



# Installation Manual

DCU  
GenSets

960-0600

3-86

Printed in U.S.A.

# Safety Precautions

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The following symbols in this manual signal potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Then, take necessary steps to protect personnel as well as equipment.

Read your manual and become thoroughly acquainted with it and your equipment before you start your unit. These recommendations and the following safety precautions are for your protection.

Fuels, electrical equipment, batteries, exhaust gases and moving parts present potential hazards that could result in serious, personal injury. Take care in following recommended procedures.

**DANGER** *This symbol warns of immediate hazards which will result in severe personal injury or death.*

**WARNING** *This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.*

**CAUTION** *This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.*

## General

- Keep your electric generating set and the surrounding area clean and free from obstructions. Remove any debris from set and keep the floor clean and dry.
- Provide appropriate fire extinguishers and install them in convenient locations. Consult your local fire department for the correct type of extinguisher to use. Do not use foam on electrical fires. Use extinguisher rated ABC by NFPA.
- Make sure that all fasteners on the generating set are secure. Tighten supports and clamps, keep guards in position over fans, driving belts, etc.
- Do not wear loose clothing in the vicinity of moving parts, or jewelry while working on electrical equipment. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts; cause shock or burning.
- If adjustment must be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.
- Do not work on this equipment when mentally or physically fatigued.
- Coolants under pressure have a higher boiling point than water. DO NOT open a radiator or heat exchanger pressure cap while the engine is running. Bleed the system pressure first.

## Protect Against Moving Parts

- Keep your hands away from moving parts.
- Before starting work on the generator set, disconnect batteries. This will prevent starting the set accidentally.

## Fuel System

- DO NOT fill fuel tanks while engine is running, unless tanks are outside engine compartment. Fuel contact with hot engine or exhaust is a potential fire hazard.
- DO NOT SMOKE OR USE AN OPEN FLAME in the vicinity of the generator set or fuel tank. Internal combustion engine fuels are highly flammable.
- Fuel lines must be adequately secured and free from leaks. Piping at the engine should be approved flexible line. Do not use copper piping flexible lines as copper will work harden and become brittle.
- Be sure all fuel supplies have a positive shutoff valve.

## Guard Against Electric Shock

- Remove electric power before removing protective shields or touching electrical equipment. Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surfaces to be damp when handling electrical equipment.
- Use extreme caution when working on electrical components. High voltages cause injury or death. DON'T tamper with interlocks.
- Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches.
- DO NOT SMOKE while servicing batteries. Lead acid batteries emit a highly explosive hydrogen gas that can be ignited by electrical arcing or by smoking.

## Exhaust Gases Are Toxic

- Provide an adequate exhaust system to properly expel discharged gases. Inspect exhaust system daily for leaks per the maintenance schedule. Ensure that exhaust manifolds are secure and not warped. Do not use exhaust gases to heat a compartment.
- Be sure the unit is well ventilated.

## Keep the Unit and Surrounding Area Clean

- Make sure that oily rags are not left on or near the engine.
- Remove all oil deposits. Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and subsequent engine damage and may present a potential fire hazard.

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## WARNING

**INCORRECT SERVICE OR REPLACEMENT OF PARTS CAN RESULT  
IN SEVERE PERSONAL INJURY AND/OR EQUIPMENT DAMAGE.  
SERVICE PERSONNEL MUST BE QUALIFIED TO PERFORM  
ELECTRICAL AND/OR MECHANICAL SERVICE.**

# Installation

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## GENERAL

Most generator set installations must be engineered to insure that the generator set will function properly under the expected load conditions. Use these instructions as a general guide only. Follow the instructions of the consulting engineer when locating or installing any components. The complete installation must comply with all local and state building codes, fire ordinances and other regulations that may apply. Also refer to Onan generator set data sheets for detailed application information.

Requirements to be considered prior to installation:

- Level mounting surface of adequate bearing strength.
- Adequate fresh air supply to engine room.
- Adequate discharge outlet of engine cooling air.
- Discharge of exhaust gases.
- Fuel system installation.
- Accessibility for operation and servicing.
- Noise levels.
- Electrical interconnect with further system components, accessories, utility, etc.

Use care in handling this equipment. Lifting, jacking, or rolling equipment of this size and weight, requires tools of adequate capacity that have been designed for the purpose.

Much of the information in this manual is general in nature and applies to the series of DCU generator sets. Refer to Figure 1 when reviewing general information suggestions in this manual. Refer to the individual specification sheets for information regarding lifting points, basic dimensions, weights, fuel connections, etc. Also refer to the engine and generator manuals supplied for more information specific to your generator set order.

## LOCATION AND MOUNTING

Generator set location is decided mainly by related systems such as ventilation, wiring, fuel, and exhaust. Provide a location to minimize extreme ambient temperatures and to protect the generator set from adverse weather conditions. All AC generators sets are designed with screen protected and drip proof enclosures and as such are not suitable for mounting outdoors unless adequately protected by the use of housings. Locate as near as possible to the main power fuse box.

Plan for access to the generator set for servicing and provide adequate lighting around the unit. Wood floors should be covered with sheet metal extending 12 inches (305 mm) beyond the extremities of the set.

Mount the generator set on a substantial and level base such as a concrete pad. For convenience in general servicing such as changing the crankcase oil, the surface of the mounting base should be at least 6 inches (152 mm) above the floor.

Vibration isolators must be installed between the skid and floor. Four are required per installation and are available through your Onan dealer. The spring type provide the greatest attenuation for critical installations. Use anchored mounting bolts to secure the isolators to the floor.

## VENTILATION

Generator sets create considerable heat which must be removed by proper ventilation. Outdoor installations rely on natural air circulation but indoor installations need properly sized and positioned vents for the required airflow. Cooling air travels from the generator end to the engine end on Onan generator sets.

### Vents and Ducts

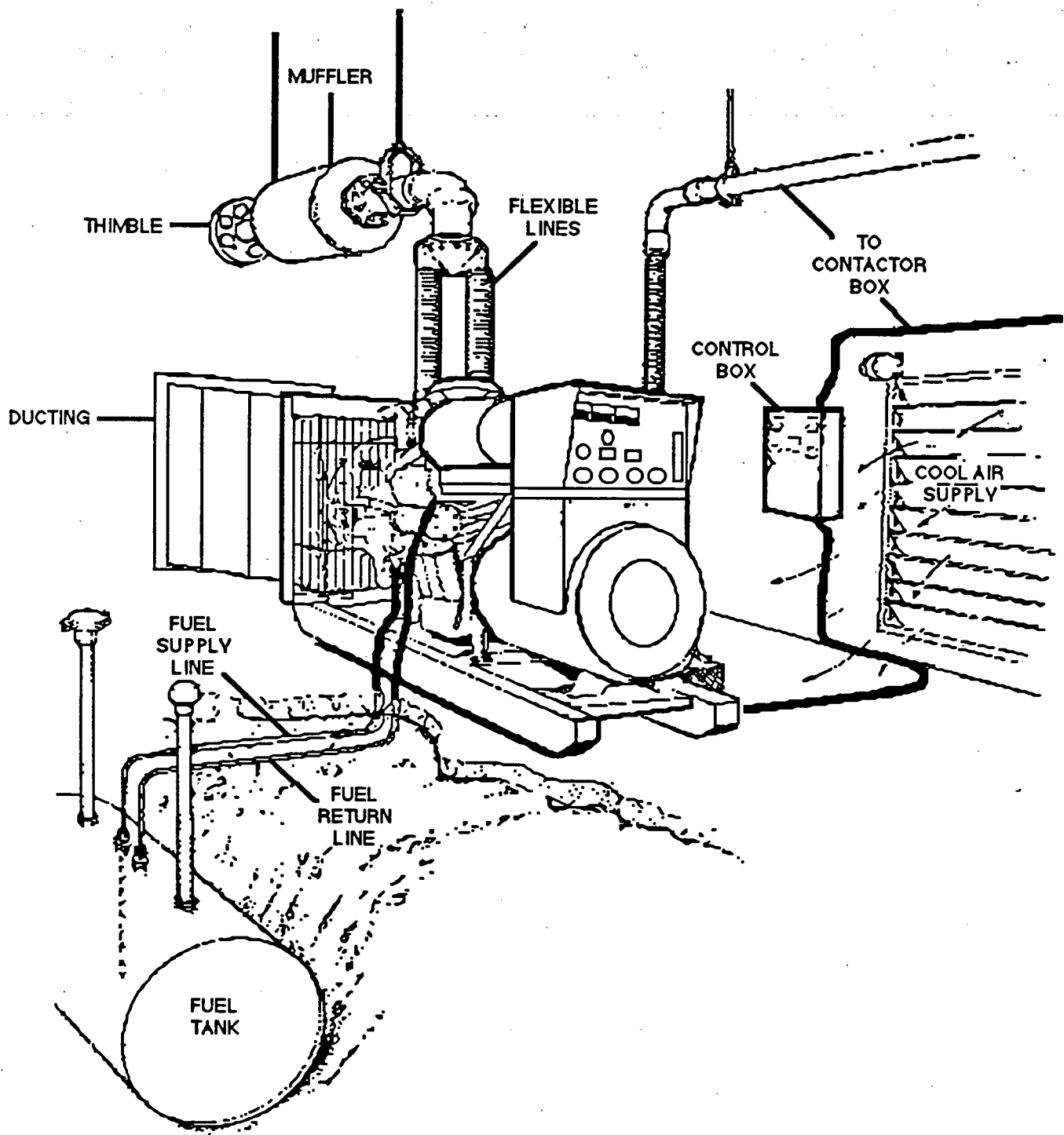
For indoor installations, locate vents so incoming air passes through the immediate area of the installation before exhausting. Install the air outlet higher than the air inlet to allow for convection air movement.

Size the vents and ducts so they are large enough to allow the required flow rate of air. "Free area" of louvers, screens and ducts must be as large as the radiator area (when radiator is used). The inlet air vent should be 1-1/2 times the size of the radiator outlet vent.

Wind will restrict free airflow if it blows directly into the air outlet vent. Consider prevailing wind directions when planning vent locations.

### Dampers

Dampers can be used in any system to block the airflow through the vents when the generator set is not running. This is sometimes necessary in cold climates to keep the generator enclosure at a normal temperature. Review the airflow requirements with your louver supplier so that restriction is within guidelines.



**FIGURE 1. TYPICAL INSTALLATION**

### Radiator Set Ventilation Requirements

Radiator set cooling air is drawn past the rear of the set by a pusher type fan which blows air through the radiator. Locate the air outlet as close as possible, directly in front of the radiator. The effective opening area should be 1.3 times as large as the radiator area. Length and shape of the air outlet duct should offer minimum restriction to airflow. Use a duct of canvas or sheet metal between the radiator and the air outlet opening to prevent recirculation of heated air. The radiator has an air discharge duct adapter flange. Remove the radiator core guard prior to installing the duct.

Locate the air inlet at floor level directly opposite the air outlet if possible, to achieve effective cooling airflow across the generator set. Make the air inlet vent opening 1-1/2 times larger than the radiator.

## COOLING SYSTEM

Although a set mounted radiator with engine driven fan is standard on Onan generator sets, a remote radiator cooling system with an electrically driven fan can also be accomplished to meet site requirements. The following briefly describes the installation requirements for each system.

### Radiator Cooling (Standard)

The standard radiator cooling system uses a set mounted generator with an engine driven pusher type fan to cool the generator set. Air is pulled from the generator end of the set across the engine and then forced through the radiator. An air duct adapter flange surrounds the radiator grill to allow mounting of the air discharge duct. Refer to the section on Ventilation for location and sizing of ducts and vents.

### Remote Radiator (Optional)

Remote radiator cooling systems use a remote mounted radiator with electrically driven fans for generator set cooling. Because of the many design considerations, a remote radiator installations must be engineered to insure that the system will function properly. Follow the instructions of the consulting engineer when installing a remote radiator system. Also consult your Onan dealer for assistance and Technical Bulletin publications more specific than what is covered in this manual. The following information is basic to any such installation.

Removal of the radiator and fan from the generator set reduces the generator set enclosure ventilation requirements but, ventilation must still be provided for engine combustion intake and to maintain a reasonable engine room temperature.

Figure 2 shows a pictorial view of a typical short remote radiator installation. Two key design considerations are the vertical and horizontal distance between the engine and the radiator. These distances determine if any additional equipment is required such as a surge tank, auxiliary pump, or hot well.

Remote radiator plumbing will vary with installation. All systems must comply with the following conditions:

- Make all connections to the set and to the radiator with flexible pipe.
- Install an auxiliary circulating pump if the engine friction and static head pressures are exceeded (see Product Data Sheet).
- Install a hot well system and an auxiliary pump in a high remote radiator installation that exceeds the engine's maximum static head pressure (see Product Data Sheet).

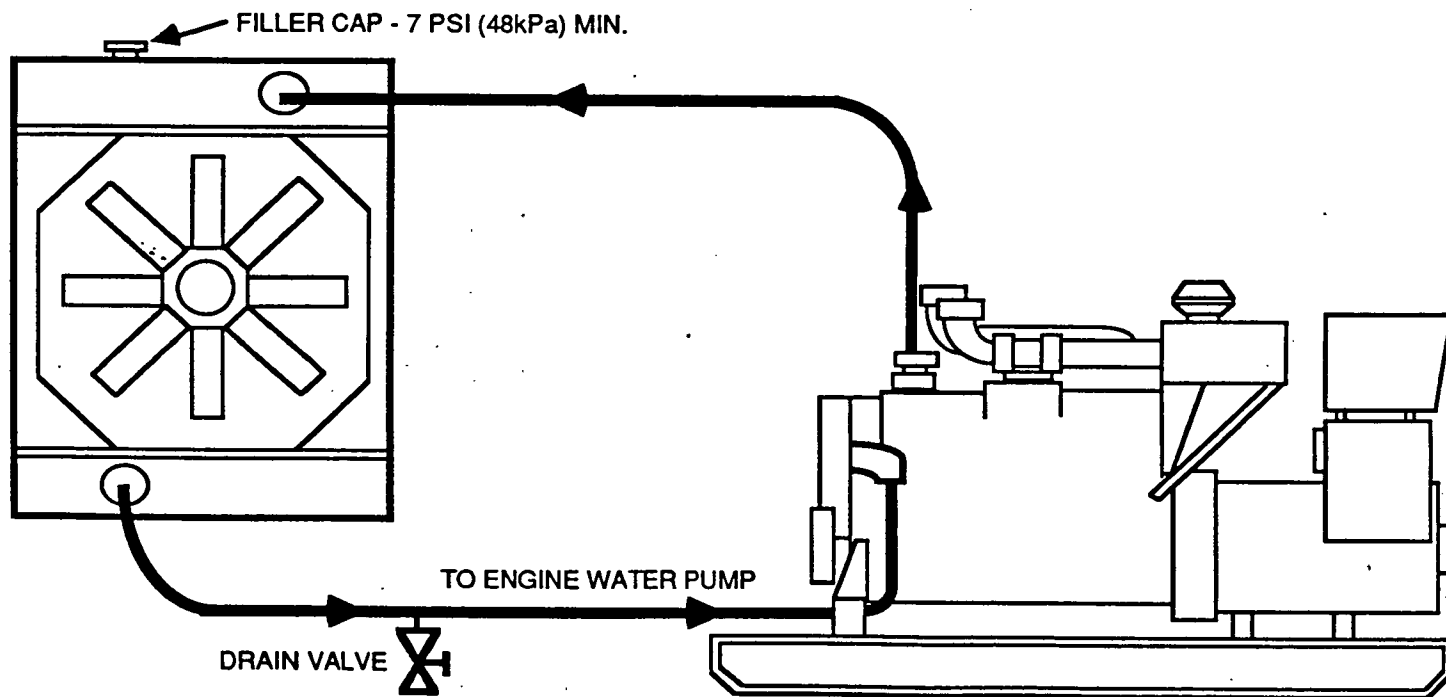


FIGURE 2. SHORT REMOTE RADIATOR INSTALLATION

### Coolant Heater (Optional)

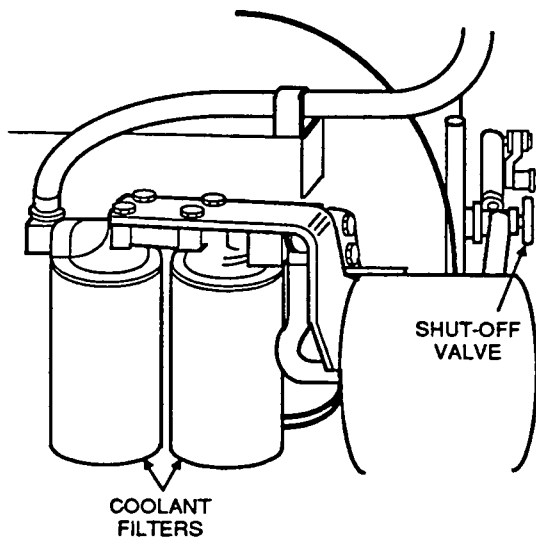
A coolant heater option will keep the engine coolant warm while the engine is shut down. It heats and circulates the coolant within the engine which reduces start-up time and engine wear caused by cold starts. It is electrically operated and thermostatically controlled. Its location is covered in the Electrical Connections section.

### Coolant Filter

Spin-on type corrosion filters are standard equipment, see Figure 3. These precharge filters are compatible with plain water and all ethylene glycol base permanent antifreeze coolants. Refer to engine manufacturer's manual for instructions if a methoxy propanal base antifreeze is desired. Replace filter periodically as recommended in Maintenance section of engine manual.

### CAUTION

**Do not use antifreeze with an anti-leak formula. The stop-leak element can prevent or retard the flow through the filter, thereby eliminating the filtering process completely.**



**FIGURE 3.  
COOLANT FILTER INSTALLATION**

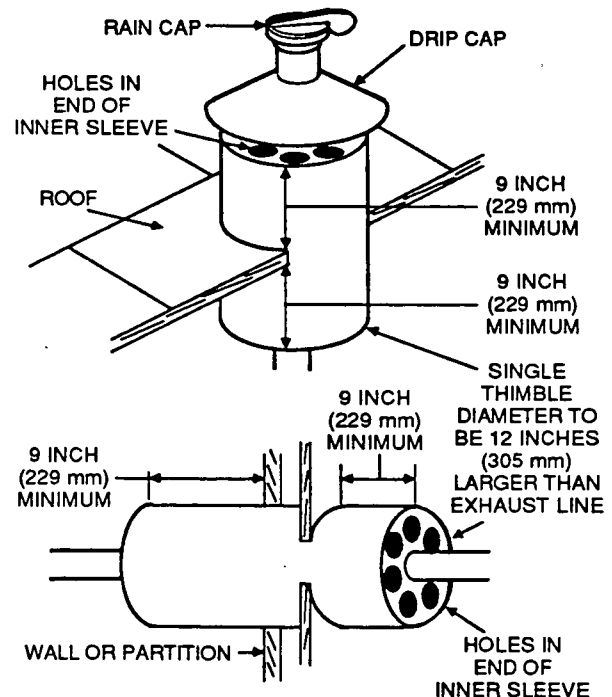
## EXHAUST SYSTEMS

Pipe exhaust gases to the outside of any enclosure. Locate the exhaust outlet away from any air inlets to avoid exhaust gases re-entering the enclosure. Exhaust installations are subject to various detrimental conditions such as extreme heat, infrequent operation, hanging loads, etc.

### WARNING

**Inhalation of exhaust gases can result in severe personal injury or death. Use extreme care during installation to ensure a tight exhaust system. Inspect system audibly and visually for leaks upon initial startup of generator set. Repair any leaks before further operating generator set.**

Use an approved thimble, or other refractory insulation system, where exhaust pipes pass through walls or partitions, see Figure 4. Build according to all applicable code requirements.



**FIGURE 4. EXHAUST THIMBLE**

## WARNING

***Inhalation of exhaust gases can result in severe personal injury or death. Do not use exhaust heat to warm a room, compartment or storage area.***

## WARNING

***Exhaust system components reach combustion temperatures for standard building materials. Use refractory type materials near exhaust components.***

Pitch a horizontal run of exhaust pipe downward to allow any moisture condensation to drain away from the engine. If an exhaust pipe must be turned upward, install a condensation trap at the point where the rise begins, see Figure 5.

Use large radius elbows and provide adequate support for mufflers and piping. Use a section of flexible stainless steel tubing between the engine exhaust connection and the exhaust piping system to permit movement and thermal expansion. Shield or insulate exhaust lines if there is danger of personal contact. Allow at least 12 inches (305 mm) of clearance if the pipes pass close to a combustible wall or partition.

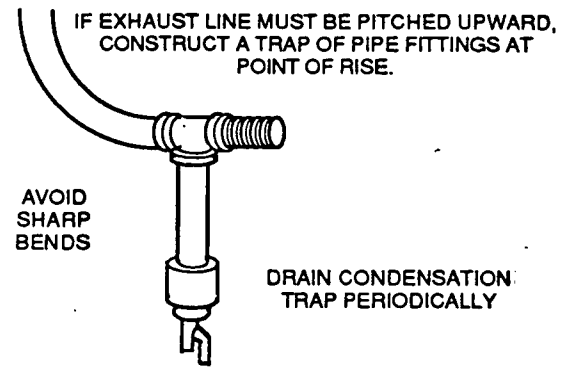
## CAUTION

***Weight applied to the engine manifold or turbocharger can result in manifold or turbocharger damage. Support the muffler and exhaust piping so that no weight or stress is applied to engine components.***

## WARNING

***Exhaust system components reach combustion temperatures which can result in severe personal injury. Provide adequate shielding of exhaust system components from accidental contact by operating personnel.***

The exhaust back pressure of the generator set, when measured at full load and governed engine speed, must not exceed specific values. Consult with your Onan dealer for assistance and Technical Bulletin publications to calculate exhaust system design parameters.



**FIGURE 5.  
EXHAUST CONDENSATION TRAP**

## FUEL SUPPLY SYSTEMS

Check local regulations governing installation of fuel tanks before installing the fuel supply system.

### General

In all fuel system installations, cleanliness is of the utmost importance. Make every effort to prevent entrance of moisture, dirt or contaminants of any kind. Clean all fuel system components before installing.

Use a flexible section of tubing between the engine and the stationary fuel supply line to withstand vibration. Use only compatible metal fuel lines when installing stationary fuel supply lines underground to avoid electrolysis. Onan can supply copper fuel lines with brass fittings if required.

Condensation (water) can cause clogging of fuel filters as well as freezing problems. In addition, water mixing with the sulfur in the fuel forms acid which can corrode and damage engine parts. To avoid condensation problems, keep fuel supply tanks as full as possible by filling up each time the engine is used. In cold weather, warm fuel returning from the injectors heats the fuel in the supply tank. If the fuel level is low, the upper portion of the tank tends to form condensation. In warm weather, both the fuel and the tank will be warm during the daytime. At night, cool air tends to lower the temperature of the tank more rapidly than the temperature of the fuel. If the fuel level is low, the upper portion of the tank will cool more rapidly and tend to form condensation.



Never use galvanized fuel lines, fittings or fuel tanks. Condensation in the tank and lines combines with the sulfur in diesel fuel to produce sulfuric acid. The zinc coating on galvanized lines or tanks reacts with the acid and flakes off to contaminate the fuel.

An electric solenoid shutoff valve in the supply line is recommended for all installations and required for indoor automatic or remote starting installations. Connect the solenoid wires to open the valve during generator set operation.

### Supply Tank

Locate the fuel tank as close as possible to the generator set and within the lift capacity of the fuel pump. Install a fuel tank that has sufficient capacity to keep the generator operating for minimum acceptable run time. Consult your Onan dealer for assistance and Technical Bulletin publications to calculate fuel system design parameters.

## WARNING

**Ignition of fuel can cause severe personal injury or death by fire or explosion. Do not permit any flame, cigarette, or other igniter near the fuel system.**

A typical underground fuel system consists of a main fuel tank, vent and fill pipes, fuel supply line, and fuel return line. If the tank is installed below the lift capabilities of the standard fuel transfer pump, a day tank and auxiliary pump will also be required. If an overhead tank is installed, a day tank and float valve will be required to prevent fuel head pressures from being placed on the fuel system components.

### Day Tank (If Used)

Day tanks are fuel transfer tanks which are used when the standard engine fuel pump does not have the capacity to draw the fuel from the supply tank; or the supply tank is overhead and presents problems of high fuel head pressure for the fuel return. See Figure 6.

## WARNING

**Fuel presents the hazard of explosion or fire which can result in severe personal injury or death. An overflow pipe must be installed between the day tank and main fuel tank to prevent fuel spills in the installation area.**

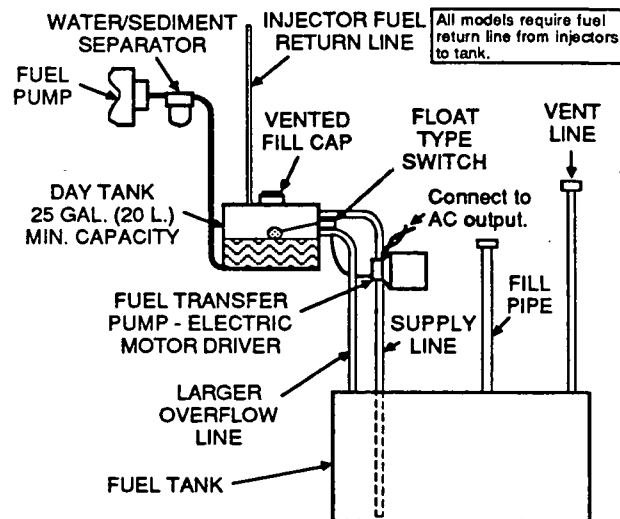


FIGURE 6. DAY TANK (TYPICAL)

**Supply Tank Lower Than Engine:** With this installation, the day tank is installed near the generator set and within the engine fuel pump lift capability, but below the fuel injection system. Install an auxiliary fuel pump as close as possible to the supply tank to pump fuel from the supply tank to the day tank. A float switch in the day tank controls operation of the auxiliary fuel pump.

The supply tank top must be below the day tank top to prevent siphoning from the fuel supply tank to the day tank.

Provide a day tank overflow line to the supply tank in case the float switch fails to shut off the fuel transfer pump.

**Supply Tank Above Engine:** Install the day tank near the generator set and within the engine fuel pump lift capability, but below the fuel injection system. Use fuel line at least as large as the fuel pump inlet.

Include a shutoff solenoid in the fuel line between the fuel supply tank and the day tank. It stops fuel flow when the generator set is shut down.

### Engine Fuel Connections

Identification tags are attached to the fuel supply line and fuel return line connections by the factory. Flexible lines for connecting between the engine and the stationary fuel line are supplied as standard equipment. Refer to Mechanical Drawings section of this manual, and the Engine manual supplied for further information regarding fitting sizes and locations.

If water and contaminants in the fuel is a problem, despite all preventative measures taken, a water/sediment separator is recommended between the engine and the fuel tank. See Figure 6.

## ELECTRICAL CONNECTIONS

### General

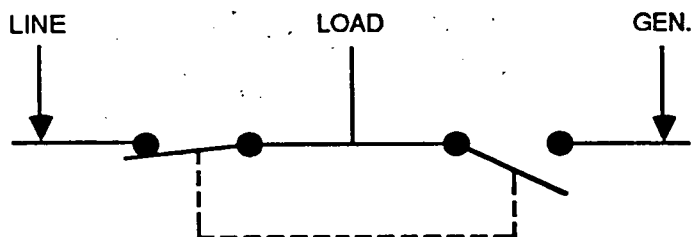
Most local regulations require that wiring connections be made by a licensed electrician and that the installation be inspected and approved before operation. All connections, wire sizes, etc., must conform to the requirements of all electrical codes in effect at the installation site.

Installing the generator set electrical system includes connecting the load and switchgear, and installing the remote start control (if used). The batteries should always be connected last to avoid accidental starting of the unit during installation. Battery connections are covered under "Preparing Generator Set for Operation."

## WARNING

**High AC voltages within the output box present the hazard of severe personal injury or death. Ensure that the generator set starting batteries are disconnected during these procedures.**

If the installation is for standby service, a double throw transfer switch must always be used, see Figure 7. Instructions for connecting an automatic load transfer control are included with such equipment.



NOTE: SHOWN WITH LINE CONNECTED TO LOAD.

FIGURE 7. LOAD TRANSFER SWITCH (TYPICAL)

### Generator Voltage Connections

The generator output voltage and maximum current rating is specified on the generator nameplate. Line-to-neutral voltage is always the lower voltage shown on the nameplate and line-to-line voltage is the higher rating.

Generators can be divided into two groups, reconnectable and non-reconnectable. The reconnectable type generator can be wired to give one of several possible voltages. Non-reconnectable type generators produce only one specific voltage and cannot be wired to give a different voltage without extensive modifications. The following sections explain the connection procedure for each type of generator. Refer to Figure 8 when reviewing the following voltage connection information; and use the electrical schematic supplied with your generator set when actually performing load connections.

**Non-reconnectable Generators (Voltage Code 25, 525, and 9X):** These generators are wired at the factory for a specific voltage and are not intended for reconnection. The voltage and corresponding current rating (amperes) are shown on the nameplate. For these generators, proceed to Load Connections.

**Reconnectable Generators (Voltage Code 47 or 547):** Generators with voltage codes 47 (for 60 Hz) and 547 (for 50 Hz) are three phase and can be reconnected for the voltages shown in Figure 8. Most of these generators must be reconnected by the installer to give the voltage required for the installation. Before shipping, the factory tests the generator set output by connecting the generator to produce a particular test voltage. The installer must always check the stator lead terminal block connections and perform the necessary reconnect to obtain the voltage desired.

### Load Connections

**Connecting the Load:** All loads are connected to the generator by bolting the load wires to the appropriate terminals on the generator terminal block. The terminals are stamped U, V, W, and N to indicate the line and neutral connections. (Reference: U, V, and W correspond with L1, L2, and L3; and N with L0 respectively.)

**Load Balancing:** When connecting loads to the generator set, balance the loads so that the current flow from each line terminal (L1, L2, and L3) is about the same. This is especially important if both single phase and three phase loads are connected. Any combination of single phase and three phase loading can be used as long as each line current is about the same, within 10 percent of median value, and no line current exceeds the nameplate rating of the generator. Check the current flow from each line after connections (procedure following) by observing the control panel ammeter.

### Grounding

Grounding involves making a conducting connection between the metal parts of the generator set or one of its electrical circuits and the earth. The design and installation of a grounding system is affected by many factors such as use of multiple transformers, ground fault protection requirements, and physical location of the generator. Follow the recommendations of the consulting engineer when installing the grounding system. All connections, wire sizes, etc. must conform to the requirements of the electrical codes in effect at the installation site.

## WARNING

**Contact with electrically "hot" equipment can result in severe personal injury or death. It is extremely important that bonding and equipment grounding be properly done. All metallic parts which could become energized under abnormal conditions must be properly grounded.**

NAMEPLATE VOLTAGE CODE	VOLTAGE	PHASES	HERTZ	Generator Connection	Current Transf. Conn.	GENERATOR CONNECTION SCHEMATIC CIAGRAM	GENERATOR CONNECTION WIRING DIAGRAM
47	120/240	1	60	DOUBLE DELTA	1 and 3		
547	115/230 110/220	1	50				
47	120/240	3	60	SERIES DELTA	1 and 3		
547	110/220 115/230	3	50				
47	120/208 127/220 139/240	3	60	PARALLEL WYE	1 and 3		
547	110/190 115/200 120/208 127/220	3	50				
47	220/380 240/416 † 254/440 † 277/480	3	60	SERIES WYE	1 and 2		
547	200/346 †† 220/380 †† 230/400 †† 240/416 254/440	3	50				
*9X	347/600	3	60				

† - Also Voltage Code \*25

†† - Also Voltage Code \*525

\* - 3-Phase/4-Wire

FIGURE 8. GENERATOR VOLTAGE CONNECTIONS

### Remote Control Connections

Provision is made for connecting one or more remote starting switches and a common alarm to the DC control circuit. Connections are made to terminal block TB1 of the Engine Control Monitor (ECM), located inside the control box, see Figure 9. The common alarm must be limited to 4 amperes maximum. If the distance between the set and remote station is less than 1000 feet (305 m), use No. 18 AWG wire; between 1000 and 2000 feet (305 and 610 m), use No. 16 AWG wire.

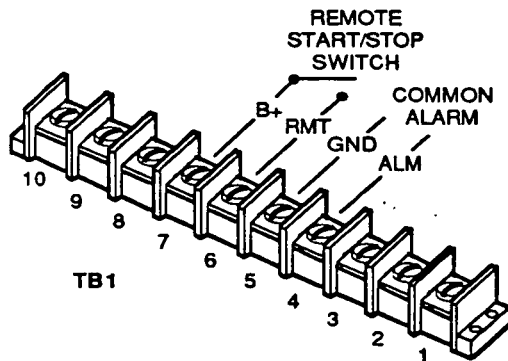


FIGURE 9.  
REMOTE CONTROL CONNECTIONS

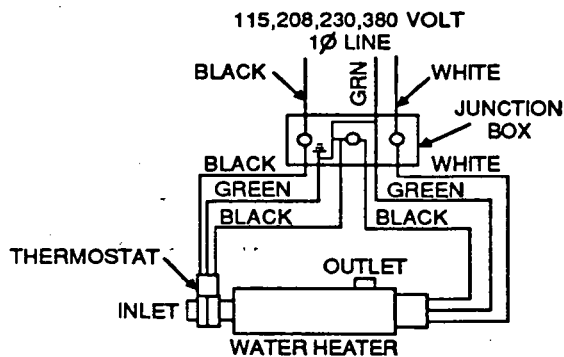
### Coolant Heater (Optional)

A coolant heater can be installed to keep engine coolant warm while the generator set is not operating. It heats and circulates the coolant within the engine which reduces start-up time and engine wear caused by cold starts. It is electrically operated and thermostatically controlled.

## CAUTION

*The heater must not be operated while the cooling system is empty or when the generator set is operating or damage to the heater will occur.*

Figure 10 shows the heater connections. Connect the heater to a source of power that will be on during the time the generator set is not operating. Be sure the voltage rating is correct for the heater element rating.



### Control Heater (Optional)

The thermostat controlled heater option maintains the control box temperature at  $105^{\circ} \pm 5^{\circ} \text{ F}$  ( $41^{\circ} \pm 3^{\circ} \text{ C}$ ). This is desirable in environments with low ambient temperatures and/or high humidity. The heater power cord must be plugged into a 120-volt AC source.

The thermostat is factory set to open on rising temperature of  $105^{\circ} \text{ F}$  ( $41^{\circ} \text{ C}$ ) and normally does not require adjustment. The wiring diagram in Figure 11 shows location of the thermostat adjustment screw. A schematic diagram is also shown for reference.

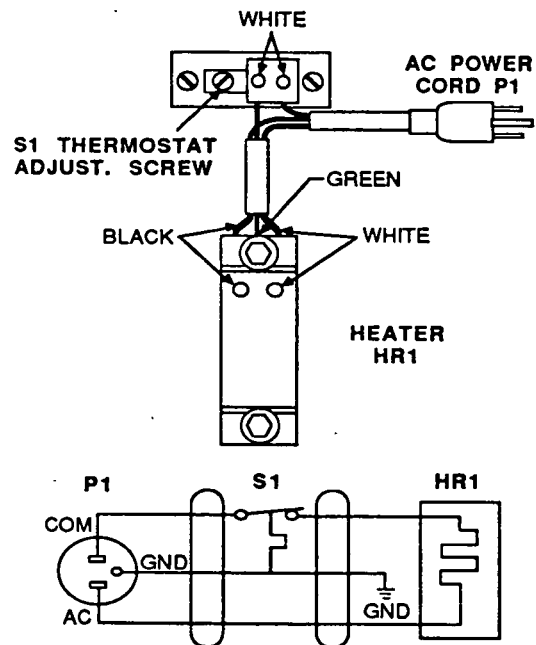


FIGURE 11. CONTROL HEATER  
WIRING/SCHEMATIC DIAGRAM

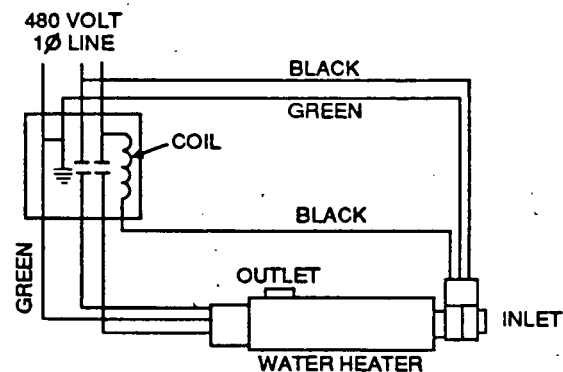


FIGURE 10. COOLANT HEATER WIRING DIAGRAMS

## PREPARING GENERATOR SET FOR OPERATION

Before attempting the initial start of the generator set, be sure the engine is serviced for operation, generator set output is correctly connected, and Remote-Stop-Run switch is at STOP position. Refer to the Maintenance section of operating instructions and engine manual supplied with your generator set for the proper procedures and recommendations. Service the following.

### Lubrication

Engine oil was drained prior to shipment. Before starting, fill the crankcase with the recommended oil.

### Coolant

Engine coolant was drained prior to shipment. Before starting, fill the cooling system with recommended coolant.

### Fuel

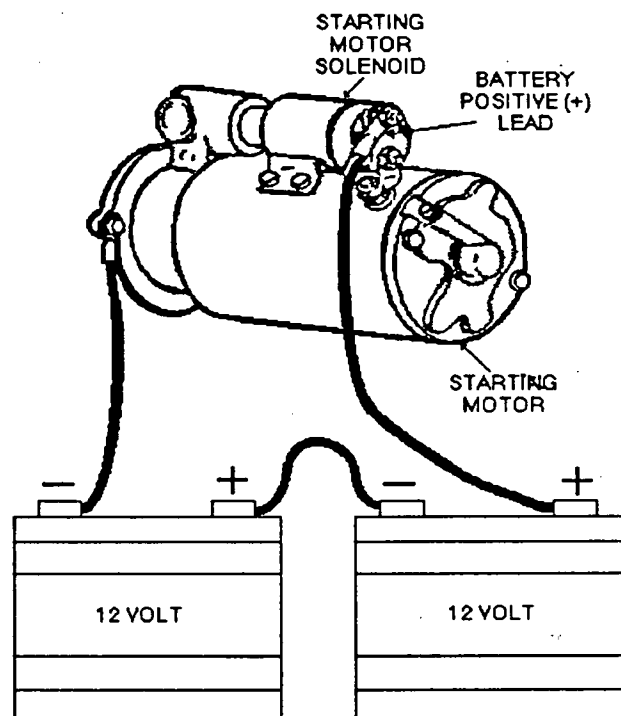
Fill the fuel tanks with the recommended fuel and prime the fuel system.

### Connect Starting Batteries

Starting the unit requires 24-volt battery current. Use two 12-volt batteries for a normal installation. Connect the batteries in series (negative post of first battery to positive post of second) as in Figure 12. Necessary battery cables are included. Service the batteries as necessary. Infrequent unit use (as in emergency standby service) can allow the batteries to self-discharge to the point where they cannot start the unit. If installing an automatic transfer switch and it has no built-in charge circuit, connect a special float charger to keep the batteries charged at proper level.

## WARNING

*Ignition of explosive battery gases can result in severe personal injury. Do not smoke or allow any arc-producing devices around the battery area. Do not disconnect battery cables while the generator set is cranking or running.*



**FIGURE 12.**  
**STARTING BATTERY CONNECTIONS**

## INITIAL START-UP AND CHECKS

Before attempting initial start-up of generator set, review the following:

1. Crankcase filled.
2. Fuel system filled and primed.
3. Cooling system filled.
4. Batteries charged and connected.
5. All covers, guards, and shrouding are securely in place.
6. Review Control Descriptions in Operators manual.
7. Fresh air supply venting system is ready.

### Initial Start-Up

Prepare all other site equipment (switchgear, remote start/stop control, etc.) to allow manual start-up for no-load operation of generator set at set control. Then perform the following:

1. Start the generator set. Move the Remote-Stop-Run switch on the engine control panel to the RUN position. The starter should crank the engine, and the engine should start within a few seconds. If engine fails to start, review Troubleshooting information in Operators manual and Control Service manual.
2. Upon successful start-up of generator set, perform the following checks:
  - Exhaust system for leaks.
  - Fuel system for leaks.
  - Cooling system for leaks.
  - Oil pressure between 50 and 70 psi (345 and 483 kPa).
  - DC ammeter reading is 10 to 30 amperes.
  - Fresh air supply okay.
  - Water temperature stabilizes (after about 10 minutes) at 165° to 195° F (74° to 91° C).

If any leaks or improper operation are noticed, shut down generator set immediately by placing the Remote-Stop-Run switch at STOP position. Remedy the problem before further operating the generator set. If operation appears proper, continue to next step.

3. Monitor the Voltage and Frequency meters on the control panel. Perform necessary Voltage adjustment at control panel to obtain rated nameplate voltage. If adjustment does not achieve proper voltage reading, refer to the generator manual supplied for adjustment procedures of Automatic Voltage Regulator (A.V.R.) unit located on generator output box.

The AC generator is fitted with a permanent magnet exciter which ensures voltage build-up from a low speed such that nominal voltage is achieved within a very short period after start-up of generator set. If proper voltage cannot be obtained, shut down generator set by placing the Remote-Stop-Run switch to STOP position and review troubleshooting information in generator manual supplied.

4. Upon successful voltage adjustment, move the Phase Selector switch to read line-to-line and line-to-neutral current readings. If current registers on AC Ammeter gauge, shut down the generator set by placing the Remote-Stop-Run switch to STOP position and contact an Onan service representative for assistance before further operating the generator set.

## WARNING

***High AC voltages produced by the generator set present the hazard of severe personal injury or death. During a no-load test there should be no AC output current readings at generator set.***

5. Stop the generator set by moving the Remote-Stop-Run switch to STOP position.
6. Prepare all other site equipment for test with load. Refer to Operators manual and perform the manual, remote, and automatic start-up procedures as they apply to your installation. If you encounter any problems of normal operation of the generator set, contact an Onan service representative for assistance.

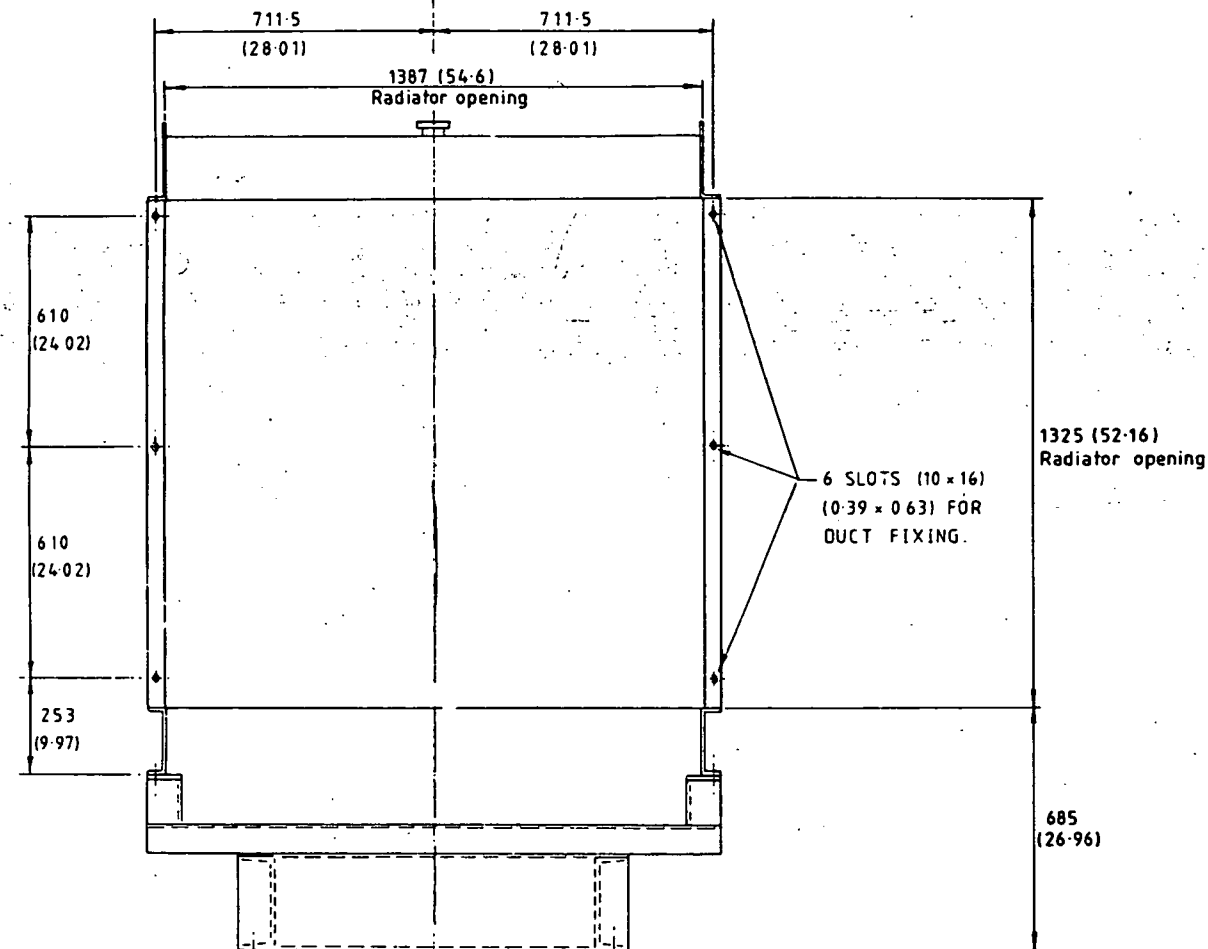
# Mechanical Drawings

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50



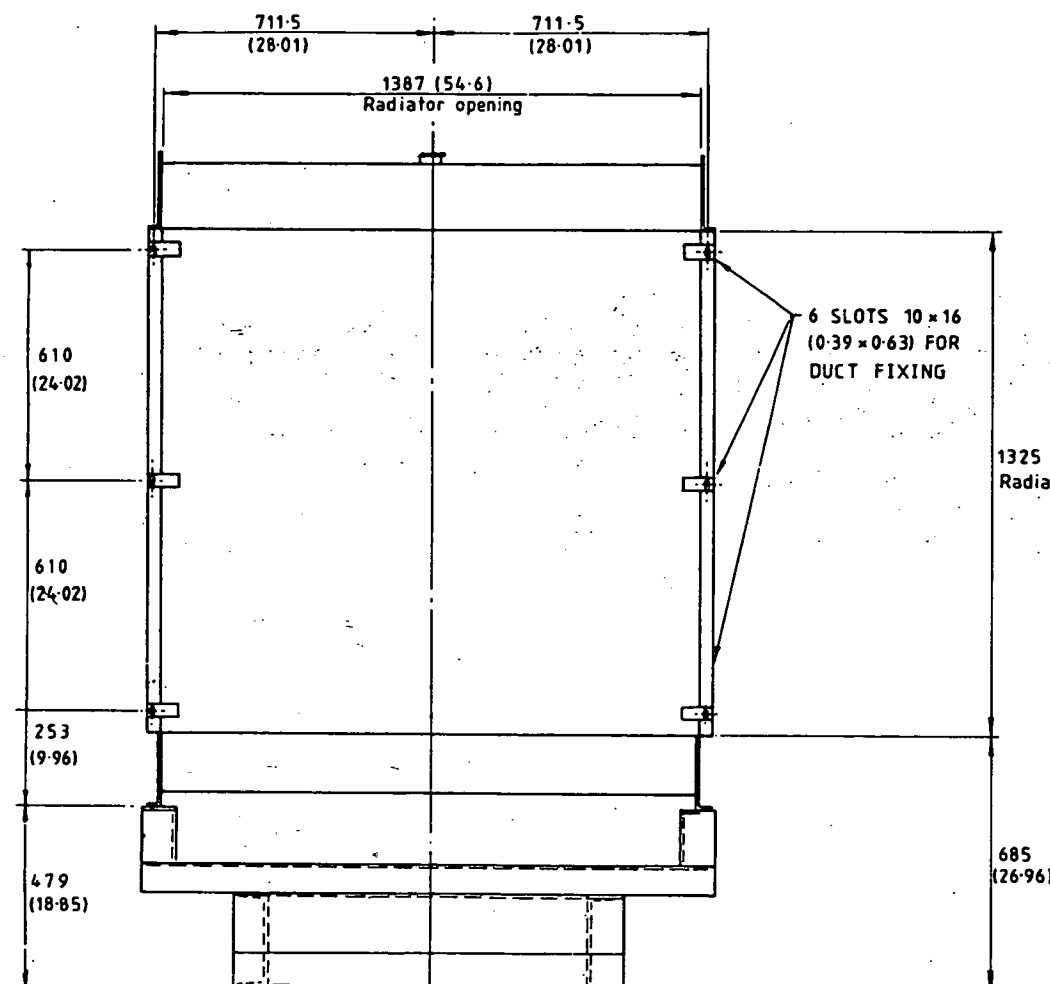
**NOTE**  
FUEL RETURN AND SUPPLY LINES ARE INCLUDED.  
LINES ARE 1270 mm (50') LONG AND HAVE  
3/16"-14 NPT THREAD ON END OPPOSITE ENGINE.



DIMENSIONS IN MILLIMETRES AND (INCHES)

Do Not Scale Print	Tolerances unless otherwise specified		Size to	500-2151 D	Rev	Item	Part No.	Q/each	Req. Size	Qty	Description of Material
	mm	inch	Copied from		Name	Date	 Onan Corporation Minneapolis, Minnesota				
	.2	.015	Third Angle Projection		13-1-66						
	Machine Notes: 5.8 to (15 mm) +0.008 -0.008	.215 +0.008 -0.008	This document is the property of Onan Corporation. It is loaned to you for your use only. It is not to be retransmitted, used, or otherwise handled in any way without the written consent of Onan Corp. as it is controlled by Onan Corp. as it is.		Color: <i>Blue</i> Approved: <i>[Signature]</i>	5-8-66 3-2-66		 Onan Corporation Minneapolis, Minnesota <b>OUTLINE - ENG. GEN.</b>			
Angles: 2	Drawn to: J: 10	For interpretation of manufacturing and assembly instructions, refer to Onan Corp. drawing 510 DCUK	510 DCUK	Qty: 500 - 2151	2-2	2-2					

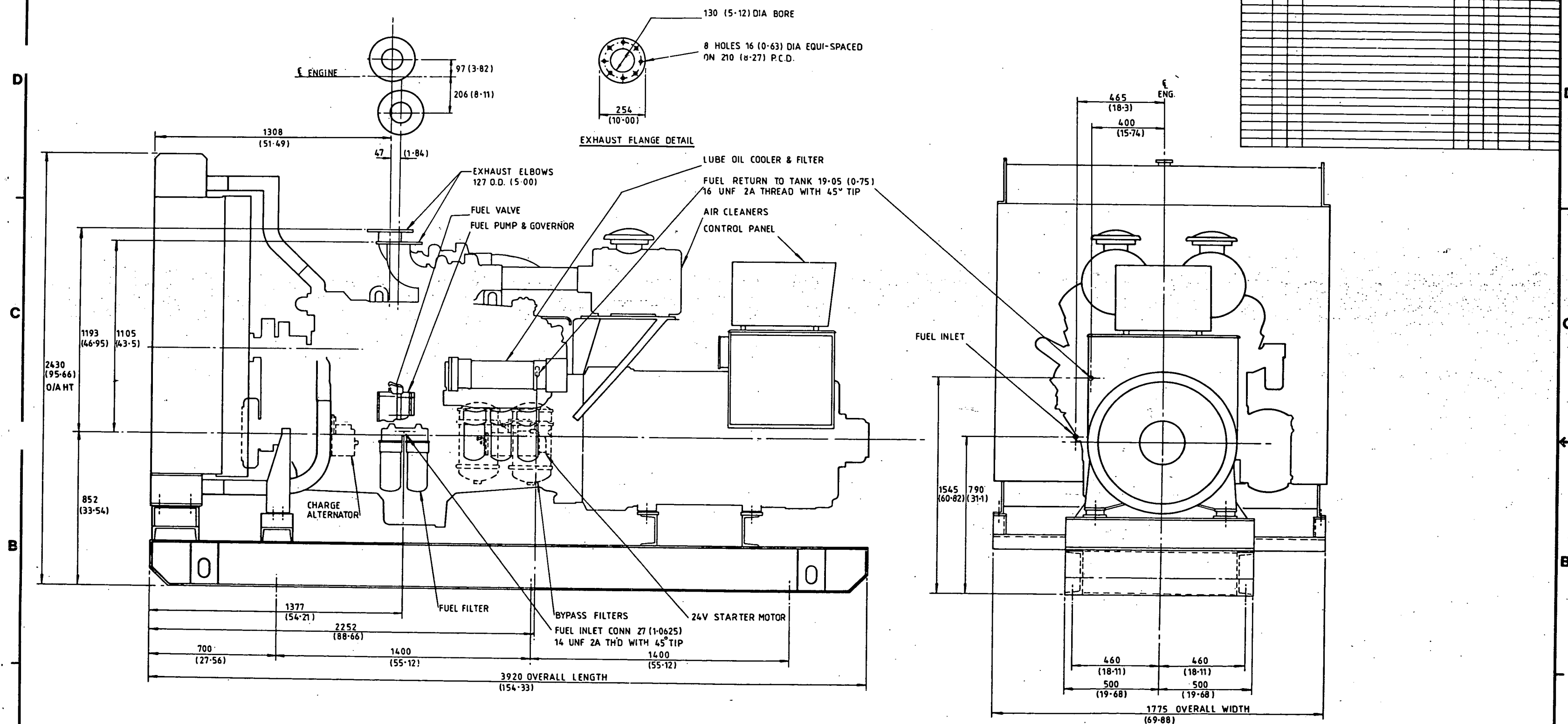


[illegible]

**NOTE**  
FUEL RETURN AND SUPPLY LINES ARE INCLUDED.  
LINES ARE 1270 mm (50") LONG AND HAVE  
3/4-14 NPT THREAD ON END OPPOSITE ENGINE.

DIMENSIONS IN MILLIMETRES AND (INCHES)

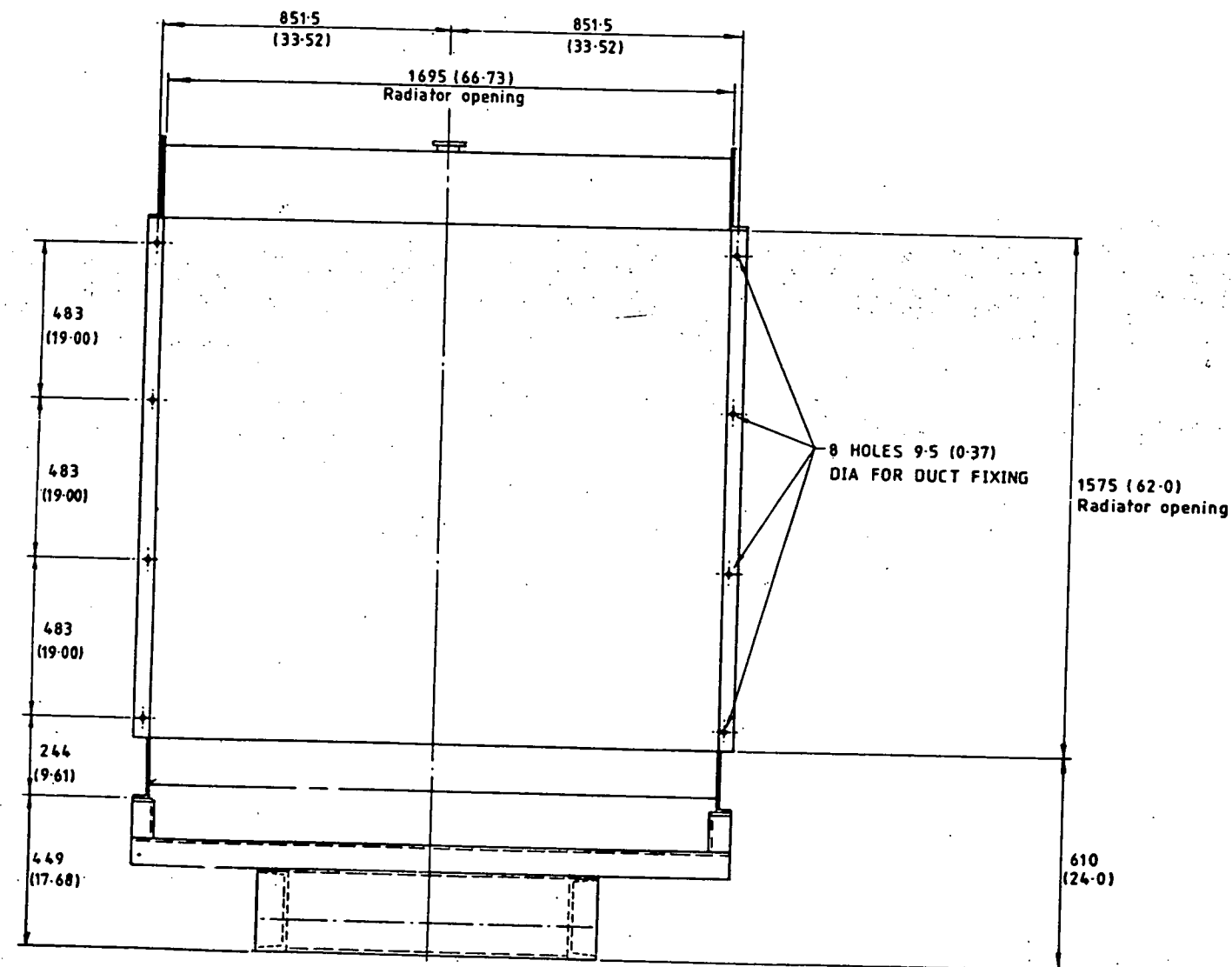
Do Not Scale Print	Tolerances unless otherwise specified		Size to	Part No.	*Qty	Drawn	Qty	Description or Material
	mm	Inch	Drawn	Name	Date			
	.25 ±	.010 ±	Third Angle Projection	Dr. <b>P.G. COPEMAN</b>	14-1-86			<b>Onan</b> Onan Corporation Minneapolis, Minnesota
	.125 ±	.005 ±		Appr. <b>R. THOMPSON</b>	3-21-86			<b>OUTLINE - ENG. GEN.</b>
Microhard Notes: .5 in (12.5 mm)		This document is the property of Onan Inc. and is loaned to you for your use only. It is not to be distributed outside your organization without the written permission of Onan Inc. or its authorized representatives.		For interpretation of tolerances and dimensions, refer to ASME Y14.5-1983.		Model first used on		Drawn
.10 ±		.000 ±		460-DCUK		500-2152		2-2
.05 ±		.002 ±						
Angles: Drawn to 1:10								



UNIT	CAP LITRES	CAP US GALS	WEIGHT Kg	WEIGHT LBS
GEN DRIVE VTA-28-G2			2770 DRY	6100 DRY
L	84.4	22.3	72	159
MOLANT	80.0	21.25	80	176.5
MODIATOR 23534-5 23536-5			408 DRY	900 DRY
COOLANT	158	41.5	158	348.5
GENERATOR SC634A/B			1740 DRY	3836 DRY
SKID UNIT			610 DRY	134.5 DRY
FUEL (A)	790	208	672	1482
TOTAL DRY			5528(5.5 TONNES)	12181 (5.44 TONS)
TOTAL GROSS			6627(6.6 " )	14339(6.4 " )

\* IF EQUIPPED WITH SET MOUNTED FUEL TANK

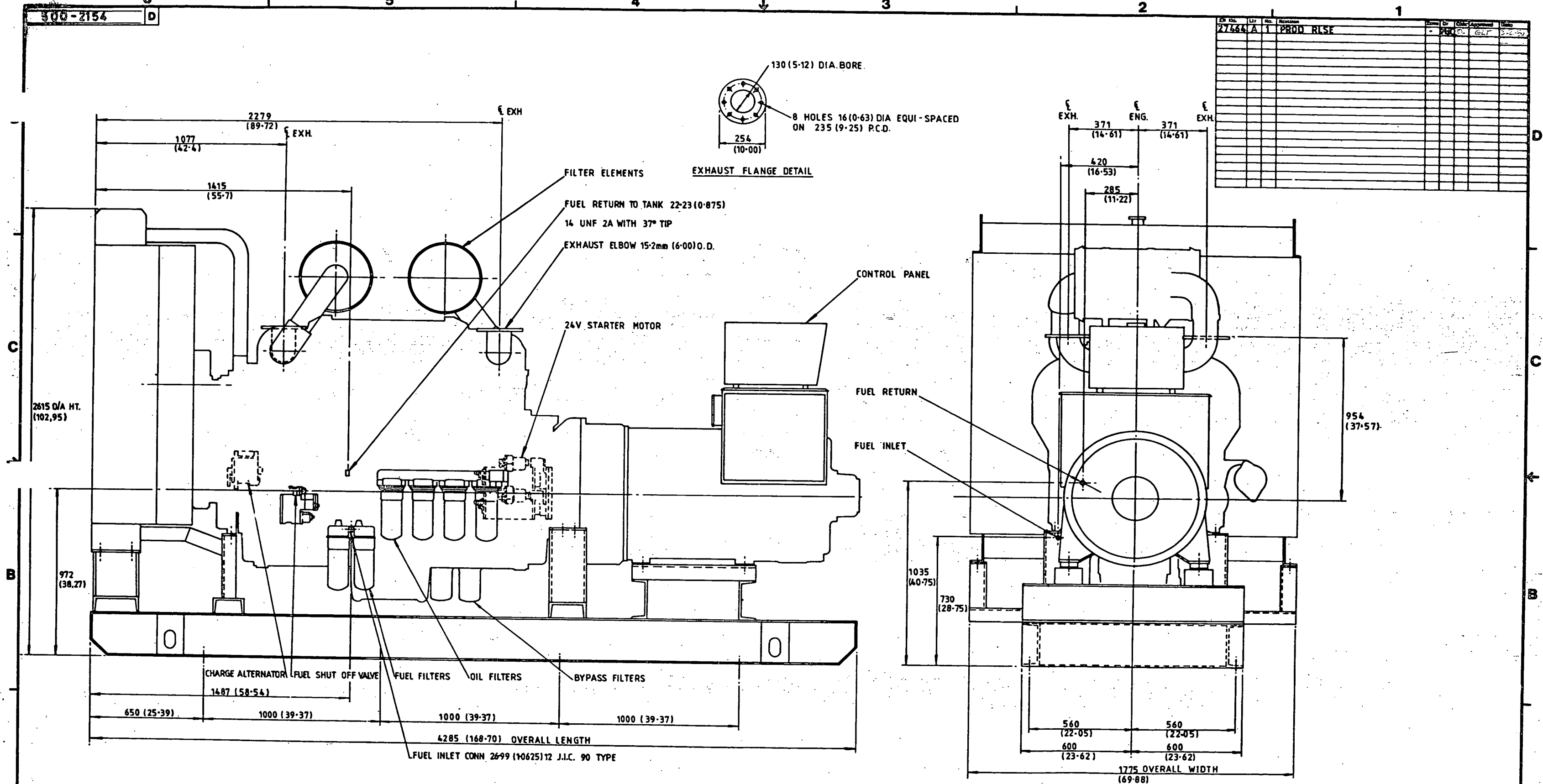
Do Not Scale Print	Tolerances unless otherwise specified		Sell to	DRAWING NO.	REV	Item	Part No.	*Bush	Shg Size	Qty	Description or Material
	mm *	Inch		500-2153		Name	Date				
	R . 2	J . 2	Third Angle Projection			P.G. COPEMAN	75-1-86				<b>Onan</b> Onan Corporation Minneapolis, Minnesota
	.XXX	.XXX				Cdr <i>[Signature]</i>	7-2-86				Tel. <b>OUTLINE - ENG. GEN.</b>
	Unbalanced Holes : < 6 in (15 mm)					Approved <i>[Signature]</i>	3-2-86				
	> 6.19	> .250									
Angles :		Drawn to 1:10									
			For reproduction of this drawing, contact Minneapolis Sales Office at 554-2153.								
			Model first used on 605DCUL/550DCUM								
			Drawing No. 500-2153								
			Sheet 1-2								



**NOTE**  
FUEL RETURN AND SUPPLY LINES ARE INCLUDED.  
LINES ARE 1270 mm (50') LONG AND HAVE  
3/4-14 NPT THREAD ON END OPPOSITE ENGINE

DIMENSIONS IN MILLIMETRES AND (INCHES)

[illegible]

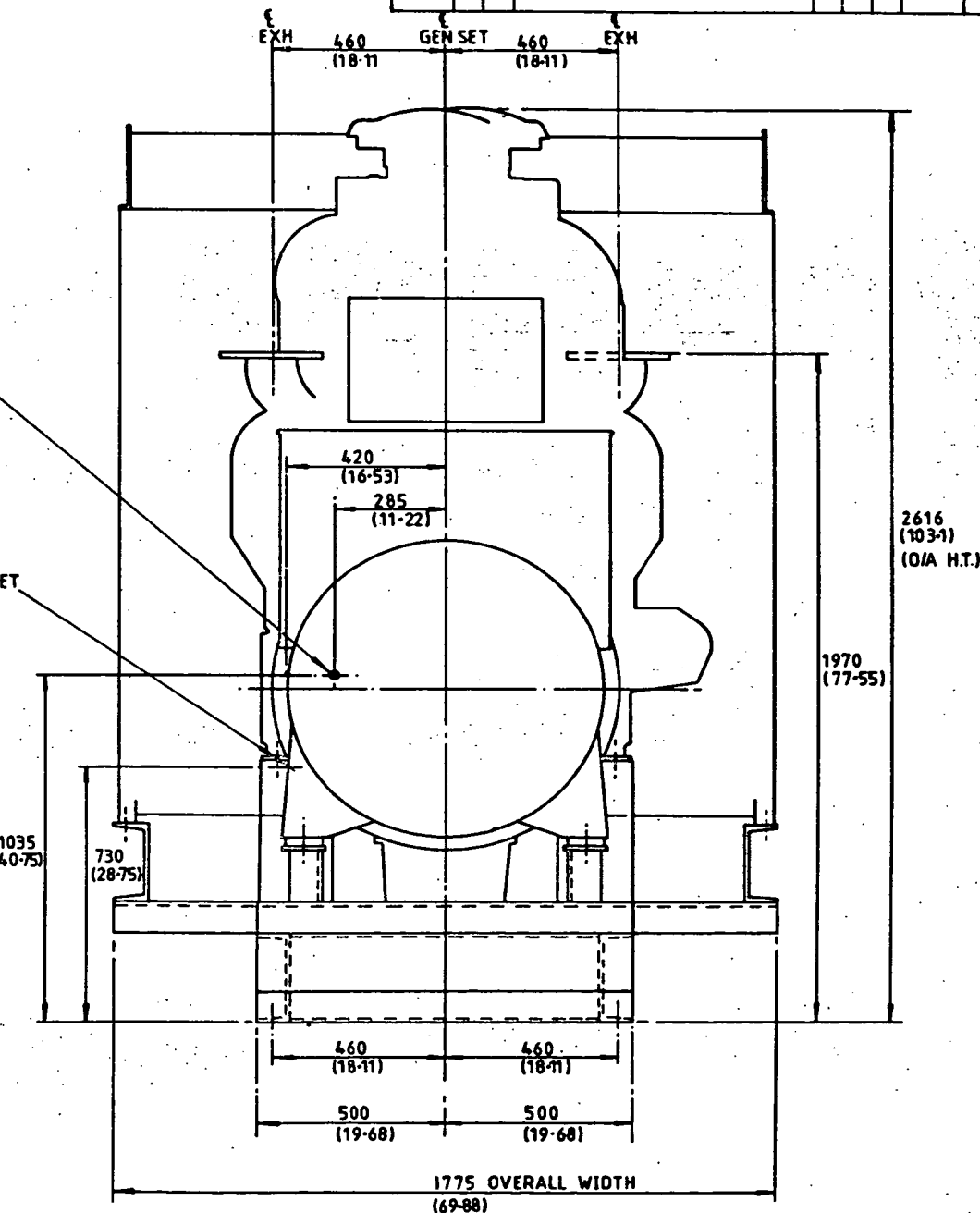
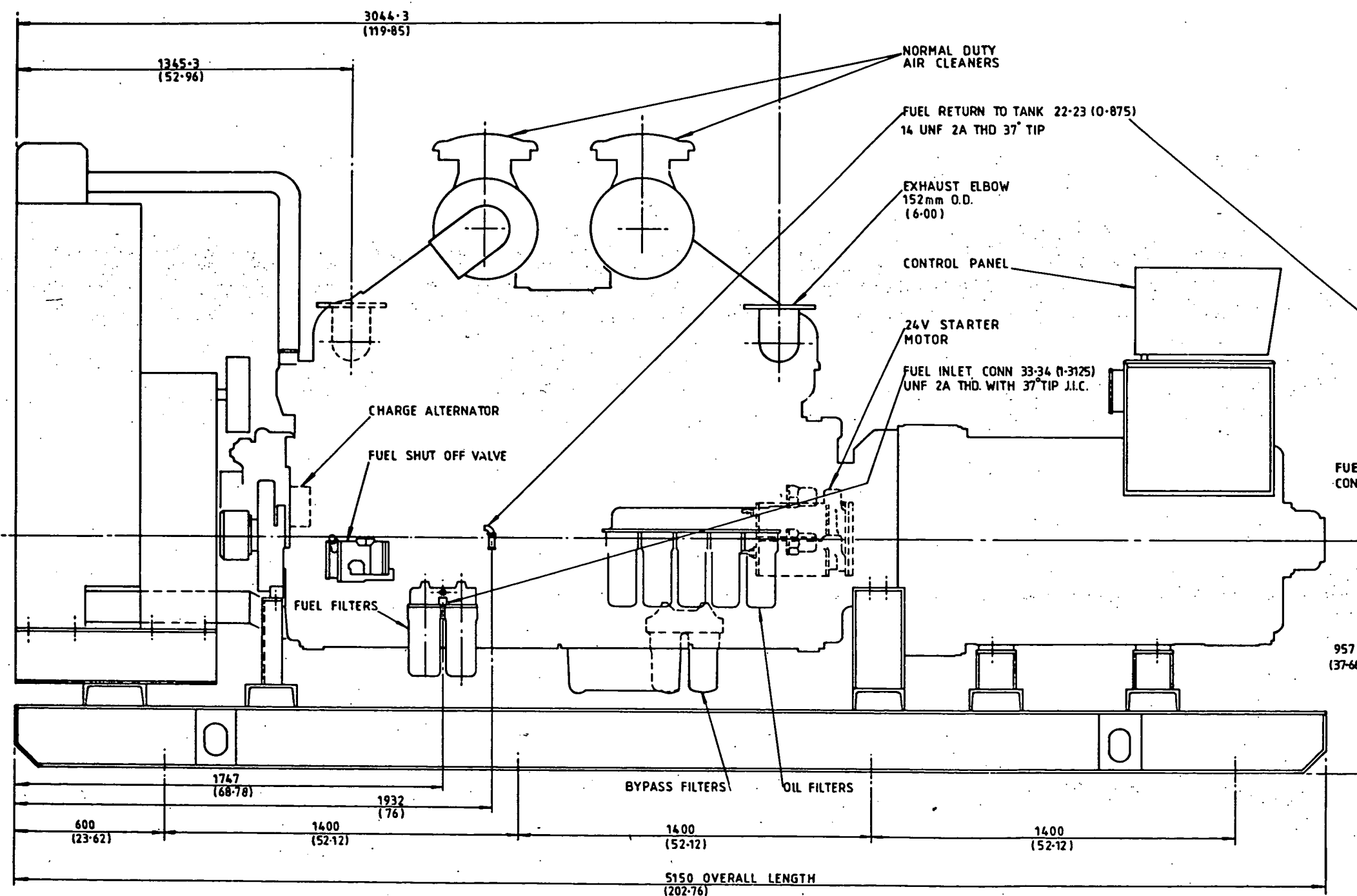


UNIT	CAP LITRES	CAP U.S. GALS.	WEIGHT Kg	WEIGHT LBS
GENERATOR DRIVE KTA 38G1			3723	8200
OR	129	34	110	246
LANT	118	31-25	100	225
NATOR 53510-4			408	900
LANT	158	41-5	134	301
GENERATOR SC634 B/C			1740	3836
SKID UNIT			883	1978
FUEL (#1)	1075	280	914	2015
TOTAL DRY			6754 (6-8 TONNES)	14914 (6-7 TONS)
TOTAL GROSS			8012 (8-0 TONNES)	17700 (7-9 TONS)

\* IF EQUIPPED WITH SET MOUNTED FUEL TANK

Do Not Scale Print	Tolerances unless otherwise specified	Scale	Item	Part No.	Rev.	Qty.	Description or Material
	mm	inch					
	1:1	1:1					
	1:2	1:2					
	1:4	1:4					
	1:8	1:8					
	1:16	1:16					
	1:32	1:32					
	1:64	1:64					
	1:128	1:128					
	1:256	1:256					
	1:512	1:512					
	1:1024	1:1024					
	1:2048	1:2048					
	1:4096	1:4096					
	1:8192	1:8192					
	1:16384	1:16384					
	1:32768	1:32768					
	1:65536	1:65536					
	1:131072	1:131072					
	1:262144	1:262144					
	1:524288	1:524288					
	1:1048576	1:1048576					
	1:2097152	1:2097152					
	1:4194304	1:4194304					
	1:8388608	1:8388608					
	1:16777216	1:16777216					
	1:33554432	1:33554432					
	1:67108864	1:67108864					
	1:134217728	1:134217728					
	1:268435456	1:268435456					
	1:536870912	1:536870912					
	1:1073741824	1:1073741824					
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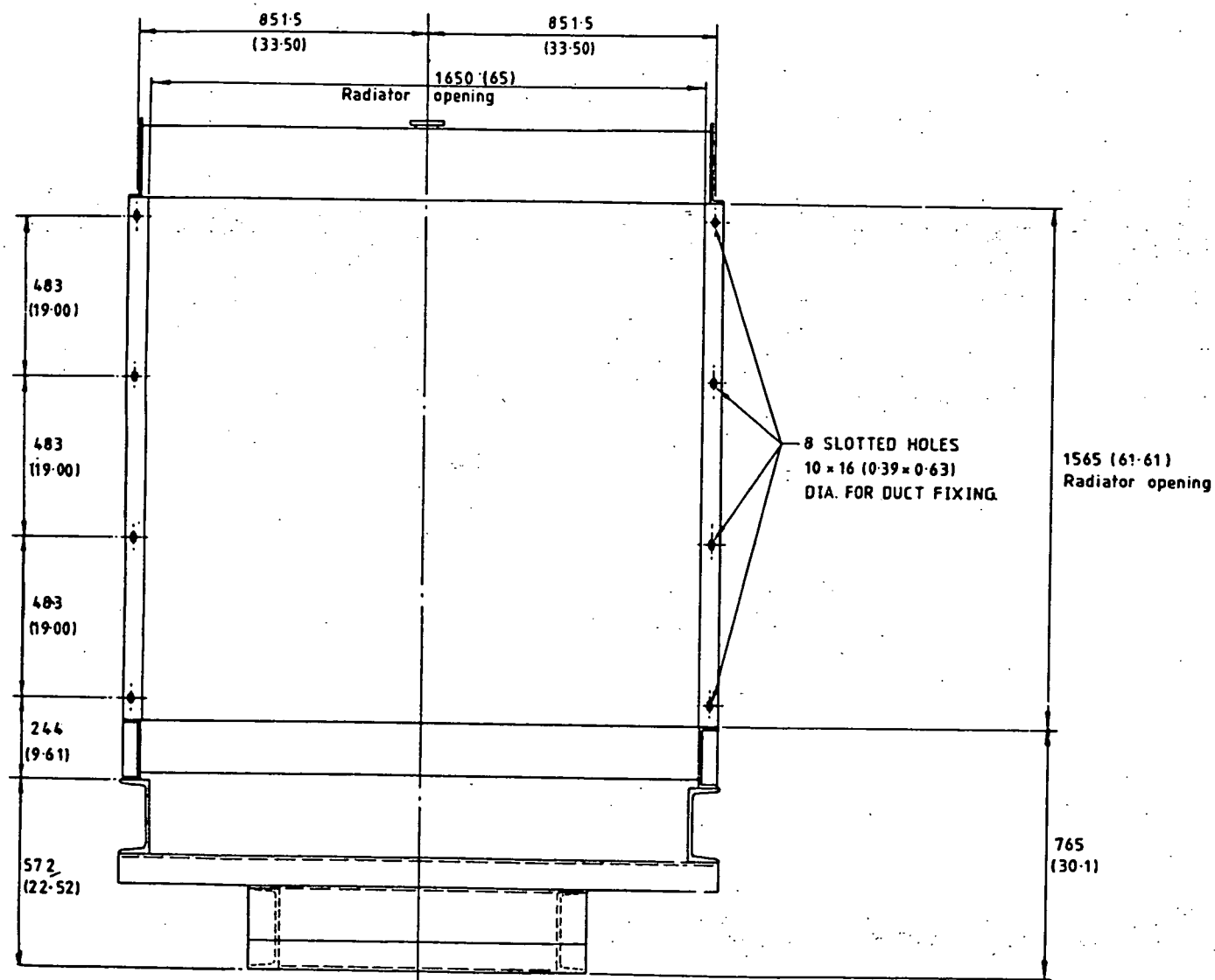
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UNIT	CAP. LITRES	CAP. U.S. GALS	WEIGHT Kg	WEIGHT LBS
MTA 50 G1. GEN. DRIVE			4860 DRY	10,714 DRY
WATER	146	38.5	124	273
PLANT	153	40.5	130	287
DIATOR 532984			510 DRY	1124 DRY
COOLANT	158	41.5	158	348
GEN. SC734A/B			2500	5,511
SKID UNIT			1042 DRY	2,297 DRY
FUEL (8)	1020	268.5	867	1911
TOTAL DRY			8912 (8.9 TONNES)	19646 (8.7 TONS)
TOTAL GROSS			10190 (10.2 " )	22465 (10 "

\* IF EQUIPPED WITH SET MOUNTED FUEL TANK

Do Not Scale Print	Tolerances unless otherwise specified		Size to	Item	Part No.	Qty	Unit	City	Description or Material
	mm	inch	Third Angle Projection	Dr	P. G. COPEMAN	7-1-86		Onen	Onen Corporation Minneapolis, Minnesota
	± .2	± .010		City	<i>St. Paul</i>	3-A-6-06		Item	OUTLINE - ENG GEN.
	Maximum Holes 5/16 to 1/2 inch	± .010		Approved	<i>[Signature]</i>	3-A-6-06		Drawn By	500-2157
	± .005								1-2





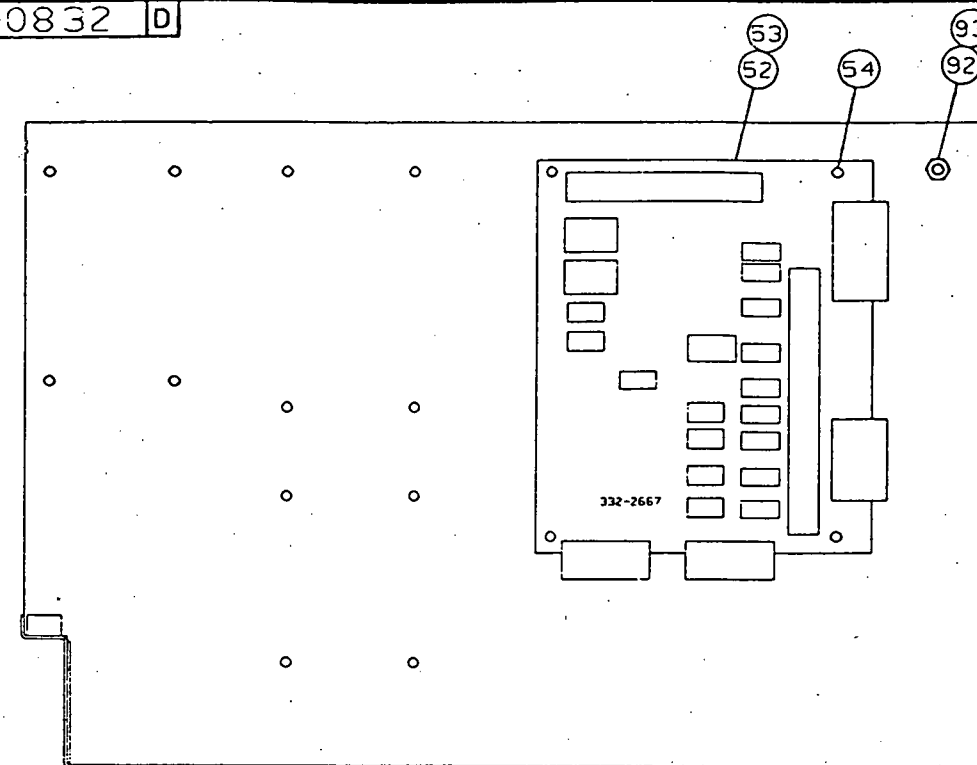
DIMENSIONS IN MILLIMETRES AND (INCHES)

**NOTE.**  
FUEL RETURN AND SUPPLY LINES ARE INCLUDED.  
LINES ARE 1270 mm (50') LONG AND HAVE  
3/4-14 NPT THREAD (RETURN) AND  
1-11.5 NPT THREAD (SUPPLY) ON ENDS OPPOSITE ENGINE.

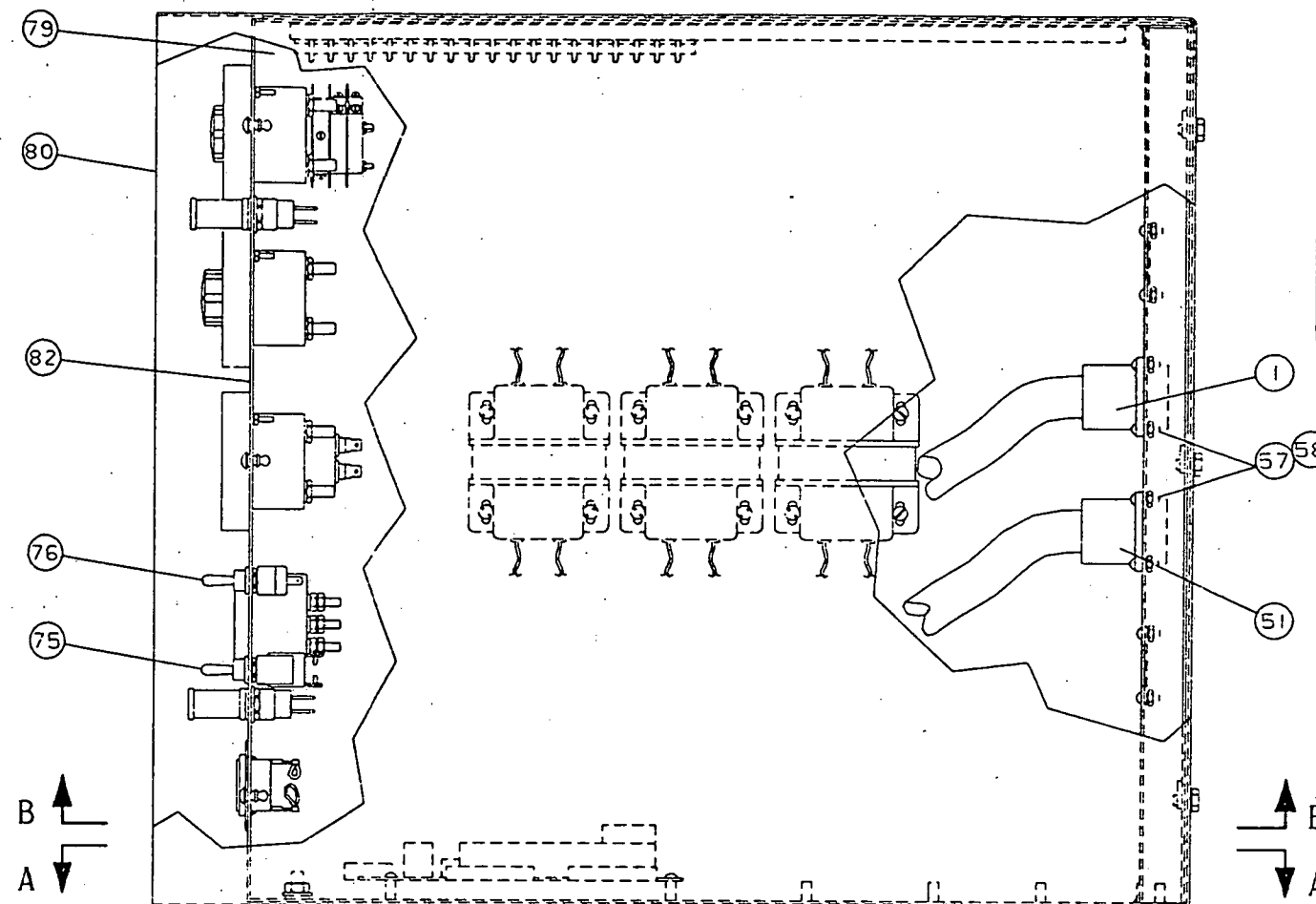
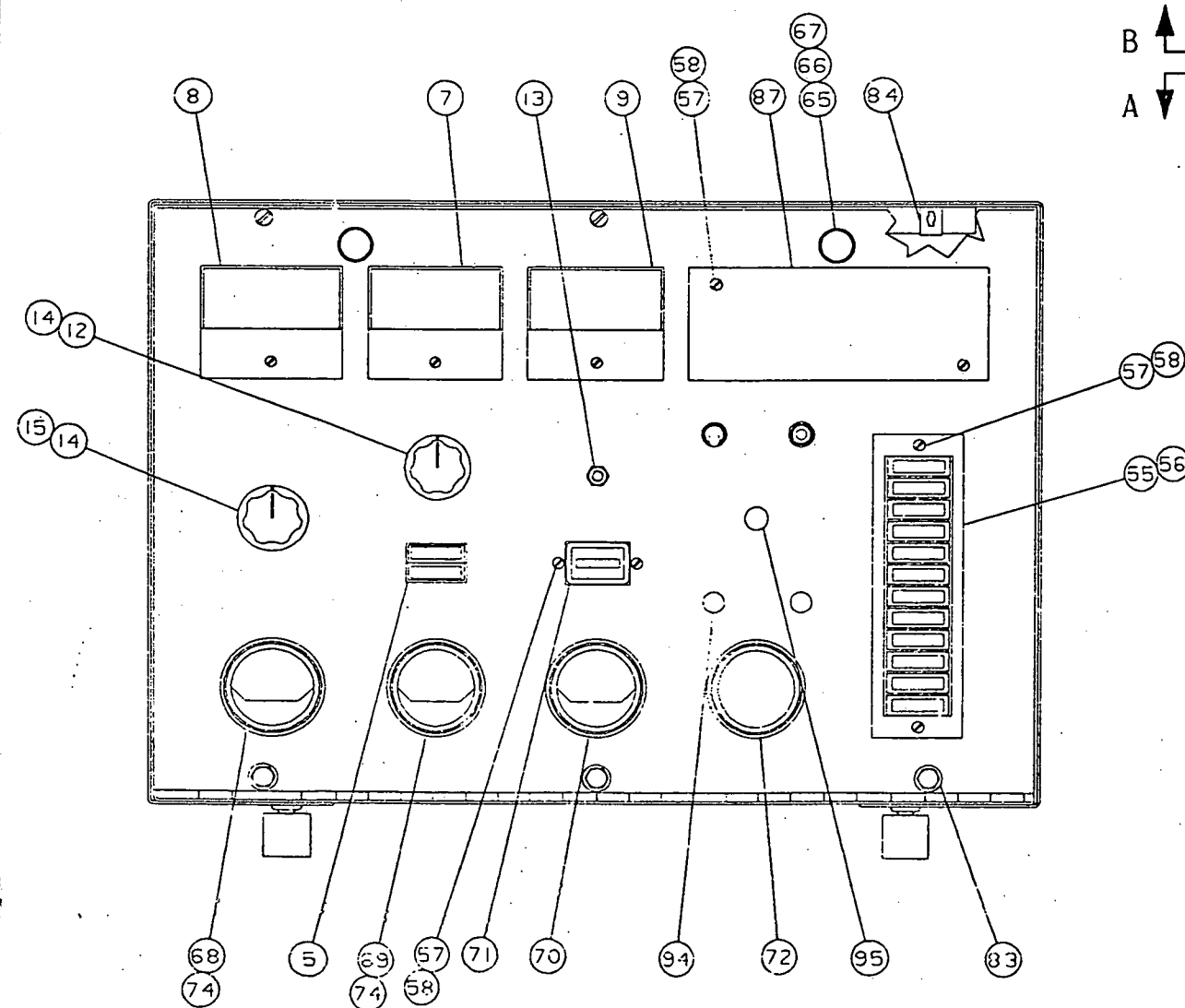
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	1:1	1:1		500-2157	1		OUTLINE - ENG.GEN.
	1:1	1:1		1020/905 DCUR			500-2157
	1:1	1:1		2-2			

# Wiring Diagrams

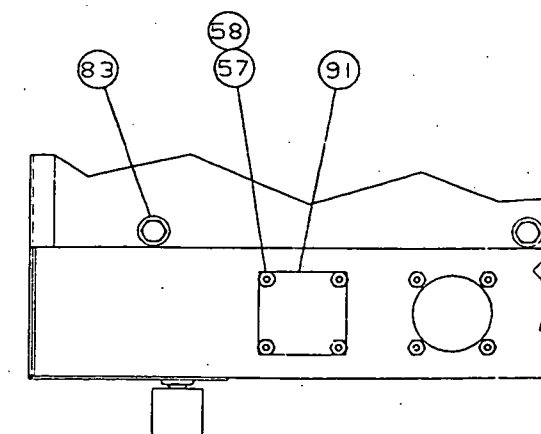
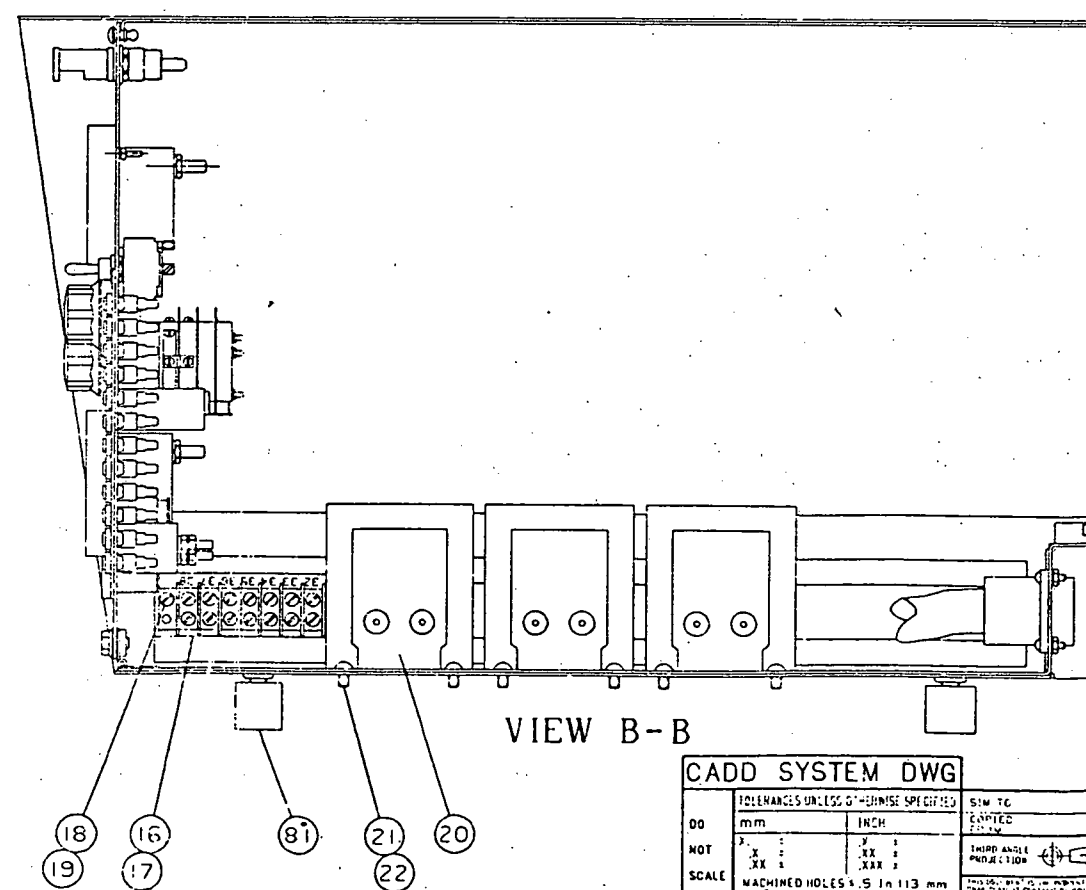
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VIEW A-A

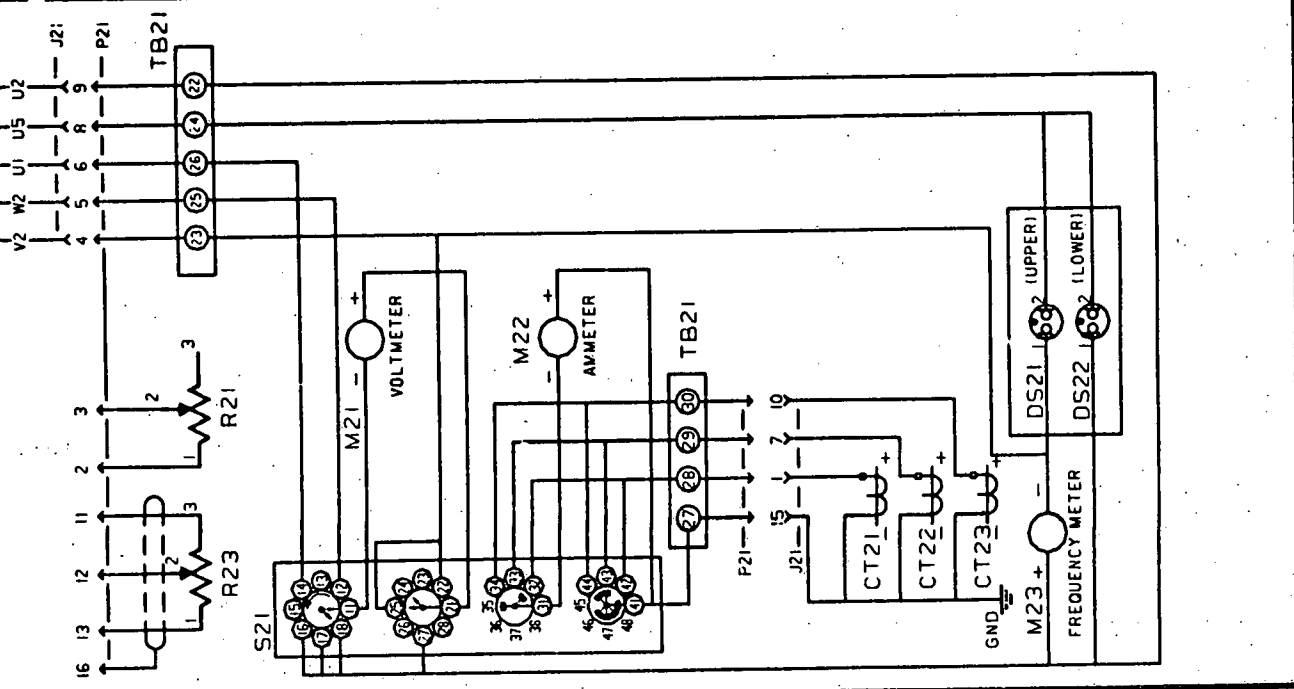
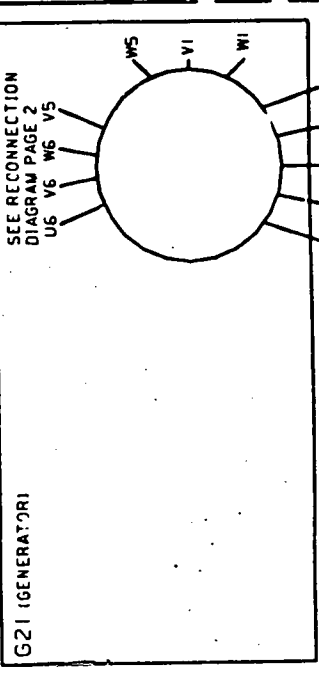


VIEW B-B

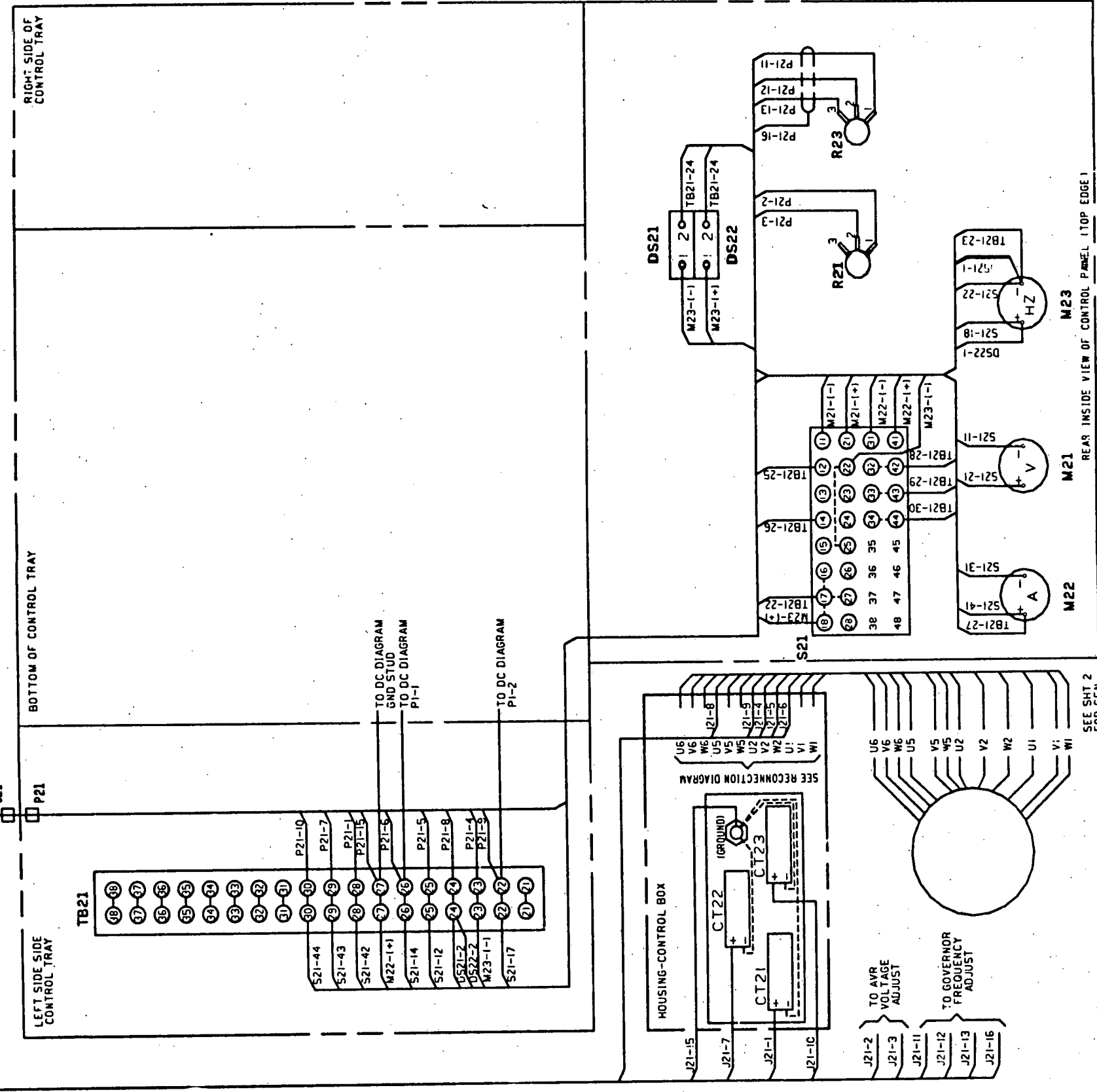
[illegible]

CADD SYSTEM DWG									
TOLERANCES UNLESS OTHERWISE SPECIFIED		UNIT	REV	ITEM	PART NO.	* QTY	DATE	DESCRIPTION OF MATERIAL	
DO	mm	INCH	0	DR	D. YOUNG		17-11-85	Onan ONAN CORPORATION MINNEAPOLIS, MINNESOTA	
NOT	.XX	.XX	1	CHN	<i>E. G. G. G.</i>		8-5-85	TITLE	
SCALE	MACHINED HOLES .5 IN 113 mm		2	APPROVED	<i>E. G. G. G.</i>		8-5-85	ILLUSTRATION-CONTROL	
PRINT	0.05	0.00	3	MODEL FIRST USED ON			UWG NO.	538-0832	
	0.01	0.00		DCU					

612-6385 SHT 1 D SCHEMATIC DIAGRAM



WIRING DIAGRAM



ITEM NO.	REF. DES.	PART NO.	QTY.	DESCRIPTION	DASH
1		328-1954	1	HARNES-AC	ALL
2					
3					
4	CT21-23	REF	B	TRANSFORMER ASSY-CUP	ALL
5	DS21-22	322-0363	P	LAMP ASSY UPPER/LOWER SCALE	ALL
6	G21	REF	B	GENERATOR	ALL
7	M21	302-1148	B	VOLTMETER-AC 10-300.0-600.0	ALL
8	M22	SEE CHART	C	AMMETER-AC (SEE CHART)	ALL
9	M23	302-1720	B	METER-FREQUENCY 145-65 HZ	ALL
10					
11					
12	R21	303-0271	P	RHEOSTAT 1VOLTS ADJUST	ALL
13	R23	REF		POTENTIOMETER-SPEED ILLUS	ALL
14		303-0032	A	KNOB-RHEOSTAT	ALL
15	DS21	308-0214	B	SWITCH-ROTARY 1VOLT & AMMETER	ALL
16	TB21	REF		PART OF AC HARNES (ILLUS *)	ALL
17		332-1244	A	MARKER STRIP	ALL
18		812-0065	-	2 SCREW-RHW 16-32 X 5/8	ALL
19		856-0001	-	2 WASHER-EIT LK 1/6	ALL
20					

- NOTES:
- ALL COMPONENTS SHOWN IN DE-ENERGIZED POSITION.
  - ILLUSTRATION NUMBERS REFER TO DRAWING 539-0832.
  - PIN 14 IS THE KEY PIN IN P21.

POSITION	CONTACTS CLOSED
L1-L2 3PH	11-18 21-25 31-32 41-43-44
L2-L3 3P1	11-12 21-25 31-33 41-42-44
L3-L1 3PH	11-12 21-27 31-34 41-42-43
L1-L0 3PH	11-14 21-27 31-35 41-42-43-44
OFF	11-14 21-28 31-36 41-42-43-44
L1-L2 1PH	11-16 21-22 31-32 41-43-44
L1-L2 1PH	11-16 21-22 31-32 41-42-44

CADD SYSTEM DWG 10 539-0832

DATE 11-85

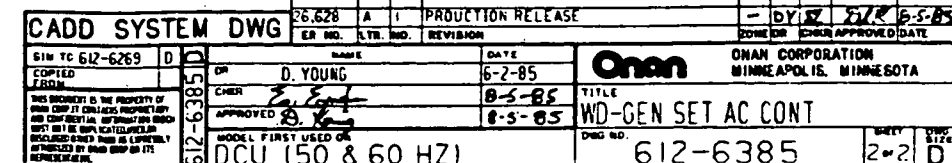
BY D. YOUNG

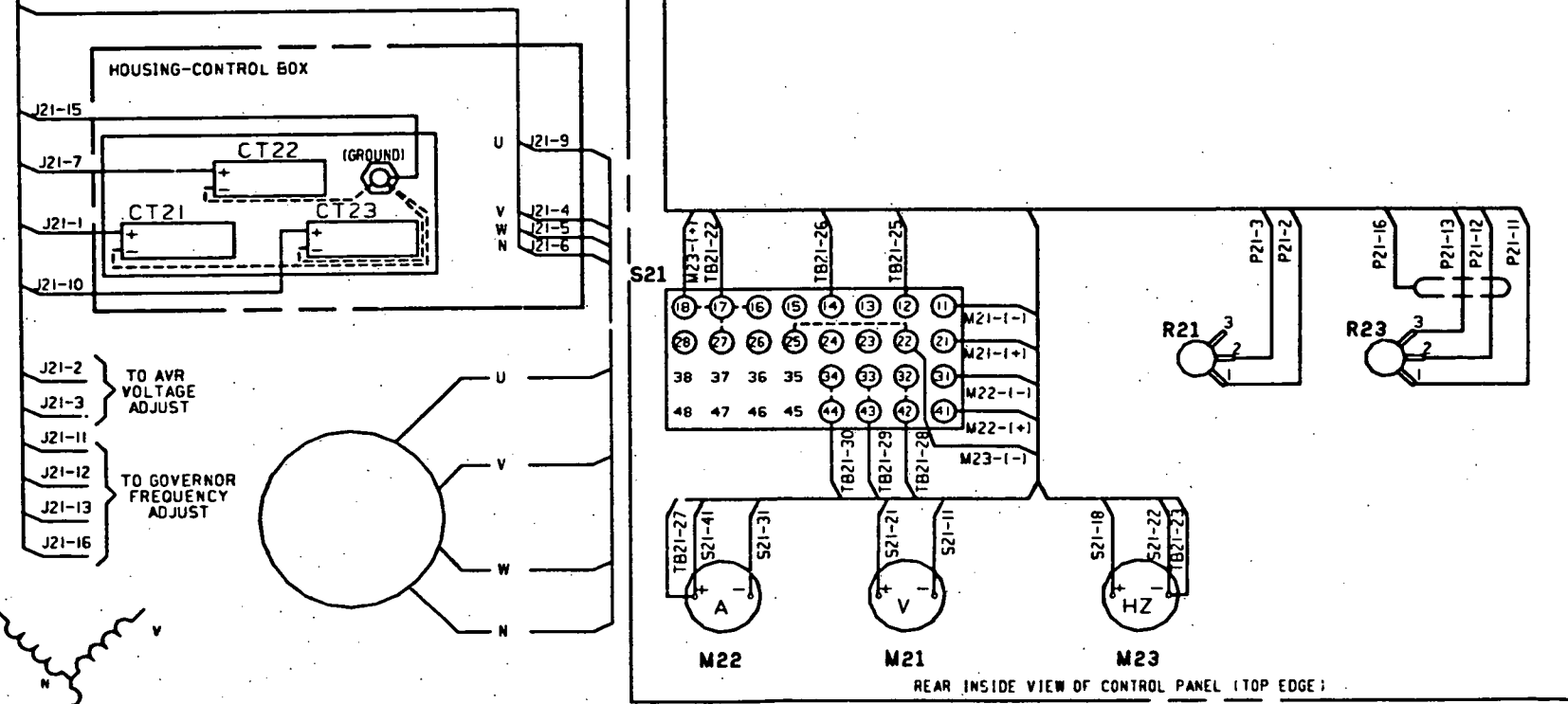
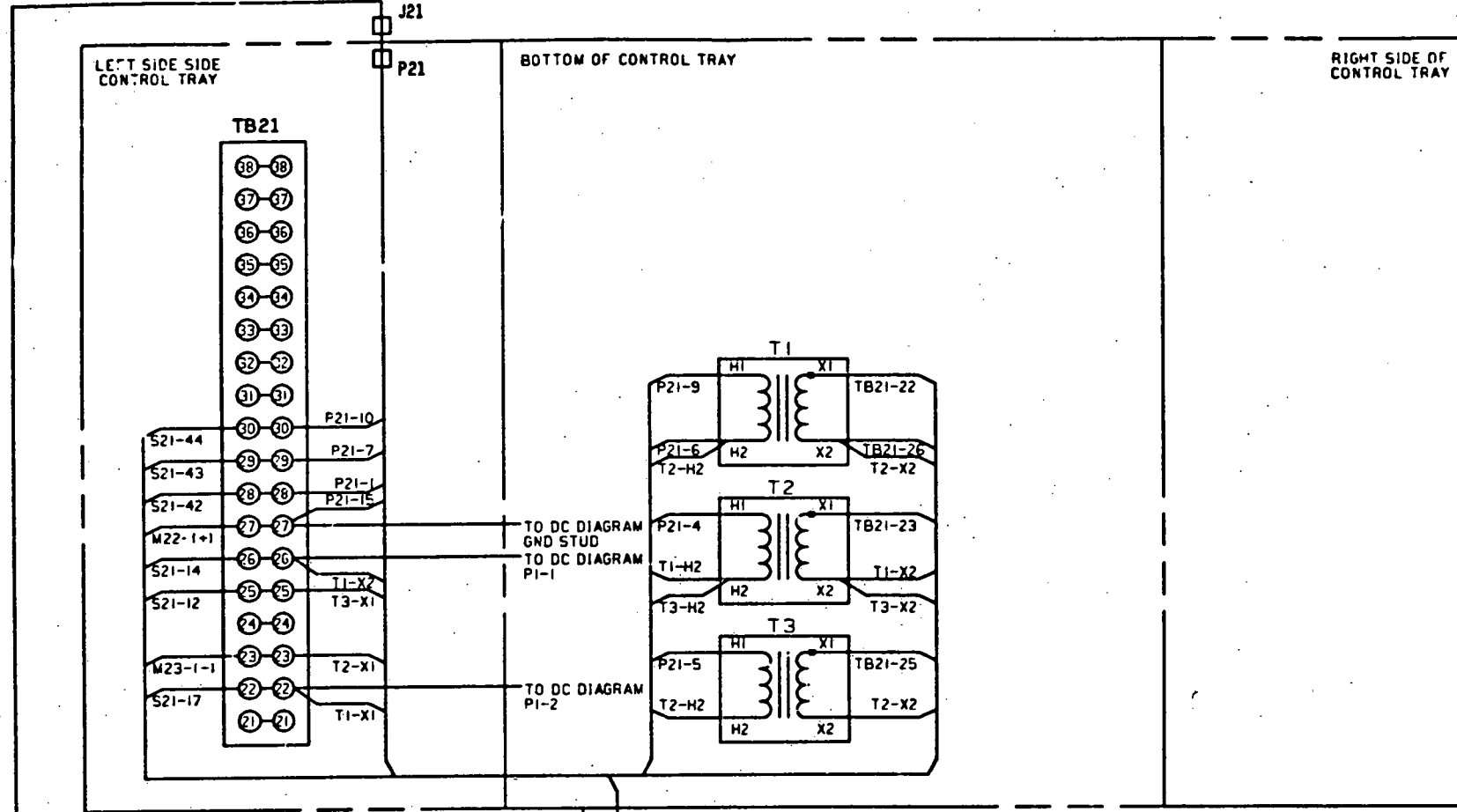
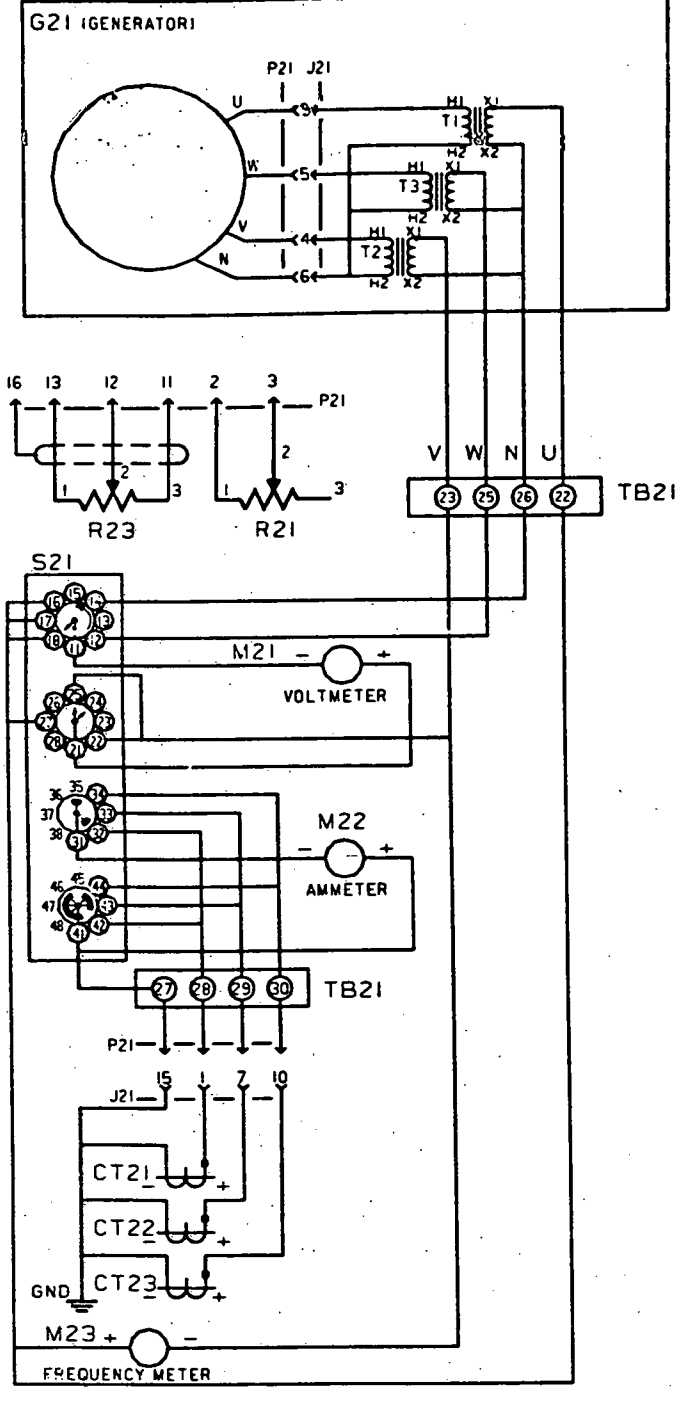
APPROVED 11-85

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S21

POSITION	CONTACTS CLOSED
L1-L2 3PH	11-18 21-25 31-32 41-43-44
L2-L3 3PH	11-12 21-25 31-33 41-42-44
L3-L1 3PH	11-12 21-27 31-34 41-42-43
L1-L0 3PH	11-14 21-27 31-35 41-42-43-44
OFF	11-14 21-28 31-36 41-42-43-44
L1-L2 1PH	11-16 21-22 31-32 41-43-44
L1-L2 1PH	11-16 21-22 31-35 41-42-44

CONNECTION DIAGRAM

DASH NUMBERS	-01	-02	-03	-04	-05
M22	302-1733	302-1734	302-1787-05	302-1735	302-1736
AMMETER SCALE (M22)	10-12001	10-15001	10-16001	10-20001	10-25001

ITEM NO.	REF	DES	PART NO.	QTY	DESCRIPTION	DASH
1			336-1956	D	HARNES-AC	ALL
2						
3						
4	CT21-23	REF		9	TRANSFORMER ASSY-CUR	ALL
5	DS21-22	322-C371	P		LAMP ASSY-BLANK	ALL
6	G21	REF			GENERATOR	ALL
7	M21	302-1788-02	B		VOLTMETER-AC 10-600V	ALL
8	M22	SEE CHART	C		AMMETER-AC (SEE CHART)	ALL
9	M23	302-1720	B		METER-FREQUENCY 145-65 HZ	ALL
10						
11						
12	R21	303-C271	P		RHEOSTAT (VOLTS ADJUST)	ALL
13	R23	REF			POTENTIOMETER-SPEED ILLUS	ALL
14		303-0032	A	2	KNOB-RHEOSTAT	ALL
15	S21	308-C264	B		SWITCH-RECTARY (VOLT & AMMETER)	ALL
16	TB21	REF			PART OF AC HARNES ILLUS	ALL
17		352-1244	A	1	MARKER STRIP	ALL
18		812-0065	-	2	SCREW-RHW 16-32 X 5/8	ALL
19		856-0001	-	2	WASHER-EIT LK 10/6	ALL
20	T1-3	315-0638	B	3	TRANSFORMER-POT	ALL
21		812-0098	-	2	SCREW-RHW 10-10-32 X 3/8	ALL
22		850-0030	-	2	WASHER-LK 10/10	ALL
23		332-1789	-	4	SPLICE-WINDOW (SEE NOTE 4)	ALL

- NOTES:
- ALL COMPONENTS SHOWN IN DE-ENERGIZED POSITION.
  - ILLUSTRATION NUMBERS REFER TO DRAWING 539-0832.
  - PIN 14 IS THE KEY PIN IN P21.
  - WINDOW SPLICES (ITEM 23) ARE USED FOR CONNECTIONS BETWEEN POTENTIAL TRANSFORMERS (ITEM 20) AS SHOWN IN THE WIRING DIAGRAM.

CADD SYSTEM DWG

612-6392

DATE: 8-5-85

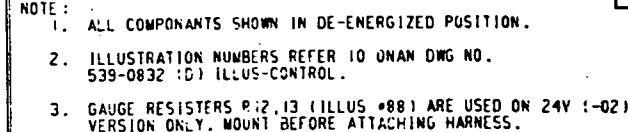
ONAN CORPORATION MINNEAPOLIS, MINNESOTA

WD-GEN SET AC CONT

612-6392

SCHEMATIC DIAGRAM

## 2



REAR INSIDE VIEW OF CONTROL PANEL (TOP OF PANEL)

1. A[illegible]

1

11-11-68

612-6387



WIRI



NOTE

4.

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	60	60
	6	6
	61	61
	62	62
	63	63
	64	64
	65	65
	66	66
(B1)	70	70
(A2)	71	71
(B3)	72	72
	73	73
	74	74
	75	75
	76	76
	77	77
	78	78
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	95	95

DWC

DR  
CHER  
APPROVED  
MODEL F  
DCU