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REPORT

Surface Water Interim Action Enhancement Operation and Maintenance Manual

Former Powerex, Inc. Facility
Site Code 7-06-006
Auburn, New York

General Electric Company
Environmental Remediation Programs
320 Great Oaks Boulevard
Suite 323
Albany, New York 12203

October 7, 2002

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1. Introduction

1.1 General

This manual has been prepared to assist the General Electric Company (GE) in the operation and maintenance (O&M) of the Surface Water Interim Action Enhancement at the former Powerex, Inc. (Powerex) facility (the site) in Auburn, New York. The system has been designed to remove volatile organic compounds (VOCs), primarily trichloroethylene (TCE) and cis-1,2-dichloroethylene (cis-1,2-DCE), from the surface water in the site storm sewer system.

1.2 Background Information

1.2.1 Site Background

The site consists of 55.4 acres of land located on the boundary of the Town of Aurelius and the City of Auburn in Cayuga County, New York. GE purchased the property, formerly farmland, in 1951 and constructed a manufacturing plant where a variety of electric components, including radar equipment, printed circuit boards for high-fidelity equipment, and high-voltage semi-conductors were manufactured. The site was acquired by Powerex in January 1986. Powerex continued to manufacture high-voltage semi-conductors until May 1990, when the plant was closed. In November 1990, GE purchased the site back from Powerex, largely to facilitate remedial activities. The plant remains inactive today.

Past waste solvent handling practices at the site included the disposal of waste solvents into one, possibly two, unlined evaporation pits: the North Evaporation Pit and the purported West Evaporation Pit. An unknown quantity of solvents was reportedly disposed of in the purported West Evaporation Pit located in the field just west of the plant building. Acetone may have been used to ignite fires in this pit to burn off ponded liquids. The practice of burning was apparently discontinued and the purported West Evaporation Pit abandoned in 1962 by bulldozing. However, although VOCs have been detected in overburden soils and groundwater in the field west of the plant building, the exact location, dimensions, and history of the purported West Evaporation Pit remain unknown. Aerial photographs clearly indicate that an evaporation pit was not present in this field in July 1954. Additionally, there is no visible expression of a former evaporation pit in aerial photographs taken in June 1963, and analysis of samples from a series of 49 test pits installed in November 1989 failed to indicate any signs of the purported West Evaporation Pit.

The North Evaporation Pit is located north of the northwestern corner of the plant building. Reports indicate that use of this pit began in 1962 or 1963, after the purported West Evaporation Pit was abandoned. During its use, the North Evaporation Pit received an unknown quantity of waste solvents which were gravity-fed to the pit through pipes from the Drum Storage Building located on the north side of the plant building. Use of the North Evaporation Pit was reportedly discontinued when the underground Waste Solvent Tank was installed in 1966 or 1967.

The Waste Solvent Tank is a 21,000-gallon, underground concrete tank located just outside the northwestern corner of the plant building. Waste solvents were periodically removed from the tank and transported off-site for reclamation or disposal. Powerex discontinued use of the Waste Solvent Tank in August 1988 and closed

the tank in December 1988 in accordance with a closure plan approved by the New York State Department of Environmental Conservation (NYSDEC).

Waste solvents were also stored in two small underground tanks located along the eastern side of the plant building. These two Laboratory Waste Solvent Tanks, which were apparently installed in 1960, were reportedly used to collect waste solvents that were gravity-fed via underground piping from the Engineering Laboratory located just inside the eastern wall of the plant building. Periodically, the contents of these tanks were reportedly pumped into 55-gallon drums, which were subsequently taken to the Drum Storage Building and emptied into the drain leading to the North Evaporation Pit. Use of the two tanks was reportedly discontinued in 1966 or 1967 when the Waste Solvent Tank and the drain lines that connected it to the Engineering Laboratory were installed. The two Laboratory Waste Solvent Tanks were removed in February 1994 as part of an Interim Remedial Measure (IRM) performed under the Order on Consent executed with the NYSDEC for the Remedial Investigation/Feasibility Study (RI/FS).

1.2.2 Previous Investigations

Systematic investigations of subsurface environmental conditions at the site began in December 1985, when a Phase I Investigation was initiated to evaluate the vertical extent of contaminants in overburden soils at the North Evaporation Pit. This investigation was conducted by Dunn Geoscience Corporation (Dunn) and is documented in a report dated February 1986.

In November 1986, Dunn proceeded with the Phase II Investigation to obtain a general understanding of hydrogeologic conditions and to make a preliminary assessment of the nature and extent of chemical constituents, primarily VOCs, in groundwater in the vicinity of the North Evaporation Pit. The Phase II Investigation is detailed in a report dated July 1987.

Based on the information obtained during the Phase I and II Investigations, the site was formally added to the NYSDEC's Registry of Inactive Hazardous Waste Disposal Sites (Site Code 7-06-006) in October 1987. The site was designated Class 2, which requires that a remedial program be developed, including performance of a RI/FS.

Dunn initiated the Phase III Investigation in August 1987 to obtain a more thorough understanding of hydrogeologic conditions, further define the extent of VOCs in groundwater, and determine if VOCs were present in surface water at the site. The results of the Phase III Investigation are presented in a May 1988 report and indicated that VOCs were present in the drainage ditch located in the northwestern corner of the site and also in the storm sewer which passes through the field west of the plant building.

Dunn began the fourth and final phase of voluntary investigation in August 1988. Although the purpose of this Phase IV Investigation was to better define the three-dimensional extent of VOCs within the bedrock groundwater, a considerable amount of information was also collected for both surface water and overburden soils. The Phase IV Investigation is detailed in a September 1991 report prepared by Dunn.

1.2.3 Remedial Investigation/Feasibility Study

An Order on Consent (Index No. A7-0286-92-08) was executed between GE and the NYSDEC on March 31, 1993. This order requires that GE perform a RI/FS for the site, and a RI/FS Work Plan was approved by NYSDEC and incorporated into the order. The RI/FS is currently in progress. The Order on Consent also

allows GE to propose IRMs for the NYSDEC's consideration. With NYSDEC's approval, GE has completed three such IRMs to date.

GE retained Dunn Engineering Company to perform the RI. To date, all of the non-contingent tasks of the RI have been completed. These tasks include performing a step-rate pumping test on a large-diameter well installed in the shallow bedrock less than 50 feet downgradient of the North Evaporation Pit. In addition, some of the contingent tasks of the RI have been triggered and have also been completed, including the permanent abandonment of selected wells, and the subsequent resampling of certain deep bedrock wells and their associated shallow bedrock wells.

Based on data developed from the site investigations performed to date, the site consists of three principal hydrostratigraphic units: overburden, shallow bedrock, and deep bedrock. The overburden unit consists of approximately 10 to 22 feet (15 feet average) of relatively fine-grained, glacially-derived, unconsolidated deposits. The water table fluctuates up to 10 feet seasonally, but during much of the year is near ground surface.

The shallow bedrock hydrostratigraphic unit consists of limestones of the Onondaga and underlying Manlius Formations, both of Devonian age. The combined thickness of these formations at the site is approximately 45 feet. The potentiometric surface in the shallow bedrock also fluctuates up to 10 feet seasonally, but is within a few feet of ground surface during the wet seasons (i.e., late fall through spring). The shallow bedrock is strongly anisotropic in vertical section, with a horizontal hydraulic conductivity approximately 250 to 500 times the vertical conductivity. The vertical hydraulic gradient is generally downward from the overburden to the shallow bedrock unit, and is downward within the shallow bedrock to the deep bedrock unit.

The deep bedrock unit consists of dolomites of the Rondout, Cobleskill, and Bertie Formations, which are of Silurian age. The deep bedrock unit is generally less fractured and less permeable than the limestones of the shallow bedrock unit. Additional work is currently planned during the RI to develop a better understanding of groundwater conditions in the deep bedrock unit.

As part of the RI, a Biodegradation Study has been completed by Beak Consultants, Ltd. (Beak), as detailed in an April 1995 report. In summary, Beak conducted a study on the biodegradation of TCE and other VOCs in the groundwater in the three hydrostratigraphic units identified at the site. The objectives of the study were to determine if biodegradation is occurring and proceeding to convert VOCs to innocuous end products, to evaluate the nature of the biological processes, and to assess what role biodegradation could play in the overall remedial program. The information presented in the Biodegradation Study Report indicates that several biological processes are working symbiotically to degrade TCE in the overburden and shallow bedrock units.

With respect to surface water conditions at the site prior to implementation of the Surface Water Interim Action, it appeared that overburden groundwater had discharged to storm sewer drains and the on-site drainage ditch flowing northwest from the plant building during wet portions of the year. Because overburden groundwater in certain areas of the site contains VOCs, contaminants had previously been detected in surface water in and downstream of those areas. TCE, cis-1,2-DCE, vinyl chloride (VC), and chloroform had been detected in surface water in the storm sewer drains located in the northeast corner of the West Parking Area and the field west of the plant building. Additionally, flow from the storm sewer drain which ran along the back of the 1962 Building Addition adjacent to the Waste Solvent Tank area appeared to contain tetrachloroethylene (PCE), 1,1,1-trichloroethane (TCA), and xylenes in addition to TCE and cis-1,2-DCE. TCE, cis-1,2-DCE, and PCE had also been detected in the drainage ditch running behind the plant building.

GE has retained O'Brien & Gere Engineers, Inc. (O'Brien & Gere) to perform the FS, and the development of remedial alternatives has been initiated. However, the remainder of the FS cannot be performed until the RI has been completed.

1.2.4 Interim Remedial Measures

Prior to construction of the Surface Water Interim Action, two IRMs had been completed at the site. Under the observation of Dunn Engineering Company, OBG Technical Services, Inc. (OBG Tech) excavated and removed the two Laboratory Waste Solvent Tanks and their contents in February 1994. This IRM was performed under the Order on Consent pursuant to the NYSDEC-approved Laboratory Waste Solvent Tanks IRM Work Plan dated September 1993. Soil from the base and walls of the excavations was sampled in accordance with the work plan, and VOCs were detected. The excavations were subsequently backfilled and the contingent investigative activities identified in the work plan were performed to determine the extent of VOCs in the vicinity of the two tanks. These investigative activities included soil borings radiating outward from the two tanks and the installation of overburden and shallow bedrock monitoring wells. The resulting data are to be incorporated into the RI, and these source areas are to be addressed in the FS for the site.

The second IRM involved the installation of additional fencing and gates at the site. This Access Restriction IRM was performed by Atlas Fence, Inc. and was completed in December 1994. Construction observation was conducted by O'Brien & Gere. This IRM was also performed under the Order on Consent, in accordance with the NYSDEC-approved Access Restriction IRM Work Plan dated July 1994.

1.2.5 Interim Action

To support development and implementation of an Interim Action addressing the surface water and shallow bedrock groundwater, Dunn Engineering Company prepared an Interim Remedial Investigation (IRI) Report to document the investigative activities which had been performed to date pursuant to the NYSDEC-approved RI/FS Work Plan. The investigative activities conducted pursuant to implementation of the Laboratory Waste Solvent Tanks IRM Work Plan are also described in the IRI Report, which was submitted to the NYSDEC in January 1995.

To expedite implementation of an Interim Action and to further support the associated decision-making, GE proposed to conduct certain pre-design investigation activities and also pilot test the use of dual-phase extraction technology at the site. These activities were incorporated into the RI/FS via an addendum to the work plan. The pre-design investigation activities included: sampling of sediments in the drainage ditch at the site; a geotechnical assessment of three existing building foundations for possible reuse during the remedial program; and a constant-head pumping test of the large-diameter well previously installed next to the North Evaporation Pit. The pilot testing consisted of three dual-phase extraction tests; one test was performed on the large-diameter well previously installed next to the North Evaporation Pit (designated PW-1), and the two other tests were performed on large-diameter wells installed next to the Waste Solvent Tank and purported West Evaporation Pit (designated as PW-2 and PW-3, respectively).

After completing the pre-design investigation and pilot testing activities, O'Brien & Gere performed a Focused Feasibility Study (FFS) to evaluate various interim remedial alternatives for surface water and shallow bedrock groundwater. A FFS Report was submitted to the NYSDEC in February 1995. An addendum to the FFS Report that evaluated two additional interim remedial alternatives for the shallow bedrock groundwater, both of which

involve hybridized discharge options, was submitted to the NYSDEC in September 1995. The FFS Report Addendum did not impact the recommended interim remedial alternative for the surface water.

In the FFS Report, a number of remedial alternatives to address the surface water at the site were developed and analyzed. Alternative SW2 was the recommended remedial alternative and included the following major activities:

- Removal and off-site disposal of impacted sediments in the on-site drainage ditch upstream of the Trap Dam;
- Slip-lining or grouting portions of the storm sewer piping to mitigate the infiltration of impacted overburden groundwater;
- Installing piping in the on-site drainage ditch to mitigate the infiltration of impacted overburden groundwater;
- Removal and off-site disposal of the abandoned agriculture drainage pipe at the northwestern corner of the site; and
- Comprehensive monitoring program to document effectiveness.

In the FFS Report and its addendum, a number of remedial alternatives were developed to address the shallow bedrock groundwater at the site. Alternative SBGW4D was the recommended remedial alternative and included the following activities:

- Extraction of groundwater from the shallow bedrock hydrostratigraphic unit;
- Construction, start-up, and operation of an on-site groundwater treatment system;
- Discharge of treated groundwater by the combination of several methods including (a) recharge back to the shallow bedrock unit via recharge wells, (b) discharge to the on-site surface water, (c) discharge to the City of Auburn's wastewater treatment plant, and (d) recharge to the ground surface via sprinkle irrigation during the growing season; and
- Comprehensive monitoring program to document effectiveness.

Since the recommended Surface Water and Shallow Bedrock Groundwater Interim Actions were not interdependent, GE separated these actions so that the surface water could be addressed on an expedited schedule. A basis of design report, dated September 7, 1995, was prepared by Blasland, Bouck & Lee, Inc. (BBL) to present the fundamental design concepts for the Surface Water Interim Action. GE submitted this report to the NYSDEC on September 8, 1995, and, so that construction could be substantially completed in 1995, proposed to complete the construction activities for the Surface Water Interim Action as a third IRM under the existing Order on Consent. In a letter dated October 3, 1995, NYSDEC approved commencement of the work described in the Surface Water Interim Action Basis of Design Report as a third IRM.

GE retained Radian Engineering, Inc. (Radian) to perform the design activities associated with the Shallow Bedrock Groundwater Interim Action. A basis of Design Report, dated October 7, 1996, was prepared to present the fundamental design concepts for the Shallow Bedrock Groundwater Interim Action. The first phase

consisted of the site preparation activities that needed to be completed prior to installing the on-site groundwater extraction and treatment system. This phase consisted of the following activities:

- Demolishing and removing the Waste Solvent Tank and the Temporary Plating Solution Storage Tank;
- Renovating a portion of the 1975 Building Addition interior for use as the Primary Treatment Room; and
- Installing a water service to the southwestern corner of the renovated 1975 Building Addition that utilized existing sections of water main piping, capping unused sections of water main piping, and installing new sections of water main piping.

Clean Harbors Environmental Services, Inc. was selected by GE as general contractor to perform the site preparation activities. Construction began in July 1997 and was substantially completed in December 1997. GE submitted an Engineering Certification Report, prepared by Radian, to the NYSDEC in July 1998.

The second phase of the construction for the Shallow Bedrock Groundwater Interim Action consisted of installing an on-site groundwater extraction and treatment system and was performed in accordance with the following design documents:

- Shallow Bedrock Groundwater Interim Action Treatment System Materials and Performance Specifications (Radian, December 17, 1997); and
- Shallow Bedrock Groundwater Interim Action Treatment System Contract Drawings (Radian, December 17, 1997).

BBL Environmental Services, Inc. (BBLES) was selected by GE as general contractor to implement the second phase of construction. Implementation of this phase of the Shallow Bedrock Groundwater Interim Action consisted of the following major activities:

- Installing a Remote Treatment Building for treatment of groundwater from extraction wells PW-6 and PW-7;
- Installing irrigation field piping and sprinkler heads;
- Installing piping, valve boxes, buried conduit, and other buried utilities;
- Installing equipment previously purchased by GE in the Primary Treatment Room and the Remote Treatment Building;
- Installing Primary Treatment Room system equipment, piping, wiring, and associated instrumentation;
- Installing electrical and instrumentation conduits from the Primary Treatment Room to the Remote Treatment Building;
- Installing natural gas piping from the gas main on West Genesee Street to the Primary Treatment Room;
- Installing telephone service to the Primary Treatment Room;
- Installing treated- and partially-treated water holding tanks; and

- Installing an asphalt cap over the former Waste Solvent Tank area.

Construction of the second phase of the Shallow Bedrock Groundwater Interim Action began in April 1998 and was substantially completed in December 1998. GE submitted an Engineering Certification Report, prepared by BBL, to the NYSDEC in May 1999. Following receipt of discharge limitations from the NYSDEC and completion of an O&M Plan, the Shallow Bedrock Groundwater Interim Action System was started up in May 2001.

In addition to the above-described facilities, a total of seven recovery wells and four injection wells are used in the Shallow Bedrock Groundwater Interim Action. Three of the recovery wells (i.e., PW-1, PW-2, and PW-3) were installed during previous RI activities. The other four recovery wells (i.e., PW-4, PW-5, PW-6, and PW-7) and the four injection wells (i.e., IW-1, IW-2, IW-3, and IW-4) were installed by O'Brien & Gere in December 1997.

1.2.6 Surface Water Interim Action

The Surface Water Interim Action was performed pursuant to the existing Order on Consent in accordance with the Surface Water IRM Work Plan, which was submitted by GE to the NYSDEC on October 13, 1995 and comprised of the following detailed design documents:

- Surface Water Interim Action Construction Plan (BBL, October 10, 1995);
- Surface Water Interim Action Materials and Performance Specifications (BBL, October 10, 1995); and
- Surface Water Interim Action Contract Drawings (BBL, October 10, 1995).

BBLES was selected by GE as general contractor to implement the Surface Water Interim Action, which consisted of the following:

- Removal and off-site disposal of approximately 140 cubic yards (i.e., 163 tons) of impacted sediments from the on-site drainage ditch upstream of the Trap Dam;
- Removal and off-site disposal of 899 linear feet of the abandoned agricultural drainage pipe from the field west of the plant building;
- Abandonment of nine storm sewer catch basins in the West Parking Area;
- Sliplining of the 24-inch-diameter reinforced concrete pipe (RCP) from manhole MH-1 to the on-site drainage ditch with a 22-inch-diameter high density polyethylene (HDPE) pipe;
- Abandonment or removal of the existing storm sewer system north and west of the plant building and replacement with a water-tight HDPE storm sewer system;
- Removal and replacement with HDPE piping of the storm sewer section near the former Laboratory Waste Solvent Tanks;
- Demolition and off-site disposal of the former Oil Storage Building and adjacent concrete trays; and

- Removal to grade and off-site disposal of four concrete tank saddles and the northern section of concrete diking in the Waste Solvent Tank area.

Construction of the Surface Water Interim Action began in early November 1995 and was substantially completed by the end of December 1995. Surface restoration was completed in June 1996. An Engineering Certification Report, prepared by BBL, was submitted to NYSDEC by GE on February 1, 1996.

1.2.7 Surface Water Interim Action Enhancement

Sampling conducted following construction of the Surface Water Interim Action indicated the continued presence of VOCs, primarily TCE and cis-1,2-DCE, in the storm sewer system at the site. To address the continued presence of VOCs in the site storm sewer system, GE proposed implementation of a Surface Water Interim Action Enhancement. A basis of design report, dated October 30, 1996, was prepared by BBL to present the detailed design for the Surface Water Interim Action Enhancement. GE submitted this report to the NYSDEC on November 1, 1996, and, so that construction could be substantially completed in 1996, proposed to complete the construction activities as an extension to the IRM previously approved by the NYSDEC under the existing Order on Consent. Information regarding the potential air emissions associated with the Surface Water Interim Action Enhancement was also submitted to NYSDEC on November 1, 1996 for the purpose of determining substantive requirements, if any. The NYSDEC provided verbal approval to proceed with the proposed enhancement activities on or about December 6, 1996. Construction of the Surface Water Interim Action Enhancement began on December 16, 1996 and was substantially completed and put into operation on January 9, 1997. An Engineering Certification Report, prepared by BBL, was submitted to NYSDEC by GE on February 6, 1997.

In February 2001, modifications were made to the Surface Water Interim Action Enhancement. Specifically, certain modifications were made to catch basin CB-16 and a water stop was installed across the storm sewer line near manhole MH-1. The CB-16 modifications were performed to increase the treatment efficiency of the Surface Water Interim Action Enhancement system and were completed on February 5 and 6, 2001. The water stop was installed on February 23, 2001 and consists of concrete flowable fill material placed in an area where the pipe trench bedding material was removed from around the sliplined 24-inch-diameter reinforced concrete MH-1 discharge pipe. The reinforced concrete pipe around the HDPE slipline piping at this location was also removed before placement of the flowable fill. An amendment to the Engineering Certification Report was prepared by BBL and submitted to NYSDEC by GE on October 10, 2001.

1.2.8 Auxiliary Electrical Generator

To provide a back-up electrical power supply, an auxiliary electrical generator was installed for the Surface Water Interim Action Enhancement. In November 1999, a temporary trailer-mounted 36 kilowatt (kw) diesel generator was put into service. At that time, a transfer switch was installed to connect the auxiliary generator to the existing electrical system. On June 29, 2000, this unit was replaced with a Spectrum™ Detroit Diesel Model 20DSEJ (20 kw) generator. Prior to start-up, a concrete pad was installed for the new generator.

1.3 Manual Organization

Following this introductory section, Section 2.0 provides a description of the Surface Water Interim Action Enhancement. Section 3.0 contains a detailed description of all components of the Surface Water Interim Action including a description of the O&M requirements of each component. Section 4.0 discusses the procedures for energizing and de-energizing electrical power to the Surface Water Interim Action Enhancement.

2. Surface Water Interim Action Enhancement Description

2.1 General

The Surface Water Interim Action Enhancement is designed to remove VOCs, primarily TCE and cis-1,2-DCE, from surface water in the storm sewer system at the site. The Surface Water Interim Action Enhancement consists of a forced air bubbler system that aerates the water passing through the last storm sewer catch basin, catch basin CB-16, prior to discharging into the site drainage ditch. The bubbler system removes VOCs in the water by providing an air supply to create bubbles in the water and thereby greatly increasing the surface area of water in the catch basin, which allows VOCs in the water to transfer to the air. The air containing the VOCs is then discharged out of the catch basin through a vent stack attached to the catch basin cover. Catch basin CB-16 has two stormsewer inlet pipes and one discharge pipe. On the eastern side of the catch basin there is a 16-inch-diameter inlet pipe that carries run-off water from the northern end of the site, including the roof drains of the 1962 Building Addition and the Condenser Building. On the southeastern side of the catch basin there is a 22-inch-diameter inlet pipe that carries run-off water from the eastern, western, and southern sides of the site, including the roof drains of the Original Plant Building and the 1975 Building Addition. The southeastern inlet pipe to catch basin CB-16 also carries run-off water from catch basins located in the residential area south of Genesee Street. On the western side of catch basin CB-16 there is a 30-inch-diameter discharge pipe that discharges water to the site drainage ditch.

2.2 Design Conditions

The Surface Water Interim Action Enhancement was designed based on the results of dry weather and wet weather sampling events. The information obtained during these sampling events indicated that VOCs were most concentrated during low flow or dry weather periods and, that as flow increased, the concentrations of VOCs decreased. Based on these findings, the Surface Water Interim Action Enhancement was designed to remove VOCs at the worst case concentrations encountered during dry weather flow. In-situ aeration was selected as the simplest, most reliable, and effective method of removing the VOCs present in the surface water leaving the site. The objectives of the Surface Water Interim Action Enhancement are to remove VOCs from the surface water to NYSDEC's best available technology economically achievable (BAT) guidance of 10 micrograms per liter (µg/l). The influent concentrations for TCE and cis-1,2-DCE used for the basis of design was the highest historical sampling results. The flow rate was assumed to be twice that of the 10 gallons per minute (gpm) flow observed during dry weather conditions. A summary of the basis of design is presented below:

- Flow of 20 gpm;
- Influent TCE concentration of 80 µg/l;
- Influent cis-1,2-DCE concentration of 65 µg//l;
- Effluent TCE concentration of 10 µg/l or less; and
- Effluent cis-1,2-DCE concentration of 10 µg/l or less.

2.3 System Design

The main components of the bubbler system are a 5 horsepower (HP) pressure blower and four stainless steel aerators. The pressure blower is located in an equipment enclosure adjacent to catch basin CB-16. The four stainless steel aerators are located within the bottom sump section of catch basin CB-16. In order to prevent the blower discharge air from freezing the water in catch basin CB-16 during cold weather, a thermostatically-controlled duct heater within the equipment enclosure heats the blower inlet air to maintain a minimum blower discharge air temperature of 40 degrees Fahrenheit (° F). A low pressure warning light located on top of the electrical enclosure and activated by a pressure switch in the blower discharge piping provides a visual indication of bubbler system blower operation problems. The area around catch basin CB-16 and the equipment enclosure is encircled with security fencing with one locked entrance gate. The interior of the equipment enclosure and the catch basin CB-16 area can be illuminated by turning on the equipment enclosure interior lights and the catch basin CB-16 floodlight. In the event that visits to the equipment enclosure area are required during night time, a motion detector spotlight provides automatic illumination of the entrance gate area.

The Surface Water Interim Action Enhancement is designed to operate continuously without constant supervision and maintenance. The location and general layout of the Surface Water Interim Action Enhancement is shown on Sheet 1 of the Surface Water Interim Action Enhancement Record Drawings (record drawings) provided in Attachment 1.

3. System Components, Operation, and Maintenance

3.1 General

This section presents a detailed description of each component of the Surface Water Interim Action Enhancement, including a description of the O&M of each component. The Surface Water Interim Action Enhancement is comprised of the following:

- Incoming electrical service;
- Auxiliary electrical generator;
- Air bubbler system components at electrical enclosure; and
- Air bubbler system components at catch basin CB-16.

The Surface Water Interim Action Enhancement is designed to operate automatically with minimal supervision and maintenance. The general layout and specifications for the Surface Water Interim Action Enhancement are shown on the record drawings. Equipment manufacturer's literature is included in Attachment 2. A system operation log sheet is provided in Attachment 3.

3.2 Incoming Electrical Service

3.2.1 Description

The incoming electrical service was installed to provide power for the Surface Water Interim Action Enhancement and for the Shallow Bedrock Groundwater Interim Action. The incoming electrical service is powered off an existing New York State Electric & Gas Corporation (NYSEG) service on West Genesee Street. The incoming electrical service is comprised of the following components:

- Four sections of 680 linear feet No. 1/0 AAAC power line cable (three conductor cables and one neutral);
- Two 45-feet-long and one 40-feet-long power poles;
- One electrical metering system (owned by NYSEG);
- Three 7,200 volt primary, 277 volt secondary, oil-filled, Class A, Type S, 167 kilovolt amperes (KVA) pole-mounted transformers;
- One ground operated, load interrupting isolation switch rated for 600 ampere (amp) at 15 kilovolts;
- On electrical enclosure;

- One 800 amp rated service entrance circuit breaker enclosure; and
- One 800 amp rated, 600 amp trip service entrance circuit breaker.

3.2.2 Operation and Maintenance

Energizing and de-energizing the incoming electrical services is discussed in detail in Section 4.0. Maintenance of the incoming electrical service consists of the following:

- Check the secureness of electrical connections and tighten as needed;
- Clean the surfaces of the 800 amp rated circuit breaker and the surrounding area of any dirt or debris as needed;
- Inspect the breaker for signs of damage;
- Remove electrical loads and operate the toggle handle to exercise the mechanism and test the mechanical operation of the circuit breaker; and
- Replace the circuit breaker if any sign of damage is found or the operation of the circuit breaker is sluggish or sticky.

The other components of the incoming electrical service do not require any routine maintenance.

3.3 Auxiliary Electrical Generator

3.3.1 Description

The auxiliary electrical generator was installed to provide power for the Surface Water Interim Action Enhancement in the event of an interruption of the NYSEG-provided electrical service. During a NYSEG electrical power interruption, the auxiliary electrical generator will automatically start and a transfer switch will activate to route power from the auxiliary electrical generator to the Surface Water Interim Action Enhancement. When NYSEG electrical service is restored, the transfer switch will again activate to route NYSEG electrical power to the Surface Water Interim Action Enhancement and the auxiliary electrical generator will go into an automated shut down mode. The auxiliary electrical generator is comprised of the following components:

- One transfer switch located in the west side of the incoming electrical service electrical enclosure near GE Power Pole No. 3; and
- One 20 kw diesel engine powered electrical generator.

3.3.2 Operation and Maintenance

Maintenance of the auxiliary electrical generator consists of the following:

- Complete monthly operation and maintenance log sheet, including diesel engine oil and coolant levels;
- Schedule diesel fuel deliveries as needed; and
- Schedule semi-annual contracted multi-point inspections (each February and August).

3.4 Air Bubbler System Components at the Electrical Enclosure

3.4.1 Description

The electrical enclosure is located northwest of the 1975 Building Addition approximately 10 feet north of the incoming electrical service transformer Pole No. 3. The electrical enclosure provides a weatherproof location for the incoming electrical service entrance circuit breaker described in Section 3.2 and also for the 100 amp rated, 30 amp fused disconnect for the power supply to the equipment enclosure. Electrical power from the service entrance transformers is fed through the service entrance circuit breaker and the 30 amp fused disconnect in the electrical enclosure to a direct bury electrical cable that leads to the equipment enclosure. A blower low pressure warning light is located on top of the electrical enclosure to provide a visual indication of bubbler system blower low pressure. The air bubbler system components at the electrical enclosure consist of the following:

- One 100 amp rated, 30 amp fused disconnect;
- 280 linear feet of direct bury electrical cable with three No. 8 conductors and one No. 10 ground from the electrical enclosure to the equipment enclosure; and
- 280 linear feet of direct bury electrical cable with nine No. 14 conductors from the electrical enclosure to the equipment enclosure.

3.4.2 Operation and Maintenance

All electrical components at the equipment enclosure can be de-energized by shutting off the 30 amp fused disconnect in the electrical enclosure. Energizing and de-energizing the electrical service to the equipment enclosure is discussed in detail in Section 4.0. Maintenance of the air bubbler system components at the electrical enclosure consists of the following:

- Check the secureness of electrical connections and tighten as needed.
- Check the output voltage of the 167 KVA transformers.

- Replace fuses in 30 amp fused disconnect switch as needed. Spare 30 amp fuses are stored in the equipment enclosure. Replace fuses with the 30 amp fused disconnect switch in the off position. If possible, replace fuses with the main service entrance breaker in the off position.

- Replace the light bulb and clean the reflector of the low blower discharge pressure warning light as needed. Any maintenance on the warning light should be conducted with the power to the warning light shut off. A circuit breaker switch located in the equipment enclosure load center panel can be used to shut power off to the warning light.

- Inspect the lock on the door of the electrical enclosure and lubricate with light oil as needed to maintain proper operation.

3.5 Air Bubbler System Components at Catch Basin CB-16

3.5.1 Description

The main components of the air bubbler system are a 480 volt, 3-phase, 5 HP pressure blower, located in a 6-foot by 6-foot by 8-foot tall prefabricated concrete equipment enclosure adjacent to catch basin CB-16, and four stainless steel aerators located in the sump section of catch basin CB-16. Air from the pressure blower is fed to the four catch basin aerators through 6-inch-diameter and 3-inch-diameter HDPE piping. Bubbler system air exits the catch basin via an 8-inch-diameter stainless steel vent stack attached to the cover of the catch basin. A thermostatically-controlled duct heater heats the inlet air to the blower during cold weather. A thermostat located on the eastern wall of the equipment enclosure controls the duct heater. The thermostat is set to maintain a minimum blower discharge air temperature of approximately 40°F.

The incoming 480 volt, 3-phase electrical power from the electrical enclosure branches at the pressure blower magnetic starter/disconnect switch. One branch of the 480 volt, 3-phase electrical circuit feeds the pressure blower motor while the other branch energizes a 30 amp rated, 20 amp fused disconnect switch that feeds a 480 volt primary, 208/120 volt secondary, 15 KVA dry transformer. The transformer provides 208 volt power to the duct heater and 120 volt power to all other bubbler system electrical components through a circuit breaker load center located on the western wall of the equipment enclosure.

A normally closed pressure switch located on the eastern wall of the equipment enclosure is set to open when the blower discharge pressure is above 5 inches of water column. If the blower discharge pressure drops below 5 inches of water column, the pressure switch closes and the low blower discharge pressure warning light on the electrical enclosure will illuminate. At the same time, an aerator low air pressure alarm message will be sent out by the Shallow Bedrock Groundwater Interim Action treatment system's programmable logic controller (PLC) and the autodialer will notify the operator.

A blower discharge pressure gauge is located on the eastern wall of the equipment enclosure. The pressure gauge provides an indication of blower operation and serves as a reference point when making blower discharge damper adjustments. A blower discharge damper is located on the blower discharge just prior to the blower to HDPE pipe flanged connection. The discharge air flow rate from the pressure blower can be adjusted by loosening the damper wing nut and incrementally opening or closing the damper.

A thermostatically-controlled cooling fan is located on the roof of the equipment enclosure to ventilate the enclosure during hot weather. A thermostat located on the northern wall of the equipment enclosure controls the

cooling fan. The thermostat is set to operate the fan when the air temperature in the equipment enclosure rises above 80°F.

Lighting inside the equipment enclosure is provided by two 60 watt incandescent fixtures located on the ceiling of the enclosure. Exterior lighting is provided by a set of motion detector-activated 150 watt spot lights that illuminate the security fence entrance gate area and a switch-operated 400 watt sodium vapor floodlight that lights the catch basin CB-16 area.

Two ground fault interrupter (GFI) electrical receptacles provide 120 volt outlets for additional lights or power tools as needed. The GFI receptacles are located on the interior and exterior western wall of the equipment enclosure.

The equipment enclosure and catch basin CB-16 area are encircled with an 8-foot-tall chain-link security fence. The security fence incorporates privacy slats to lower the visibility of the bubbler system.

The following is a list of air bubbler system components at catch basin CB-16:

- One 6-feet by 6-feet by 8-feet tall pre-fabricated concrete equipment enclosure;
- One motor starter/disconnect switch;
- One 30 amp rated, 20 amp fused disconnect switch;
- One 480 volt primary, 208/120 volt secondary, 15 KVA, 3-phase transformer;
- One load center designated LP-1;
- One 400 watt exterior flood light (for illumination of catch basin CB-16 area);
- One 150 watt exterior motion detector-activated spot light (for illumination of equipment enclosure entrance area);
- Two 60 watt interior lights;
- Two 120 volt GFI receptacles (one interior and one exterior);
- One 5 HP blower;
- Four stainless steel aerators, each having 3.7 square feet of aeration surface area consisting of approximately 530 3/16-inch-diameter perforations;
- 20 linear feet of 6-inch-diameter HDPE aeration piping;
- 40 linear feet of 3-inch-diameter HDPE aeration piping;
- Galvanized steel blower inlet duct work;
- One 5 kilowatt blower inlet duct air heater with thermostat;

- One 0 to 50 inch water column pressure gauge;
- One 1.4 to 5.5 inch water column pressure switch; and
- One 173 cubic feet per minute roof exhaust fan with thermostat.

3.5.2 Operation and Maintenance

The pressure blower can be started or stopped by using the magnetic motor starter/disconnect switch start and stop push buttons. When maintenance is to be performed on the pressure blower, the blower magnetic motor starter/disconnect switch can be switched off and locked out. The operation of the aerators can be checked by using the observation port located in the catch basin CB-16 cover. The air flow can be measured using an air velocity instrument by placing the velocity probe in the port in the 6-inch-diameter HDPE pipe located outside the equipment enclosure. Adjustments of air flow are made by opening or closing the blower discharge damper. Maintenance of the air bubbler system components at catch basin CB-16 consist of the following:

- Check the secureness of electrical connections and tighten as needed.
- Check the tightness of pressure blower hold-down bolts, motor mounting bolts, set screws, and keys.
- Keep the blower motor clean and do not allow blower motor cooling fan inlet or discharge to become blocked.
- Clean blower outside air intake screen quarterly.
- Remove and clean aerators, as needed and at least annually, to remove any scale, biological growth, or chemical precipitates. This maintenance activity should be done only during dry weather. The procedure for removing and cleaning the aerators is as follows:
  - Shut down the Shallow Bedrock Groundwater Interim Action remote treatment system.
  - Block flow through manhole MH-1 using sand bags.
  - Shut down and lockout pressure blower using magnetic motor starter/disconnect switch located on the eastern wall of the equipment enclosure.
  - Acknowledge the low air pressure alarm at the Shallow Bedrock Groundwater Interim Action treatment system PLC.
  - Remove the exhaust stack support cables.
  - Remove the aerator catch basin cover bolts and remove and set aside the stainless steel catch basin cover/stack assembly.
  - Loosen the four compression couplings on the 3-inch-diameter HDPE pipe within the aeration catch basin and slide the couplings up until they clear the pipe joint.

- Remove the two u-joints that secure the HDPE weir plate to the catch/basin piping and remove the weir plate and set aside.

- Remove the bolts connecting the 3-inch-diameter HDPE pipes to the aerator section flanges and remove the four 3-inch-diameter HDPE pipes from the catch basin.

- Remove the four aerator assembly sections from the catch basin.

- Reverse the procedure to reinstall spare aerator sections or when cleaning of the removed aerator sections is completed.

- Scrape and remove any solids or scale from the bottom of catch basin CB-16 and collect all solids removed into a properly labeled 55-gallon open top steel drum.

- Clean aerator trays removed from catch basin CB-16 using the following procedure:

  * Transfer the aerators to the Shallow Bedrock Groundwater Interim Action primary treatment system area;

  * Place aerator trays into 30-inch-diameter polyethylene tank containing approximately 10 percent hydrochloric acid;

  * Let trays soak in acid solution until all scale is removed;

  * Remove aerator trays and rinse with potable water until any remaining acid solution is removed;

  * If necessary, open up any plugged holes in each aerator using a cordless drill fitted with a 3/16-inch-diameter drill bit;

  * Reinstall the aerator sections in catch basin CB-16 or place in storage at the Shallow Bedrock Groundwater Interim Action treatment system;

  * Neutralize remaining acid wash solution in the 30-inch-diameter polyethylene tank to pH 6.5-7.5 using sodium hydroxide;

  * Allow the neutralized acid wash solution to settle for 24 hours and draw off the liquid layer for treatment using the Shallow Bedrock Groundwater Interim Action system (via the vacuum hose inlet of primary treatment area main separator) or off-site disposal; and

  * Collect any solids remaining in the 30-inch-diameter polyethylene tank and place the solids in a 55-gallon drum for off-site disposal.

- Remove sand bags from manhole MH-1.

- Restart the Shallow Bedrock Groundwater Interim Action remote treatment system.

- Check proper operation of the duct heater and thermostat each heating season.

- Check for proper operation and verify set point of blower low pressure switch annually. Adjust pressure switch as needed to have switch open when blower discharge pressures is at 5 inches of water column or greater.
- Keep exterior case of pressure gauge clean and re-zero gauge annually per instruction given in the manufacturer's literature.
- Replace light bulbs in exterior and interior light fixtures as needed.
- Check proper operation of roof vent fan and cooling thermostat each cooling season.
- Replace fuses in 30 amp rated, 20 amp fused disconnect switch as needed.
- Inspect the prefabricated concrete equipment enclosure for structural integrity and repair as needed.
- Check operation of equipment enclosure door lock and lubricate with light oil as needed to maintain proper operation.
- Inspect the security fencing for structural integrity and repair as necessary.
- Inspect the lock on the security fence entrance gate and lubricate with light oil as needed to maintain proper operation.

The other components of the air bubbler system do not require any routine maintenance.

4. Energizing/De-Energizing Electrical Power to the Surface Water Interim Action Enhancement

4.1 General

The Surface Water Interim Action Enhancement can be totally electrically de-energized by five different methods and partially de-energized by other methods. The following presents a description of each method along with procedures for implementing the method.

4.2 NYSEG Overcurrent Protective Devices at Pole No. 1

The NYSEG power lines that feed Pole No. 1 from the south side of West Genesee Street are connected to NYSEG overcurrent protective devices on Pole No. 1. When the overcurrent protective devices are in place, electrical power is fed to the GE power lines that run along Pole No. 1, Pole No. 2, and Pole No. 3. Removal of the overcurrent protective devices at Pole No. 1 will de-energize the entire electrical distribution system after Pole No. 1. In order to energize or de-energize the electrical power by using the overcurrent protective devices at Pole No. 1, NYSEG must be contacted and NYSEG must perform the procedure (NYSEG Service phone number is 1-800-572-1131).

4.3 Electrical Isolation Switch at Pole No. 2

A hand operated electrical isolation gang switch is located on Pole No. 2. When the switch is in the closed position, electrical power is fed to the GE power lines that run from Pole No. 2 to Pole No. 3 (the transformer pole). Opening of the electrical isolation switch will de-energize the entire electrical distribution system after Pole No. 2. To energize or de-energize the electrical distribution system after Pole No. 2, use the following procedure:

- Unlock and remove the padlock from the switch handle;
- To de-energize the electrical distribution after Pole No. 2, use the insulated switch handle to open the gang-operated electrical isolation switch;
- To energize the electrical distribution after Pole No. 2, use the insulated switch handle to close the gang operated electrical isolation switch.
- If possible, remove electrical loads from the electrical distribution system prior to operating the electrical isolation switch; and
- The electrical isolation switch should only be operated by someone familiar with high voltage electrical power systems.

4.4 GE Overcurrent Protective Devices at Pole No. 3

The power lines from Pole No. 2 are connected to overcurrent protective devices on Pole No. 3. When the overcurrent protective devices are in place, electrical power is fed to the three 167 KVA transformers on Pole No. 3 and from there to the remainder of the electrical distribution system. Removal of the overcurrent protective devices at Pole No. 3 will de-energize the entire electrical system after Pole No. 3, including the three 167 KVA transformers on Pole No. 3. In order to energize or de-energize the electrical power by using the overcurrent protective devices at Pole No. 3, NYSEG or a high-voltage electrical service contractor must be contacted to perform the procedure (NYSEG Service phone number is 1-800-572-1131).

4.5 800 Amp Rated, 600 Amp Trip Service Entrance Breaker at Electrical Enclosure

The service entrance breaker is located in the electrical enclosure near the northwestern corner of the 1975 Building Addition. The service entrance breaker is rated at 800 amps and is set to trip at 600 amps. When the service entrance breaker is in the on position, power is fed to the Surface Water Interim Action Enhancement disconnect switch and the Shallow Bedrock Groundwater Interim Action disconnect switch. Switching the service entrance breaker to the off position will de-energize both the Surface Water Interim Action Enhancement and the Shallow Bedrock Groundwater Interim Action. If the service entrance breaker is tripped, determine the cause of the trip and rectify the situation prior to resetting the breaker. To reset the breaker, move the handle all the way to the off position and then back to the on position. To energize or de-energize both the Surface Water Interim Action Enhancement and the Shallow Bedrock Groundwater Interim Action by operating the service entrance breaker, use the following procedure:

- Unlock and remove the padlock from the door handle of the electrical enclosure and open the electrical enclosure door;
- To de-energize the Surface Water Interim Action Enhancement and the Shallow Bedrock Groundwater Interim Action, use the toggle handle on the main service entrance breaker to switch the breaker to the off position;
- To energize the Surface Water Interim Action Enhancement and the Shallow Bedrock Groundwater Interim Action, use the toggle handle on the main service entrance breaker to switch the breaker to the on position; and
- If possible, remove electrical loads prior to operating the main service entrance breaker.

The service entrance breaker is capable of being locked in the off position in the event that maintenance requiring lock-out procedures is necessary.

4.6 100 Amp Rated, 30 Amp Fused Disconnect Switch at Electrical Enclosure

A fused disconnect switch for the Surface Water Interim Action Enhancement is located in the electrical enclosure near the northwestern corner of the 1975 Building Addition. The disconnect switch is rated at 100 amps and is fused at 30 amps. When the disconnect switch is in the on position, power is fed to the Surface Water Interim Action Enhancement equipment enclosure via an underground direct bury electrical cable. Switching the disconnect switch to the off position will de-energize the Surface Water Interim Action Enhancement. If one or more of the 30 amp fuses in the disconnect switch are blown, determine the cause for

the circuit overload and rectify the situation prior to replacing the fuses. Replace the fuses with the disconnect in the off position. If possible, replace fuses with the main service entrance breaker in the off position. To energize or de-energize the Surface Water Interim Action Enhancement by operating the 30 amp fused disconnect switch, use the following procedure:

- Unlock and remove the padlock from the door handle of the electrical enclosure and open the electrical enclosure door;
- To de-energize the Surface Water Interim Action Enhancement bubbler system, switch the disconnect switch to the off position;
- To energize the Surface Water Interim Action Enhancement bubbler system, switch the disconnect switch to the on position; and
- If possible, remove electrical loads prior to operating the disconnect switch.

The disconnect switch is capable of being locked in the off position in the event that maintenance requiring lock-out procedures is necessary.

4.7 Pressure Blower Magnetic Starter/Disconnect Switch

A magnetic starter/disconnect switch for the pressure blower is located in the equipment enclosure adjacent to catch basin CB-16. In the event that electrical power to only the pressure blower is required to be shut off, the disconnect switch can be used. The disconnect switch is part of the magnetic starter/disconnect switch that is located on the interior eastern wall of the equipment enclosure. With the disconnect switch in the off position, power to the pressure blower will be cut off, but will continue to be fed to all other electrical components (e.g., outlets, lighting, and controls) in the equipment enclosure. The disconnect switch is capable of being locked in the off position in the event that maintenance requiring lock-out procedures is necessary. A magnetic motor starter switch located on the magnetic starter/disconnect switch is used to stop and start the pressure blower when the disconnect switch is in the on position.

4.8 30 Amp Rated, 20 Amp Fused Disconnect Switch at Equipment Enclosure

A fused disconnect switch, located in the equipment enclosure, provides fused overcurrent protection and is used to energize or de-energize the 480 volt primary, 208/120 volt secondary, 15 KVA transformer that powers the ancillary bubbler system equipment. Shutting the transformer disconnect switch off will not de-energize the pressure blower, but will de-energize the 15 KVA transformer and the following:

- Interior and exterior GFI receptacles;
- Pressure blower inlet air duct heater and control thermostat;
- Interior and exterior lights;
- Equipment enclosure cooling fan and control thermostat; and
- Pressure blower low pressure warning light at electrical enclosure.

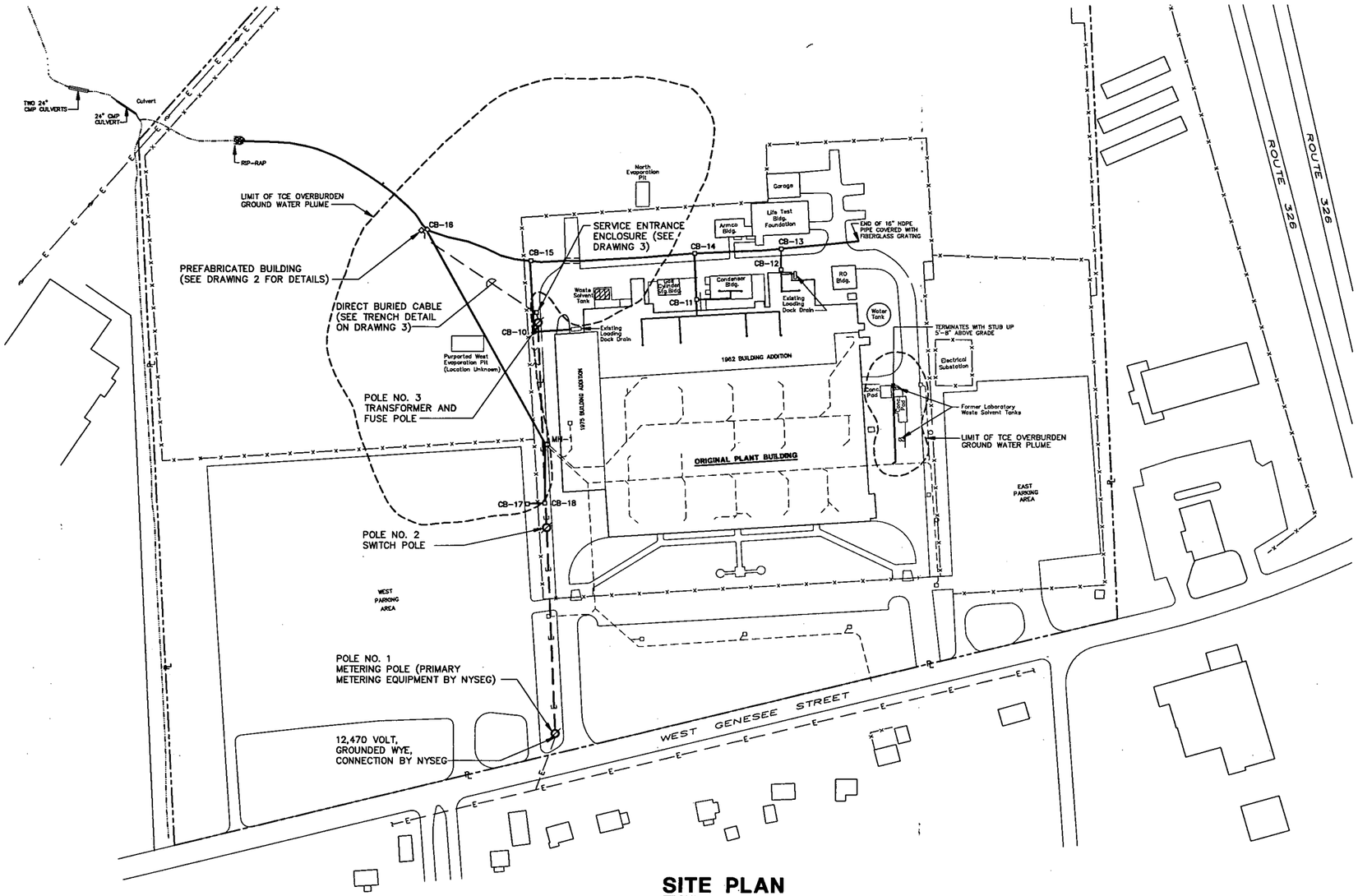
The disconnect switch is capable of being locked in the off position in the event that maintenance requiring lock-out procedures is necessary.

A load center, designated as LP-1, located on the western wall of the equipment enclosure receives power from the 15 KVA transformer and provides circuit breaker overcurrent protection for each ancillary bubbler system component. To reset a tripped load center circuit breaker, move the toggle switch of the affected breaker all the way to the off position and then back to the on position.

Attachment 1

Surface Water Interim Action Enhancement Record Drawings

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists



SITE PLAN

SCALE: 1"=100'

LEGEND

- NEW ELECTRICAL POWER POLE
- NEW OVERHEAD ELECTRICAL LINE
- NEW DIRECT BURIED ELECTRICAL CONDUCTORS
- NEWLY INSTALLED ABOVEGROUND ROOF DRAIN
- NEWLY INSTALLED HDPE STORM SEWER
- CB-13 CATCH BASIN DESIGNATION
- MH-1 MANHOLE DESIGNATION
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING STORM SEWER
- EXISTING FENCE
- DRAINAGE DITCH
- APPROXIMATE PROPERTY BOUNDARY

GENERAL NOTES:

1. THE CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION ACTIVITIES WITH REPRESENTATIVES OF GENERAL ELECTRIC COMPANY (GE) PRIOR TO COMMENCING ON-SITE ACTIVITIES.
2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD.
3. THE CONTRACTOR SHALL PROVIDE ALL LOCAL PERMITS AND MAKE ARRANGEMENTS FOR LOCAL INSPECTIONS (AS NECESSARY).
4. THE CONTRACTOR SHALL INSTALL COMPONENTS IN NEAT AND WORKMANLIKE MANNER; ALIGN, LEVEL AND ADJUST FOR SATISFACTORY OPERATION; INSTALL SO THAT PARTS ARE EASILY ACCESSIBLE FOR INSPECTION, OPERATION, AND MAINTENANCE AND REPAIR. DEVIATIONS FROM INDICATED ARRANGEMENTS ARE SUBJECT TO REVIEW AND APPROVAL BY REPRESENTATIVES OF GE PRIOR TO INSTALLATION AND/OR OPERATION.
5. THE CONTRACTOR SHALL HANDLE ALL SPOIL MATERIAL AS DIRECTED BY REPRESENTATIVES OF GE.
6. THE LOCATION OF UNDERGROUND UTILITIES AND OTHER UNDERGROUND STRUCTURES ARE APPROXIMATE ONLY. OTHER UNDERGROUND UTILITIES MAY EXIST, THE LOCATION OF WHICH AT THIS TIME ARE PRESENTLY UNKNOWN. THE CONTRACTOR SHALL UNDERTAKE MEASURES TO LOCATE UTILITIES KNOWN AND UNKNOWN IN THE FIELD PRIOR TO INITIATING WORK UNDER THIS CONTRACT.
7. THE CONTRACTOR SHALL RESTORE ALL SURFACES DAMAGED OR DESTROYED AS A RESULT OF WORK PERFORMED UNDER THIS CONTRACT TO THEIR PRE-CONSTRUCTION CONDITION IN A TIMELY MANNER.
8. THE CONTRACTOR SHALL UTILIZE SILT CONTROL, SUCH AS PLASTIC FILTER FABRIC AND/OR HAY BALES, WHERE NECESSARY, TO ALLOW SEDIMENT AND SUSPENDED SOLIDS TO SETTLE OUT OF RUN-OFF WATERS THAT COME IN CONTACT WITH CONSTRUCTION AREAS BEFORE SUCH WATERS ENTER ANY STORM SEWER SYSTEM OR SURFACE WATERS. THE CONTRACTOR SHALL ALSO UTILIZE OIL ABSORBENT BOOMS TO REMOVE ANY POTENTIAL SURFACE SHEEN FROM THE RUN-OFF WATERS.
9. ALL EXCAVATIONS SHALL BE OBSERVED BY REPRESENTATIVES OF GE OR THEIR DESIGNEE PRIOR TO PLACING BACKFILL.
10. THE CONTRACTOR SHALL REPLACE/REPAIR ANY FENCE REMOVED DURING CONSTRUCTION.
11. ALL ELECTRICAL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST REVISION OF NFPA-70, NATIONAL ELECTRICAL CODE (NEC).
12. ELECTRIC POLES, CABLE, POLE STRUCTURES, TRANSFORMERS, PRIMARY FUSES, SECONDARY DROP AND SERVICE ENTRANCE ENCLOSURE TO BE PROVIDED BY CONTRACTOR.

X: (XREF)
L: (LAYER)
P: STD-PCP/DL-E
1/97 SYR-54-JLG
10066005/10066G10.DWG

RECORD DRAWING CREATED FROM CONTRACT DRAWING NO. 1 FILE NUMBER 100.66.01F DATED OCTOBER 30, 1996.

Graphic Scale
100' 0 100' 200'
1"=100'

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

No.	Date	Revisions	Init

Project Mgr. DFS
Designed by WGS, WKD
Drawn by JLG
Checked by DFS
Prof. Eng. EDWARD R. LYNCH
PE License 057526

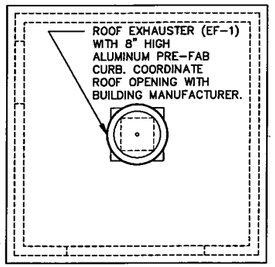
BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

GENERAL ELECTRIC COMPANY • ALBANY, NEW YORK
FORMER POWEREX, INC. FACILITY
AUBURN, NEW YORK
SITE PLAN

File Number 100.66.10F
Date JANUARY , 1997

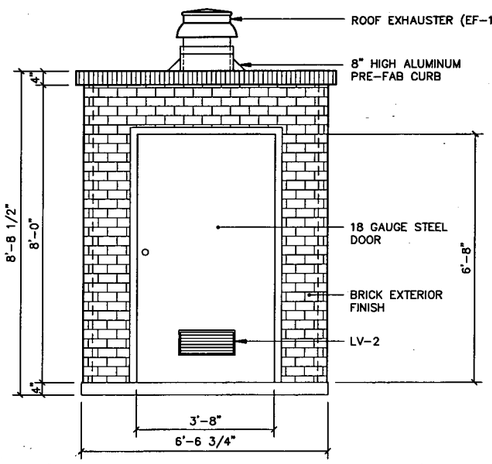
Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

1



ROOF PLAN

SCALE: 1/2"=1'-0"



SOUTH ELEVATION

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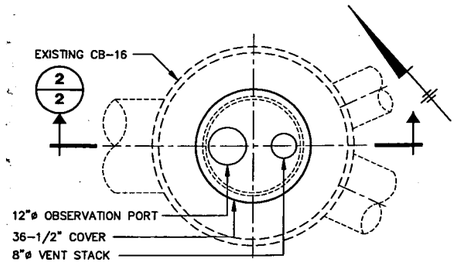
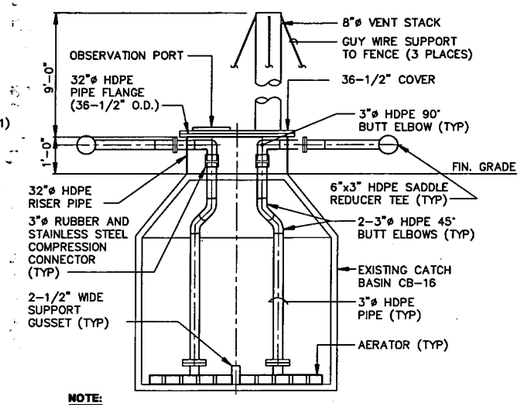


EXISTING CB-16 COVER PLAN

SCALE: 1/2"=1'-0"

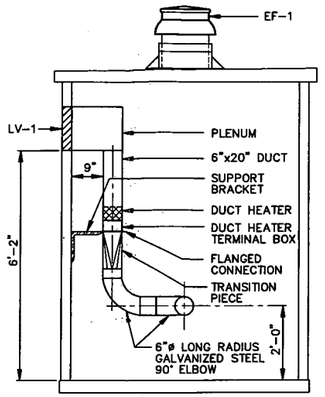


NOTE:

GUY WIRE SUPPORT CABLES TO BE STAINLESS STEEL WITH REMOVABLE DISCONNECTS AT THE FENCE.

SECTION 2/2

SCALE: 1/2"=1'-0"

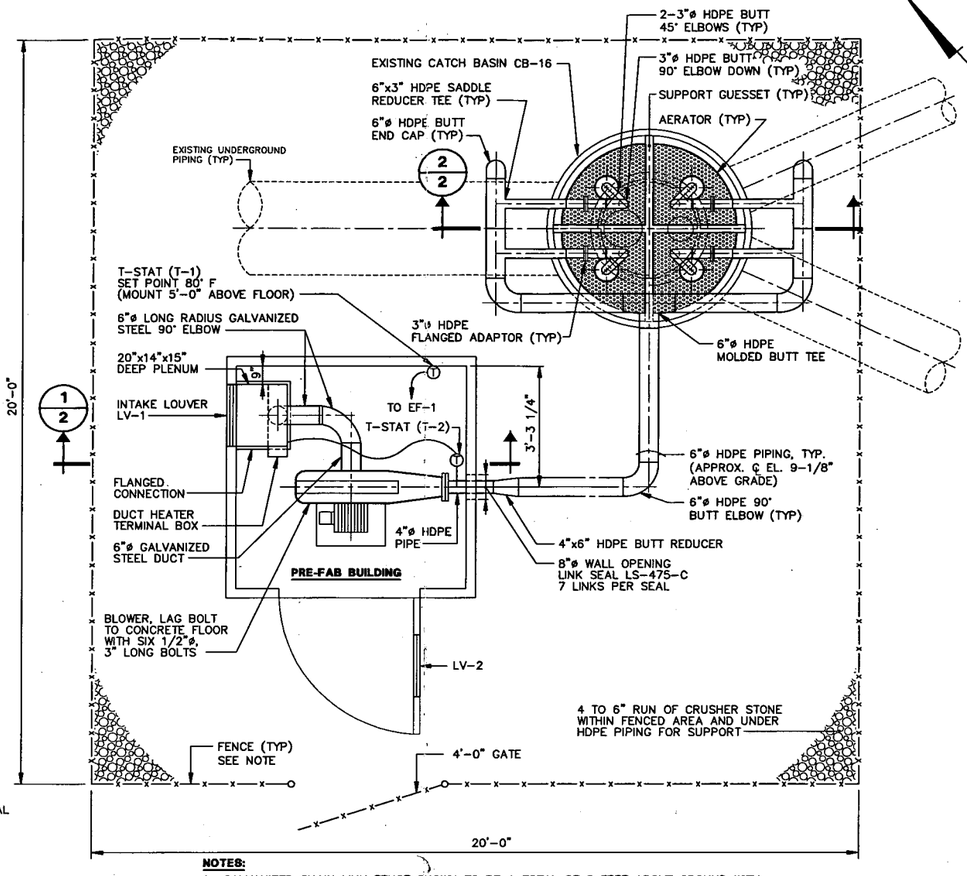


NOTES:

1. FABRICATE A BRACKET TO SUPPORT THE DUCT HEATER AT THE FLANGED CONNECTION.
2. MOUNT DUCT HEATER 2'-0" ABOVE BLOWER INLET CENTERLINE.
3. FLANGE WIDTH AS REQUIRED FOR DUCT HEATER.
4. ROUND DUCT WORK SHALL BE HDPE PIPE.
5. DUCT TRANSITION PIECE SHALL NOT EXCEED 30 DEGREE CONVERGENCE.
6. PLENUM WILL HAVE AIR-FOIL SHAPED TURNING VANES.

SECTION 1/2

SCALE: 1/2"=1'-0"

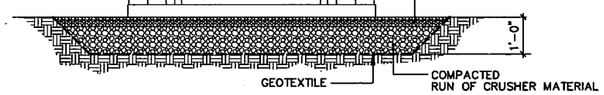


NOTES:

1. GALVANIZED CHAIN LINK FENCE SHOWN TO BE A TOTAL OF 8 FEET ABOVE GROUND WITH 1 FOOT HIGH BARBED WIRE. FENCE SHALL CONSIST OF SCHEDULE 40 GALVANIZED STEEL PIPE FOR POSTS, RAILS, AND BRACES. FABRIC SHALL BE ONE PIECE, 9 GAUGE, 2-INCH MESH WITH DARK BROWN OR DARK GREEN PRIVACY SLATS, TWISTED AND BARBED BOTTOM WITH THREE 12 GAUGE BARBED WIRE TOP STRANDS.
2. CONTRACTOR TO PROVIDE CHAIN AND LOCK (WITH 8 KEYS) FOR LOCKING FENCE GATE.

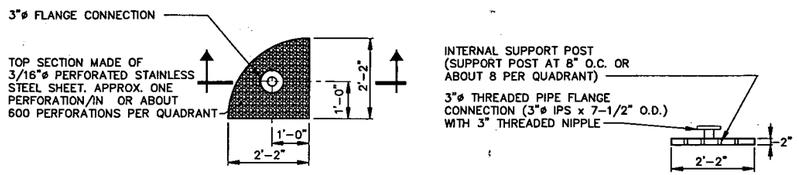
PARTIAL SITE PLAN

SCALE: 1/2"=1'-0"



BUILDING FOUNDATION DETAIL

SCALE: 1/2"=1'-0"



PLAN SECTION

NOTE:

AERATORS TO BE CONSTRUCTED WITH 304 STAINLESS STEEL SHEET METAL, 1/8" THICK.

AERATOR DETAIL

SCALE: 1/2"=1'-0"

MECHANICAL NOTES AND SPECIFICATIONS:

1. PRESSURE BLOWER TO BE MANUFACTURED BY CHICAGO BLOWER CORPORATION, SIZE D2, DESIGN 53, DIRECT DRIVE PRESSURE BLOWER WITH A BOTTOM HORIZONTAL DISCHARGE CONFIGURATION WITH A COUNTER CLOCKWISE ROTATION AS VIEWED FROM THE DRIVE SIDE. CAPABLE OF 300 CFM @ 31" SP COMPLETE WITH:
   - 4"ø FLANGED OUTLET TO MATCH 125# ANSI 4" BOLT CIRCLE
   - 6"ø SLIP-FIT INLET
   - FACTORY MOUNTED AND TESTED 5 HP, 3600 RPM, 3 PHASE, 60 HERTZ, 230/460V, TEFC STANDARD EFFICIENCY FR.184T MOTOR WITH A 1.15 SERVICE FACTOR.
   - MANUAL OUTLET VOLUME CONTROL DAMPER
   - 1-1/2" NPT HOUSING DRAIN
2. AERATORS TO BE CONSTRUCTED OF 304 STAINLESS STEEL AS SHOWN ON THIS DRAWING.
3. RECTANGULAR INTAKE DUCTWORK AND ROUND INLET DUCTWORK TO BE CONSTRUCTED OF 20 GAUGE ASTM A527 GALVANIZED STEEL SHEET.
4. DISCHARGE DUCTWORK AND DISTRIBUTION PIPING TO BE CONSTRUCTED OF SDR17 HDPE PIPE, PLEXCO PE3408 OR EQUAL.
5. ALL HDPE TO HDPE JOINTS ARE TO BE BUTT FUSED.
6. ELECTRIC DUCT HEATER TO BE MANUFACTURED BY INDEECO WITH FINNED TUBULAR ELEMENT DESIGN. FLANGE MOUNTED TO EXTERNAL DUCT FLANGES. ORIENTATION WILL COMPRISE DOWNWARD AIRFLOW WITH A STANDARD UP OVERHANG TERMINAL BOX. UNIT WILL HAVE A DISCONNECT, AIRFLOW SWITCH AND ONE CONTACTOR. HEATER SHALL BE CAPABLE OF 5 kW AT 208V, 1ø, SINGLE STAGE OPERATION.
7. DUCT HEATER THERMOSTAT TO BE HONEYWELL TYPE T675A TEMPERATURE CONTROLLER 0-100°F OPERATING RANGE, 5° F DIFFERENTIAL (ADJUSTABLE), STANDARD SENSING BULB, 5 FT. COPPER CAPILIARY 40° F SET POINT (ON) AND 120 CONTROL VOLTS.
8. LOUVERS TO BE RUSKEN ELF375DX STATIONARY, DRAINABLE EXTRUDED ALUMINUM WITH AN INSECT SCREEN AND STANDARD MIL FINISH.
   LV-1: 20"x14"
   LV-2: 18"x12"
9. ROOF EXHAUSTER TO BE CENTRIFUGAL, DIRECT DRIVEN WITH A BACKWARD CURVED CENTRIFUGAL FAN WHEEL. FAN HOUSING WILL BE CONSTRUCTED OF HEAVY GAUGE ALUMINUM MOUNTED ON A RIGID SUPPORT. A DISCONNECT SWITCH SHALL BE FACTORY INSTALLED AND WIRED FROM THE FAN MOTOR TO THE DISCONNECT JUNCTION BOX. A PRE-FAB ROOF CURB SHALL BE PROVIDED BY THE SAME MANUFACTURER WHICH WILL BE INSTALLED BY OTHERS.
   EF-1: GREENCHECK MODEL G-60-D; 173 CFM @ 0.1" SP.
   ROOF CURB: GREENCHECK MODEL GPS.
10. ROOF EXHAUSTER CONTROL THERMOSTAT TO BE HONEYWELL FARM-O-STAT T631A HEAVY DUTY SINGLE STAGE LINE VOLTAGE FOR EXHAUST FAN. RATED FOR 16 AMPS AT 120 VAC, 35° F DIFFERENTIAL OVER A RANGE OF 35-100° F U.L. LISTED.
11. PRE-FABRICATED BUILDING TO BE 6'-0" WIDE X 6'-0" LONG X 8'-0" HIGH (I.D.) EASI-SET PRECAST CONCRETE BUILDING FROM KISTNER CONCRETE PRODUCTS, INC. COMPLETE WITH
    - 44" WIDE, 18 GAUGE SECURITY DOOR.
    - AIR DUCT OPENINGS AS SHOWN ON THIS DRAWING.
12. EXHAUST STACK AND CATCH BASIN COVER FOR CATCH BASIN CB-16 TO BE CONSTRUCTED OF 304 STAINLESS STEEL AS SHOWN ON THIS DRAWING.

RECORD DRAWING CREATED FROM CONTRACT DRAWING NO. 2 FILE NUMBER 100.66.02F DATED OCTOBER 30, 1998.

X: (XREF)
L: (LAYER)
P: STD-PCP/DL
1/97 SYR-54-JLG
10066005/10066M10.DWG

Graphic Scale
1/2"=1'-0" 2' 0 2' 4'

No.	Date	Revisions	Init
		—	

Project Mgr. DFS
Designed by WKD, WFF
Drawn by JLG
Checked by DFS
Prof. Eng. EDWARD R. LYNCH
PE License 057526

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

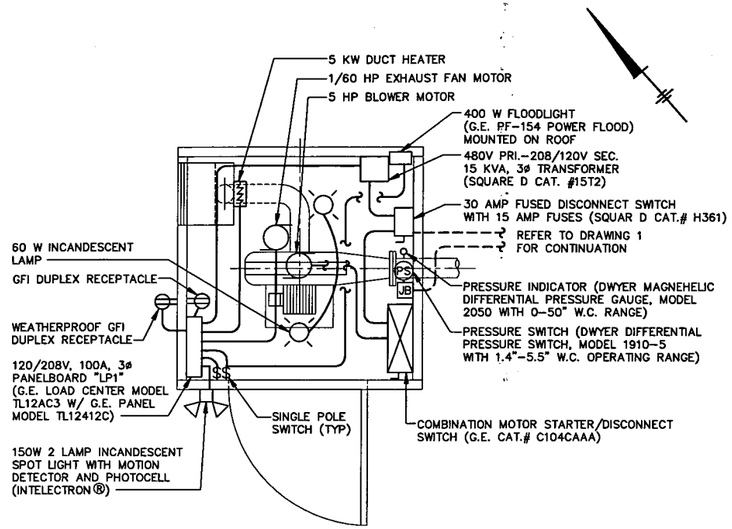
GENERAL ELECTRIC COMPANY • ALBANY, NEW YORK
FORMER POWEREX, INC. FACILITY
AUBURN, NEW YORK

PLANS, SECTIONS AND DETAILS

File Number 100.66.11F
Date JANUARY , 1997

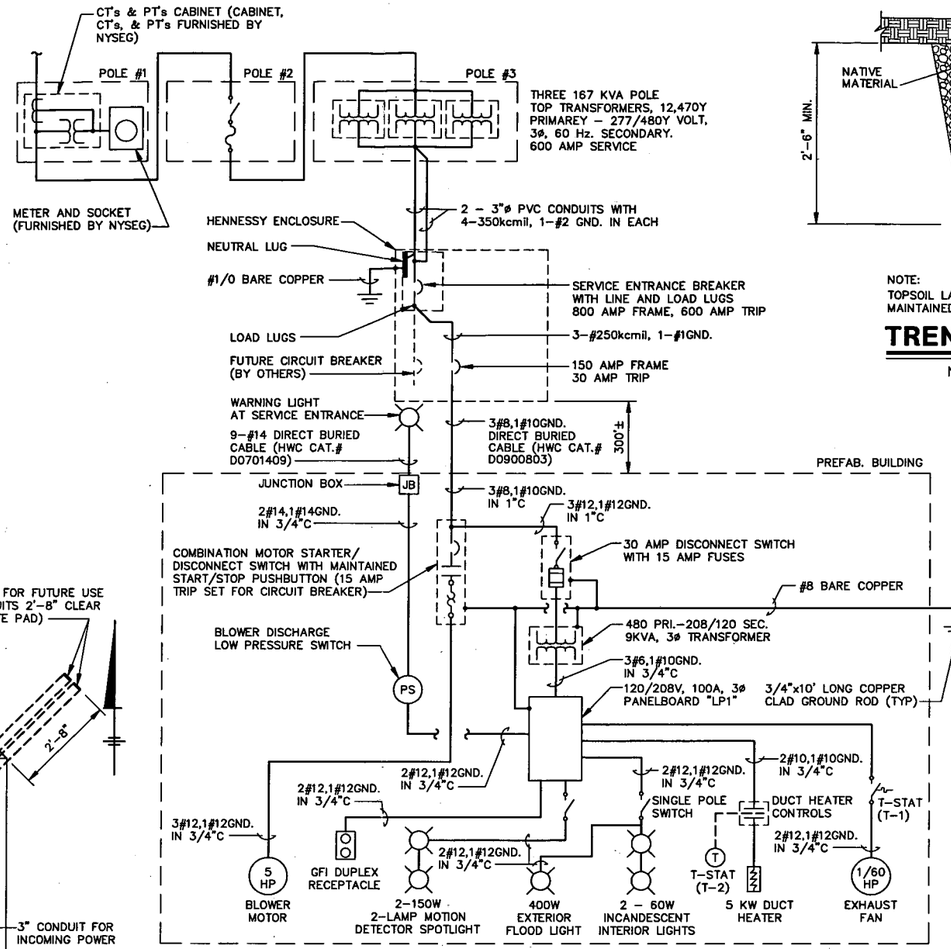
Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

2



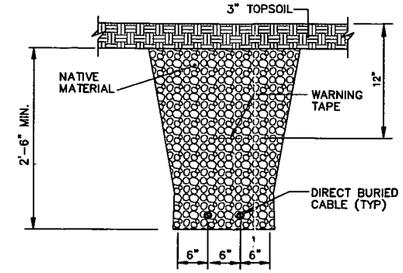
ELECTRICAL PLAN

SCALE: 1/2" = 1'-0"



ONE LINE DIAGRAM

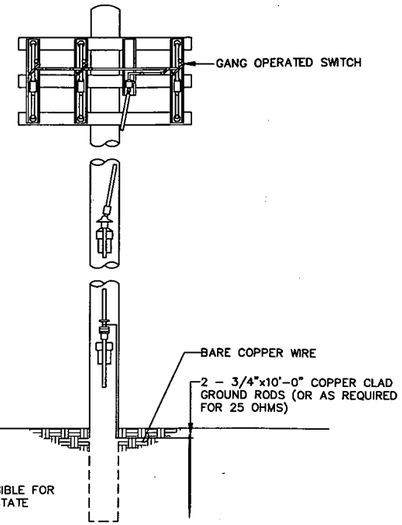
NOT TO SCALE



NOTE:
TOPSOIL LAYER REQUIRED ONLY IN MAINTAINED LAWN AREAS.

TRENCH DETAIL

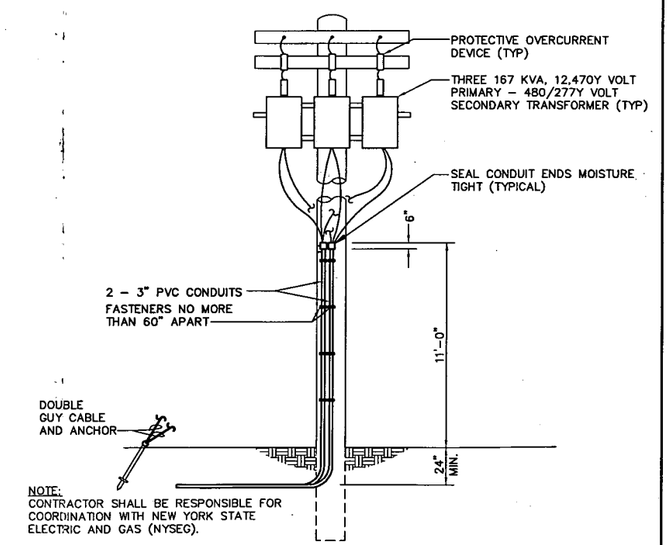
NOT TO SCALE



NOTE:
CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH NEW YORK STATE ELECTRIC AND GAS (NYSEG).

SWITCH AND FUSE POLE (POLE #2) DETAIL

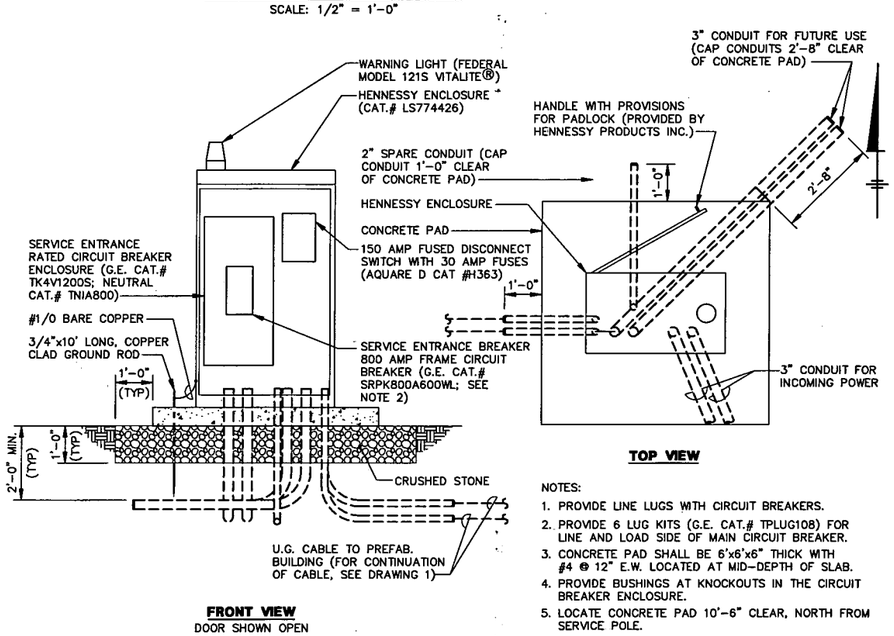
NOT TO SCALE



NOTE:
CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH NEW YORK STATE ELECTRIC AND GAS (NYSEG).

TRANSFORMER POLE (POLE #3) DETAIL

NOT TO SCALE



FRONT VIEW
DOOR SHOWN OPEN

TOP VIEW

NOTES:
1. PROVIDE LINE LUGS WITH CIRCUIT BREAKERS.
2. PROVIDE 6 LUG KITS (G.E. CAT.# TPLUG108) FOR LINE AND LOAD SIDE OF MAIN CIRCUIT BREAKER.
3. CONCRETE PAD SHALL BE 6'x6'x6" THICK WITH #4 @ 12" E.W. LOCATED AT MID-DEPTH OF SLAB.
4. PROVIDE BUSHINGS AT KNOCKOUTS IN THE CIRCUIT BREAKER ENCLOSURE.
5. LOCATE CONCRETE PAD 10'-6" CLEAR, NORTH FROM SERVICE POLE.

SERVICE ENTRANCE ENCLOSURE

SCALE: 1/2" = 1'-0"

PANELBOARD LP1 SCHEDULE

LOCATION : PREFAB. BUILDING
MAIN BUS RATINGS : 100 AMPS, 208/120
MINIMUM SHORTCIRCUIT INTERUPTING RATING : 10,000
MAIN BREAKER TRIP : MLO AMPS, -
ESTIMATED CONNECTED LOAD : -

FED FROM : 15 KVA, 3ø TRANSFORMER
VOLTS, 3ø PHASE, 4 WIRE
RMS. SYMM. AMPS
INCOMING FEED : BOTTOM, #6 PER PHASE
ENCLOSURE : NEMA 1 - SURFACE MOUNTED

DESCRIPTION	LOAD W-KW-HP	CB AMPS	CIR.	A B C	CIR.	CB AMPS	LOAD W-KW-HP	DESCRIPTION
GFI DUPLEX RECEPTACLE	180	20/1	1		2	30	5KW	DUCT HEATER
SPARE	120	15/1	3		4	2		
WARNING LIGHT	40	15/1	5		6	15/1	1/6OHP	EXHAUST FAN
WEATHERPROOF GFI RECEPTACLE	180	20/1	7		8	-	-	-
EXTERIOR LIGHT (2-INCAND.)	300	15/1	9		10	-	-	-
INTERIOR LIGHTS, EXTERIOR LIGHT (HPS)	400	15/1	11		12	-	-	-

X: (XREF)
L: OFF=REF
P: STD-PCP/DL-E
1/97 SYR-54-DJO, JLG
10066005/10066E10.DWG

RECORD DRAWING CREATED FROM CONTRACT DRAWING NO. 3 FILE NUMBER 100.66.03F DATED OCTOBER 30, 1996.

Graphic Scale 1/2"=1'-0" (2' 0 2' 4')

No.	Date	Revisions	Init

Project Mgr. DFS
Designed by DJO
Drawn by DJO
Checked by WGS
Prof. Eng. EDWARD R. LYNCH
PE License 057526

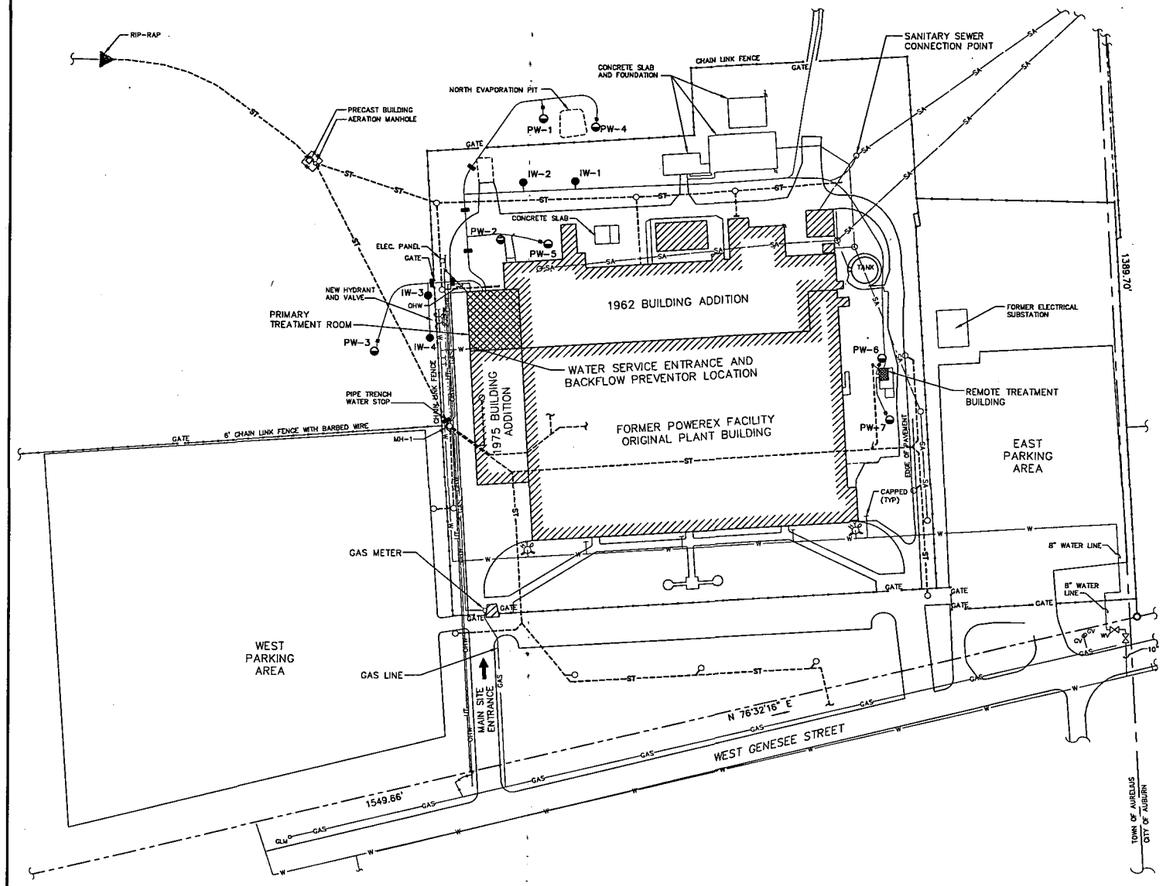
BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

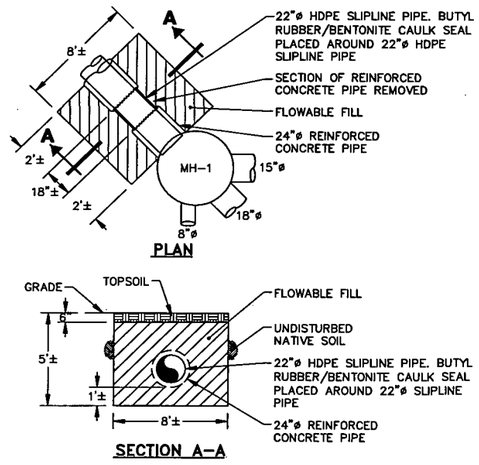
GENERAL ELECTRIC COMPANY • ALBANY, NEW YORK
FORMER POWEREX, INC. FACILITY
AUBURN, NEW YORK

ELECTRICAL PLANS AND DETAILS

File Number 100.66.12F
Date JANUARY , 1997

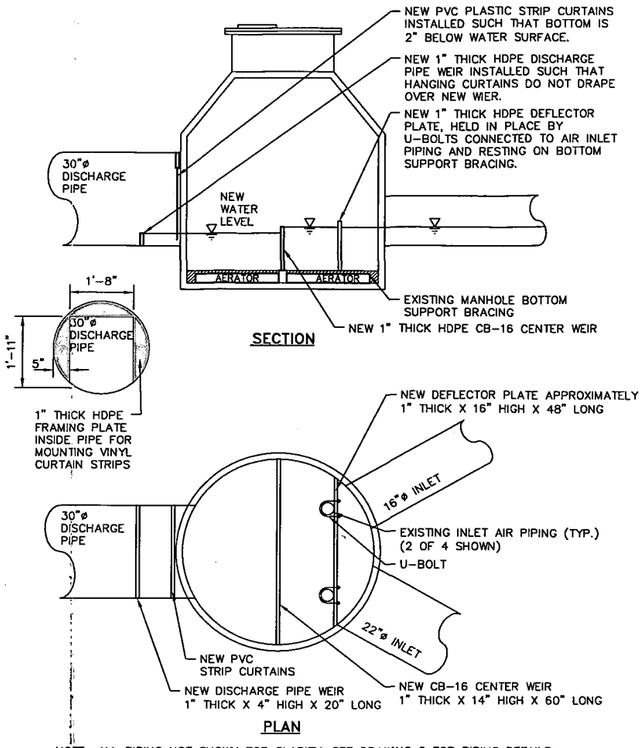
Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120





WATER STOP AT MANHOLE MH-1

NOT TO SCALE



NOTE: ALL PIPING NOT SHOWN FOR CLARITY. SEE DRAWING 2 FOR PIPING DETAILS.

CB-16 MODIFICATIONS

SCALE: 1/2"=1'-0"

NOTES

1. BASE MAP OBTAINED FROM RADIAN ENGINEERING INC., DRAWING TITLED SHALLOW BEDROCK GROUNDWATER INTERIM ACTION, GENERAL SITE PLAN, DATED 12/17/97 AT AN APPROXIMATE SCALE OF 1"=100'.
2. NORTH ORIENTATION IS BASED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM (NAD 83) ORIGINATING FROM CAYUGA COUNTY GPS POINTS 96A0401 AND AU930062.

LEGEND:

PW-1	EXTRACTION WELL	ST	STORM SEWER CATCH BASIN
IW-1	INJECTION WELL	ST	STORM WATER DRAINAGE DITCH
	EXTRACTION AND INJECTION WELL PIPE	W	APPROXIMATE LOCATION OF PUBLIC WATER PIPE
WV	WATER VALVE	OHW	OVERHEAD ELECTRIC POWER LINES
	FIRE HYDRANT	UT	DIRECT BURY TELEPHONE LINE
GAS	NATURAL GAS PIPE		UTILITY POLE
	PROPERTY LINE	GV	GAS VALVE
	EXISTING STRUCTURE		IRON ROD SET
	6' HIGH CHAIN LINK FENCE (W/BARBED WIRE WHERE NOTED)		PROPERTY CORNER
SA	SANITARY SEWER PIPE		
ST	STORM SEWER PIPE		
	SANITARY SEWER MANHOLE		

RECORD DRAWINGS
TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF, THESE RECORD DRAWINGS SUBSTANTIALLY REPRESENT THE PROJECT AS CONSTRUCTED.
BLASLAND, BOUCK & LEE, INC.

DATE_____ BY_____

X: NONE
L: ON=*; OFF=REF*
P: PAGESET/PLT-CDL
9/07/01 SYR-54-KLN LAF
48097106/RECORD/48097G04.DWG

Graphic Scale
1"=100' (100' 0 100' 200')
1/2"=1'-0" (2' 0 2' 4')

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED IN THE TITLE BLOCK. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE TITLE BLOCK TO DETERMINE THE ACTUAL SCALE OF THIS DRAWING.

No.	Date	Revisions	Init

NO ALTERATIONS PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW

Project Mgr. DFS
Designed by WKD/DFS
Drawn by KMD
Checked by WKD/DFS
Prof. Eng.
PE License

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

GENERAL ELECTRIC COMPANY • ALBANY, NEW YORK
FORMER POWEREX, INC. FACILITY
AUBURN, NEW YORK

REVISED SITE PLAN AND CB-16 MODIFICATIONS AND WATER STOP DETAILS

File Number 48097G04.DWG
Date SEPTEMBER 2001

Blasland, Bouck & Lee, Inc.
Corporate Headquarters
6723 Towpath Road
Syracuse, NY 13214
315-446-9120

Attachment 2

Surface Water
Interim Action Enhancement
Equipment Manufacturer's Literature

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Spectra RMS™ SK Frame Molded-Case Circuit Breakers

Introduction

Spectra RMS™ circuit breakers provide overload and short-circuit protection to electrical equipment. Frame types SKH, SKL, and SKP are available with a selection of rating plugs to a maximum of 1200 A, depending on the maximum rating or the breaker frame chosen.

SK frame circuit breakers are listed per Underwriters Laboratories standard UL489 and Canadian Standards Association standard CSA22.2 No. 5 and meet the requirements of the International Electrotechnical Commission standard IEC947-2. Mag-Break® breakers meet these same standards and are UL-recognized.

Spectra RMS molded-case and Mag-Break® breakers incorporate a unique adjustable instantaneous pickup, with tracking short time that picks up at approximately 60% of the instantaneous pickup. Overloads are cleared in a fraction of the time required by the normal long-time function in older-design long-time/instantaneous breakers.

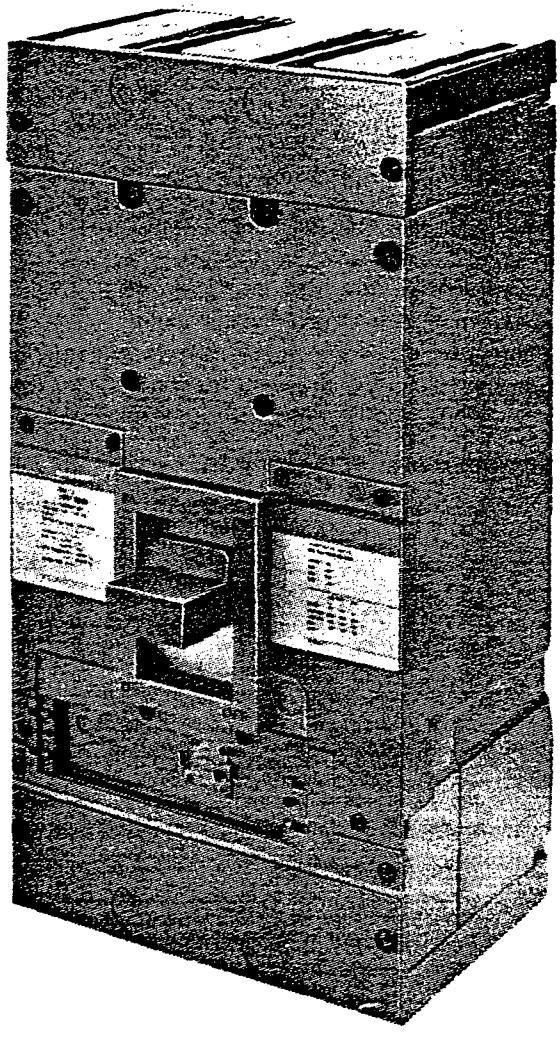
Molded-case switches are UL listed per UL1087 and incorporate a fixed, high-set instantaneous trip to allow higher withstand levels. For additional information, refer to GE publication GET-7002.

WARNING: Danger of electrical shock or injury. Turn OFF the power ahead of equipment before installing this device or removing any other device.

IMPORTANT: Danger d'electrocution. Couper l'alimentation avant d'installer cet appareil ou avant de retirer un autre appareil.

CAUTION: This product is NOT suitable for use in equipment not specifically designed to accept it. Contact equipment manufacturer for possible equipment modifications.

IMPORTANT: Cet appareil ne doit pas etre employé dans un equipement non specialement adapté a cet effet. Contactez le constructeur concernant les possibles modifications a apporter a l'equipement.



SK 1200A Frame

Installation

1. Unpack the circuit breaker or switch and inspect it for any shipping damage. Ensure that the breaker has the proper ampere, voltage, and interruption ratings for the application.
2. Following the instructions supplied with the rating plug, install the plug into the main breaker body. Available rating plugs, with their catalog numbers, are listed in Table 1.
3. Install all accessories, listed in Table 2, and terminal lugs, listed in Table 3, following the installation instructions supplied with each. Check all accessories for proper installation, wire routing, and operation.
4. Drill and tap all mounting holes and make any necessary front-panel escutcheon cutouts, as shown in Figure 1.
5. Mount the breaker with the mounting hardware described in Table 4.

All Spectra RMS circuit breakers are suitable for reverse feed and have no line or load markings. Incoming power cables or busbars may be connected to either the upper or lower terminals as dictated by the application.

Catalog Number	Sensor Rating, Amps	Plug Rating
SRPK800A300	800	300
SRPK800A400		400
SRPK800A500		500
SRPK800A600		600
SRPK800A700		700
SRPK800A800		800
SRPK1200A600	1200	600
SRPK1200A700		700
SRPK1200A800		800
SRPK1200A1000		1000
SRPK1200A1200		1200

Table 1. SK Frame rating plugs.

Internal Accessory Installation	Pocket Location and Exit Side①		Maximum Number of Accessories
	Left	Right	
Auxiliary Switches		√	Bell Alarm, plus
Shunt Trip	√		Aux. Switch, plus
Bell Alarm Switch	√		either a
Undervoltage Release	√		Shunt Trip or Undervoltage Release

① Leads may be routed under breaker to opposite side.

Table 2. Available accessories.

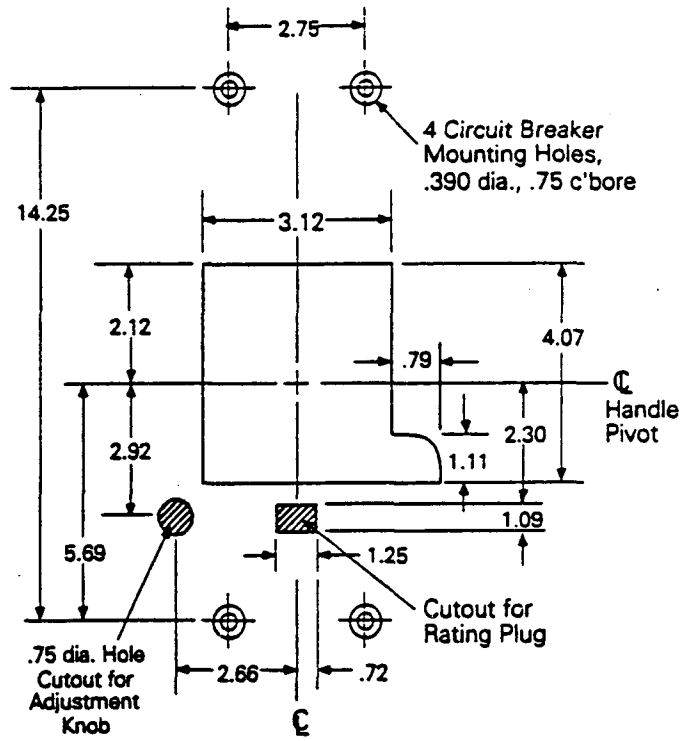


Figure 1. Mounting hole and escutcheon cutout pattern.

Catalog Number	Wire Range	Wire Type	Torque (in-lb) Wire-Lug	Torque (in-lb) Lug-Strap	Strip Length	Number of Wire Holes	Lug Material
TCAL81	3/0 - 500 kcmil	Copper or Aluminum	375	400	1-1/2	3	Aluminum
TCAL121	250 - 500 kcmil	Aluminum	375	400	1-1/2	4	Aluminum
	250 - 350 kcmil②	Copper					
TCO81A	3/0 - 500 kcmil	Copper	375	400	1-1/2	3	Copper
TCO121	250 - 400 kcmil	Copper	375	400	1-1/2	4	Copper
TCAL124①	350 - 750 kcmil	Copper or Aluminum	500	400	1-1/2	3	Aluminum

① UL listing pending.
② Suitable for 500 kcmil for voltage-drop considerations.

Table 3. Terminal lug catalog numbers and specifications.

Catalog Number	Application	Kit Description
SKMSK1	Mounting plate with tapped holes	Four 5/16-18 x 1-1/4 screws and lockwashers
SKMSK2	Mounting plate with clearance holes	Four 5/16-18 x 1-1/4 screws, nuts, and lockwashers

Table 4. Breaker mounting-screw kits.

Spectra RMS SK Frame breakers, types SKH, SKL, and SKP, with production date codes after J31=, use the same terminal lugs on both the line (upper) and load (lower) ends. These lugs are listed in Table 3. **All Spectra RMS SK Frame breakers with date codes before J31= require unique terminal lugs on their load ends. These lugs, suitable only for the load end, are catalog numbers TCAL91, TCAL 131, TCAL 134, TCO91, and TCO131.**

NOTE: When using aluminum wire, apply a joint compound as recommended by the wire manufacturer.

IMPORTANT: Dans les cas d'emploi de cable aluminium, utilizez le lubricant recommandé par le fabricant.

WARNING: It is important that the terminal covers are installed correctly to ensure proper circuit breaker operation.

IMPORTANT: Il es important de verifier que tout couvercle ou cache de protection est correctement installé afin d'assurer le bon fonctionnement de l'appareil.

Check that all terminals are torqued to the proper values. Reinstall the terminal covers, ensuring that *all* screws in each cover are secure.

NOTE: The SKP Frame (100kA, 480V) has a longer terminal cover for the upper (line) end. The top portion of this cover *must be installed* after cable or bus installation. *Do not substitute* the shorter lug cover.

Use the following steps for installing cables and terminal covers for SKP Frame breakers. Figure 2 illustrates the procedure.

1. Attach the bottom part of the lug cover with two M3.5 captive screws.
2. Attach the cables to the lugs, referring to Table 3 for the proper strip lengths and terminal torques. Ensure that the stripped end of each cable is fully seated in its lug. If busbar connections are used instead of lugs, torque them to 400 in-lbs.
3. Attach the large top lug cover with four M5 captive screws connecting to the breaker and two M4 captive screws to the lower lug cover.

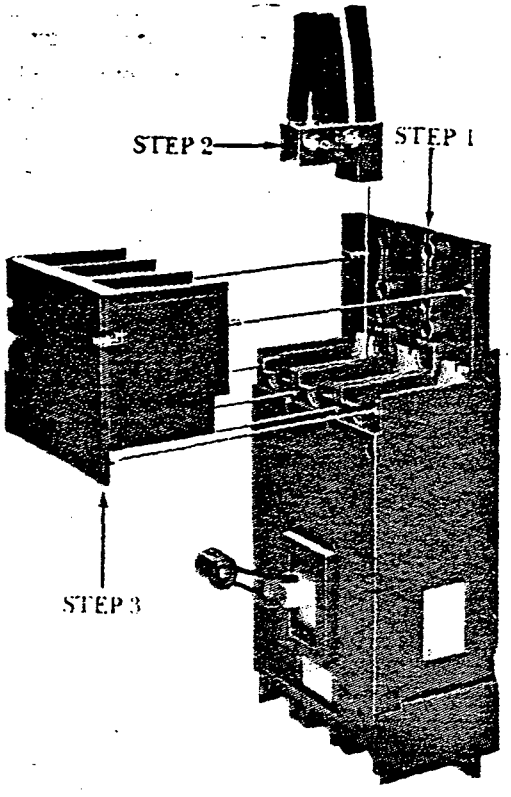


Figure 2. SKP Frame terminal-cover assembly for upper (line) end.

Adjustment

Instantaneous trip points are set with the red rotary switch. Each set point provides a different instantaneous trip value, which is a multiple of the installed rating plug. The multipliers for each switch position are given in Table 5. In addition, rating plugs are marked with all of the nominal values.

Switch Setting	Low	•	•	•	•	High
Multiplier	3.04	3.85	4.84	6.14	7.88	10.18

Table 5. Nominal instantaneous trip settings as multiples of rating plug values (tolerance ±20%).

Operation

The circuit breaker position is indicated by ON/OFF markings, universal I/O symbols, and an indicator window that shows red for ON, yellow for TRIP, and green for OFF. The corresponding three handle positions are illustrated in Figure 3. To close the breaker from the OFF position, move the handle to the ON position. To close the breaker from the TRIP position, first move the handle to the OFF (reset) position, then back to the ON position. A folding handle extension is provided on all SK frames for ease of operation.

A Push-To-Trip button is provided for convenience in testing the mechanical operation of the breaker.

CAUTION: Automatic tripping of the circuit breaker, Mag-Break® motor circuit protector, or molded-case switch may indicate a system problem. Identify and correct any problem before turning the device on again.

IMPORTANT: Le declenchement automatique de disjoncteur, Mag-Break®, ou interrupteur peut indiquer un probleme de circuit. Identifiez et corrigez le probleme avant de refermer l'appareil.

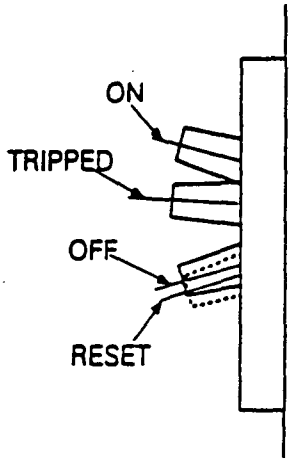


Figure 3. Handle positions for ON, TRIP, and OFF.

Maintenance

Generally no maintenance is required, but it is recommended that the following operations be performed annually:

WARNING: Danger of electrical shock or injury. Turn off power ahead of equipment before attempting to service.

IMPORTANT: Danger d'electrocution. Couper l'alimentation avant d'affectuer toute action d'entretien.

1. Turn off the power to the equipment being serviced.
2. Clean the surfaces of the breaker and surrounding area of any dirt, soot, or other debris.
3. Inspect the breaker for any signs of damage.
4. Operate the push-to-trip button and toggle handle several time to exercise the mechanism and test the mechanical operation of the breaker.
5. If any sign of damage is found or if the mechanism has a sluggish or sticky operation, replace the circuit breaker.

The circuit breaker is sealed and contains no user-serviceable parts. Opening the breaker will void any and all warranties.

External Accessories

The following external accessories are available for Spectra RMS SK Frame breakers. Catalog numbers and other ordering information for internal and external accessories may be obtained from your authorized GE distributor. (Accessories identified with an asterisk [*] require removal of the handle extension.)

- Mounting kits
- Plug-in base, Bolt-on base
- Back-connected studs
- Padlock kits
- External handle operators*
- Motor operators*
- Mechanical interlock*

These instructions do not cover all details or variations in equipment nor do they provide for every possible contingency that may be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise that are not covered sufficiently for the purchaser's purposes, the matter should be referred to the GE Company.

GE Electrical Distribution & Control

General Electric Company
41 Woodford Ave., Plainville, CT 06062

GEH5592D 0693 PSA

Spectra RMS™ Molded Case Circuit Breakers

Rating Plug

FUNCTION

Spectra RMS™ circuit breaker frames are designed for use with UL listed field interchangeable rating plugs. These rating plugs are directly analogous to the interchangeable trip unit employed with thermal-magnetic designs. They serve the function of changing the per unit (1X) continuous current rating of a breaker. A circuit breaker frame equipped with a suitable rating plug will have a long time trip value equal to the ampere rating marked on the rating plug.

Spectra RMS™ motor circuit protectors use these rating plugs to change the adjustable instantaneous/tracking short-time pick-up values. They do *not* provide any low level overcurrent protection.

For example, a breaker frame with a 1200 amp sensor and an 800A rating plug will have an 800 amp continuous current (long-time) rating and may be cabled or bussed to the rating plug ampere rating. Several rating plugs exist for a particular sensor rating and each rating plug is keyed to fit a particular circuit breaker frame and sensor rating.

Table 1 outlines all the available rating plugs for the E, F, G and K frame breakers.

FRONT LABEL (Figure 1)

The front plate label shown in Figure 1 is visible when the rating plug is installed. The items displayed are as follows:

Ampere Rating—The rating plug current rating in amperes.

Type–Identifies the Spectra RMS™ circuit breaker frame for which the rating plug is suitable.

Inst. Adj. Range—The value of short circuit current (±20%) which will cause the breaker to trip instantaneously, adjustable in discrete steps from LO to HI.

UL LABEL (Listing Mark)

This label is mounted on the side of the rating plug and is not visible with the rating plug installed. The label lists the breaker frame that will accept that particular rating plug.

INSTALLATION

Before installing a rating plug into a Spectra RMS™ circuit breaker frame, inspect for physical damage.

STEP 1:

Verify that the rating plug type matches the type on the breaker frame label and that the Ampere Rating matches the desired continuous current rating (X).

STEP 2:

Grasp the rating plug by the thumb and forefinger and push it into the programmer. See Figure 2 for location. Proper engagement will be verified by a "click."

Do Not attempt to push the rating plug into the programmer if resistance is felt. You may have the wrong rating plug for the frame/sensor rating. Stop immediately and verify that the rating plug type matches the type shown on the breaker frame label.

REMOVAL

To remove the rating plug it is recommended that a tool be used to minimize the risk of damage. A suitable removal tool is GE Cat. No. TRTOOL (AUGATT114-1 IC remover or equivalent). Squeeze the two rating plug tabs to release the lock and pull firmly upwards while maintaining pressure on the tabs. If no tool is available, grasp the two ends of the rating plug tabs with *two* small (1/8" maximum width blade) flat head screwdrivers and gently pry out.

NOTE: *Protection to the breaker is maintained at a much lower rating (10%–50% of sensor rating) when the rating plug is pulled out.* If the breaker is carrying more than 10% of the sensor rating load current when the rating plug is removed, the breaker may trip.

TABLE 1

Rating Plug Cat. No.	Sensor Rating (Amperes)	Rating Plug Rating (Amperes)	Circuit Breaker and Instantaneous Only Frames
SRPE7A3	7	3	SELA
SRPE7A7		7	(Mag-Break®)
SRPE30A15	30	15	SEDA, SEHA
SRPE30A20		20	SELA, SEPA
SRPE30A25		25	
SRPE30A30		30	
SRPE60A40	60	40	SEDA, SEHA
SRPE60A50		50	SELA, SEPA
SRPE60A60		60	
SRPE100A70	100	70	SEDA, SEHA
SRPE100A80		80	SELA, SEPA
SRPE100A90		90	
SRPE100A100		100	
SRPE150A110	150	110	SEDA, SEHA
SRPE150A125		125	SELA, SEPA
SRPE150A150		150	
SRPF250A70	250	70	SFHA, SFLA
SRPF250A90		90	SFPA
SRPF250A100		100	
SRPF250A110		110	
SRPF250A125		125	
SRPF250A150		150	
SRPF250A175		175	
SRPF250A200		200	
SRPF250A225		225	
SRPF250A250		250	

(CONTINUED)

TABLE 1 (CONTINUED)

Rating Plug Cat. No.	Sensor Rating (Amperes)	Rating Plug Rating (Amperes)	Circuit Breaker and Instantaneous Only Frames
SRPG400A125	400	125	SGDA, SGHA SGLA, SGPA
SRPG400A150		150	
SRPG400A175		175	
SRPG400A200		200	
SRPG400A225		225	
SRPG400A250		250	
SRPG400A300		300	
SRPG400A350		350	
SRPG400A400		400	
SRPG600A250	600	250	SGLA, SGHA SGPA
SRPG600A300		300	
SRPG600A350		350	
SRPG600A400		400	
SRPG600A450		450	
SRPG600A500		500	
SRPG600A600		600	
SRPK800A300	800	300	SKHA, SKLA SKPA
SRPK800A400		400	
SRPK800A500		500	
SRPK800A600		600	
SRPK800A700		700	
SRPK800A800		800	
SRPK1200A600	1200	600	SKHA, SKLA SKPA
SRPK1200A700		700	
SRPK1200A800		800	
SRPK1200A1000		1000	
SRPK1200A1200		1200	

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the GE Company.

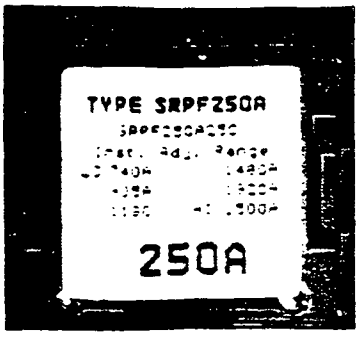


Figure 1

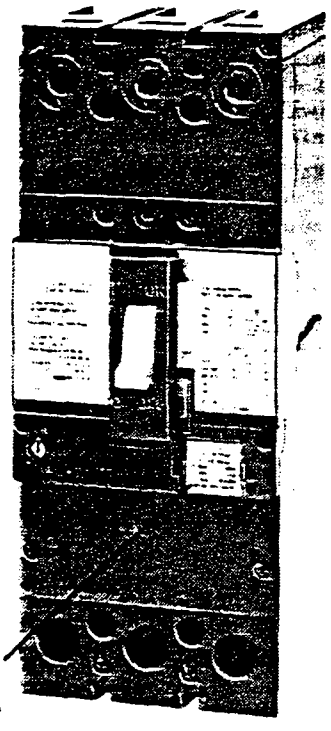


Figure 2

General Electric Company
41 Woodford Ave., Plainville, CT 06062

GEH-5549 0989 PSA

IMPORTANT NOTICE

This SK circuit breaker, Mag-Break® circuit breaker, or molded-case switch has redesigned lower (load) terminal pads that are dimensionally the same as the upper (line) terminal pads and the same as the load terminals on TKMA, THKMA, and TKH breakers, and on TKL breakers with RMS-9 trip units.

To terminate insulated cables on the lower (load) terminals of this breaker, use one of the following lug catalog numbers: TCAL81, TCAL121, TCAL124, TCO81A, or TCO121, as appropriate for the trip rating. See enclosed instructions for additional lug information.

FEDERAL SIGNAL CORPORATION
Electrical Products

256872D
REV. D 795
Printed in U.S.A.

INSTRUCTION SHEET FOR FEDERAL MODEL 121S VITALITE®

For Parts Call (708) 534-3400

I. INSTALLATION.

SAFETY MESSAGE TO INSTALLERS

It is important to follow all instructions shipped with this product. This device is to be installed by a trained electrician who is thoroughly familiar with the National Electrical Code and will follow the NEC Guidelines as well as local codes.

The selection of the mounting location for the device, its controls and the routing of the wiring is to be accomplished under the direction of the facilities engineer and the safety engineer. In addition, listed below are some other important safety instructions and precautions you should follow:

- Read and understand all instructions before installing or operating this equipment.
- Do not connect this light to the system when power is on.
- After installation, test the light system to ensure that it is operating properly.
- After testing is complete, provide a copy of this instruction sheet to all operating personnel.
- Establish a procedure to routinely check the light system for proper activation and operation.

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death to you or others.

A. Unpacking.

After unpacking the Model 121S, examine it for damage that may have occurred in transit. If the equipment has been damaged, do not attempt to install or operate it, file a claim immediately with the carrier stating the extent of the damage. Carefully check all envelopes, shipping labels and tags before removing or destroying them.

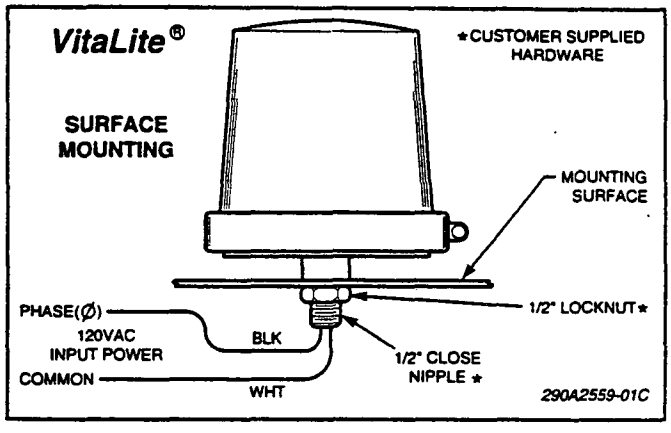


Figure 1.

B. Mounting.

The Model 121S can be mounted on a flat surface or a 1/2-inch pipe, as shown in figures 1 and 2.

Mounting on a vertical surface can also be accomplished using a separately purchased Federal Model LWMB2 (wall mounting bracket) or LCMB2 (corner mounting bracket) mounting kit.

The light can be mounted in any position. However if the unit is mounted upside-down in a damp location, drill a 1/8-inch hole in the dome to allow moisture to drain from the unit as shown in figure 2.

Hardware and installation details are left to the user.

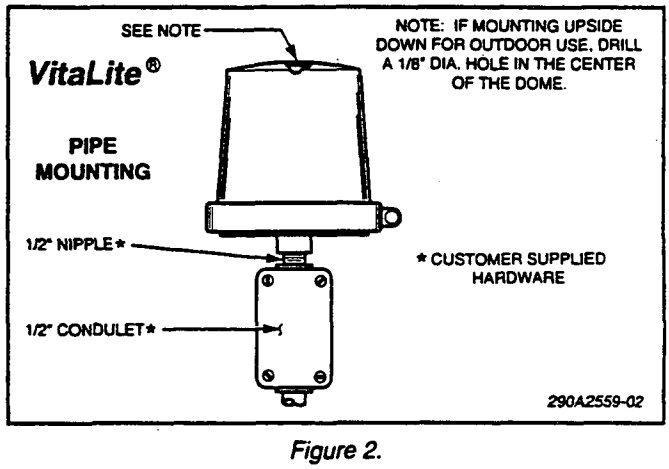


Figure 2.

C. Electrical Connections (See figure 1).

WARNING

Do not connect wires when power is applied.

Connect the light's black lead to the phase (hot) power source connection. Connect the light's white lead to the neutral (common) power source connection.

II. MAINTENANCE.

SAFETY MESSAGE TO OPERATORS

Listed below are some important safety instructions and precautions you should follow:

- Read and understand all instructions before operating this system.
- Any maintenance to the light system must be done with power turned off.
- Any maintenance to the light system must be performed by a trained electrician in accordance with NEC Guidelines and local codes.
- Never alter the unit in any manner. Safety in hazardous locations may be endangered if additional openings or other alterations are made in units specifically designed for use in these locations.
- The nameplate, which may contain cautionary or other information of importance to maintenance personnel, should NOT be obscured in any way. Ensure that the nameplate remains readable when the housing's exterior is painted.
- After servicing, test the light system to ensure it is operating properly.

Failure to follow these safety precautions may result in property damage, serious injury, or death to you or others.

A. Re-lamping.

To change the lamp, proceed as follows:

1. Remove the screw that secures the retaining band on the unit.

2. Remove the retaining band and lift off the dome.

3. Replace the lamp with Federal Signal lamp Part No. 8107164.

4. Replace the dome and retaining band. Secure with the previously removed screw.

B. Cleaning Reflector.

Remove and replace dome in accordance with instructions in paragraph II.A. To clean reflector, use a soft cloth and any liquid household cleaner. DO NOT USE abrasive cleaners.

C. Lubrication.

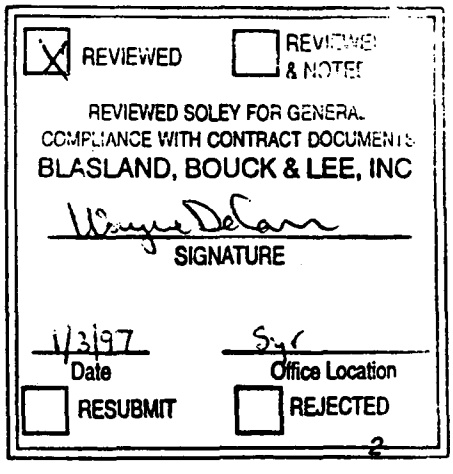
The Motor-Gear Reducer Assembly is a sealed unit. Therefore, no lubrication is required.

D. Replacement Parts.

Description	Part No.
Dome, Lexan, Red	8444B019-11
Dome, Lexan, Amber	8444B019-12
Dome, Lexan, Blue	8444B019-13
Dome, Lexan, Clear	8444B019-14
Dome, Lexan, Green	8444B019-15
Lamp, 120V	~~8107164~~ K8107181A

E. Mounting Kits.

Description	Model No.
Mounting Bracket, Wall	LWMB2
Mounting Bracket, Corner	LCMB2



Supersedes GEH-4793B & GEH-4796B

300-Line

Combination Magnetic Starters

CR307–CR308, CR310–CR311, CR387, CR390 Series

Caution: *Before installing in a nuclear application, determine that the product is intended for such use.*

Warning: *Disconnect power before installing or servicing.*

Description

General Electric 300-Line full-voltage motor starters include a magnetic contactor and a three-leg block overload relay, providing motor protection against running and stalled motor overloads. The overload relay is provided with a yellow trip indicator located to the right of the reset arm, and is visible when the overload relay is tripped.

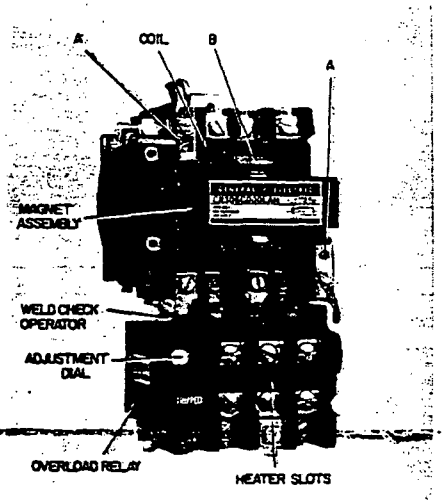


Figure 1. Typical 300-Line magnetic starter

Ratings–600 V Maximum

Starter Max. Current Rating	Contactor Max. Current Rating	AC Volts	Max. Hp For AC Motors	
			Single-phase	Poly-phase
Size 0				
18 amp (open and enclosed)	20 amp (open)	115	1	—
	18 amp (enclosed)	200	—	3
		230	2	3
		460–575	—	5
Size 1				
27 amp (open and enclosed)	30 amp (open)	115	2	—
	27 amp (enclosed)	200	—	7½
		230	3	7½
		460–575	—	10

Motor branch circuit and control circuit overcurrent protection should be supplied in accordance with the National Electrical Code. CR305 contactors are suitable for use on a circuit capable of delivering not more than 5,000 RMS symmetrical amperes, 600 volts maximum when protected by H, J, K1, K5, RK1, RK5 class fuses, or a circuit breaker having an interrupting rating not less than 5,000 RMS symmetrical amperes.

Installation

Before connecting controller to power supply:

1. Remove all packing.
2. Clean magnet mating surfaces of any dirt or foreign matter.
3. Select and install heaters in accordance with heater table.
4. Operate movable magnet and operating arm by pressing on the nameplate to assure free movement.
5. Mount on a sturdy vertical support.
6. Make the electrical connections.
7. The starter overload relay may be reset manually by depressing and releasing the reset arm.

Coil Replacement

1. Remove power from device.
2. Press against coil while pulling up slightly on coil retainers (A–Figure 1) and move retainers away from coil.
3. Withdraw magnet assembly, coil, molded cover, and movable arm from device.
4. Withdraw spring clip (B–Figure 1) and remove armature from movable arm.
5. Remove coil from magnet.
6. Replace coil.
7. Reassemble device by reversing procedure.

Contact Replacement

1. Perform steps 1 through 5 under *Coil Replacement*.
2. Remove magnet from molded cover and movable arm.
3. Remove return spring from center of movable arm.
4. Remove molded cover from movable arm.
5. Depress and slide movable contact and spring from movable arm.
6. Remove screws holding stationary contacts in place and remove stationary contacts.
7. Reassemble device by reversing procedure.

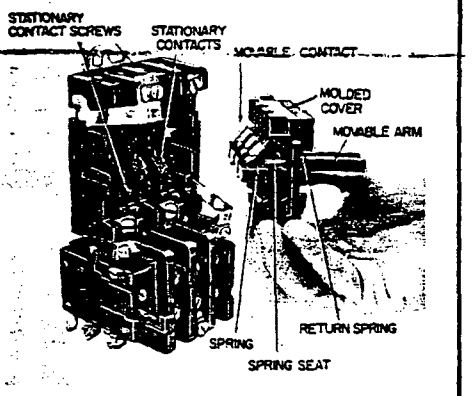


Figure 2.

Note: For starters with one or more normally closed contacts, perform steps 1 and 2 shown under *Coil Replacement*. Withdraw spring clip (B–Figure 1) and remove armature, coil, and magnet from device. Remove return spring from center of movable arm. Remove molded cover and stationary contacts before lifting movable arm from device.

Normally Closed Contacts

The contacts may be converted from normally open to normally closed with no additional parts. Perform steps 1 through 4 shown under *Coil Replacement*. Lift coil and magnet from movable arm. Remove return spring from center of movable arm. Depress movable contact spring and spring seat against movable contact and rotate these parts ½ turn without removing them from window. Remove the stationary contacts. Install the movable arm in the device. Install the stationary contacts so that their silver pads face the movable contact silver pads.

Reassemble the device. To change contacts from normally closed to normally open position, reverse the above procedure.

Check For Welded Contacts In Overload Relay

With power disconnected, disconnect the control wiring from the relay terminals. Place a bell set or resistance measuring instrument across relay terminals. Depress and release reset arm to insure relay is reset.

GENERAL ELECTRIC

In this condition there should be continuity between the terminals. Depress white manual check operator to trip the relay. In the tripped condition the circuit between the terminals should be open indicating the contacts are operating normally. Rewire the terminals and reset the relay for normal operation.

Maintenance

1. Always remove power from device before performing any maintenance.
2. Keep magnet mating surface free of accumulated dirt or dust.
3. *Do Not Oil Or Grease* the magnet mating surfaces.
4. Contacts are carefully designed for maximum life. They need only be replaced when nearly all the silver tip is gone and the contact tip support is exposed. *Do Not File* the contacts. Filing or dressing the contacts only results in lost tip material and reduces life.
5. The ultimate tripping current of the installed relay heater can be adjusted ±10% by using the adjustment dial, shown in Figure 1.
6. On reversing and two-speed starters, the mechanical interlock has been factory adjusted and normally should never have to be readjusted. If readjustment is ever needed, these steps should be followed:

A. Close one contactor by hand by pushing down on armature.

B. Using the other hand, loosen the nut on opposite contactor interlock arm and slide it towards the top of the elongated slot until all gap is taken up between the two arms. Follow the same procedure with the opposite contactor and interlock arm.

C. Best adjustment is usually obtained when both mechanical interlock arm assemblies are as far up in the elongated slot as possible.

D. With both arms adjusted, there should be a very slight gap (approximately 1/16-inch) between the arms with both contactors open. Neither arm should overlap the other with both contactors open.

Caution: Before adjusting or operating reverser, make sure the mechanical interlock arm is engaged with movable contact arm.

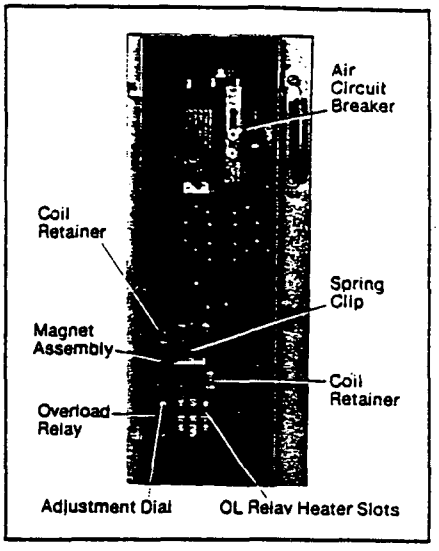


Figure 3. Typical CR307 combination starter.

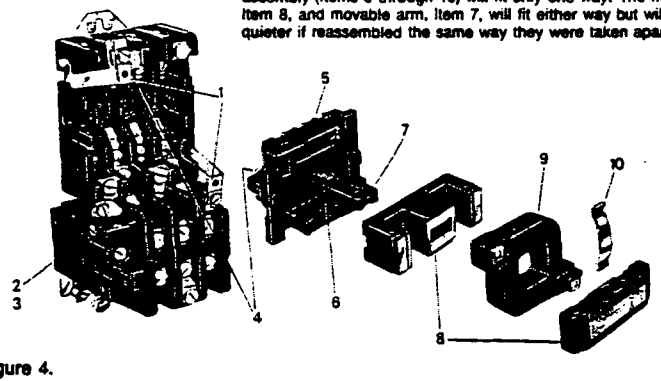


Figure 4.

***Coil Suffix Table

(Order 15D21G plus coil suffix number below)

60 Hertz	115–120V	200–208V	230–240V	—	460–480V	575–600V
50 Hertz	110V	——	220V	380V	440V	550V
Coil Suffix	002	023	003	064	004	005

Accessory Kits

First NO aux. cont. for CR305, CR306	CR305X100A
First NC aux. cont. for CR305, CR306	CR305X100B
First NO–NC aux. cont. for CR305, CR306	CR305X100C
Additional NO aux. cont. for all forms	CR305X100D
Additional NC aux. cont. for all forms	CR305X100E
Push button	CR305X120N
Selector switch, H–O–A	CR305X130N
Selector switch, OFF–ON	CR305X130P
Indicating light	CR305X150N
Fifth pole	CR305X111B
Control circuit fuse	CR305X141A, B, C, D

Principal Renewal Parts

Ref. No. Figure 4	Description	Catalog Number	Quantity Required		
			CR307/CR308/CR387	CR310/CR311/CR390	
				Left Cont.	Right Cont.
1	Coil retainer assembly	546A301G050	2	2	2
2	Overload relay (3-heater, non-compensated form, 1 NC contact)	CR324C310F	1	1†	‡
3	Overload relay (3-heater, non-compensated form, 1 NO–1 NC contact)	CR324C360F	1	1†	‡
4	Set of stationary and movable contacts with springs and screws for four-poles:	——	—	—	—
	NEMA Size 0	546A300G002	1	1	1
	NEMA Size 1	546A301G053	1	1	1
5	Molded cover for stationary and movable contacts	188D711P001	1	1	1
6	Return spring for movable contact support	541A278P001	1	1	1
7	Molded movable contact support for 2-, 3-, 4-pole	187D350P001	1	1	1
8	Armature and frame (magnet)	546A301G054	1	1	1
9	Operating coil	15D21G***	1	1	1
10	Spring retainer for armature	546A588P001	1	1	1
11	Overload relay for 2-speed single-winding controller (1 NC contact)	CR324C310G	—	1	—
12	Overload relay for 2-speed single-winding controller (1 NO–1 NC contact)	CR324C360G	—	1	—

*** Add coil suffix number from above table to complete the catalog number. Example: Cat. No. 15D21G002 has ratings of 115–120V, 60 Hz and 110V, 50 Hz.

† Omitted on 2-speed single-winding controller.

‡ Quantity one for multi-speed controller.

These instructions do not purport to cover all details or variations in equipment not to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should particular problems arise which are not covered sufficiently for the Purchaser's purposes, the matter should be referred to the nearest General Electric sales office.

For further information call or write your local General Electric distributor or sales office.
Or write . . .

General Electric Company
General Purpose
Control Components
P. O. Box 2913
Bloomington, IL 61702-2913

GENERAL ELECTRIC

(1M)

Printed In U.S.A.

GE Electrical Distribution & Control

55-179340

CONT ON SHEET FL SH NO. 1

REV NO.

TITLE

WIRING INSTRUCTIONS FOR CR 306, 307, 308 & 387 FULL VOLTAGE NON-REVERSING MAGNETIC STARTERS.

CONT ON SHEET SH NO.

FIRST MADE FOR NEMA SIZE 00 , 0 & 1

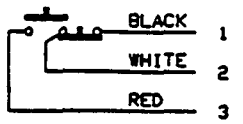
REVISIONS

9 BRONSON AN94-2020 Jan. 18, 1995

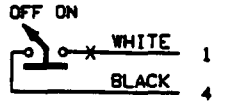
TABLE A

STANDARD PILOT DEVICES

START-STOP

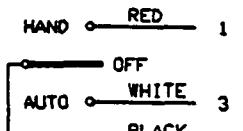


PUSHBUTTONS



(OMIT WIRE 'B')

2 POSITION SELECTOR SWITCH



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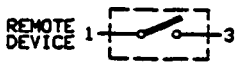
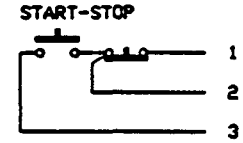


3 POSITION SELECTOR SWITCH

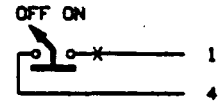
TABLE B

OIL-TIGHT PILOT DEVICES

START-STOP



PUSHBUTTONS



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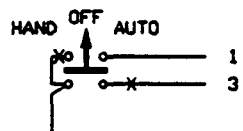
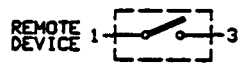
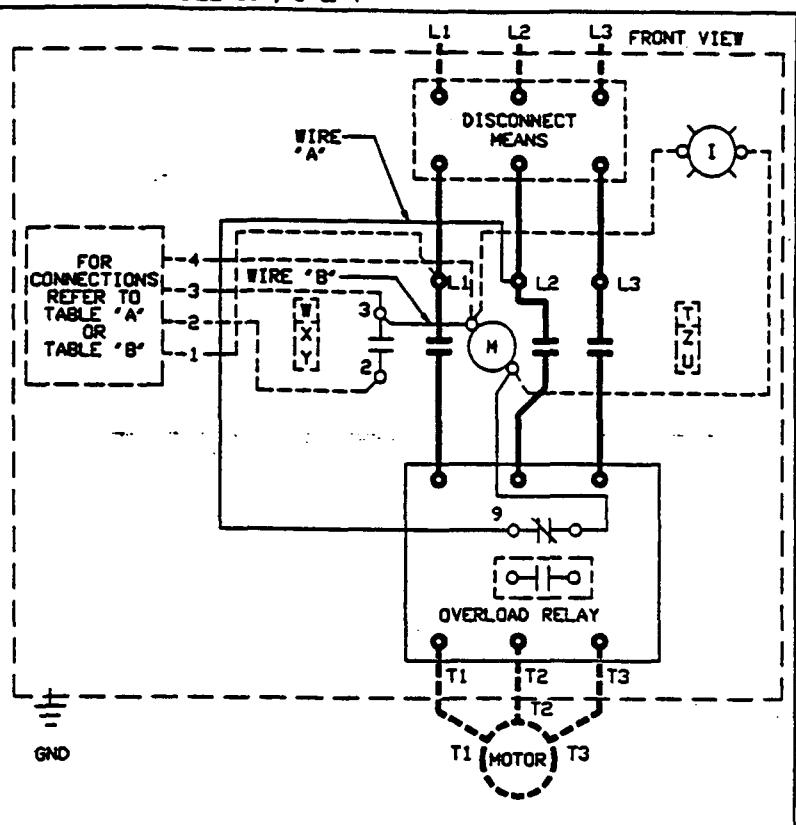
2 POSITION SELECTOR SWITCH



(OMIT WIRE 'B')



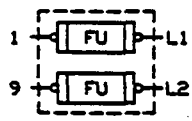
3 POSITION SELECTOR SWITCH



-NOMENCLATURE-

M-LINE CONTACTOR
OL-OVERLOAD RELAY
I-INDICATING LIGHT
FU-FUSE
X-INDICATES CONTACT CLOSED

CONTROL CIRCUIT FUSING



GROUND KIT

1/2-IN CONDUIT	55-213403G001
3/4-IN CONDUIT	55-213403G002
1-IN CONDUIT	55-213403G003
1 1/4-IN CONDUIT	55-213403G004
1 1/2-IN CONDUIT	55-213403G005
2-IN CONDUIT	55-213403G006
2 1/2-IN CONDUIT	55-213403G007
3-IN CONDUIT	55-213403G008

NOTE: ADDITIONAL OVER-CURRENT PROTECTION MAY BE REQUIRED. REFER TO THE NATIONAL ELECTRICAL CODE OR LOCAL ELECTRICAL CODE AS REQUIRED.

FOR 1-PHASE OPERATION USING
- SOLID STATE OVERLOAD RELAY
  SEE GEH-6430(sz 1,2) OR GEH-6431 (sz 3,4)
- THERMAL OVERLOAD RELAY
  CHANGE CONNECTION WIRE "A" FROM L2 TO L3.
  CONNECT LINE TO L1 AND L3 AND LOAD TO T1 AND T3.

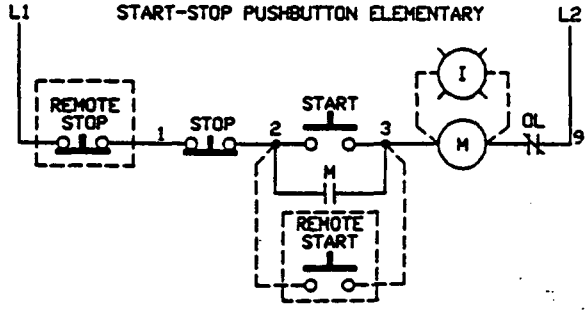
FOR STARTER WITHOUT DISCONNECT MEANS - WIRE LINE DIRECT TO L1, L2 AND L3 ON STARTER.

FOR EXTRA AUXILIARY CONTACTS- A MAXIMUM OF 4 CONTACTS MAY BE ADDED AT POSITIONS T, U, W, X, Y & Z FOR SIZE 0 & 1 ONLY.

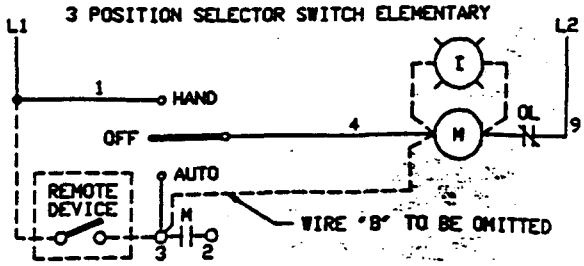
FOR SEPARATE CONTROL SOURCE - OMIT WIRE "A" AND CONNECT SEPARATE CONTROL SOURCE TO N/C CONTACT ON OL AND TO 1 ON PILOT DEVICE. WIRE "A" IS OMITTED AT FACTORY ON ALL STARTERS WITH A COIL VOLTAGE OF 120V OR LESS.

USE 75°C COPPER CONDUCTORS ONLY, FOR FIELD WIRING. TORQUE LINE AND LOAD TERMINALS AS MARKED OR AS SHOWN AT RIGHT:		LINE	LOAD
	CR306	20 LB-IN	20 LB-IN
	CR307	AS MARKED	20 LB-IN
	CR308	35 LB-IN	20 LB-IN
	CR387	AS MARKED	20 LB-IN

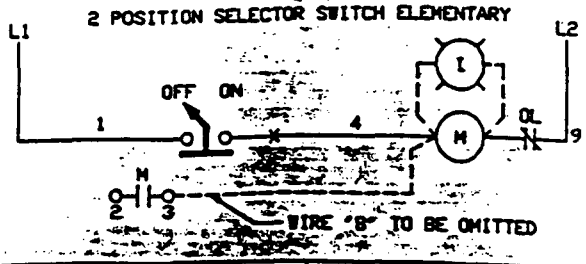
START-STOP PUSHBUTTON ELEMENTARY



3 POSITION SELECTOR SWITCH ELEMENTARY



2 POSITION SELECTOR SWITCH ELEMENTARY



OFS

PRINTS TO

MADE BY C. DEVISSER 20/MAR/68

REISSUED January 18, 1995

APPROVALS

GE E D & C BLOOMINGTON, IL

55-179340

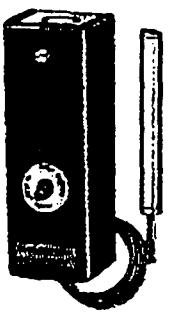
CONT ON SHEET FL SH NO. 1

Honeywell

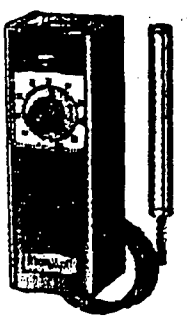
T675A,B and T678A TEMPERATURE CONTROLLERS

THE T675 AND T678 TEMPERATURE CONTROLLERS REGULATE THE TEMPERATURE OF AIR OR LIQUIDS IN DUCTS, PIPES, TANKS, AND BOILERS. TYPICAL USES INCLUDE CONTROL OF DAMPERS AND VALVES IN HEATING, COOLING, OR HEATING-COOLING SYSTEMS.

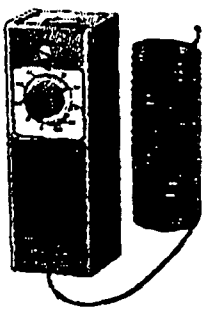
❑ T675A ❑ T675B ❑ T678A



T675B



T675A
T678A



T675A, T678A
WITH FAST-RESPONSE
SENSING ELEMENT

- **T675A has one single-pole, double-throw (spdt) switch that breaks R-B and makes R-W at the set point on a temperature rise.**
- **T675B Manual Reset Low Unit Limit has one single-pole, single-throw (spst) switch that breaks at the set point on a temperature fall, and requires manual resetting.**
- **T678A has two single-pole, double-throw (spdt) switches that operate in sequence. The right switch breaks R-B and makes R-W at the set point on a temperature rise. The left switch breaks R-B and makes R-W if the temperature continues to rise through the interstage differential.**
- **T675A models available with an adjustable differential.**
- **T675A and T678A have set point adjustment knob on front of case.**
- **Capillary tubing allows remote mounting of sensing element; models available with various lengths.**
- **T675A and T678A models available with a fast-response sensing element.**
- **Controller can be mounted for all applications.**
- **Mounting accessories available for all applications.**
- **Ambient temperature compensated.**
- **Insert supplied with TRADELINE models replaces set point knob to discourage tampering.**

SPECIFICATIONS

TRADELINE MODELS

TRADELINE models are selected and packaged to provide ease of stocking, ease of handling, and maximum replacement value. TRADELINE model specifications are the same as those of standard models except as noted below.

TRADELINE MODELS AVAILABLE:
T675A and T678A Temperature Controllers—see Table 1 for TRADELINE models available.
CAPILLARY: 5 ft [1.5 m] long, copper (except one T675A model with a 20 ft [6.1 m] capillary).
ADDITIONAL FEATURES:

- All TRADELINE models include tamper resisting insert and 107324A Capillary Holder. (Models with fast-response sensing element include 131624A Capillary Holder.)
- TRADELINE models of T675A, T678A supplied with impact resistant Norel covers.
- TRADELINE pack with cross-reference and special instruction sheet.

TABLE 1—TRADELINE MODELS AVAILABLE

Model	Differential	Operating Temperature		Maximum Sale Bulb Temperature	
		F	C	F	C
T675A (1 spdt switch)	Adjustable 3 F to 10 F [1.7 C to 5.6 C]	0 to 100[a,b]	–18 to 38	125	52
		160 to 260	71 to 127	280	138
	Adjustable 3.6 F to 12 F [2.0 C to 6.7 C]	55 to 175[a]	13 to 79	200	93
	Fixed at 1 F [0.6 C]	0 to 100	–18 to +38	125	52
T678A (2 spdt switches)	Each switch: Fixed at 3 F [1.7 C] Interstage: Adjustable 3 F to 10 F [1.7 C to 5.6 C]	0 to 100[a]	–18 to +38	125	52
	Each switch: Fixed at 3.6 F [2.0 C] Interstage: Adjustable 3.6 F to 12 F [2.0 C to 6.7 C]	55 to 175[a]	13 to 79	200	93

[a] TRADELINE model also available with a fast-response sensing element, including a 131624A Capillary Holder.
[b] TRADELINE model also available with a 20 ft [6.1 m] copper capillary.

Differential (cover must be removed):
T675A Models with adjustable differential—adjustment dial on snap-acting switch.
T678A Interstage adjustment—star wheel on left side of chassis.

MAXIMUM SAFE BULB TEMPERATURE: See Table 2.

TEMPERATURE SENSING ELEMENT: Standard element is a liquid-filled, remote bulb. Some models are available with a fast-response, liquid-filled, coiled capillary element which reduces response time to approximately 1/4 that of the standard bulb.

SENSING BULB SIZE:
Length—4-3/16 in [106.4 mm].
Diameter—1/2 in [12.7 mm].

MAXIMUM SENSING BULB PRESSURE: 50 psi [344.7 kPa] for direct immersion.

CAPILLARY LENGTH AND MATERIAL:
T675A and T678A standard models—5 ft [1.5 m] copper or 20 ft [6.1 m] copper, monel, or stainless steel.
T675A and T678A fast-response models—5 ft [1.5 m] copper capillary with a coiled sensing element on the end; sensing element is coiled 1/8 in. [3.2 mm] tubing, 1-1/2 in [38.1 m] diameter x 5 in. [127 mm] long. The coil may be stretched to approximately 10 in. [254 mm].
T675B—10 ft [3.0 m] copper.

CAPILLARY HOLDER: 107924A included with TRADELINE models (except fast-response models). 131524A included with all fast-response models.

WIRING KNOCKOUTS: Two 7/8 in. [22.2 mm] diameter knockouts for 1/2 in. conduit (one in the top and one in the bottom).

CONTROLLER MOUNTING: Any position; three screws through slotted holes in back of case (Fig. 1).

SENSING BULB MOUNTING:
In air ducts—capillary holder.
In boilers or storage tanks—immersion well (Fig. 4) or capillary compression fitting.

DIMENSIONS: See Fig. 1.

APPROVALS:
UNDERWRITERS LABORATORIES INC. LISTED:
T675A and T678A—File No. E4436, Vol. 4; Guide No. XAPX.
T675B—File No. SA481, Vol. 3; Guide No. SDFY.
CANADIAN STANDARDS ASSOCIATION CERTIFIED (120 V, 240 V, and some 208 V models only): T675a and T678A—File No. LR1620, Guide No. 400-E-O.

REPLACEMENT PART:
1. 131524A Capillary Holder, for mounting a fast-response sensing element in an air duct.

ACCESSORIES:
1. 131524A Capillary Holder, for mounting a sensing bulb in an air duct 8-3/8 in. [212.7 mm] long.
2. 311266D Duct Bulb Holder.
3. Immersion Well Assembly—to protect sensing bulb from mechanical or chemical damage when mounting in a boiler or storage tank; copper, 4-3/4 in. [120.7 mm] insertion length; includes 112721 Tube Clip for clamping capillary tube to immersion well—
– 112622AA, 1/2-14 NPT external threads on spud.
– 112630A, 3/4-14 NPT external threads on spud.
4. Capillary Compression Fitting—to provide seal-off when mounting sensing bulb directly in a boiler or storage tank; brass, 5/8 in. [15.9 mm] thread length—
– 104484A, 1/2-14 NPT external threads on spud.
– 104484B, 3/4-14 NPT external threads on spud.
5. 105900 T-strap—for clamping sensing bulb to a pipe or similar mount.
6. 7640HY Bag Assembly—with standoff bracket for mounting the controller to an insulated duct.
7. C815A Splash-proof Enclosure.
8. 34886A Sun Shield.
9. 601534 Calibration Wrench.
10. 194899 Tamper-resisting insert button to conceal set point.
11. Celsius scaleplates for T675.
– 194486D: 75 to 125 C replaces 160 F to 260 F scaleplate.
– 194486H: minus 30 C to plus 50 C replaces 0 F to 100 scaleplate.
– 194486F: 15 C to 75 C replaces 55 F to 175 F scaleplate.

ELECTRICAL RATINGS:
T675A models with adjustable differential and T678A:

	120 Vac	240 Vac	277 Vac
Full Load	8.0	5.1	4.2
Locked Rotor	48.0	30.6	25.2
Pilot Duty	125 VA	125 VA	125 VA

T675A models with fixed differential—125 VA at 120/208/240/277 Vac.
T675B—125 VA pilot duty up to 277 Vac.
T678A—maximum connected load=2000 VA.

OPERATING TEMPERATURE RANGE (SCALE RANGE): See Table 2.

DIFFERENTIAL: See Table 2.

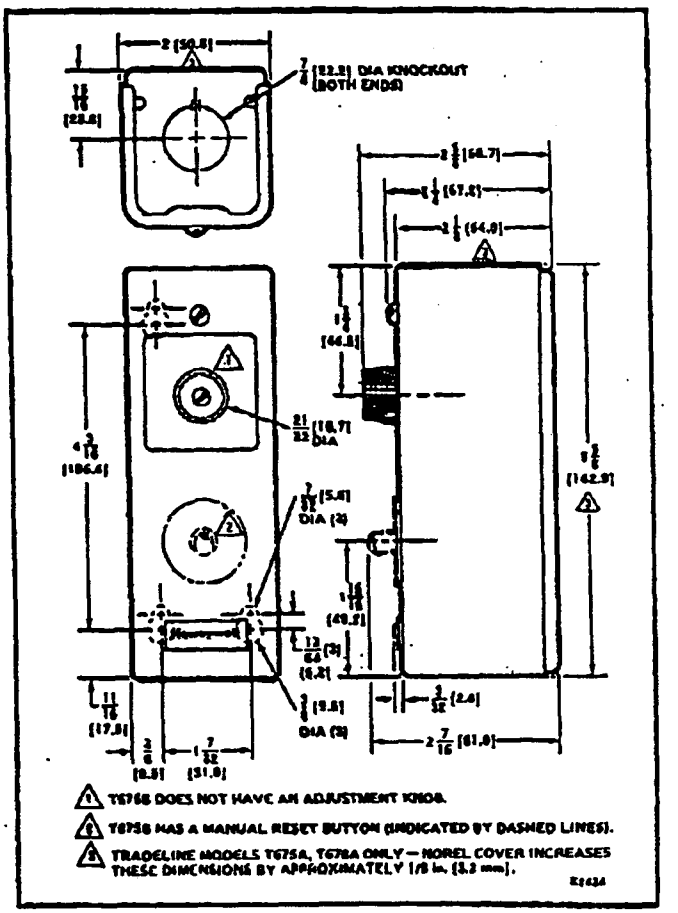


Fig. 1— DIMENSIONS OF THE T675 and T678 TEMPERATURE CONTROLLER, IN in. [mm IN BRACKETS].

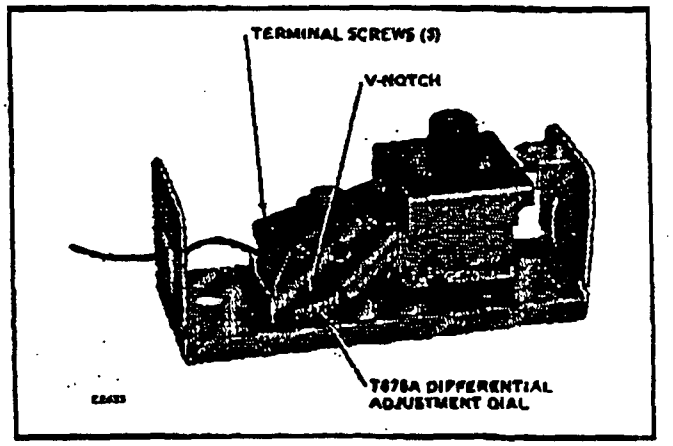


Fig. 2—LOCATION OF THE ADJUSTMENT DIAL ON T678A MODELS WITH AN ADJUSTABLE DIFFERENTIAL.

INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS FOR INDEECO ELECTRIC DUCT HEATERS

APPLICATION INFORMATION

1. Follow the procedure given on the reverse side of this sheet to find the minimum air velocity for safe operation. At least this minimum velocity must be provided at all points over the heater face area. Failure to meet this requirement may result in serious damage or nuisance thermal cutout tripping.

2. The maximum air inlet temperature for open coil heaters is 100°F and for finned tubular heaters, 80°F.

3. The heater must be located at least 48" from any grills, registers, filters, abrupt duct size changes, humidifiers, air conditioning or air handling units, or any other change or obstructions in the duct which may result in nonuniform airflow. Duct elbows or turns must be located at least 4' from the inlet of the heater and 2' from the outlet of the heater. Sufficient working space must be provided per paragraph 110-16 of the NEC.

4. These duct heaters are not intended for installation in series in the airstream; the heaters are designed for use only as a single unit within a duct with the exception of Series ZUA, XUA, TFZUA, TFLZUA, TFXUA and TFLXUA, which are designed for stacked installation for use as a single unit within a duct. (See Fig. No. 3)

MECHANICAL INSTALLATION

1. Heater terminal outlet box should not be enclosed. Heaters with expanded metal terminal box covers must be installed in a position where air passing out of the terminal box does not enter into confined areas of the building structure (such as a space behind a false ceiling, a hollow space in a wall, etc.).

2. All heaters are suitable for installation with zero spacing between the duct and combustible surfaces.

3. The heater must be installed in the correct position as shown by the arrows in the terminal box.

4. Sufficient clearance for convection cooling must be allowed for all heaters with built-in SOLITECH Power Controllers. Provide at least 5 inches of free air space above and below cooling fins extending from heater terminal box.

5. The air duct should be installed in accordance with the standards of the National Fire Protection Association for installation of air conditioning and ventilating systems of other than residence type (Pamphlet No. 90A) and residence type warm air heating and air conditioning systems (Pamphlet No. 90B).

6. For proper operation of heaters equipped with a built-in airflow switch, a minimum of .07" WC of static pressure is required in the duct system and the velocity pickup tube for the airflow switch must be pointed in the proper direction. When the heater is installed on the downstream or positive pressure side of the air moving fan, the arrow on the mounting flange of the pickup tube must point in the same direction as the airflow. When the heater is installed on the upstream or negative pressure side of the air moving fan, the arrow must point in the direction opposite to the airflow. If incorrectly installed, remove the two screws holding the pickup tube in place, rotate 180° and reinstall. See separate instruction sheet for installation of heaters supplied with a remote pickup tube.

FOR FLANGE TYPE HEATERS ONLY: (See Fig. No. 1)

7. Provide flanges on the duct to match the heater flanges, both on the entering and leaving air sides.

8. Attach the duct flanges to the heater flanges with bolts, sheet metal screws or slip and drive connectors when the heater has matching connectors for this purpose.

FOR SLIP-IN TYPE HEATERS ONLY: (See Fig. No. 2)

9. Cut a hole in the side of the duct to accommodate the body of the heater (excluding terminal box). This hole should be 1/8" larger than the heater frame.

10. Slip the heater into the duct and attach the back of the terminal box to the duct with sheet metal screws.

FOR STACKED TYPE HEATERS ONLY: (See Fig. No. 3)

11. The heaters with catalog prefix ZUA, XUA, TFZUA, TFLZUA, TFXUA, or TFLXUA must be stacked as indicated in Fig. No. 3.

FOR HEATERS TO BE INSTALLED IN FIBER GLASS DUCTS:

12. Write factory for special instructions. Note that the fiber glass duct material itself must be UL listed.

FOR HEATERS TO BE INSTALLED IN INTERIOR INSULATED DUCTS:

13. All slip-in type heaters are suitable for installation in ducts with up to 1" of interior insulation as long as they have been sized for the dimensions inside the insulation. The heaters are not suitable for insulation depths of greater than 1" unless a special construction has been ordered. Flange type heaters are only suitable for installation in insulated ducts if specially ordered for this application.

ELECTRICAL INSTALLATION

14. Follow the wiring diagram on the inside of the terminal box.

15. Supply connections must be made with copper wiring rated for 75°C minimum. Use aluminum wire only when specifically called for on accompanying wiring diagram.

16. If supply connections are for 250 volts or greater, all wiring must be insulated for 600 volts.

17. When making line connections to heater element terminals FOR FINNED TUBULAR DUCT HEATERS ONLY, apply a 1/4" wrench to flat section of terminal immediately below threads. Otherwise damage to terminal may result.

18. Supply conductors for heaters rated less than 50 KW, must be sized at 125% of rated load. On heaters rated 50 KW and more, the supply conductors may be sized at 100% of rated load, if indicated on the wiring diagram. The line current for either a single or three phase load is calculated as follows:

$$\text{Single Phase Line Current} = \frac{\text{KW} \times 1000}{\text{Voltage}}$$

$$\text{Three Phase Line Current} = \frac{\text{KW} \times 1000}{\text{Voltage} \times 1.73}$$

19. The following table shows the maximum current for 75°C. Copper wire with not more than 3 conductors in a raceway. It is based on the 1990 National Electrical Code table 310-16. The amperages shown are for 125% and 100% wire sizing. If there are more than 3 conductors in a raceway, derate these amperages per note 8 to Table 310-16.

AMPS		Wire Size	AMPS		Wire Size	AMPS		Wire Size
125%	100%	AWG/MCM	125%	100%	AWG/MCM	125%	100%	AWG/MCM
12		14	80	100	3	184	230	4/0
16		12	92	115	2	204	255	250
24		10	104	130	1	228	285	300
40		8	120	150	0	248	310	350
52	65	6	140	175	2/0	268	335	400
68	85	4	160	200	3/0	304	380	500

20. When connecting heaters with more than one stage, wire stage No. 1 so that it is the first stage on and the last stage off. Heaters with built-in PE switches must follow this rule also. The stage number will be indicated on the front of each PE switch.

continued installation etc.

21. The heater must be wired so that it cannot operate unless air is flowing over it. This can be accomplished by using a built-in airflow switch, a built-in fan relay or any of several other methods. See the accompanying wiring diagram for the method used with this heater and provide appropriate interlock wiring as illustrated.

22. National Electrical Code and Underwriters Laboratories require the heater manufacturer to supply 1) over-current protection where heater total current exceeds 48 amperes and 2) any contactors required for proper functioning of temperature limiting controls. Where these devices are not included in the heater terminal box of a U.L. listed heater, they are supplied in a remote U.L. listed panel board shown on the wiring diagram.

23. If not supplied as part of this heater, install a line disconnect switch or main circuit breaker in accordance with the National Electrical Code. Depending upon the heater's location and accessibility, a built-in disconnect switch may meet this requirement.

24. All electrical connections in the heater, including both field and factory made connections, should be checked for tightness before operating the heater. In addition, after a short period of operation, all connections should again be checked for tightness.

25. If heater is wired to a heating-cooling thermostat, use a thermostat with isolating circuits to prevent possible interconnection of Class 2 outputs.

26a. If the area inside of the sheet metal directly surrounding the heating element section is more than 1" smaller in length and/or width than the duct in which the duct heater is installed, the watts per square foot of duct area should be calculated as the heater nameplate watts divided by the area inside the sheet metal enclosure directly around the heating elements.

26b. If the heating elements are divided into several sections with uncoiled resistance wire between two or more coiled sections, maximum watts per sq. ft. should be calculated as follows:

$$\frac{\text{Heater nameplate watts}}{\text{Number of heated sections} \times \text{area of one heated section}}$$

INSTALLATION DRAWINGS

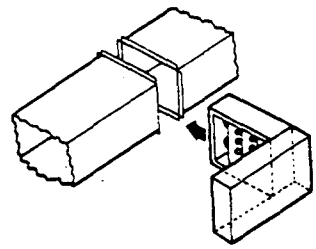


Fig. 1 – Installation drawing of flanged heater.

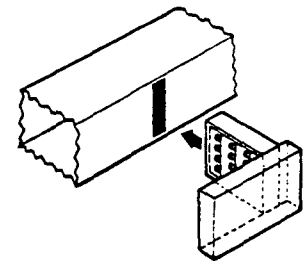


Fig. 2 – Installation drawing of slip-in heater.

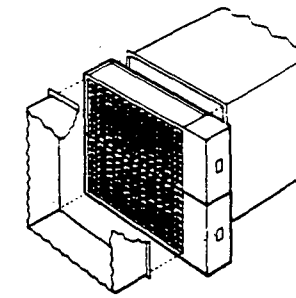


Fig. 3 – Installation drawing of two stacked sections in a duct.

AIR FLOW REQUIREMENTS

Calculate watts per square foot of duct area as: $\frac{\text{heater nameplate watts.}}{\text{duct area (Sq. Ft.)}}$ (see #26)

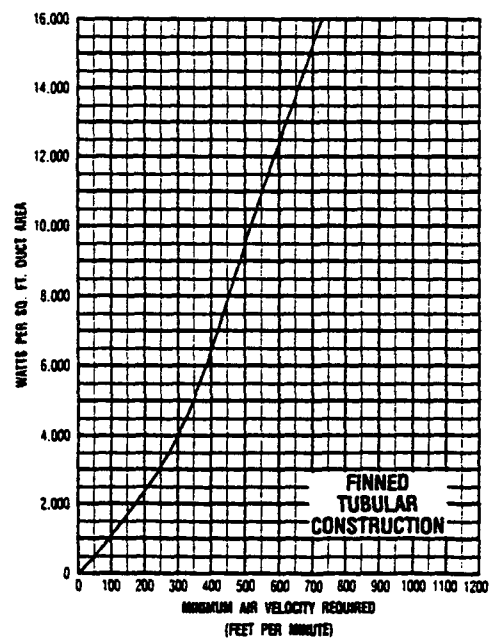


Fig. 4.

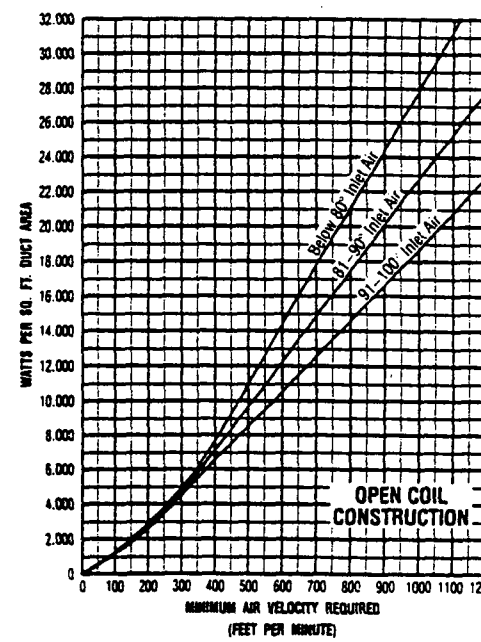


Fig. 5

OPERATION & MAINTENANCE

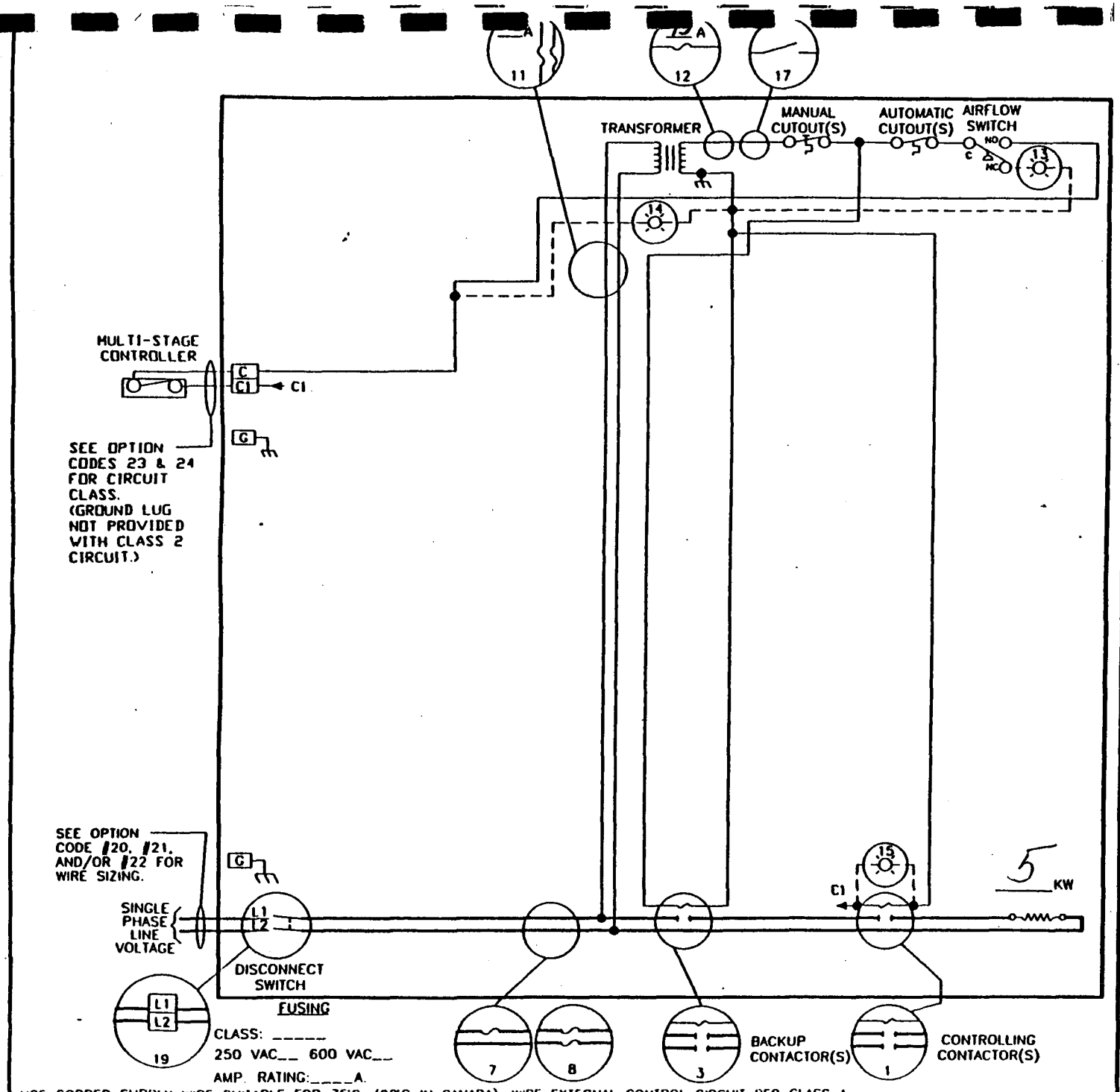
NOTICE: ALL SOURCES OF SUPPLY MUST BE DISCONNECTED BEFORE WORKING ON THIS EQUIPMENT.

To operate this heater make sure all associated control equipment is on, energize main supply disconnect and set controlling thermostat above ambient temperature. This heater is equipped with automatic and manual reset temperature limiting controls. If it fails to operate, make sure manual resets are operative by pushing reset buttons.

The only routine maintenance required is to check all electrical connections, including field and factory made connections, for tightness at least once each year or operating season. In addition, of course, any filters in the airstream must be kept clean so that adequate airflow is maintained.

INDUSTRIAL ENGINEERING & EQUIPMENT COMPANY

425 Hanley Industrial Court • (314) 644-4300 • St. Louis, MO 63144 USA • FAX 314-644-5332



USE COPPER SUPPLY WIRE SUITABLE FOR 75°C. (90°C IN CANADA). WIRE EXTERNAL CONTROL CIRCUIT PER CLASS 1, ARTICLE 725 OF NEC, AND/OR CLASS 1, SECTION 16 OF CEC, EXCEPT THE CLASS 2 CIRCUIT(S) SHOWN ABOVE.

UTILISEZ DU CONDUIT CAPABLE DE SUPPORTER 75°C. (90°C AU CANADA). CONNECTEZ LE CIRCUIT DE CONTROL EXTERNE EN SUIVANT CLASSE 1, ARTICLE 725 DE LA NEC, OU/ET CLASSE 1, SECTION 16 DE LA CEC (EXCEPTION: LE CIRCUIT DE CLASSE 2 DEJA MENTIONNE AU DESSUS)

ITEMS WITHIN A CIRCLE MAY VARY OR MAY NOT BE SUPPLIED. SEE THE OPTION KEY BELOW WHICH INDICATES BY CHECK MARKS WHICH NUMBERED CIRCLES APPLY

OPTION KEY – CHECK MARKS INDICATE WHICH CIRCLES APPLY

✓	01	CONTROLLING CONTACTOR(S) – 2 POLE
	02	SAFETY CONTACTOR(S) – 2 POLE
✓	03	BACK-UP CONTACTOR(S) – 2 POLE
	04	CONTROLLING CONTACTOR(S) – 3 POLE
	05	SAFETY CONTACTOR(S) – 3 POLE
	06	BACK-UP CONTACTOR(S) – 3 POLE
	07	SINGLE PHASE LINE FUSING (L1 ONLY)
	08	SINGLE PHASE LINE FUSING (L1 & L2)
	09	THREE PHASE LINE FUSING
	10	PRIMARY TRANSFORMER FUSING – 1 LINE
	11	PRIMARY TRANSFORMER FUSING – 2 LINE
	12	SECONDARY TRANSFORMER FUSING
	13	PILOT LIGHT – LOW AIRFLOW
	14	PILOT LIGHT – HEATER ON
	15	PILOT LIGHT – STAGE(S) ON
	16	PILOT LIGHT – FAN ON
	17	PILOT SWITCH
	18	CONTROL CIRCUIT DISCONNECT SWITCH
	19	NO DISCONNECT SWITCH
	20	IF CHECKED, HEATER MAY BE WIRED WITH____ AWG MIN. SUPPLY WIRE PER 424.22(d)NEC. IF THE HEATER IS CONTROLLED IN ONE OF THE FOLLOWING 3 WAYS (1)TWO OR MORE THERMOSTAT(S) (2)THERMOSTAT WITH 2 OR MORE STAGES (3)PROPORTIONING TYPE THERMOSTAT(S)
✓	21	USE 8 AWG MIN. SUPPLY WIRE. 1 WIRE(S) PER PHASE.
	22	UTILISER UN CABLE D'ALIMENTATION D'AU MOINS _____AUG. _____CONDUCTEUR(S) PAR PHASE
✓	23	CLASS 1 CIRCUIT
	24	CLASS 2 CIRCUIT
	25	NO MANUAL CUT-OUT(S)

LEGEND:
- ——— POWER WIRING
- ——— CONTROL WIRING
- - - - - - WIRING SUPPLIED ONLY WHEN ASSOCIATED OPTION IS SUPPLIED

INDEECO
425 HANLEY INDUSTRIAL COURT
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OFFICE: 314/644-4300
FAX: 314/644-5332
USA

NO.
931-2-1122-019-A (1)

Columbus Electric

INSTRUCTIONS FOR MODEL
RH-1 AIR FLOW SWITCH

This switch may be used to sense duct static pressure or to prove blower is running and performs as an interlock to assure proper air movement when equipment is on and running.

NOTE: THIS DEVICE IS GRAVITY SENSITIVE AND MUST BE INSTALLED IN A VERTICAL POSITION.

MOUNTING: The RH-1 Air Flow Switch may be used to sense pressure, vacuum or differentials of pressure or vacuum. Mount the control vertically on duct or equipment using sheet metal screws. Connect 1/4" tubing to Air Flow Switch using connectors as provided. Insert other end of tubing into area to be sensed. A pitot tube, part no. 1729-00, may be ordered when plastic tubing is used. When a pitot tube is used, face the pitot tube opening toward the blower.

SETTING: The Operate Point is factory set at .05" +.02"W.C. The differential is .04. The switch will operate at .05 and reset before .01.

WIRING: When pressure is applied to the high side of the Air Flow Switch or vacuum is applied to the low side of the Air Flow Switch an internal diaphragm moves against and operates the lever of the snap switch. When the Air Flow Switch is at rest (not operating), the snap switch contacts are in the closed position. This is normal and typical of snap switches. The normally closed terminal of the snap switch is closest to the tube or fitting end of the Air Flow Switch. The middle terminal of the snap switch is the normally open terminal, and the terminal farthest from the tube end is the common. The action of the diaphragm on the snap switch is the same when pressure or vacuum is being controlled or sensed. The wiring from the Air Flow Switch to other devices depends upon the application, but in all cases the switch action is from the Normally Closed position to the Normally Open position when the diaphragm of the Air Flow Switch is moved internally against the switch lever. External wiring must be guided accordingly.

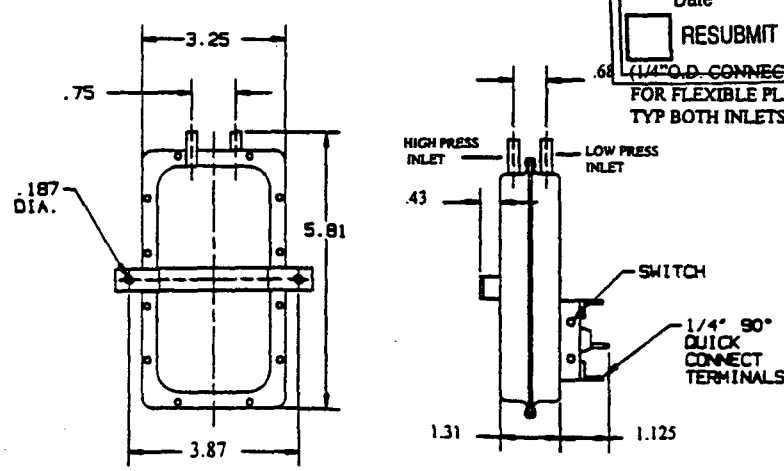
The controls have been tested also for a non-inductive rating of 15 amperes at 277 V.A.C.. At this, over a 2000 VA rating which is not displayed on the control, allows the switch to be used for applications where spacings are acceptable.

Not more than 1/2 P.S.I. may be applied to the device.

May be operated in a temperature range of -40 degrees to 180 degrees Fahrenheit.

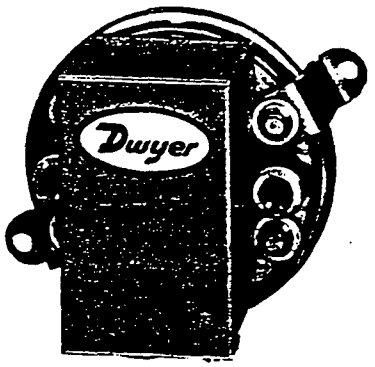
U.L. recognition number MH-10196.

ELECTRICAL RATING: 300 VA pilot duty at 125 to 277 V.A.C.
15 Amp resistive at 125 V.A.C.
1/4 H.P. at 125 V.A.C.
1/2 H.P. at 250 V.A.C.
490 VA Pilot duty at 250 V.A.C.

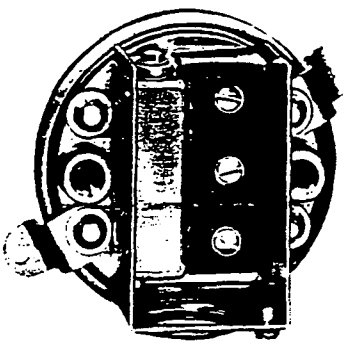


SERIES 1900 PRESSURE SWITCH
Installation and Operating Instructions

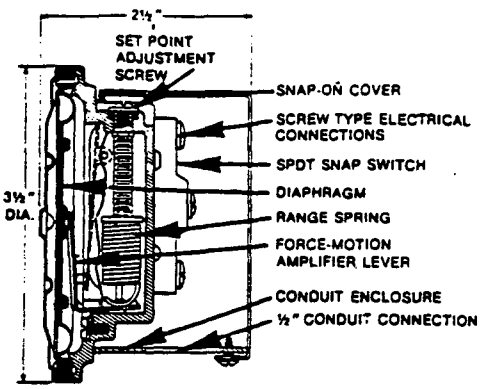
Set points from 0.07" to 20" W.C. Repetitive accuracy within 3%, U.L. and C.S.A. listed, F.M. approved.



Series 1910 pressure switch. All pressure and electrical connections and set point adjustments are on one side for easy installation.



Series 1910 switch with conduit enclosure off. Shows electric switch and set point adjustment screw.



The Dwyer-engineered force-motion amplifier increases the leverage of diaphragm movement and results in a switch with excellent sensitivity and repeatability.

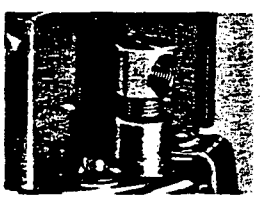
Advanced design and precision construction permit these switches to perform many of the tasks of larger, costlier units. Designed for air conditioning service, they also serve many fluidics, refrigeration, oven and dryer applications. For use with air and non-combustible gases. Series 1900 switches are available with set points of 0.07 to 20 inches water column. Set point adjustment can be made easily — before or after installation. Range screw is inside conduit enclosure to help prevent tampering. For easy mounting and access, pressure and electrical connections and set point adjustment are located on one side. This permits installation in corners or spaces too small for other switches.

PHYSICAL DATA

Temperature limits: 32°F (–30° for dry air), to 180°F
Maximum surge pressure: 10 psig.
Rated pressure: 45" H_2O.
Pressure connections: ⅛" NPT.
Electrical rating: 15 amps, 120-480 volts, 60 Hz. A.C. Resistive ⅛ H.P. @ 125 volts, ¼ H.P. @ 250 volts, 60 Hz. A.C. See INSTALLATION for de-rating information.
Wiring connections: 3 screw type, common, normally open and normally closed.
Set point adjustment: Screw type inside conduit enclosure.
Housing: Aluminum die casting with chemical conversion coating for corrosion protection; zinc plated steel stamping.
Diaphragm: Molded Silicone rubber.
Calibration spring: Stainless steel
Weight: 1 lb.

SPECIAL MODELS AND ACCESSORIES

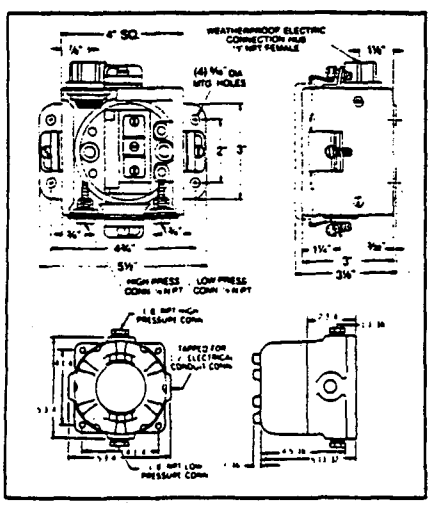
Dwyer Accessory Part No. A-329



Special close coupled street elbow for right angle pressure connections. Can be installed on switch anytime. Zinc plated aluminum.

Weatherproof Enclosure:
16 ga. steel enclosure for unusually wet or oily conditions. Withstands 200 hour salt spray test. Gasketed cover. Weight 5 lbs. Switch must be installed at factory. Specify "WP" in addition to switch catalog number.

Explosion-Proof Housing:
Cast iron base and aluminum dome cover. Approximate weight 7 lbs. Specify "EXPL" in addition to switch catalog number.



MODEL 1910 SWITCHES:
OPERATING RANGES AND DEAD BANDS.

To order specify Model Number	Operating Range Inches, W.C.	Approximate Dead Band	
		At Min. Set Point	At Max. Set Point
1910-00	0.07 to 0.15	.04	.05
1910-0	0.15 to 0.5	0.10	0.15
1910-1	0.4 to 1.6	0.15	0.20
★ 1910-5	1.4 to 5.5	0.3	0.4
1910-10	3.0 to 11.0	0.4	0.5
1910-20	4.0 to 20.0	0.4	0.6

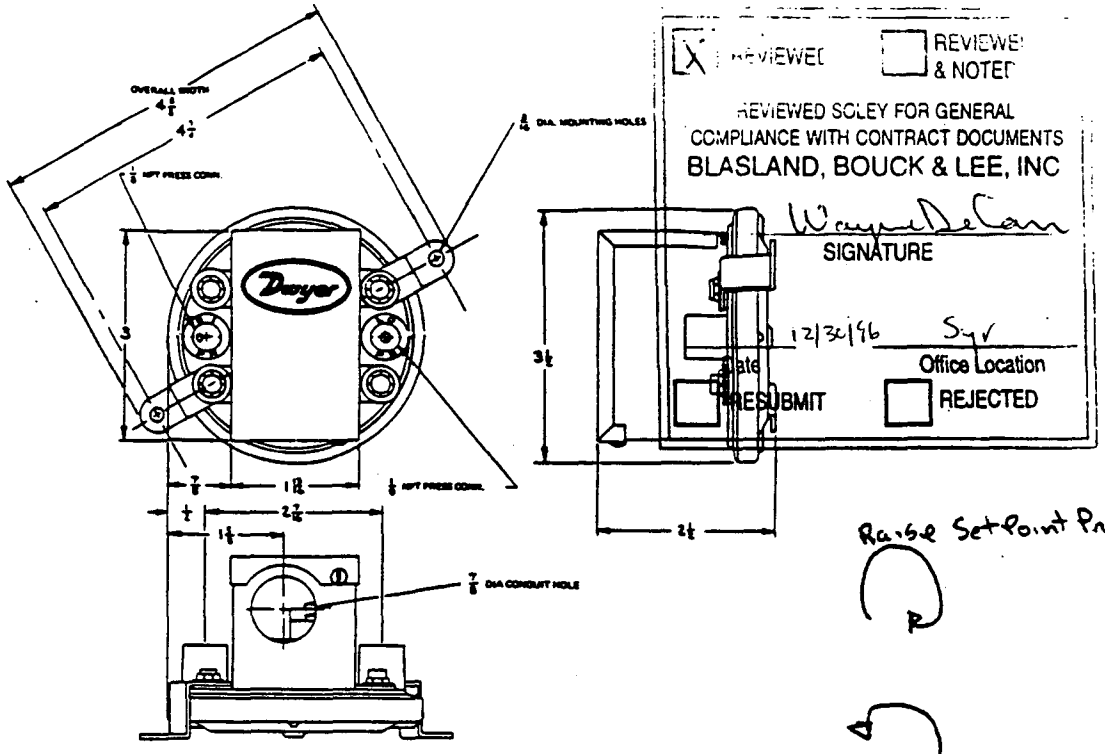
Suggested Specification

Differential pressure switches shall be diaphragm operated with 3½" diaphragm to actuate a single pole double throw snap switch. Motion of the diaphragm shall be restrained by a calibrated spring that can be adjusted to set the exact pressure differential at which the electrical switch will be actuated. Motion of the diaphragm shall be transmitted to the switch button by means of a direct mechanical linkage. Switches shall be Dwyer Instruments, Inc. Catalog No. 1910-____ for the required operating ranges.

How to Order: See price list, Bulletin S-26.

DWYER INSTRUMENTS, INC.
P. O. BOX 373 • MICHIGAN CITY, INDIANA 46360, U.S.A.
Telephone 219/879-8000
Fax 219/872-9057

SERIES 1900 PRESSURE SWITCH
Installation and Operating Instructions



1900 SWITCH OUTLINE DIMENSIONS

INSTALLATION

1. Select a location that is free from excessive vibration, corrosive atmosphere and where the ambient temperature is within the limits for these switches.

2. Mount standard switches with the diaphragm in a vertical plane and with switch lettering and Dwyer nameplate in an upright position. Some switches are position sensitive and may not reset properly unless they are mounted with the diaphragm vertical. (Special units can be furnished for other than vertical mounting arrangements if required.)

3. Connect switch to source of pressure, vacuum or differential pressure. Metal tubing with 1/4" O.D. is recommended, but any tubing which will not restrict the air flow can be used. Connect to the two 1/8" NPT female pressure ports as noted below:

   A. Differential pressures — connect pipes or tubes from source of greater pressure to high pressure port marked HI-PR and from source of lower pressure to low pressure port marked LO-PR.

   B. Pressure only (above atmospheric) — connect tube from source of pressure to high pressure port. The low pressure port is left open to atmosphere.

   C. Vacuum only (below atmospheric pressure) —connect tube from source of vacuum to low pressure port. The high pressure port is left open to atmosphere.

4. Electrical connections to the standard single pole, double throw snap switch are provided by means of screw terminals marked "common", "norm open", and "norm closed". The normally open contacts close and the normally closed contacts open when pressure increases beyond the set point.

5. Switch loads should not exceed the maximum specified current rating of 15 amps resistive. Switch capabilities decrease with high load inductance or rapid cycle rates. Whenever an application involves either of these factors, the user may find it desirable to limit the switched current to 10 amps or less in the interest of prolonging switch life.

OPERATION

Pressure acting on the power diaphragm rotates the amplifying lever, which in turn extends the range spring and rotates the snap switch input lever. When the set point is reached, the snap switch is actuated and the electrical contacts make or break.

ADJUSTMENT

To change the set point, proceed as follows:

A. Remove the snap-on cover from the conduit enclosure by loosening its retaining screw and pulling firmly at its bottom end. Turn the slotted Adjustment Screw at the top of range spring housing clockwise to raise the set point pressure and counter-clockwise to lower the set point.

B. The recommended procedure for calibrating or checking calibration is to use a "T" assembly with three rubber tubing leads, all as short as possible and the entire assembly offering minimum flow restriction. Run one lead to the pressure switch, another to the manometer of known accuracy and appropriate range, and apply pressure through the third tube. Make final approach to the set point very slowly. Note that manometer and pressure switch will have different response times due to different internal volumes, lengths of tubing, fluid drainage, etc. Be certain the switch is checked in the position it will assume in use, i.e. with diaphragm in a vertical plane and switch lettering and Dwyer nameplate in an upright position.

C. For highly critical applications it is a good idea to check the set point adjustment and reset it as necessary once or twice in the first few months of operation. This will compensate for any change in initial tension which may occur in the spring and diaphragm. For most applications this change will not be significant and no resetting will be required.

MAINTENANCE

Moving parts of these switches are sealed in and are permanently tamper proof. The single adjustment is that of the set point. Care should be taken to keep the switch reasonably dry and free from dust or dirt. No lubrication or unusual precautions are required for normal use.

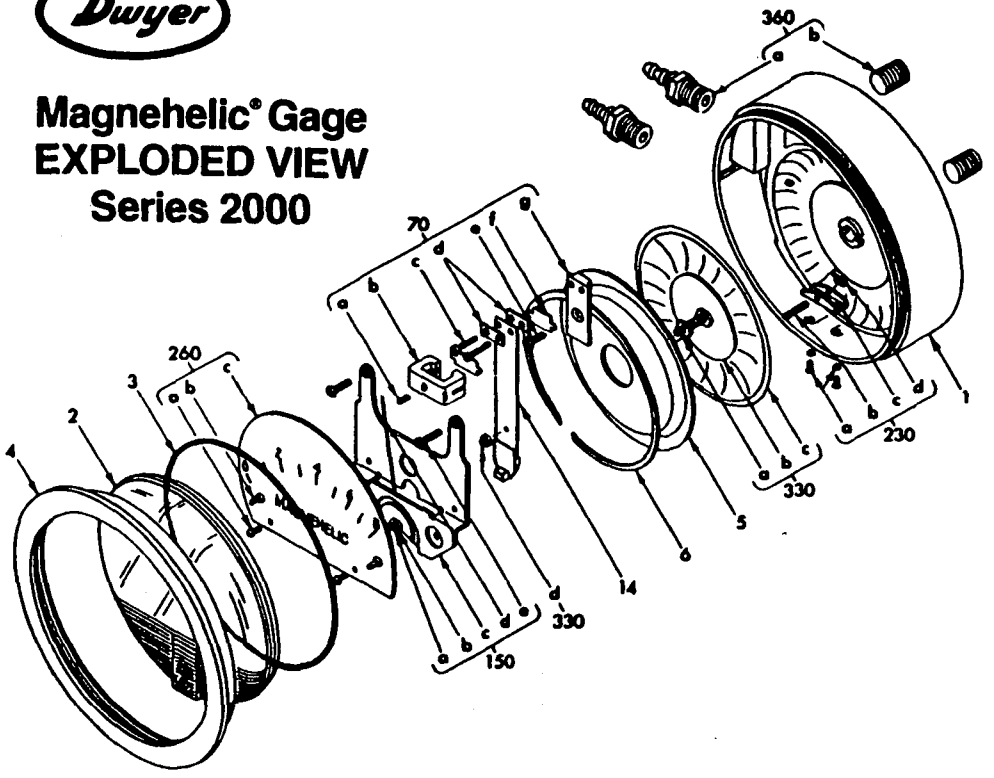
Litho in U.S.A. 12/93

26-440232-00

DWYER INSTRUMENTS, INC.
P.O. Box 373, Michigan City, Indiana 46360 U.S.A.
Phone: 219/879-8000 Fax: 219/872-9057

Dwyer

Magnehelic® Gage EXPLODED VIEW Series 2000



1. Case
2. Cover with zero adjust assy.
3. "O" ring seal
4. Bezel
5. Diaphragm sealing plate
6. Retaining ring
70. Range Spring assembly
    a. Clamp set screw
    b. Clamp
    c. Mounting screws (2 req'd)
    d. Clamping shoe (2 req'd)
    e. Clamp plate screw
    f. Spacer (2 req'd)
    g. Clamp plate
14. Range Spring with magnet
150. Wishbone Assembly – consists of:
    a. Front jewel
    b. Locking nut
    c. Wishbone
    d. Pointer
    e. Mounting screws (2 req'd)
    f. Helix assembly (not shown)
    g. Pivots (2 req'd) (not shown)
    h. Rear jewel (not shown)
230. Zero adjust assembly – consists of:
    a. Foot screws with washers (2 req'd)
    b. Adjust screw
    c. Foot
    d. Finger
260. Scale Assembly – consists of:
    a. Mounting screws (2 req'd)
    b. Bumper pointer stop (2 req'd)
    c. Scale
330. Diaphragm Assembly – consists of: (Arbor press needed to install)
    a. Linkage assy., complete
    b. Front plate
    c. Diaphragm
    d. Rear plate (not shown)
    e. Plate washer (not shown)
360. Mounting Hardware Kit
    a. Adapter – pipe plug ⅛" NPT to rubber tubing – (2 req'd)
    b. Pipe plug ⅛" NPT – (2 req'd)
    c. Mounting lug (3 req'd)
    d. Long screw (3 req'd)
    e. Short screw (3 req'd)

Ordering Instructions:

When corresponding with the factory regarding Magnehelic® gage problems, refer to the call-out numbers in this view. Be sure to include model number, pressure range, and any special options. Field repair is not recommended; contact the factory for repair service information.

Printed in U.S.A. 6/93

12-440212-00

OPERATING INSTRUCTIONS and PARTS LIST

Dwyer

Magnehelic® Differential Pressure Gage

SPECIFICATIONS

Dimensions: 4-3/4" dia. X 2-3/16" deep.

Weight: 1 lb. 2 oz.

Finish: Baked dark gray enamel.

Connections: 1/8 N.P.T. high and low pressure taps, duplicated, one pair side and one pair back.

Accuracy: Plus or minus 2% of full scale, at 70°F (Model 2000-0, 3%; 2000-00, 4%).

Pressure Rating: 15 PSI.

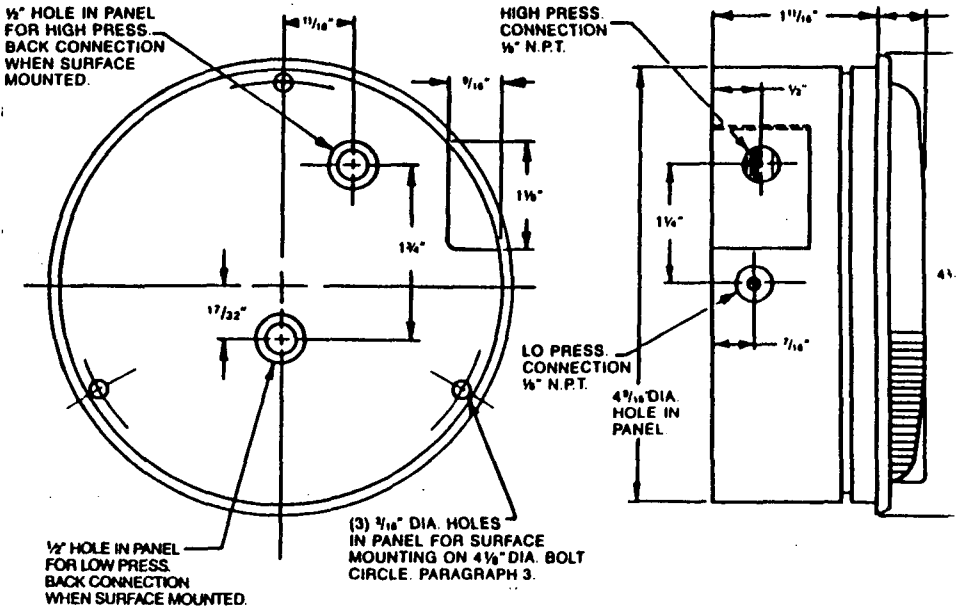
Ambient Temperature Range: 20° to 140°F.

Standard gage accessories include two 1/8" N.P.T. plugs for duplicate pressure taps, two 1/8" pipe thread to rubber tubing adapters, and three flush mounting adapters with screws.

Caution: For use with air or compatible gases only.

For repeated over-ranging or high cycle rates contact factory.

Hydrogen Gas Precautionary Note: The rectangular rare earth magnet used in the standard gage may not be suitable for use with hydrogen gas since a toxic and explosive gas may form. For hydrogen service, consult the factory for an alternate gage construction.



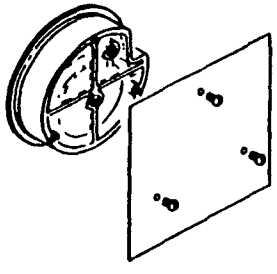
DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46360, U.S.A.
Telephone 219/879-8000
Fax 219/872-9057

MAGNEHELIC® INSTALLATION

1. Select a location free from excessive vibration and where the ambient temperature will not exceed 140°F. Also, avoid direct sunlight which accelerates discoloration of the clear plastic cover. Sensing lines may be run any necessary distance. Long tubing lengths will not affect accuracy but will increase response time slightly. Do not restrict lines. If pulsating pressures or vibration cause excessive pointer oscillation, consult the factory for ways to provide additional damping.

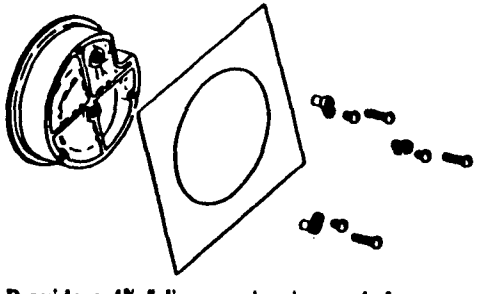
2. All standard Magnehelic gages are calibrated with the diaphragm vertical and should be used in that position for maximum accuracy. If gages are to be used in other than vertical position, this should be specified on the order. Many higher range gages will perform within tolerance in other positions with only rezeroing. Low range Model 2000-00 and metric equivalents must be used in the vertical position only.

3. Surface Mounting



Locate mounting holes, 120° apart on a 4-1/8" dia. circle. Use No. 6-32 machine screws of appropriate length.

4. Flush Mounting



Provide a 4⅛" dia. opening in panel. Insert gage and secure in place with No. 6-32 machine screws of appropriate length, with adaptors, Part No. 360c, firmly secured in place. To mount gage on 1¼"-2" pipe, order optional A-610 pipe mounting kit.

5. To zero the gage after installation

Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

Operation

Positive Pressure: Connect tubing from source of pressure to either of the two high pressure ports. Plug the port not used. Vent one or both low pressure ports to atmosphere.

Negative Pressure: Connect tubing from source of vacuum or negative pressure to either of the two low pressure ports. Plug the port not used. Vent one or both high pressure ports to atmosphere.

Differential Pressure: Connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports.

When one side of gage is vented in a dirty, dusty atmosphere, we suggest an A-331 Filter Vent Plug be installed in the open port to keep inside of gage clean.

a. For portable use or temporary installation, use 1/8" pipe thread to rubber tubing adapter and connect to source of pressure with rubber or Tygon tubing.

b. For permanent installation, 1/4" O.D., or larger, copper or aluminum tubing is recommended. See accessory bulletin S-101 for fittings.

MAINTENANCE

Maintenance: No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressure lines to vent both sides of gage to atmosphere and re-zero. Optional vent valves, (bulletin S-101), should be used in permanent installations.

Calibration Check: Select a second gage or manometer of known accuracy and in an appropriate range. Using short lengths of rubber or vinyl tubing, connect the high pressure side of the Magnehelic gage and the test gage to two legs of a tee. Very slowly apply pressure through the third leg. Allow a few seconds for pressure to equalize, fluid to drain, etc., and compare readings. If accuracy unacceptable, gage may be returned to factory for recalibration. To calibrate in the field, use the following procedure.

Calibration:

1. With gage case, P/N 1, held firmly, loosen bezel, P/N 4 by turning counterclockwise. To avoid damage, a canvas strap wrench or similar tool should be used.
2. Lift out plastic cover and "O" ring.
3. Remove scale screws and scale assembly. Be careful not to damage pointer.
4. The calibration is changed by moving the clamp, P/N. 70-b. Loosen the clamp screw(s) and move slightly toward the helix if gage is reading high, and away if reading low. Tighten clamp screw and install scale assembly.
5. Place cover and O-ring in position. Make sure the hex shaft on inside of cover is properly engaged in zero adjust screw, P/N 230-b.
6. Secure cover in place by screwing bezel down snug. Note that the area under the cover is pressurized in operation and therefore gage will leak if not properly tightened.
7. Zero gage and compare to test instrument. Make further adjustments as necessary.

Caution: If bezel binds when installing, lubricate threads sparingly with light oil or molybdenum disulphide compound.

Warning: Attempted field repair may void your warranty. Recalibration or repair by the user is not recommended. For best results, return gage to the factory. Ship prepaid to:

Dwyer Instruments, Inc.
Attn. Repair Dept.
55 Ward St.
Wakarusa, IN 46573

Trouble Shooting Tips:

• *Gage won't indicate or is sluggish.*

1. Duplicate pressure port not plugged.
2. Diaphragm ruptured due to overpressure.
3. Fittings or sensing lines blocked, pinched, or leaking.
4. Cover loose or "O" ring damaged, missing.
5. Pressure sensors, (static tips, Pitot tube, etc.) improperly located.
6. Ambient temperature too low. For operation below 20°F, order gage with low temperature, (LT) option.

• *Pointer stuck-gage can't be zeroed.*

1. Scale touching pointer.
2. Spring/magnet assembly shifted and touching helix.
3. Metallic particles clinging to magnet and interfering with helix movement.
4. Cover zero adjust shaft broken or not properly engaged in P/N 230-b adjusting screw.

We generally recommend that gages needing repair be returned to the factory. Parts used in various sub-assemblies vary from one range of gage to another, and use of incorrect components may cause improper operation or failure. Gages repaired at the factory are carefully calibrated and tested to assure "like-new" operation. After receipt and inspection, we will be happy to quote repair costs before proceeding.

Consult factory for assistance on unusual applications or conditions.

Use with air or compatible gases only.

DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46360, U.S.A.
Telephone 219/879-8000
Fax 219/872-9057

Honeywell

FARM-O-STAT AIRSWITCH CONTROLLERS

T631 CONTROLLERS PROVIDE LINE VOLTAGE CONTROL OF HEATING, COOLING, AND VENTILATION SYSTEMS IN FARM BUILDINGS OR STORAGE AREAS.

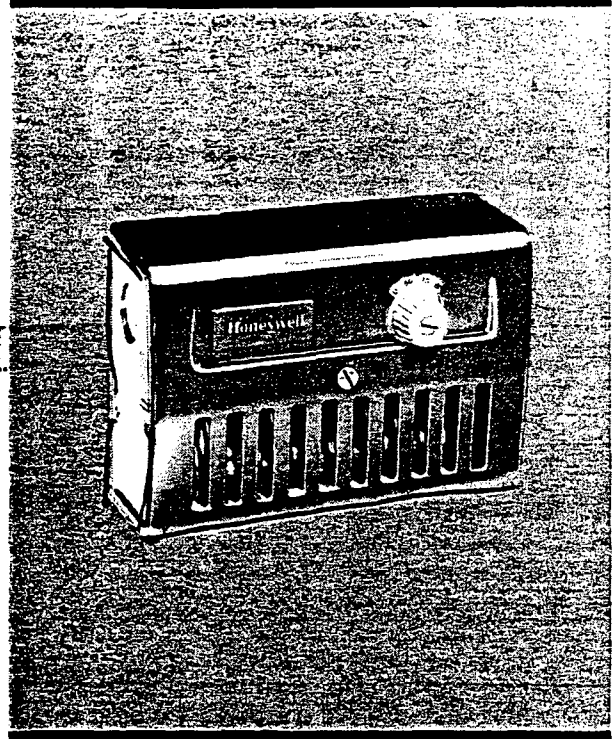
☐ Typical applications include barns, brooder houses, poultry houses, hog houses, pump houses, milk houses, and crop storage houses.

☐ Slots in front and bottom of case provide maximum air circulation over the coiled sensing element.

☐ Rugged steel case treated to resist corrosion.

☐ Dependable switching provided by spdt snap switch(es) permanently sealed against contamination.

☐ Temperature setting knob and scale on front of controller.



T631A-C

[X] REVIEWED [ ] REVIEWED & NOTED

REVIEWED SOLEY FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS
BLASLAND, BOUCK & LEE, INC.

Wayne DeLeon
SIGNATURE

12/27/96 Syr
Date Office Location

[ ] RESUBMIT [ ] REJECTED

G.P.
Rev. 7-83•

Form Number 60-2214—6

SPECIFICATIONS

TRADELINE MODELS

TRADELINE models are selected and packaged to provide ease of stocking, ease of handling, and maximum replacement value. TRADELINE model specifications are the same as those of standard models except as noted below.

TRADELINE MODEL AVAILABLE: T631C Airswitch Controller, with switch rated for 1 hp [0.7 kW].

TEMPERATURE SCALE RANGE: Minus 30 F to plus 100 F [minus 34 C to plus 38 C].

DIFFERENTIAL: 5 F [2.8 C].

ADDITIONAL FEATURES: TRADELINE pack with cross reference label and special instruction sheet.

STANDARD MODELS

MODELS (also refer to Table 1):

T631A Farm-O-Stat Controller—for control of barn ventilation, red finish, spdt switching.

T631B Farm-O-Stat Controller—for control of barn ventilation, red finish, two spdt switches.

T631C Airswitch Controller—for temperature or ventilation control, gray finish, spdt switching.

For weatherproof Farm-O-Stat Controller in NEMA 4X enclosure, use T631F,G. See specification sheet, form 60-2509.

SENSING ELEMENT: Coiled copper tube.

MAXIMUM AMBIENT TEMPERATURES (tabulated by scale range):

TEMPERATURE SCALE RANGE	MAX. AMBIENT F	C
20 C to 60 C	150	66
35 F to 100 F	120	49
70 F to 140 F	150	66
0 F to 70 F	125	52
20 F to 90 F	125	52
-10 F to 60 F	125	52
-10 C to 30 C	125	52
-10 F to 100 F	125	52
-30 F to 100 F	125	52
70 F to 160 F	175	79
0 C to 40 C	120	49

MOUNTING MEANS: Screws through holes in back of case.

ADJUSTMENT: Knob on front of case.

UNDERWRITERS LABORATORIES INC. LISTED: File No. E4436, Vol. 1, dated 2-27-55; Guide No. XAPX.

CANADIAN STANDARDS ASSOCIATION COMPONENT LISTED: File No. LR1620, Guide No. 400-E-O.

REPLACEMENT PART:
103774 Spdt Switch.

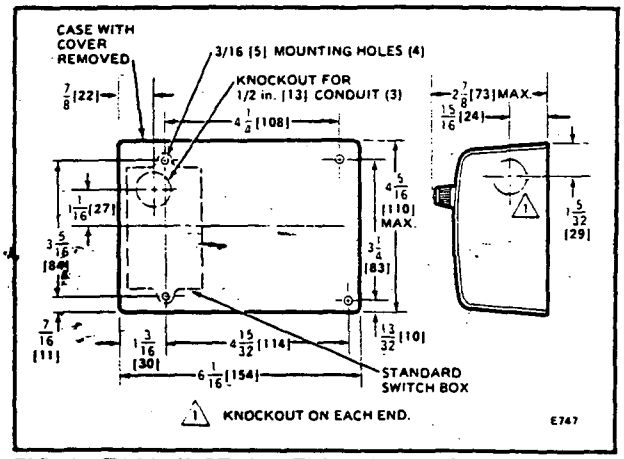


FIG. 1—T631 INSTALLATION DIMENSIONS, IN in. [mm SHOWN IN BRACKETS].

(continued on page 3)

ORDERING INFORMATION

WHEN PURCHASING REPLACEMENT AND MODERNIZATION PRODUCTS FROM YOUR TRADELINE WHOLESALER OR YOUR DISTRIBUTOR, REFER TO THE TRADELINE CATALOG OR PRICE SHEETS FOR COMPLETE ORDERING NUMBER, OR SPECIFY—

1. **Order number (specify T631C with ground screw, if desired).**
2. **Scale range.**
3. **Differential (including interstage differential for T631B).**
4. **One hp [0.7 kW] switch(es) if desired.**
5. **Accessory, if desired.**

IF YOU HAVE ADDITIONAL QUESTIONS, NEED FURTHER INFORMATION, OR WOULD LIKE TO COMMENT ON OUR PRODUCTS OR SERVICES, PLEASE WRITE OR PHONE:

1. **YOUR LOCAL HONEYWELL RESIDENTIAL SALES OFFICE (CHECK WHITE PAGES OF YOUR PHONE DIRECTORY).**
2. **RESIDENTIAL DIVISION CUSTOMER SERVICE**
   HONEYWELL INC., 1885 DOUGLAS DRIVE NORTH
   MINNEAPOLIS, MINNESOTA 55422-4386 (612)542-7508

   (IN CANADA—HONEYWELL LIMITED/HONEYWELL LIMITEE, 740 ELLESMERE ROAD, SCARBOROUGH, ONTARIO M1P 2V9) INTERNATIONAL SALES AND SERVICE OFFICES IN ALL PRINICIPAL CITIES OF THE WORLD.

TABLE 1—MODEL NUMBERS

MODEL NUMBER	TEMPERATURE RANGE		DIFFERENTIAL SWITCH		ADDITIONAL FEATURES
	F	C	F	C	
T631A	35 to 100	2 to 38	2	1.1	—
	70 to 140	21 to 60	2	1.1	—
	0 to 70	-18 to 21	3	1.7	—
	-10 to 100	-23 to 38	3	1.7	—
	0 to 40	32 to 104	1.1	2	—
	70 to 140	21 to 60	8	4.4	—
	70 to 160	21 to 71	3	1.7	—
	35 to 100	2 to 38	3-1/2	1.9	with 1 hp [0.7 kW] rated switch
T631B	35 to 100	2 to 38	2	1.1	3-1/2 F [1.9 C] between switches
	35 to 100	2 to 38	2	1.1	9 F [5 C] between switches
	35 to 100	2 to 38	2	1.1	adjustable interstage differential[a]
	35 to 100	2 to 38	3-1/2	1.9	adjustable interstage differential[a]; with 1 hp [0.7 kW] rated switches
T631C	-10 to 60	-23 to 16	3	1.7	with 1 hp [0.7 kW] rated switch
	20 to 90	-7 to 32	3	1.7	with 1 hp [0.7 kW] rated switch
	70 to 140	21 to 60	2	1.1	—
	14 to 86	-10 to 30	3	1.7	—
	68 to 140	20 to 60	3	1.1	—
	35 to 100	2 to 38	2	1.1	—
	14 to 86	-10 to 30	3	1.7	with ground screw

[a]Interstage differential is adjustable from 0 F to 7 F [0 C to 4 C]. At 0 differential, both switches make at set point. With differential set above 0, speed change switch closes after fan switch, on temperature rise.

ELECTRICAL RATINGS (Amperes):

T631A,B

VOLTAGE (Vac)	24[a]	120	240	WITH 1 hp SWITCH	
				120	240
Full Load	2.0	7.4	3.7	16.0	8.0
Locked Rotor	—	44.4	22.2	96.0	48.0

[a]24 Vac rating for T631B.

T631C

VOLTAGE (Vac)	24	120	240	277	WITH 1 hp SWITCH			
					R-B		R-W	
					120	240	120	240
Full Load	2.0	7.4	3.7	3.0	8	5.1	16	8
Locked Rotor	—	44.4	22.2	18.0	48	30.6	80	40
Resistive Load	—	10.0	5.0	—	—	—	—	—

INSTALLATION

WHEN INSTALLING THIS PRODUCT...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

CAUTION

Disconnect power supply before beginning installation to prevent electrical shock and equipment damage.

LOCATION

Locate the T631 controller about 5 ft [1.5 m] above the floor in an area with good air circulation and average temperature. The controller mounts on any flat surface or on switch box with screws through back of case. Do not locate T631 on an outside wall, or where the controller will be affected by drafts or radiant heat from the sun.

MOUNTING ON FLAT SURFACE OR SWITCH BOX

1. Remove cover by unscrewing single screw in cover.
2. Remove appropriate knockout for wiring.
3. Attach controller to mounting surface or switch box.

NOTE: A wooden panel should be placed between the controller and the mounting surface if the surface is brick, metal, or concrete.

4. Run wires through the knockout and into the controller case.

WIRING

Disconnect power supply before making wiring connections to avoid possible electrical shock or equipment damage. All wiring must agree with local codes and ordinances.

Refer to the wiring diagrams (Figs. 2-8) and to installation information furnished with the system equipment when wiring the T631.

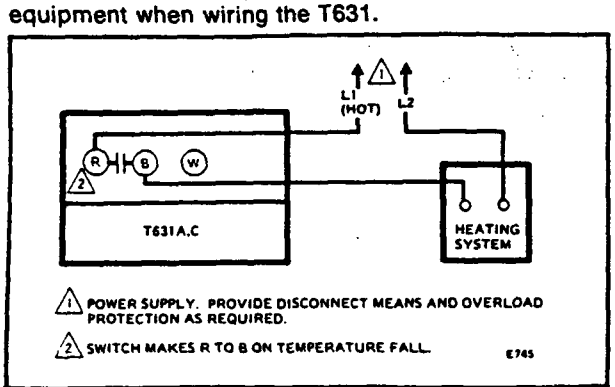


FIG. 2—T631A OR C HOOKUP FOR CONTROL OF HEATING SYSTEM.

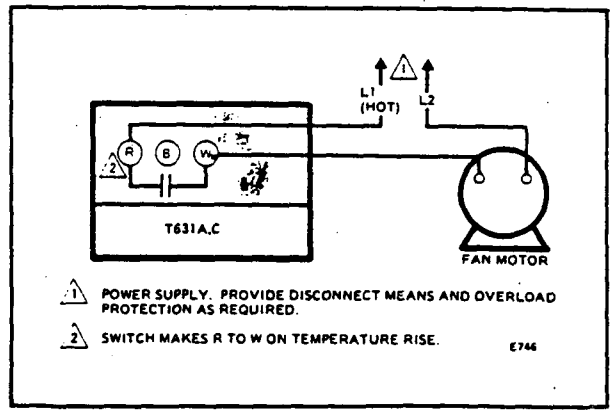


FIG. 3—T631A OR C HOOKUP FOR CONTROLLING FAN.

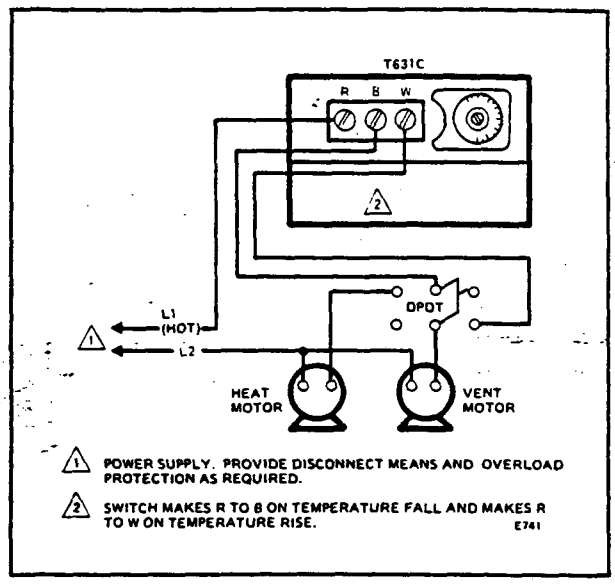


FIG. 4—T631C CONTROLLING HEATING AND VENTILATION.

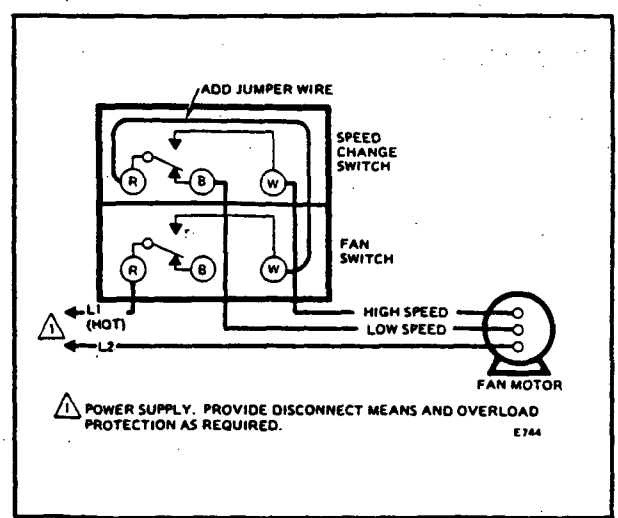


FIG. 5—TYPICAL HOOKUP OF T631B FOR CONTROLLING A 2-SPEED FAN.

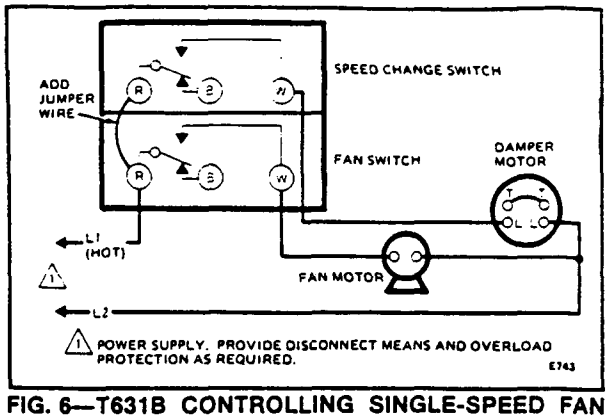


FIG. 6—T631B CONTROLLING SINGLE-SPEED FAN AND DAMPER MOTOR.

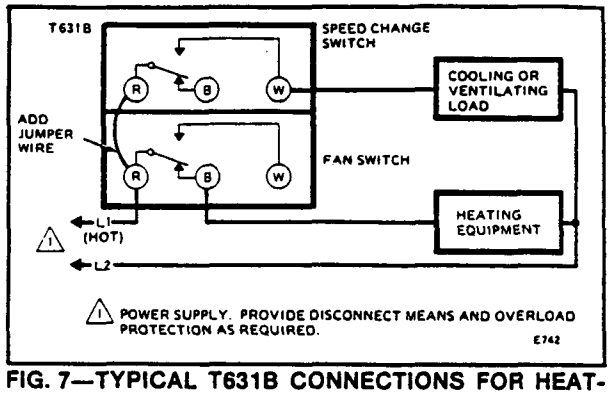


FIG. 7—TYPICAL T631B CONNECTIONS FOR HEATING AND COOLING (or ventilating) CONTROL.

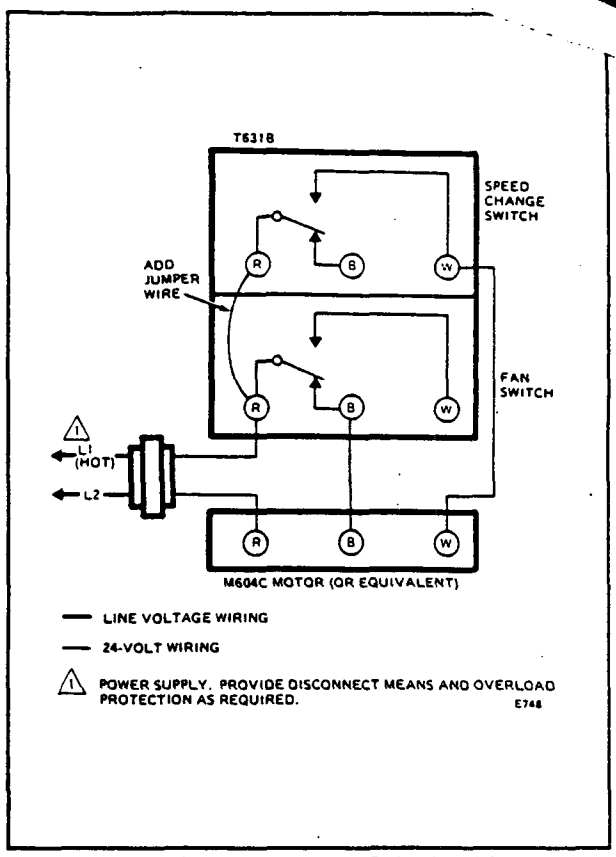


FIG. 8—TYPICAL T631B CONNECTIONS FOR FLOATING CONTROL OF DAMPER MOTOR.

CHECKOUT

1. Turn on the power.
2. Turn the temperature adjusting knob and scale across the indicator and back again. See Fig. 9. The controlled equipment should switch on and off.

When wired for heating (R to B), turning the dial counterclockwise ↶ to a higher setting simulates a space temperature drop and the heating equipment should come on. When the controller is wired for a cooling or ventilating application (R to W), turning the dial clockwise ↷ to a lower setting simulates a rise in temperature and the cooling or ventilating equipment should come on.

3. If the controlled equipment does not start and stop as indicated in step 2, disconnect the power supply and check the wiring and terminal connections.
4. If the controlled equipment operates opposite to the sequence desired, shut off the power and check for reversed leads on the switch.

IMPORTANT

If the T631 is mounted in an area where it is subjected to dust or other substances, clean periodically. Wipe the temperature sensing coil to maintain maximum air contact if the surrounding air contains oil or other adhesive substances.

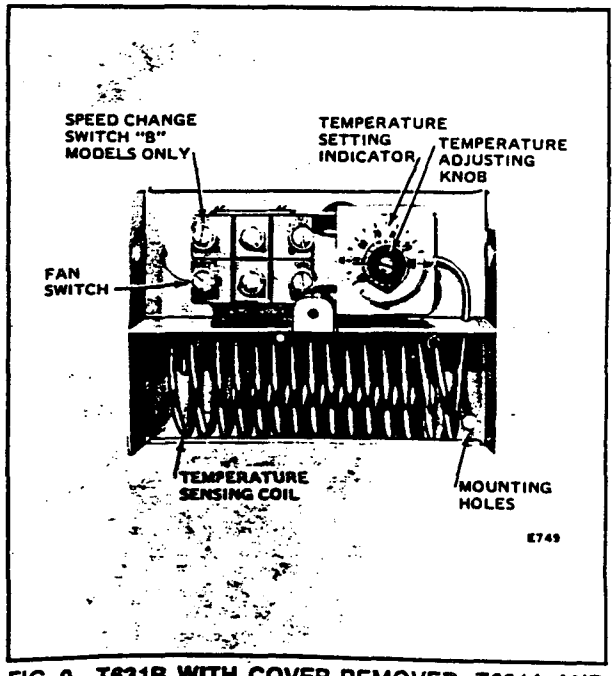


FIG. 9—T631B WITH COVER REMOVED. T631A AND C HAVE 3 WIRING TERMINALS ONLY.

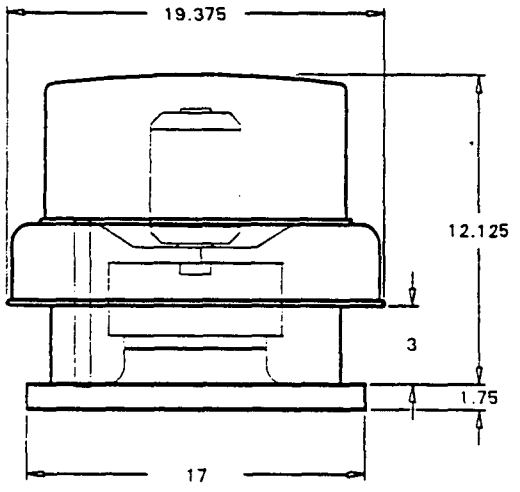
If questions arise regarding this product, contact your distributor or local Honeywell representative.

HONEYWELL MINNEAPOLIS, MN 55408 INTERNATIONAL Sales Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.
PRINTED IN U.S.A.

GREENHECK

12/12/96 | JOB : POWEREX 12/12/96

MARK : F-1



NOTES : All dimensions shown are in units of inches.

G Direct Drive Centrifugal Roof Exhauster

Standard Construction Features

• A NEMA 1 disconnect switch (Only available on ODP and TE motors) with factory installed wiring from the motor to the disconnect box • Birdscreen • Aluminum housing • Backward inclined wheel • Aluminum curb cap with prepunched mounting holes • Ball bearing motors (sizes 100-180) • Sleeve bearing motors(sizes 60-95) • Shock mounts • Corrosion resistant fasteners.

Options & Accessories Selected

- UL 705 electrical
- Gravity Damper WD-100 8x8
- 2" Galvanized Roof Curb w/tray GPI-17-S-G12

REVIEWED ☒ REVIEWED & NOTED ☐

REVIEWED SOLEY FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS

BLASLAND, BOUCK & LEE, INC.

Wayne DeCarr

SIGNATURE

12/16/96 Date

Syr Office Location

RESUBMIT ☐ REJECTED ☐

amca CERTIFIED RATINGS SOUND AIR

DIMENSIONS

Damper Size (In)	Roof Opening (In)	Approximate Weight (Lb)
8 x 8	10.5 x 10.5	14

PERFORMANCE

Qty.	Model	Volume (CFM)	SP (In WC)	FRPM	Power (BHp)	Motor Information			
						Hp	V/C/P	Enclosure	RPM
1	G-60-D	120	0.250	1550	0.02	1/60	115/60/1	Open Drip Proof	1550

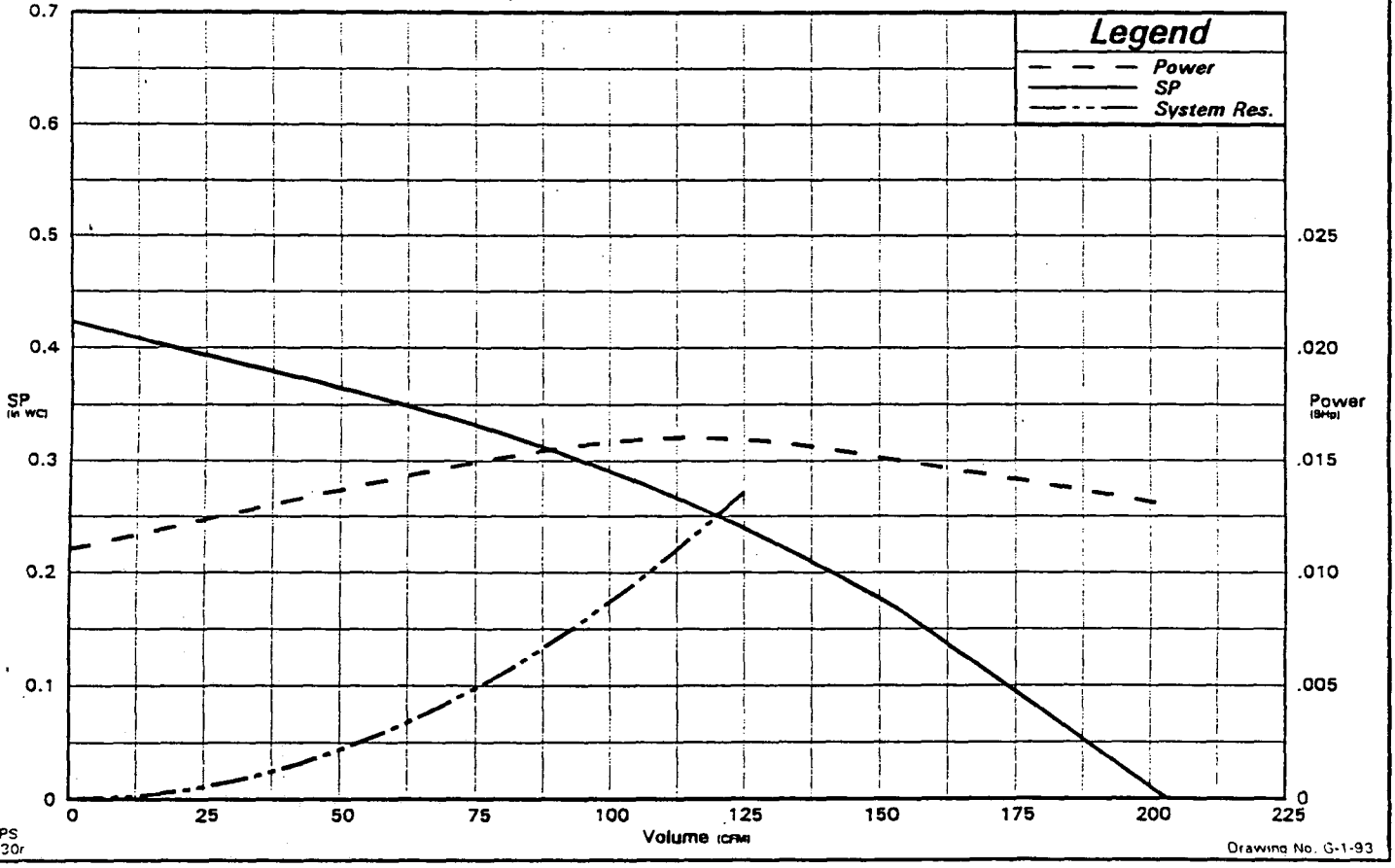
SOUND

Inlet Sound Power by Octave Band								LwA	dBA	Sones
63	125	250	500	1000	2000	4000	8000			
59	62	60	50	48	49	41	33	56	45	3.7

AIR DENSITY

Elevation (Ft)	Airstream Temp. (F)
0	70

LwA - A weighted sound power level, based on ANSI S1.4. dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 feet. Sones calculated using AMCA 301 at 5 feet.



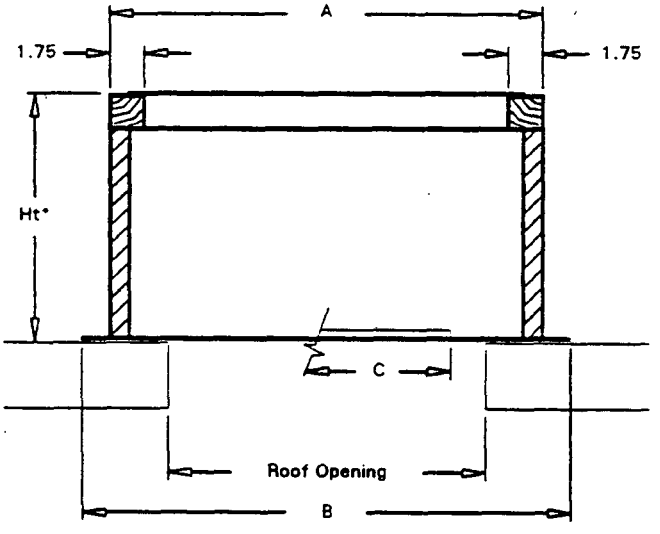
CAPS v6.30r

Drawing No. G-1-93

GPI Roof Curb

Standard Construction Features

• All welded Aluminum (.064) or galvanized (18 ga.) construction • Straight sided • 2" mounting flange • 1" 3# density insulation • Wood nailer.

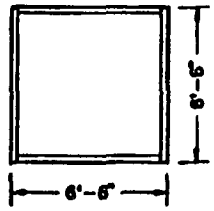


* Height available from 12" to 24"

Size	Tray Size	A	B	C	Damper Size	Roof Opening
17	8	15.5	19.5	8	8 x 8	10.5 x 10.5
19	8	17.5	21.5	8	8 x 8	10.5 x 10.5
19	10	17.5	21.5	10	10 x 10	12.5 x 12.5
22	12	20.5	24.5	12	12 x 12	14.5 x 14.5
24	14	22.5	26.5	14	14 x 14	16.5 x 16.5
26	16	24.5	28.5	16	16 x 16	18.5 x 18.5
30	18	28.5	32.5	18	18 x 18	20.5 x 20.5
30	20	28.5	32.5	20	20 x 20	22.5 x 22.5
34	24	32.5	36.5	24	24 x 24	26.5 x 26.5
40	30	38.5	42.5	30	30 x 30	32.5 x 32.5
46	36	44.5	48.5	36	36 x 36	38.5 x 38.5
52	42	50.5	54.5	42	42 x 42	44.5 x 44.5
58	48	56.5	60.5	48	48 x 48	50.5 x 50.5
64	54	62.5	66.5	54	54 x 54	56.5 x 56.5
70	60	68.5	72.5	60	60 x 60	62.5 x 62.5
76	60	74.5	78.5	60	60 x 60	62.5 x 62.5
82	72	80.5	88.75	72	72 x 72	74.5 x 74.5

NOTES : All dimensions shown are in units of inches.

KISTNER EASI-SET 6' X 6'
BACKFLOW PREVENTOR/RPZ ENCLOSURE
STANDARD STOCK SERIES



PLAN

X REVIEWED
☐ REVIEWED & NOTED

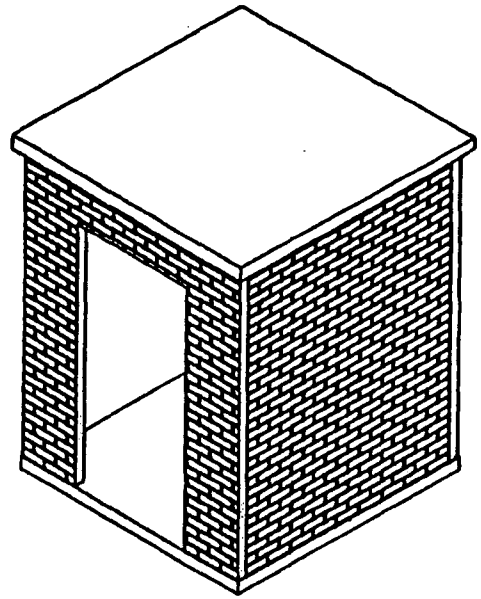
REVIEWED SOLEY FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS
BLASLAND, BOUCK & LEE, INC.

SIGNATURE

11/4/96
Date

Syr
Office Location

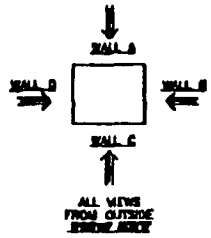
☐ RESUBMIT ☐ REJECTED



OPTIONS:
FINISH: BRICK ☐
STONE ☐

OPENINGS: LOCATE ON PLAN VIEW.
SIZE:
LOCATION: 2 DIRECTION ℄:

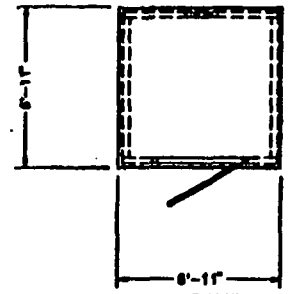
DOORS: LOCATE ON PLAN VIEW.



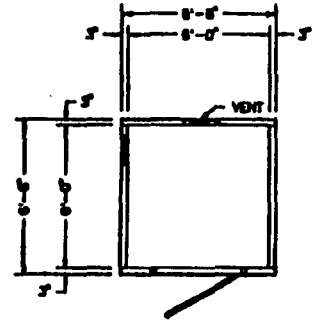
BUILDING TYPE: 8' X 8' STANDARD

BUILDING CODE: ARCH-ES66

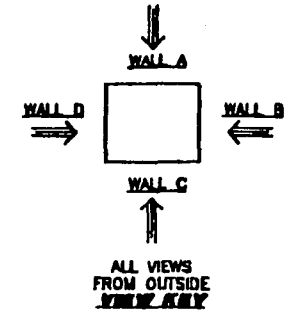
REVISIONS		
		PROJECT: EASI-SET 6' X 6' RPZ ENCLOSURE
		LOCATION:
		OWNER:
		ENGINEER:
		CONTRACTOR:
		MANUFACTURER: KISTNER CONCRETE PRODUCTS, INC.
		PRODUCT DESIGNATION: EASI-SET STANDARD STOCK BUILDINGS
		SCALE: 1/4"=1' DRAWN BY: CAE DATE: 1-17-95 DWG. NO.: ES-6SERIES



ROOF PLAN



FLOOR PLAN

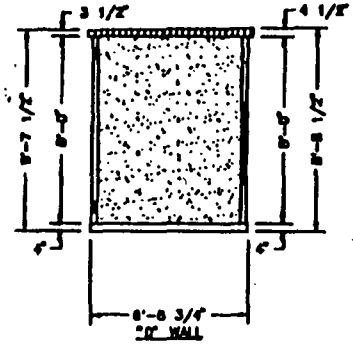


ALL VIEWS FROM OUTSIDE LOOKING AWAY

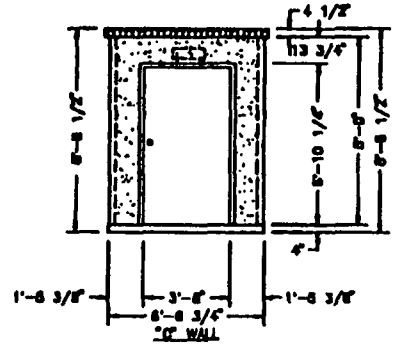
NOTES:
MEETS BOCA, SBC, ICBO, ANSI AND ACI REQUIREMENTS
PATENTS: US #4,432,175
CANADA #1,165,133 AND #47,588

- DIMENSIONS: INTERIOR: 6'-0" X 6'-0" X 6'-0" HIGH
  EXTERIOR: 8'-6" X 8'-6" X 8'-6" HIGH
- STORAGE SPACE: 288 CUBIC FEET
- TOTAL WEIGHT: 12,000 LBS.
- 4,000 PSI STEEL-REINFORCED CONCRETE
- 1 STANDARD DOOR, 3'-0" X 6'-0" X 1 3/4" 18 GAUGE STEEL, TAMPER-PROOF HINGES, DEAD BOLT LOCKS
- 1 ADJUSTABLE DOOR HOLDER
- EXTRUDED ALUMINUM THRESHOLD
- TWO SCREENED VENTS, 7" X 15", 15.8 GAUGE ALUMINUM (5" X 13" RO)
- POST-TENSIONED ROOF AND FLOOR, EACH BY A SINGLE CONTINUOUS TENDON, FORMING A SUBSTANTIALLY RECTANGULAR CONFIGURATION
- SLOPED ROOF PANEL WITH PREFABRICATED, ARCHITECTURAL RIBBED EDGE
- TURNED DOWN ROOF WITH BUILT IN DRIP EDGE
- ROOF LOAD CAPACITY: 35 PSF STANDARD; HIGHER LOADINGS AVAILABLE
- WIND LOAD: 97 PSF STANDARD (130 MPH); HIGHER LOADINGS AVAILABLE
- VARIETY OF EXTERIOR FINISHES: ☐ EXPOSED GRAVEL FINISH
  ☐ VERTICAL BROOM FINISH
  ☐ BRICK FINISH
- SITE WORK, FOUNDATION STONE, PERMITS, ELECTRICAL, ETC. BY OWNER

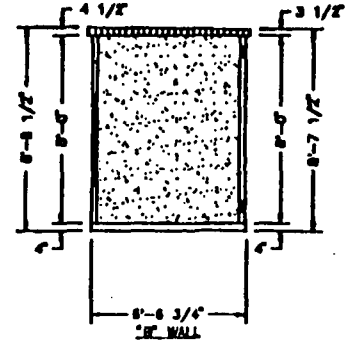
FROM: ES-6X6PRO - REV. 0



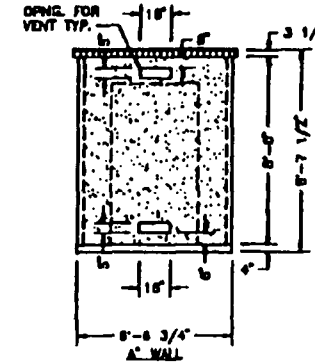
"D" WALL



"C" WALL



"B" WALL



"A" WALL

LAYER KEY
0 (ALWAYS ON)
CUSTOMER
DIMS
ELECTRICAL
HVAC
NOTES
SHOW

REVISIONS	

PROJECT: PRECAST CONCRETE 8'-0" X 6'-0" "EASI-SET" BUILDING
LOCATION:
OWNER:
ENGINEER:
CONTRACTOR:
MANUFACTURER: KISTNER CONCRETE PRODUCTS, INC.
PRODUCT DESIGNATION: PRECAST CONCRETE 8'-0" X 6'-0" "EASI-SET" BUILDING
SCALE: 1/8"=1' DRAWN BY: DAR DATE: 2-13-95 DWG. NO.: ES-6X6-S

Doors

☒ REVIEWED ☐ REVIEWED & NOTED

REVIEWED SOLEY FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS

BLASLAND, BOUCK & LEE, INC.

Wayne DeCann
SIGNATURE

11/4/96
Date

Syracuse
Office Location

☐ RESUBMIT ☐ REJECTED

Project: GE Powerex

Location: Auburn, NY

Contractor: Blasland, Bouke & Lee

Engineer: Blasland, Bouke & Lee

October 30, 1996

8 mea
SWF

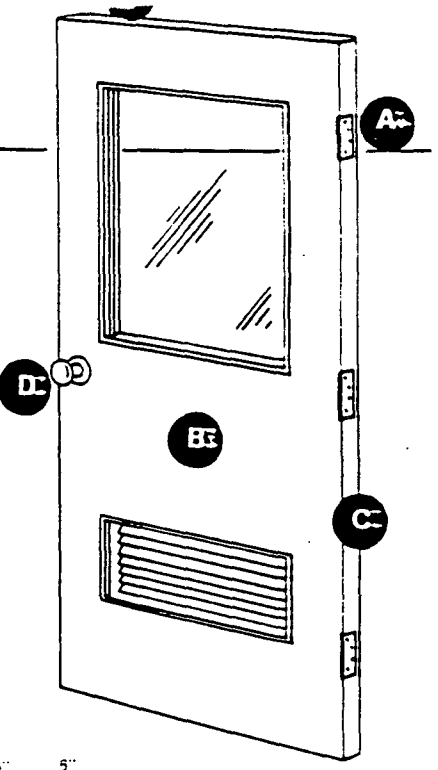
STEEL DOORS AND FRAMES

Steel Doors and Frames for the Commercial, Institutional and Industrial Construction Industry.

Fleming

Building on Quality

D-Series Steel Doors



The Fleming D-Series steel door has earned its reputation for quality and top performance throughout the commercial, industrial and institutional building construction market through reliable performance over many years.

Available in 16 ga. (D-16), 18 ga. (D-18), or 20 ga. (D-20), it is suitable for most applications.

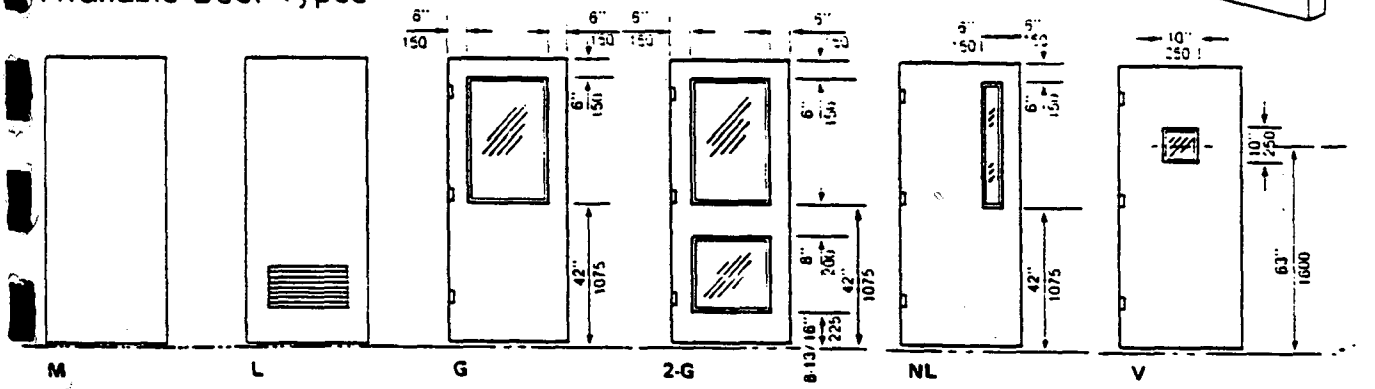
Manufactured from mirror flat wiped coat galvanized steel with no face seams, the D-Series door is available in a complete range of sizes, cores, glass lite and louvre openings. Also available with full U.L., ULC, or F.M. fire labels up to 3 hour (Class "A").

Pre-expanded, small-cell honeycomb core material (or for insulated applications, a solid slab of polyurethane or polystyrene) is laminated under pressure to the face sheets. The face sheets are connected by a continuous "deep pocket" interlocking edge lock seam for added durability.

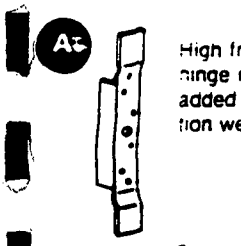
Compare our specifications and built-in quality and you will see that Fleming's D-Series doors offer the ultimate in steel doors.

We also offer our DSS series door, manufactured from Type 304 or 316 Stainless Steel in finishes from No. 4 (satin grained) to No. 10 (mirror finish) for use when the possibility of high corrosion due to presence of chemicals exists, or when design and appearance warrant that little extra 'touch of class'. The Fleming DSS series door is also available with a 1-1/2" hour "(B)" U.L. fire label.

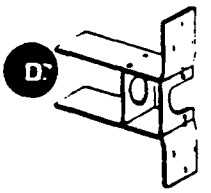
Available Door Types



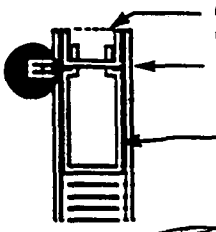
'D' Series Door Features



A — High frequency top hinge reinforcement for added strength. Projection welded to door.



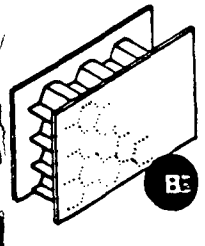
D — Cylindrical lock reinforcing unit projection welded to door.



Optional vinyl or steel Top cap Exterior doors.

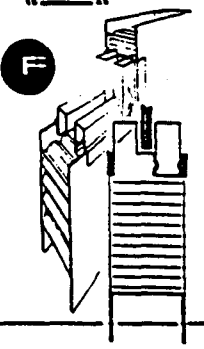
B — 16 ga. End Channels.

Heavy gauge drop in tubular Closer reinforcing.

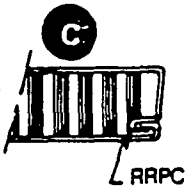


Pre-expanded small cell honeycomb core.

B



F — UL, ULC & FM approved Fleming roll formed steel glass lite trim with snap-on glazing bead.



C — Continuous, vertical, mechanically interlocking seam, sealed with RRPC adhesive.

RRPC adhesive.

Specifications

1. Doors shall be type(s)* D-SERIES as manufactured by S.W. Fleming Ltd.
2. Doors shall be fabricated of * 18 ga. wipe coat galvanized steel. (when stainless required specify Type and Finish of stainless steel).
3. Doors shall be flush with no face seams.
4. Doors shall have 1/8"(3) bevel in 2" (51) on door edges.
5. Doors shall have vertical, mechanically interlocking seams on hinge and lock edges, sealed in RRPC adhesive.
6. Doors shall have 16 ga. steel end channels projection welded to top and bottom of door.
7. Doors shall be stiffened, insulated and sound-deadened with pre-expanded small cell honeycomb core, completely filling the inside of the doors and laminated to the inside of the door skins with U.L. approved adhesive (alternative for insulated exterior applications: solid slab of polyurethane or polystyrene, in lieu of honeycomb).
8. Doors shall be:

a) mortised, reinforced, drilled and tapped for three templated hinges for 1-3/4"(45) thick doors.

b) mortised, reinforced, drilled and tapped for standard cylindrical lock or blank reinforced for push/pull or rim panic.

9. Exterior doors shall be provided with optional top caps for protection against weather.

Specification writers note:

* Specify series by gauge of door i.e. D-20, D-18, D-16.

** D-Series doors available in three gauges —
D-20 Series 20 ga. for light duty use.
D-18 Series 18 ga. for moderate duty use.
D-16 Series 16 ga. for heavy duty use.

NOTE: All metric dimensions are expressed in millimetres mm unless otherwise noted.

: Metric dimensions shown reflect nominal sizes and/or locations for hard metric product only.

: Imperial and metric dimensions may not be equivalents.

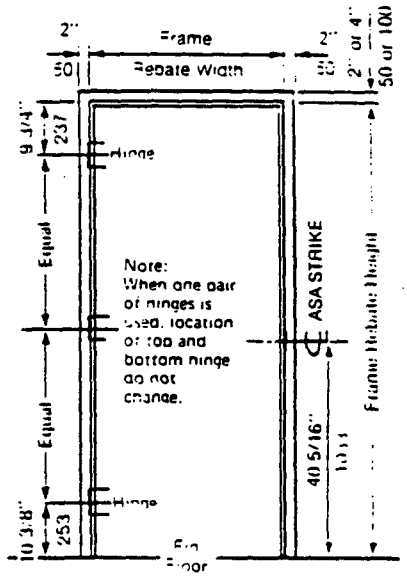
F-16 Series Stock Steel Frames

Manufactured from 16 ga. wipe coat galvanized steel, this full line of standard-sized "from stock" steel frames is universally applicable. Frames are mortised and reinforced for 4-1/2" x 4" standard weight templated hinges, an A.S.A. (4-7/8" x 1-1/4") strike, and 3 rubber silencers. Additional reinforcing for other hardware available on special request. All hardware cutouts are provided with plaster guards.

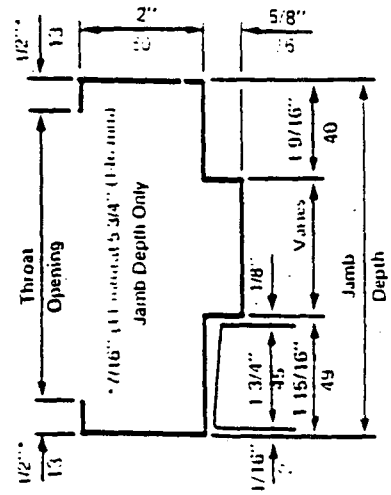
Frames may be shipped knocked down, set up and tack-welded, or set up and arc-welded with mitres ground smooth.

Choose from U.L., ULC or FM labels for 3 hours, 1-1/2 hours, 3/4 hour or 1/3 hour.

We also offer our FFS-16 series frame, manufactured from Type 302, 304, or 316 Stainless Steel in finishes from No. 4 (satin grained) to No. 10 (mirror finish) for use when the possibility of high corrosion due to presence of chemicals exists, or when design and appearance warrant that little extra touch of class. The Fleming FSS-16 series frame is also available with a 1-1/2 hours (18)" U.L., ULC or FM fire label.



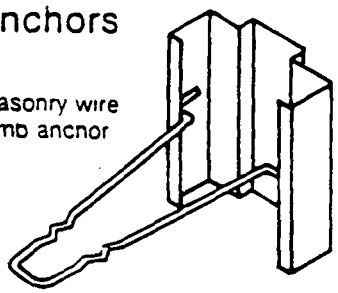
Typical Frame Profile



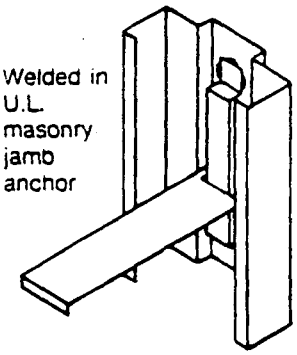
Standard Sizes				
Frame Rebate Height	Frame Rebate Width		Profile Dimensions	
	Single	Double	Jamb Depth	Throat Opening
6'8" 2050	2'0" 600	4'0" 1200	4-3/4 121	3-3/4 95
6'10"	2'4"	4'8"		
7'0" 2150	2'6" 800	5'0" 1600	5-3/4 146	4-7/8 124
7'2"	2'8"	5'4"		
8'0" 2350	3'0" 900	6'0" 1800	6-3/4 172	5-3/4 146
	3'4"	6'8"		
	3'6" 1100	7'0" 2200	7-3/4 197	6-3/4 172
	3'8"	7'4"		
	4'0" 1200	8'0" 2400	8-3/4 222	7-3/4 197

Anchors

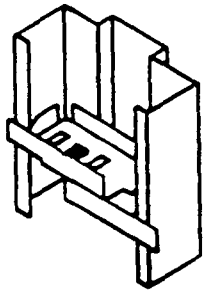
Masonry wire jamb anchor



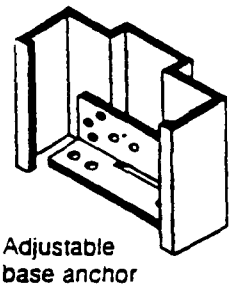
Welded in U.L. masonry jamb anchor



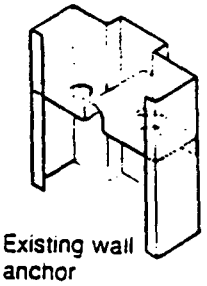
Snap in stud Jamb anchor (Wood, steel or trussteel stud walls)



Adjustable base anchor

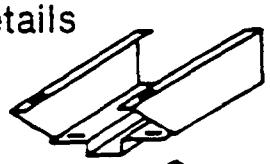


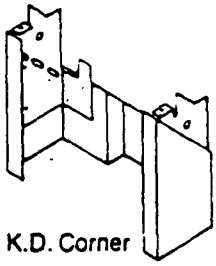
Existing wall anchor



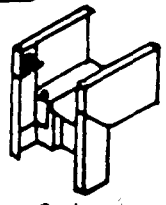
Mitre Details

Factory Projection Welded



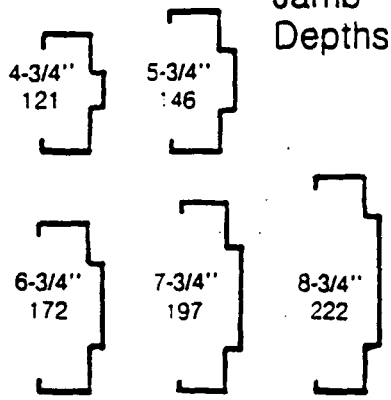


K.D. Corner



Optional 4" Head

Jamb Depths



Specifications

1. Frames shall be type(s) F-16 SERIES as manufactured by S.W. Fleming Ltd.
2. Frames shall be fabricated of 16 ga. wipe coat galvanized steel. (When stainless required specify Type and Finish of stainless steel).
3. Frames shall be knocked down. Mitered corners shall have heavy reinforcements with four (4) integral tabs for solid and easy interlocking of jambs and head.

3A. (Alternate)
Frames shall be assembled in position and arc-welded or tack-welded. A spreader bar shall be welded to each frame.

4. Frames shall be provided with 6 wall-anchors and 2 base-anchors to suit wall construction.
5. Frames shall be furnished with 3 rubber bumpers.
6. Frames shall be mortised, reinforced, drilled and tapped for hinges and strikes. Strike and hinge reinforcing shall be protected by metal guard-boxes.

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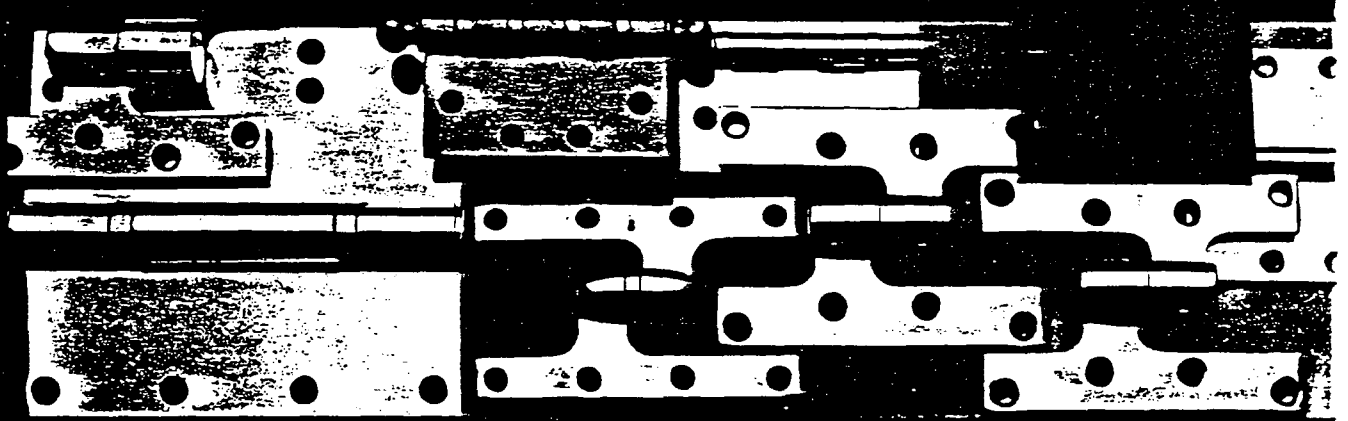
NOTE: All metric dimensions are expressed in millimetres mm unless otherwise noted.

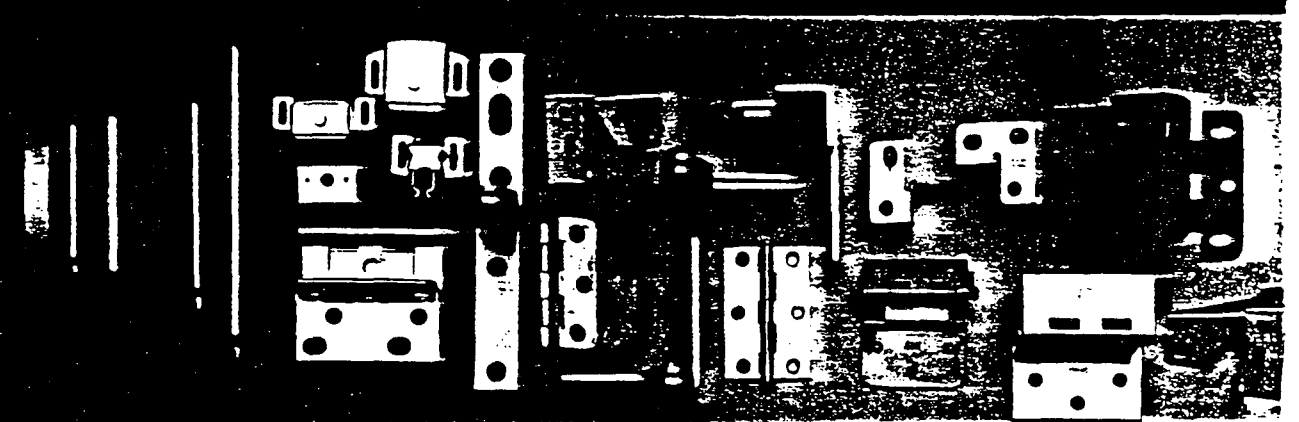
: Metric dimensions shown reflect nominal sizes and/or locations for hard metric product only.

: Imperial and metric dimensions may not be equivalents.

STANLEY

ARCHITECTURAL HARDWARE





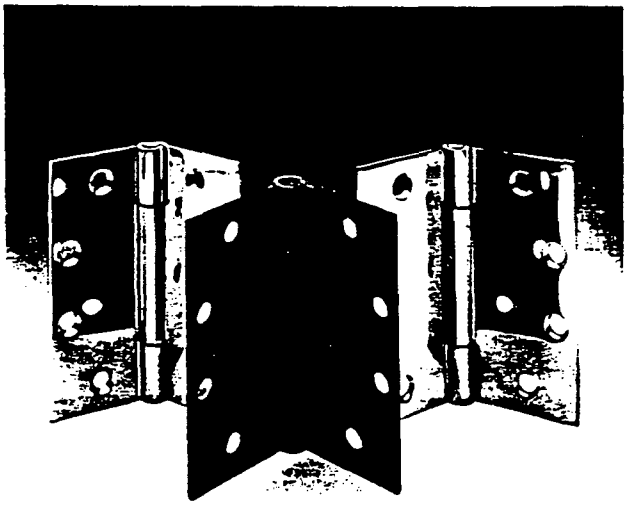
LifeStan BEARING

Developed by the Hardware Division of The Stanley Works. LifeStan is a revolutionary concept in bearing construction and materials. It combines a space-age material with standard materials of the highest quality. Extremely close tolerances and high manufacturing precision are required. The LifeStan bearing makes it possible for Stanley s LifeSpan hinge to require no maintenance, no oils, no grease – to offer smoother, more quiet operation and to last for the life of the building.*

LifeSpan Hinges with LifeStan bearings are Guaranteed To Last For The Life Of The Building*

- Slimmest barrel with flush tips and pins for clean lines.
- Only two horizontal lines.
- Hinge hole location for use on wood or hollow metal doors and frames.
- Hinges can be furnished with raised barrel, electric wires, concealed switches, security studs, and hospital tips.
- Low frequency plain bearing 1900 hinges do not utilize the LifeStan bearing.

* Hinges for replacement guaranteed if originally specified & applied in accordance with Stanley s general catalog.



CB1900 SERIES

APPLICATION DETERMINES THE PROPER TYPE OF HINGE - F & FBB LINE

HIGH FREQUENCY HINGES

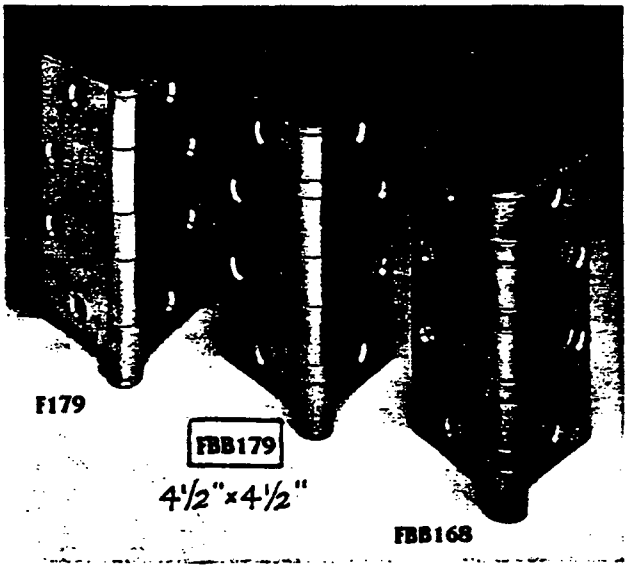
These modern style, heavy weight, high frequency hinges (FBB168, FBB199, FBB163, FBB113, FBB138, FBB98, FBB169, FBB169-1/2, FBB109, FBB109-1/2) feature the same streamlined, modern styling as the FBB line. Ball bearings are made of superior chrome alloy, raceways are flush with the barrel, and the tips are flat and neat. All hinges meet ANSI Standards for performance and screw hole locations.

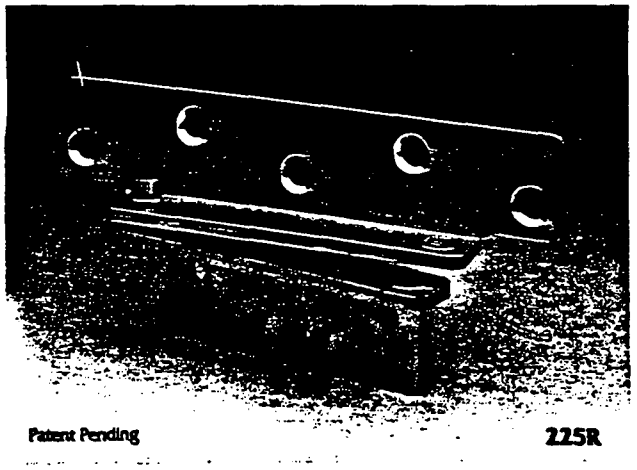
AVERAGE FREQUENCY HINGES

These modern style, standard weight, average frequency hinges (FBB179, FBB191, FBB173, FBB112, FBB167, FBB108, FBB171, FBB110) are the basis of the FBB line. They feature chrome alloy ball bearings, raceways flush with the barrel & flat tips. All hinges meet ANSI Standards for performance and screw hole locations.

LOW FREQUENCY HINGES

These low frequency, plain bearing hinges (F179, F191, F173, F167) incorporate flat tips achieving the same neat effect as the FBB line. All hinges meet ANSI Standards for performance and screw hole locations.





Patent Pending

225R

SHOCK ARRESTER

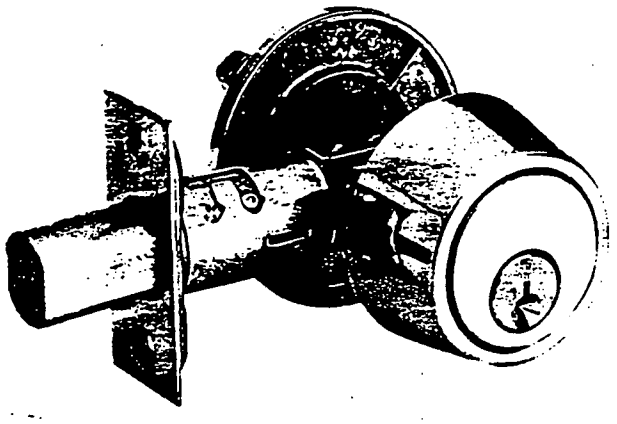
The new supplement to Stanley's Pivot Reinforced hinge line. Protects against loosened screws and bent hinge leaves.

225R–Solid Steel. Plated finishes, US10, US26D or phosphated and prime coated for painting, USP.

SUGGESTED USES

- For use in retrofit or new construction.
- Surface applied.
- For doors 1-3/4" thick with either standard or heavy weight hinges, 4-1/2" wide.
- Door edge may be either square or beveled edge 1/8" in 2".
- Brass pintle and large screws resist maximum shock loads.
- Non handed.

B-Series Deadbolt Locks



B160N

Applications: Auxiliary and primary locking for residential and commercial buildings. B-Series locks are designed to meet various security door preparations and functional requirements as determined by local codes and life safety regulations.

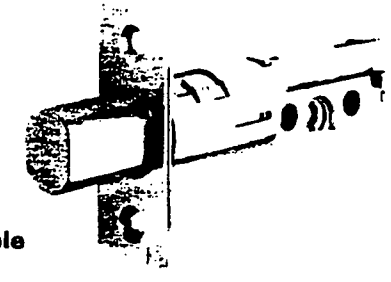
Certifications: ANSI A156.5, 1984. B100-Series, Grade 3; B400-Series, Grade 2; B500-Series, Grade 1.

Exposed Trim: Wrought brass or bronze.

Keying: 5 Pin keying with two nickel silver keys per lock. 6 Pin keying available. Other keying options available from the factory include masterkeying and construction keying. B200 and B400-Series are also available with interchangeable cores. B200, B400, and B500-Series are available with Primus high security cylinders.

Door Range: B100-Series, 1 3/8" to 1 3/4" (35mm-44mm) standard. Regular parts available to 2 1/4" (57mm), assembled to order, 6 pin keyed double cylinders available to 2" (51mm). B200-Series, 1 3/8" to 1 3/4" (35mm-44mm) standard. B400-Series, 1 3/8" to 1 3/4" (35mm-44mm) standard. Regular parts available to 2 3/4" (70mm), range varies by function. B500-Series, 1 5/8" to 2 1/8" (41mm-54mm) standard.

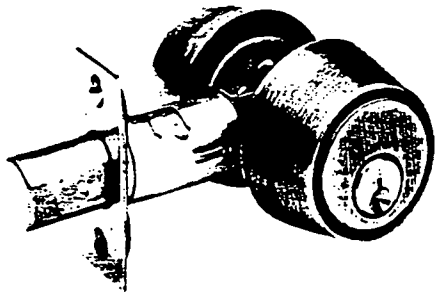
Deadbolt: B100–1" (25mm) throw standard with concealed hardened steel roller. B400, B500-Series–1" (25mm) throw standard, high strength sintered stainless steel with concealed hardened steel roller.



12-137
B100 Adjustable Backset

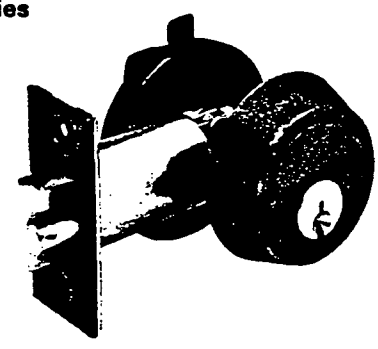
Note: B100 Series–adjustable deadbolt for 2 3/8" or 2 3/4" (60mm-70mm) backset standard. 5" (127mm) backset available.

B100 Series



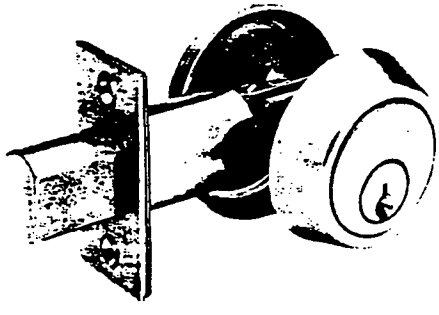
B162N — **Standard Duty**

B200 Series



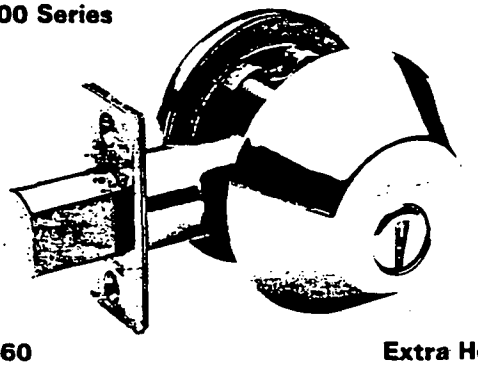
B250PD — **Nightlatch**

B400 Series



B460P — **Heavy Duty**

B500 Series

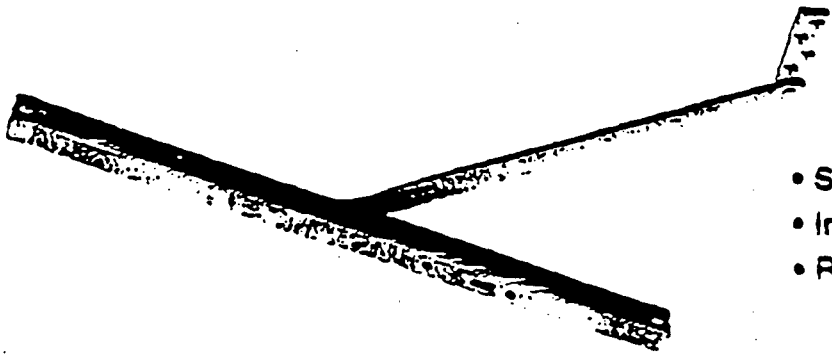


B560 — **Extra Heavy Duty**

SCHLAGE.

GLYNN-JOHNSON

90 Series



- Single acting doors
- Interior / exterior applications
- Reversible, non-handed

Glynn-Johnson 90 series surface mounted holders and stops provide the most versatile and attractive variety of functions, materials and finishes to fit heavy duty applications. Models are available in 300 series stainless steel, brass/bronze, and steel materials. The broadest range of finishes in the industry are furnished to complement design requirements.

Three basic models are available, each offered in five sizes to accommodate virtually all openings. The models available include:

- **90H Series** - Hold-Open Model
- **90F Series** - Friction Hold-Open Model
- **90S Series** - Stop-Only Model

All models incorporate a heavy duty channel and slide arm design and offset jamb brackets for improved compatibility with door closers. Unique design allows for simple field changing of functions to compensate for changes in user requirements. If, for example, a hold-open model is furnished and it is determined at a later date that a stop-only model would better suit the application, a simple field change can be made to convert the hold-open unit to a stop-only function, or to friction if so required. Kits are available for simple conversion in the field.

90H series hold-open units feature a selective hold-open mechanism which is easily controlled by a serrated knob on the underside of the channel. Flipped one way the control knob engages the hold-open mechanism, allowing the door to be held open at a predetermined position from 85° to 110°. Flipped the opposite way, the unit acts as a stop and shock absorber. The tension on the hold-open mechanism is adjustable to satisfy individual requirements due to air currents or exterior conditions.

90S series stop-only units feature the same rugged shock absorbing mechanism used on the hold-open model, but the hold-open mechanism is removed.

90F series friction hold-open models provide a heavy duty multi-point hold open mechanism, permitting the door to be held open at various degrees. The tension on the friction mechanism is adjustable to suit field requirements..

All models are available in brass/bronze, 300 series stainless steel, and steel substrates. US3, 4, 9, 10, 10B, 26 and 26D finishes are furnished on a brass/bronze substrate. All new 300 series stainless steel is furnished in US32 and US32D finishes, offering the highest resistance to corrosion. Steel units are available in S1 (sprayed bronze), S2 (sprayed brass), S3 (sprayed aluminum), S4 (sprayed black) and S5 (sprayed 10B). Steel units feature a corrosion resistant pretreatment prior to painting. Brass, bronze and stainless material are highly recommended for applications that are exposed to exterior or otherwise corrosive elements, while all four base materials are suitable for normal interior use.

All 90 series models are designed for heavy duty applications and will provide long lasting protection for doors, frames and hardware. Refer to pages C19 / C20 for additional application information and to sizing chart for specific model selection.

Other options available:

Suffix J - Angle Jamb Bracket - Used to convert standard unit to hinge side or flush transom mounting (ordered as 80/90J and affixed to standard jamb bracket).

Suffix SE - Stop only model is furnished less shock absorber (for use with single-point hold-open electronic closers).

ORDERING INFORMATION

Example:
902H-US32D

1st 2 digits identify series

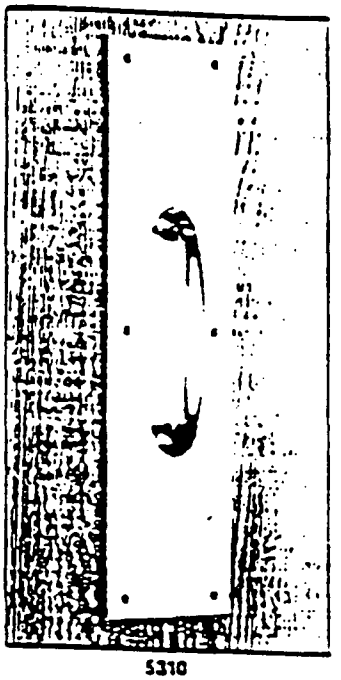
3rd digit designates size (i.e. 2, 3, 4, 5, 6)

90 2 H - US32D

Finish (also designates the base material)
US3, 4, 9, 10, 10B, 26 & 26D - Brass/Bronze
US32, 32D - 300 Series Stainless Steel
S1 - S5 Sprayed finishes - Steel

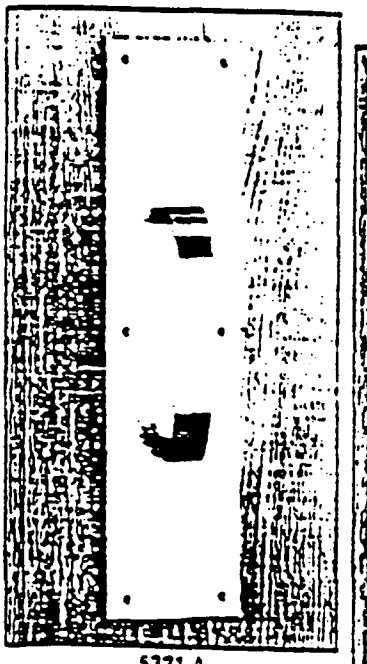
Suffix identifying function
H - Hold open S - Stop only F - Friction

PULL PLATES

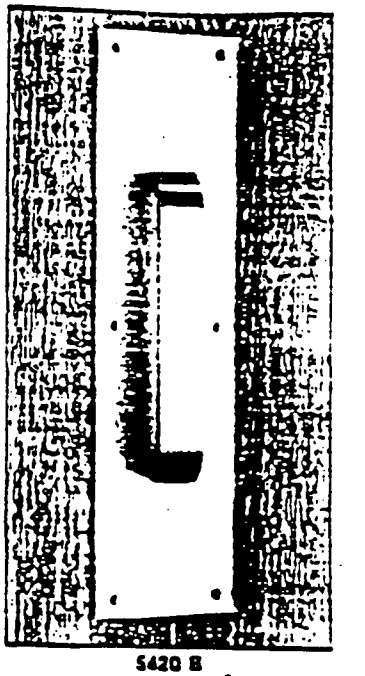


5310

5426 B



5321 A



5420 B

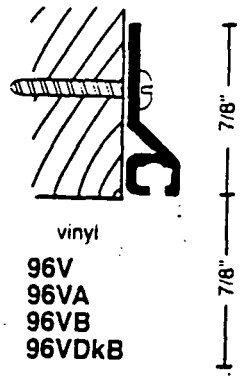
The pull plates shown above are but a few of the popular applications of grips to plates available. Please call if you have any questions concerning our product or delivery.

In the Burns numbering system, the first two numbers designate the plate and the last two numbers, the pull. For example, the 5426B pull plate shown above consists of a # 54 plate and a # 26B pull.

Please feel free to mix and match any pull to any plate.

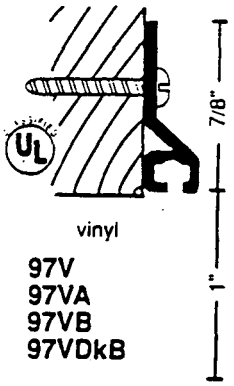
BURNS

Door Sweeps



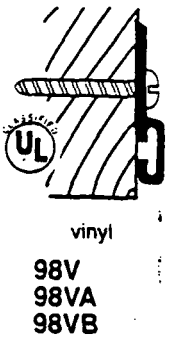
vinyl

96V
96VA
96VB
96VDkB



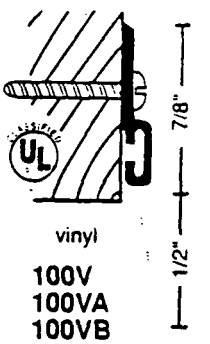
vinyl

97V
97VA
97VB
97VDkB



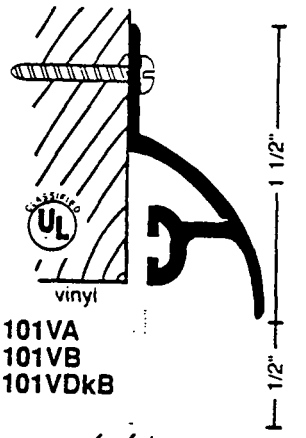
vinyl

98V
98VA
98VB
98VDkB



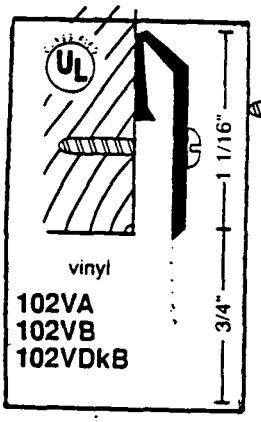
vinyl

100V
100VA
100VB
100VDkB



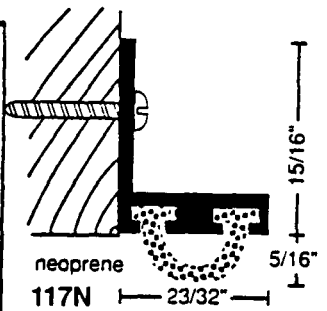
vinyl

101VA
101VB
101VDkB



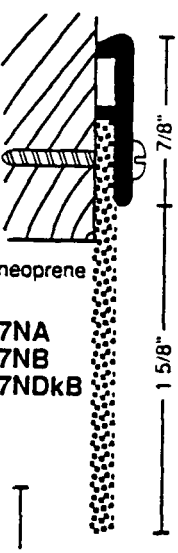
vinyl

102VA
102VB
102VDkB



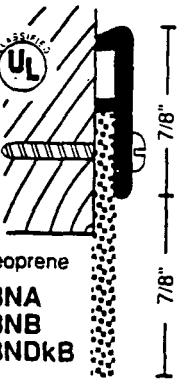
neoprene

117N
117NDkB



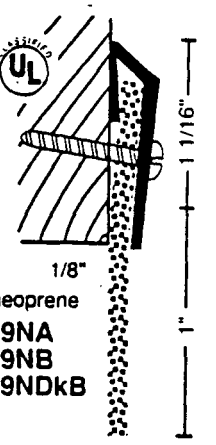
neoprene

197NA
197NB
197NDkB



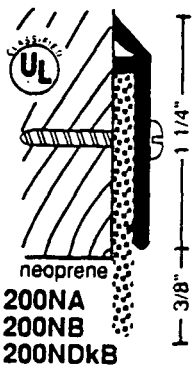
neoprene

198NA
198NB
198NDkB



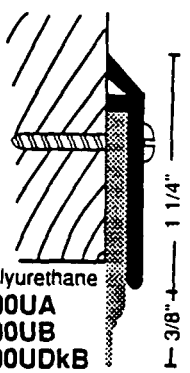
1/8"
neoprene

199NA
199NB
199NDkB



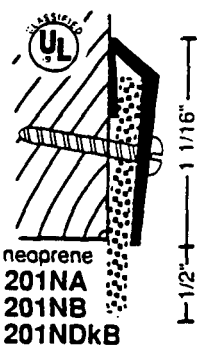
neoprene

200NA
200NB
200NDkB



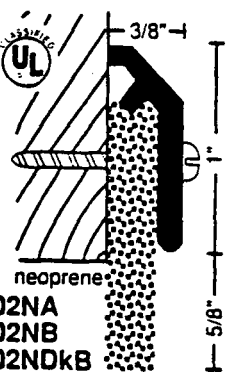
polyurethane

200UA
200UB
200UDkB



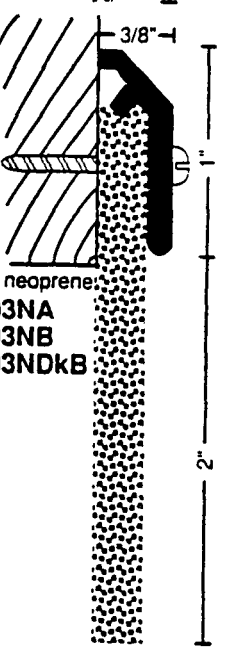
neoprene

201NA
201NB
201NDkB



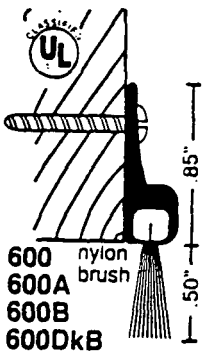
neoprene

202NA
202NB
202NDkB

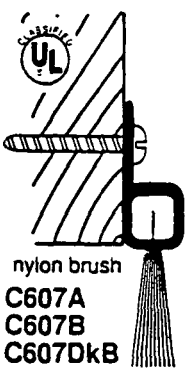


neoprene

203NA
203NB
203NDkB

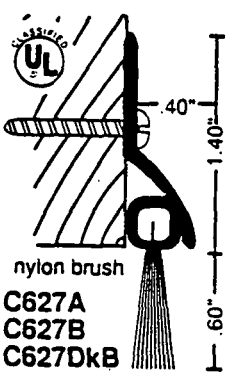


600 nylon brush
600A
600B
600DkB



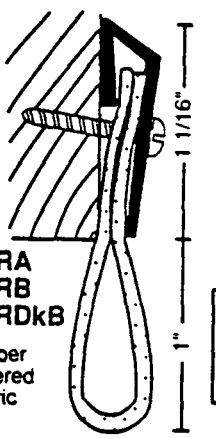
nylon brush

C607A
C607B
C607DkB



nylon brush

C627A
C627B
C627DkB



2014RA
2014RB
2014RDkB

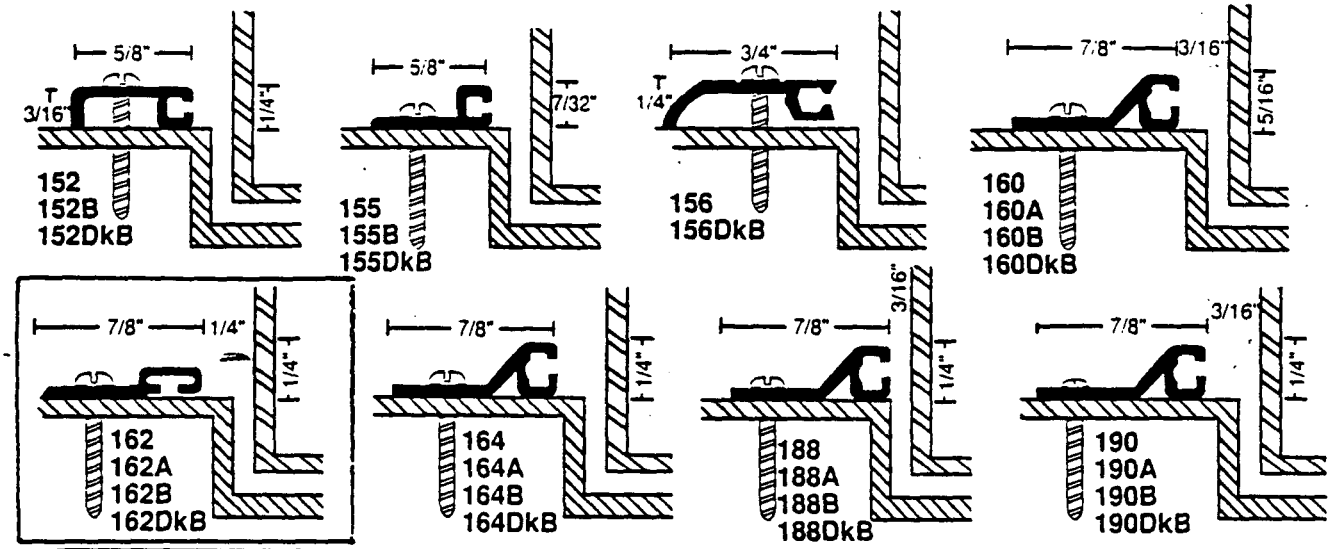
rubber covered fabric

A - natural satin anodized
B - gold anodized
DkB - dark bronze anodized

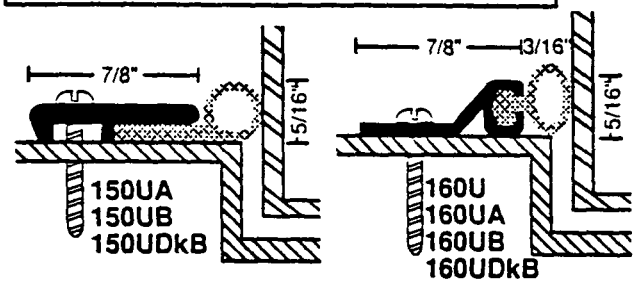
#6 x 3/4" Stainless Steel Sheet Metal Screws Furnished

Vinyl Perimeter Gasketing

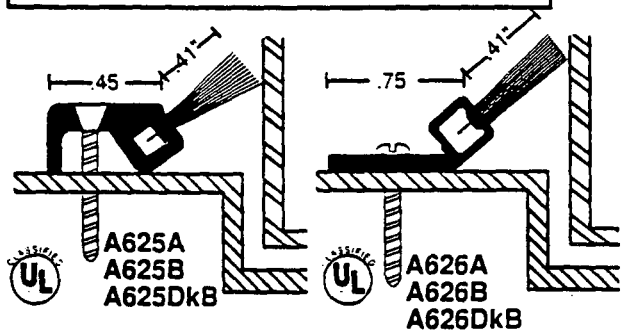
#6 x 3/4" Stainless Steel Sheet Metal Screws Furnished with perimeter seals.



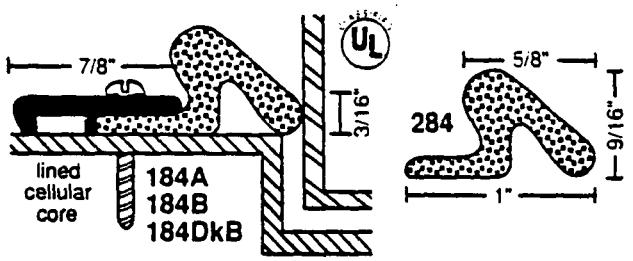
Polyurethane Perimeter Gasketing



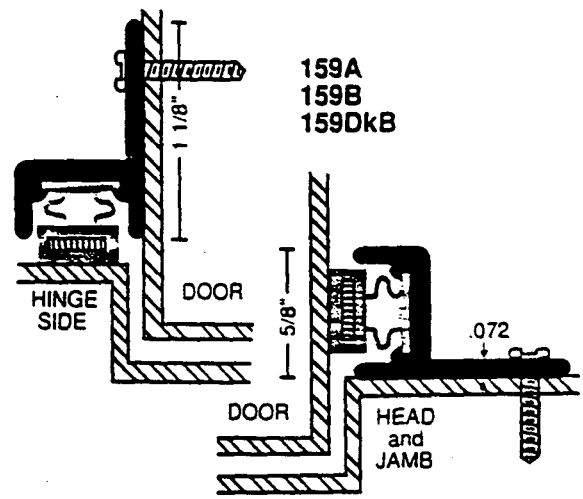
Nylon Brush Perimeter Gasketing



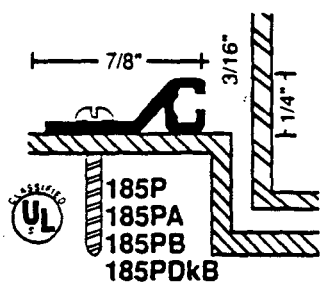
Sponge Perimeter Gasketing



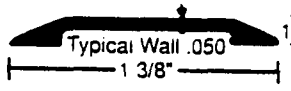
Magnetic Perimeter Gasketing



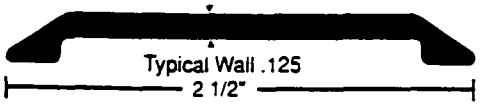
Pile Perimeter Gasketing



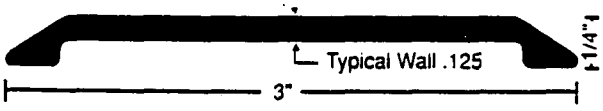
Saddle Thresholds



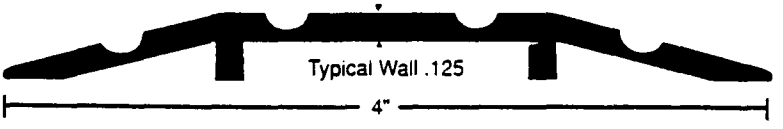
408 .1 lbs./ft.



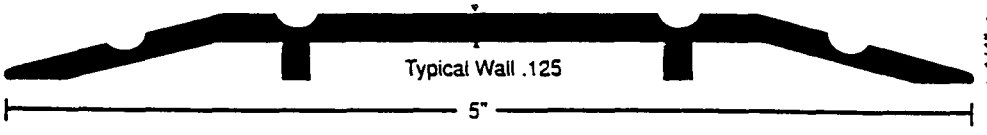
410 .4 lbs./ft.
410DkB .4 lbs./ft.



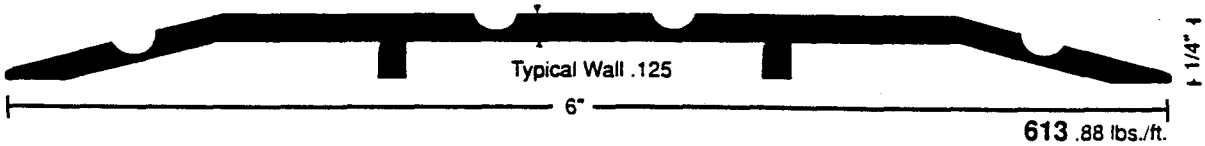
411 .5 lbs./ft.
411DkB .5 lbs./ft.



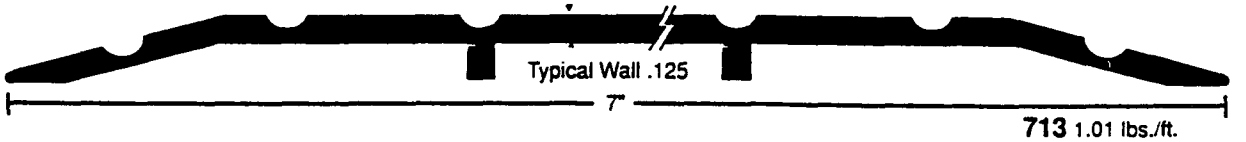
413 .58 lbs./ft.
413DkB .58 lbs./ft.



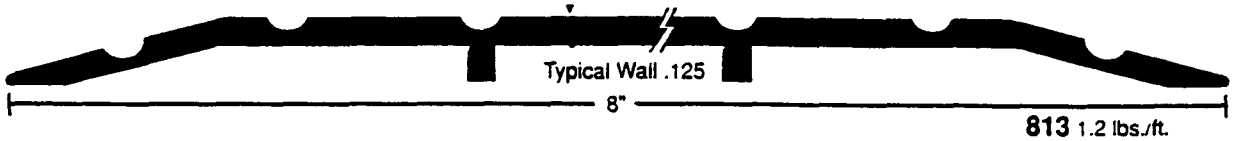
513 .74 lbs./ft.
513DkB .74 lbs./ft.



613 .88 lbs./ft.
613DkB .88 lbs./ft.



713 1.01 lbs./ft.
713DkB 1.01 lbs./ft.



813 1.2 lbs./ft.
813DkB 1.2 lbs./ft.

1/2" added to thresholds under 72"
1" added to thresholds over 72"

#10 x 1-1/2" FH zinc plated wood screws are included on mill finish thresholds up to 1/4" in height. Chemically treated stainless steel screws are provided to match DkB finish.

#12 x 1-1/2" FH zinc plated wood screws are included on mill finish thresholds 1/2" or higher. Chemically treated stainless steel screws are provided to match DkB finish.

- All thresholds are aluminum mill finish.
- DkB indicates aluminum dark bronze 2 step anodized finish.

NON-SKID SURFACE
All thresholds are available with an abrasive coating for better traction. and a non-skid surface. Specify SIA finish.

TECHNICAL DATA

FROM

Anemostat

DOOR PRODUCTS

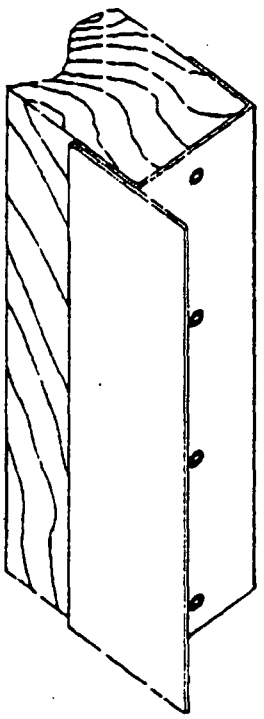
A DIVISION OF DYNAMICS CORPORATION OF AMERICA
P.O.BOX 4938 • 1220 WATSON CENTER RD.
CARSON, CA 90745
(213)775-7441 FAX(310)835-0448

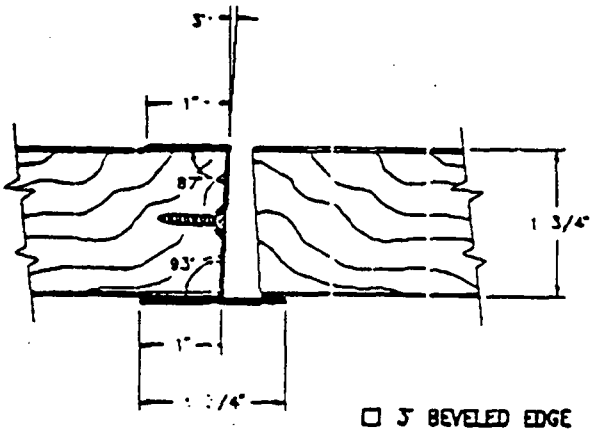
FMA

METAL ASTRAGAL
(EACH)

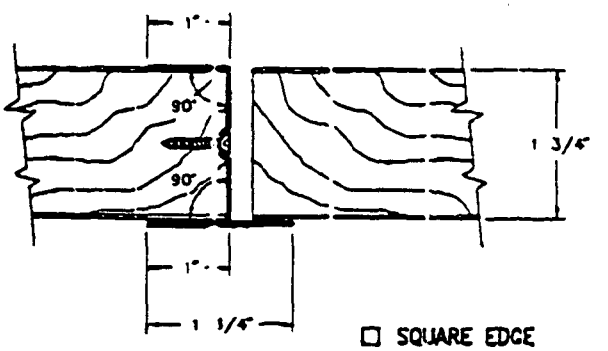
NOT FIRE RATED

DETAIL DRAWING





☐ 3" BEVELED EDGE



☐ SQUARE EDGE

All Dimensions ± 1/32

STANDARD PRODUCT FEATURES

- MATERIAL: 20 GA. Cold Rolled Steel – Edge,
  18 GA. Cold Rolled Steel – Astragal.
- FINISH: Grey Primer, Beige or Bronze Baked Enamel.
- INSTALLATION: Fits over edge of door (stile) and installs using #8X3/4 phillips head sheet metal screws with countersunk mounting holes for a flush appearance on maximum 12" centers.
  (spacing will vary based on hardware preparation and size)
- DOOR THICKNESS: For 1 3/4" (Actual 1 3/4" Inside Dimension)
- NOTE: For Exterior use, High Humidity or Salt Air application, product must be Galvanized or Stainless Steel.
- IMPORTANT: Interpretation of building and fire codes may vary. Consult with the local authority having jurisdiction in your area, to determine appropriate standards.

OPTIONAL FEATURES

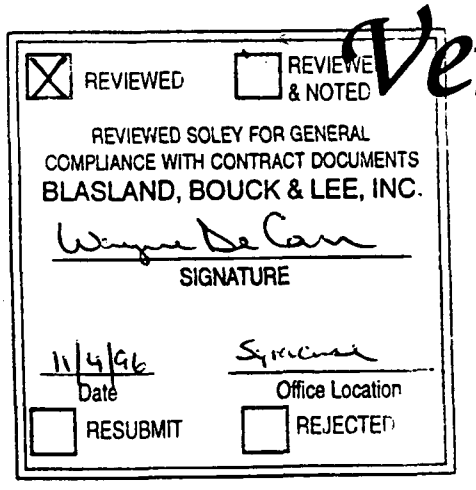
- MATERIAL: #304 Stainless Steel, #4 Finish(Satin), Galvanized Sheet metal.
- FINISH: Special order Baked Enamel colors (as per sample chip supplied). Plated finishes to match the vision frame, lock, hinges and closer.
- FASTENERS: Special Security Screw Fasteners. See Security Products Section Page 13.
- SPECIALS: Machining Preps (must have signed hardware Prep Sheet attached with order).
  Lead Lined for X-ray applications.
  Door thickness (specify inside dimension required).

FIRE RATINGS

- FMA is not fire rated.

Job Name & Location	Submitted by

Vents



Project: GE Powerex

Location: Auburn, NY

Contractor: Blasland, Bouke & Lee

Engineer: Blasland, Bouke & Lee

October 30, 1996

MODULAR SIZE BRICK VENTS (7 5/8" X 2 1/4" X 4")

TYPE NO.	WIDTH	* HEIGHT (VENT DIM.)	** HEIGHT (OVERALL)	DEPTH
TYPE M-11	7 3/4	2 1/4	2 1/2	4
TYPE M-21	15 5/8	2 1/4	2 1/2	4
TYPE M-12	7 3/4	4 7/8	5 1/8	4
➔ TYPE M-22	15 5/8	4 7/8	5 1/8	4
TYPE M-13	7 3/4	7 1/2	7 3/4	4
TYPE M-23	15 5/8	7 1/2	7 3/4	4

MODULAR SIZE BLOCK VENTS (15 5/8" X 7 5/8" X 4")

TYPE NO.	WIDTH	* HEIGHT (VENT DIM.)	** HEIGHT (OVERALL)	DEPTH
TYPE B-11	15 5/8	7 5/8	7 15/16	4
TYPE B-21	31 5/8	7 5/8	7 15/16	4
TYPE B-12	15 5/8	15 5/8	15 15/16	4

STANDARD SIZE BRICK VENTS (8" X 2 1/4" X 4")

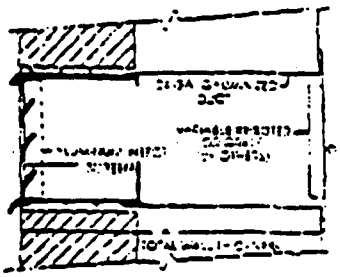
TYPE NO.	WIDTH	* HEIGHT (VENT DIM.)	** HEIGHT (OVERALL)	DEPTH
TYPE S-11	8	2 1/4	2 1/2	4
TYPE S-21	16 3/8	2 1/4	2 1/2	4
TYPE S-12	8	4 7/8	5 1/8	4
TYPE S-22	16 3/8	4 7/8	5 1/8	4
TYPE S-13	8	7 1/2	7 3/4	4
TYPE S-23	16 3/8	7 1/2	7 3/4	4

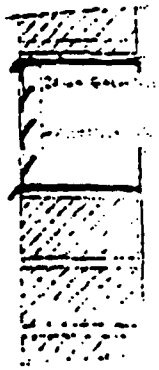
* Indicates actual brick displacement.
** Indicates overall dimension including mortar lugs.
Note: Metalines extruded aluminum brick vents can be made in 4"

24 Ga. galvanized steel ducts can be furnished for all sizes of brick vents. Duct
place at the factory. Specify total wall thickness (A), duct thickness (B), and the

STRAIGHT DUCTS

7 Ga





SUGGESTED SPECIFICATIONS

Furnish and install where indicated on architectural drawings extruded aluminum br
by Metalines 5551 N.W. 5th Street, Oklahoma City, Oklahoma, 73127. Furnish
clear anodized finish as standard (Medium Bronze Anodized Finish also available
mesh .028" dia. aluminum insect screen. Each vent shall be provided with prote
protect finish during installation.

Structural or 24 ga. galvanized steel extensions shall be furnished as detailed
furnished as detailed.

Standard Vents

metalines
P.O. Box 75699 • Oklahoma City, OK 73147
5551 N.W. 5th Street • Oklahoma City, OK 73127
405-946-9721 • 800-654-6778 • Fax: 405-943-6247

GE PowerMark Plus™ Load Centers

Interior Type

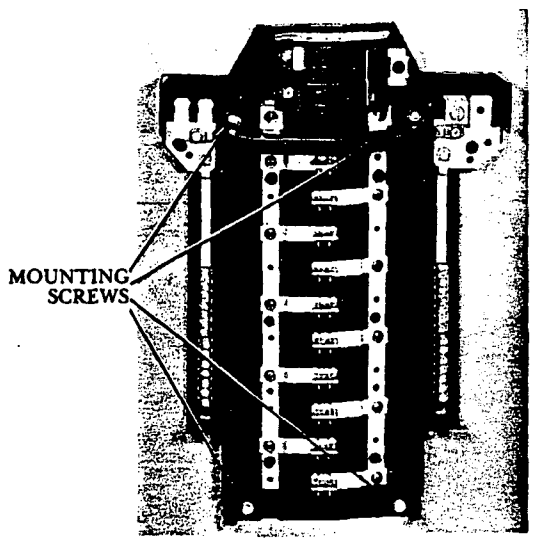
GENERAL

To comply with the National Electrical Code and Underwriters Laboratories, the load center must be installed in accordance with the information included on the label inside the door.

1. REMOVE FRONT.

Slip front and accessory package back into carton to protect finish.

2. REMOVE INTERIOR. (Optional)



Back out mounting screws and save for reuse.

3. MOUNT BOX.

For **Flush Mount** line up front box edge with finish wall surface and screw or nail to stud through small KO's in box side. For **Surface Mount** screw or nail through keyhole slots in back of box.

4. REMOVE KO'S FOR ALL MAIN AND BRANCH CIRCUITS.

First knock center KO inward. Outer rings should be alternately pried up or driven in one at a time.

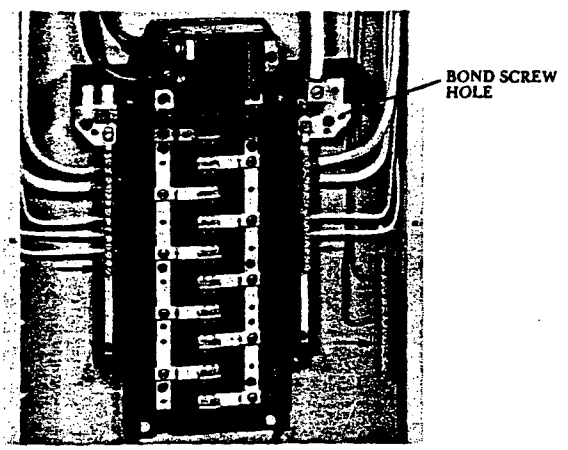
5. PULL INCOMING SERVICE AND BRANCH CIRCUIT WIRING INTO BOX.

6. REPLACE INTERIOR.

Drive mounting screws from Step 2.

7. WIRE MAIN, NEUTRAL AND EQUIPMENT GROUND.

Refer to rating label inside door for proper tightening torque.



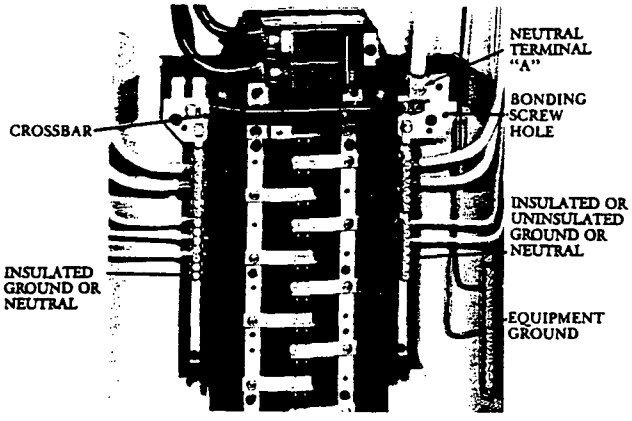
Wire neutral and equipment ground only in direction indicated by arrows. If required, ground and bond neutral to box using screw or straps provided. Straps must be placed in screw or large neutral holes.

8. OPTIONAL WIRING OF NEUTRAL AND GROUND

For panelboards rated 150 AMP or less the neutral crossbar may be removed to provide optional neutral and ground wiring as follows:

Right Side – Insulated neutral or ground without bonding screw. Uninsulated neutral or ground with bonding screw secured.

Left Side – Insulated neutral or ground only. No bonding provision provided. Neutral terminal "A" may be moved to left side or see rating label wiring diagram for additional terminal kit.

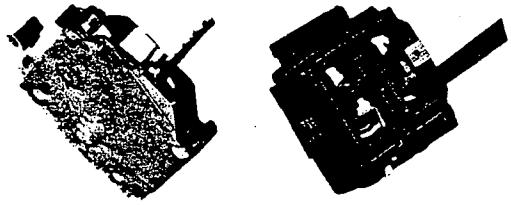


9. WIRE BRANCH CIRCUITS.

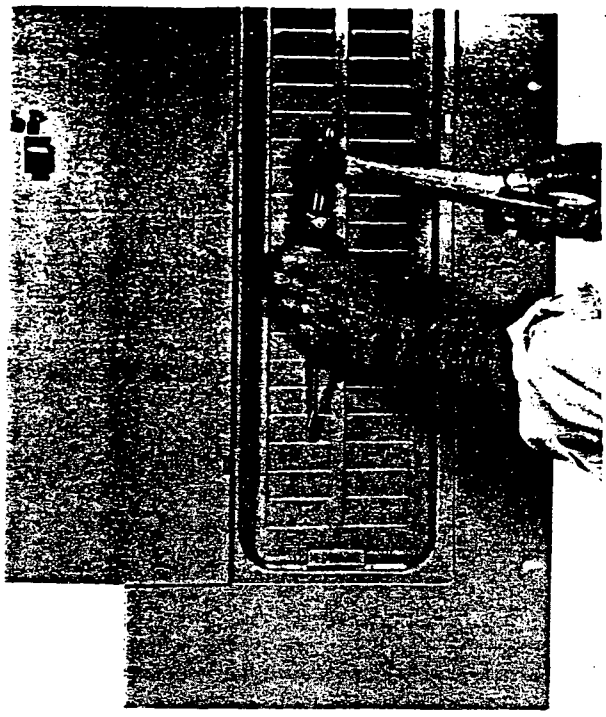
Individually wire each branch circuit into a circuit breaker, then plug into interior.

Refer to label on circuit breaker for proper tightening torque.

Use General Electric circuit breakers only.



10. REMOVE COVER KO'S.



Place screwdriver as shown and tap with hammer.

11. IMPORTANT!

Re-tighten **all** electrical connections before energizing.

12. SCREW FRONT ON BOX.

Adjustment for flush mount will be automatic when cover is installed.

13. IDENTIFY CIRCUITS.

For user's convenience.

NOTE: Accessories and replacement parts are listed on the label inside the load center door.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the GE Company.

GE Electrical Distribution & Control

General Electric Company
41 Woodford Ave., Plainville, CT 06062

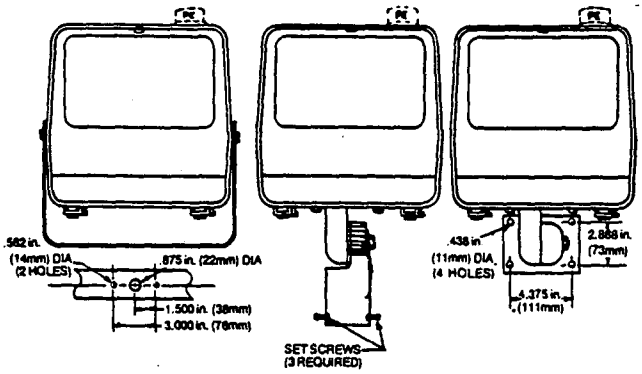
GEH-5021B 7/89

GE Lighting Systems

INSTRUCTIONS
PF-154 Powerflood® Floodlight

General Electric Company
Hendersonville, NC 28739

READ THOROUGHLY BEFORE INSTALLING



TRUNNION MOUNTED PIPE MOUNTED WALL MOUNTED

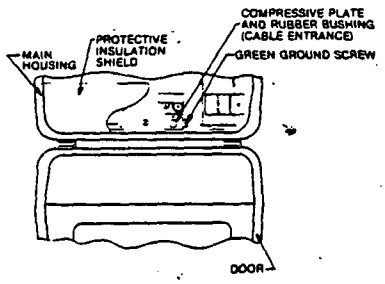


FIGURE 1

WARNING: DANGEROUS VOLTAGES EXIST WITHIN THESE UNITS AND ALL PRECAUTIONS USUALLY OBSERVED IN HANDLING HIGH VOLTAGE EQUIPMENT SHOULD BE OBSERVED. MAKE CERTAIN POWER IS OFF BEFORE STARTING INSTALLATION PROCEDURE OR BEFORE SERVICING.

GENERAL

This luminaire is designed for outdoor lighting applications, and should not be used in areas of limited ventilation, or in high ambient temperature enclosures. Best results will be obtained if installed and maintained according to the following recommendations.

UNPACKING

This luminaire has been properly packed so that no parts should have been damaged during transit. Inspect to confirm.

NOTICE: The unit may be mounted to point from straight up to straight down but in no case may the ballast be located above the optical.

MOUNTING

This floodlight is provided with either trunnion mounting, pipe mounting, or wall mounting.

TRUNNION MOUNTED UNITS—Mounted directly on a flat surface. Mounting adapters are available for installation on poles, crossarms, pipes, etc.

The trunnion bracket has a clearance hole for a $\frac{5}{8}$-inch bolt used for attachment to such mountings. The $\frac{7}{16}$-inch holes on either side permit additional anchoring, where required.

PIPE MOUNTED UNITS—The slipfitter can be mounted on $1\frac{7}{8}$-inch O.D. through $2\frac{3}{8}$-inch O.D. or $2\frac{7}{8}$-inch O.D. through 3-inch O.D. pipes.

Three set screws are used to clamp the floodlight securely to the pipe.

WALL MOUNTED UNITS—The wall mounting plate is provided with four (4) 0.438-inch clearance holes spaced 4.375(H) x 2.875(V) inches for mounting.

AIMING

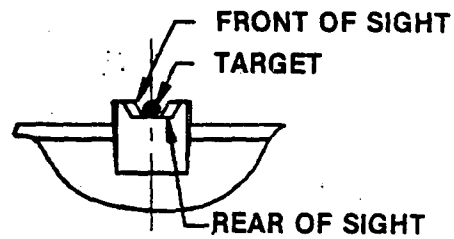


FIGURE 2

FIGURE 2

Located on top of the luminaire, above the door locking screw, is a "sight-track" optical sight for point aiming. Align the front and rear sights so that they have equal space showing on either side of the groove and the target centered in the groove.

On trunnion mounted floodlights tighten the two (2) trunnion bolts to 35 Ft. Lb. On pipe mounted or wall mounted floodlights tighten the vertical adjustment bolt to 35 Ft. Lb.

WIRING

WARNING: MAKE ALL ELECTRICAL CONNECTIONS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND ANY APPLICABLE LOCAL CODE REQUIREMENTS.

NOTE: Verify that the supply line voltage to be used is the same as that stamped on the nameplate.

TRUNNION MOUNTED UNITS—
NOTE: Cable strain relief and sealing are provided by the compression plate and rubber bushing supplied for $\frac{7}{16}$-inch O.D. cable. Three-conductor, AWG No. 14 cable is recommended. (Refer to Figure 1.)

1. **Open the glass door.**
   NOTE: Door may be removed by opening approximately 190°, lifting up slightly and sliding to the right.
2. **Remove protective insulation shield.**
   NOTE: On units provided with the "power tray" option, disconnect the two plugs on the top of tray. Loosen screws and remove tray.
3. **Insert cable** through compression plate and rubber bushing and secure by tightening screw.
4. **Make electrical connections.**
   NOTE 1: Connect ground lead to the green ground screw on the housing.
   NOTE 2: All of the single voltage ballasts are completely wired so that the user must connect only the supply conductors. On multivolt units additional connections will be needed.

BALLAST CONNECTIONS ON MULTIVOLT UNITS (120/208/240/277 volts):

5.a High Pressure Sodium Units—Connect the loose lead with the insulated terminal to the desired voltage terminal as indicated on the ballast terminal name plate.

5.b Mercury and Metal Halide Units—Select the proper wires from the connection diagram inside the unit. Remove only the crimped connectors (cutoff and strip) required for the supply voltage.

WARNING: WIRES NOT REQUIRED FOR DESIRED VOLTAGE SHOULD ALWAYS REMAIN WITH THE INSULATED CONNECTORS INTACT.

NOTE: Units provided with field re-connectable ballasts rated 120 x 240 volts are factory-connected for 120 volts. For 240 volt operation rewire per attached wiring tag.

6. **Reposition protective insulation shield.** (If power tray, connect both plugs on top of tray after securing the tray.)
7. **Close and secure door.**

PIPE AND WALL MOUNTED UNITS—Open wiring compartment cover located on the mounting bracket.

Make electrical connections and close wiring compartment cover.

NOTE: For multivolt units refer to "Ballast Connections on Multivolt Units".

LAMPS AND BALLASTS

This unit is designed for mercury, metal halide or high pressure sodium (HPS) lamps. Lamp type and wattage should be checked against that designated on the unit nameplate.

All ballasts except multivolt are completely wired so that the user must only connect the supply conductors. For units with multivolt, or field-reconnected for 120 x 240 volt ballasts, please refer to the WIRING section of these instructions.

All ballasts will reliably start lamps at temperatures down to −20°F for Mercury and Metal Halide and −40°F for HPS.

MAINTENANCE AND CLEANING

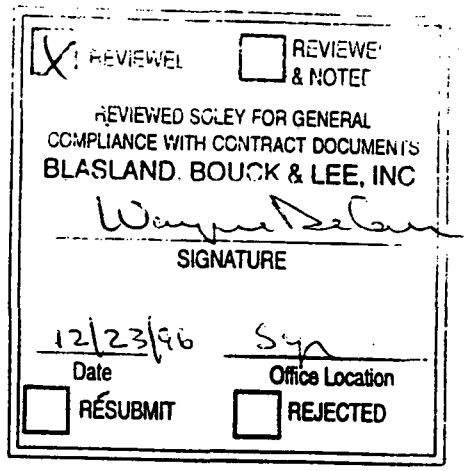
WARNING: MAKE CERTAIN POWER IS OFF BEFORE ATTEMPTING ANY MAINTENANCE.

Periodic cleaning on the outside of the door glass will ensure operation at maximum optical efficiency.

The glass and reflector (if needed) should be cleaned with non-abrasive soap, cleaner, or detergent solutions, rinsed with cold water and wiped dry.

NOTE: Door may be removed by opening approximately 190°, lifting up slightly and sliding to the right.

The light output is also dependent on the age of the lamp. In applications where the light level is critical, it may be desirable to replace lamps before they burn out. The lamp manufacturer can provide data showing how the lamp light output decreases with use.

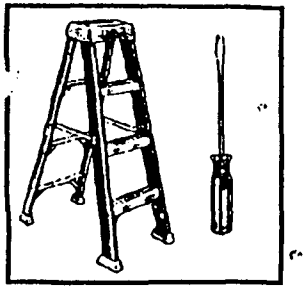


INTELECTRON®

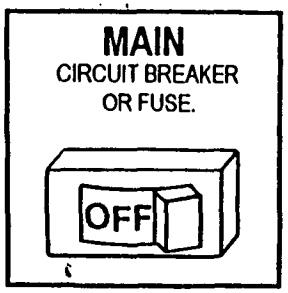
We Bring Security Home ®

INSTALLATION GUIDE:

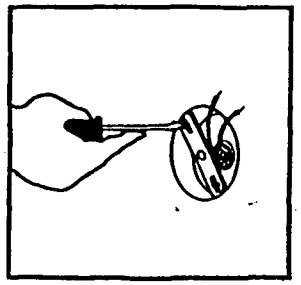
Thank you for purchasing an Intelectron motion detector. You now own the finest decorative motion detector product on the market. We work hard to ensure that you receive the quality and performance you expect in our products. Please feel free to call or write us should you have any questions or problems with your product.



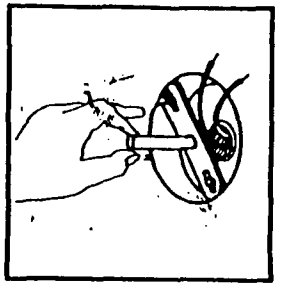
1) Tools you will need.



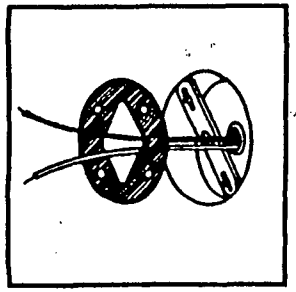
2) Make absolutely sure that all power to the circuit has been shut OFF. Do not use the wall switch as the only method of turning the power off. All power should cut off at main breaker.



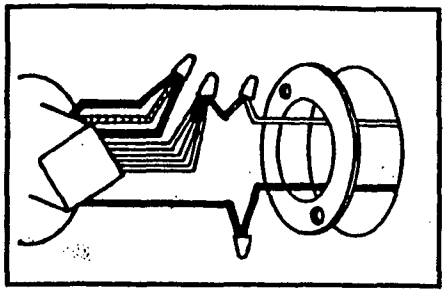
3) Attach the crossbar onto the junction box using the crossbar screws. Then attach the ground wire from the house to the crossbar, using the green ground screw.



4) Screw the mounting bolt into the center of the mounting bracket about 1/4 of an inch.

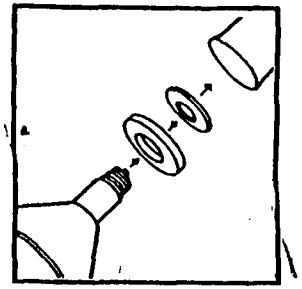


5) Extend the black and white wires from the junction box and feed them through the weatherproof gasket.



6) Using the wire nuts, connect the black wire from the house to the black wire from the Motion Detector. Connect the white wire from the house to the white wire from the motion detector. Make sure all connections are secure and that no bare wires are exposed.

7) Carefully pack all the wires into the junction box. Mount the motion detector over the junction box with the mounting bolt protruding through the center hole in the cover plate. Screw the decorative cap onto the mounting bolt until tight.



8) Place a fiber washer into each of the light sockets. Then place the rubber gaskets around each socket and a floodlight into each of the light sockets. DO NOT EXCEED THE 150 WATT MAXIMUM PAR BULB RATING PER SOCKET.
Your installation is now complete!

OVER

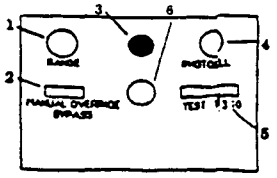
You should not use the wall switch as the only method of turning the power off. This is due to the fact that some switches may be switching the Neutral line, or are used in 3-way configurations.

Note: This unit will not operate correctly with a dimmer switch.

REVIEWED
REVIEWED & NOTED
REVIEWED SOLEY FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS
BLASLAND, BOUCK & LEE, INC.
SIGNATURE
1/3/97
Date
Syr
Office Location
RESUBMIT
REJECTED

77-901101011+17

BC9000/W/K/KW. 1094



1 - RANGE CONTROL
2 - MANUAL OVERRIDE BYPASS SWITCH
3 - PHOTOCELL COVER PLUG
4 - PHOTOCELL ADJUSTMENT
5 - TIME ADJUSTMENT SWITCH
6 - PHOTOCELL

Your motion detector has adjustments for time and range (sensitivity). These controls are located under your motion detector, and are illustrated above.

SET UP / CONTROL ADJUSTMENT

RANGE

This adjusts the sensitivity of your Motion Detector. Turn the knob clockwise for more sensitivity counterclockwise for less.

TEST 1/3/10

Test allows you to test the area of coverage during daylight hours.

To test the area:

1. Select the TEST position.
2. Walk across the area you wish to protect.
3. Stop and make sure there is not any motion in the area until the light turns off.
4. Wait 8 seconds, then move in the test area to trigger the motion detector, wait 8 seconds again before repeating the test in the next location.
5. Aim your motion detector as appropriate.

Once you have determined your range setting move the switch to the 1, 3, or 10 to set the length of time the light should remain ON after motion stops. When set in the 1, 3, or 10 position, the light will turn on only after dark.

The range control should be set at maximum sensitivity when you begin your test, and adjusted downward as necessary, to achieve desired coverage.

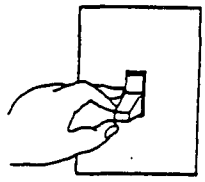
PHOTOCELL ADJUSTMENT

Sometimes the motion detector will be mounted in areas such as carport or sheds. The areas becomes darker sooner. You can use the photocell adjustment to have the motion detector come on earlier or later in the evening.

Adjust clockwise for earlier, (Lighter) operation, and counter clockwise for later, (Darker) operation.

FEATURES

MANUAL OVERRIDE



Your motion detector has a built-in manual override feature, which allows you to use your existing indoor light switch. To manually turn your lights on, simply turn your wall switch off for 4 seconds and then back on. The lamp will turn on and remain on until you turn it off. To resume automatic operation (motion detection) again, flip your wall switch off for 4 seconds and then back on. Your light will shut off and your motion detector will return to the automatic mode. (NOTE: to utilize this feature, the Manual Override Bypass switch must be in the OFF position.) You must wait 25 seconds before you try to manually override the motion detector again.

MANUAL OVERRIDE BYPASS SWITCH

Sudden power surges or outages, sometimes caused by storms or utility line work, can adversely affect operation of most security lighting systems causing lights to turn ON and stay ON. Intelectron's Manual Override Bypass protects against these false activations. Should your system be triggered by a power interruption, this feature prevents your light from staying ON. The system automatically resets itself and returns the system to normal operation, even when you're away or on vacation. Remember, when the Manual Override Bypass switch is in the ON position you cannot use the wall switch to manually activate your light.

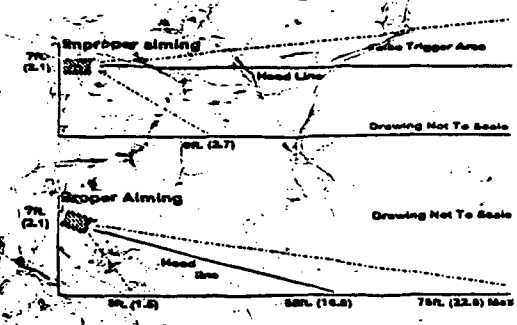
PHOTOCELL

The Photocell prevents energy wasting daytime operation. For 24 hour operation remove the rubber photocell plug from its storage area on the bottom of the unit and place it over the photocell.

AIMING

For the most reliable triggering, aim the motion detector head lower than the maximum distance you need. The motion detector can see above the hoodline. Begin by aiming your motion detector downward. Then slowly raise the unit as required for your range needs. If the unit is aimed too high, your area of coverage may decrease, as the 4th level of vision may cover an area over your head. Remember to keep the range setting at the maximum.

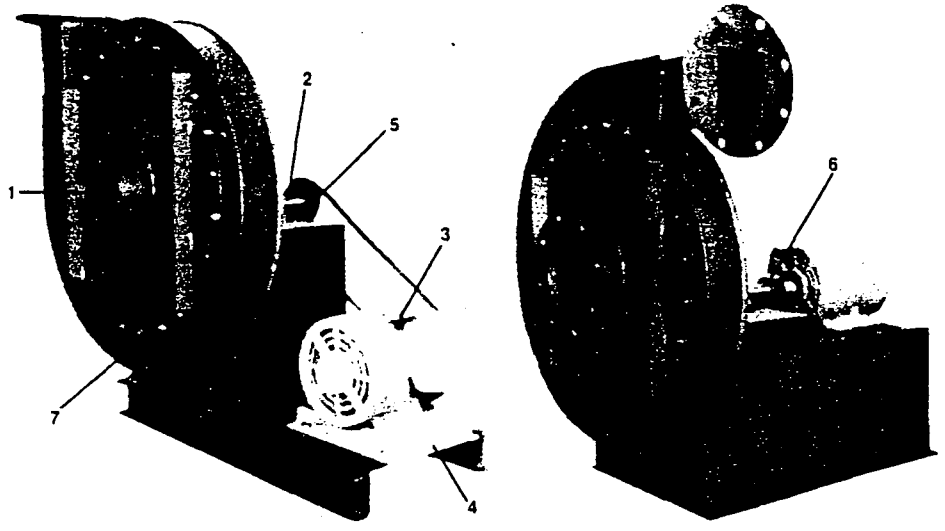
Your motion detector is most sensitive to motion across its field of view, not directly towards it.



INTELECTRON
21021 Corsair Blvd
Hayward, CA 94545

CHICAGO BLOWER CORPORATION

SAFETY — INSTALLATION — OPERATING AND MAINTENANCE INSTRUCTIONS DESIGN 53 PRESSURE BLOWERS



AVAILABLE PARTS

1. Wheel
2. Shaft and/or Bearings
3. Motor
4. Motor Slide Rails
5. V-Belt Drive
6. Coupling
7. Housing

ALSO:
Inlet Venturi

TO ORDER SPARE PARTS

Spare or repair parts may be ordered from your nearest "Chicago" Sales Office by giving the part name, (Wheel, Motor, Bearing, etc.) and the FAN SERIAL NUMBER taken from the nameplate or the SHOP ORDER drawings. If possible also give the bearing or shaft size. Due to the small number of parts required, spare parts lists are neither necessary nor available. Use these instructions instead.

SAFETY PRECAUTIONS:

The fan which you have purchased is a rotating piece of equipment and can become a source of danger to life or cause injury if not properly applied. The **maximum operating temperature or speed** for which this fan is designed **must not be exceeded.** These limits are given in our catalog, in the order write-up, or on Chicago Blower Corporation drawings.

Personnel who will operate this fan, or those who will perform maintenance thereon, **must be given this bulletin to read and warned of the potential hazards of this equipment.**

This pamphlet contains general recommendations, but specific requirements may apply to the individual installation. Such requirements are outlined in federal, state and local safety codes. Strict compliance with these codes, and strict adherence to these installation instructions **are the responsibility of the user.**

STORAGE:

If the fan is not to be installed promptly, store it in a dry place with the motor and wheel protected against moisture, dust, corrosion and physical damage. If the unit must be exposed to weather, contact the Motor manufacturer for special instructions. For extended long storage periods call Chicago Blower for instructions and the cost of Extended Warranty. Keep bearings fully greased.

RECEIVING:

Chicago Blower Corporation equipment is prepared for shipment in accordance with the Uniform Freight Classification. It is thoroughly inspected at the factory, has usually been run tested, and, barring damage in transit, should be in perfect condition.

When a carrier signs the Chicago Blower Corporation's bill of lading, the **carrier accepts the responsibility** for any subesequent shortages or damage evident or concealed, and **any claim must be made against the carrier by the purchaser.** Evident shortage or **damage should be noted on the carrier's delivery document** before signature of acceptance. Inspection by the carrier of damage evident or concealed must be requested. After inspection, issue a purchase order for necessary parts or arrange for return of the equipment to CBC factory for repair.

Chicago Blower Corporation fans are shipped completely assembled and skidded. These units may be handled and moved using good rigging techniques, being careful to avoid concentrated stresses that will distort any of the parts.

CHICAGO BLOWER CORPORATION 1675 GLEN ELLYN ROAD, GLENDALE HGTS., IL 60139 • Dial Area Code 708/858-2600
FAX 708/858-7172

INSTALLATION:

1. Good results **require a proper foundation.** Foundations should be level, rigid, and of sufficient mass for the equipment. Concrete is preferable. Its mass should equal four times the fan weight. Adequately brace steel platforms in all directions. The minimum natural frequency of any part must be at least 50% higher than the fan running speed.
2. Shim the fan support points before tightening foundation bolts. Do not distort or twist the equipment. Make sure that the fan is set level.
3. Make sure power is locked "OFF".
4. Check wheel-to-inlet clearance to make sure it has not shifted during shipment or handling. There should be approximately equal axial clearance all around. Rotate wheel by hand to check that it runs free.

   If the wheel is striking, correct it by loosening the hub set screws and reposition the wheel on the motor shaft, or loosen the motor mounting bolts and realign the wheel to inlet so it does not hit. Retighten all set screws and bolts and turn by hand again.
5. If the fan wheel is fastened with a taper-lock bushing and the wheel must be shifted, follow this procedure:

   a. Match mark the bushing and the hub so they can be reinstalled in exactly the same relative position and not unbalance the wheel.

   b. Remove all bolts from the bushing.

   c. Insert two bolts in the holes that are threaded in the bushing. (Note that one bolt is left over and not used in demounting).

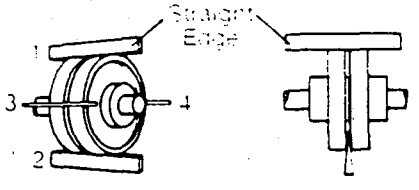
   d. Tighten bolts alternately until bushing is loosened in hub. If bushing does not loosen immediately, lightly tap hub while applying torque to the bolts.
6. To reinstall the taper-look bushing in the wheel hub, orient bushing to align the match marks and insert the three mounting bolts, through the unthreaded bushing holes, into the hub. Alternately tighten bolts. Hammer against the large end of the bushing using a brass block or sleeve to avoid damage, and again tighten the bolts. Repeat this procedure until bolts no longer turn.
7. Check the motor wiring and fusing in accordance with the National Electrical Code and local requirements. Follow wiring diagram on the motor nameplates.

FAN AND MOTOR BEARINGS:

1. Lubricate fan bearings per instructions packed with the fan. Use Texaco Molytex #2 E.P. or equivalent. Lubricate the bearings immediately on receipt.
2. Bearings must be properly locked to the shaft. Check before operation. Make sure bearing locking collar is in position and set screws tight. See bearing instructions.
3. Check motor bearing lubrication. They were lubricated at the factory, but recheck and, if required, use a good grade motor lubricant such as Chevron SRI-2 or Unirex N2.

FANS WITH COUPLINGS:

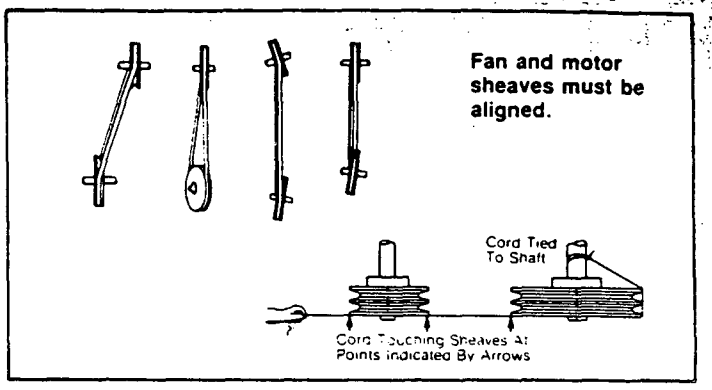
On any completely assembled fan, where CBC has mounted the motor and coupling, it is required that the alignment be rechecked after the fan is set on its permanent foundation. It is not possible to hold alignment during shipment or when set on a different foundation. Alignment must be redone, if necessary, and the coupling lubricated. A tag is on the coupling.



Check at four positions 90° apart as shown.

FANS WITH V-BELT DRIVES

When included in shipment, alignment must be checked after shipment and installation.



OPERATION OF FAN:

After installing the fan per these instructions and those of the manufacturers of components, **make final safety checks** to prevent injury to personnel or damage to the equipment.

1. Make sure the wheel, inside of the fan housing, and any ductwork, is clean and free of debris.
2. Start the fan to check proper rotation. It is clockwise or counterclockwise as seen from the drive side of the fan. If the wheel turns in the wrong direction, reverse motor rotation per the motor instructions—usually by interchanging any two leads on a three phase motor.
3. Start fan and allow unit to reach full speed, then shut down. During this short period, check for vibration, any unusual noise, or overheating of the motor. Check the motor amps drawn against the nameplate rating. A plate over the fan inlet will limit the horsepower drawn during a test run with limited ductwork.
4. After the trial run lock the power "OFF".
5. Recheck for tightness of hold-down bolts, all set screws and keys, and retighten if necessary. Recheck again after 8 and 24 hours of actual operation.
6. The run-in period should be at least 8 hours. Check the motor bearings and motor heating a minimum of once each hour. Do not overgrease motor bearings. Relubricate per motor manufacturer's instructions.
7. Take vibration readings at the bearings, or the motor if the fan wheel is mounted directly on the motor shaft, and adhere to these limits.

	Vibration in Mils (Peak to Peak)		
Maximum or Design RPM	Normal	Alarm	Shut-Down
1800	2.3	3.5	8.0
3600	1.2	1.75	4.0

MAINTENANCE:

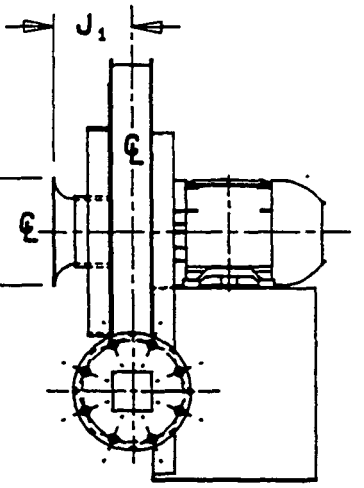
Should excessive vibration or motor temperature later develop, check the following possibilities: (1) Buildup of dirt or foreign material on wheel; (2) Bolts on motor or fan housing or foundation loose; (3) The wheel eroding or corroding; (4) Wheel set screws loose; (5) Vibration coming from source other than fan; (6) Foundation settled; (7) Clearance between wheel and inlet has changed and wheel is hitting.

If the fan is to remain idle for an extended period, protect motor and exposed surfaces. Follow the motor manufacturer's recommendations for storage and rotate the shaft by hand several revolutions each month.

WARRANTY:

The warranty on the Chicago Blower fan is our standard warranty. The warranty on the motor is that extended by the motor manufacturer.

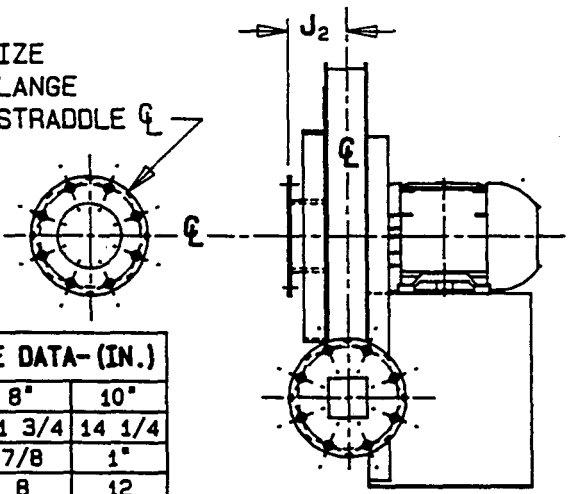
REVIEWED
REVIEWED & NOTED
REVIEWED SOLEY FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS
BLASLAND, BOUCK & LEE, INC.
SIGNATURE
11/15/96
Date
Office Location
RESUBMIT
REJECTED



VENTURI INLET

DIMENSIONS-INCHES		
FAN MODEL	G_1	J_1
A	10	6 3/4
B, C	12	7 7/8
D, E	10	7 1/4
F, G	12	7 7/8
H	12	8 1/8
I	12	8 3/8
J, K	12	8 1/8
L, M	14	8 3/8

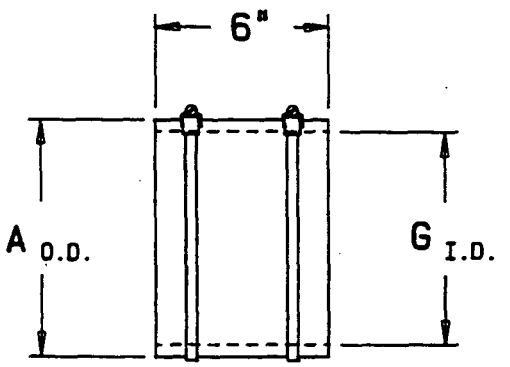
"Y_1" SIZE
125# FLANGE
HOLES STRADDLE ℄



ANSI STD. 125# FLANGE DATA-(IN.)			
PIPE SIZE	6"	8"	10"
B.C. DIA.	9 1/2	11 3/4	14 1/4
HOLE DIA.	7/8	7/8	1"
NO. OF HOLES	8	8	12
PIPE O.D.	6 5/8	8 5/8	10 3/4
FLANGE O.D.	11	13 1/2	16

FLANGED INLET

DIMENSIONS-INCHES		
FAN MODEL	J_2	Y_1
A	5 1/2	6
B, C	6 3/4	8
D, E	5 1/2	6
F, G	6 3/4	8
H	6 1/8	8
I	7 1/4	8
J, K	6 1/8	8
L, M	7 1/4	10



INLET RUBBER SLEEVE

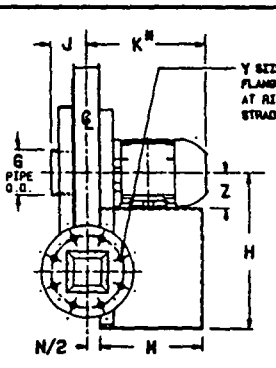
DIMENSIONS-INCHES		
FAN MODEL	A	G
A, D, E	7 1/8	6 5/8
B, C, F, G H, I, J, K	9 1/8	8 5/8
L, M	11 1/4	10 3/4

CHICAGO BLOWER CORPORATION
1675 GLEN ELLYN ROAD, GLENDALE HEIGHTS, IL. 60139

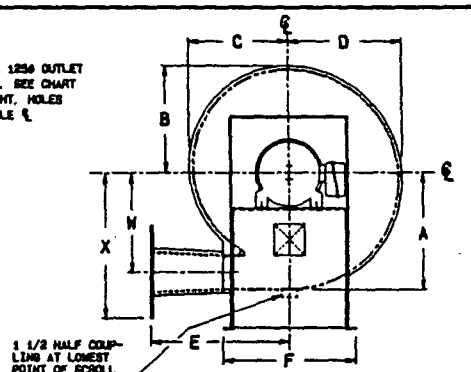
TITLE

DESIGN 53 PRESSURE BLOWER INLET ACCESSORIES

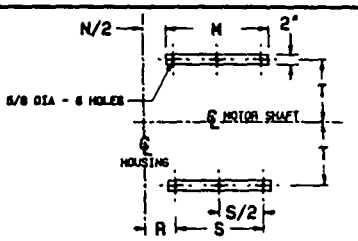
DIMENSION TOLERANCE ±1/8 UNLESS OTHERWISE NOTED. DO NOT USE FOR GENERAL CONSTRUCTION UNLESS CERTIFIED BY C.B.C. ENGR. DEPT. 53-0-5A



FRONT ELEVATION



SIDE ELEVATION - DRIVE SIDE



FOUNDATION PLAN

ANSI STD. 125# OUTLET FLANGE DATA				
PIPE SIZE "Y"	4"	6"	8"	10"
B.C. DIA.	7 1/2	9 1/2	11 3/4	14 1/4
HOLE DIA.	3/4	7/8	7/8	1"
NO. OF HOLES	8	8	8	12
PIPE O.D.	4 1/2	6 5/8	8 5/8	10 3/4
FLANGE O.D.	9	11	13 1/2	16

FAN MODEL	MOTOR FRAME	DIMENSIONS (INCHES) A	B	C	D	E	F	G	H	J	K*	M	N/2	R	S	T	W	X	Y	Z
A	143T, 145T	14 7/8	13 1/4	12 7/16	14 1/16	18 1/4	19 1/2	6 5/8	17 3/4	5 1/4	13 3/8	11 1/2	1 15/16	3 3/8	8 5/8	8 7/8	11 3/4	16 1/4	4	3 5/8
	182T, 184T								19		14 5/8	17			14 1/8					4 5/8
B	143T, 145T							8 5/8	17 3/4	6 3/8	14 5/8	11 1/2	3 1/8	4 9/16	8 5/8			17 1/4	6	3 5/8
	182T, 184T								19		15 7/8									4 5/8
	213T, 215T								19 3/4		19									5 3/8
C	182T, 184T								19		15 7/8							18 1/2	8	4 5/8
	213T, 215T								19 3/4		19									5 3/8
	254T								20 3/4		22 1/8									6 3/8
D →	143T, 145T	18	16	15	17	17 3/4	23 1/2	6 5/8	23	5 1/4	13 3/8	17	1 15/16	3 3/8	14 1/8	10 7/8	14 7/8	19 3/8	4	3 5/8
	182T, 184T								24		14 5/8									4 5/8
	213T, 215T								24 3/4		16 3/8									5 3/8
E	143T, 145T								23		13 3/8							20 3/8	6	3 5/8
	182T, 184T								24		14 5/8									4 5/8
	213T, 215T								24 3/4		17 7/8									5 3/8
	254T								26		20 7/8	22 1/4		3 5/16	19 1/2					6 3/8
F	182T, 184T								24		15 7/8	17		4 9/16	14 1/8			21 5/8	8	4 5/8
	213T, 215T								24 3/4		19									5 3/8
	254T, 256T								26		23 7/8	22 1/4		4 1/2	19 1/2					6 3/8
	284TS							8 5/8	26 3/4	6 3/8	24 1/2		3 1/8							7 1/8
G	182T, 184T								24		15 7/8	17		4 9/16	14 1/8			22 7/8	10	4 5/8
	213T, 215T					21 3/4			24 3/4		19									5 3/8
	254T, 256T								26		23 7/8	22 1/4		4 1/2	19 1/2					6 3/8
	284TS, 286TS								26 3/4		26									7 1/8

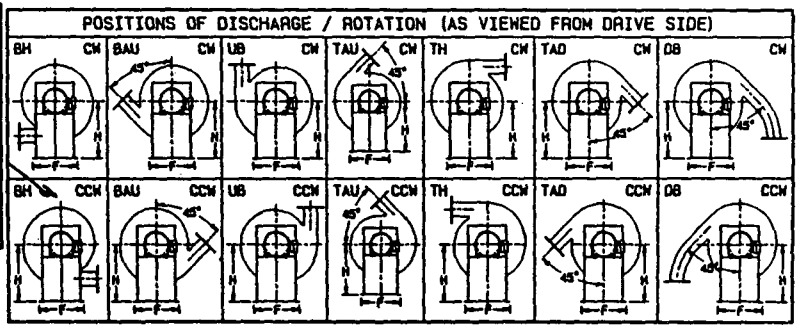
* "K" IS LARGER OF TEFC MOTOR FRAMES SHOWN ON A LINE IN THE TABLE.

ITEM NO.	IDENTIFICATION	NO. REQ'D	FAN MODEL	DISCH & ROT ●	PERFORMANCE CFM	OV FT/MIN	SP IN. W.G.	RPM	BHP BOPER DENS.	BHP @ .075 LB/FT³	TEMP. DEG. F.	OPER. DENS. LB/FT³	ALT. FT.	OPTIONAL ACCESSORIES
1	SN213600	1	D-2	CCW BH	300		31.08	3500		2.72	70F	.075	SL	3,13A

ITEM NO.	MOTOR HP	RPM	CURRENT	FRAME	TYPE
	☒ FURNISHED BY CBC ☐ FURNISHED BY OTHERS				
1	5	3600	3/60/230/460v	184T	TEFC
			(Std. Eff.)		

● DISCHARGE/ROTATION SHOWN AT RIGHT.

POSITIONS OF DISCHARGE / ROTATION (AS VIEWED FROM DRIVE SIDE)



OPTIONAL ACCESSORIES

1. VENTURI INLET: SEE DWG. 53-0-5.
2. FLANGED INLET: SEE DWG. 53-0-5.
3. RUBBER INLET SLEEVE: SEE DWG. 53-0-5.
4. SLIP TUBE OUTLET: SEE DWG. 53-0-6.
5. 45° DISCHARGE ELBOW. REQUIRED FOR ALL MODELS EXCEPT "H" AND "J". WHEN DB DISCHARGE IS REQUIRED. SEE DWG. 53-0-6.
6. RUBBER OUTLET SLEEVE: SEE DWG 53-0-6.
7. CORK PADS: 1" x 2" x "M" DIM.
8. INTAKE FILTER SEE DWG. 53-0-7.
9. INLET BLAST GATE: SEE DWG. 53-0-8.
10. OUTLET BLAST GATE: SEE DWG. 53-0-8.
11. DRAIN.
12. INLET SCREEN.
13. OUTLET VOLUME DAMPER: SEE DWG. 53-0-40.
    A. MANUAL OPERATION.
    B. AUTOMATIC WITH LINKAGE.
    C. PNEUMATIC.
    D. ELECTRIC.

CUSTOMER BB&L Environmental Systems Inc.

Syracuse, NY PO# 13214-0066

JOB NAME Liverpool, NY

LOCATION

ARCHITECT/ENGINEER

NOTES

REFER TO ORDER ACKNOWLEDGMENT FOR SHIPPING DETAILS.

THIS DRAWING IS: ☒ REVIEWED ☐ REVIEWED & NOTED

PO#100.69 DESCRIPTION: Powerex Sparging Blower

REVIEWED SOLEY FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS

BLASLAND, BOUCK & LEE, INC

SIGNATURE

11/15/96 Date

Syr Office Location

☐ RESUBMIT ☐ REJECTED

REV. LTR.	DESCRIPTION	DATE

DESIGN 53 PRESSURE BLOWERS
ARRANGEMENT 4, FIXED HOUSING, MODELS A THROUGH G

CHICAGO BLOWER CORPORATION

1675 GLEN ELLYN ROAD, GLENDALE HEIGHTS, IL. 60139

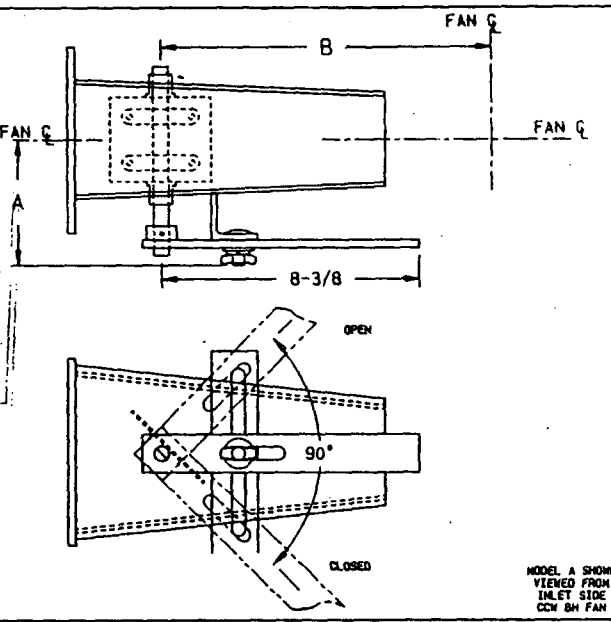
FURNISHED FOR SALES PURPOSES - DIMENSIONS NOT CERTIFIED BY CBC	DATE	SUBMITTED BY	SALES OFFICE
DRAWING CERTIFIED BY CBC - FURNISHED FOR APPROVAL - NOT RELEASED FOR PRODUCTION	DATE	CBC ENGINEER	SO# 213600
DRAWING CERTIFIED BY CBC - APPROVAL NOT REQUIRED - RELEASED FOR PRODUCTION	DATE 11/4/96	CBC ENGINEER HS	DWG. # 213600-1

MANUAL OPERATION

FAN MODEL	A	B
A	4-9/32	15-1/4
B	5-3/16	15-5/8
C	5-5/8	15-5/32
D	4-9/32	15-7/16
E	4-9/16	14-1/2
F	5-5/8	14-21/32
G	5-13/16	15-11/16
H	5	15
I	6-7/32	15-11/16
J	5	16-1/4
K	5-3/16	14-5/16
L	6-7/32	16-5/16
M	6-3/8	16-5/16

NOTES:
1. HANDLE ASSEMBLY IS LOCATED ON THE INLET SIDE OF THE FAN. (AS STANDARD)
2. OPERATING HANDLE TRAVEL IS 90° FROM OPEN TO CLOSED POSITION. THE ENDS OF THE SHAFT ARE MARKED TO INDICATE LOCATION OF THE BLADE INSIDE.

[X] REVIEWED [ ] REVIEWED & NOTED
REVIEWED SOLEY FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS
BLASLAND, BOUCK & LEE, INC.
SIGNATURE
Date
Office Location
[ ] RESUBMIT [ ] REJECTED

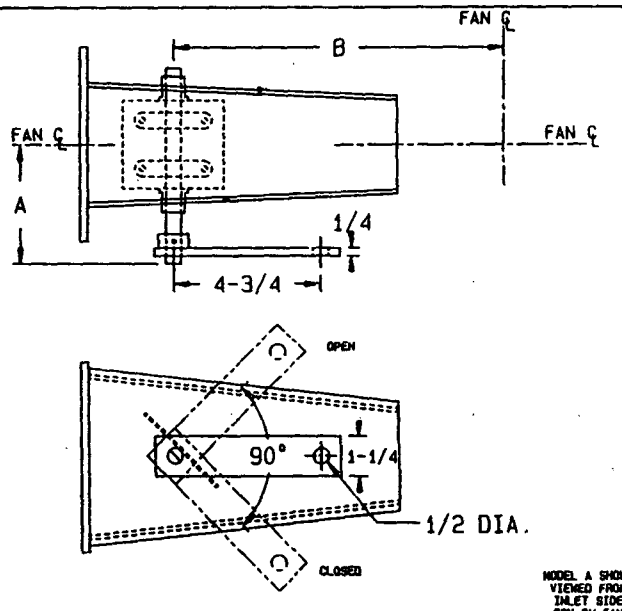


MODEL A SHOWN VIEWED FROM INLET SIDE CCW SH FAN

AUTOMATIC OPERATION
(FOR ACTUATOR W/LINKAGE)

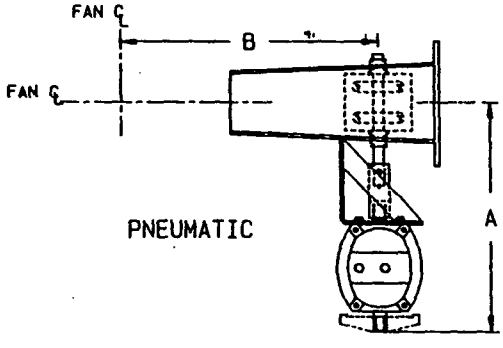
FAN MODEL	A	B
A	3-23/32	15-1/4
B	4-5/8	15-5/8
C	5-1/16	15-5/32
D	3-23/32	15-7/16
E	4	14-1/2
F	5-1/16	14-21/32
G	5-1/4	15-11/16
H	4-7/16	15
I	5-21/32	15-11/16
J	4-7/16	16-1/4
K	4-5/8	14-5/16
L	5-21/32	16-5/16
M	5-13/16	16-5/16

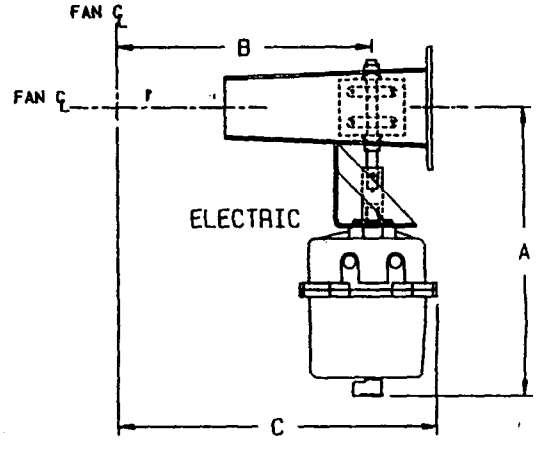
NOTES:
1. HANDLE ASSEMBLY IS LOCATED ON THE INLET SIDE OF THE FAN. (AS STANDARD)
2. OPERATING HANDLE TRAVEL IS 90° FROM OPEN TO CLOSED POSITION. THE ENDS OF THE SHAFT ARE MARKED TO INDICATE LOCATION OF THE BLADE INSIDE.



MODEL A SHOWN VIEWED FROM INLET SIDE CCW SH FAN

AUTOMATIC OPERATION
(WITH CBC SUPPLIED DIRECT CONNECTED ACTUATORS)





MODEL A SHOWN TOP VIEW OF INLET SIDE CCW SH FAN

PNEUMATIC ACTUATOR		
FAN MODEL	A	B
A	9-11/16	15-1/4
B	10-3/4	15-5/8
C	11-3/16	15-5/32
D	9-11/16	15-7/16
E	10-3/16	14-1/2
F	11-3/16	14-21/32
G	11-1/2	15-11/16
H	10-1/2	15
I	11-13/16	15-11/16
J	10-1/2	16-1/4
K	10-3/4	14-5/16
L	11-13/16	16-5/16
M	12-1/16	16-5/16

ELECTRIC ACTUATOR			
FAN MODEL	A	B	C
A	14-1/16	15-1/4	18-7/8
B	15-1/8	15-5/8	19-1/4
C	15-9/16	15-5/32	18-13/16
D	14-1/16	15-7/16	19-1/16
E	14-9/16	14-1/2	18-1/8
F	15-9/16	14-21/32	18-9/32
G	15-7/8	15-11/16	19-5/16
H	14-7/8	15	18-5/8
I	16-3/16	15-11/16	19-5/16
J	14-7/8	16-1/4	19-7/8
K	15-1/8	14-5/16	17-15/16
L	16-3/16	16-5/16	19-15/16
M	16-7/16	16-5/16	19-15/16

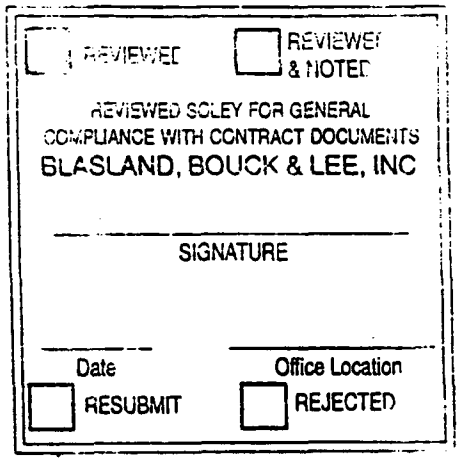
OUTLET VOLUME CONTROL (OVC)
DESIGN 53 PRESSURE BLOWER

CHICAGO BLOWER CORPORATION

SIEMENS

Installation • Operation • Maintenance

Instructions



Induction Motors
143-449 Frame

TABLE OF CONTENTS

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens Sales Office.

The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

SIEMENS

INDUSTRIAL MOTOR DIVISION

INTRODUCTION

THIS EQUIPMENT CONTAINS HAZARDOUS VOLTAGES, ROTATING PARTS AND HOT SURFACES. SEVERE PERSONAL INJURY OR PROPERTY DAMAGE CAN RESULT IF SAFETY INSTRUCTIONS ARE NOT FOLLOWED. ONLY QUALIFIED PERSONNEL SHOULD WORK ON OR AROUND THIS EQUIPMENT AFTER BECOMING THOROUGHLY FAMILIAR WITH ALL WARNINGS, SAFETY NOTICES, AND MAINTENANCE PROCEDURES CONTAINED HEREIN. THE SUCCESSFUL AND SAFE OPERATION OF THIS EQUIPMENT IS DEPENDENT UPON PROPER HANDLING, INSTALLATION, OPERATION AND MAINTENANCE.

QUALIFIED PERSON

For the purpose of this manual and product labels, a qualified person is one who is familiar with the installation, construction and operation of the equipment, and the hazards involved. In addition, he has the following qualifications:

a) Is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.

b) Is trained in the proper care and a use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.

c) Is trained in rendering first aid.

DANGER

For the purpose of this manual and product labels, **DANGER** indicates death, severe personal injury or substantial property damage will result if proper precautions are not taken.

WARNING

For the purpose of this manual and product labels, **WARNING** indicates death, severe personal injury or substantial property damage can result if proper precautions are not taken.

CAUTION

For the purpose of this manual and product labels, **CAUTION** indicates minor personal injury or property damage can result if proper precautions are not taken.

INSPECTION

Care is taken at the factory to assure that the motor arrives at its destination in first class condition. If there is evidence of rough handling or damage in shipping, file a claim at once with the carrier and notify your Siemens Sales Office.

Examine the outside of the motor carefully for damage, with particular attention to conduit box, fans, and covers. Inspect and tighten all hardware and accessories which may have become loosened during shipping and handling. Turn the shaft by hand to be sure that it rotates freely. If the motor has been mishandled sufficiently to break external parts, the end shield should also be removed to check for internal damage unless the motor is explosion-proof. See warning below on explosion proof motors.

WARNING

Explosion-proof motors—these motors are constructed to comply with the U.L. Label Service Procedure Manual. When repairing and reassembling a motor that has an underwriter's label, it is imperative that the unit be reinspected and:

1. All original fits and tolerance be maintained.
2. All plugs and hardware be securely fastened.
3. Any parts replacements, including hardware, be accurate duplicates of the originals.

Repair work on explosion-proof motors can only be done by the original manufacturing or U.L. certified shops. Violations of any of the above items will invalidate the significance of the U.L. Label.

STORAGE

Motors must be stored in a clean, dry, well ventilated location free from vibration and rapid or wide temperature variations. If the unit is to be stored longer than three months, consult factory. Ball bearing motors are shipped from the factory properly lubricated and ready to operate. When in storage, the motor shaft must be turned several rotations every month and the bearing relubricated every year. On non-explosion-proof TEFC motors, a removable plug in the bottom of the frame or housing permits removal of accumulated moisture. Drain regularly if storage atmosphere results in formation of condensation.

INSTALLATION

Installation must be handled by qualified service or maintenance personnel. The motor foundation must rigidly support all four feet in the same plane. Place shims under the motor feet, as required, so they will not be pulled out of plane when mounting bolts are tightened. All wiring to the motor and control must be in accordance with the National Electrical Code and all local regulations. Before drive is connected, momentarily energize motor to check that direction of rotation is proper. For direct drive, accurate alignment is 0.004 inch/ft. (radius to dial indicator = one foot.)

Any change in shims requires rechecking alignment. When alignment is within limits, dowel two feet of each unit. When installing flat belt pulley, V-belt sheave, spur or helical pinion or chain drives, be certain that they are within NEMA limitations. Refer to NEMA motor and general standards, MG-1 14.07 and 14.42.

OPERATION

Repeated trial starts can overheat the motor and may result in motor burnout (particularly for across the line starting). If repeated trial starts are made, allow sufficient time between trials to permit heat to dissipate from windings and rotor to prevent overheating. Starting currents are several times running currents, and heating varies as the square of the current.

After installation is completed, but before motor is put in regular service, make an initial start as follows:

1. Check motor starting and control device connections against wiring diagrams.

2. Check voltage, phase, and frequency of line circuit (power supply) against motor nameplate.

3. If possible, remove external load (disconnect drive) and turn shaft by hand to ensure free rotation. This may have been done during installation procedure; if so, and conditions have not changed since, this check may not be necessary.

   a. If drive is disconnected, run motor at no load long enough to be certain that no unusual conditions develop. Listen and feel for excessive noise, vibration, clicking, or pounding. If present, stop motor immediately. Investigate the cause and correct before putting motor in service.

   b. If drive is not disconnected, interrupt the starting cycle after motor has accelerated to low speed. Carefully observe for unusual conditions as motor coasts to a stop.

4. When checks are satisfactory, operate at minimum load and look for unusual condition. Increase load slowly to maximum. Check unit for satisfactory operation.

CAUTION

Guard against overloading. Overloading causes overheating and overheating means shortened insulation life. A motor subjected to a 10°C temperature rise above the maximum limit for the insulation may cause the insulation life to be reduced by 50%. To avoid overloading, be sure motor current does not exceed nameplate current when nameplate voltage is applied.

Electric motors operating under normal conditions become quite warm. Although some places may feel hot to the touch, the unit may be operational within limits. Use a thermocouple to measure winding temperature when there is any concern.

The total temperature, not the temperature rise, is the measure of safe operation. Investigate the operating conditions if the total temperature measured by a thermocouple placed on the winding exceeds:

230°F (110°C) for class "B" insulation

275°F (135°C) for class "F" insulation

302°F (150°C) for class "H" insulation

VOLTAGE REGULATION

Motors will operate successfully under the following conditions of voltage and frequency variation, but not necessarily in accordance with the standards established for operation under rated conditions:

a. When the variation in voltage does not exceed 10% above or below normal, with all phases balanced.

b. When the variation in frequency does not exceed 5% above or below normal.

c. When the sum of the voltage and frequency does not exceed 10% above or below normal (provided the frequency variation does not exceed 5%).

MAINTENANCE

Failure to properly maintain the equipment can result in severe personal injury and product failure. The instructions contained herein should be carefully reviewed, understood and followed. The following maintenance procedures should be performed regularly:

1. Bearing lubrication

2. Insulation resistance check

3. Cleaning

This checklist does not represent an exhaustive survey of maintenance steps necessary to ensure safe operation of the equipment. Particular applications may require further procedures. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens Sales Office.

Dangerous voltages are present in the equipment which can cause severe personal injury and product failure. Always de-energize and ground the equipment before maintenance. Maintenance should be performed only by qualified personnel.

The use of unauthorized parts in the repair of the equipment, tampering by unqualified personnel, or removal or alteration of guards or conduit covers will result in dangerous conditions which can cause severe personal injury or equipment damage. Follow all safety instructions contained herein.

BEARING LUBRICATION

CAUTION

Do not lubricate motor while in operation, since excess grease will be forced through the bearings and into the motor before it will force its way out of the drain plug. Excess grease accumulation on windings reduces insulation life.

Bearing life is assured by maintaining proper alignment, proper belt or chain tension, and good lubrication at all times.

Prior to shipment, motor bearings are lubricated with the proper amount and grade to provide six months of satisfactory service under normal operation and conditions.

For best results, grease should be compounded from a polyurea base and a good grade of petroleum oil. It should be of No. 2 consistency and stabilized against oxidation. Operating temperature range should be from −15°F to + 250°F for class B insulation, and to +300°F for class F and H. Most leading oil companies have special bearing greases that are satisfactory.

Relubricate bearings every six months (more often if conditions require), as follows:

1. Stop the motor. Lock out the switch.
2. Thoroughly clean off pipe plugs and remove from housings.
3. Remove hardened grease from drains with stiff wire or rod.
4. Add grease to inlet with hand gun until small amount of new grease is forced out of drain.
5. Remove excess grease from ports, replace inlet plugs, and run motor ½ hour before replacing drain plug.
6. Put motor back in operation.

INSULATION RESISTANCE

Check insulation resistance periodically. Any approved method of measuring insulation resistance may be used, provided the voltage across the insulation is at a safe value for the type and condition of the insulation. A hand cranked megger of not over 500 volts is the most convenient and safest method. Standards of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) recommend that the insulation resistance of stator windings at 75°C, measured at 500 volts DC, after one minute should not be less than:

$$\frac{\text{Rated Voltage of Machine} + 1000}{1000} = \text{Insulation Resistance In Megohms}$$

This formula is satisfactory for most checks. For more information, see IEEE Standard No. 43, "Recommended Practice for Insulation Resistance Testing of AC Rotating Machinery".

Siemens Energy
& Automation, Inc.
Motors and Drives Division
14000 Dineen Drive
Little Rock, Arkansas 72206

CLEANING

WARNING

Do not attempt to clean motor while it is operating. Contact with rotating parts can cause severe personal injury or property damage. Stop the motor and lock out switch before cleaning.

The motor exterior must be kept free of oil, dust, dirt, water, and chemicals. For fan cooled motors, it is particularly important to keep the air intake openings free of foreign material. Do not block air outlet or inlet.

On non-explosion-proof TEFC motors, a removable plug in the bottom center of the motor frame or housing permits removal of accumulated moisture. Drain regularly.

VERTICAL MOTOR THRUST BEARINGS

Top bearings — high external thrust from the driven unit is usually carried by the top bearing or bearings. If replacement is necessary, the new bearing must be the same size and type as the original. Duplex bearings must also be the same type and mounted in an identical manner. When angular contact type bearings are replaced, the new bearing must have the same thrust capacity.

Bottom bearings — grease lubricated lower bearings are adequately lubricated at the factory for at least three months operation. The relubrication procedure is the same as outlined above under "Bearing Lubrication". It is important to maintain the lower cavity full of grease at all times.

The correct replacement bearings are given on the nameplate by AFBMA (Anti-Friction Bearing Manufacturers Association) number.

SERVICE

For immediate action on your motor problems call your certified service center or contact your nearest Siemens District Office.

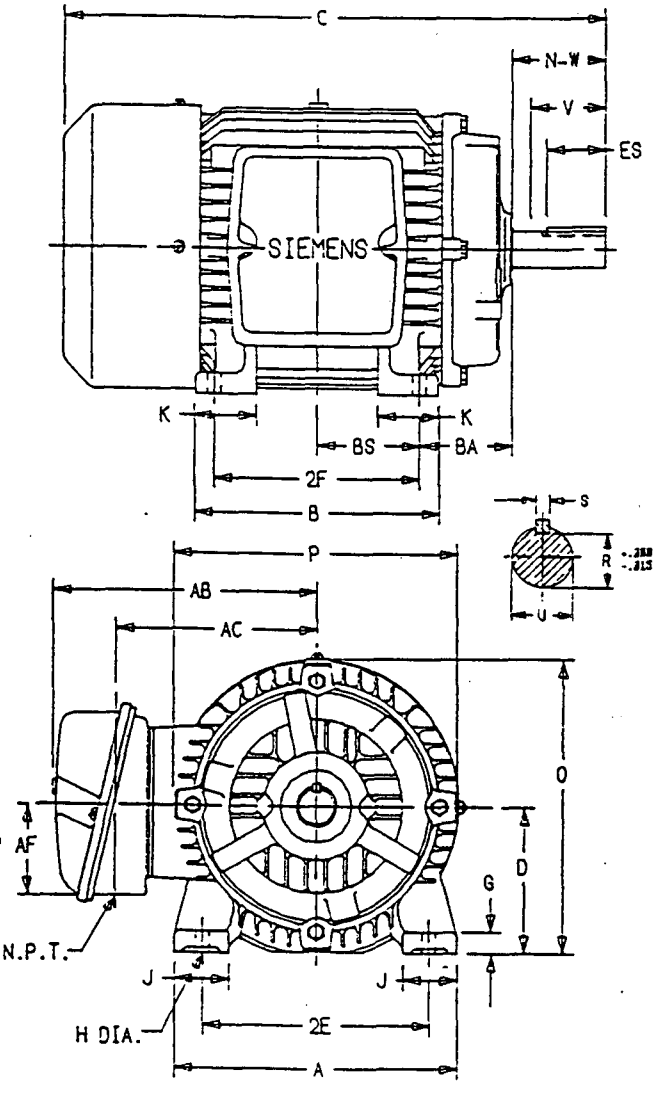
SIEMENS

JOB# 213600
TAG PO# 100.69 DFS
POWEREX SPARGING BLOWER

Section 4
Part 4.3
Page 1
Date 1/96

NEMA Frames Application Manual

Type RGZ / RGZE
Totally Enclosed Fan Cooled
Frames 143T-184T



Standard Dimensions - In Inches

FRAME	143T	145T	182T	184T
A	6.9	6.9	8.9	8.9
B	5.2	6.0	5.9	6.9
C	12.2	13.2	14.2	15.2
D	3.50	3.50	4.50	4.50
2E	5.50	5.50	7.50	7.50
2F	4.00	5.00	4.50	5.50
G	0.5	0.5	0.6	0.6
H	0.3	0.3	0.4	0.4
J	1.3	1.3	1.8	1.8
K	1.5	1.5	1.9	1.9
N-W	2.25	2.25	2.75	2.75
O	6.9	6.9	8.9	8.9
P	6.9	6.9	8.7	8.7
U	0.875	0.875	1.125	1.125
V	2.00	2.00	2.50	2.50
ES	1.41	1.41	1.78	1.78
BA	2.25	2.25	2.75	2.75
BS	2.00	2.50	2.25	2.75
AA(NPT)	0.75	0.75	0.75	0.75
AB	6.5	6.5	7.4	7.4
AC	4.95	4.95	5.87	5.87
AF	2.2	2.2	2.2	2.2
R	0.771	0.771	0.986	0.986
S	0.188	0.188	0.250	0.250
Approx. Ship Wt. (Lbs.)	45	50	85	100

Footnotes:

(D) Frames 143T-326T + .000-.032
Frames 364T-449T + .000-.062

(S) .188 to .750 + .002-.000
Over .750 to 1.500 + .003-.000

(U) .750 to 1.500 + .000-.0005
Larger than 1.500 + .000-.001

(V) Shaft length available for coupling, pinion or pulley hub.

CERTIFIED PRINT						
CUSTOMER CHICAGO BLOWER						
P.O. # 65640			S.O. # 2169392			
H.P	R.P.M.	FRAME	TYPE	VOLTS	PH	HZ
5	3600	184T	RGZ	230/460	3	60
BY:			DATE: 11/8/96			

NOT FOR CONSTRUCTION, INSTALLATION OR APPLICATION PURPOSES, UNLESS CERTIFIED.

Generator Set Specification

SPECTRUM®

DETROIT DIESEL

BBL

Contact:

Don Sauda

Telephone:
315-446-9120
Fax Number:
315-446-4005

Email Address:

Table of Contents

SECTION 16231

SPECIFICATIONS: GENERATOR SET

1) **Scope of Work**

a) It is the intent of this specification to secure an engine driven generator set that has been prototype tested, factory built, production tested, and site tested, together with all accessories necessary for a complete installation as shown on the plans and drawings and specified herein. All equipment shall be new and of current production by an international firm which manufactures the generator and controls.

2) **General Requirements**

a) It is the intent of this specification to secure a generator system that has been tested during design verification, production and at the final job site. The generator set will be of the lasted commercial design and will be complete with all of the necessary accessories for complete installation as shown on the plans, drawings, and specifications herein. The equipment supplied and installed shall meet the requirements of the National Electrical Code, along with all applicable local codes and regulations. All equipment shall be new and of current production of a national firm which manufactures the generator and controls, transfer switches, switchgear, and assembles the generator sets as a complete and coordinated system. There will be one source responsibility for warranty, parts, and service through a local representative with factory-trained servicemen. Provided by Penn Power.

3) **Submittal**

a) The submittal shall include prototype test certification and specification sheets showing all standard and optional accessories to be supplied, schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number, each required interconnection between the generator set, the transfer switch, and the remote annunciator panel if it is included elsewhere in these specifications.

4) **Testing**

a) To assure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer and/or local representative shall be responsible for three separate tests: design prototype tests, final production tests, and site tests.

i) Design Prototype Tests: Components of the emergency system such as the engine/generator set, transfer switch, and accessories shall not be subjected to prototype tests since the tests are potentially damaging. Rather, similar

design prototypes and preproduction models, which will not be sold, shall have been used for the following tests.

(1) Maximum power (kW).

(2) Maximum motor starting (kVA) at 35% instantaneous voltage dip.

(3) Alternator temperature rise by embedded thermocouple and/or by resistance method per NEMA MG1-22.40 and 16.40.

(4) Governor speed regulation under steady-state and transient conditions.

(5) Voltage regulation and generator transient response.

(6) Fuel consumption at 1/4, 1/2, 3/4, and full load.

(7) Harmonic analysis, voltage waveform deviation, and telephone influence factor.

(8) Three-phase short circuit tests.

(9) Alternator cooling air flow.

(10) Torsional analysis to verify that the generator set is free of harmful torsional stresses.

(11) Endurance testing.

b) **Production Tests**

i) Final Production Tests: Each generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:

ii) Single-step load pickup.

iii) Transient and steady—state governing.

iv) Safety shutdown device testing.

v) Voltage regulation.

vi) Rated Power @ 0.8 PF

vii) Maximum Power.

viii) Upon request, arrangements to either witness this test will be made, or a certified test record will be sent prior to shipment.

c) **Site Tests**

i) Site Tests: An installation check, start-up, and building load test shall be performed by the manufacturer's local representative. The engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test. The tests shall include:

ii) Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations, under the environmental conditions present and expected.

iii) Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include: block heaters, battery charger, generator strip heaters, remote annunciator, etc.

iv) Start-up under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage and frequency, and phase rotation.

v) Automatic start-up by means of simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper system coordination. Engine coolant temperature, oil pressure, and battery charge level along with generator voltage, amperes, and frequency shall be monitored throughout the test. An external load bank shall be connected to the system if sufficient building load is unavailable to load the generator to the nameplate kW rating.

5) **Warranty & Maintenance**

a) The generator set shall be guaranteed against defective material and workmanship in accordance with the manufacturer's published warranty for five years from date of start-up. Optional warranties shall be available upon request.

b) The generator set manufacturer and its distributor shall maintain a 24-hour parts and service organization. This organization shall be regularly engaged in a maintenance contract program to perform preventive maintenance and service on equipment similar to that specified. A service agreement shall be available and shall include system operation under simulated operating conditions, adjustment to the generator, transfer switch, and switchgear controls as required, and certification in the owner's maintenance log of repairs made and proper functioning of all systems.

6) **Equipment**

a) The generator set shall be a Spectrum model 20DSEJ with a 4P4 generator. It shall provide 25 kW, 31.25 kVA when operating at 277/480 volts, .8 power factor. The generator set shall be capable of this rating while operating in an ambient condition of 105°F (87.2°C) and 3300 feet above sea level.

b) The generator set shall be capable of starting motor loads of 121 kVA inrush, with a maximum voltage dip of 35%.

c) Vibration isolators shall be provided between the engine-generator and heavy-duty steel base

7) **Engine**

a) The 276 cubic-inch-displacement engine shall deliver a minimum of 71 hp at a governed speed of 1800 rpm. The engine shall be equipped with the following:

i) An isochronous governor capable of +.25% steady-state frequency regulation.

ii) 12 Volt positive engagement solenoid shift-starting motor.

iii) 65-Ampere minimum automatic battery charging alternator with solid-state voltage regulation.

iv) Positive displacement, full pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain.

v) Dry-type replaceable air cleaner elements for normal applications.

vi) Engine-driven or electric fuel transfer pump capable of lifting fuel 3 feet, fuel filters, and electric solenoid fuel shut-off valve.

b) The naturally aspirated engine shall be fueled with No. 2 diesel

c) The engine shall have a minimum of 4 cylinders, and be liquid-cooled by a unit-mounted radiator, blower fan, water pump, and thermostats. This system shall properly cool the engine with up to 0.5 inches H20 static pressure on the fan in an ambient temperature up to 122F/50C.

8) **Generator**

a) The alternator shall be salient-pole, brushless, 12-lead reconnectable, self-ventilated of drip-proof construction with amortisseur rotor windings and skewed stator for smooth voltage waveform. The insulation shall meet the NEMA standard (MG1-22.40 and 16.40) for Class H and be insulated with epoxy varnish to be fungus resistant per MIL 1-24092. Temperature rise of the rotor and stator shall be limited to NEMA Class F ratings. The excitation system shall be of brushless construction controlled by a solid- state voltage regulator capable of maintaining voltage within +/- 2% at any constant load from 0% to 100% of rating. The regulator must be isolated to prevent tracking when connected to SCR loads, and provide individual adjustments for voltage range, stability and volts-per-hertz operations; and be protected from the environment by conformal coating.

b) The generator set shall meet the transient performance requirements of ISO 8528-5, level G-2 .

c) The generator shall be inherently capable of sustaining at least 250% of rated current for at least 10 seconds under a 3-phase symmetrical short circuit without the addition of separate current support devices.

d) The generator, having a single maintenance-free bearing, shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel.

9) Controller

a) Set-mounted controller capable of facing right, left, or rear, shall be vibration isolated on the generator enclosure. The controller shall be capable of being remote-mounted. The microprocessor control board shall be moisture proof and capable of operation from -40°C to 85°C. Relays will only be acceptable in high-current circuits.

b) Circuitry shall be of plug-in design for quick replacement. Controller shall be equipped to accept a plug-in device capable of allowing maintenance personnel to test controller performance without operating the engine. The controller shall include the following features:

i) Fused DC circuit.

ii) Complete 2-wire start/stop control, which shall operate on closure of a remote contact.

iii) Speed sensing and a second independent starter motor disengagement systems shall protect against starter engagement with a moving flywheel. Battery charging alternator voltage will not be acceptable for this purpose.

iv) The starting system shall be designed for restarting in the event of a false engine start, by permitting the engine to completely stop and then re-engage the starter.

v) Cranking cycler with 15-second ON and OFF cranking periods.

vi) Overcrank protection designed to open the cranking circuit after 75 seconds if the engine fails to start.

vii) Circuitry to shut down the engine when signal for high coolant temperature, low oil pressure, or overspeed are received.

viii) Engine cooldown timer factory set at 5 minutes to permit unloaded running of the standby set after transfer of the load to normal.

ix) 3-position (Automatic-OFF-TEST) selector switch. In the TEST position, the engine shall start and run regardless of the position of the remote starting contacts. In the Automatic position, the engine shall start when contacts in the remote control circuit close and stop 5 minutes after those contacts open. In the OFF position, the engine shall not start even though the remote start contacts close. This position shall also provide for immediate shutdown in

case of an emergency. Reset of any fault shall also be accomplished by putting the switch to the OFF position.

x) Alarm horn with silencer switch per NFPA 110.

c) Standard indicating lights to signal the following shall be included:

i) Overcrank (red)
ii) High Engine Temperature (red)
iii) Overspeed (red)
iv) Low Oil Pressure (red)
v) Auxiliary Fault (red)
vi) Low Water Temperature (red)
vii) Air Damper (red)

d) Test button for indicating lights.

e) Terminals shall be provided for each indicating light above, plus additional terminals for common fault and common prealarm.

10) **Accessories**

a) Line circuit breaker of 50 amperes, 50 amps sensor, 3 poles, 600 volt rated, UL molded case type, generator mounted.

b) Engine block heater. Thermostatically controlled and sized to maintain manufacturers recommended engine coolant temperature to meet the start-up requirements of NFPA-99 and NFPA-110, Level 1.

c) A resettable line current sensing circuit breaker with inverse time versus current response shall be furnished which protects the generator from damage due to its own high current capability. This breaker shall not trip within the 10 seconds specified above to allow selective tripping of down-stream fuses or circuit breakers under a fault condition. This breaker shall not automatically reset, preventing restoration of voltage if maintenance is being performed. a field current-sensing breaker will not be acceptable.

d) A sound attenuated weather housing shall be provided. The housing shall be constructed of 14-guage prepainted aluminum to resist corrosion. The maximum sound level shall not exceed 68 dba at 7 meters (23 feet). Steel enclosures do not meet this specification and will not be accepted.

e) Battery rack, and battery cables, capable of holding the manufacturer's recommended batteries, shall be supplied.

f) 12-volt lead-antimony battery(ies) capable of delivering the manufacturer's recommended minimum cold-cranking Amps required at 0°F, per SAE Standard J-537, shall be supplied.

g) 10-Ampere automatic float and equalize battery charger with +/- 1% constant voltage regulation from no load to full load over +/-10% AC input line variation,

current limited during engine cranking and short circuit conditions, temperature compensated for ambients from -40°C to +60°C, 5% accurate voltmeter and ammeter, fused, reverse polarity and transient protected.

h) The engine exhaust silencer shall be coated to be temperature and rust resistance, rated for critical application. The silencer will reduce total engine exhaust noise by 25-35 dB(A)

i) Battery heater

11) **Double Wall Secondary Containment Sub Base Fuel Tank**:

a) A sub base fuel tank used in conjunction with a diesel powered generator set of 25 kW rating will contain 120 gallons of fuel to support the generator set for a period of 57 hours at 100% of rated load and 80 hours at 75% of rated load.

b) The sub base fuel system is listed under UL 142, sub section entitled Special Purpose Tanks EFVT category, and will bear their mark of UL Approval according to their particular classification.

c) The above ground steel secondary containment rectangular tank for use as a sub base for diesel generators is manufactured and intended to be installed in accordance with the Flammable and Combustible Liquids Code—NFPA 30, the Standard for Installation and Use of Stationary Combustible Engine and Gas Turbines—NFPA 37, and Emergency and Standby Power Systems—NFPA 110.

d) Construction:
   i) Primary Tank

      (1) It will be rectangular in shape and constructed in clam shell fashion to ensure maximum structural integrity and allow the use of a full throat fillet weld.

   ii) Steel Channel Support System

      (1) Reinforced steel box channel for generator support, with a load rating of 5,000 lbs. per gen set mounting hole location. Full height gussets at either end of channel and at gen set mounting holes shall be utilized.

   iii) Exterior Finish

      (1) The exterior coating has been tested to withstand continuous salt spray testing at 100 percent exposure for 244 hours to a 5 percent salt solution at 92-97° F. The coating has been subjected to full exposure humidity testing to 100 percent humidity at 100° F for 24 hours. Tests are to be conducted in accordance with The American Standard Testing Methods Society.

e) Venting:

i) Normal venting shall be sized in accordance with the American Petroleum Institute Standard No 2000, Venting Atmospheric and Low Pressure Storage Tanks not less than 1-1/4" (3 cm.) nominal inside diameter. A 1 -1/4" atmospheric mushroom cap shall be furnished and the installing contractor shall pipe above the highest fill point as a minimum

f) Emergency Venting

i) The emergency vent opening shall be sized to accommodate the total capacity of both normal and emergency venting and shall be not less than that derived from NFPA 30, table 2-8, and based on the wetted surface area of the tank. The wetted area of the tank shall be calculated on the basis of 100 percent of the primary tank. A zinc plated 3 inch emergency pressure relief vent cap shall be furnished for the primary tank. The vent is spring-pressure operated: opening pressure is 0.5/psig and full opening pressure is 2.5 psig. Limits are stamp marked on top of each vent. The emergency relief vent is sized to accommodate the total venting capacity of both normal and emergency vents.

g) Fuel Fill:

i) There shall be a 2" NPT opening within the primary tank with an 8" raised fill pipe and lockable manual fill cap.

h) Fuel Level:

i) A direct reading, UL listed, magnetic fuel level gauge with a hermetically-sealed vacuum tested dial shall be provided to eliminate fogging.

i) Low Fuel Level Switch

i) Consists of a 50 watt float switch for remote or local annunciation of a (50% standard) low fuel level condition.

12) END SECTION GENERATOR SET

NO. OF UNITS: 1

SPECTRUM BILL OF MATERIAL

Spectrum Detroit Diesel Model number 20DSEJ. Rated 25 kW, 277/480 volts, 3 phase, 60 hertz.

- John Deer Diesel engine 4045DF, rated 34 kWm @ 1800 RPM
- 4P4 generator rated 130 deg., C rise
- Solid state automatic voltage regulator
- Permanent magnet generator (PMG)
- Two-Thirds pitch stator
- Class H insulation
- Vacuum impregnated stator and rotor
- Mechanical governor – 3-5%
- 12 volt DC engine generator set controls
- Radiator cooling system with pusher fan
- Critical grade silencer
- 1000 watt coolant heater, power cord
- Oil drain extension

SPECTRUM GENERATOR SET CONTROL PANEL:

- Microprocessor control – NFPA-110, Level 2
- DC power source protection
- AC interlock to prevent starter reengagment
- Error proof wiring harness
- Panel lamps

- Analog gauges 2 in., 2% accuracy
  - Oil pressure
  - Engine coolant temperature
  - DC voltmeter
- Analog meter 2.5 in.
  - AC ammeter
  - AC voltmeter
  - Frequency meter

Fault shutdowns and status indicators

  - Auxiliary fault (red)
  - Low coolant level - uses auxiliary fault indicator
  - Overcrank (red)
  - Overspeed (red)
  - Low oil pressure (red)
  - High engine temperature (red)
  - Low coolant temperature (red)
- Switches and standard features
  - Cycle cranking
  - Alarm horn
  - Voltage adjust rheostat
  - Overvoltage shutdown
  - Two wire autostart
  - Lamp test switch
  - Selector switch - RUN / OFF - RESET / AUTO
  - Engine cooldown timer

SPECTRUM WEATHER ENCLOSURE:

- Heavy gauge aluminum
- Painted inside and outside
- Removable side panels
- Key lock panels
- Louvers at the generator and radiator ends
- Silencer mounting - Critical

SPECTRUM SUBBASE FUEL TANK

- 120 gallon
- Double wall construction
- Mounted and plumbed to the generator set
- Rupture basin alarm

SPECTRUM TRICKLE BATTERY CHARGER:

- 12 volts
- NEMA 1 enclosure
- Red LED indicates charging
- Green LED indicates battery charged

SPECTRUM BATTERIES:

- 700 CCA
- One (1) 12 Volt DC
- 280 W Battery heater, power cord
- Battery rack and cables

SPETRUM BATTERY HEATER:

- 120 Volt AC input
- 80 Watt

SPECTRUM CIRCUIT BREAKER:

- Part number - 335019
- 50 amp
- 3 Pole, 480 volt
- Mounted in the generator enclosure

SPECTRUM FIVE YEAR WARRANTY:

SPECTRUM®

DETROIT DIESEL

Model: 20DSEJ

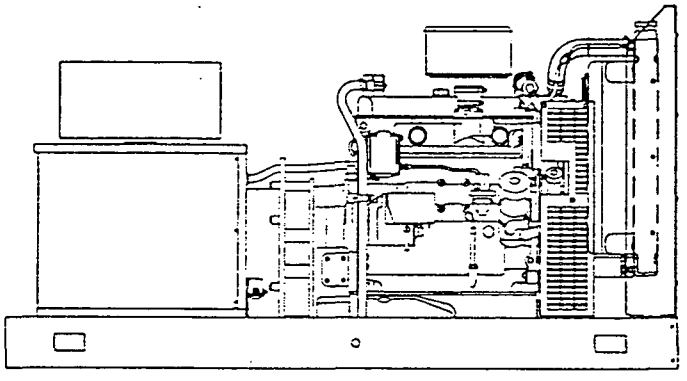
4 Cycle Diesel

190–600 V

ISO 9001 INTERNATIONALLY REGISTERED SPECTRUM®

Ratings Range

		60 Hz	50 Hz
Standby:	**kW**	25–27	18–21
	kVA	25–34	20–26
Prime:	**kW**	22–24	17–19
	kVA	23–30	18–24



Standard Features

- Spectrum® product distributors provide one-source responsibility for the generating system and accessories.
- All generator sets and components are prototype tested, factory built, and production tested.
- Generator sets provide one-step load acceptance per NFPA 110.
- The generator set engine on the 60 Hz model is Environmental Protection Agency (EPA) certified.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Generator features:
  - Brushless, rotating-field generator has broadrange reconnectability.
  - Permanent magnet-excited generator (PMG) provides superior short-circuit capability.
- Other features:
  - Controllers are available to meet all applications. See controller features inside.
  - Low coolant level shutdown protects the generator set from overheating.
  - Integral vibration isolation eliminates the need for installation of vibration spring isolators under the unit.

Generator Ratings

Generator	Voltage	PH	Hz	130°C Rise Standby Rating kW/kVA	130°C Rise Standby Rating Amps	105°C Rise Prime Rating kW/kVA	105°C Rise Prime Rating Amps
4P4	120/208	3	60	26/33	90	24/30	83
	120/240	3	60	26/33	78	24/30	72
	120/240	1	60	25/25	104	23/23	96
	127/220	3	60	26/33	85	23/29	76
	139/240	3	60	25/31	75	22/28	66
	220/380	3	60	27/34	51	24/30	46
	277/480	3	60	25/31	38	22/28	33
	347/600	3	60	25/31	30	22/28	26
	110/190	3	50	21/26	79	19/24	72
	110/220	3	50	20/25	66	18/23	59
	110/220	1	50	20/20	91	18/18	82
	115/200	3	50	20/25	72	17/21	61
	120/208	3	50	18/23	64	17/21	59
	220/380	3	50	21/26	40	19/24	36
	230/400	3	50	20/25	36	17/21	31
	240/416	3	50	18/23	32	17/21	30

RATINGS: Standby ratings are continuous for the duration of any power outage. No overload capacity is specified at this rating. Prime ratings are continuous per BS 5514, DIN 6271, ISO-3046, and IEC 34-1 with 10% overload capacity one hour in twelve hours. All single-phase units are rated at 1.0 power factor. All 3-phase units are rated at 0.8 power factor. Contact the factory for ratings of city water-cooled and remote radiator models. Larger alternators may be used to meet special application requirements. Availability is subject to change without notice. The manufacturer of Spectrum reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Spectrum products distributor for availability. GENERAL GUIDELINES FOR DERATION: *ALTITUDE:* Derate 3.0% per 305 m (1000 ft.) elevation above 2532 m (8300 ft.). *TEMPERATURE:* Derate 1.5% per 5.5°C (10°F) temperature above 40°C (104°F).

Alternator Specifications

Specifications	Generator
Type	4-Pole, Rotating Field
Exciter type	Brushless Permanent Magnet
Number of leads	12, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation: NEMA MG1-1.66,	
Material	Class H
Temperature rise	130°C, Standby
Bearing: number, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no load to full load	±2%
One-step load acceptance per NFPA 110	100% of Rating
Peak motor starting kVA:	(35% dip for voltages below)
480 V, 380 V 4P4 (12 lead)	120 (60 Hz), 88 (50 Hz)

- Compliance with NEMA, IEEE, and ANSI standards for temperature rise.
- Sustained short-circuit current of up to 300% of rated current for up to 10 seconds.
- Sustained short-circuit capability enabling downstream circuit breakers to trip without collapsing the generator field.
- Self-ventilation and drip-proof construction.
- Vacuum-impregnated windings with fungus-resistant epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
- Solid-state, volts-per-hertz voltage regulator with ±2% no-load to full-load regulation.
- Brushless alternator with brushless exciter for excellent load response.

Application Data

Engine

Engine Specifications	60 Hz	50 Hz
Manufacturer	John Deere	
Engine: model, type	4045DF150, 4-Cycle, Naturally Aspirated	
Cylinder arrangement	4 In-line	
Displacement, L (cu. in.)	4.52 (276)	
Bore and stroke, mm (in.)	106.5 x 127 (4.19 x 5.00)	
Compression ratio	17.6:1	
Piston speed, m/sec. (ft/min.)	7.6 (1500)	6.4 (1250)
Main bearings: number, type	5, Replaceable Insert	
Rated rpm	1800	1500
Max. power at rated rpm, kWm (bhp)	53 (71)	44 (59)
Engine power at standby rating, kWm (bhp)	34 (46)	26 (35)
Cylinder head material	Cast Iron	
Crankshaft material	Forged Steel	
Valve material:		
Intake	Chromium-Silicon Steel	
Exhaust	Stainless Steel	
Governor: type, make/model	Mechanical, Stanadyne/DB2	
Frequency regulation, no load to full load	3-5%	
Frequency regulation, steady state	±0.33%	
Air cleaner type, all models	Dry	

Exhaust

Exhaust System	60 Hz	50 Hz
Exhaust flow at rated kW, m^3/min. (cfm)	9.0 (318)	7.3 (258)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	593 (1100)	566 (1050)
Maximum allowable back pressure, kPa (in. Hg)	7.5 (2.2)	
Exhaust outlet size at engine hookup, mm (in.)	63.5 (2.5)	

Engine Electrical

Engine Electrical System (12/24 V*)	60 Hz	50 Hz
Battery charging alternator:	12 Volt/24 Volt	
Ground (negative/positive)	Negative	
Volts (DC)	12/24	
Ampere rating	65/45	
Starter motor rated voltage (DC)	12/24	
Recommended battery cold cranking amps (CCA) rating	640/575	
Quantity of batteries	1/2	
Battery voltage (DC)	12	

* 12-volt or 24-volt engine electrical systems are available.

Fuel

Fuel System	60 Hz	50 Hz
Fuel supply line, min. ID, mm (in.)	8 (0.31)	
Fuel return line, min. ID, mm (in.)	6 (0.25)	
Max. lift, engine-driven fuel pump, m (ft.)	0.9 (3.0)	
Max. fuel flow, Lph (gph)	117 (30.8)	113 (29.7)
Fuel Prime Pump	Manual	
Fuel filter	2, Primary/Secondary	
Recommended fuel	#2 Diesel	

Lubrication

Lubricating System	60 Hz	50 Hz
Type	Full Pressure	
Oil pan capacity, L (qts.)	7.6 (8)	
Oil pan capacity with filter, L (qts.)	8.5 (9)	
Oil filter, quantity, type	1, Cartridge	
Oil cooler	Water-Cooled	

Application Data

Cooling (Standard Radiator)

Cooling System	60 Hz	50 Hz
Ambient temperature °C (°F)	50 (122)	
Engine jacket water capacity, L (gal.)	8.5 (2.25)	
Radiator system capacity, including engine, L (gal.)	17.8 (4.7)	
Engine jacket water flow, Lpm (gpm)	144 (38)	121 (32)
Heat rejected to cooling water at rated kW, dry exhaust kW (Btu/min.)	21.6 (1230)	16.5 (940)
Water pump type	Centrifugal	
Fan diameter, including blades, mm (in.)	483 (19)	
Fan kWm (hp)	2.2 (2.9)	1.3 (1.7)
Max. restriction of cooling air, intake and discharge side of rad., kPa (in. H_2O)	0.125 (0.5)	

Cooling (Optional Systems)

Remote Radiator System *	60 Hz	50 Hz
Exhaust manifold type	Dry	
Connection sizes:		
Water inlet, mm (in.)	51 (2.0) ID Hose	
Water outlet, mm (in.)	44 (1.75) ID Hose	
Static head allowable above engine, kPa (ft. H_2O)	63 (21)	

City Water Cooling System	60 Hz	50 Hz
Exhaust manifold type	Dry	
Connection sizes:		
Water inlet, in.	0.5 NPT	
Water outlet, in.	0.5 NPT	

* Contact your local distributor for cooling system options and specifications based on your specific application.

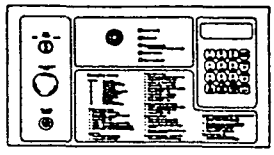
Operation Requirements

Air Requirements	60 Hz	50 Hz
Radiator-cooled cooling air, m^3/min. (scfm)÷	102 (3600)	82 (2900)
Cooling air required for gen. set when equipped with CWC or remote radiator, based on 14°C (25°F) rise and ambient temp. of 29°C (85°F), m^3/min. (cfm)	42 (1500)	37 (1300)
Combustion air, m^3/min. (cfm)	3.3 (117)	2.6 (93)
Heat rejected to ambient air:		
Engine kW (BTU/min.)	6.5 (370)	5.3 (300)
Generator kW (BTU/min.)	4.6 (260)	4.2 (240)

÷ air density = 0.075 lbm/ft^3 or 1.20 kg/m^3

Fuel Consumption	60 Hz	50 Hz
Diesel, Lph (gph) at % load	Standby	Prime
100%	8.3 (2.2)	6.8 (1.8)
75%	6.8 (1.8)	5.7 (1.5)
50%	4.9 (1.3)	4.2 (1.1)
25%	4.2 (1.1)	3.2 (0.9)

Controllers



Available Controllers

Digital Controller
Audio/visual annunciation with NFPA 110, Level 1 capability
Programmable microprocessor logic with digital display
Compatible with 12-volt or 24-volt engine electrical systems
Remote start, prime power, remote annunciation, and remote communication capability

Microprocessor-Plus, 16-Light Controller
Audio/visual annunciation with NFPA 110, Level 1 capability
Microprocessor logic with AC meters and engine gauges
Compatible with 12-volt or 24-volt engine electrical systems
Remote start, prime power, and remote annunciation capability

Microprocessor-Plus, 7-Light Controller
Audio/visual annunciation with NFPA 110, Level 2 capability
Microprocessor logic with AC meters and engine gauges
Compatible with 12-volt or 24-volt engine electrical systems
Remote start, prime power, and remote annunciation capability

Basic Controller
Provides remote or automatic start with NFPA compliance
Uses single-light annunciation with basic control functions
Relay logic with three models—standard Basic, standard Basic with engine gauges, and expanded Basic with AC meters and engine gauges
Compatible with 12-volt engine electrical systems only

Oversized Meterbox Controllers
Provides additional space for optional engine oil temperature gauge, tachometer, and wattmeter
Available with 16-light or 7-light annunciation and microprocessor logic
Same features as Microprocessor-Plus controller
Compatible with 12-volt or 24-volt engine electrical systems

Manual Controller
Designed for prime power and mobile applications
Uses single-light annunciation with basic control functions
Relay logic with AC meters and engine gauges
Compatible with 12-volt engine electrical systems only

Engine Gauge Box Controller for Paralleling Switchgear
Interfaces between generator set and switchgear for paralleling switchgear applications
Engine gauges with emergency stop switch
Compatible with 12-volt or 24-volt engine electrical systems

NOTE: See the respective controller spec sheet for additional controller features and accessories.

SPECTRUM®
DETROIT DIESEL

SPECTRUM, N7650 County Trunk LS, Sheboygan, Wisconsin 53083 U.S.A.
Phone 920-459-1877
Fax 920-459-1825 (U.S.A. Sales), Fax 920-459-1614 (International)

Standard Features and Accessories

Standard Features

- Battery Rack and Cables
- Engine Shutdowns for High Engine Temperature, Low Coolant Level, and Low Oil Pressure.
- Oil Drain Extension
- Operation and Installation Literature

Accessories

Enclosed Unit

- ☑ Exhaust Silencer, Critical ~~or Industrial~~
- ☑ Silencer Mounting Kit for Housing
- ☑ Sound Shield Enclosure
- ☑ Tail Pipe and Rain Cap Kit
- ☐ Weather Housing

Open Unit

- ☐ Exhaust Silencer, Critical or Industrial
- ☐ Flexible Exhaust Connector, Stainless Steel

Cooling System

- ☑ Block Heater
- ☐ City Water Cooling
- ☐ Radiator Duct Flange
- ☐ Remote Radiator Cooling

Fuel System

- ☐ Auxiliary Fuel Pump
- ☐ Day Tanks
- ☐ Flexible Fuel Lines
- ☐ Fuel Pressure Gauge
- ☑ Subbase Fuel Tanks

Electrical System

- ☑ Battery
- ☐ Battery Charger, Equalize/Float Type
- ☑ Battery Charger, Trickle Type
- ☑ Battery Heater

Engine and Generator

- ☐ Air Cleaner, Heavy Duty
- ☐ Air Cleaner Restriction Indicator
- ☐ Bus Bar Kits
- ☐ CSA Certification
- ☐ Current Transformer Kit
- ☐ Electronic Isochronous Governor
- ☐ Generator Strip Heater
- ☑ Line Circuit Breaker (NEMA type 1 Enclosure)
- ☐ Line Circuit Breaker with Shunt Trip (NEMA type 1 Enclosure)
- ☐ NFPA 110 Literature
- ☐ Optional Generators
- ☐ Rated Power Factor Testing
- ☐ Rodent Guards
- ☑ Safeguard Breaker
- ☐ Skid End Caps
- ☐ Voltage Regulation, 1%
- ☐ Voltage Regulator Sensing, Three-Phase

Paralleling System

- ☐ Load-Sharing Module
- ☐ Reactive Droop Compensator
- ☐ Remote Speed Adjust Potentiometer/Electronic Governor
- ☐ Voltage Adjust Potentiometer
- ☐ Voltage Regulator Relocation Kit

Maintenance

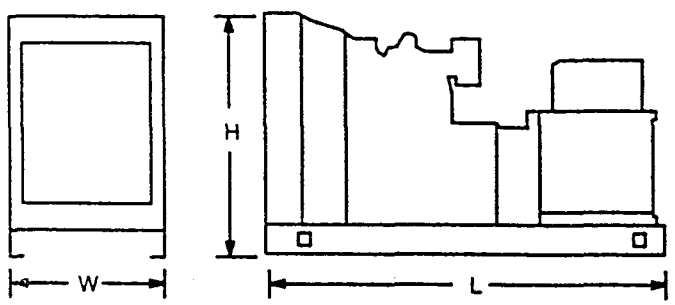
- ☑ General Maintenance Literature Kit
- ☐ Maintenance Kit (includes standard air, oil, and fuel filters)
- ☐ Overhaul Literature Kit
- ☐ Production Literature Kit

Controller (Digital and Microprocessor-Plus)

- ☐ Common Failure Relay Kit
- ☐ Communication Products and PC Software (Digital controller only)
- ☐ Controller Cable, 12 m (40 ft.)
- ☐ Customer Connection Kit
- ☐ Dry Contact Kit (Isolated Alarm)
- ☐ Engine Prealarm Sender Kit
- ☐ Prime Power Switch
- ☐ Remote Annunciator Panel
- ☐ Remote Audio/Visual Alarm Panel
- ☐ Remote Emergency Stop Kit
- ☐ Run Relay Kit
- ☐ Tachometer Kit/Oversized Meterbox
- ☐ Wattmeter Kit/Oversized Meterbox

WEIGHTS AND DIMENSIONS

Overall Size, L x W x H, mm (in.):	2083 x 787 x 1156 (82.00 x 31.00 x 45.51)
Weight (Radiator Model), wet kg (lbs.):	794 (1750)



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

DISTRIBUTED BY:

PENN POWER SYSTEMS
7044 Interstate Island Road
Syracuse, NY 13209-9799
315-451-3838
Fax: 315-461-8662
A Division of Penn Detroit Diesel Allison

TECHNICAL INFORMATION SERIES

Alternator Data Sheet

Alternator Model: 4P7
Frequency: 60 Hz
Speed: 1800 RPM
Leads: 12 (6 Lead, 600 Volt)

Voltage L-N/L-L	Phase	Power Factor	Connection	kW* (kVA) 80°C	90°C Lloyds	95°C ABS	105°C Prime	125°C	130°C Standby
139/240 277/480	3	0.8	Wye	35.0 (43.8)	36.5 (45.6)	37.0 (46.3)	39.0 (48.8)	43.0 (53.8)	44.0 (55.0)
127/220 254/440	3	0.8	Wye	34.0 (42.5)	36.0 (45.0)	37.5 (46.9)	40.0 (50.0)	43.0 (53.8)	44.0 (55.0)
120/208 240/416	3	0.8	Wye	33.0 (41.3)	36.5 (45.6)	38.0 (47.5)	42.0 (52.5)	44.0 (55.0)	45.0 (56.3)
110/190 220/380	3	0.8	Wye	32.0 (40.0)	33.5 (41.9)	34.0 (42.5)	36.0 (45.0)	39.0 (48.8)	40.0 (50.0)
120/240	3	0.8	Delta	33.0 (41.3)	35.0 (43.8)	36.5 (45.6)	39.0 (48.8)	41.0 (51.3)	42.0 (52.5)
120/240	1	1.0	Dogleg	29.0 (29.0)	30.5 (30.5)	31.0 (31.0)	33.0 (33.0)	36.5 (36.5)	37.5 (37.5)
120/240	1	0.8	Dogleg	20.0 (25.0)	20.5 (25.6)	21.0 (26.3)	22.0 (27.5)	24.0 (30.0)	25.0 (31.3)
347/600	3	0.8	Wye	32.0 (40.0)	33.5 (41.9)	34.0 (42.5)	36.0 (45.0)	39.0 (48.8)	40.0 (50.0)

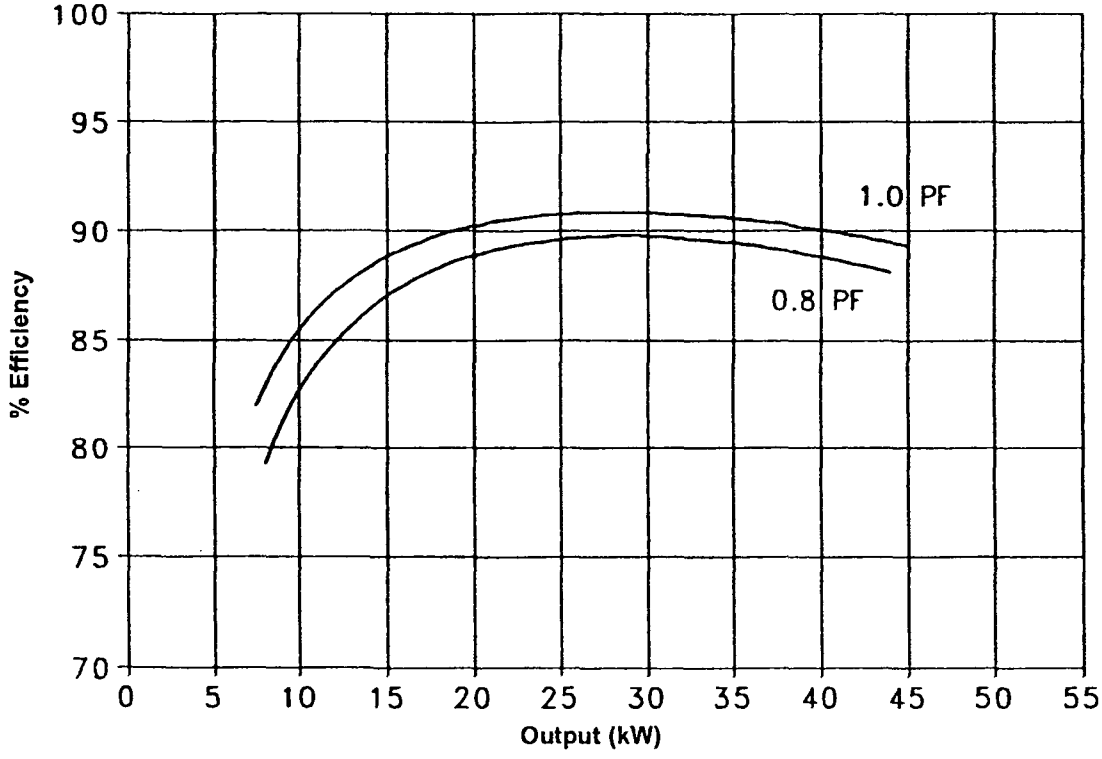
* All data tested in accordance with IEEE Standard 115. The manufacturer of Spectrum reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Submittal Data: 139/240 Volts, 0.8 PF, 1800 RPM, 60 Hz, 3-Phase

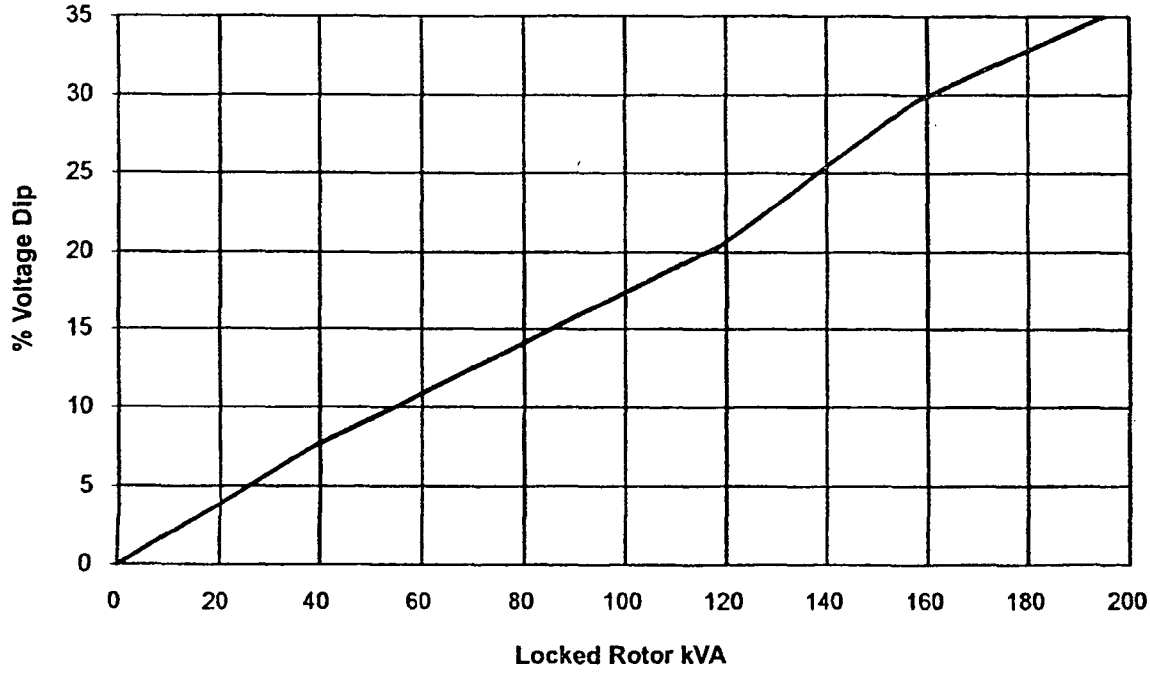
	Symbol	Per Unit	Ohms
Typical Resistances			
Phase Resistance		0.036	0.041
Rotor Resistance		3.794	4.371
Typical Reactances			
Synchronous			
Direct	X_d	2.305	2.655
Quadrature	X_q	1.120	1.290
Transient			
Unsaturated	X'_{du}	0.253	0.291
Saturated	X'_d	0.222	0.256
Subtransient			
Direct	X''_d	0.106	0.123
Quadrature	X''_q	0.097	0.112
Negative Sequence	X_2	0.102	0.117
Zero Sequence	X_0	0.007	0.008

	Symbol	Value
Typical Time Constants		
Armature Short Circuit	T_a	0.008 sec.
Transient Short Circuit	T'_d	0.085 sec.
Transient Open Circuit	T'_{do}	0.884 sec.
Typical Field Current		
Full Load	If_{FL}	15.72 amps
No Load	If_{NL}	4.92 amps
Typical Short Circuit Ratio		0.531
Harmonic Distortion		
RMS Total Harmonic Distortion		2.7%
Max. Single Harmonic		5^{th}
Deviation Factor (No Load, L-L)		4.9%
Telephone Influence Factor		<50
Insulation Material Class per NEMA MG1-1.66		H
Phase Rotation		ABC

TYPICAL GENERATOR EFFICIENCY*
139/240, 277/480 Volts, Wye



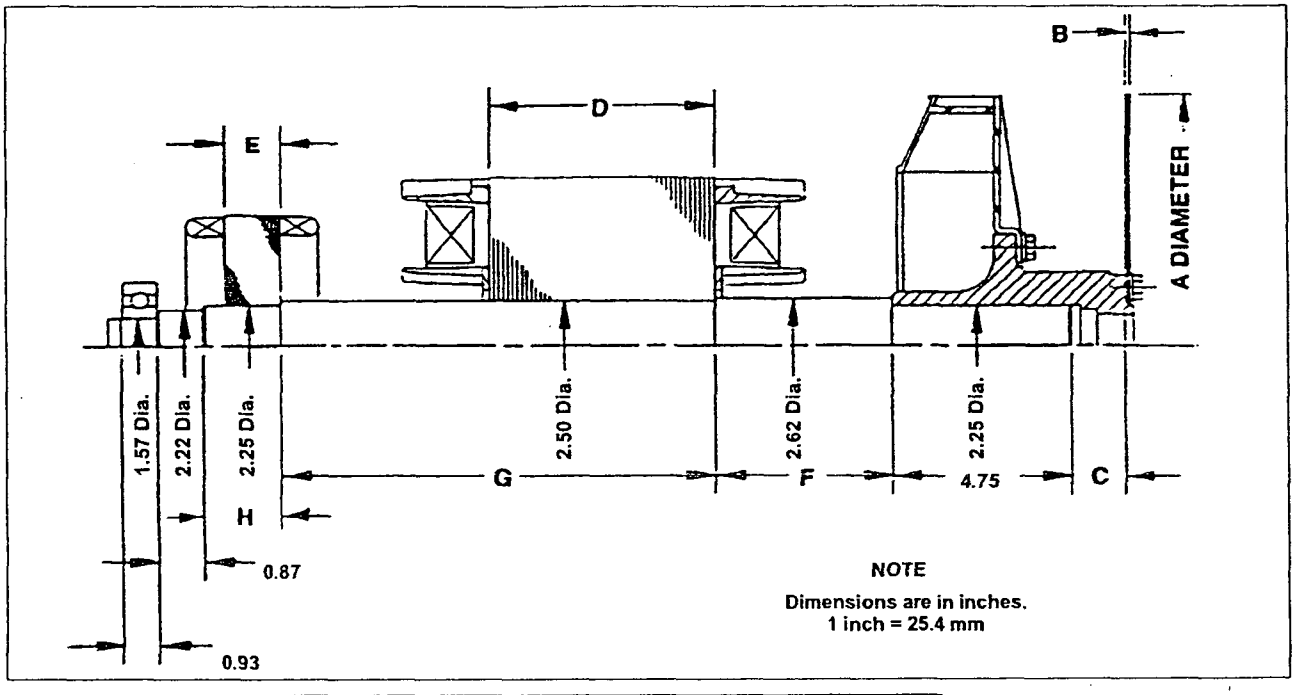
TYPICAL MOTOR STARTING CHARACTERISTICS*
139/240, 277/480 Volts, Wye



* All data tested in accordance with IEEE Standard 115. The manufacturer of Spectrum reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

TECHNICAL INFORMATION SERIES

Torsional Data for Alternator Models 4P4-4P10



Mounting Arrangement Flywheel Size	A	B	C
SAE 7 1/2	9.500	0.12	1.06
SAE 8	10.375	0.12	2.31
SAE 10	12.375	0.12	2.00
SAE 11 1/2	13.875	0.12	1.44
SAE 14	–	–	–

Alternator Model	D	E	F	G	H
4P4	4.12	3.38	2.67	10.61	3.42
4P5	5.25	3.38	2.67	10.61	3.42
4P7	7.00	4.62	2.67	13.97	4.81
4P8	8.25	4.62	2.67	13.97	4.81
4P10	10.50	4.62	2.67	16.22	4.81

Alternator Model	Hub & Drive Disc Inertia In. Lb./Sec^2 (Lb./Ft.^{2})	Front Shaft Stiffness In. Lb./Rad. x 10^6	Rotor & Shaft Inertia Sec^2 In. Lb./Sec^2 (Lb./Ft.^{2})	Rear Shaft Stiffness In. Lb./Rad. x 10^6	Exciter Inertia In. Lb./Sec^2 (Lb./Ft.^{2})
4P4	0.494 (1.32)	8.22	2.34 (6.27)	6.05	0.572 (1.53)
4P5	0.494 (1.32)	9.25	2.78 (7.46)	5.75	0.572 (1.53)
4P7	0.494 (1.32)	7.09	3.47 (9.32)	5.12	0.753 (2.02)
4P8	0.494 (1.32)	8.08	4.05 (10.87)	5.04	0.753 (2.02)
4P10	0.494 (1.32)	7.81	4.97 (13.33)	5.04	0.753 (2.02)

SPECTRUM®

DETROIT DIESEL

GENERATOR ACCESSORIES

Float/Equalize Battery Charger 12 VDC, 6 A and 24 VDC, 3 A

ISO 9001
INTERNATIONALLY REGISTERED
SPECTRUM®

Features

- True equalize and float charging.
- Indicator lamps: A red LED indicates that battery charging is in progress. A green LED indicates that the battery is fully charged.
- Easy installation: 3-prong 120-VAC power cord and DC ring terminals for permanent connection to the battery.
- Broad-range input of 90-132 VAC, 50/60 Hz.
- Microprocessor circuitry correctly charges any size (capacity) lead-acid battery.
- Short-circuit protection.
- Reverse-polarity protection.
- Water-repellent circuitry.
- UL listed, U.S. and Canada.

Specifications

Model No.	Output Voltage, VDC	Output Amps
GM11849	12	6
GM11850	24	3
Input Voltage	90-132 VAC, 50/60 Hz	
Dimensions (L x W x D)	5 x 4.9 x 2 in. (127 x 124.46 x 50.80 mm)	
Enclosure	Aluminum Chassis	
Weight	1.3 lb. (0.6 kg)	
Minimum Operating Temperature Range	-4° to 122° F (-20° to 50°C)	

SPECTRUM®
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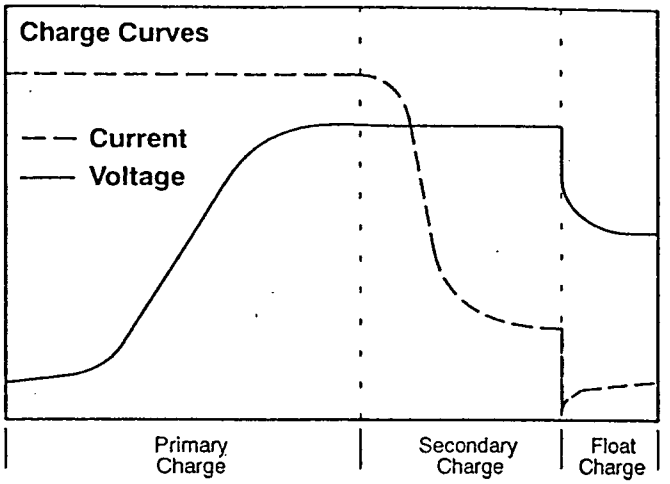
SPECTRUM, N7650 County Trunk LS, Sheboygan, Wisconsin 53083 U.S.A.
Phone 920-459-1877
Fax 920-459-1825 (U.S.A. Sales), Fax 920-459-1614 (International)

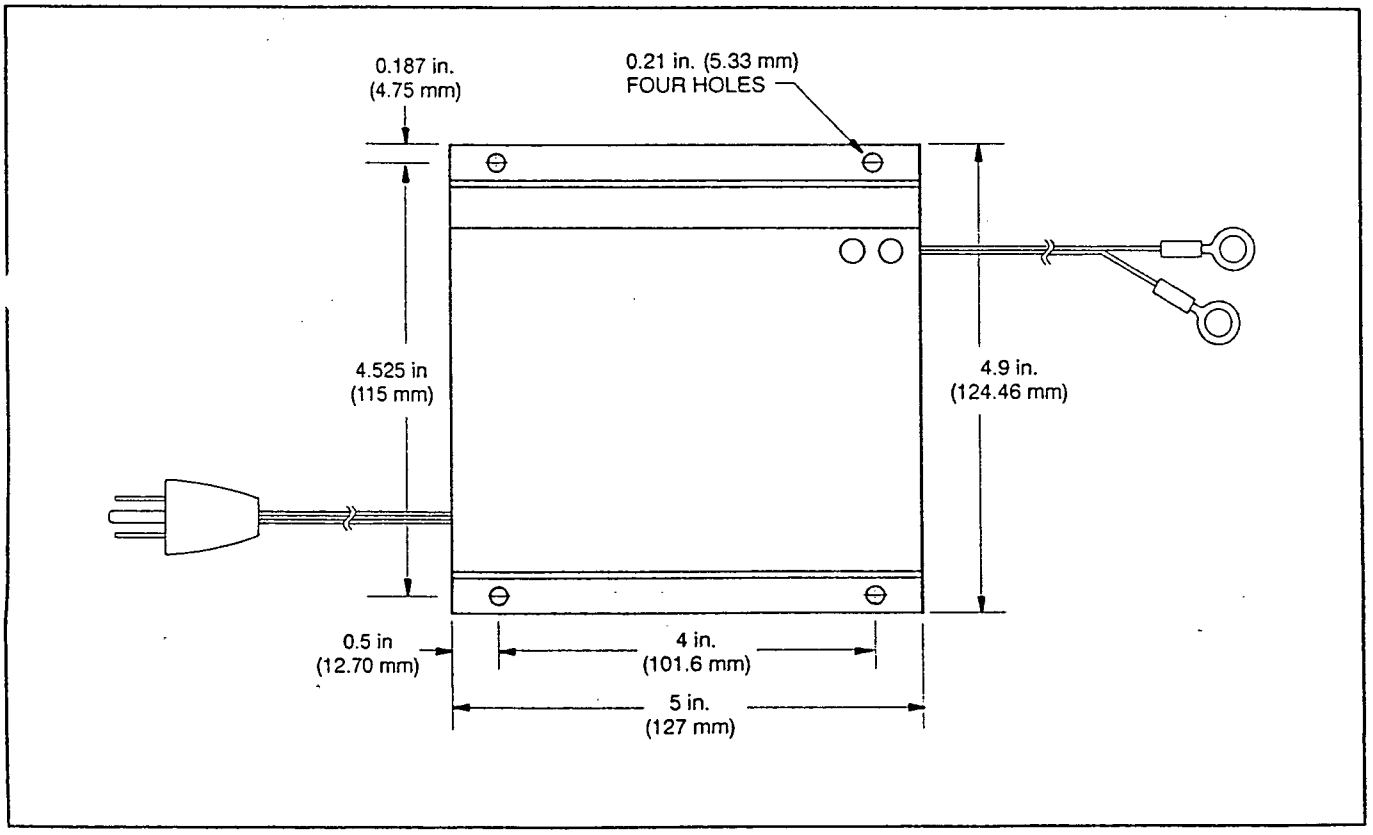
Three-Step Charging Process

Primary Charge: The maximum current is held constant. The voltage rises to the equalize level.

Secondary Charge: The voltage is held constant. The battery regulates the current.

Float Charge: The voltage is held constant at 13.2 VDC for 12-volt chargers or 26.4 VDC for 24-volt chargers.





Battery Connections

Length: 6 ft. (1.8 m)
Ring Terminals:
Positive (red): 3/8 in. (10 mm) I.D.
Negative (blue): 5/16 in. (8 mm) I.D.

120 VAC Power Cord

Length: 5 ft. (1.5 m)
nector: U.S.-style 3-prong plug

Availability is subject to change without notice. The manufacturer of Spectrum® products reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Spectrum® products distributor for availability.

Shipping Information

Carton Size: 6 x 6 x 6 in. (152 mm)
Shipping Weight: 2 lbs. (1 kg)

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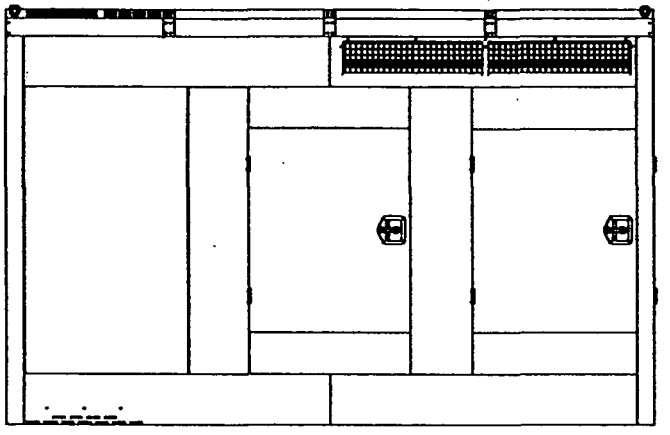
SPECTRUM®

DETROIT DIESEL

GENERATOR ACCESSORIES

Sound Shield Enclosures

ISO 9001
INTERNATIONALLY REGISTERED
SPECTRUM®



Applies to models
20-180DSJ/DSEJ

- Standard equipment includes enclosure-mounted super critical silencer.
- Heavy-gauge prepainted aluminum resists corrosion.
- Low-weight material and heavy-gauge design facilitates use in mobile as well as stationary applications.
- Each model is prototype tested to ensure generator set performance and structural integrity.
- A slanted roof prevents standing water. The enclosure design helps prevent water from entering the generator set compartment.
- Heavy-duty latches ensure tamper-proof security and safety.
- Sound shield lifting eyes simplify installation.
- Sound shield will mount to a subbase fuel tank-equipped generator set. Order the sound shield with subbase fuel tank option when ordering.

Application Data

Material	Aluminum alloy
Material Gauge	14
No. of Doors	5
Type of Doors	Hinged/removable
Latches	Lockable/stainless steel
Silencer	Super critical
Generator Set Temperature and Altitude Derate	See generator set specification sheet
Enclosure Radiator Rating with 50°C/122°F Generator Set Radiator	40°C/105°F

Ratings and Performance

The manufacturer of Spectrum® products designs sound shield enclosures that provide full generator set ratings while generator set is operating in the sound shield enclosure. For generator set ratings and performance, refer to the respective generator set's specification sheet.

Sound Shield Enclosure and Generator Set Testing

The manufacturer of Spectrum® prototype tests the generator set inside the sound shield enclosure to ensure that there is no generator set performance loss while operating in the sound shield enclosure.

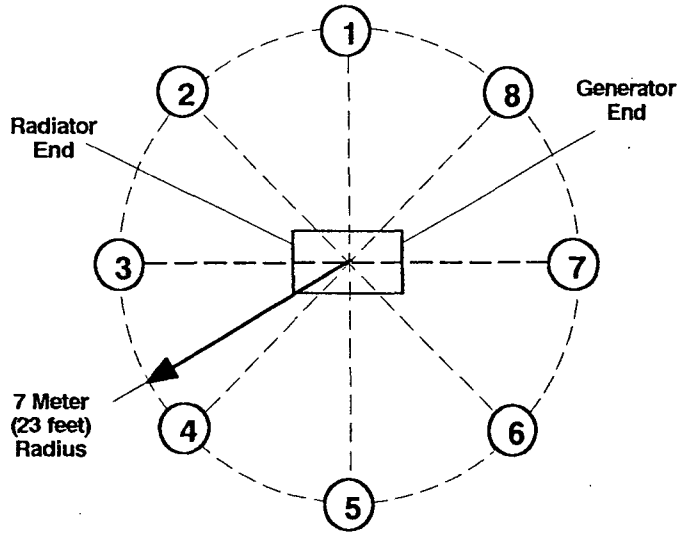
Sound Data

Sound Data Measurement Positions

Measurement Positions and Distances for Data

Microphone Positions:	(1-8) as shown
Microphone Distance:	7 meters (23 feet) (from center of enclosure)
Microphone Height:	1 meter (3.28 feet)
Data Measured in:	dB(A), Sound Pressure (Re: 20μPa)

NOTE: Measurements taken with generator sets operating at full load.



Acoustic Data in dB(A)

Models	Hz	Microphone Positions 1	2	3	4	5	6	7	8
20DSJ/DSEJ	60	67	66	65	66	68	68	66	67
	50	63	63	64	64	62	63	63	64
30DSJ/DSEJ	60	67	66	65	66	68	69	67	68
	50	64	64	64	65	64	63	62	64
40DSJ/DSEJ	60	68	66	65	66	68	69	67	68
	50	63	63	63	64	64	64	62	64
50DSJ/DSEJ	60	65	67	65	66	64	66	65	67
	50	63	64	62	63	63	63	65	64
60DSJ/DSEJ	60	65	67	66	66	64	66	64	67
	50	63	64	63	63	63	64	64	64
80DSJ/DSEJ	60	66	66	66	66	66	67	64	66
	50	62	62	63	63	63	64	62	64
100DSJ/DSEJ	60	66	66	66	66	66	67	65	67
	50	64	64	64	64	64	64	63	63
135DSJ	60	70	71	68	70	69	70	70	71
	50	67	67	66	67	67	68	68	68
150DSJ	60	67	67	66	68	66	67	66	68
	50	66	65	66	66	65	65	65	67
150DSJ IMS*	60	72	72	71	72	72	74	70	73
	50	67	68	67	67	68	68	66	68
180DSJ	60	73	72	72	72	72	75	72	73
	50	72	69	68	69	72	70	67	71

Overall Sound Pressure in Octave Bands in dB(A)

Models	Hz	Band Center Frequency 63	125	250	500	1000	2000	4000	8000
20DSJ/DSEJ	60	67	69	65	68	68	67	61	57
	50	59	67	59	66	65	64	58	51
30DSJ/DSEJ	60	68	70	65	69	68	68	61	58
	50	59	67	59	67	65	63	59	52
40DSJ/DSEJ	60	69	70	65	69	68	68	62	58
	50	60	67	60	66	65	64	58	53
50DSJ/DSEJ	60	57	61	66	70	69	66	61	57
	50	55	59	68	67	65	62	58	54
60DSJ/DSEJ	60	57	60	67	70	69	66	62	58
	50	58	61	66	67	65	62	60	55
80DSJ/DSEJ	60	55	65	67	68	70	66	61	60
	50	58	65	65	64	65	63	58	57
100DSJ/DSEJ	60	57	65	67	68	70	66	61	60
	50	59	66	66	65	65	63	59	59
135DSJ	60	63	67	69	72	72	70	69	70
	50	65	66	68	68	68	67	66	69
150DSJ	60	64	63	66	69	70	67	62	59
	50	62	64	69	67	69	66	61	57
150DSJ IMS*	60	65	69	74	76	75	72	67	67
	50	62	65	70	73	72	69	65	65
180DSJ	60	66	70	75	77	75	72	67	67
	50	63	66	72	75	72	69	65	66

*IMS—Improved motor starting with optional alternator

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DETROIT DIESEL

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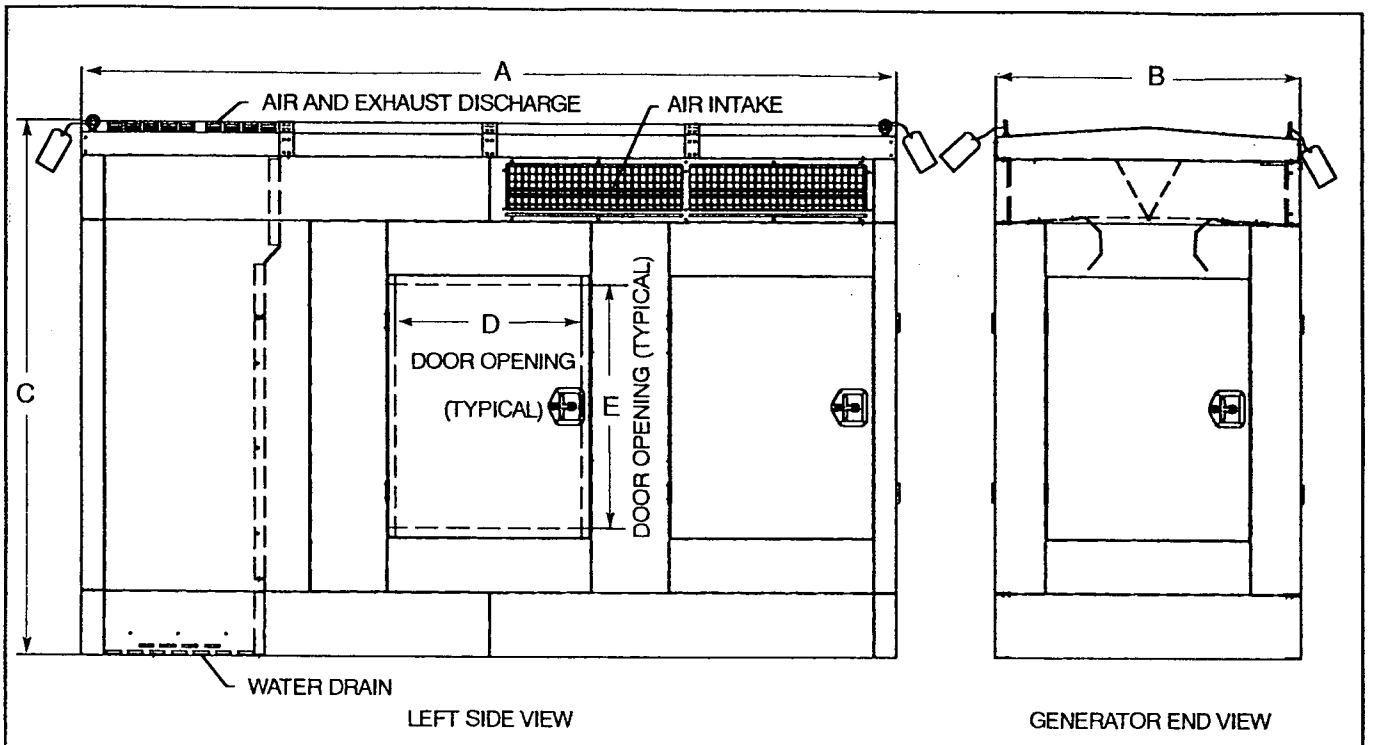
Phone 920-459-1877
Fax 920-459-1825 (U.S.A. Sales), Fax 920-459-1614 (International)

Weight and Dimension Data



NOTE: This drawing is provided for reference only and is not to be used in planning installation. Contact your local distributor for more detailed information.

ADV-5837

Weights and Dimensions

	Length A mm (in.)	Width B mm (in.)	Height C mm (in.)	Dimension D mm (in.)	Dimension E mm (in.)	Weight kg (lbs.)
20-60DSJ/DSEJ	2845 (112.00)	1067 (42.00)	1765 (69.50)	654 (25.75)	800 (31.50)	240 (530)
80/100DSJ/DSEJ	3454 (136.00)	1067 (42.00)	1763 (69.40)	654 (25.75)	800 (31.50)	322 (710)
135/150DSEJ	3759 (148.00)	1168 (46.00)	1908 (75.13)	657 (25.88)	803 (31.63)	390 (860)
150DSEJ IMS*/180DSEJ	3759 (148.00)	1422 (56.00)	2044 (80.49)	657 (25.88)	803 (31.63)	449 (990)

*IMS—Improved motor starting with optional alternator

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Fax: 315-461-8662
A Division of Penn Detroit Diesel Allison

Industrial Warranty Program Features

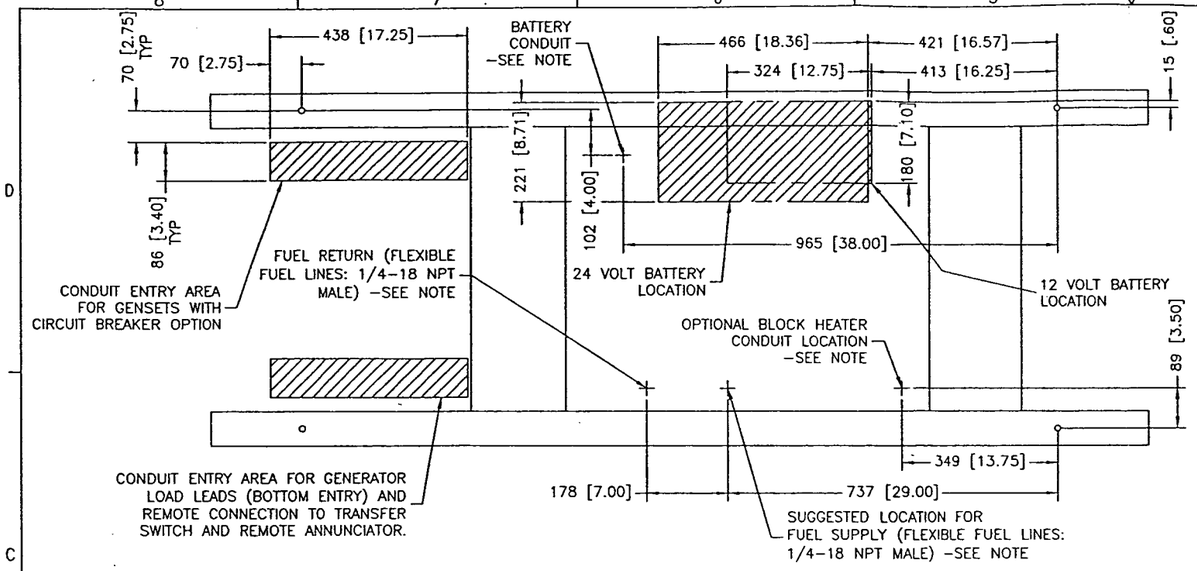
Base Warranties for Generator Sets, Transfer Switches and Bypass-Isolation Switches, and Switchgear Power Systems

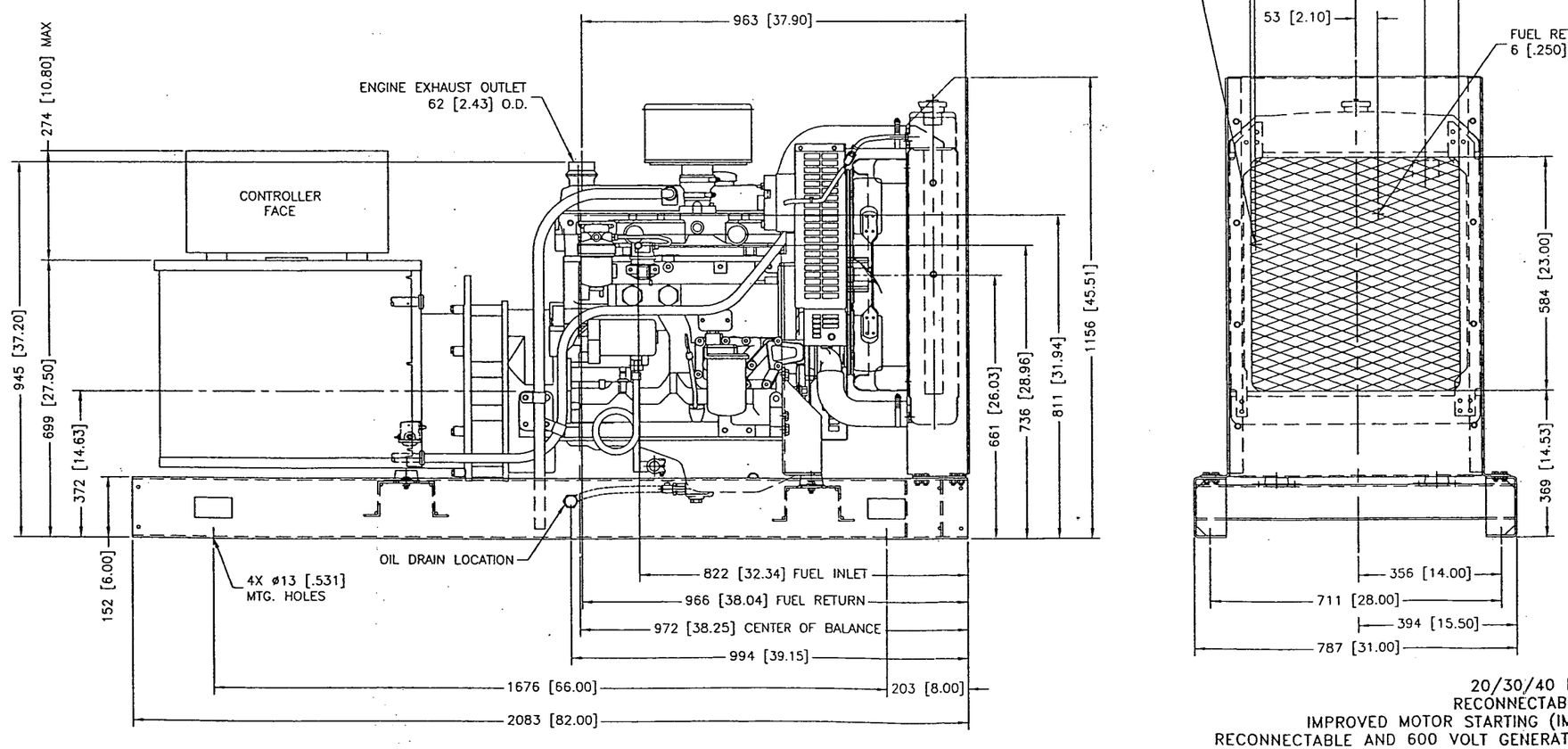
	Base Warranty for Generator Sets	Base Warranty for Transfer Switches	Base Warranty for Switchgear
Application	Standby and Prime Power	Standby and Prime Power	Standby and Prime Power
Warranty Period Years/Hours	One Year or 2000 Hours from Start-up Date	One Year from Start-up Date	One Year from Start-up Date
Parts Reimbursement	Standard	Standard	Standard
Labor	Standard	Standard	Standard
Travel/Mileage	300 Miles (483 km) Round Trip	300 Miles (483 km) Round Trip	300 Miles (483 km) Round Trip
Deductibles	None	None	None

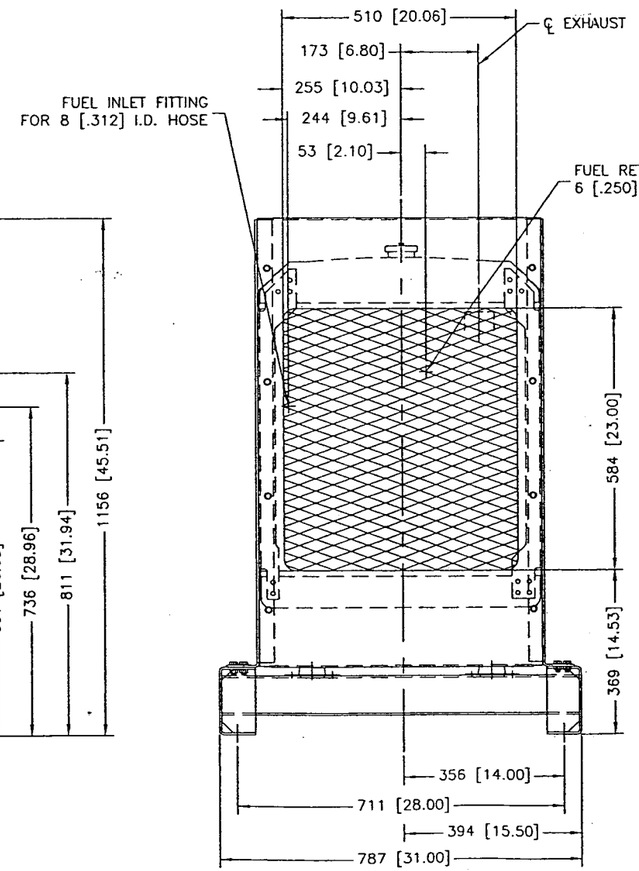
Extended Warranties for Generator Sets

	Extended 2-Year Basic	Extended 2-Year Prime	Extended 5-Year Basic	Extended 5-Year Comprehensive	Extended 10-Year Major Components
Application	Stationary Standby	Stationary Prime Water-Cooled Diesel, 20 kW and Larger	Stationary Standby	Stationary Standby	Stationary Standby Water-Cooled Diesel, 20 kW and Larger
Warranty Period Years/Hours	Two Years or 2000 Hours from Start-up Date	Two Years or 6000 Hours from Start-up Date	Five Years or 3000 Hours from Start-up Date	Five Years or 3000 Hours from Start-up Date	Ten Years or 3000 Hours from Start-up Date
Parts Reimbursement	Standard	Standard	Standard	Standard	Standard Major Components only in Years 6-10 or up to 3000 Hours
Labor	Standard	Standard	Through Second Year only	Standard	Through Second Year only
Travel/Mileage	300 Miles (483 km) Round Trip	300 Miles (483 km) Round Trip	300 Miles (483 km) Round Trip Through Second Year only	300 Miles (483 km) Round Trip	300 Miles (483 km) Round Trip Through Second Year only
Deductibles	None	None	None	None	None

REV	DATE	REVISION	BY
–	3-14-97	NEW DRAWING [502B2]	KGS
A	1-6-99	REDRAWN IN METRIC AND GENERIC TITLE BLOCK ADDED [57438]	KGS
B	3-31-99	SEE SHEET 4-5. [58225]	LRH







WEIGHT (WET)	
20 KW	794 Kg [1750 LBS]
30 KW	816 Kg [1800 LBS]
40 KW	857 Kg [1890 LBS]
40 KW IMS	878 Kg [1935 LBS]

NOTES:
1) IF SUB–BASE FUEL TANK IS USED, REFER TO SUB–BASE FUEL TANK DRAWING TO DETERMINE CONDUIT LOCATIONS.
2) DIMENSIONS IN [] ARE ENGLISH STANDARD EQUIVALENTS.
3) WHEN A HOUSING IS USED THE FUEL LINE MUST BE STUBBED UP FROM DIRECTLY UNDER THE UNIT OR BROUGHT IN FROM THE END OF THE SKID.

METRIC CAD FILE

20/30/40 KW
RECONNECTABLE,
IMPROVED MOTOR STARTING (IMS)
RECONNECTABLE AND 600 VOLT GENERATOR
JOHN DEERE 4045

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ±
X.X ±
X ±
ANGLES ±
SURFACE FINISH √ MAX.
THIRD ANGLE PROJECTION

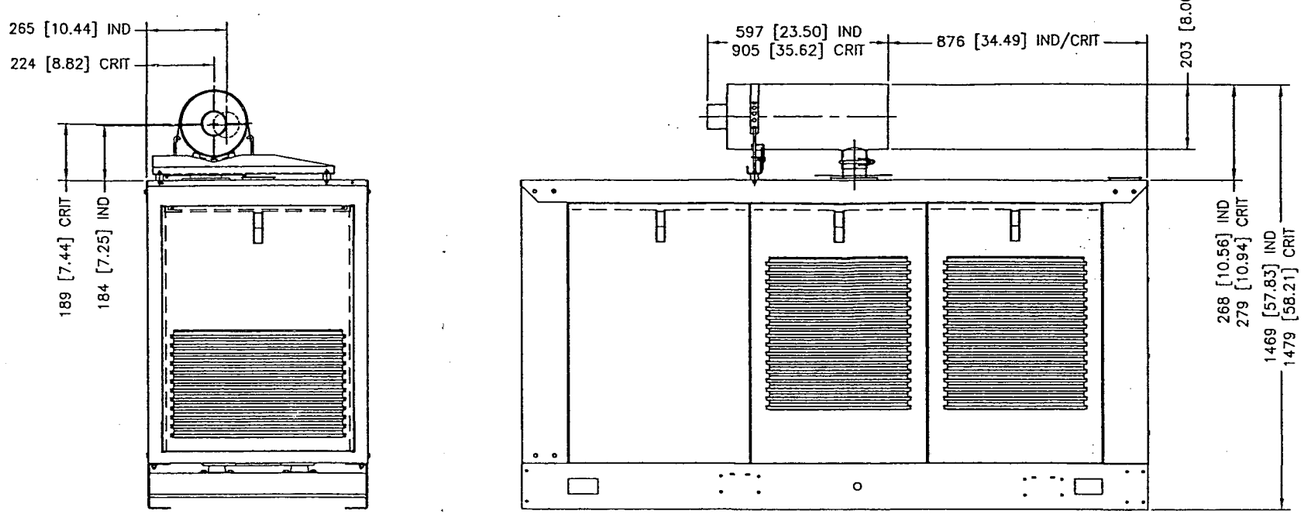
APPROVALS	DATE
DRAWN KGS	3-14-97
CHECKED CF	9-8-97
APPROVED CF	9-8-97

SPECTRUM™
DETROIT DIESEL
SHELBYVILLE, IN 46065 U.S.A.

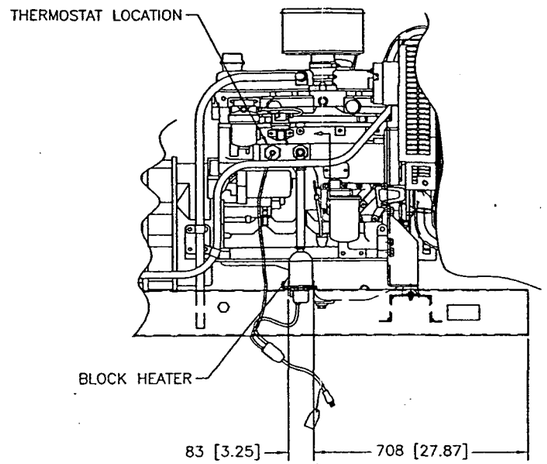
TITLE: DIMENSION PRINT
SCALE 0.18X.P | DWG NO. ADV6304A.DWG | SHEET 1-5
DWG. NO. ADV–6304–S | D$_c$
PLOTTED DATE

JUNE 30 1999

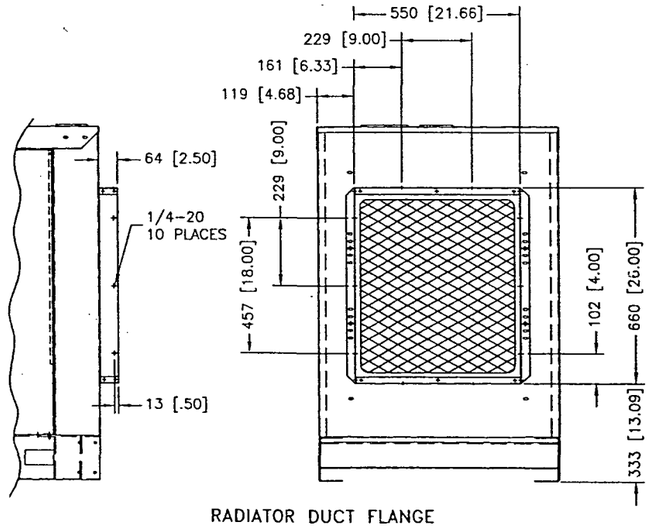
REV	DATE	REVISION	BY
-	5-22-97	NEW DRAWING [50282]	KGS
A	1-6-99	REDRAWN IN METRIC AND GENERIC TITLEBLOCK ADDED;(A-4) FLEXIBLE	
		EXHAUST KIT ADDED [57438]	KGS
B	3-31-99	(C,D-5-7) LOUVER VIEWS UPDATED. [58225]	LRH



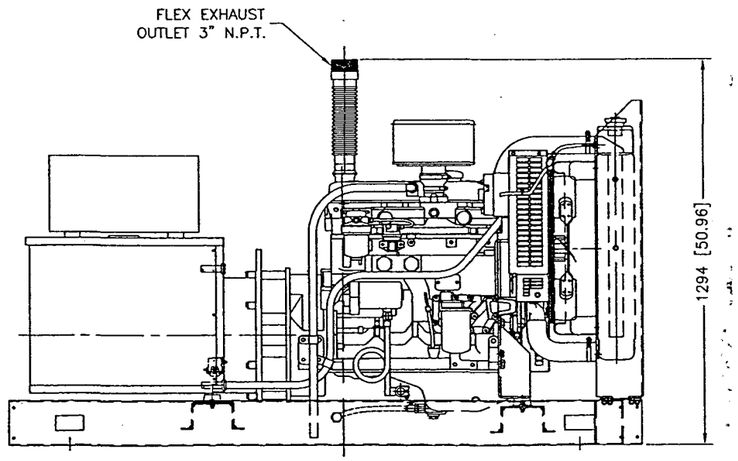
SILENCER AND MOUNTING
CRITICAL AND INDUSTRIAL



BLOCK HEATER
120 AND 240 VOLT



RADIATOR DUCT FLANGE



FLEXIBLE EXHAUST KIT

METRIC CAD FILE

20/30/40 KW
RECONNECTABLE,
IMPROVED MOTOR STARTING (IMS)
RECONNECTABLE AND 600 VOLT GENERATOR
JOHN DEERE 4045

DIMENSIONS IN [] ARE ENGLISH STANDARD EQUIVALENTS

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ±
X.X ±
ANGLES ±
SURFACE FINISH
THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN KGS	5-22-97
CHECKED CF	9-8-97
APPROVED CF	9-8-97

SPECTRUM™
DETROIT DIESEL
SHEBOYGAN, WI 53083 U.S.A.

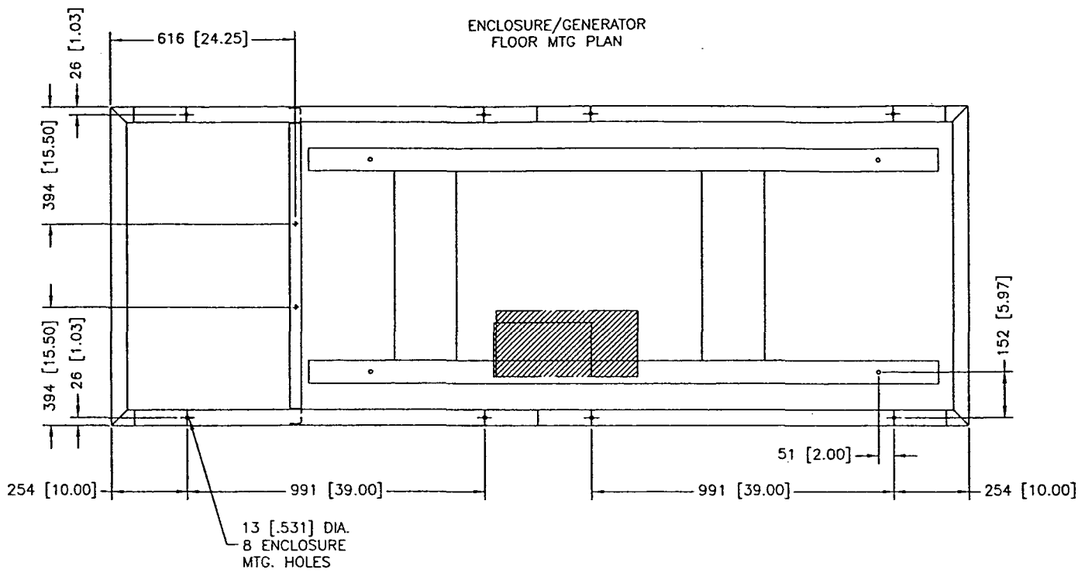
TITLE: DIMENSION PRINT

SCALE 0.12X | DWG NO. ADV6304C.DWG | SHEET 3-5
DWG NO. ADV-6304-S | D
PLOTTED DATE

JUNE 30 1999

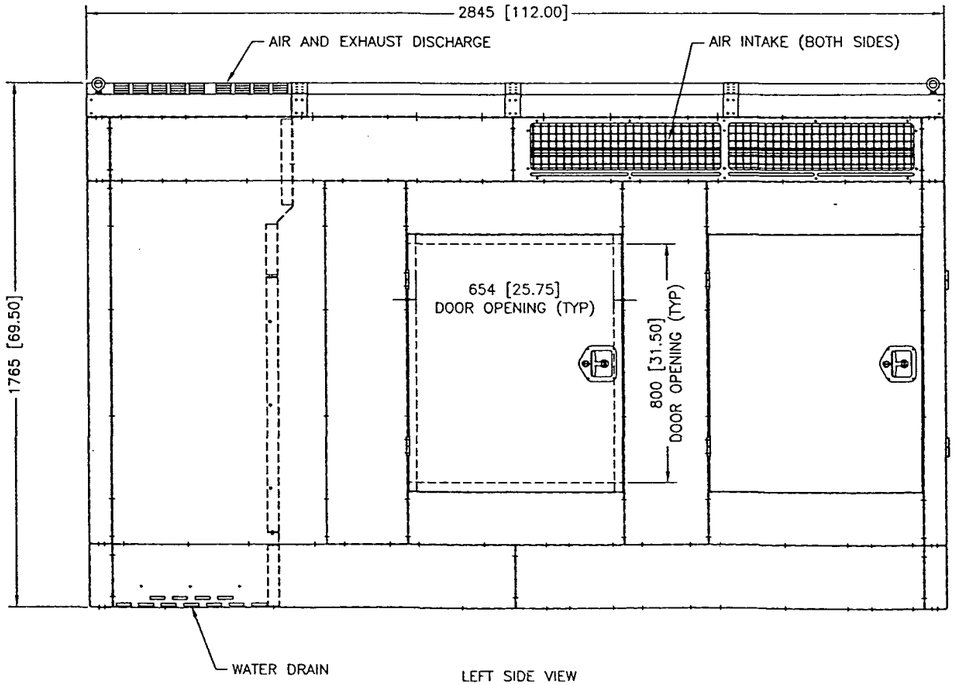
REV	DATE	REVISION	BY
–	5-22-97	NEW DRAWING [50282]	KGS
A	1-8-99	REDRAWN IN METRIC AND GENERIC TITLEBLOCK ADDED [57438]	KGS
B	3-31-99	SEE SHEET 4-5, [58225]	LRH

ENCLOSURE/GENERATOR
FLOOR MTG PLAN

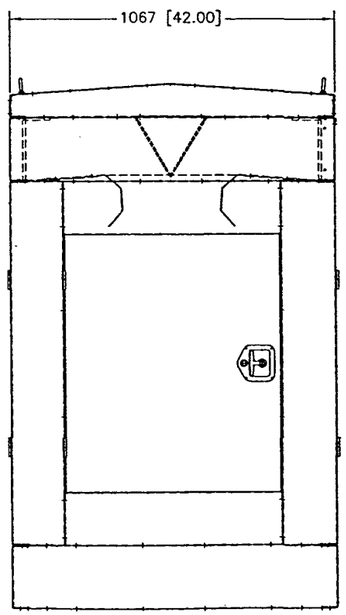


FRONT

REAR



LEFT SIDE VIEW



GENERATOR END VIEW

DIMENSIONS IN [] ARE ENGLISH STANDARD EQUIVALENTS

METRIC CAD FILE

20/30/40 KW
RECONNECTABLE,
IMPROVED MOTOR STARTING (IMS)
RECONNECTABLE AND 600 VOLT GENERATOR
JOHN DEERE 4045

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ±
X.X ±
X ±
ANGLES ±
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN KGS	5-22-97
CHECKED CWF	6-2-97
APPROVED CWF	6-5-97

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ENERTRADIT DIESEL
SHEBOYGAN, WI 53083 U.S.A.

TITLE: DIMENSION PRINT

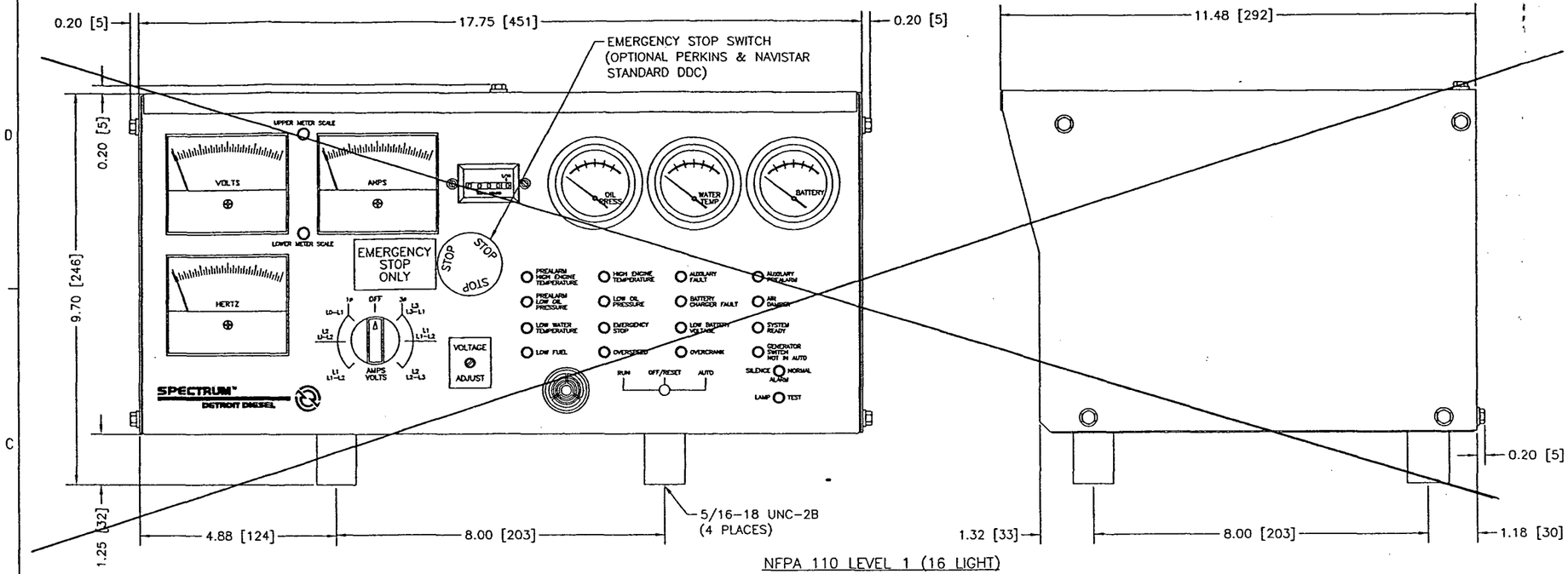
SCALE 0.18X | CAD NO. ADV6304E.DWG | SHEET 5-5

DWG. NO. ADV-6304-S | D

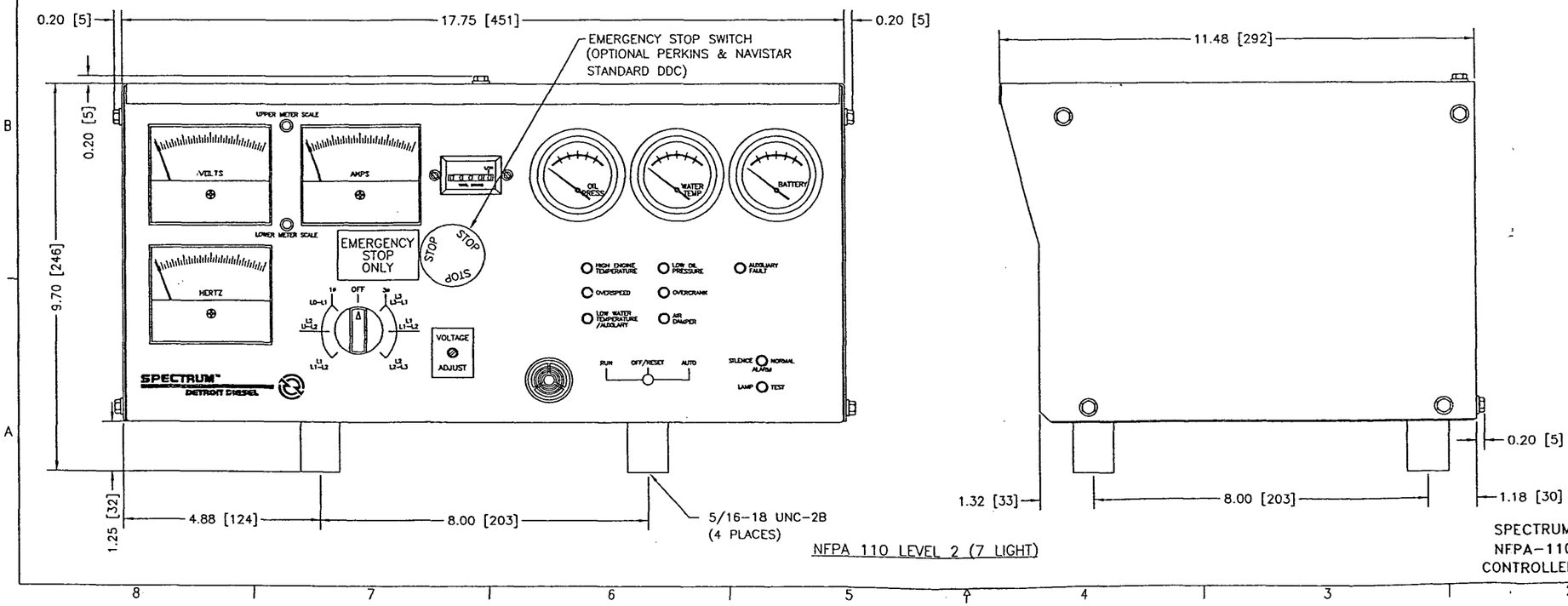
PLOTTED DATE

JUNE 30 1999

REV	DATE	REVISION	BY	V F
A	5-10-92	(C-5) NFPA 110 LEVEL 1 (16 LIGHT) WAS DEC 3 ENHANCED		
		& (A-5) NFPA 110 LEVEL 2 (8 LIGHT) WAS 6 LIGHT	LRH	X
B	2-14-95	(A-1) SHEET 1 OF 4 WAS 1 OF 3 [40941]	RSH	X
C	6-29-95	(A-4) 7 LIGHT WAS 8 LIGHT, (A-1) SHEET 1 OF 5 WAS		
		1 OF 4 [41045]	KAR	X
D	2-12-97	(A-1) SHEET 1 OF 6 WAS 1 OF 5 [49136]	RSH	



NFPA 110 LEVEL 1 (16 LIGHT)



NFPA 110 LEVEL 2 (7 LIGHT)

NOTE:
DIMENSIONS IN [ ] ARE
MILLIMETER EQUIVALENTS.

SPECTRUM
NFPA-110
CONTROLLER

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES ARE:
.XX ±
.XXX ±
ANGLES ±
FRACTIONS ±
SURFACE FINISH: MAX

APPROVALS	DATE
DRAWN DFS	1-13-93
CHECKED EB	1-19-93
APPROVED PJN	1-15-93

SPECTRUM
DETROIT DIESEL
SHEBOYGAN, WI 53083 U.S.A.
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TITLE: DIMENSION PRINT

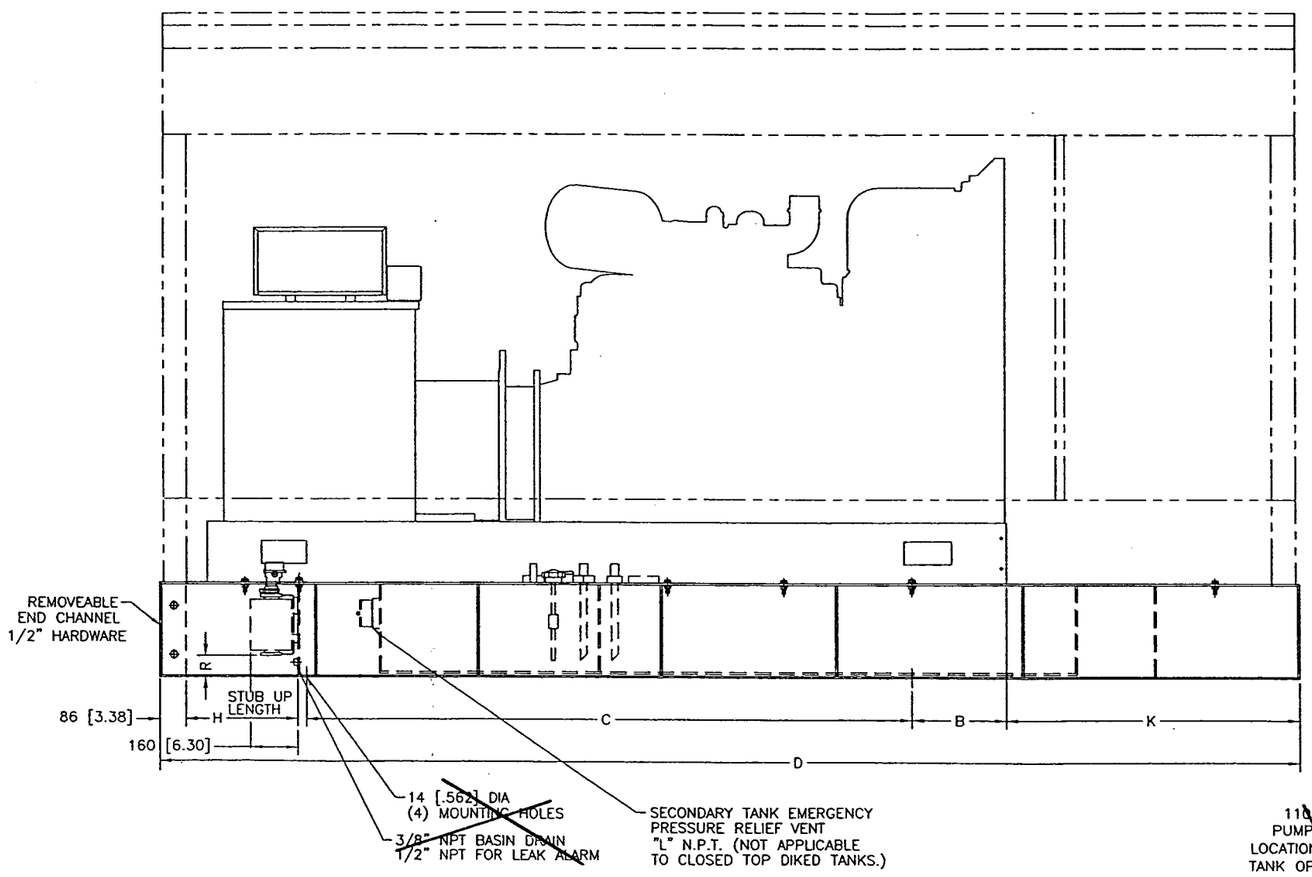
SCALE 3/4 | CAD NO. ADV5888A.DWG | SHEET 1-6
PLOTTED | DWG NO. ADV-5888-S | D

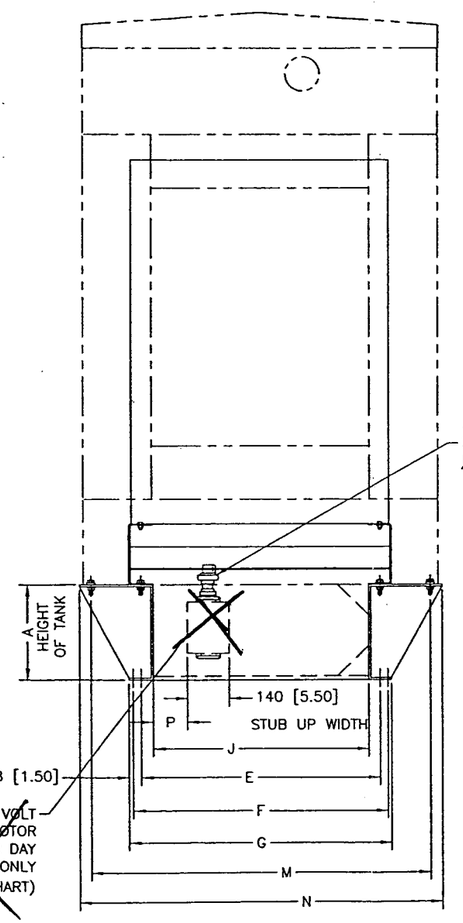
APRIL 14, 1999

REV	DATE	REVISION	BY
–	2-7-97	NEW DRAWING [45694]	KGS
A	5-16-97	(D-8) 20-60 KW KITS ADDED [50282]	KGS
B	10-14-97	SHEET 2 OF 4 WAS 2 OF 3; (D-8)-(D-2) CHART MOVED TO SHEET 3. [52181]	LRH
C	1-22-99	REDRAWN IN METRIC & GENERIC TITLE BLOCK ADDED. [57438]	LRH

NOTES:
THE SMALLEST CAPACITY TANK IN EACH MODEL MAY BE ORDERED STANDARD OR AS A DAY TANK.

TANKS MAY BE ORDERED AS SECONDARY CONTAINMENT OR CLOSED TOP DIKED.





FITTINGS:

1. "K" NPT EMERGENCY VENT PER NFPA 30
2. 2" NPT FILL FOR OPTIONAL FUEL CAP AND RISER
3. 2" LEVEL GAUGE – STANDARD
4. 1-1/4" NPT FOR OPTIONAL NORMAL VENT AND RISER
5. "P" DIP TUBE-FUEL SUPPLY AND "L" REDUCER
6. "R" DIP TUBE-FUEL RETURN AND "S" REDUCER
7. 2" NPT FOR OPTIONAL LOW LEVEL ALARM SWITCH
8. 2" NPT FOR SENSOR/ PUMP CONTROL FLOAT (DAY TANK ONLY)
9. 1/2" NPT FOR OVERFLOW – 2 GPM PUMP MAX. (DAY TANK ONLY)
10. 3/8" NPT FOR DAY TANK FILL (DAY TANK ONLY)

METRIC CAD FILE

DIMENSIONS IN [ ] ARE ENGLISH STD. EQUIVALENTS

20-180 KW JOHN DEERE DUAL WALLED SUB-BASE TANKS FOR SOUND HOUSING (DIESEL ONLY)

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ±
X.X ±
X ±
ANGLES ±
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	KGS	2-7-97
CHECKED	CWF	2-17-97
APPROVED	CWF	2-17-97

SPECTRUM™
DETROIT DIESEL
SHEBOYGAN, WI 53081 U.S.A.

TITLE: DIMENSION PRINT

SCALE 0.12X | CAD NO. ADV62708.DWG | SHEET 2-4

DWG. NO. ADV-6270-S | D c

PLOTTED DATE

APRIL 14, 1999

REV	DATE	REVISION	BY
A	10-21-97	(A-1) SHT 3 -4 WAS 3-3; CHART ADDED FROM SHT 1 & 2;	
		(C,D-1) WISCONSIN OUTDOOR TANKS REMOVED FROM CHART;	
		(D-2,3) -R- & -S- ADDED; (C,D-8) 221, 276, 332, 356,	
		444, 533, 514, 642, 771, 658, 822 & 987 GAL TANKS ADDED	
		TO CHART. [53161]	LRH
B	1-22-99	REDRAWN IN METRIC & GENERIC TITLE BLOCK ADDED. [57436]	LRH

20-180 KW J.D. DUAL WALLED SUB-BASE TANK (DIESEL ONLY)

MODEL	CAPACITY LITER [GAL.]	SIDE VIEW (SHT. 1)	-A-	-B-	-C-	-D-	-E-	-F-	-G-	-H-	-J-	-K- (N.P.T.)	-L-	-M-	-N-	-P-	-R-	-S-	DAY TANK MODEL AVAILABLE	STANDARD TANK WEIGHT APPROX. KG [LBS.]
20-60 KW	151 [40]	B1	318 [12.5]	203 [8.0]	1676 [66.0]	2083 [82.0]	660 [26.0] (ROZJR) 711 [28.0] (REOZJR)	787 [31.0]	473 [18.62]	584 [23.0]	0	2"	3/8-1/4	137 [5.4]	71 [2.8]	3/8"	3/8	3/8-1/4	YES (DIAG. SHEET 4)	199 [438]
	284 [75]		610 [24]						473 [18.62]	584 [23.0]		3"		—	—				NO	295 [648]
	454 [120]		762 [30]			2692 [106.0]			371 [14.62]	584 [23.0]		3"		—	—				NO	388 [853]
	837 [221]		914 [36]			3200 [126.0]				584 [23.0]	610 [24.0]	3"		—	—				NO	640 [1430]
	1045 [276]		914 [36]							584 [23.0]	1067 [42.0]	4"		—	—				NO	694 [1530]
	1211 [332]	B2	813 [32]			2591 [102.0]	1118 [44.0]	1194 [47.0]		1041 [41.0]	508 [20.0]	4"		—	—				NO	740 [1631]
80-100 KW	284 [75]	B1	457 [18]	254 [10.0]	1930 [76.0]	2489 [98.0]	660 [26.0] (ROZJR) 711 [28.0] (REOZJR)	787 [31.0]	524 [20.62]	584 [23.0]	0	2"	3/8-1/4	137 [5.4]	211 [8.3]	3/8"	3/8	3/8-1/4	YES (DIAG. SHEET 4)	284 [625]
	473 [125]		610 [24]			2489 [98.0]			371 [14.62]	584 [23.0]	0	3"		—	—				NO	365 [804]
	757 [200]		762 [30]			2692 [106.0]			219 [8.62]	584 [23.0]	203 [8.0]	3"		—	—				NO	480 [1057]
	1348 [356]		914 [36]			3683 [146.0]			371 [14.62]	584 [23.0]	1219 [48.0]	4"		—	—				NO	807 [1780]
	1681 [444]	B2	813 [32]			2997 [118.0]	1118 [44.0]	1194 [47.0]	219 [8.62]	1041 [41.0]	508 [20.0]	4"		—	—				NO	857 [1890]
	2018 [533]		813 [32]			2997 [118.0]	1321 [52.0]	1398 [55.0]	219 [8.62]	1245 [49.0]	508 [20.0]	4"		—	—				NO	943 [2080]
135-150 KW	379 [100]	B1	457 [18]	305 [12.0]	2045 [80.5]	2645 [104.5]	787 [31.0]	864 [34.0]	557 [21.92]	711 [28.0]	0	2"	1/2 COUPLING	137 [5.4]	211 [8.3]	1/2"	1/2"	1/2-1/4	YES (DIAG. SHEET4)	330 [725]
	681 [180]		610 [24]			2645 [104.5]			303 [11.92]	711 [28.0]	0	3"		—	—				NO	428 [941]
	1041 [275]		762 [30]			2908 [114.5]			227 [8.92]	711 [28.0]	254 [10.0]	4"		—	—				NO	559 [1230]
	1946 [514]		914 [36]			4216 [166.0]			219 [8.62]	711 [28.0]	1562 [61.5]	5"		—	—				NO	975 [2160]
	2430 [642]	B2	813 [32]			3175 [125.0]	1473 [58.0]	1549 [61.0]		1397 [55.0]	521 [20.5]	4"		—	—				NO	998 [2201]
	2919 [771]		813 [32]			3175 [125.0]	1727 [68.0]	1803 [71.0]		1651 [65.0]	521 [20.5]	5"		—	—				NO	1175 [2590]
150-180 KW	379 [100]	B1	318 [12.5]	305 [12.0]	2210 [87.0]	2819 [111.0]	1067 [42.0]	1143 [45.0]	627 [24.62]	991 [39.0]	0	3"	1/2 COUPLING	137 [5.4]	71 [2.8]	1/2"	1/2"	1/2-1/4	YES (DIAG. SHEET 4)	341 [751]
	757 [200]		457 [18]						321 [12.62]	991 [39.0]	0	3"		—	—				NO	454 [998]
	1136 [300]		610 [24]						219 [8.62]	991 [39.0]	0	4"		—	—				NO	555 [1220]
	2491 [658]		914 [36]			3886 [153.0]					1067 [42.0]	5"		—	—				NO	1066 [2350]
	3112 [822]	B2	813 [32]			3327 [131.0]	1753 [69.0]	1829 [72.0]		1676 [66.0]	508 [20.0]	5"		—	—				NO	1231 [2715]
	3736 [987]		813 [32]			3607 [142.0]	1880 [74.0]	1956 [77.0]		1803 [71.0]	787 [31.0]	5"		—	—				NO	1379 [3040]

20-180 KW J.D. DUAL WALLED SUB-BASE TANK FOR SOUND HOUSINGS (DIESEL ONLY)

MODEL	CAPACITY LITER [GAL.]	-A-	-B-	-C-	-D-	-E-	-F-	-G-	-H-	-J-	-K-	-L- (N.P.T.)	-M-	-N-	-P-	-R-	DAY TANK MODEL AVAILABLE	STANDARD TANK WEIGHT APPROX. KG [LBS.]	WISCONSIN OUTDOOR TANK WEIGHT APPROX. KG [LBS.]
20-60 KW	151 [40]	318 [12.5]	203 [8.00]	1676 [66.0]	2870 [113]	660 [26.0]	711 [28.0]	787 [31.0]	371 [14.62]	584 [23.0]	673 [26.5]	2"	1014 [39.94]	1092 [43.0]	137 [5.4]	71 [2.8]	YES (DIAG. SHEET 4)	293 [645]	340 [747]
	284 [75]	318 [12.5]							346 [13.62]			2"			—	—	NO	349 [768]	400 [880]
	454 [120]	457 [18]							219 [8.62]			3"			—	—	NO	432 [951]	507 [1115]
80-100 KW	284 [75]	318 [12.5]	254 [10.00]	1930 [76.0]	3480 [137]	660 [26.0]	711 [28.0]	787 [31.0]	371 [14.62]	584 [23.0]	851 [33.5]	2"	1014 [39.94]	1092 [43.0]	137 [5.4]	71 [2.8]	YES (DIAG. SHEET 4)	387 [853]	444 [976]
	473 [125]	457 [18]							270 [10.62]			3"			—	—	NO	478 [1052]	560 [1232]
	757 [200]	610 [24]							371 [14.62]			3"			—	—	NO	601 [1323]	721 [1587]
135-150 KW	379 [100]	318 [12.5]	305 [12.00]	2045 [80.5]	3785 [149]	787 [31.0]	N/A	864 [34.0]	397 [15.62]	711 [28.0]	947 [37.3]	3"	1116 [43.94]	1194 [47]	137 [5.4]	71 [2.8]	YES (DIAG. SHEET 4)	440 [967]	500 [1101]
	681 [180]	457 [18]							244 [9.62]			3"			—	—	NO	555 [1222]	616 [1356]
	284 [275]	610 [24]							397 [15.62]			4"			—	—	NO	682 [1500]	749 [1647]
150-180 KW	379 [100]	318 [12.5]	305 [12.00]	2045 [80.5]	3785 [149]	1067 [42.0]	N/A	1143 [45.0]	651 [25.62]	991 [39.0]	947 [37.3]	3"	1395 [54.94]	1448 [57]	137 [5.4]	71 [2.8]	YES (DIAG. SHEET 4)	448 [985]	509 [1119]
	757 [200]	457 [18]							549 [21.62]			3"			—	—	NO	582 [1280]	671 [1476]
	1136 [300]	457 [18]							244 [9.62]			4"			—	—	NO	676 [1487]	777 [1709]

DIMENSIONS IN [ ] ARE ENGLISH STD. EQUIVALENTS.

METRIC CAD FILE

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ±
X.X ±
X ±
ANGLES ±
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	KGS	2-7-97
CHECKED	CWF	2-17-97
APPROVED	CWF	2-17-97

SPECTRUM
DIETROYET DIESEL
SHEBOYGAN, WI. 53083 U.S.A.
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TITLE: DIMENSION PRINT

SCALE NONE | CAD WG. ADV6270C.DWG | SHEET 3-4

DWG. NO. ADV-6270-S | D

PLOTTED DATE

APRIL 14, 1999

MICROPROCESSOR-PLUS CONTROLLER
JOHN DEERE 20-180 KW
PERKINS 20-100 KW
DDC SERIES 40 125-180 KW

SPLIT ACTIVATOR 1ø, 3ø, AND 600V

K6 — P — WHITE

ELECTRONIC GOVERNOR CONTROL

BCA — DELCO — 10P — P — 70
BCA — BOSCH — 10P — 70
BCA — PRESTOLITE — 10P — ACINDEX — 70

MAG PICK-UP

ACTUATOR

12VDC BATTERY + / − 12VDC BATTERY − / + (USED FOR 24V ONLY)

SS — SM — 10F

K20 — 10P — 14S — SS — 7N

14P

TB5

CONTROLLER BOARD

GROUND P1-5 ← 14N
BATTERY VOLTAGE (FUSE 3) P1-7 ← 70
BATTERY VOLTAGE (FUSE 3) P1-3 ← 70
BATTERY VOLTAGE (FUSE 3) P1-1 ← 71
BATTERY VOLTAGE (FUSE 3) P2-1 ← 70
GROUND P2-6

P1-12-10 : FUSE 1, FUSE 2, FUSE 3

LOP — 13 → P1-22
HET — 34 → P1-21
AUXILIARY DELAY SHUTDOWN — 31 → P1-15
AUXILIARY DELAY SHUTDOWN — 31 → P1-13
WLS — 31A → P1-10
— 31 → P1-14
— 57 → P1-19
— 56 → P1-18
AUXILIARY IMMEDIATE SHUTDOWN — 30 → P1-17

INHIBIT FOR 30 SEC. AFTER START, THEN 5 SECONDS.
SHUTDOWN

PLOP — 41A → P1-23
PHET — 40A → P1-16
LWT — 35A → P1-24
PREALARM

SFG — 1B

OPG — 7C — OPS
WTG — 5 — WTS
DV
HR
PANEL LAMP
PANEL LAMP
PANEL LAMP (OPT.)

TB1
1A
1
42A
2
70C
70R
56
48
32A
26
12
39
38
36
60
80
41
62
32
35
40
63
61

ESS — 1A

AC CRANK DISCONNECT P2-3 ← V7F
AC CRANK DISCONNECT P2-5 ← V0

CRANK DISCONNECT
OVERCRANK
LOCK ROTOR
OVERSPEED
AUTOMATIC RESTART
P1-9
P1-8 +12VDC REGULATED (FUSE #2)
P1-2 GROUND
P1-6 SHIELD GROUND

16 24 2 S2

TB2
8 7 6 5 4 3 2 1
3 4 9A 9 4P 3P 2P 1P

2 46 24 38 39 12 26 48 40
1 2 3 4 5 6 7 8 9 10 11 12
24 23 22 21 20 19 18 17 16 15 14 13
47 43 32 63 61 62 56 41 35 80 60 36

P3
P4
IPA
T56
HIGH BATTERY VOLTAGE T27

SELSW (CONTACTS SHOWN WITH SWITCH IN OFF POSITION)

C1 C2 C3 V7 V7 V8 V9 V0
N
C0
600 V. ONLY
V
A
C3 C2 C1 C0
TB3 TB5

NOTE: CT WIRES GO DIRECTLY TO TB5 WHEN SAFEGUARD BREAKER IS NOT USED.

SFG
CT1 CT2 CT3
L1 L2 L3 L0

NOTE: CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR

TB1, TB2, P3-P4 & T27

TERMINAL ID.	DESCRIPTION	
42A	BATTERY VOLTAGE (FUSE #1 PROTECTED)	STANDARD CONTROLLER
2	GROUND	
3	REMOTE START GROUND	
4	REMOTE START (ACTIVE LOW)	
9	CRANK MODE (OPEN=CYCLIC;GROUND=CONTINUOUS)	
9A	CRANK MODE GROUND	
12	OVER CRANK INDICATOR	
24	+12VDC REGULATED	
26	AUXILIARY INDICATOR	
32	COMMON FAULT/PRE-ALARM LINE 1 (ACTIVATED BY HET, PHET, LOP, PLOP, OS, LWT, OC, LF, AUX. FAULTS)	
32A	COMMON FAULT LINE 2 (ACTIVATED BY E-STOP, OS, LOP, HET, AUX. FAULTS)	
36	HIGH ENGINE TEMPERATURE INDICATOR	
38	LOW OIL PRESSURE INDICATOR	
39	OVER SPEED INDICATOR	
43	OFF/RESET COMMAND (ACTIVE LOW)	
46	AUTO COMMAND (ACTIVE LOW)	
47	RUN COMMAND (ACTIVE LOW)	
56	AIR DAMPER INDICATOR	
60	SYSTEM READY INDICATOR	
70C	GENERATOR IN COOL DOWN	
70R	GENERATOR RUNNING	
80	NOT IN AUTO INDICATOR	
35	LOW WATER TEMPERATURE	REQUIRES PRE ALARM KIT TO OPERATE
40	PRE ALARM HIGH ENGINE TEMP. INDICATOR	
41	PRE ALARM LOW OIL PRESSURE INDICATOR	
*1	EMERGENCY-STOP RELAY (K4) GROUND	USED FOR DEC 34 ACCESSORIES
*1A	EMERGENCY-STOP RELAY (K4) COIL, NEGATIVE	
27	HIGH BATTERY VOLTAGE (ACTIVE LOW)	
48	EMERGENCY-STOP INDICATOR	
61	BATTERY CHARGER FAULT (ACTIVE LOW)	
62	LOW BATTERY VOLTS (ACTIVE LOW)	
63	LOW FUEL (ACTIVE LOW)	

* MUST HAVE JUMPER IF THERE IS NO EMERGENCY STOP KIT CONNECTED.

1P	PRIME POWER OPERATION	REQUIRES OPTIONAL KIT
2P	PRIME POWER OPERATION	
3P	PRIME POWER OPERATION	
4P	PRIME POWER OPERATION	

3ø SELSW

L0-L3 8	L0-L2 1	L0-L1 2	OFF 3	L1 L1-L2 4	L2 L2-L3 5	L3 L1-L3 6	7
1 C	C	C	C	M	M	C	C
3				M	C	M	
5 C	C	C	C	C	M	M	C C
7					M	C	M
9 C	C	C	C	C	C	M	M C
11						M	C M
13		C		C			
15							C
17	C						
19				C	C		
21 C					C	C	
23 C	C	C					

NOTE:
BLANK DENOTES CONTACT OPEN
"C" DENOTES CONTACT CLOSED
"M" DENOTES MAKE BEFORE BREAK CONTACT

1ø - 3ø SELSW

L1 L1-L2 8	L2 L1-L2 1	L0-L1 2	OFF 3	L3 L3-L1 4	L1 L1-L2 5	L2 L2-L3 6
1	M C	C	C	C	M	M C
3 C	M				M	C M
5 C	M	M C	C	C	C	C M
7	M	C M				M C
9 C	C	C	C	M	M C	C
11				M	C M	
13 C	C	C				
15				C	C	
17				C		
19 C	C					C
21				C		C
23		C				

NOTE:
BLANK DENOTES CONTACT OPEN
"C" DENOTES CONTACT CLOSED
"M" DENOTES MAKE BEFORE BREAK CONTACT

AVR
6 9 3 1 7 4 10 2 11
P5
38 50 67 68 V9 V8 V7 7N 10

USED FOR OPTIONAL 3ø REGULATOR SENSING ONLY

VADJ

TB3 — V0 V7 V8 V9 — TB4
250V 1.5A

SPEED SENSOR
PHOTO BOARD
SLB
P1-1
P1-2
PHOTO-COUPLING
SPEED SENSOR ACTUATOR

AC F+ G F− AC
MAIN FIELD
HEAT SINK ASS'Y
PMG EXCITER FIELD

12 LEAD STATOR SEE ADV-5875 FOR GENERATOR CONNECTIONS.

V7 V0 V8 V9
1 4 2 5 3 6
6 LEAD STATOR (600V ONLY) SEE ADV-5875 FOR GENERATOR CONNECTIONS
MAIN FIELD

V7 V0 V8
1 2 3 4
4 LEAD STATOR (SINGLE PHASE) SEE GG-250000 FOR GENERATOR CONNECTIONS
MAIN FIELD

LEGEND

A - A.C. AMMETER
AVR - AUTOMATIC VOLTAGE REGULATOR
BCA - BATTERY CHARGING ALTERNATOR
BV - BATTERY VOLTMETER
CT - CURRENT TRANSFORMER
ESS - EMERGENCY STOP SWITCH
FS - FUEL SOLENOID
FSH - FUEL SOLENOID (HOLD)
FSP - FUEL SOLENOID (PULL-IN)
HET - HIGH ENGINE TEMPERATURE SWITCH
HR - HOUR METER
HZ - FREQUENCY METER
IP - INJECTOR PUMP
IPA - INDICATOR PANEL ASSEMBLY
K6 - GOVERNOR CONTROL RELAY
K20 - CRANK RELAY
LOP - LOW OIL PRESSURE SWITCH
LWT - LOW WATER TEMPERATURE SWITCH
OPG - OIL PRESSURE GAUGE
OPS - OIL PRESSURE SENDER
P(//) - PLUG
PHET - PRELIMINARY HIGH ENGINE TEMPERATURE SWITCH
PLOP - PRELIMINARY LOW OIL PRESSURE SWITCH
SELSW - SELECTOR SWITCH
SFG - SAFEGUARD BREAKER
SLB - STATIONARY LED BOARD
SM - STARTER MOTOR
SS - STARTER SOLENOID
TB1,2 - CONTROLLER BOARD TERMINAL BLOCK
TB3 - CT/METER SCALE TERMINAL BLOCK
TB4 - AC FUSE BLOCK
TB5 - SAFEGUARD BREAKER TERMINAL BLOCK
V - A.C. VOLTMETER
VADJ - VOLTAGE ADJUST
WLS - WATER LEVEL SENDER
WTG - WATER TEMPERATURE GAUGE
WTS - WATER TEMPERATURE SENDER

REV	DATE	REVISION	BY
C	11-19-97	(A-2) "MICROPROCESSOR-PLUS CONTROLLER" ON SPECTRUM [53652]	MGR
D	2-26-99	(C-2) GENERATOR CONNECTIONS REMOVED. GENERATOR CONNECTION ADV NUMBER ADDED [57438]	LRH
E	3-31-99	UPDATED DRAWING TO CURRENT STANDARDS: (C-7) P22 ADDED [57028]	JS

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SHEBOYGAN, WI 53083 U.S.A.
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DRAWN		
CHECKED	DFS	3-5-95
APPROVALS		DATE
ENGR	JS	3-16-95
APPROVED	SL	3-21-95

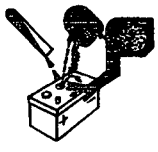
TITLE: DIAGRAM, SCHEMATIC 20-180KW
SCALE: NONE
SIZE: D
DWG NO: ADV-6002-SI
ADV6002.DWG
SHEET 1 OF 1

JUNE 30 1999

Battery Heater Kits PA–258885 and PA–273564 Standby Generator Sets

Kit No.	Model
PA–258885	20–100ROZJ
	20–150RZ
	20–150ROZ
PA–273564	125–180ROZJ
	200ROZD

The battery heater kit provides a means to increase battery temperature in cold climates. The battery warmers are connected to a thermostat for controlled heating.



⚠ WARNING

Sulfuric acid in batteries can cause permanent damage to eyes, burn skin, and eat holes in clothing. Always wear splash–proof safety goggles when working around the battery. If battery electrolyte is splashed in the eyes or on skin, immediately flush the affected area for 15 minutes with large quantities of clean water. In the case of eye contact, seek immediate medical aid. Never add acid to a battery once the battery has been placed in service. Doing so may result in hazardous spattering of electrolyte.

⚠ WARNING

Battery gases can cause an explosion.
Do not smoke or permit flame or spark to occur near a battery at any time, particularly when it is being charged. Avoid contacting terminals with tools, etc. to prevent burns and to prevent sparks that could cause an explosion. Remove wristwatch, rings, and any other jewelry before handling battery. Never connect negative (–) battery cable to positive (+) connection terminal of starter solenoid. Do not test battery condition by shorting terminals together or sparks could ignite battery gases or fuel vapors. Any compartment containing batteries must be well ventilated to prevent accumulation of explosive gases. To avoid sparks, do not disturb battery charger connections while battery is being charged and always turn charger off before disconnecting battery connections. When disconnecting battery, remove negative lead first and reconnect it last.

⚠ CAUTION

Hot parts can cause personal injury.
Do not touch hot engine parts. An engine gets hot while running and exhaust system components get extremely hot.

⚠ WARNING

Accidental starting can cause death or serious personal injury. Turn Generator Master Switch to OFF position, disconnect power to battery charger, and remove battery cables (remove negative lead first and reconnect it last) to disable generator set before working on any equipment connected to generator. The generator set can be started by automatic transfer switch or remote start/stop switch unless these precautions are followed.

INSTALLATION

1. Disconnect battery(ies), negative lead first. Remove battery(ies) from battery rack.

2. Place receptacle box bracket 275451 on skid and use as a template to drill two 11/32 in. (9 mm) dia. through skid. Drill holes at the *two* hole locations which are 5.875 in. (149 mm) apart. See Figure 1 and the appropriate view for location. Remove burrs from holes.

3. Mount receptacle box bracket to skid using two screws X–465–16, plain washers X–25–40, and lock nuts X–101–8.

4. Remove four screws to open relay box assembly.

5. Mount relay box assembly (receptacle outlet box) A–272826 (PA–258885 kit) or A–272825 (PA–273564 kit) to bracket using two screws X–125–3, split–lock washers X–21–1, and nuts X–82–2.

6. Locate black and white leads and connect power source. See Figure 2. Wiring should be done according to local codes and National Electrical Code (N.E.C.)

   NOTE

   All electrical connections should be done by a certified electrician or competent electrical technician.

7. Install battery plate warmer 255649 to top of battery rack using two screws X–73–14, plain washers X–25–40 and lock nuts X–101–8. Be sure to place end of battery plate warmer with cord nearest to relay box assembly. Do not plug battery plate warmer into relay box assembly at this time.

   Install second battery plate warmer (kit PA–258885 only).

8. Replace battery(ies) in battery rack. Secure using battery rack hardware. Do NOT connect battery cables at this time.

9. Attach battery wrap heater(s) 258780 to battery(ies) using supplied cable ties. Be sure to place end of battery wrap heater with cord nearest to relay box assembly and with arrow on battery wrap heater(s) pointing upward.

10. Plug battery plate warmer(s) into top outlet and plug battery wrap heater(s) into bottom outlet of relay box assembly.

11. Energize battery heater kit.

12. Reconnect battery, negative lead last.

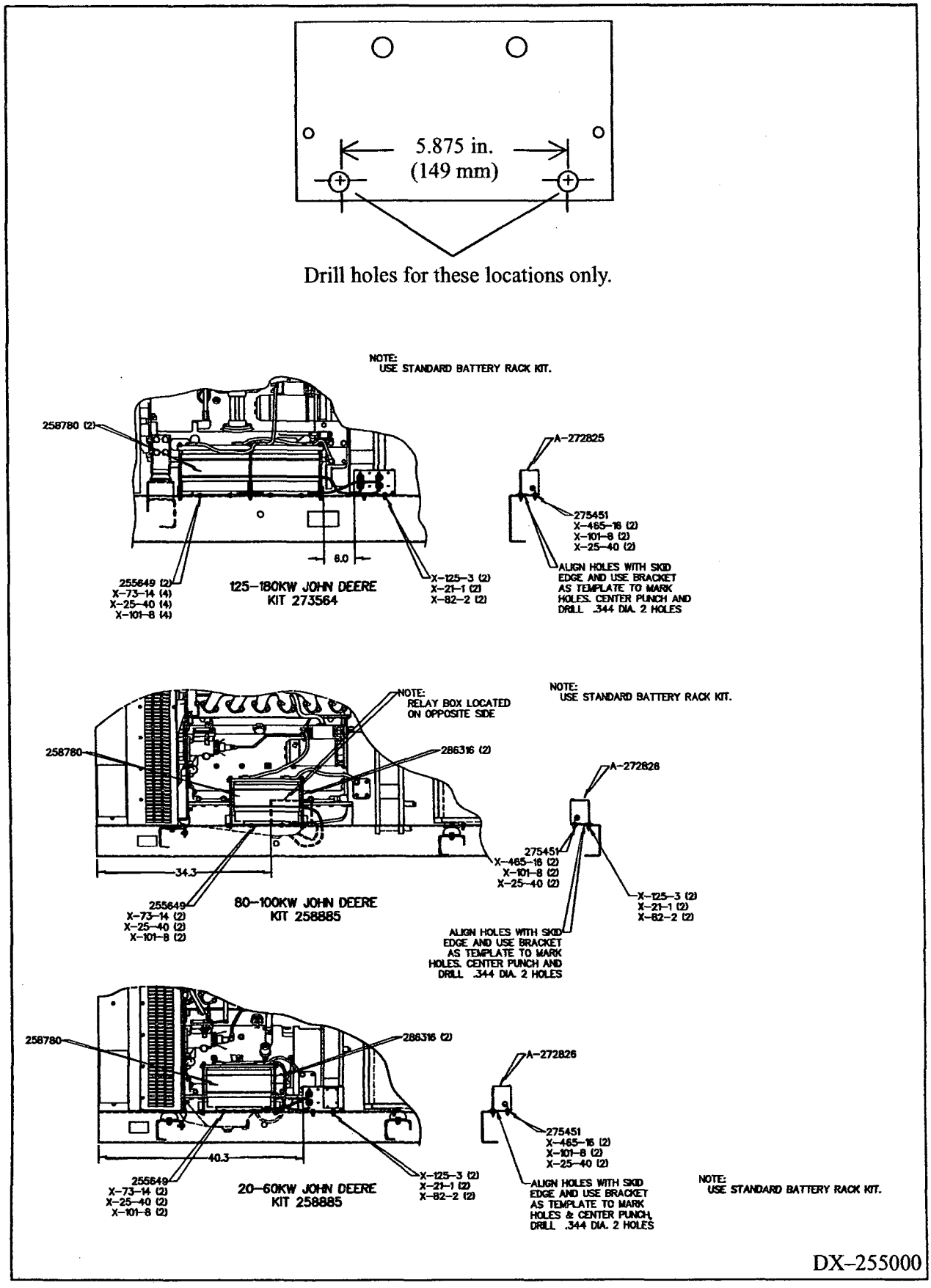


Figure 1a. Installing Battery Heater

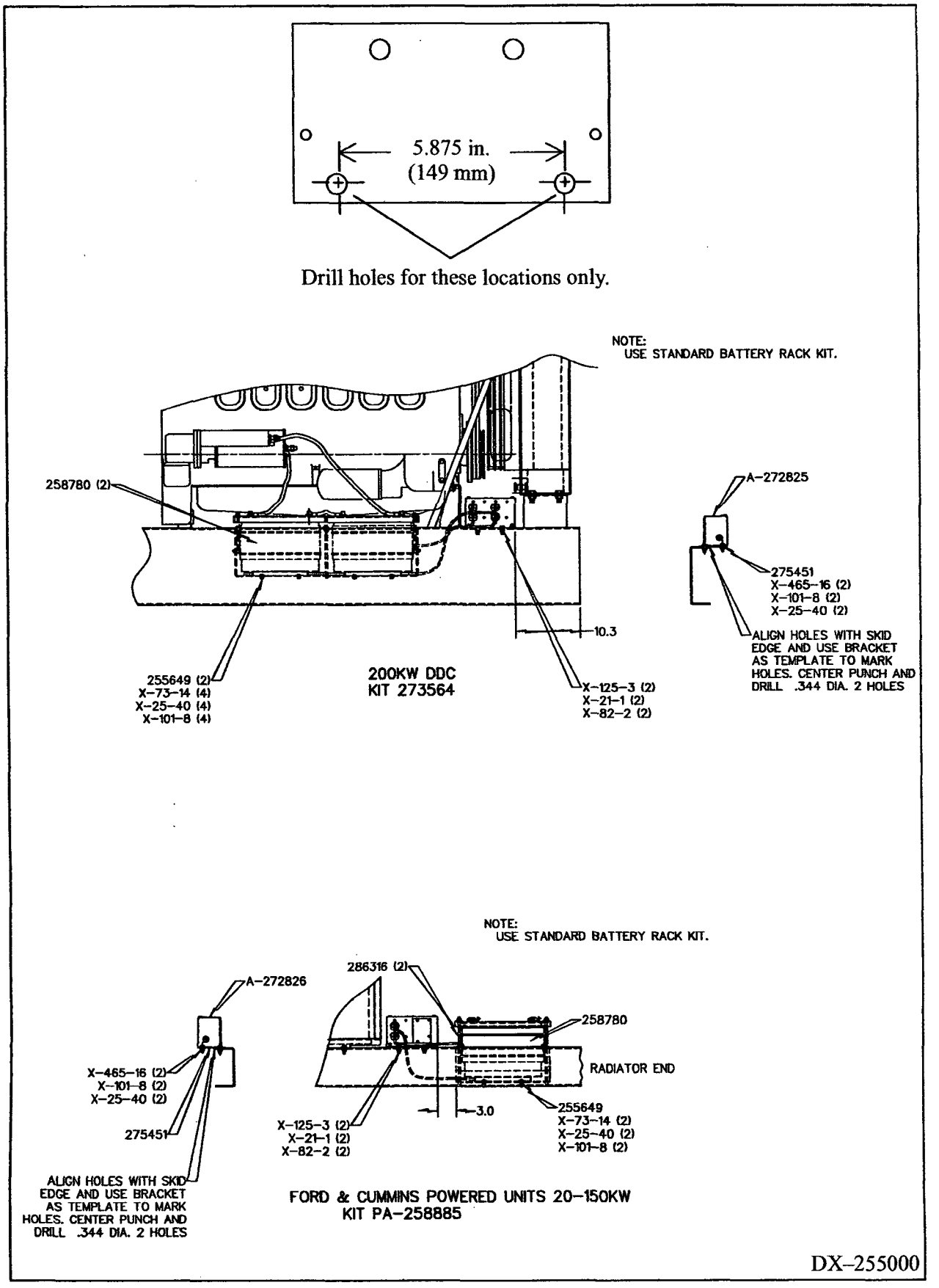


Figure 1b. Installing Battery Heater

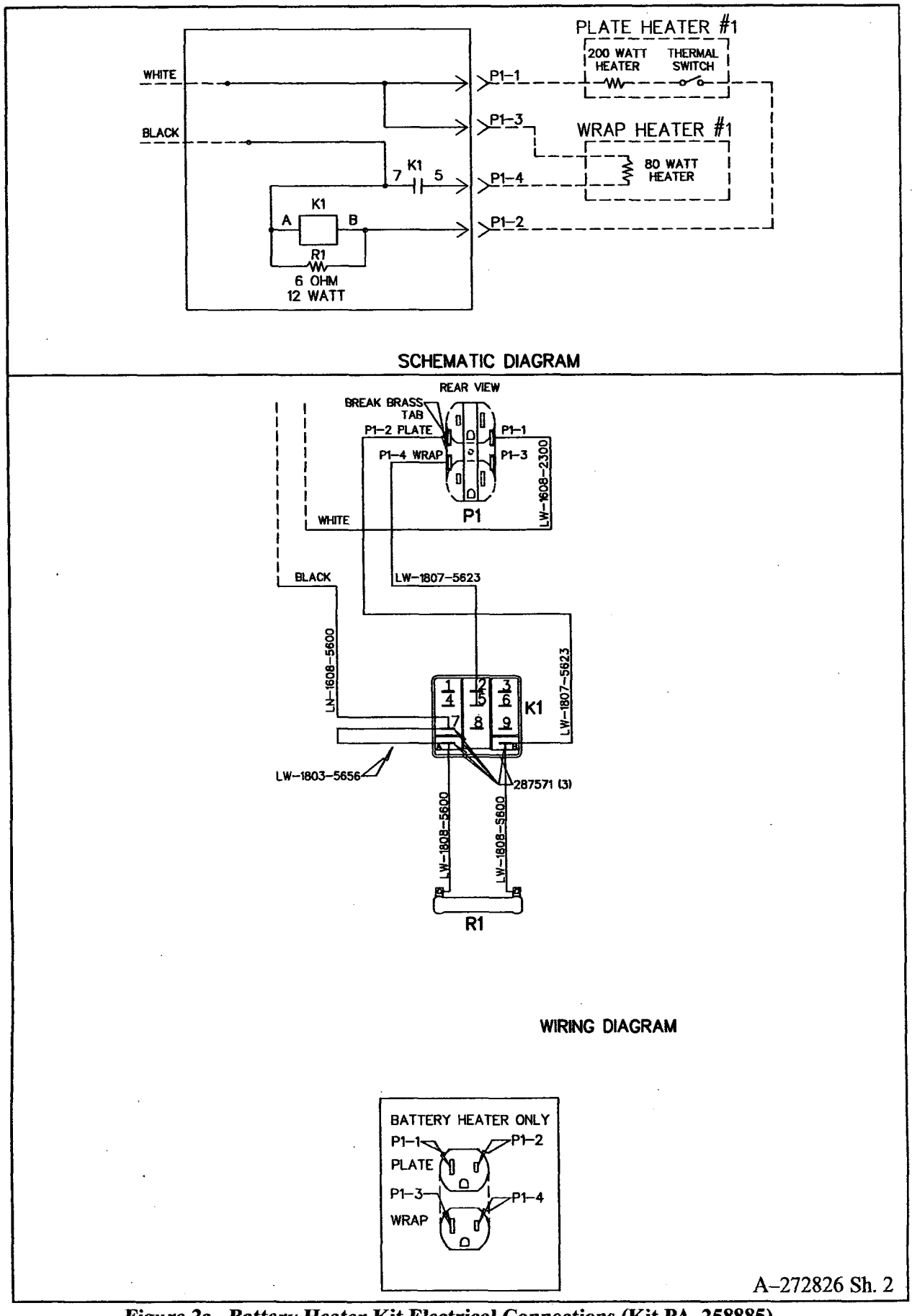


Figure 2a. Battery Heater Kit Electrical Connections (Kit PA-258885)

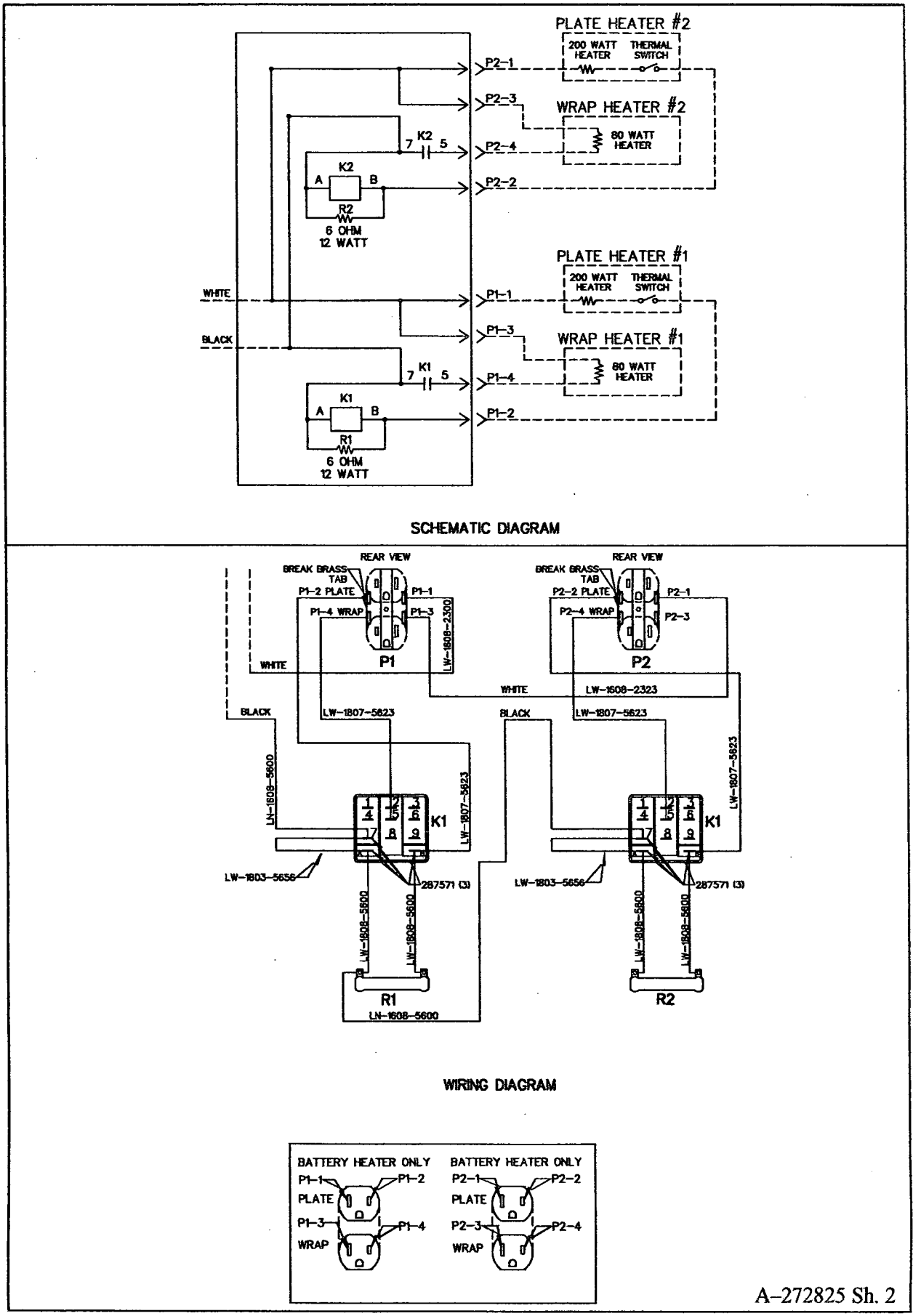


Figure 2b. Battery Heater Kit Electrical Connections (Kit PA–272825)

Parts Listing

Description	Qty.	PA–258885 Kit Part No.	PA–273564 Kit Part No.
Box assembly, relay	1	A–272826	A–272825
Leads	–	(7)(see Fig. 2)	(14)(see Fig. 2)
Washer, #6 split lock	4	X–18–1	X–18–1
Washer, #8 split lock	4	X–18–2	X–18–2
Washer, 3/16 x 7/16 x 3/64 plain	–	(2) X–25–48	(4) X–25–48
Washer, 5/32 x 3/8 x 3/64 plain	–	(4) X–25–9	(8) X–25–9
Screw, 6–32 x 3/8	–	(2) X–49–2	(8) X–49–2
Screw, 6–32 x 1/2	4	X–49–26	–
Screw, 8–32 x 1/2	4	X–51–15	X–51–15
Screw,	4	X–6216–1	X–6216–1
Nut, 6–32	–	(6) X–71–2	(8) X–71–2
Nut, 8–32	4	X–72–4	X–72–4
Receptacle	–	(1) 238581	(2) 238581
Box, relay	1	272820	272820
Plate, cover	1	273822	–
Cover, silkscreen	1	272824	272823
Adapter, tab	–	(3) 287571	(6) 287571
Resistor	–	(1) 292915	(2) 292915
Relay	–	(1) 292916	(2) 292916
Nut, 1/4–20 elastic stop	–	(4) X–101–8	(6) X–101–8
Screw, 5/16–18 x 3/4	2	X–125–3	X–125–3
Washer, 5/16 split lock	2	X–21–1	X–21–1
Washer, 9/32 x 5/8 x 1/16 plain	–	(4) X–25–40	(6) X–25–40
Screw, 1/4–20 x 3/4	2	X–465–16	X–465–16
Screw, 1/4–20 x 5/8	–	(2) X–73–14	(4) X–73–14
Nut, 5/16–18	2	X–82–2	X–82–2
Warmer, battery	–	(1) 255649	(2) 255649
Heater, battery	–	(1) 258780	(2) 258780
Bracket, box	1	275451	275451
Bolt, angle	2	286316	–

Attachment 3

Surface Water Interim Action Enhancement Operation and Maintenance Log Sheet

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Surface Water Interim Action Enhancement
Former Powerex, Inc. Facility
Auburn, New York
Monthly Operation and Maintenance Log Sheet

Aeration System Operational Data

Aeration Blower Discharge Pressure	_____	inches of water
Aeration Blower Discharge Damper Position	_____	
Discharge Air Flow	_____	cubic feet per minute
Discharge Air Temperature	_____	°F
Building Cooling Thermostat Setting	_____	°F
Duct Heater Thermostat Setting	_____	°F
Elapsed Time Meter	_____	hours
	_____	time of reading

Aeration System Inspection and Maintenance

	Yes/No	Comments/Maintenance Performed
Incoming electrical service, including power lines, power poles, isolation switch, and pole-mounted transformers in good condition		
Electrical enclosure locked and in good condition		
Service entrance circuit breaker and fused disconnect switch at electrical enclosure functioning properly		
Equipment enclosure and security fence locked and in good condition		
Blower motor started/disconnect switch and blower functioning properly		
Aerators and piping in good condition		
Catch basin CB-16 cover and vent stack in good condition		
20 amp fused disconnect switch and 15 KVA transformer at equipment enclosure functioning properly		
Load center LP-1 at equipment enclosure functioning properly		
Duct heater functioning properly		
Aeration blower low pressure switch and warning light operational		
0-50" WC pressure gauge functioning properly		
Equipment enclosure interior lights operational		
Equipment enclosure exterior motion detector spot light operational		
Catch basin CB-16 area flood light operational		
Equipment enclosure exhaust fan operational		
GFI receptacles functioning properly		

Surface Water Interim Action Enhancement
Former Powerex, Inc. Facility
Auburn, New York
Monthly Operation and Maintenance Log Sheet

Auxiliary Electrical Generator Operating Data

Hour Meter	_____hours
	_____time of reading
Water Temperature	_____°F
Oil Pressure	_____psi
Battery Charging Voltmeter	_____volts
Fuel Gauge	⅛ ¼ ⅜ ½ ⅝ ¾ ⅞ full
Generator Output	_____AC hertz
	_____AC amps
	_____AC volts

Auxiliary Electrical Generator Inspection and Maintenance

	Circle One	Comments/Maintenance Performed
Mode of Operations Switch	Auto/Off/Manual	
Low Oil Pressure Alarm Light	On/Off	
Inner Tank Fuel Leak Alarm Light	On/Off	
High Engine Water Temp. Alarm Light	On/Off	
Engine Overcrank Alarm Light	On/Off	
Engine Overspeed Alarm Light	On/Off	
Auxilary Fault Alarm Light • Steady Light Means Low Coolant Level • Flashing Light Means No AC Output	On/Off/Flashing	
Diesel Fuel Tank Level Checked and Sufficient to Provide 100 Hrs. of Operation	Yes/No	
Diesel Engine Oil and Engine Coolant Levels Checked and at Appropriate Levels	Yes/No	
Battery Charge, Battery Heater and Engine Block Heater Plugged in and Functioning Properly	Yes/No	
Generator Housing Inspected and in Good Condition	Yes/No	
Generator Tested for a Minimum of 15 Minutes Under Load and Performed Satisfactory	Yes/No	

Surface Water Interim Action Enhancement
Former Powerex, Inc. Facility
Auburn, New York
Monthly Operation and Maintenance Log Sheet

Aeration System Spare Parts Inventory

Spare Part	Quantity Required	Quantity On Hand	Comments
Blower Assembly	1		
Aerator Tray Sections	4		
Duct Heater	1		
Light Bulbs, High Pressure Alarm	1		

Aeration System Preventative Maintenance (PM) Activities

Component	PM Activity	Required Frequency	Comments
Aerator	Remove and clean the aerator tray sections	As required due to low air flow (less than 350 cfm) or high differential pressure (greater than 21 inches of water) or at a minimum, annually	
Blower Air Intake Screen	Clean screen	Quarterly (January, April, July, October)	
Magnehelic Differential Pressure Gauge	Vent both sides of gauge to atmosphere and rezero	Annually (July)	

Auxiliary Electrical Generator PM Activities

Component	PM Activity	Required Frequency	Comments
Electrical Generator	Contracted multi-point inspection	Annually (February)	
	Contracted multi-point maintenance including oil/oil filter change and fuel filter change	Annually (August)	
Diesel Fuel	Add fuel as needed to maintain full fuel level	As required	
Diesel Fuel	Operate generator for 24 to 30 hours and refuel to full fuel level	Annually (November)	

Date: _____

Inspector: _____ print

_____ sign

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