

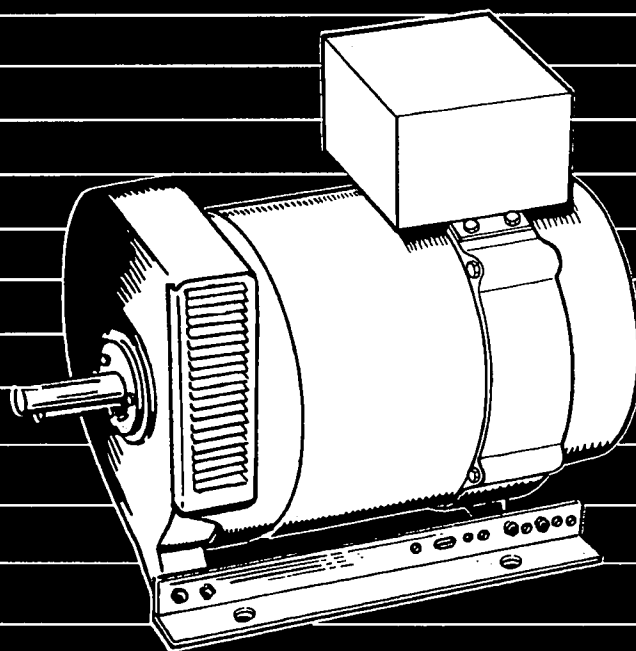
Onan

Generator

Installation Manual

YD PTO

PROTEC Series



Printed in U.S.A.

929-0600
10-94

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Safety Precautions

Before operating the generator, read the Operator's Manual and become familiar with it and the equipment. **Safe and efficient operation can be achieved only if the unit is properly operated and maintained.** Many accidents are caused by failure to follow fundamental rules and precautions.

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to the operator, service personnel, or the equipment.

⚠ 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.*

GASOLINE AND LPG FUEL MAY BE ACCIDENTALLY IGNITED BY ELECTRICAL SPARKS, presenting the hazard of fire or explosion, which can result in severe personal injury or death. When installing the generator set:

- Do not tie electrical wiring to fuel lines.
- Do not run electrical lines and fuel lines through the same compartment openings.
- Keep electrical and fuel lines as far apart as possible.
- Place a physical barrier between fuel lines and electrical lines wherever possible.
- If electrical and fuel lines must pass through the same compartment opening, make certain that they are physically separated by running them through individual channels, or by passing each line through a separate piece of tubing.
- **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.

Safety Precautions

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Before starting work on the generator, disconnect batteries, negative (-) cable last. This will prevent accidental arcing.
- Keep your hands away from moving parts.
- Make sure that fasteners on the generator are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.
- Do not wear loose clothing or jewelry while working on generators. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts and cause shock or burning.
- If adjustment must be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Disconnect starting battery 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 can cause injury or death.
- Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches to avoid accidental closure.
- **DO NOT CONNECT GENERATOR DIRECTLY TO ANY BUILDING ELECTRICAL SYSTEM.** Hazardous voltages can flow from the generator set into the utility line. This creates a potential for electrocution or property damage. Connect only through an approved device and after building main switch is open. Consult an electrician in regard to emergency power use.

GENERAL SAFETY PRECAUTIONS

- Have a fire extinguisher nearby. Maintain extinguisher properly and become familiar with its use. Extinguishers rated ABC by the NFPA are appropriate for all applications. Consult the local fire department for the correct type of extinguisher for various applications.
- Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and generator damage, which presents a potential fire hazard.
- **DO NOT** store anything in the generator compartment such as oil or gas cans, oily rags, chains, wooden blocks, portable propane cylinders, etc. A fire could result or the generator set operation (cooling, noise and vibration) may be adversely affected. Keep the compartment floor clean and dry.
- Do not work on this equipment when mentally or physically fatigued, or after consuming any alcohol or drug that makes the operation of equipment unsafe.

Section 1. Introduction

GENERAL

This manual provides instructions for mounting:

- Onan AC PTO generator
- Voltage regulator box
- Meter/breaker panel

Onan does not provide the associated components that comprise a complete PTO system (power take-offs, in-cab control devices, interlock switches, PTO transmissions, etc.). Consult the manufacturer's instructions for details on non-Onan equipment.

The Operator's Manual (929-0100) that accompanies each AC PTO generator describes operation and maintenance.

⚠ WARNING *Incorrect installation, service, or replacement of parts can result in severe personal injury, death and/or equipment damage. Service personnel must be qualified to perform electrical and mechanical component installation.*

GENERATOR

The Onan YD series AC generators are two-bearing, 1800 rpm, 60 hertz units designed for direct drive from a power takeoff unit connected to a vehicle engine.

A centrifugal blower on the front end of the rotor shaft draws cooling air through the end bell cover, over the generator rotor, and discharges it through an outlet at the blower end.

A ball bearing at each end of the generator supports the rotor shaft. The end bell and stator housing are attached by four through-studs which pass through the stator assembly. The brushless exciter stator mounts in the end bell. The exciter rotor and its rotating rectifier assemblies mount on the rotor shaft.

VOLTAGE REGULATOR

The voltage regulator assembly includes the following components:

- Printed circuit board
- Voltage reference transformer

- Commutating reactor assembly
- Field circuit breaker

The voltage regulator box is mounted near the generator.

METER/BREAKER BOX

The meter/breaker box contains the following components:

- Voltmeter
- Ammeters
- Hour meter
- Frequency meter
- Line circuit breakers
- Marked output terminals

The generator AC output is routed to the Onan meter/switch box where amperage, voltage and frequency are displayed on a meter panel. Circuit breakers protect the generator from overcurrent conditions. The meter/breaker box is mounted within a 15 foot radius of the generator: the AC load is attached here.

OPERATION

The generator and voltage regulator operate as follows:

- Residual magnetism in the rotor and a permanent magnet embedded in one exciter field pole begin the voltage buildup process as the generator starts running.
- Single-phase AC voltage, taken from one of the stator windings, is fed to the voltage regulator as a reference voltage for maintaining the generator output voltage.
- The AC reference voltage is converted to DC by a silicon controlled rectifier bridge on the voltage regulator printed circuit board and fed into the exciter field windings.
- The exciter armature produces three-phase AC voltage that is converted to DC by the rotating rectifier assembly.
- The resulting DC voltage excites the generator rotor winding to produce the stator output voltage for the AC load.

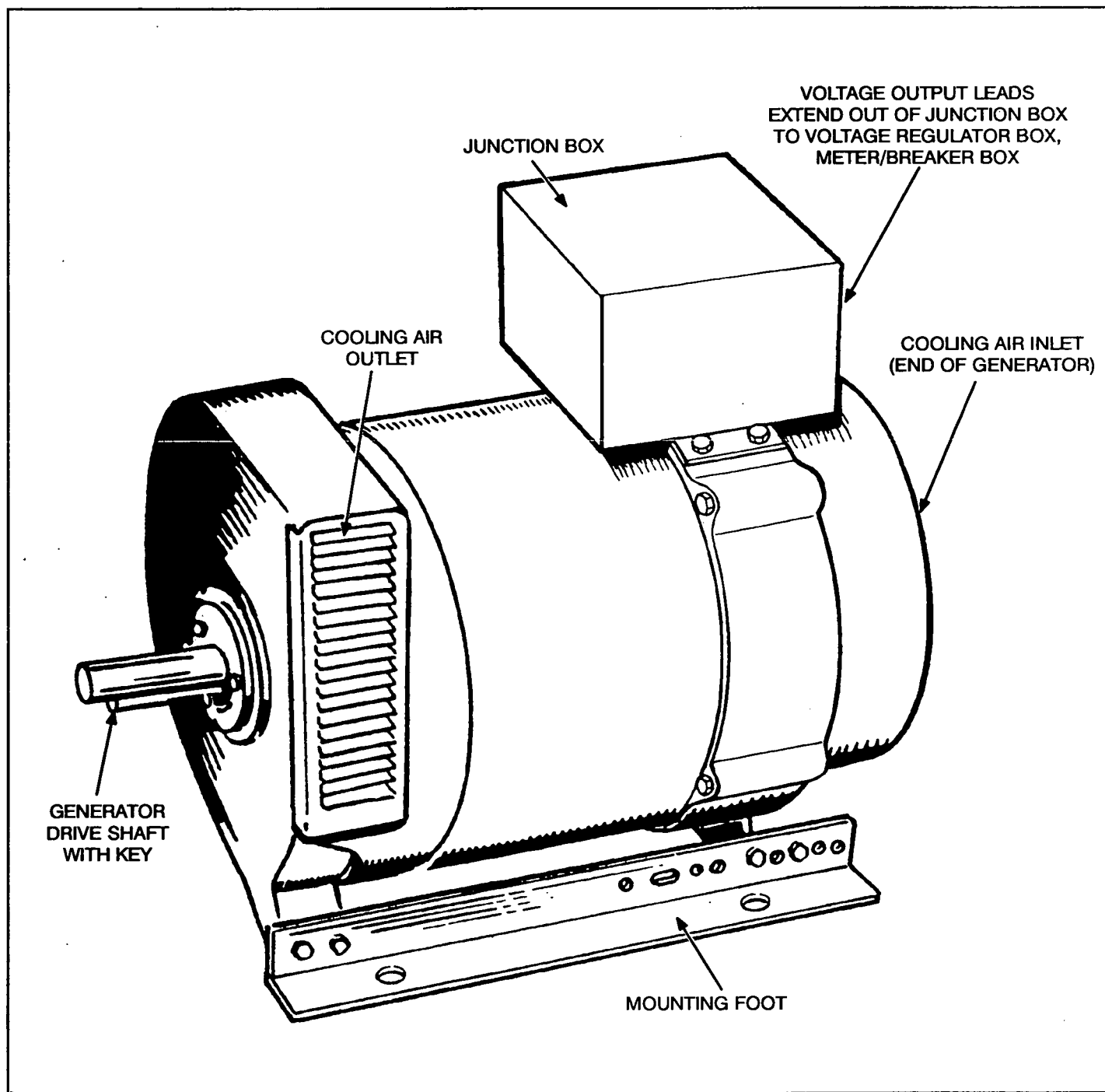


FIGURE 1-1. YD PTO GENERATOR

NOTE: AMMETER RATINGS
VARY DEPENDING ON MODEL

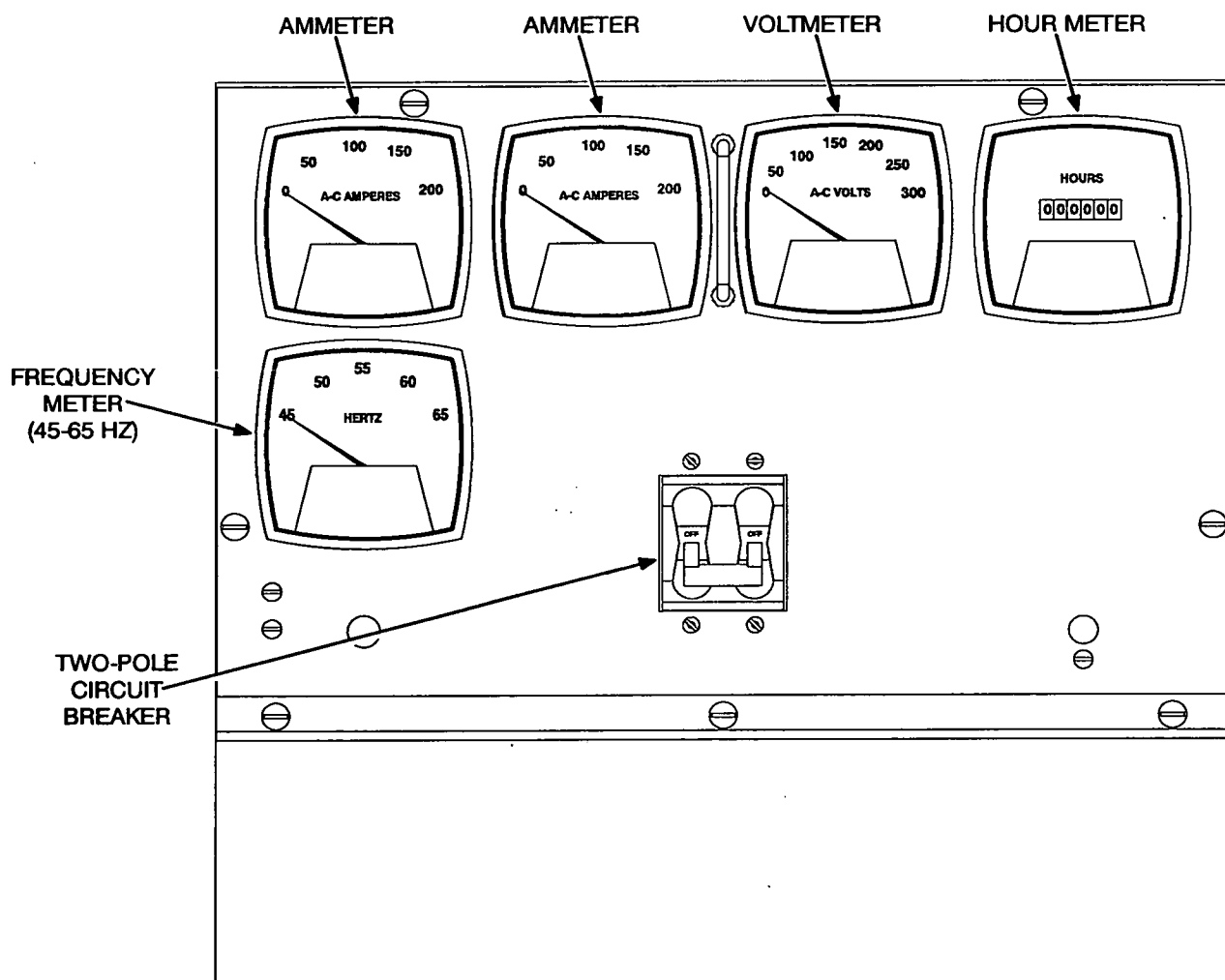
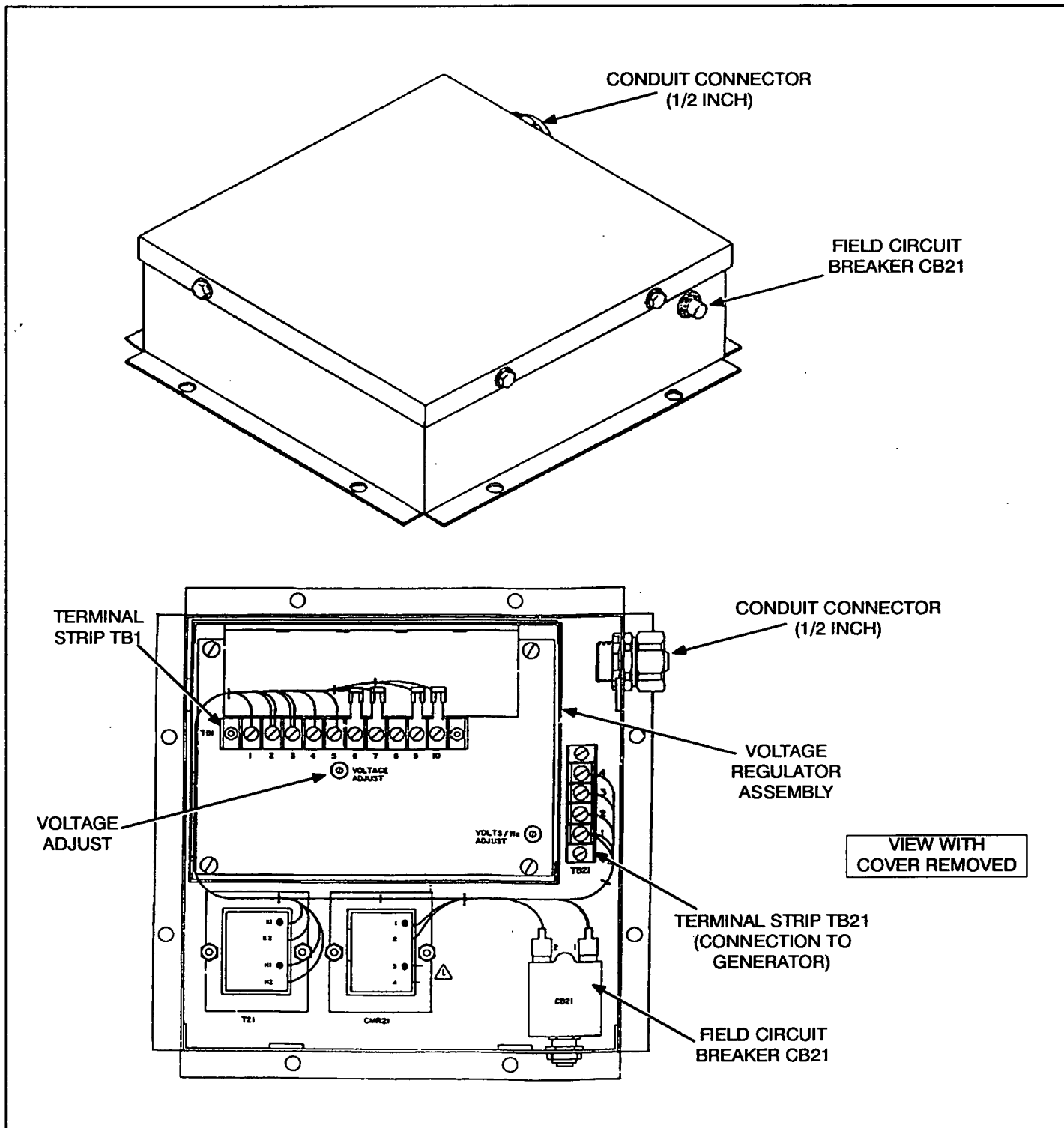


FIGURE 1-2. YD PTO GENERATOR METER/BREAKER BOX (20 kW UNIT SHOWN)



FIE

FIGURE 1-3. YD PTO GENERATOR VOLTAGE REGULATOR BOX

Section 2. Specifications

Design: Revolving field: 4 pole. Drip-proof construction. Skewed stator minimizes field heating and voltage harmonics. Stator laminations welded in heavy steel frame. Dynamically balanced rotor. Windings epoxy impregnated and over-coated for environmental protection and improved cooling.

Bearings: 2, double sealed, prelubricated ball

Cooling: Direct-drive centrifugal blower. Single-opening air outlet, 250 ft³/m (7.08 m³/min), easily ducted

Output Box: Top mounted. Houses output terminals and conduit connectors.

Exciter System: Brushless, with 8-pole stator mounted in end bell. Rectifier assemblies encapsulated for environmental protection. Permanent magnet in stator field provides reliable voltage buildup.

Voltage Regulator: Components include printed circuit board, voltage reference transformer, commutating reactor, field circuit breaker, voltage adjust rheostat.

Insulation System: Class F, per NEMA MG1-1.65 definition. Insulating varnish conforms with MIL-I-24092, Grade CB, Class 155° C.

Electromagnetic Interference Attenuation: Meets requirements of most industrial and commercial applications.

Configuration: Platform-mounted or side-mounted.

15 KW GENERATOR Voltage/Frequency: 120/240 VAC @ 60 Hz Phase: One Wires: Four Watts: 15 Kw kVA at PF: 15.0 @ 1.0 power factor Circuit breaker rating: 70 amps	Ampere meter rating: 0 - 100 amperes Height: 19.55 inches Width: 15.0 inches Length: 21.9 inches Weight: 306 pounds Meter/breaker box dimensions: 10-15/16" x 16-7/16" x 4-1/2"
20 KW GENERATOR Voltage/Frequency: 120/240 VAC @ 60 Hz Phase: One Wires: Four Watts: 20 Kw kVA at PF: 20.0 @ 1.0 power factor Circuit breaker rating (amps): 85	Ampere meter rating: 0 - 100 amperes Height: 19.55 inches Width: 15.0 inches Length: 23.34 inches Weight: 356 pounds Meter/breaker box dimensions: 15" x 16-1/2" x 10"
24 KW GENERATOR Voltage/Frequency: 120/240 VAC @ 60 Hz Phase: One Wires: Four Watts: 24 Kw kVA at PF: 24.0 @ 1.0 power factor Circuit breaker rating (amps): 100	Ampere meter rating: 0 - 150 amperes Height: 19.55 inches Width: 15.0 inches Length: 24.59 inches Weight: 398 pounds Meter/breaker box dimensions: 15" x 16-1/2" x 10"
30 KW GENERATOR Voltage/Frequency: 120/240 VAC @ 60 Hz Phase: One Wires: Four Watts: 30 Kw kVA at PF: 30.0 @ 1.0 power factor Circuit breaker rating: 150 amps	Ampere meter rating: 0 - 200 amperes Height: 19.55 inches Width: 15.0 inches Length: 26.21 inches Weight: 453 pounds Meter/breaker box dimensions: 15" x 16-1/2" x 10"
35 KW GENERATOR Voltage/Frequency: 120/240 VAC @ 60 Hz Phase: One Wires: Four Watts: 35 Kw kVA at PF: 35.0 @ 1.0 power factor Circuit breaker rating: 175 amps	Ampere meter rating: 0 - 200 amperes Height: 19.55 inches Width: 15.0 inches Length: 27.97 inches Weight: 512 pounds Meter/breaker box dimensions: 15" x 16-1/2" x 10"
Voltage Regulator Box Dimensions (all generators) 8" x 7.75" x 2.75"	

Section 3. Pre-Installation

GENERAL

The following factors should be considered before installing the generator, voltage regulator box and meter/breaker box:

- Location
- Adequate cooling air
- Electrical connections
- Accessibility for operation and service
- Vibration isolation

The PTO system must be designed, configured and installed properly for the Onan YD PTO AC generator to operate correctly. Each PTO installation is different, depending on the manufacturer's requirements. PTO operating considerations as they affect the Onan generator are described later in this section.

⚠ WARNING *Incorrect installation, service, or parts replacement can result in severe personal injury, death, and/or equipment damage. Service personnel must be qualified to install electrical and mechanical components.*

GENERATOR MOUNTING

Generator mounting considerations include:

- **Generator support area:** The mounting framework must be able to support the weight of the generator. Generator weight is found in Section 2 of this manual. The vehicle manufacturer and the installer must provide a structurally sound support area.
- **Generator mounting hole configuration:** The mounting area must be able to accept the mounting hole arrangement found on the generator. Generator mounting holes are illustrated in Section 7 of this manual.
- **Generator ventilation:** The mounting area must have sufficient ventilation for the generator's cooling requirements. An area with minimal dust and dirt is preferable. Generator air requirements are listed in Section 2 of this manual.

NOTE: Avoid recirculation of ventilation air. Configure the generator ventilation so that only fresh air is circulated through the generator.

- **Protection from exhaust heat:** The generator must be protected from excess heat: for this reason, it should not be mounted close to the vehicle muffler or exhaust area unless it is absolutely necessary. Use a heat shield if the muffler and generator are to be mounted close together.
- **Generator mounting hardware:** Along with a mounting framework for the generator, hardware for connecting the generator to the PTO output should be considered. Components that must be selected typically include:
 - A keyed coupler to connect the generator shaft to the PTO output
 - U-joints for the PTO-generator coupling
 - A sliding coupler element to prevent thrust load on the front bearing of the generator
 - A shear-limiting coupler to prevent damage to the transmission or generator due to a seized bearing or high starting torque

METER/BREAKER BOX MOUNTING

Meter/breaker enclosure mounting considerations include:

- **Meter/breaker box mounting hole configuration:** The mounting area must be able to accept the mounting hole arrangement found on the control box. Section 5 of this manual describes meter/breaker box mounting.
- **Meter/breaker box vibration mounting:** Rubber/plastic vibration mounts should be used between the box and the mounting framework. The box must be protected from potentially harmful vibration.
- **Meter/breaker box protection:** The box should be mounted in an area that is protected from the elements: rain, dust, etc. can harm electrical components.

Figure 3-1 shows a typical meter/breaker box installation.

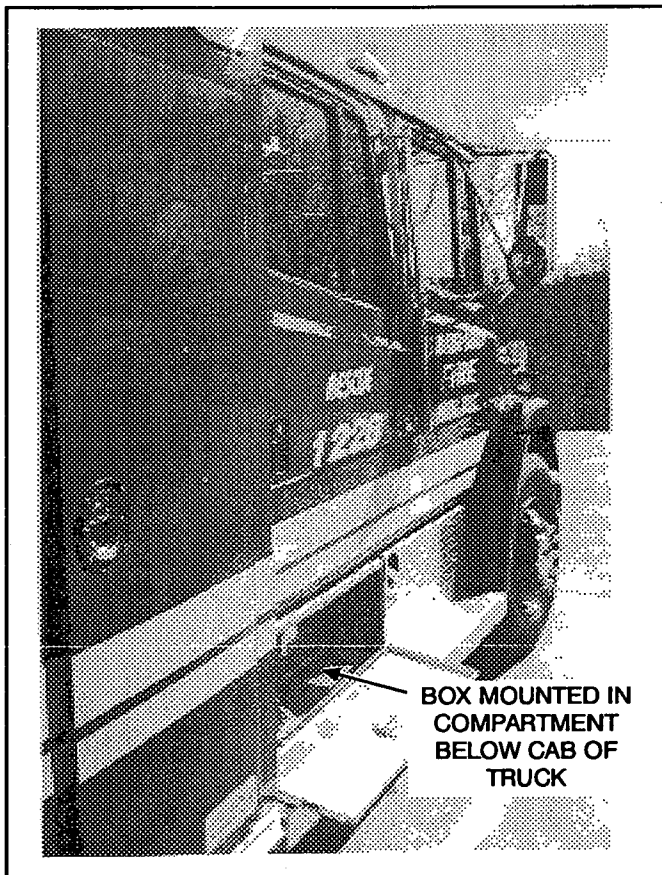


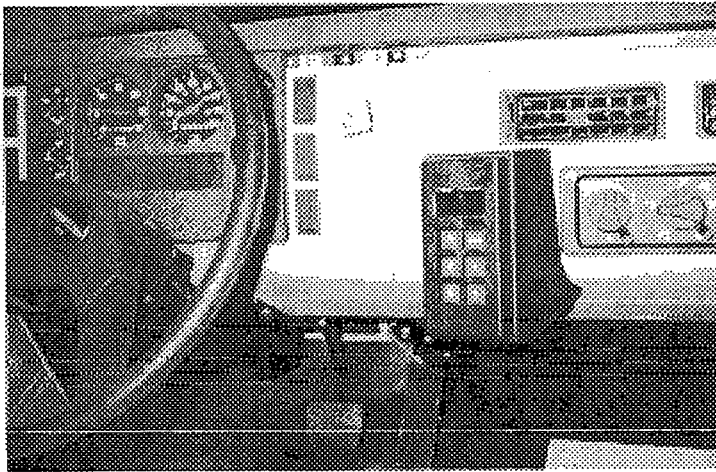
FIGURE 3-1. METER/BREAKER BOX MOUNTING

PTO SYSTEM CONFIGURATION

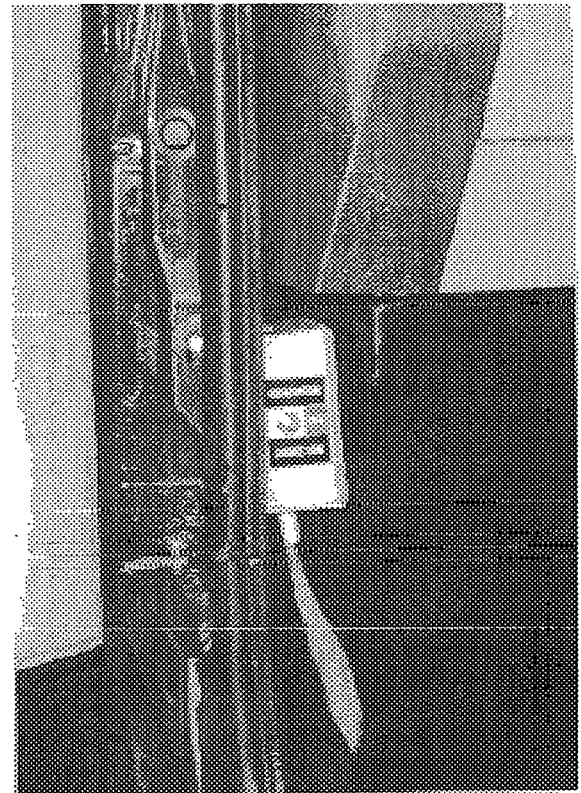
The installation and operation of a vehicle-mounted PTO system are outside the scope of this manual. However, any PTO system must be configured bearing these considerations in mind:

Control System

The control system can have as many or as few automated elements as is necessary. Controls may be mounted inside or outside the vehicle cab, in any location. Figure 3-2 illustrates some typical control mounting locations.



TYPICAL IN-CAB PTO CONTROL



PTO ON-OFF SWITCH

FIGURE 3-2. EXAMPLES OF PTO CONTROL PANELS

Interlocks

The PTO control system should have interlocks to keep the PTO from being engaged under the following circumstances:

- When the vehicle is moving (emergency brake interlock)
- When the vehicle is in gear (transmission neutral interlock)

- If the engine speed is higher than the speed required to run the generator (engine governor interlock)

Other interlocks may be necessary depending on the application and the control system selected. Consult the PTO and control systems' manuals for guidelines. Figure 3-3 is a block diagram of a typical PTO/generator system, showing how the Onan components fit into a standard configuration.

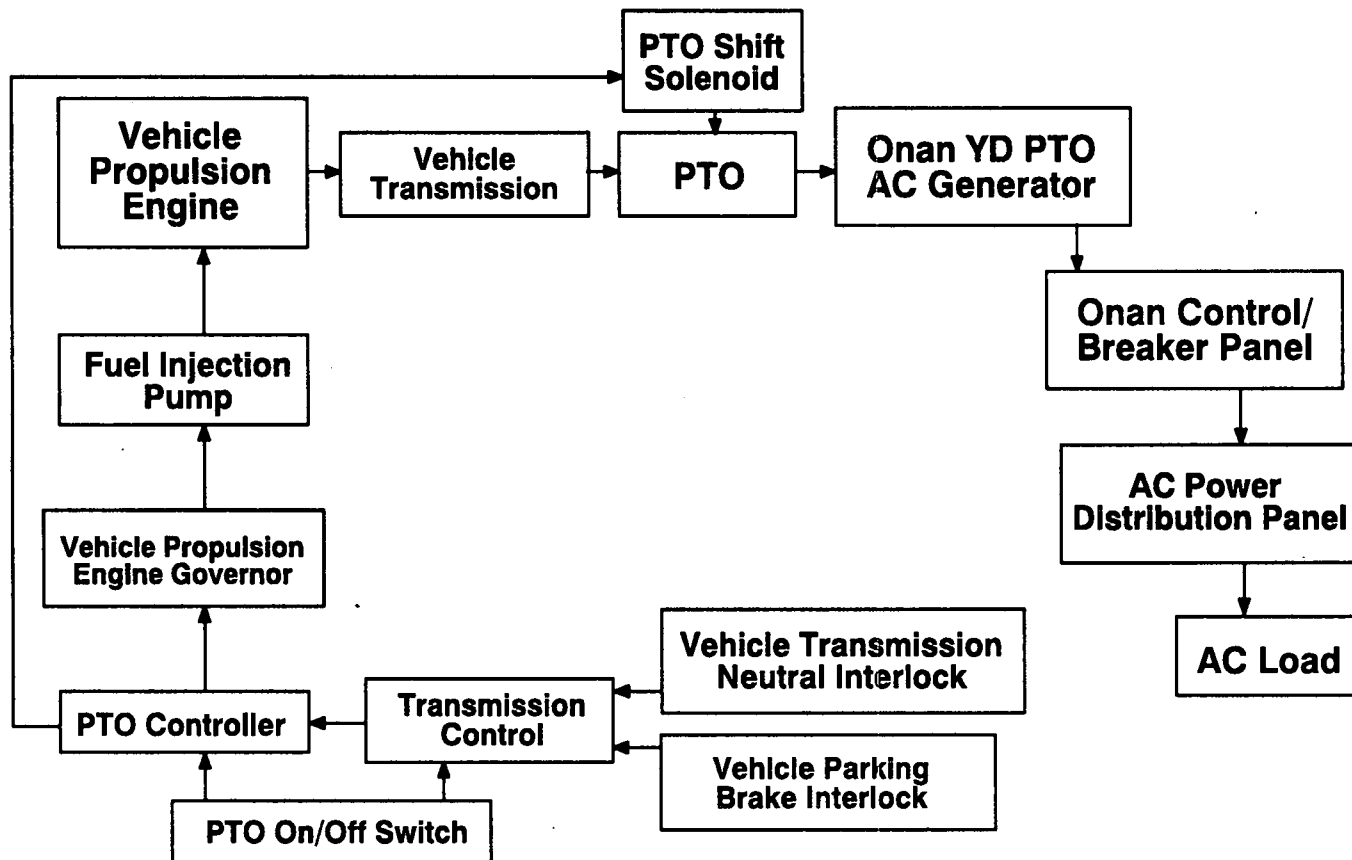


FIGURE 3-3. PTO GENERATOR SYSTEM BLOCK DIAGRAM

Section 4. Generator Mounting

GENERATOR SUPPORT FRAMEWORK

The generator must be mounted on a framework that is capable of supporting its weight. Generator weights are listed in Section 2 of this manual.

Normally a framework is constructed underneath the vehicle chassis, located in line with the PTO transmission. See Figure 4-1. A tubular steel framework cradles the PTO generator from the main frame rail at the right hand side of the vehicle. The generator cooling air outlet points downward in this example; however, on a different installation, the outlet might point toward the side.

Points to consider when constructing such a framework include:

- **Clearance:** Allow as much clearance as possible between the generator framework and the road, especially if travel over rough surfaces or grass and brush is likely.
- **Frame support:** The frame support must be reinforced to avoid system resonances at generator running speed (and multiples of running speed).
- **Frame alignment:** Alignment is critical to generator operation. Side loads due to misalignment could provide a source for system resonance at multiples of running speed.

See Section 7 of this manual for an outline drawing of the generator showing its mounting holes, dimensions, and air inlet and outlet locations.

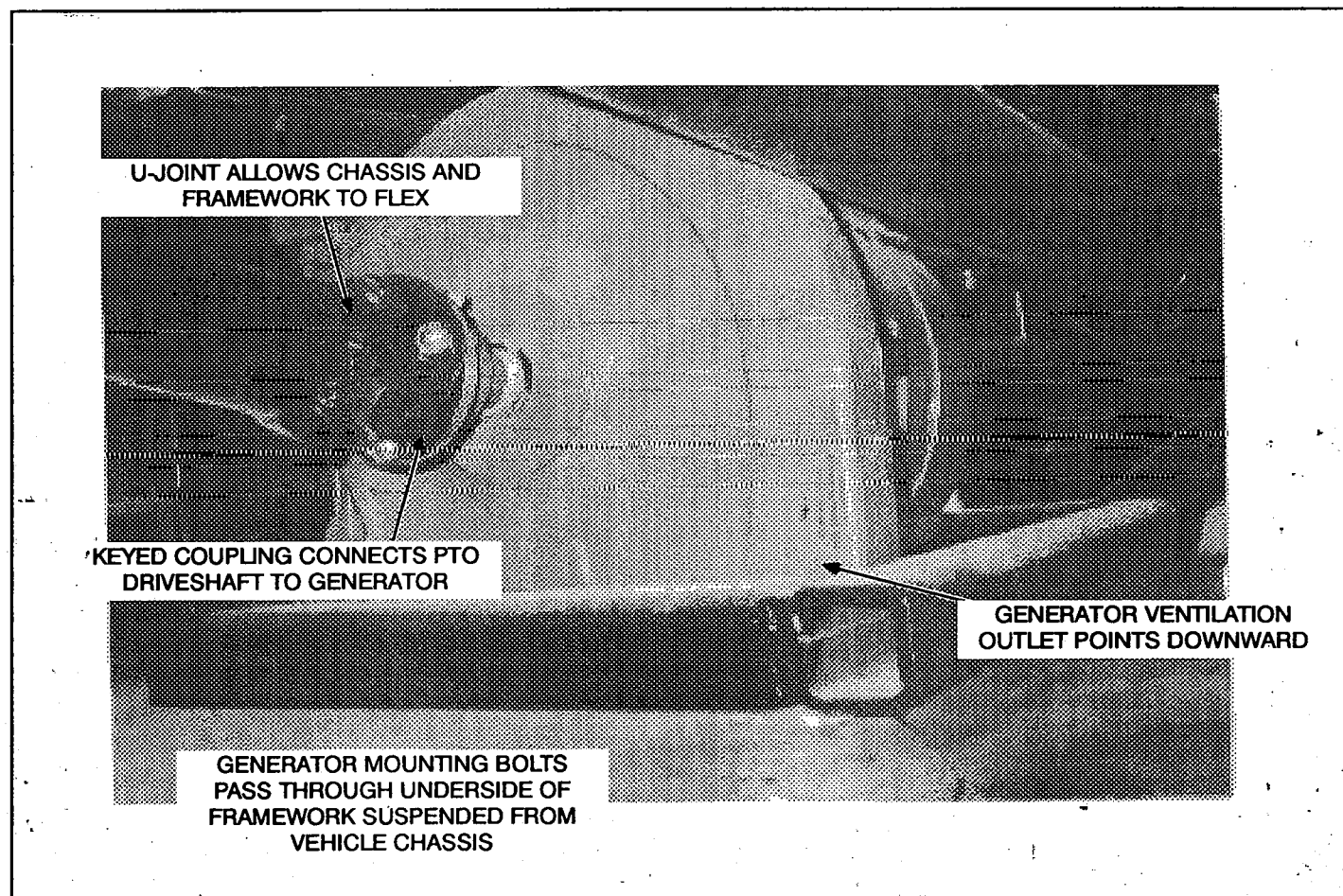


FIGURE 4-1. YD GENERATOR ON MOUNTING FRAMEWORK UNDERNEATH VEHICLE CHASSIS

CONNECTING THE PTO

A standard keyed coupling should be used to connect the generator driveshaft with the PTO output shaft. In Figure 4-1, the drive shaft yoke is coupled to the generator's straight shaft with a four-bolt steel flange coupling keyed to the shaft. Figure 4-2 shows the generator shaft and key. A full outline drawing of the generator is found in Section 7 of this manual.

Points to consider when connecting the PTO AC generator to the driving source:

- **Generator Inertia load:** Note that the entire drive train including the generator shaft must be designed to absorb the starting torque due to the inertia of the generator rotor. A torsional drawing showing the inertia, weight, stiffness
- **Generator driveshaft takeover section:** Note that the drive shaft should have a slider bar, splined take-up section or other variable-length coupling, to take up slight drive shaft length variances, and to prevent thrust load on the front bearing.
- **Generator driveshaft shear limiter:** A shear limiting device may be needed in the coupling to prevent damage to the transmission or generator due to a seized bearing or high starting torque.
- **Driveshaft alignment:** Side loads due to misalignment could provide a source for running speed vibration. Alignment is critical on the YD PTO generator.

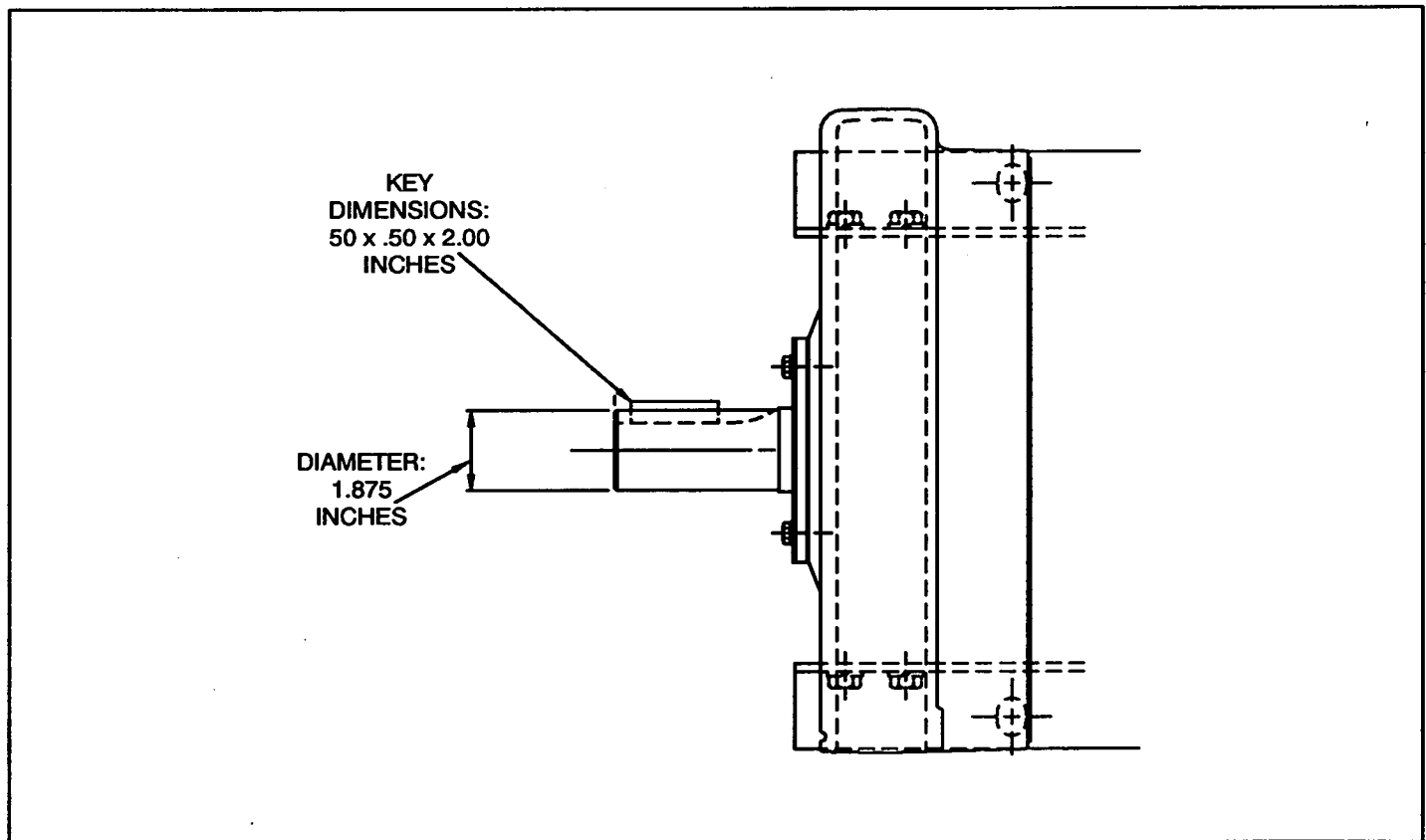


FIGURE 4-2. DETAIL OF GENERATOR SHAFT AND MOUNTING KEY

Section 5. Meter/Breaker Box, Voltage Regulator Box Mounting

GENERAL

Mounting the voltage regulator box and the optional meter/breaker box supplied with the Onan YD PTO AC generator is a relatively uncomplicated process. The boxes are bolted to a convenient surface which is:

- Protected from the elements
- Convenient to the electrical load or load panel
- Within 15 feet of the generator (the length of the generator leads)

See Section 3 of this manual (Pre-Installation) for factors regarding the selection of the location for the meter/breaker box.

Mounting the two boxes simply involves:

- Selecting the mounting area
- Measuring the mounting area
- Drilling the mounting holes
- Installing bolts and nuts to hold the box in place

See Section 7 of this manual for drawings of the voltage regulator box and of the two sizes of meter/breaker box, with dimensions and the locations of their mounting holes.

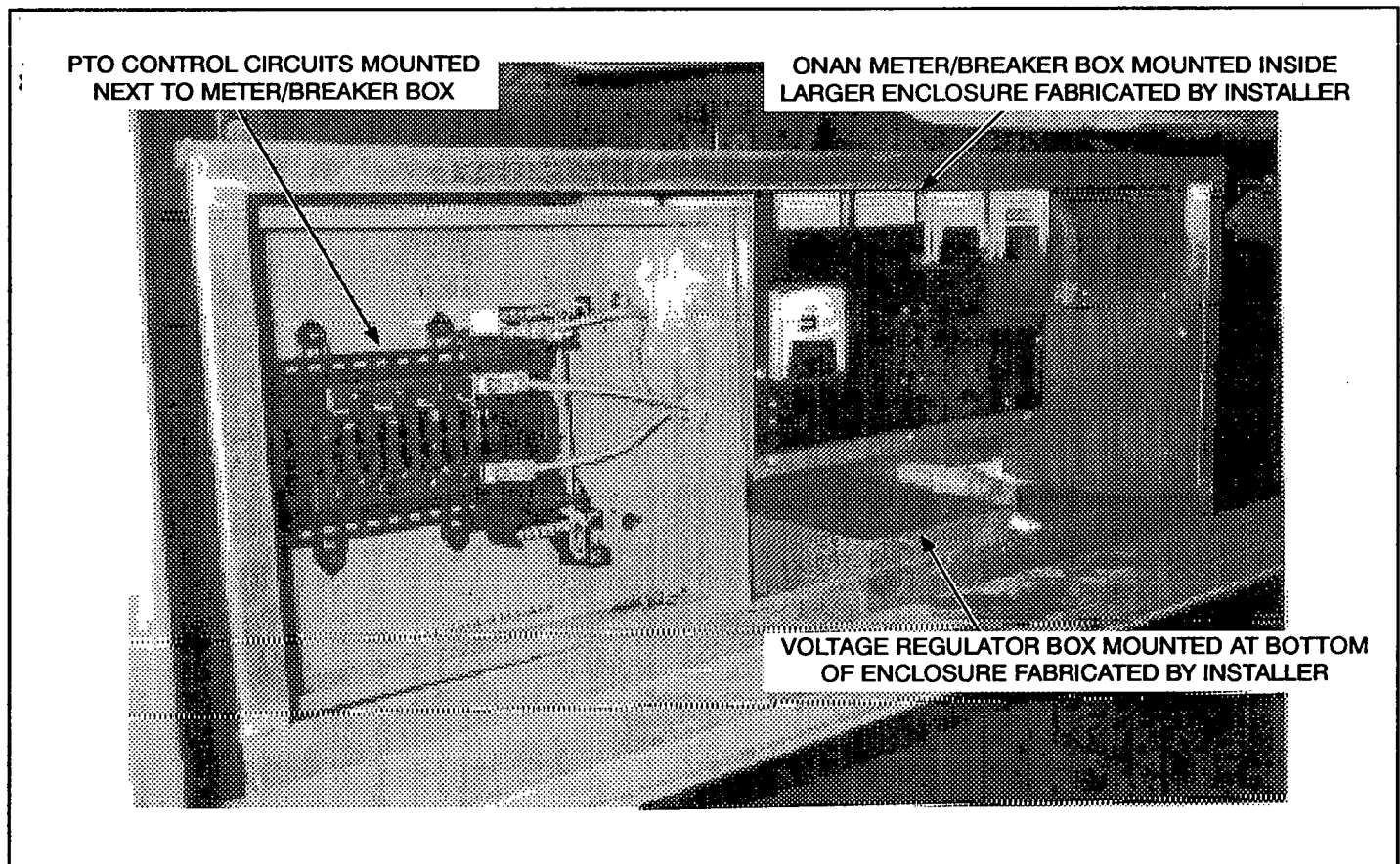


FIGURE 5-1. ONAN METER/BREAKER PANEL MOUNTING

Section 6. System Wiring

SYSTEM CONNECTIONS

The YD PTO AC generator, voltage regulator box and meter/breaker box are simply interconnected: four wires extend from the small conduit box on top of the generator to the meter/breaker box, and four wires extend from the generator to the voltage regulator box.

⚠ WARNING *Incorrect installation, service or replacement of parts can result in severe personal injury, death and/or equipment damage. Service personnel must be qualified to perform electrical and/or mechanical component installation.*

Once the generator, voltage regulator box and control/meter box are mounted, perform the following steps:

1. Cut and fit watertight conduit between the generator and the voltage regulator, and between the generator and the meter/breaker box. Conduit connector sizes:

Generator T1, T2, T3, T4: 1-1/4"

Generator voltage reg. leads: 1/2"

Voltage regulator box: 1/2"

15 KW meter/breaker box: 1/2", 3/4", 1-1/2" (2 each)

20, 24, 30, 35 KW meter/breaker box: 1/2", 1", 1-1/4" (2 each)

2. Pass the leads from the small conduit opening on the generator through the conduit to the voltage regulator box.
3. Pass the leads from the large conduit opening on the generator through the conduit leading to the meter/breaker panel.
4. (20, 24, 30, 35 KW meter breaker boxes): Pass the T1, T2, T3, T4 leads through current transformers CT1 and CT2 as shown in Figure 6-2 or Figure 6-3.
5. Connect the leads inside the voltage regulator box and the meter/breaker box according to the appropriate diagram found in this manual section:
 - 15 KW generator wiring: Figure 6-1
 - 20, 24KW generator wiring: Figure 6-2
 - 30, 35 KW generator wiring: Figure 6-3

Wiring diagrams for the meter/breaker panels, generator, and voltage regulator are found in Section 7 of this manual.

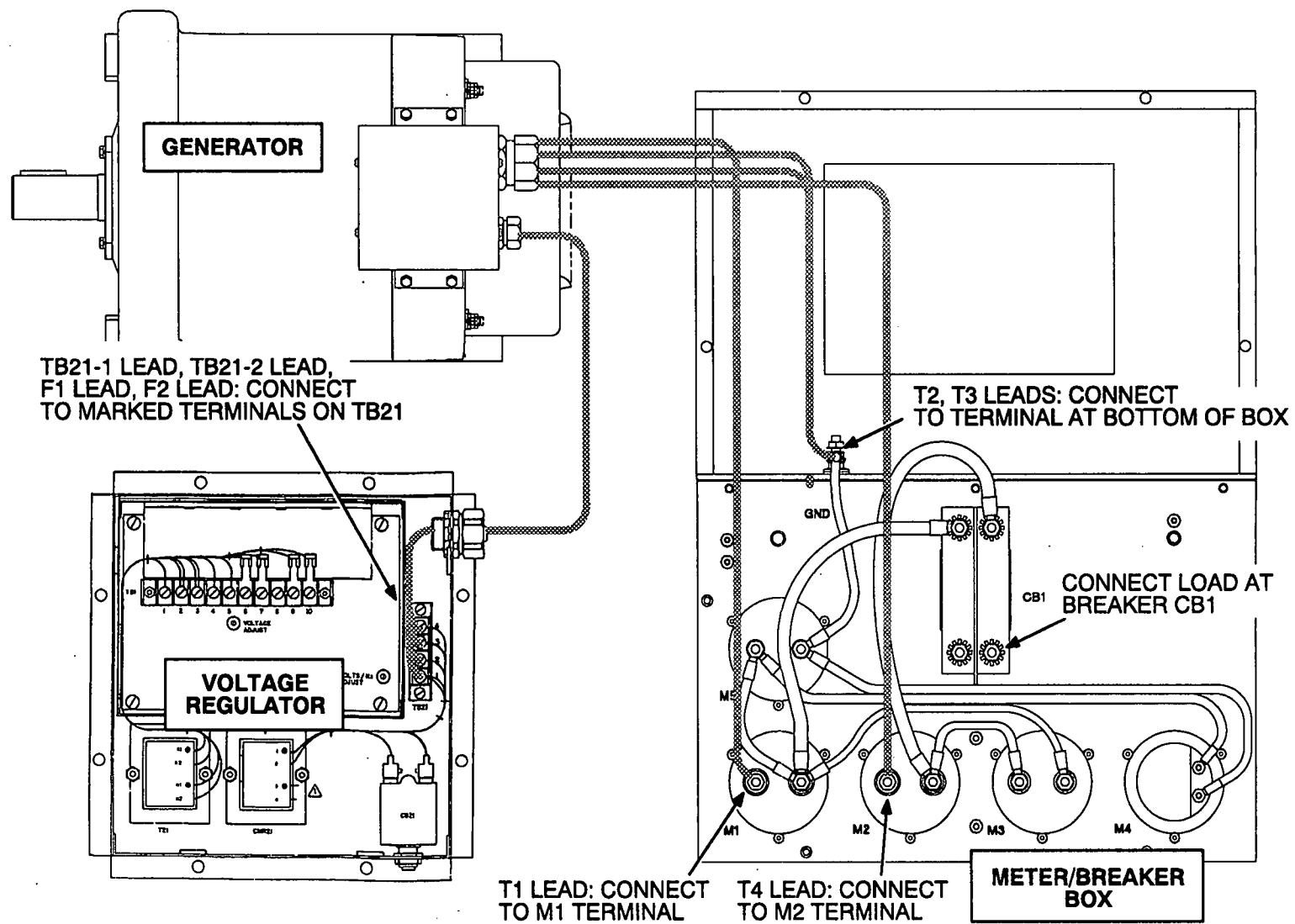


FIGURE 6-1. 15 KW GENERATOR WIRING

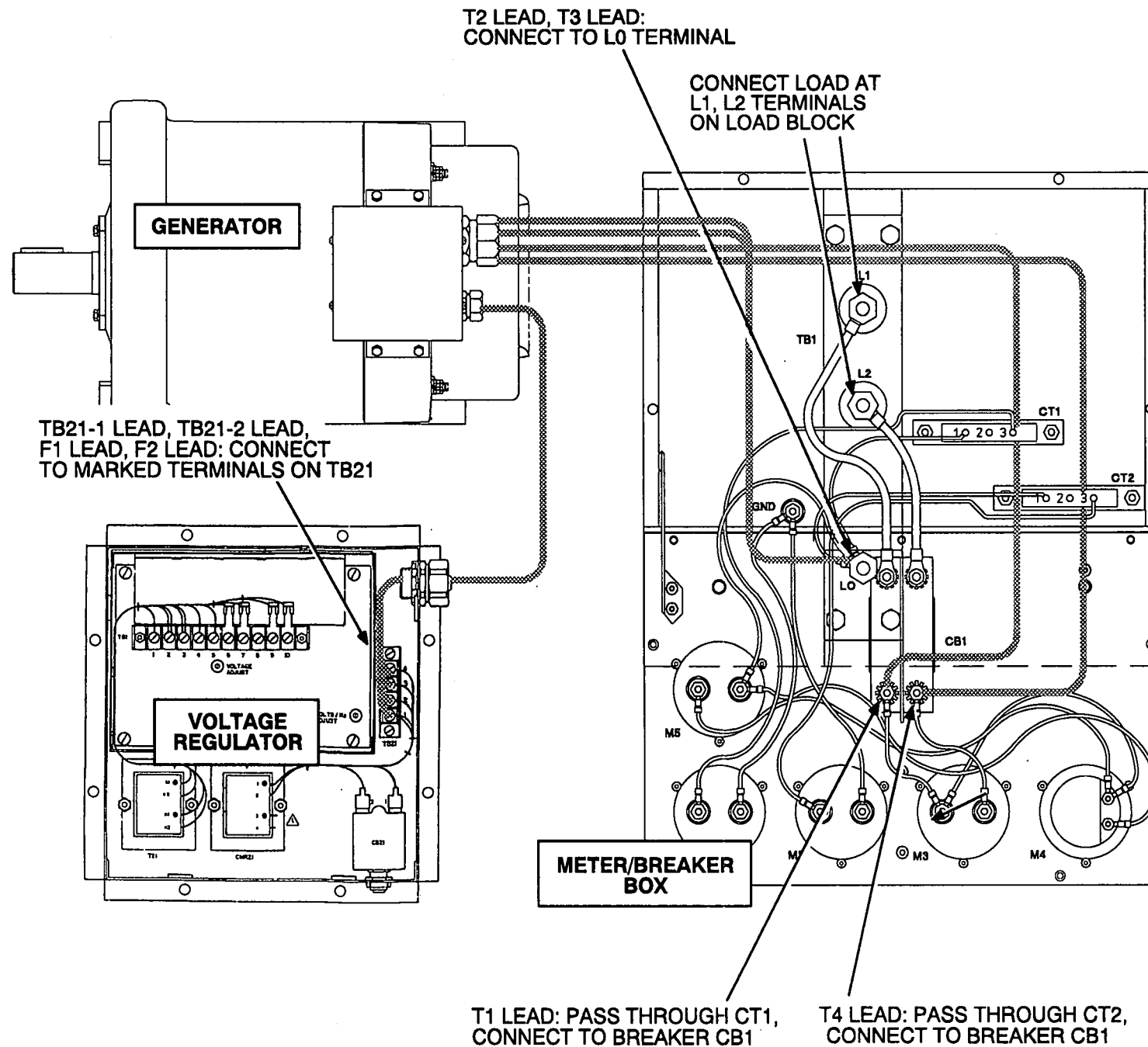
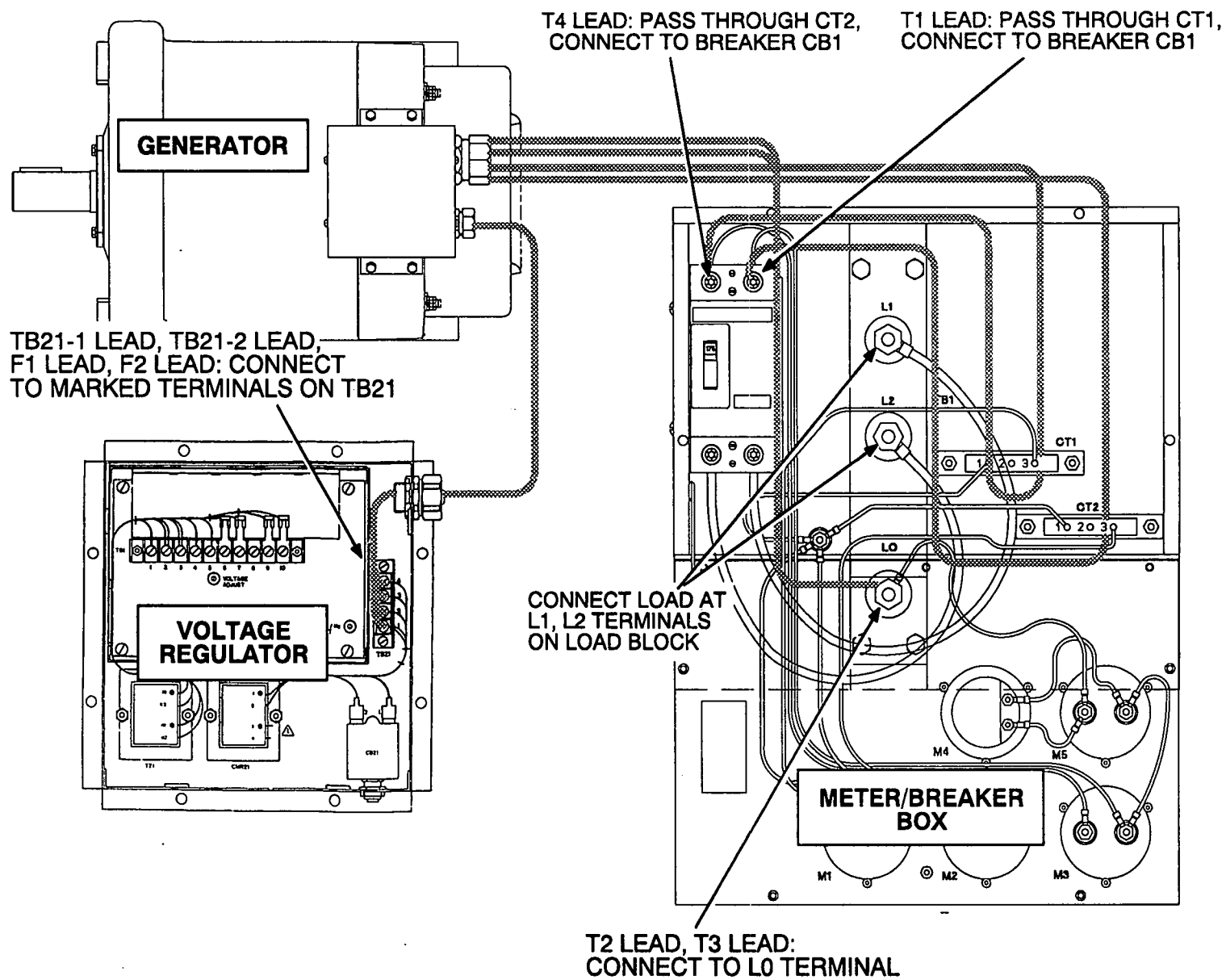


FIGURE 6-2. 20. 24 KW GENERATOR WIRING

FIGURE 6-3. 30, 35 KW GENERATOR WIRING



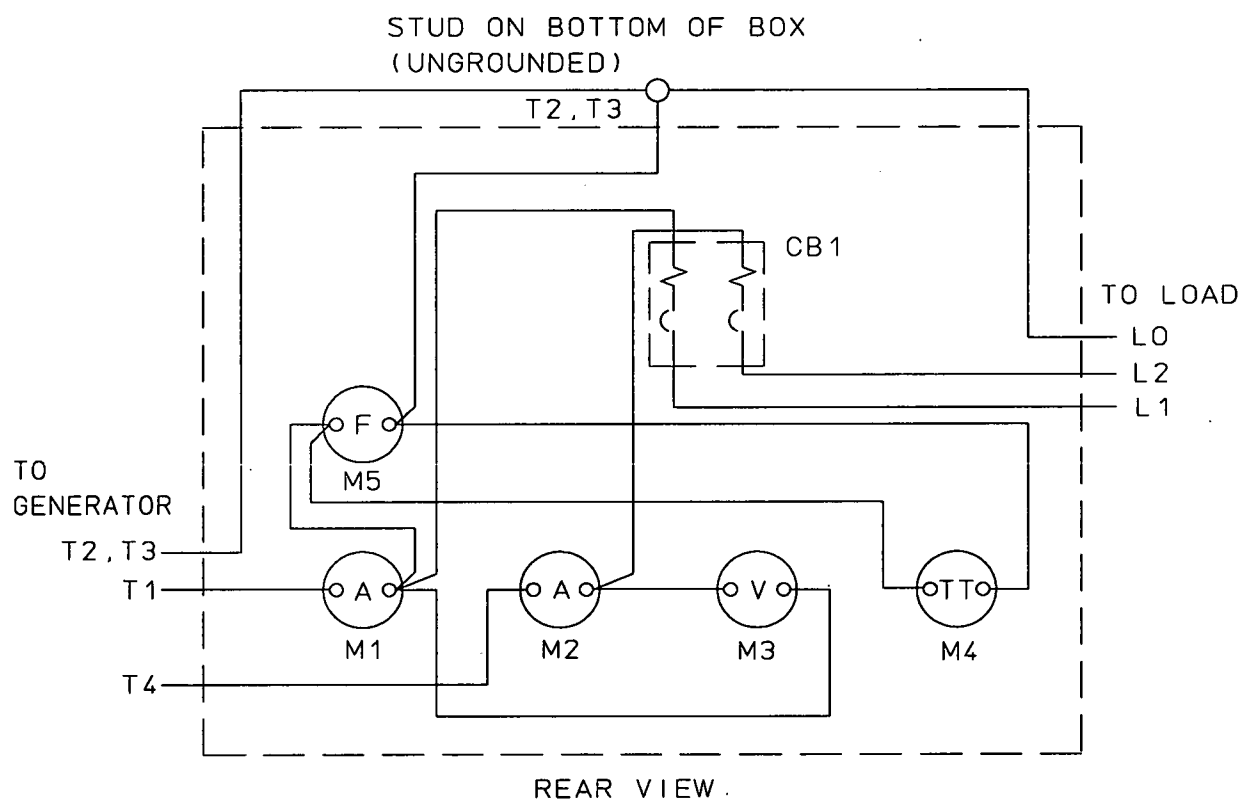
Section 7. Installation and Wiring Diagrams

8-1/2" x 11" Diagrams:

DRAWING	PAGE
15 KW Generator Meter/Breaker Panel Schematic Diagram (615-0426)	7-2
20/24 KW Generator Meter/Breaker Panel Schematic Diagram (615-0427)	7-3
30/35 KW Generator Meter/Breaker Panel Schematic Diagram (615-0428)	7-4
Voltage Regulator Box Dimensions	7-5

11" x 17" Diagrams:

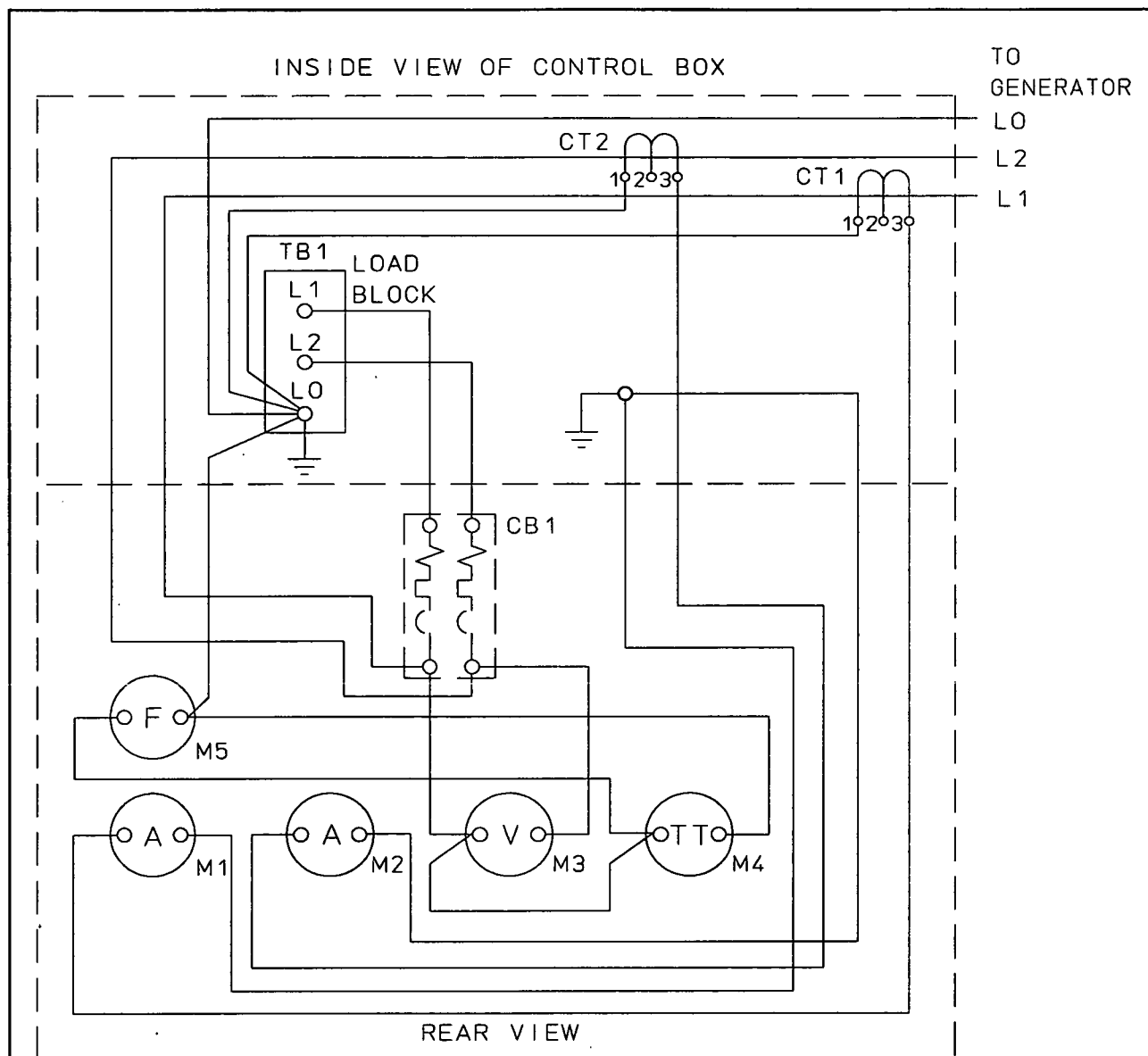
DRAWING	PAGE
Meter/Breaker Panel Dimensions, Mounting Holes, Conduit Openings (all models)	7-6
YD PTO AC Generator Dimensional Drawing (500-3006)	7-7
YD PTO AC Generator Wiring Diagram (612-6678)	7-8
Torsional Illustration of YD Generator Rotor	7-9



5	METER-FREQUENCY	M5
4	METER-TOTAL TIME	M4
3	METER-AC VOLT	M3
2	METER-AC AMMETER	M1, 2
1	ASSY-SWITCHBOARD	
ITEM	DESCRIPTION OR MATERIAL	REF DES

15 KW GENERATOR METER/BREAKER PANEL SCHEMATIC DIAGRAM

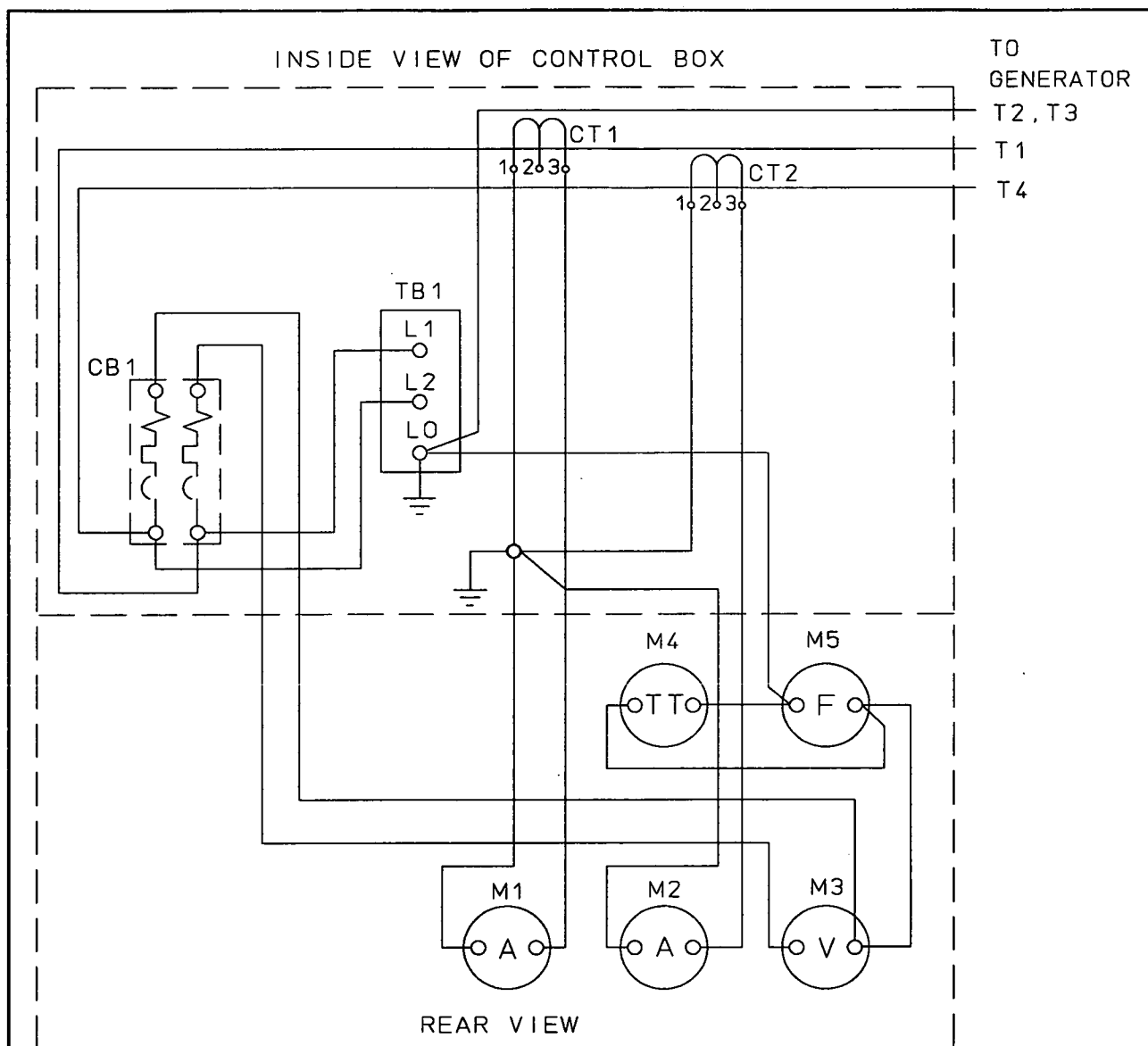
**NO. 615-0426
REV. A
MODIFIED**



7	TERMINAL BLOCK	TB1
6	CIRCUIT BREAKER	CB1
5	TRANSFORMER-CURRENT	CT1, CT2
4	METER-FREQUENCY	M5
3	METER-TIME TOTALIZING	M4
2	METER-AC VOLTAGE	M3
1	METER-AC AMMETER	M1, 2
ITEM	DESCRIPTION OR MATERIAL	REF DES

20, 24 KW GENERATOR METER/BREAKER PANEL SCHEMATIC DIAGRAM

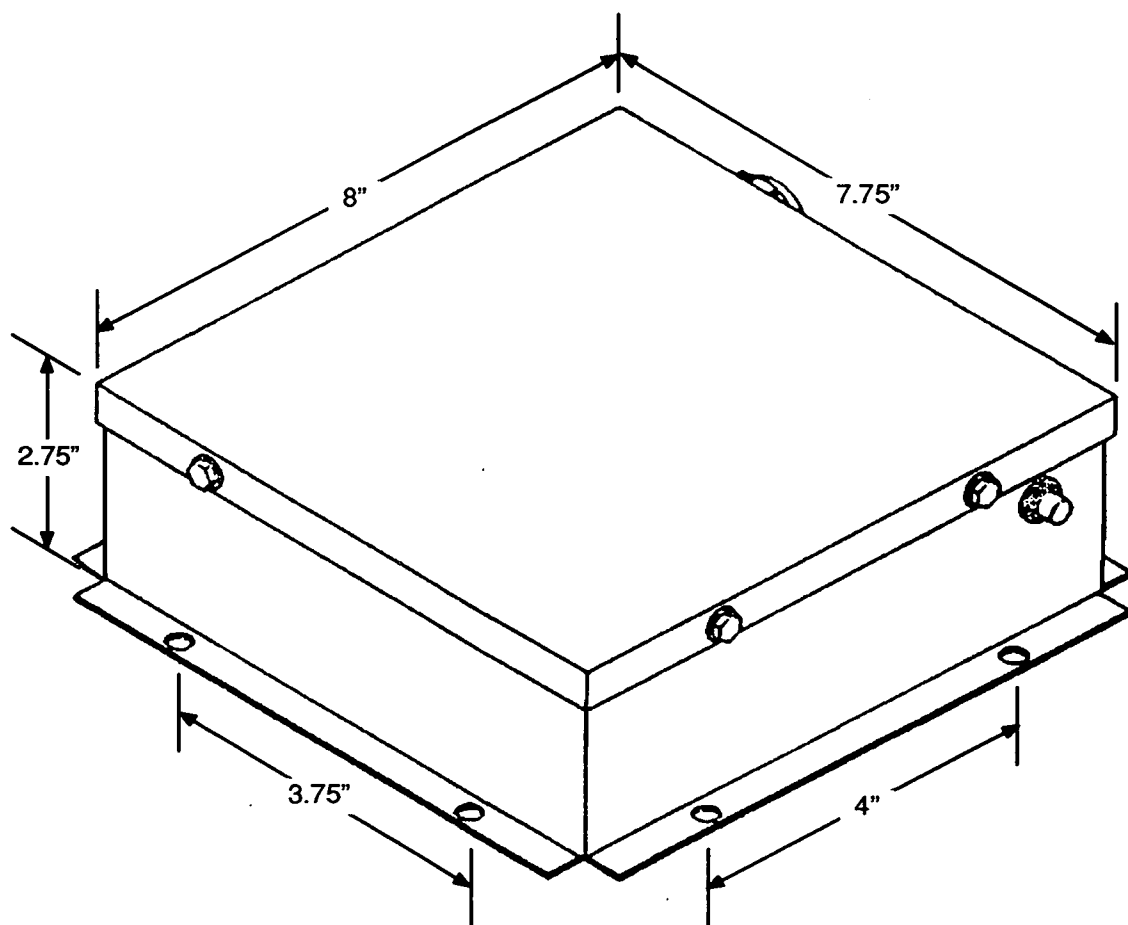
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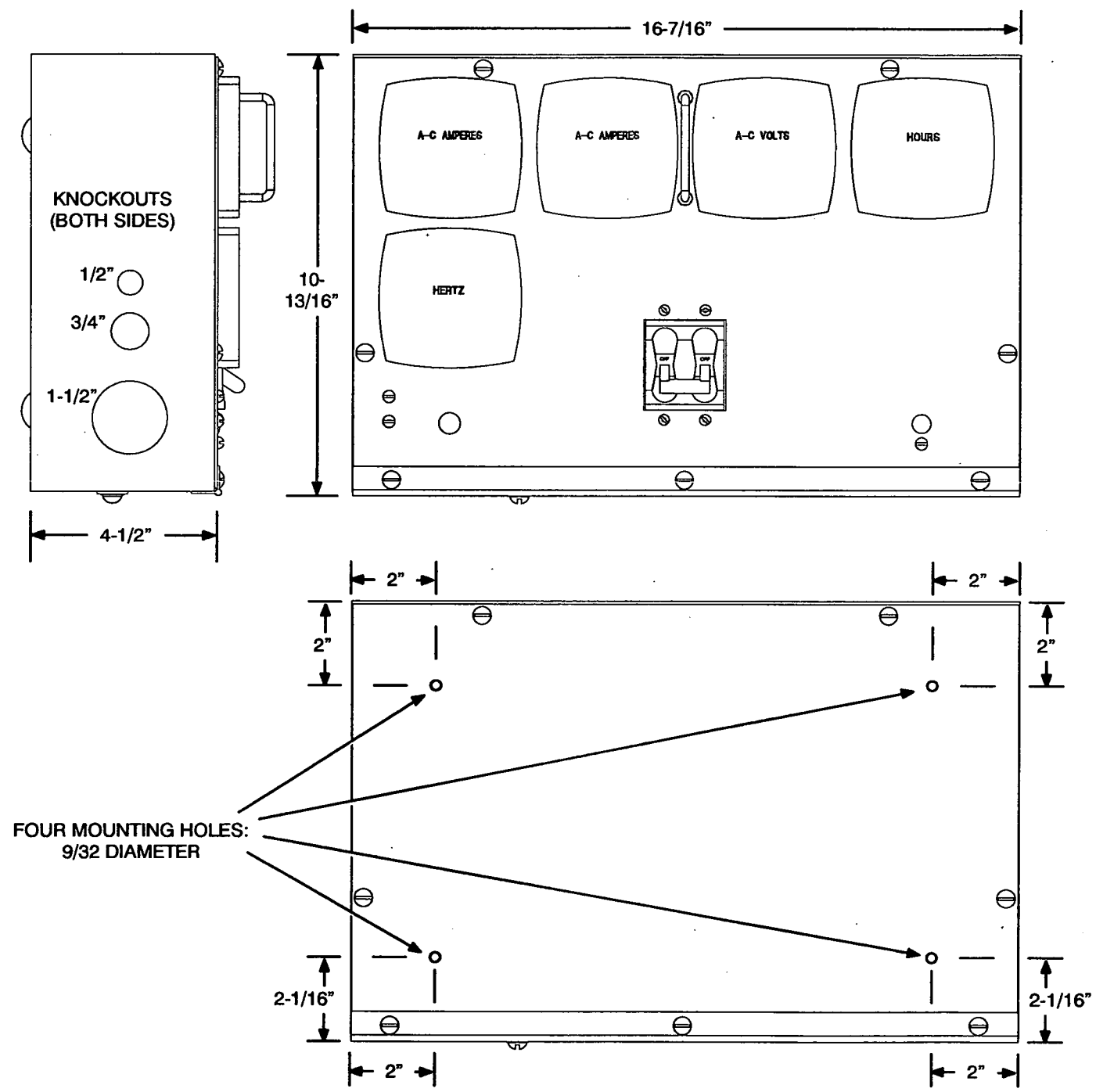
7	TERMINAL BLOCK	TB1
6	CIRCUIT BREAKER	CB1
5	TRANSFORMER-CURRENT	CT1, CT2
4	METER-FREQUENCY	M5
3	METER-TIME TOTALIZING	M4
2	METER-AC VOLTAGE	M3
1	METER-AC AMMETER	M1, 2
ITEM	DESCRIPTION OR MATERIAL	REF DES

30, 35 KW GENERATOR METER/BREAKER PANEL SCHEMATIC DIAGRAM

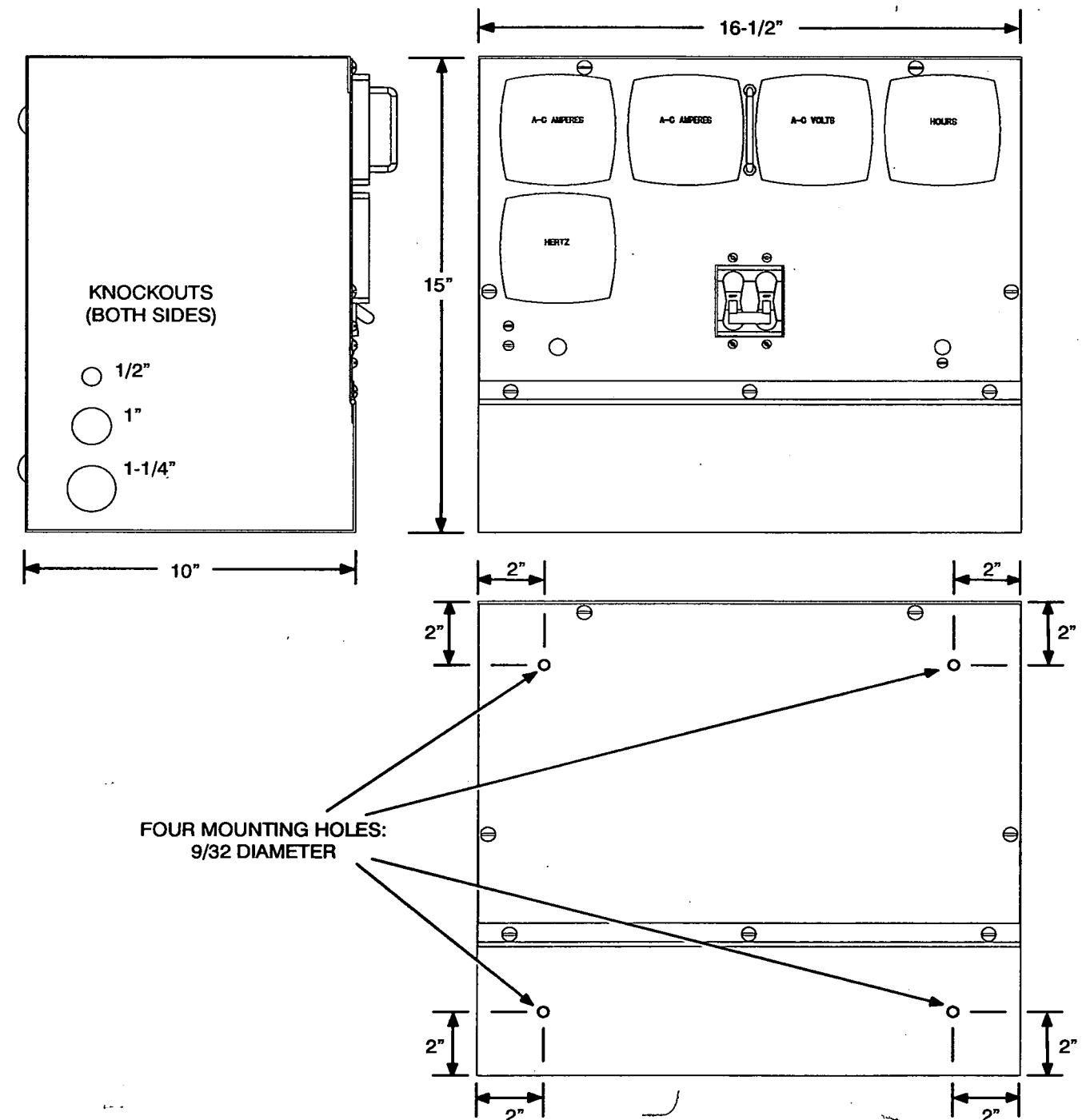
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VOLTAGE REGULATOR BOX DIMENSIONS



15 KW YD PTO GENERATOR METER/BREAKER PANEL
DIMENSIONS, MOUNTING HOLES, AND CONDUIT OPENINGS

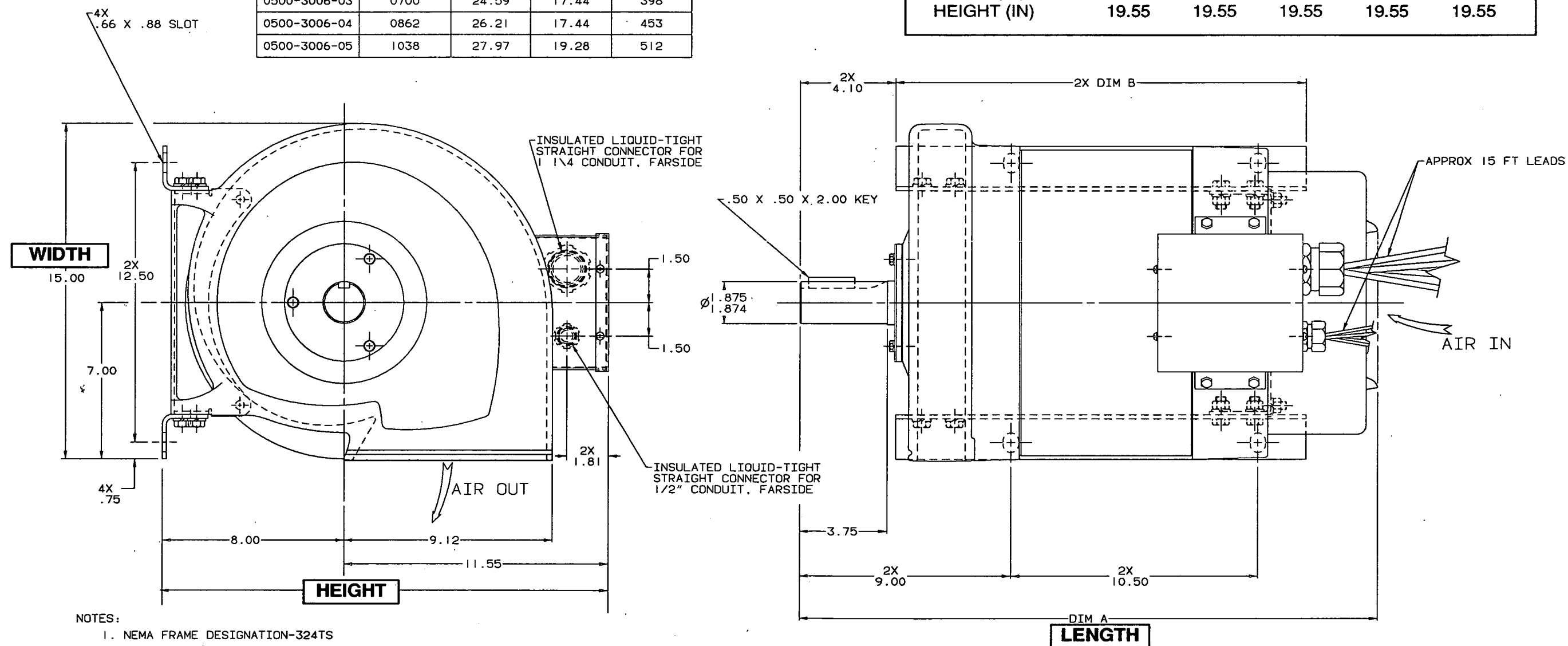


20, 24, 30, 35 KW YD PTO GENERATOR METER/BREAKER PANEL
DIMENSIONS, MOUNTING HOLES, AND CONDUIT OPENINGS

TABULATION				
OUTLINE- GEN	FRAME DESIGNATION CODE	DIM A	DIM B	APPROX WEIGHT (LBS)
0500-3006-01	0431	21.90	17.44	306
0500-3006-02	0575	23.34	17.44	356
0500-3006-03	0700	24.59	17.44	398
0500-3006-04	0862	26.21	17.44	453
0500-3006-05	1038	27.97	19.28	512

DIMENSIONS (COMPUTED FROM TABLE AT LEFT)

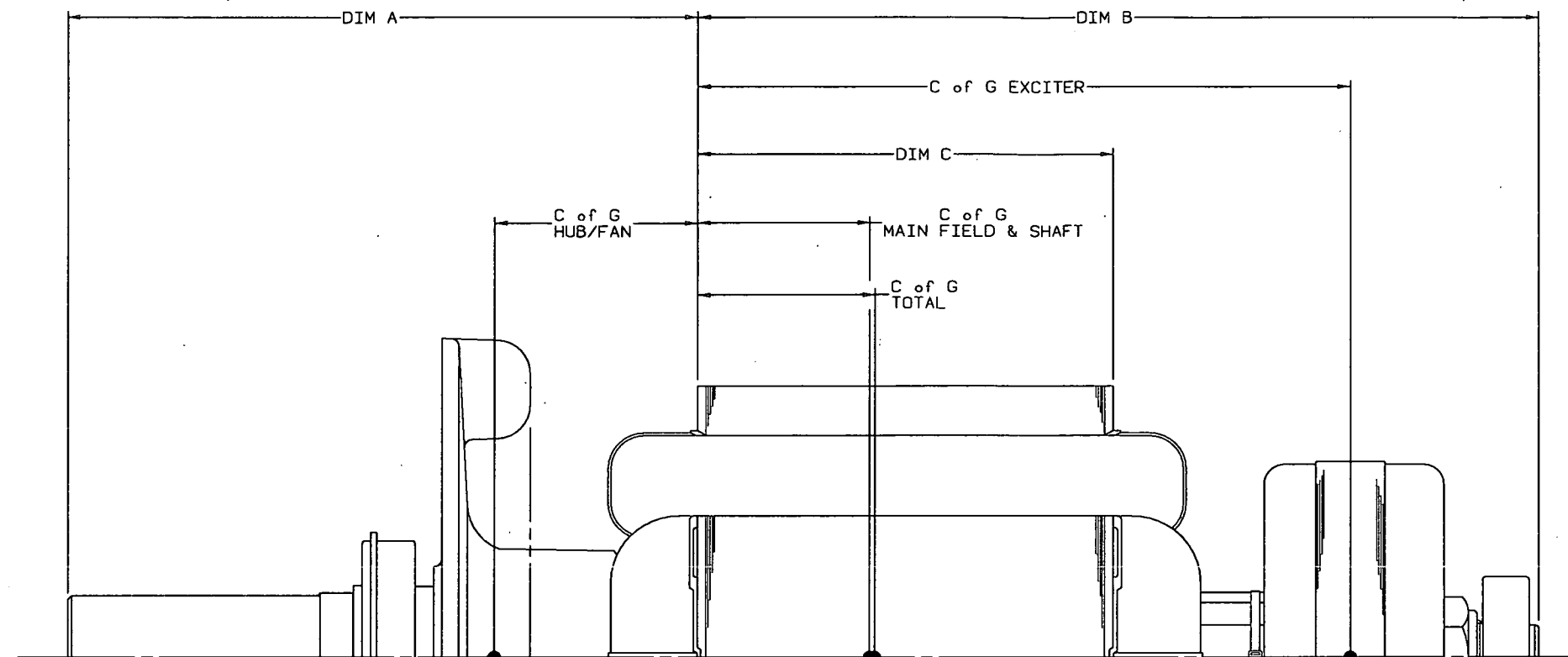
RATING (KW)	15	20	24	30	35
WEIGHT (LB)	306	356	398	453	512
LENGTH (IN)	21.90	23.34	24.59	26.21	27.97
WIDTH (IN)	15.0	15.0	15.0	15.0	15.0
HEIGHT (IN)	19.55	19.55	19.55	19.55	19.55



- NOTES:
1. NEMA FRAME DESIGNATION-324TS
 2. DIRECTION OF ROTATION WHEN FACING DRIVE END IS CLOCKWISE ONLY.
 3. SHAFT SPEED:
1800 RPM, 60HZ
1500 RPM, 50HZ
 4. SEE DWG 0539-1601 (D) FOR TORSIONAL INFORMATION.

YD PTO AC GENERATOR DIMENSIONAL DRAWING

**NO. 500-3006
REV. A
MODIFIED**



NOTES:

1. MATERIALS-
SHAFT = AISI, C-1018, CD
HUB = CAST IRON, 30,000
LAMS = AISI 1010, QTR HARD, 20 GA
2. UNITS-
INERTIA = LB-IN-SEC²
WEIGHT = LB
STIFFNESS = IN-LB/RAD
LENGTH = INCHES
3. DIMENSIONS REFERRED TO COUPLING END OF LAMINATION STACK

TABULATION																	
FRAME DESIGNATION CODE	DIM "A"	DIM "B"	DIM "C"	HUB/FAN			MAIN FIELD AND SHAFT			EXCITER			TOTAL			SHAFT STIFFNESS	
				C of G	WEIGHT	WR ²	C of G	WEIGHT	WR ²	C of G	WEIGHT	WR ²	C of G	WEIGHT	WR ²	COUPLING	EXCITER
0431	9.35	10.84	4.68	3.00	11.7	.278	1.700	75.5	1.319	8.122	10.5	.127	1.827	97.7	1.724	3.550	3.810
0575	9.35	12.28	6.12	3.00	11.7	.278	2.554	90.1	1.583	9.562	10.5	.127	2.631	112.3	1.988	3.550	3.810
0700	9.35	13.53	7.38	3.00	11.7	.278	3.219	104.8	1.874	10.812	10.5	.127	3.274	127.0	2.279	4.189	3.675
0862	9.35	15.16	9.00	3.00	11.7	.278	4.071	123.9	2.253	12.438	10.5	.127	4.106	146.1	2.658	4.056	3.654
1038	9.35	16.91	10.75	3.00	11.7	.278	4.976	144.4	2.661	14.188	10.5	.127	4.996	166.6	3.066	4.056	3.654

TORSIONAL ILLUSTRATION OF YD GENERATOR ROTOR

NO. 539-1601
REV. A
MODIFIED



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