, silicone, polyurethane, natural and buna rubber, etc.



SERIES F - FLOOR MOUNT **SERIES H - HANGER MOUNT**

(NUT, WASHER, & ROD BY OTHERS)

TABLE I

Mount Size and Loading Code	Color Code	Maximum Recommended Load Pounds	Maximum Static Deflection Std.	Maximum Static Deflection Dbl.	Mount Static Constant lbs. (#/in.) Std.	Mount Static Constant lbs. (#/in.) Dbl.	A	B	C Std.	C Dbl.	D	E	F	G	H	Weight Pounds Std.	Weight Pounds Dbl.	J	K	L	M	N	P	R Std.	R Dbl.	Weight Pounds Std.	Weight Pounds Dbl.
35	Green	35	0.12"		292		3	1 1/16	7/8	1 1/2	3/16-18	2 1/4	11/32	1 1/8	3/32	.19	.25	3 3/8	2	1 3/4	1 1/4	3/8	3/32	1	1 1/8	.56	.63
60	Blue	60			500																						
95	Yellow	95			792																						
60	Green	60				200																					
80	Blue	80	—	0.3"		267																					
160	Yellow	160				533																					
110	Green	110			550	275																					
190	Blue	190			950	475																					
260	Yellow	260	0.20"	0.40"	1300	650	3 3/4	2 1/8	1 1/8	1 7/8	3/8-16	3	3/8	1 5/16	1/4	.38	.50	4 1/8	2 5/8	2 1/8	1 1/2	5/8	3/64	1 1/8	2 1/8	1.2	1.3
470	Red	470			2350	1175																					
300	Blue	300			1200	600																					
500	Yellow	500			2000	1000																					
720	Red	720	0.25"	0.50"	2880	1440	5	3 1/16	1 3/8	2 3/4	1/2-13	4	5/16	2 5/16	3/8	1.4	1.6	5 5/8	3 3/4	3 3/16	3 3/16	1	3/64	1 1/8	3	3.3	3.6
1120	White	1120			4480	2240																					
1800	Yellow	1800			7200	3600																					
3000	Red	3000	0.25"	0.50"	12000	6000	7 1/8	4 5/8	1 3/8	2 3/4	5/8-11	5 7/8	5/16	3 7/8	3/8	2.9	3.9	7	5 1/2	5	5	1	1/2	2 1/8	3 1/4	12.7	13.6
5000	White	5000			20000	10,000																					

DYNAMIC CONVERSION TABLE II

MOUNTING COLOR CODE	GREEN	BLUE	YELLOW	RED	WHITE
DYNAMIC CONVERSION COEF. (C)	1.1	1.2	1.5	1.75	2.2

HOW TO ORDER KORFUND ELASTOMER MOUNTS

A complete designation for ordering mounts consists of: USE-CODE, SIZE-CODE and LOADING-CODE.
(The COLOR CODE — not needed when ordering — refers to the color in which the full designation is stamped on the mounting.)

F
USE-CODE
F = Floor Mount
H = Hanger Mount

DD
SIZE-CODE
Single letter denotes standard deflection; double letter denotes double deflection.

5000
LOADING-CODE
Denotes maximum allowable loading.

WHITE
COLOR-CODE
For convenience in the field.

PIPE HANGER SELECTOR

At the right is a helpful selector table to facilitate choosing the proper size of Korfund Elastomer Hangers for 14 different diameters of piping.

1. The hanger selection is based upon clevis-type installations on 10 foot centers, for water-filled pipe without valves or couplings.

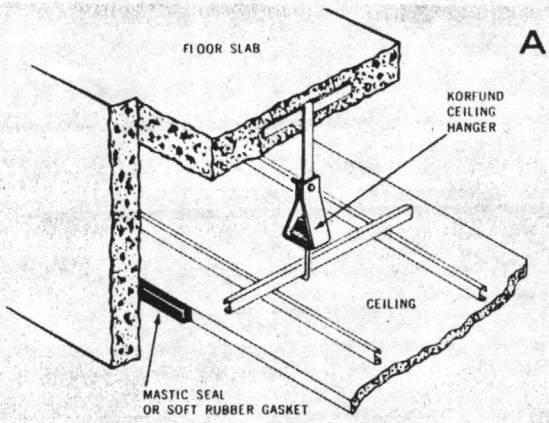
2. However, if valves or couplings are used within a section of piping, the extra weight of this equipment must be taken into consideration and the hanger selection altered accordingly.

3. If the hangers are spaced on centers other than 10 feet, the load per hanger is computed by multiplying the distance between hangers by the weight per foot of pipe filled with water, and the hangers selected accordingly.

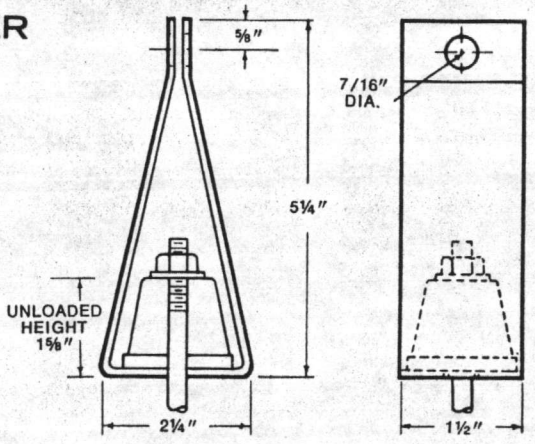
4. For steam or gas filled piping, compute load per hanger as outlined in the above Step 3, using the weight per foot of dry or steam filled piping, from the selector.

5. When trapeze or roller type hangers are used, compute the load per trapeze and divide by two. Then select proper size Korfund Elastomer Hanger.

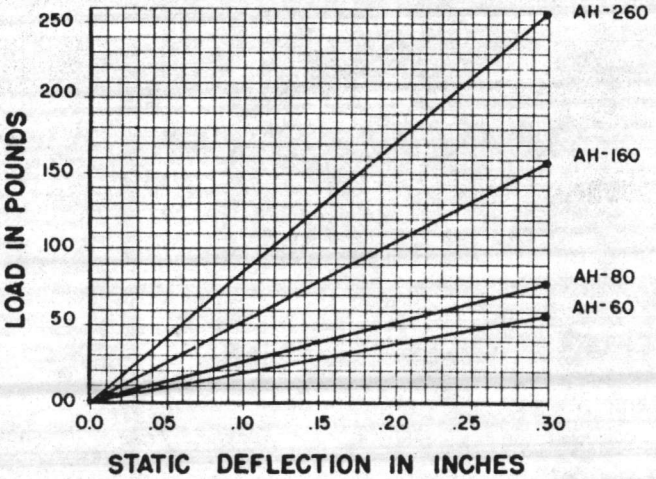
NOMINAL PIPE SIZE (INCHES)	WEIGHT PER FOOT Standard Pipe		ISOLATOR SELECTION Based on 10' centers, water filled	
	DRY OR STEAM FILLED—POUNDS	WATER FILLED—POUNDS	SERIES H	
			SINGLE DEFLECTION	DOUBLE DEFLECTION
¾	1.13	1.36	A-35	AA-60
1	1.68	2.06	A-35	AA-60
1¼	2.28	2.93	A-35	AA-60
1½	2.73	3.62	A-60	AA-80
2	3.68	5.15	A-95	AA-80
2½	5.82	7.91	A-95	AA-160
3	7.62	10.85	B-190	BB-190
3½	9.20	13.52	B-190	BB-190
4	10.89	16.45	B-260	BB-260
5	14.81	23.55	B-470	BB-470
6	19.18	31.8	B-470	BB-470
8	28.6	50.5	C-720	CC-720
10	40.5	75.0	C-1120	CC-1120
12	49.6	39.0	D-1800	DD-1800



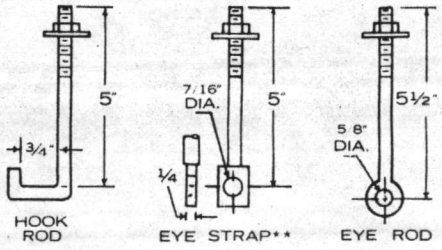
AH HANGER



LOAD DEFLECTION CURVES



OPTIONAL FASTENING DEVICES



NUT, WASHER, AND FASTENING DEVICE FURNISHED ONLY UPON REQUEST AND AT ADDITIONAL COST.

*EYE STRAP HAS FLAT SURFACE FOR BOLTING

HOW TO SPECIFY KORFUND AH CEILING HANGERS

The ceiling isolation hangers shall consist of a steel housing and a one-piece elastomeric isolation element. All metallic surfaces of the element to be covered with elastomer material to resist corrosion. They shall be capable of static deflections not less than ..... inches at rated load. (Insert pertinent deflection from Table 2.) Hangers shall be Korfund Series AH.

YOUR NEAREST KORFUND REPRESENTATIVE

KORFUND DYNAMICS CORPORATION

P.O. BOX 235 • CANTIAGUE ROAD • WESTBURY, N.Y. 11590

TELEX-12-7335

Over half a century of VIBRATION • SHOCK • NOISE / CONTROL & MEASUREMENT

83-5840

BYPASS SWITCH

GENERAL

The function of a Bypass-Isolation Switch is to enable personnel to inspect and maintain the Automatic Transfer Switch. By incorporating a Bypass-Isolation Switch in an emergency electrical system, the load will not be interrupted during periodical testing. This is critical for systems such as those for hospitals, computers, military installations and others where loads cannot be interrupted. Because the Automatic Transfer Switch is responsible for switching loads from a primary source to a secondary or standby source, a Bypass Isolation Switch helps to ensure reliability of the electrical system.

DESCRIPTION

Lake Shore Electric Bypass-Isolation Switch is a multi-pole rotary switch with a positive spring-loaded, make-before-break contact arrangement (overlapping contact arrangement). Heavy duty silver/tungsten contacts allow for quick visual inspection. Manual bypass handle and normal indicating light are provided. One source design is arranged to bypass normal and isolate emergency, **or** bypass emergency and isolate normal. Bypass Isolation Switches are listed by **UL 1008** (File #E68465) to 1200 amperes and also meet FAA Specification E2083A.

CONSTRUCTION

Minimum space requirements are not to be less than one (1) inch through air and two (2) inches over the surface of insulating material, which are maintained between any uninsulated live parts, and an uninsulated live part of the opposite polarity. Not less than one (1) inch measured over the shortest distance is maintained between any uninsulated live part and an uninsulated grounded part, exposed metal part or the walls of a metal enclosure, including fittings for conduit or armoured cable. Tolerances, unless specified otherwise, for all indicated dimensions are nominal. Corrosion protection includes all parts that are of corrosion resistant material, plated or painted as corrosion protection.

OPERATION

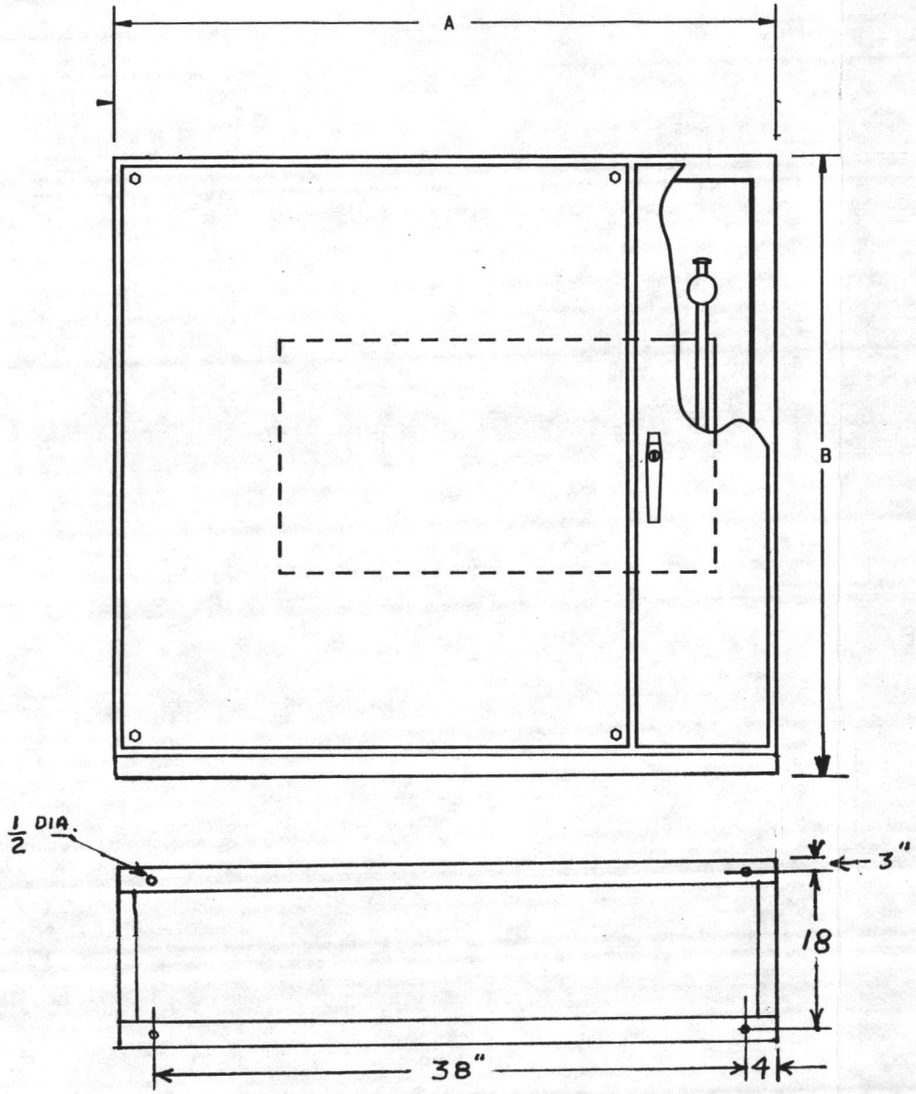
A single operator (handle) accomplishes manual bypass and isolation of the source desired. When arranged to bypass emergency and isolate normal, the bypass switch is locked in the normal position until the automatic transfer switch is placed in the emergency position and energizes the solenoid lock. The solenoid is energized through the auxiliary contacts on the normal side of the automatic transfer switch from normal service. When emergency fails, the bypass switch must be returned to the normal source before the transfer switch.

When arranged to bypass normal and isolate emergency, the above operation is the same only the normal and emergency positions are reversed.

Lake Shore Electric Bypass Switches are recommended for additional reliability in an electrical system.

NOTES

1) NEMA 3R FLOOR-MOUNTED ENCLOSURE TO BE CONSTRUCTED OF 11 GA. SHEET METAL.
2) ENCLOSURE TO BE 24" DEEP.
3) (1) REMOVABLE FRONT PANEL & (1) HINGED FRONT DOOR WITH LOCKABLE HANDEL.
4) FINISH PRIMED & PAINTED ANSI-61 LIGHT GRAY.



LAKE SHORE NUMBER	AMPERE RATING	DIMENSIONS	
		A	B
9973530	225	46	64
9973530	400	46	64
9973530	~~600~~	46	64

P0000 3- 600A

CUSTOMER

846-0551

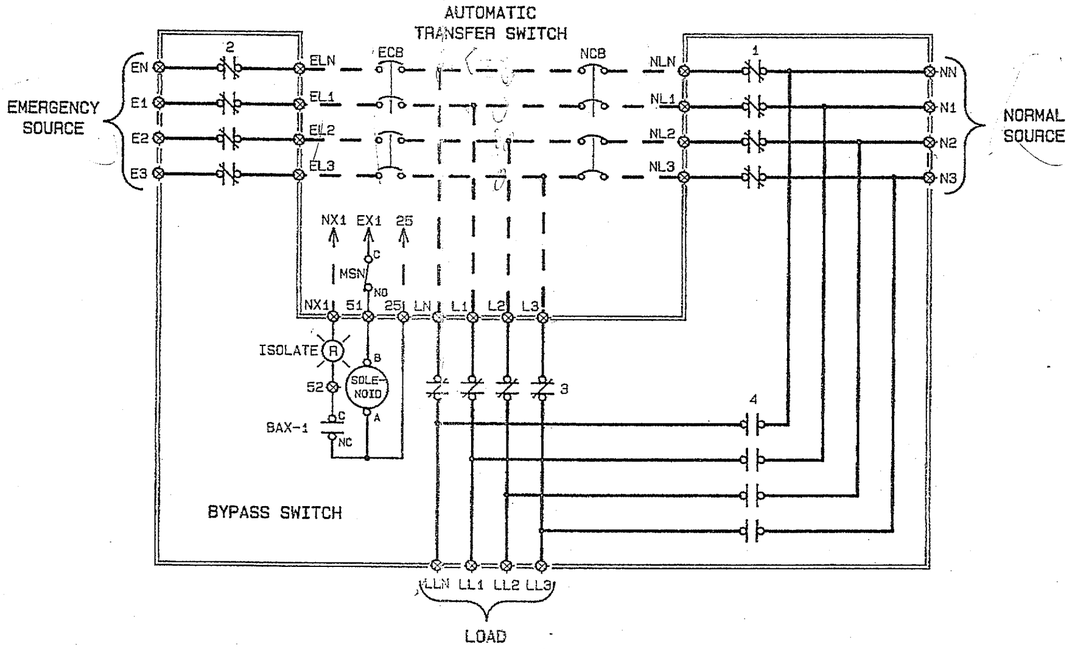
LAKE SHORE ELECTRIC CORPORATION
Bedford, Ohio U.S.A.

SCALE	NONE	REVISIONS	BY	DATE
DATE	05/15/84			
DR'N	TL CKD			
APVD				

TITLE: BPS NEMA 3R ENCLOSURE 225 THRU 600 AMP

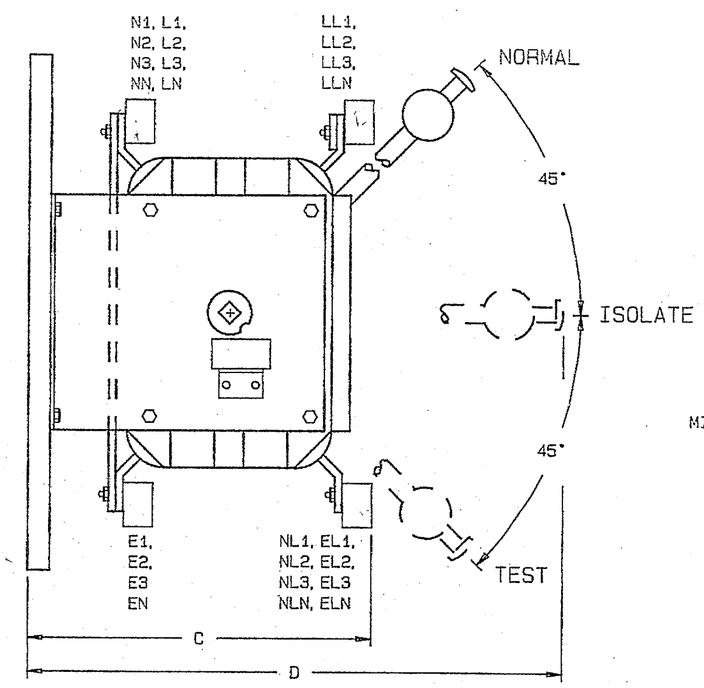
NO: BPS9973500

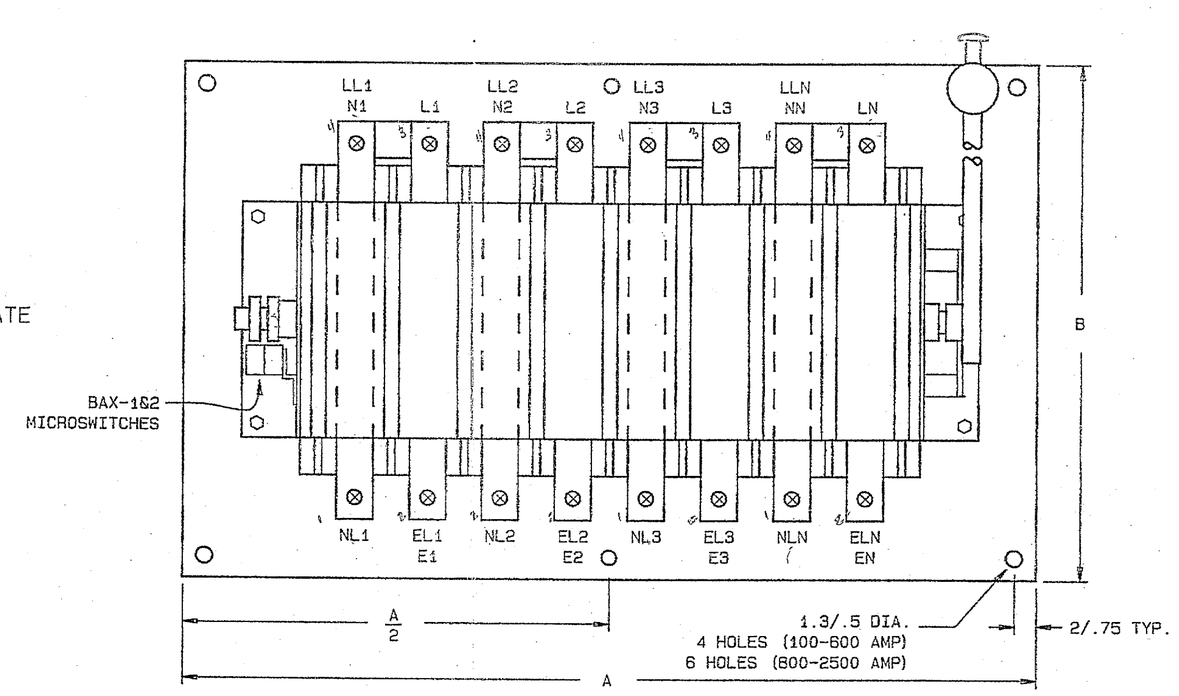
BYPASS SWITCH		NORMAL			ISOLATE			TEST
POSITIONS		0°	15°	30°	45°	60°	75°	90°
DECK 1	NLN – NN	X	X	X		X	X	X
	NL1 – N1	X	X	X		X	X	X
	NL2 – N2	X	X	X		X	X	X
	NL3 – N3	X	X	X		X	X	X
DECK 2	ELN – EN	X				X	X	X
	EL1 – E1	X				X	X	X
	EL2 – E2	X				X	X	X
	EL3 – E3	X				X	X	X
DECK 3	LN – LLN	X	X	X				
	L1 – LL1	X	X	X				
	L2 – LL2	X	X	X				
	L3 – LL3	X	X	X				
DECK 4	LLN – NN				X	X	X	X
	LL1 – N1				X	X	X	X
	LL2 – N2				X	X	X	X
	LL3 – N3				X	X	X	X



NOTES

1) BYPASS SWITCH AND AUTOMATIC TRANSFER SWITCH SHOWN IN NORMAL POSITION.
2) AUTOMATIC TRANSFER SWITCH MUST BE IN THE NORMAL POSITION [redacted] (SOLENOID ENERGIZED) TO ALLOW THE BYPASS SWITCH TO BE CHANGED FROM ITS NORMAL OR TEST POSITION.
3) IF NORMAL SOURCE FAILS THE BYPASS SWITCH MUST BE PLACED IN THE NORMAL POSITION BEFORE THE AUTOMATIC TRANSFER SWITCH IS TRANSFERED TO EMERGENCY.
4) ISOLATE LIGHT IS MOUNTED ON ENCLOSURE DOOR.
5) ⊛ CUSTOMER CONNECTIONS.





AMPERE RATING	DIMENSIONS IN CM/IN			
	A	B	C	D
100	XX/XX	36/14	30/11.5	55/21.5
225	XX/XX	36/14	30/11.5	55/21.5
400	XX/XX	36/14	32/12.5	55/21.5
600	XX/XX	36/14	35/13.5	55/21.5
800	147/58	41/16	43/17	75/29.5
1000	147/58	41/16	43/17	75/29.5
1200	147/58	41/16	43/17	75/29.5
1600	XX/XX	41/16	43/17	75/29.5
2000	XX/XX	41/16	43/17	75/29.5
2500	XX/XX	41/16	43/17	75/29.5

NOTE-These dimensions are intended for reference only.

LAKE SHORE ELECTRIC CORPORATION
Bedford, Ohio U.S.A.

SCALE	NONE	REVISIONS	BY	DATE
DATE	012684			
DR'N	TL / CKD			
APVD				

CUSTOMER
846-0551

TITLE
16 POLE BYPASS SWITCH
BYPASS NORMAL / ISOLATE EMERGENCY

NO.
BPS1920016