

# Operation and Installation Manual

## RV/Mobile Generator Sets



### Models:

4CKM  
4CFKM  
5CKM  
4CKMR  
4CFKMR  
5CKMR

**KOHLER**<sup>®</sup>  
POWER SYSTEMS

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**California Proposition 65**

** WARNING**

Engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

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# Table of Contents

SUBJECT	PAGE	SUBJECT	PAGE
<b>Safety Precautions and Instructions</b> .....	<b>I</b>	Checking Specific Gravity .....	3-14
Routine Service Parts .....	VIII	Cylinder Head Service .....	3-15
<b>Section 1. Specifications</b> .....	<b>1-1</b>	Valve Service .....	3-15
General Specifications .....	1-1	Wattage Requirements .....	3-16
Engine .....	1-3	Generator Service .....	3-17
Generator .....	1-4	General .....	3-17
<b>Glossary of Abbreviations</b> .....	<b>1-5</b>	Storage Procedure .....	3-17
Controller .....	1-7	<b>Section 4. Troubleshooting</b> .....	<b>4-1</b>
<b>Section 2. Operation</b> .....	<b>2-1</b>	Engine .....	4-1
Prestart Checklist .....	2-1	Generator .....	4-2
Start-Stop Procedure .....	2-1	<b>Section 5. Wiring Diagrams</b> .....	<b>5-1</b>
Automatic De-Icing (For Gasoline Models Only) .....	2-1	Four-Lead Reconnectable (Single-Phase) ...	5-2
Circuit Protection .....	2-2	<b>Section 6. Installation</b> .....	<b>6-1</b>
<b>Section 3. Scheduled Maintenance</b> .....	<b>3-1</b>	Introduction .....	6-1
Lubrication System .....	3-2	General Information .....	6-1
Low Oil Pressure Shutdown .....	3-2	Generator Selection And Wattage	
Oil Check .....	3-2	Requirements .....	6-2
Oil Change .....	3-3	Installation Factors .....	6-2
Oil Type .....	3-3	Electrical Load .....	6-2
Cooling System .....	3-4	Lighting Load .....	6-2
Ignition System .....	3-5	Motor Loads .....	6-3
Electronic Magneto Ignition System .....	3-5	Appliance Loads .....	6-3
Operation .....	3-5	Kilowatt Derating .....	6-4
Spark Plugs .....	3-6	4/5CKM-RV Generator Set Mounting .....	6-5
Gasoline Fuel System .....	3-6	Compartment Size .....	6-5
Specification– Gasoline .....	3-6	Air Requirements .....	6-6
Fuel Filter– Gasoline Only .....	3-7	Mounting .....	6-8
Gasoline Carburetor Adjustments .....	3-8	4/5CKMR-Mobile Generator Set Mounting ...	6-9
Main And Idle Fuel Mixture .....	3-8	Compartment Mount .....	6-10
LP Gas Fuel System .....	3-9	Below-floor Mount .....	6-11
Specification– LP Liquid .....	3-9	Vehicle-floor Mount .....	6-12
Fuel Filter– LP Vapor .....	3-9	Extended Shaft Option .....	6-12
LP Carburetor Adjustments .....	3-10	Air Requirements .....	6-13
Main Fuel Mixture .....	3-10	Fuel System .....	6-16
Idle Fuel Mixture .....	3-10	Gasoline .....	6-16
Fuel Valve and Filter– LP Liquid .....	3-10	LP Gas Fuel System .....	6-17
Choke Adjustments .....	3-11	Exhaust Systems .....	6-18
Procedure For Operation		Electrical Systems .....	6-22
above 10°F (-12.2°C) .....	3-11	Battery And Connections .....	6-23
Procedure For Operation		AC Load Lead Connections .....	6-24
below 10°F (-12.2°C) .....	3-11	Remote Switch Connection .....	6-25
Electronic Governor .....	3-12	<b>Section 7. Installation Drawings</b> .....	<b>7-1</b>
Air Cleaner .....	3-12	<b>Section 8. Service Ordering Instructions</b> ..	<b>8-1</b>
Battery .....	3-13	Service Manual Procurement .....	8-1
Battery Charging (if equipped) .....	3-13	<b>Section 9. Operating Hour Service Log</b> ...	<b>9-1</b>
Cleaning .....	3-14		
Checking Electrolyte Level .....	3-14		

# Safety Precautions and Instructions

A generator set, like any other electro-mechanical device, can pose potential dangers to life and limb if improperly maintained or imprudently operated. The best way to prevent accidents is to be aware of the potential dangers and to always use good common sense. In the interest of safety, some general precautions relating to the operation of a generator set follow. Keep these in mind. This manual contains several types of safety precautions which are explained below.

## DANGER

Danger is used to indicate the presence of a hazard that will cause severe personal injury, death, or substantial property damage if the warning is ignored.

## WARNING

Warning is used to indicate the presence of a hazard that can cause severe personal injury, death, or substantial property damage if the warning is ignored.

## CAUTION


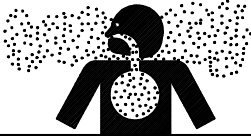
Caution is used to indicate the presence of a hazard that will or can cause minor personal injury or property damage if the warning is ignored.

## NOTE

Note is used to notify people of installation, operation, or maintenance information that is important but not hazard-related.

Safety decals are affixed to the generator set in prominent places to advise the operator or service technician of potentially hazardous situations. The decals are reproduced here to improve operator recognition and thereby increase decal effectiveness. For a further explanation of decal information, reference the accompanying safety precautions. Before operating or servicing the generator set, be sure you understand the message of these decals. Replace decals if missing or damaged.

## EXHAUST SYSTEM

 <b>WARNING</b>

<p><b>Carbon monoxide.</b> <b>Can cause severe nausea, fainting, or death.</b></p> <p>The exhaust system must be leakproof and routinely inspected.</p>

**Carbon monoxide can cause severe nausea, fainting, or death.** Install exhaust system tail pipe so discharged exhaust gases will not be drawn into vehicle interior through windows, doors, air conditioners, etc. Do not use flexible tail piping since this type could crack and allow lethal exhaust fumes to enter the vehicle.

**Carbon monoxide can cause severe nausea, fainting, or death.** Never operate the generator set inside a building unless the exhaust gas is piped safely outside. Never operate in any area where exhaust gas could accumulate and seep back inside an occupied building or vehicle. Be careful when parking your vehicle to avoid obstructing the exhaust outlet. The exhaust gases must discharge freely, otherwise carbon monoxide may deflect into the vehicle. Avoid breathing exhaust fumes when working on or near the generator set. Carbon monoxide is particularly dangerous because it is an odorless, colorless, tasteless, nonirritating gas that can cause death if inhaled for even a short period of time.

## ACCIDENTAL STARTING





**Accidental starting.**

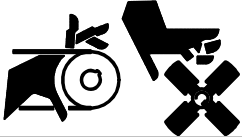
**Can cause severe injury or death.**

Disconnect battery cables before working on generator set (negative lead first and reconnect it last).

**Accidental starting can cause severe injury or death.** 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.

## MOVING PARTS


<b>⚠ WARNING</b>	
	
<b>Hazardous voltage.</b>	<b>Moving rotor.</b>
<b>Can cause severe injury or death.</b>	
Do not operate generator set without all guards and electrical enclosures in place.	

<b>⚠ WARNING</b>	
	
<b>Rotating parts.</b>	
<b>Can cause severe injury or death.</b>	
Do not operate generator set without all guards, screens, or covers in place.	

**Exposed moving parts can cause severe injury or death.** Keep hands, feet, hair, and clothing away from belts and pulleys when unit is running. Replace guards, covers, and screens before operating generator set.

**Flying projectiles can cause severe injury or death.** Retorque all crankshaft and rotor hardware after servicing. When making adjustments or servicing generator set, do not loosen crankshaft hardware or rotor thru-bolt. If rotating crankshaft manually, direction should be clockwise only. Turning crankshaft bolt or rotor thru-bolt counterclockwise can loosen hardware and result in serious personal injury from hardware or pulley flying off engine while unit is running.




## ENGINE BACKFIRE/FLASH FIRE



<b>⚠ WARNING</b>	
	
<b>Fire.</b>	
<b>Can cause severe injury or death.</b>	
Do not smoke or permit flame or spark to occur near fuel or fuel system.	

**A flash fire can cause severe injury or death.** Do not smoke or permit flame or spark to occur near carburetor, fuel line, fuel filter, fuel pump, or other potential sources of spilled fuel or fuel vapors. When removing fuel line or carburetor, use a proper container to catch all fuel.

**A sudden backfire can cause severe injury or death.** Do not operate with backfire flame arrestor removed.

## HAZARDOUS VOLTAGE/ ELECTRICAL SHOCK

 <b>WARNING</b>	
	
<b>Hazardous voltage.</b>	<b>Moving rotor.</b>
<b>Can cause severe injury or death.</b>	
Do not operate generator set without all guards and electrical enclosures in place.	

 <b>WARNING</b>

<b>Hazardous voltage.</b>
<b>Backfeed to utility system can cause severe injury, death, or property damage.</b>
Do not connect to any building electrical system without connecting through an approved device and after building main switch is open.

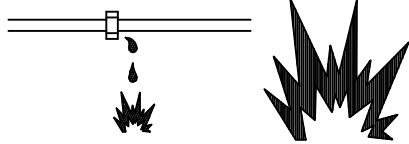
**Hazardous voltage can cause severe injury or death.** The heat sink of the voltage regulator contains high voltage. Do not touch voltage regulator heat sink when testing or electrical shock will occur.

**Hazardous voltage can cause severe injury or death.** Perform electrical service only as prescribed in equipment manual. Be sure that generator is properly grounded. Never touch electrical leads or appliances with wet hands, when standing in water, or on wet ground as the chance of electrocution is especially prevalent under such conditions. Wiring should be inspected at the interval recommended in the service schedule— replace leads that are frayed or in poor condition. The function of a generator set is to produce electricity and wherever electricity is present, there is the hazard of electrocution.

**Hazardous “backfeed” voltage can cause severe injury or death.** The generator must not be used to “backfeed” by connecting it to building/campground circuits. Install a transfer switch in standby power installations to prevent connection of standby and other sources of power. Electrical backfeed into a utility electrical system can cause serious injury or death to utility personnel working on transmission lines.

**Hazardous voltage can cause severe injury or death.** Short circuits can cause bodily injury and/or equipment damage. Do not contact electrical connections with tools or jewelry while adjustments are made. Remove wristwatch, rings, and jewelry that can cause short circuits.

## FUEL SYSTEM



**Explosive fuel vapors.  
Can cause severe injury or death.**

Use extreme care when handling, storing,  
and using fuels.

**Explosive fuel vapors can cause severe injury or death.** All fuels are highly explosive in a vapor state. Use extreme care when handling, storing, and using fuels. Store fuel in a well-ventilated area away from spark-producing equipment and out of the reach of children. Never add fuel to the tank while the engine is running since spilled fuel may ignite on contact with hot parts or from ignition spark. Do not smoke or permit flame or spark to occur near potential sources of spilled fuel or fuel vapors. Keep fuel lines and connections tight and in good condition— don't replace flexible fuel lines with rigid lines. Flexible sections are used to avoid breakage due to vibration. Should any fuel leakage, fuel accumulation, or electrical sparks be noted, **DO NOT OPERATE GENERATOR SET.** Have systems repaired before resuming generator operation.

**Explosive fuel vapors can cause severe injury or death.** Additional precautions must be taken when using the following fuels:

**Gasoline**— Store gasoline only in approved red containers clearly marked GASOLINE. Do not store gasoline in any occupied building.

**Propane (LP)**— Adequate ventilation is mandatory. Propane is heavier than air; install gas detectors low in room. Inspect detectors often.

**Explosive fuel vapors can cause severe injury or death.** Spilled fuel can cause an explosion. Use a container to catch fuel when draining fuel system. Wipe up all spilled fuel after draining system.

**Explosive fuel vapors can cause severe injury or death.** Fuel leakage can cause an explosion. Check LP vapor gas fuel system for leakage using a soap-water solution with fuel system test pressurized to 6-8 ounces per square inch (10-14 inches water column). Do not use test solutions that contain ammonia or chlorine, since the soap will not bubble for an accurate leakage test.

**Explosive fuel vapors can cause severe injury or death.** Fuel leakage can cause an explosion. Check LP liquid withdrawal gas fuel system for leakage using a soap-water solution with fuel system test pressurized not less than 90 psi (621 kPa). Do not use test solutions that contain ammonia or chlorine, since the soap will not bubble for an accurate leakage test.



## BATTERY

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**Sulfuric acid in batteries.**  
**Can cause severe injury or death.**

Use protective goggles and clothes. Can cause permanent damage to eyes, burn skin, and eat holes in clothing.

**Sulfuric acid in batteries can cause severe injury or death.** Sulfuric acid in battery 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.

**Explosion can cause severe injury or death.** 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.

## HAZARDOUS NOISE



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**Hazardous noise.**  
**Can cause loss of hearing.**

Never operate generator without a muffler or with faulty exhaust system.

## HOT PARTS

 <b>WARNING</b>

<b>Hot engine and exhaust system. Can cause severe injury or death.</b>
Do not work on generator set until unit is allowed to cool.

**Fire can cause severe injury or death.** Hot exhaust system can ignite adjacent combustible materials. Do not locate electrical wiring, fuel lines, or combustible material above the exhaust muffler. Be careful when parking your vehicle to prevent grass fires started by exhaust system and hot exhaust gases.

**Fire can cause severe injury or death.** Hot generator can ignite debris in compartment. Keep the compartment and generator set clean and free of debris and combustible materials to minimize chances of fire. Do not block fuel/oil drain opening in generator mounting tray. If sub-flooring is used, cut a corresponding hole in the sub-flooring for drain opening.

**Hot parts can cause severe injury or death.** Do not touch hot engine parts. An engine gets hot while running and exhaust system components get extremely hot.

## NOTES

### NOTE

**This generator set does not comply with United States Coast Guard (U.S.C.G.) requirements and must not be used for marine applications.** Use only generator sets specified for marine use in marine installations. U.S.C.G. Regulation 33CFR183 requires a generator set to be "ignition protected" when used in a gasoline-fueled environment.

### NOTE

Do not "tee" into fuel injected fuel systems. Use a two dip tube arrangement for fuel supply. Consult an Authorized Kohler Service Dealer for further fuel system installation information.

### NOTE

Generator sets equipped with optional "swing down" tray should not be left in the tilted position for any extended period (one hour or more) otherwise, hydrostatic lock can occur. Always place unit in the normal mounting position when service is not actually being performed.

# Routine Service Parts

Contact your Kohler generator dealer/distributor for a complete listing of service parts for your generator set.

<b>Part Description</b>	<b>Kohler Part No.</b>
Engine:	
Air Filter	278612
Oil Filter	52 050 02
Fuel Filter: 1/4 in. inlet	228269
Fuel Filter: 5/16 in. inlet	227647
Ignition System:	
Spark Plug	51 132 02
Black Spray Paint	221292

# Section 1. Specifications

## Introduction

Your vehicle is equipped with a dependable Kohler alternating-current generator set. Service requirements of the generator set are minimal but it is important that the required services be performed at the prescribed intervals. Please take a few moments to read through this manual then carefully follow all service recommendations to keep your set in top conditions. In the space provided, record the MODEL,

SPECIFICATION, SERIAL and ENGINE SPEC. numbers as found on the nameplate attached to the controller of the generator (see "Section 8. Service Ordering Instructions"). This information will enable your Kohler generator service dealer/distributor to supply the correct part or data for your particular version. Keep this manual in your vehicle for future reference.

## Specifications

### General Specifications

	<b>4CKM/CKMR (60Hz)</b>	<b>5CKM/CKMR (60Hz)</b>
Dimensions– L x W x H– in. (mm)	24.83 x 18.46 x 13.98 (631 x 469 x 355)	24.83 x 18.46 x 13.98 (631 x 469 x 355)
Weight– lbs. (kg)	258 (117)	268 (121.5)
Air Requirements:		
Combustion– cfm	20	20
Cooling– cfm	340	340
Free Air Opening	85 sq. in. (548 sq. cm)	85 sq. in. (548 sq. cm)

	<b>4CFKM/CFKMR (50Hz)</b>
Dimensions– L x W x H– in. (mm)	24.83 x 18.46 x 13.98 (631 x 469 x 355)
Weight– lbs. (kg)	258 (117)
Air Requirements:	
Combustion– cfm	20
Cooling– cfm	340
Free Air Opening	85 sq. in. (548 sq. cm)

<b>Fuel Consumption</b>	<b>Gasoline– gph (Lph)</b>			
Load	25%	50%	75%	100%
<b>4CKM/CKMR (60 Hz)</b>	0.48 (1.8)	0.58 (2.2)	0.70 (2.6)	0.89 (3.4)
<b>4CFKM/CFKMR (50 Hz)</b>	0.39 (1.5)	0.48 (1.8)	0.59 (2.2)	0.75 (2.8)
<b>5CKM/CKMR (60 Hz)</b>	0.45 (1.7)	0.58 (2.2)	0.75 (2.8)	1.04 (3.9)
<b>Fuel Consumption</b>	<b>LP Gas– gph (Lph)</b>			
Load	25%	50%	75%	100%
<b>4CKM/CKMR (60 Hz)</b>	0.46(1.7)	0.69 (2.6)	0.77(2.9)	0.99 (3.8)
<b>4CFKM/CFKMR (50 Hz)</b>	0.39 (1.5)	0.58 (2.2)	0.65 (2.5)	0.82 (3.1)
<b>5CKM/CKMR (60 Hz)</b>	0.54 (2.0)	0.80 (3.0)	0.90 (3.4)	1.15 (4.4)

## Engine

Some general engine specifications are listed below. Refer to the appropriate service section and the engine service manual for specific service details.

	4CKM/CFKM/ 4CKMR/CFKMR	5CKM/ 5CKMR
Manufacturer	Kohler	
Model	M18	M20
Cycle	4	
Number Cylinders	2	
Compression Ratio	6.0:1	6.6:1
Displacement– cu.in. (L)	42.18 (0.69)	46.98 (0.77)
Rated Horsepower:		
60 Hz	8.9	9.5
50 Hz	7.4	7.9
RPM:		
60 Hz	1800	
50 Hz	1500	
Bore– in. (mm)	3.12 (79.25)	3.12 (79.25)
Stroke– in. (mm)	2.75 (69.85)	3.06 (77.72)
Valve Material	Stelliteâ	
Valve Clearance– in. (mm):		
Intake	0.003-0.006 (0.076-0.152)	
Exhaust	0.011-0.014 (0.279-0.355)	
Cylinder Block Material	Aluminum crankcase with cast iron cylinders	
Cylinder Head Tightening Torque– ft. lbs (Nm)	15-20 (20-27)	
Cylinder Head Material	Aluminum	
Piston Rings	2 Compression/ 1 Oil	
Crankshaft Material	Heat treated ductile iron casting	
Bearings, Number & Type	2, Replaceable Sleeve	
Governor	Electronic	
Lubrication System	Full Pressure	
Oil Capacity (with filter)– qts. (L)	1.5 (1.4)	2.5 (2.36)
Oil Type (API)	SF	
Oil Pressure– psi (kPa)	30-40 (207-276)	
Fuel Type:		
Gasoline	87 Octane Unleaded	
LP Vapor Gas (Inlet Pressure)	4-6 oz. per sq. in.	
LP Liquid Withdrawal	50 psi	
Battery Voltage	12	
Battery Ground	Negative	
Battery Recommendation (min.)	290 Cold Cranking Amps/90 Amp Hr.	
Spark Plug Type	Championâ RV17YC	
Spark Plug Gap:		
Gasoline– in. (mm)	0.025 (0.64)	
LP Gas– in. (mm)	0.018 (0.46)	
Spark Plug Tightening Torque– ft. lbs (Nm)	10-15 (13.6-20)	
Ignition System	Electronic	
Ignition Module to Magnet Air Gap	0.008-0.012	
Starter Motor	Bendix-drive electric starter motor	
Cranking current at 70° F.	100 Amps	
Cooling System	Air-Cooled	
Intake Manifold Bolt Torque– ft. lbs. (Nm)	12.5 (17)	

## Generator

	4CKM/CKMR	5CKM/CKMR
Rated kW	4	5
Rated kW (LP Liquid Withdrawal)	4	4.6
Rated kW (LP Liquid Withdrawal with Battery Charging)	3.7	4.3
Frequency– Hz	60	
Rated Voltage	120/240 Volt, 3 wire, single phase  120 Volt, 2 wire, single phase	
Rated Amps (120 Volt)	33.3	41.7
Rated Amps (240 Volt)	16.7	20.8
Rated Amps 12 Volt Battery Charging System	0-15 Amps– Regulated	
Stator Resistance (ohms)** Leads:		
1-2, 3-4, 33-44	0.34	
55-33	2.8	
B1-B2	0.15	
C1-CP, C2-CP	0.14	
<b>4CFKM/CFKMR</b>		
Rated kW	3.3	
Frequency– Hz	50	
Rated Voltage	110 Volt, 2 wire, single phase 110/220 Volt, 3 wire, single phase	
Rated Amps (110 Volt)	30.0	
Rated Amps (220 Volt)	15.0	
Stator Resistance (ohms)** Leads:		
1-2, 3-4, 33-44	0.40	
55-33	2.8	
B1-B2	0.15	
C1-CP, C2-CP	0.14	
Rotor Resistance (ohms)	3.5-5.5	
Excitation Method	Solid State Brush	
Coupling Type	Direct	
Overbolt Torque– in. lbs. (Nm)	60 (7)	
Voltage Regulator Type (Single-Phase Models)	PowerBoostä III	
Voltage Regulator Type (Three-Phase Models)	PowerBoostä V	
Insulation (Rotor and Stator)	Class 155, Epoxy Varnish, Vacuum Impregnated	
Winding Material	Copper	
Bearing, Number and Type	1, Replaceable Ball	
Circuit Protection:		
Controller	15 Amp Fuse	
Voltage Regulator	5 Amp Fuse	
Battery Charging (if equipped)	25 Amp Circuit Breaker	
De-Icing Module (if equipped)	5 Amp Fuse	

\*\* Most ohmmeters will not give accurate readings when measuring less than 1 ohm. The stator can be considered good if a low resistance reading (continuity) is obtained and there is no evidence of shorted windings (discoloration). Do not confuse a low resistance reading with a reading indicating a shorted winding.

DERATION: All units are rated 1.0 power factor.  
Derate approximately 3.5% per 1000 ft. (300 m) above

500 ft (150 m) above sea level and 1 % for each 10°F  
(5.5°C) increase in temperature above 85°F (29°C).

# Glossary of Abbreviations

Abbreviations are used throughout this manual. Normally in the text they will appear in complete form with the abbreviation following in parenthesis the first time they are used. After that they will appear in the abbreviated form. The commonly used abbreviations are shown below.

AC	alternating current
AHWT	anticipatory high water temp.
ALOP	anticipatory low oil pressure
AM	amplitude modulation
Amp	ampere
Amps	amperes
ANSI	American National Standard Institute
API	American Petroleum Institute
approx.	approximate, approximately
A/R	as required, as requested
A/S	as supplied, as stated, as suggested
ASA	American Standards Association
assy.	assembly
ASTM	American Society for Testing Materials
ATDC	after top dead center
ATS	automatic transfer switch
aux.	auxiliary
AWG	American Wire Gauge
AWM	appliance wiring material
BHP	brake horsepower
bmep	brake mean effective power
Btu	British thermal unit
°C	Celsius degree
cc	cubic centimeter
CCA	cold cranking Amps.
CEC	Canadian Electrical Code
cfh	cubic feet per hour
cfm	cubic feet per minute
CID	cubic inch displacement
cm	centimeter, centimeters
cmm	cubic meters per minute
co.	company
cont'd.	continued
C.S.A.	Canadian Standards Association
cu. in.	cubic inch, cubic inches
cyl.	cylinder
dba	decibels
DC	direct current
DCR	direct current resistance
deg.	degree
dept.	department
dia.	diameter
e.g.	example given
EMI	electromagnetic interference

etc.	etcetera, (and so forth)
ext.	external
°F	Fahrenheit degree
fl. oz.	fluid ounce, fluid ounces
FM	frequency modulation
fs	full scale
ft.	foot, feet
ft. lbs.	foot pound, foot pounds
ga.	gauge
gal., gals.	gallon, gallons
gal./hr.	gallons per hour
GPH	gallons per hour
GPM	gallons per minute
gr.	grade
grd.	ground
HCHT	high cylinder head temperature
HET	high exhaust temperature
Hg	mercury (element)
H <sub>2</sub> O	water
HP	horsepower
hr, hrs	hour
HWT	high water temperature
Hz	hertz (cycles per second)
ID	inside diameter
in.	inch(es)
inc.	incorporated
in. lbs.	inch pounds
int.	internal
int.-ext.	internal-external
ISO	International Standards Organization
J	joule, joules
JIS	Japanese Industry Standard
kg	kilogram, kilograms
kg/cm <sup>2</sup>	kilograms per square centimeter
kgm	kilogram meter(s)
km	kilometer, kilometers
kPa	kiloPascal, kiloPascals
kph	kilometers per hour
kV	kilovolt
kVA	kilovolt amperes
kW	kilowatt, kilowatts
kWH	kilowatt hour
L	liter, liters
LxWxH	length x width x height
LED, LEDs	light emitting diode
lb., lbs.	pound, pounds
L/hr.	liter per hour, liters per hour
L/min.	liter(s) per minutes,
LOP	low oil pressure
LP	liquefied petroleum
LWT	low water temperature



m	meter, meters	OS	overspeed, oversize
m <sup>3</sup>	cubic meter, cubic meters	OV	overvoltage
max.	maximum	oz.	ounce, ounces
MCM	one thousand circular mils.	PF	power factor
mi.	mile, miles	pot.	potentiometer
mil	one one-thousandth of an inch	ppm	parts per million
min.	minimum	psi	pounds per square inch
mJ	millijoule, millijoules	pt., pts.	pint, pints
MJ	mega joule, mega joules	qt., qts.	quart, quarts
mm	millimeter, millimeters	qty.	quantity
m <sup>3</sup> /min	cubic meters per minute	ref.	reference
MPa	megaPascal	RFI	radio frequency interference
mph	miles per hour	rms	root mean square
MS	military standard	rpm	revolutions per inch
mW	milliwatt, milliwatts	SAE	Society of Automotive Engineers
MW	megawatt, megawatts	sec.	second, seconds
N/A	not available	SCR	silicon controlled rectifier
NEC	National Electrical Code	spec, specs	specification
NEMA	National Electrical Manufacturers Association	sq.	square
NFPA	National Fire Protection Association	sq. cm	square centimeters
Nm	Newton meter, Newton meters	sq. in.	square inch, square inches
no., nos.	number, numbers	tach	tachometer
NPT	National Standard taper pipe thread per general use	TDC	top dead center
N/R	not required	temp.	temperature
OC	overcrank	TIF	telephone influence factor
OD	outside diameter	turbo	turbocharger
OEM	original equipment manufacturer	UNC	Unified coarse thread (was NC)
		UNF	Unified fine thread (was NF)
		UL	Underwriter's Laboratories, Inc.
		US	undersize
		V	volt, volts
		vac	Volts alternating current
		vdc	volts direct current
		W	watt, watts

## Controller

The Kohler relay controller has a rocker-type momentary contact START-STOP switch for operating the set at the controller. Also included is a connector for attaching a remote start/stop switch located inside the vehicle. See Figure 1-1. The green GENERATOR ON lamp on the optional remote control panel will light whenever the generator is running. If the generator set has automatically stopped due to low oil pressure,  $3\frac{1}{2}$  psi  $\pm$   $1\frac{1}{2}$  psi (24.1 kPa) or less, the cause must be eliminated before the set can be restarted.

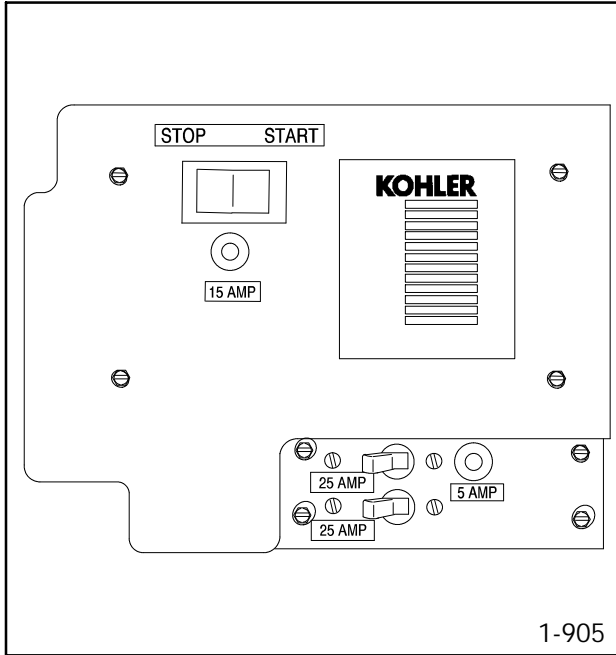
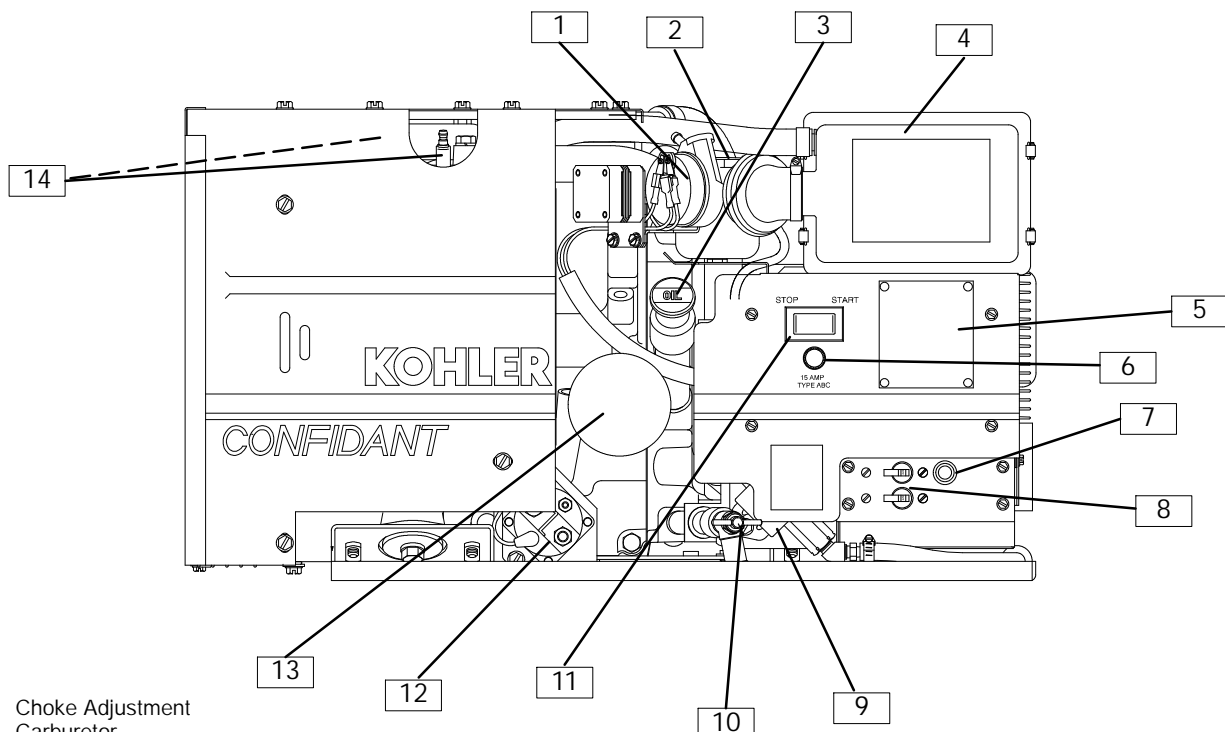
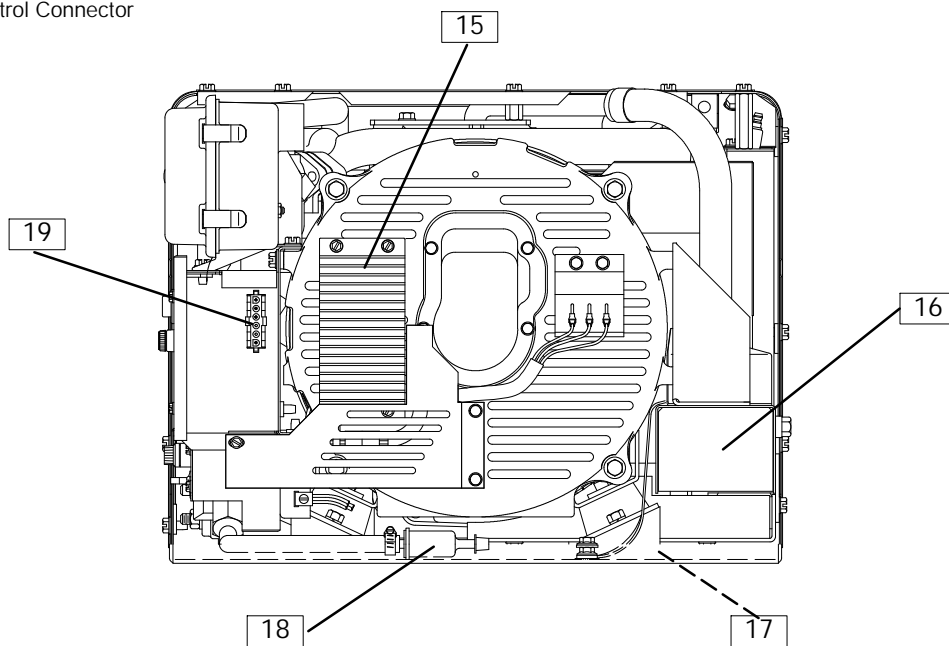


Figure 1-1. Controller

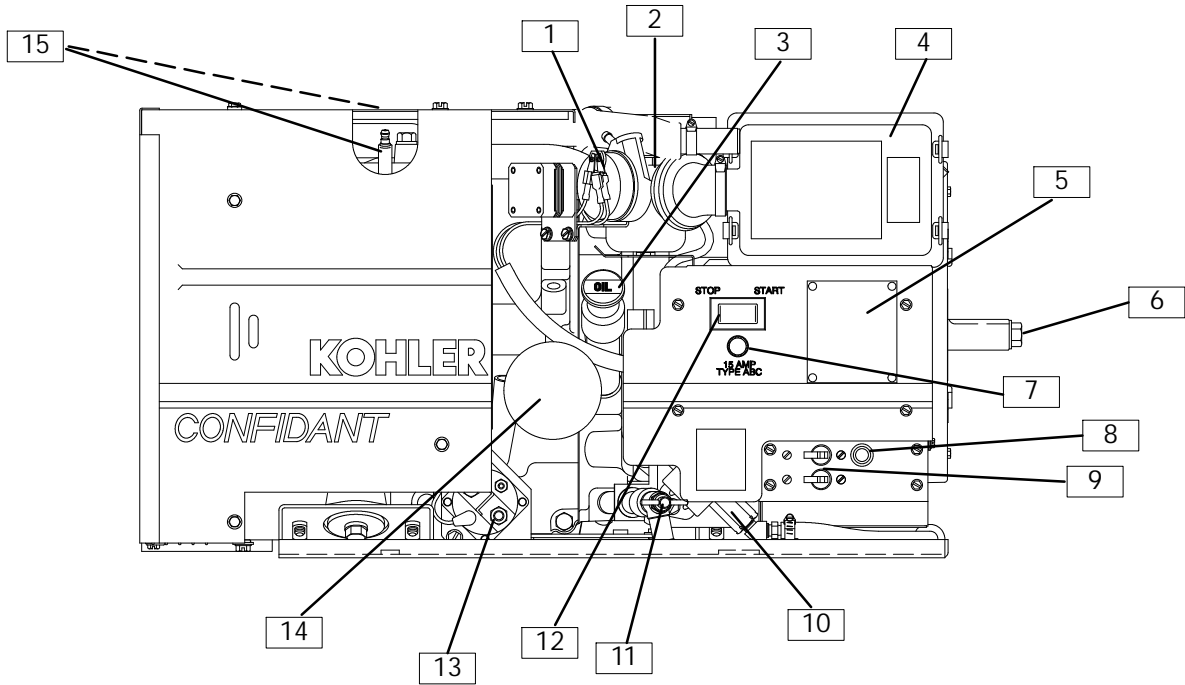


- 1. Choke Adjustment
- 2. Carburetor
- 3. Oil Fill/ Oil Check
- 4. Air Cleaner
- 5. Nameplate
- 6. 15-Amp Controller Fuse
- 7. 5-Amp Voltage Regulator Fuse
- 8. Line Circuit Breakers
- 9. Fuel Pump
- 10. Oil Drain
- 11. Start-Stop Switch
- 12. Battery Positive Connection
- 13. Oil Filter
- 14. Spark Plugs
- 15. Voltage Regulator
- 16. Oil Sump (5CKM only)
- 17. Load Leads
- 18. Fuel Filter
- 19. Remote Control Connector

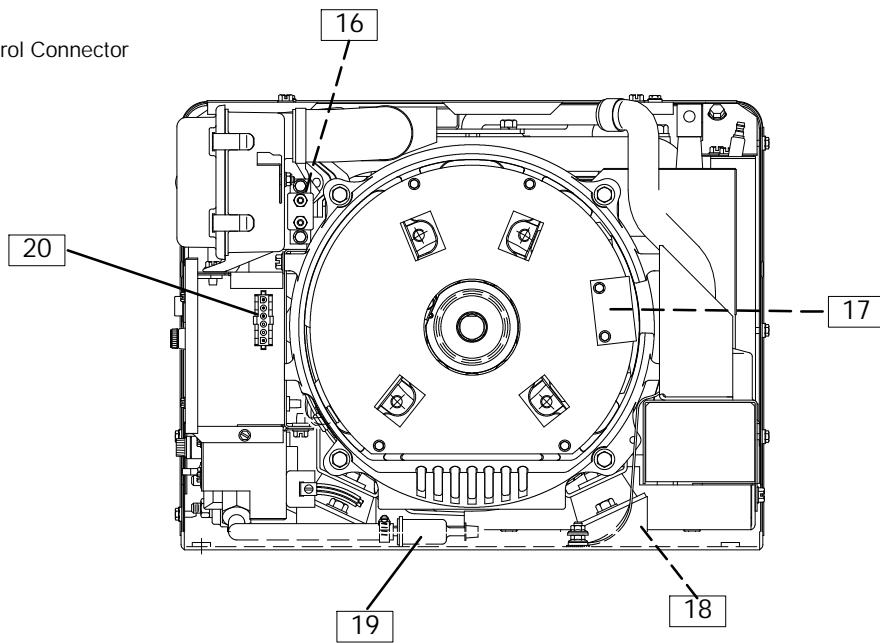


ADV-5728-F

Figure 1-2. Service View 4/5CKM-RV



- 1. Choke Adjustment
- 2. Carburetor
- 3. Oil Fill/ Oil Check
- 4. Air Cleaner
- 5. Nameplate
- 6. Extended Shaft (Option)
- 7. 15-Amp Controller Fuse
- 8. 5-Amp Voltage Regulator Fuse
- 9. Line Circuit Breakers
- 10. Fuel Pump
- 11. Oil Drain
- 12. Start-Stop Switch
- 13. Battery Positive Connection
- 14. Oil Filter
- 15. Spark Plugs
- 16. 25-Amp Battery Charging Circuit Breaker (Option)
- 17. Voltage Regulator
- 18. Load Leads
- 19. Fuel Filter
- 20. Remote Control Connector



ADV-5780-B

Figure 1-3. Service View 4/5CKMR-Mobile

# Section 2. Operation

To insure continued satisfactory operation, the following items should be checked before each start-up.

## Prestart Checklist

**OIL LEVEL:** Should be at or near full mark (not over).

**AIR INLETS:** Must be clear and unobstructed.

**COMPARTMENT:** Interior must be clean.

**AIR CLEANER:** Must be clean and properly installed.

**AIR SHROUDING:** Must be tight and in proper position.

**EXHAUST:** Tail pipe must be clear, muffler and piping tight and in good condition.

**ELECTRICAL:** All connections (including battery) must be tight.

## Start-Stop Procedure

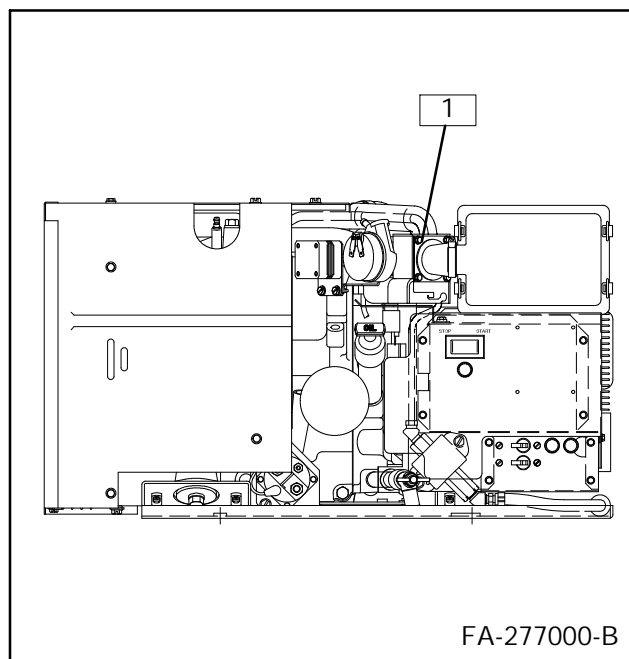
Move the START-STOP switch into the START position and hold in this position until the engine is running, then release. Do not crank engine continuously for more than 10 seconds at a time. A 60 second cool-down period must be allowed between cranking attempts if the engine does not start. If the unit fails to start after three attempts contact an authorized service dealer for repair. Failure to follow these guidelines may result in burn out of the starter motor. To stop, move the switch to the STOP position. If the generator stops automatically, identify and correct the problem before attempting to restart.

## Automatic De-Icing (For Gasoline Models Only)

The automatic de-icing module, mounted between the carburetor air horn and air cleaner, warms the incoming air to reduce moisture from being introduced into the fuel system. The system will function whenever the generator set is running.

The de-icing module is heated by an internal cartridge heater which is controlled by high- and low-limit thermostats. The low-limit thermostat (located in the intake manifold) will turn the cartridge heater on as the outside air temperature reaches approximately 40° F (4° C). When the de-icing module reaches 185° F (85° C) the high-limit thermostat (located in the de-icing module) will cycle the cartridge heater off preventing carburetor icing and crankcase breather freeze up.

When the generator set is turned off, heat retained in the de-icing module and the carburetor assembly will reduce condensation from accumulating inside the carburetor thereby reducing throttle plate icing.



1. De-Icing Module

**Figure 2-1. Automatic De-Icing**

# Circuit Protection

**AC Circuit Breaker(s)**– will trip when a fault is detected in the AC output circuit. See Section 4– Troubleshooting to determine cause of fault. After fault is corrected, reset AC circuit breaker by placing in “ON” position.

**Input (Controller) Fuse (15 Amp)**– indicates a fault in the controller circuit. See Section 4– Troubleshooting. After fault is corrected, fuse must be replaced. Unit is now ready to be restarted.

**Voltage Regulator Fuse (5 Amp)**– Indicates a fault in the voltage regulator and/or generator circuit. After fault is corrected, replace fuse. Voltage regulator circuit is now functional.

**De-Icing Module Fuse (5 Amp) (on gasoline-fueled units)**– Indicates a fault in the de-icing circuit. After fault is corrected, replace fuse.

**Battery Charging Circuit Breaker (25 Amp) (on units equipped with battery charging)**– indicates a fault in the battery charging circuit. Breaker will automatically reset.

# Section 3. Scheduled Maintenance

In addition to the routine services listed in this manual, there are other important steps that should be taken to keep a generator set in top condition. Usually, tools and instruments required for these additional steps are not available to the generator set owner. For this reason,

the set should be returned periodically to an authorized service dealer for complete servicing and tune-up. The benefits of such service will be improved performance and continuous satisfactory operation during a long trouble-free service life.

Perform Service at Intervals Indicated (X)	Before Each Start-up	Every 50 Hours or 6 Months	Every 100 or 12 Months	Every 500 Hours
Check exhaust outlet	X			
Check oil level	X			
Check fuel supply	X			
Keep cooling air inlets and outlets clean	X			
Remove loose dirt from compartment	X			
Check electrolyte level in battery	X			
Check air cleaner (replace if dirty)		X		
Change lube oil (Change oil initially after first five hours of operation)		X*	X**	
Replace lube filter		X*	X**	
Service or replace spark plugs			X	
Check battery specific gravity			X	
Check and tighten electrical connections			X	
Check and tighten mounting bolts and vibro-mounts			X	
Blow dust out of generator			X	
Clean spark arrestor			X	
Check valve-tappet clearance				X***
Service cylinder heads				X***
Check compression				X
Replace fuel filter				X

\* Applies to 5 kW

\*\* Applies to 4 kW

\*\*\* Performed at an authorized Kohler service dealer/distributor

### NOTE

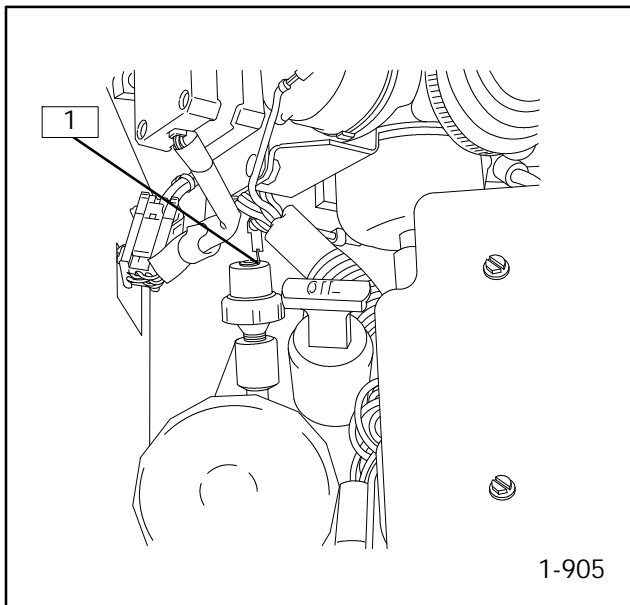
Unleaded gasoline is recommended. If leaded gasoline is used, service cylinder heads every 250 hours.

# Lubrication System

Your engine has a positive pressure lubrication system and low oil pressure shutdown.

## Low Oil Pressure Shutdown

The low oil pressure shutdown feature protects the engine against internal damage if the oil pressure drops below  $3\frac{1}{2}$  psi  $\pm$   $1\frac{1}{2}$  psi (24.1 kPa) due to oil pump fault or other malfunction. It does not protect against damage due to operating with the oil level below the safe range— it is not a low oil level shutdown. The only protection against running out of oil is to check the level regularly and to add oil as needed. Location of the low oil pressure (LOP) switch is shown in Figure 3-1.

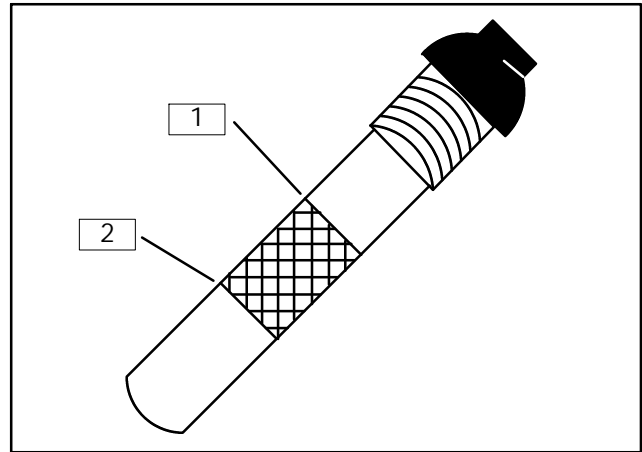


1. Low Oil Pressure Switch

**Figure 3-1. Low Oil Pressure Switch**

# Oil Check

Check crankcase oil level daily or before each start. To check oil level, remove oil cap/dipstick assembly and wipe dipstick clean (see Figure 3-3). Reposition dipstick in crankcase and push it all the way down into the tube. Remove dipstick and check the level. Oil level should read between max and min marks on dipstick. Do not operate set if oil level exceeds the max mark or registers below the min mark on dipstick. Figure 3-2.

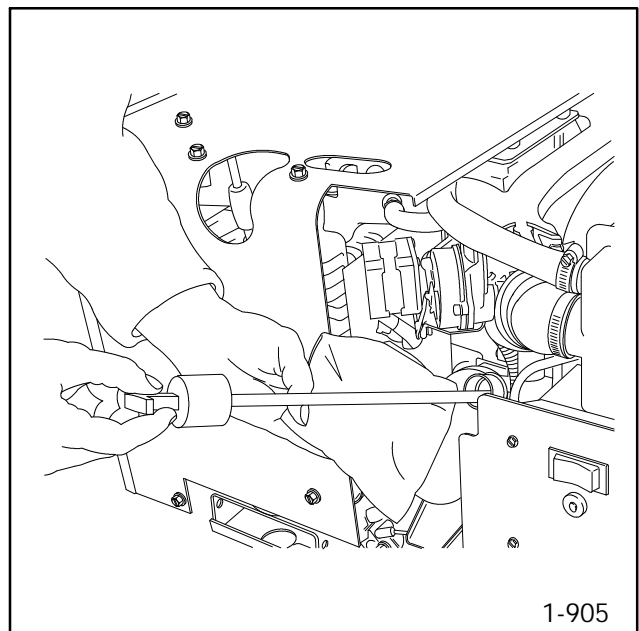


1. Max Mark  
2. Min Mark

**Figure 3-2. Lube Oil Level**

### NOTE

Do not check oil level when the set is in operation. The engine must be stopped and on a level surface when checking oil. Most accurate oil reading is obtained by shutting down the generator and waiting several minutes before checking oil.



**Figure 3-3. Oil Check**



# Oil Change

## Break-In Period Oil Recommendations

Generator set engines may be shipped dry; the oil used in factory testing having been drained. Before operating a new set, the engine crankcase should be filled to specified capacity with a straight-weight oil having a viscosity appropriate for your particular climate. Do not use synthetic oils during the first five hours of operation or the rings may not seat properly. This oil should be changed immediately after the first five hours of operation. See OIL TYPE following.

On a new engine, change the oil after the first five hours of operation and thereafter at 100 hour intervals or 12 months, whichever occurs first, on the 4 kW, and 50 hour intervals or 6 months, whichever occurs first, on the 5 kW. Replace the oil filter at every oil change. Whenever possible, drain the oil while it is still warm. To drain, place container below unit and open petcock (located directly beneath the dipstick assembly). Allow

adequate time for generator to drain completely. Remove filter by rotating filter counterclockwise with an oil filter wrench. After draining, close petcock then install replacement filter. Before installing replacement filter, apply a light coating of fresh oil to the rubber seal at the base of the filter. Add new oil of proper weight and grade as specified under OIL TYPE following. After restarting, check the area around the filter for evidence of leakage. Tighten filter if needed to stop leakage.

## Oil Type

High quality detergent oils meeting the requirements of SAE service class SF are recommended for use in the Kohler M18 & M20 engines. Straight weight 30 oil is preferred. If multi-viscosity oil is used, be aware of the resulting increase in oil consumption and combustion deposits when used in temperatures above 32°F (0°C). Base oil weight selection on air temperature at time of operation. Consult the SAE Viscosity Grade chart (see Figure 3-4).

Recommended SAE Viscosity Grades

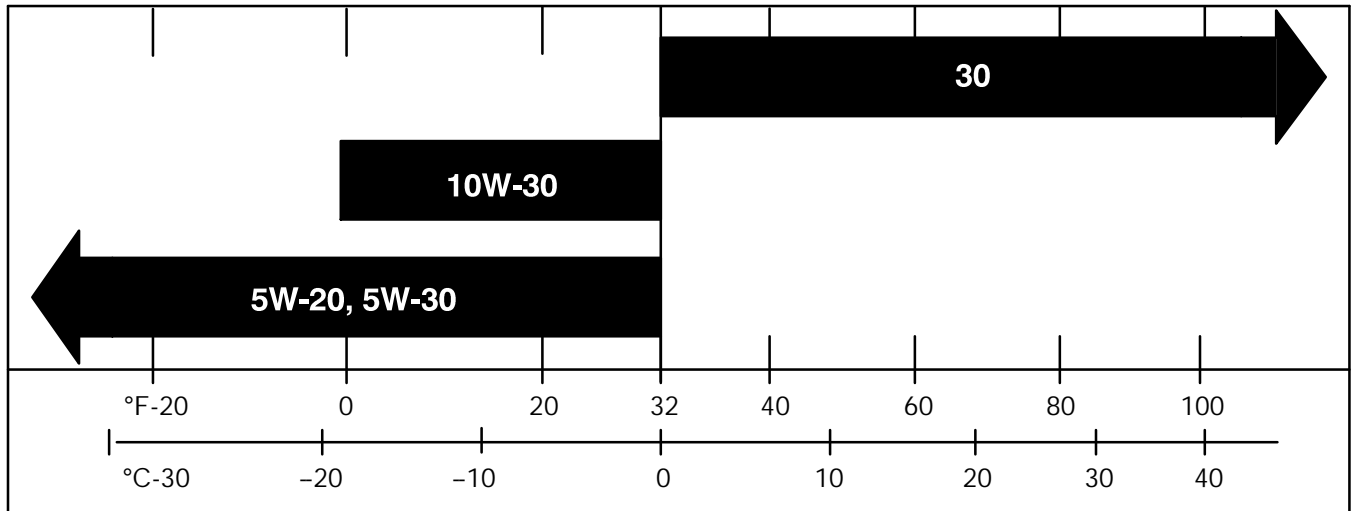


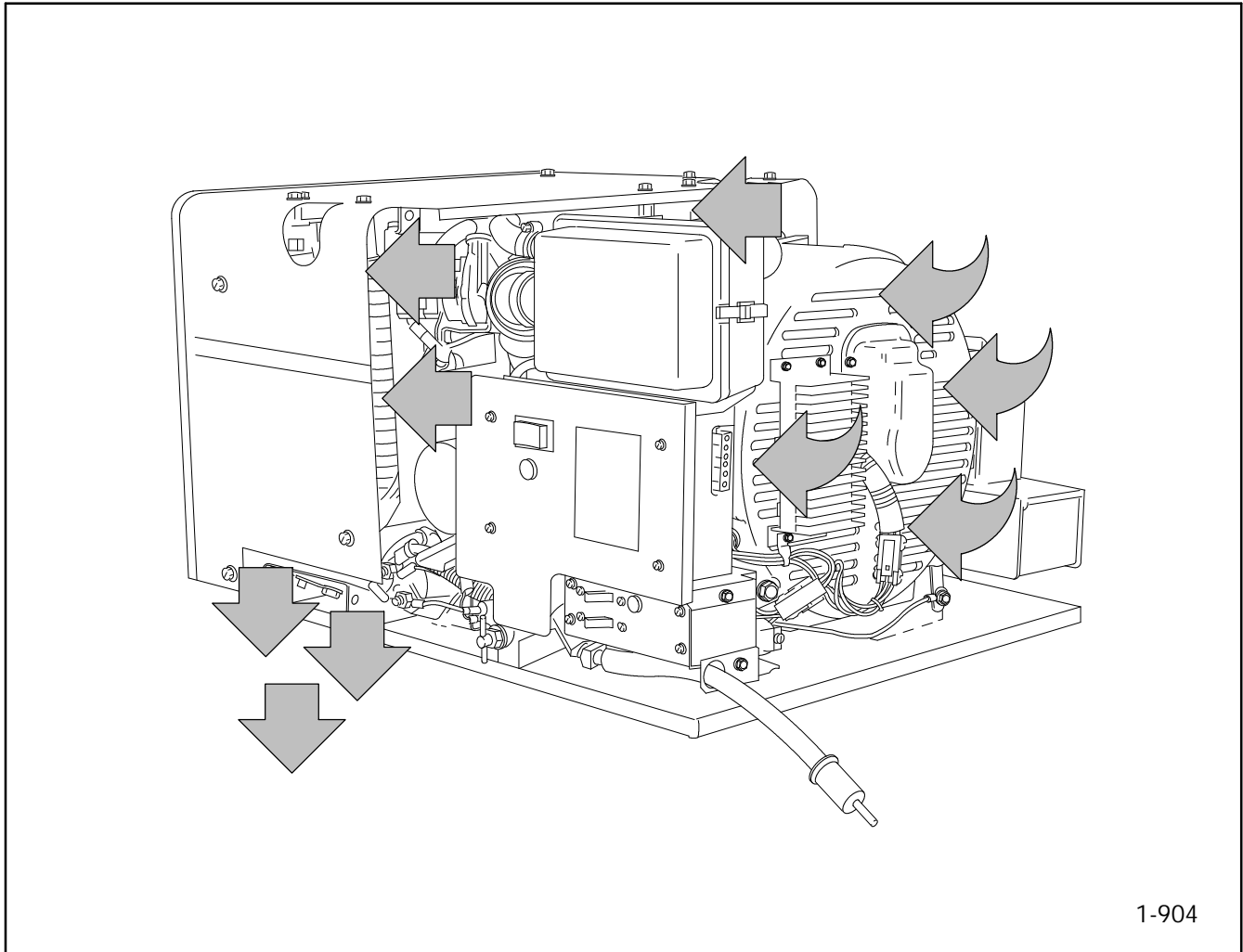
Figure 3-4. Temperature range expected before next oil change

# Cooling System

To prevent damage to the generator set from overheating, keep the cooling air inlets to the compartment clean and unobstructed at all times.

A fan on the rotor of the generator draws cooling air into the compartment through the generator cooling slots and expels it at the engine-generator adapter. The

engine of the generator set features an Air-Vac reverse flow cooling system. Fins on the engine flywheel pull cooling air past the fins of the cylinder heads and heated air is discharged downward and out of the compartment through the discharge chute. See Figure 3-5.



1-904

Figure 3-5. Cooling Air Circulation

# Ignition System

## Electronic Magneto Ignition System

The 4 and 5 kW generator sets are equipped with a dependable electronic magneto ignition system (Figure 3-6) containing the following:

- A magnet assembly which is PERMANENTLY affixed to the flywheel.
- An electronic magneto ignition module, which is mounted to the #1 side cylinder barrel.
- A controller which stops the engine by grounding the ignition module.

## Operation

As the flywheel rotates and the magnet assembly moves past the ignition module, a low voltage is induced in the primary windings of the module. When the primary voltage is precisely at its peak, the module induces a high voltage in its secondary windings. This high voltage creates a spark at the tip of the spark plugs, igniting the fuel-air mixture in the combustion chambers. Other than periodically checking/replacing the spark plugs, no maintenance, timing, or adjustments are necessary with this ignition system.

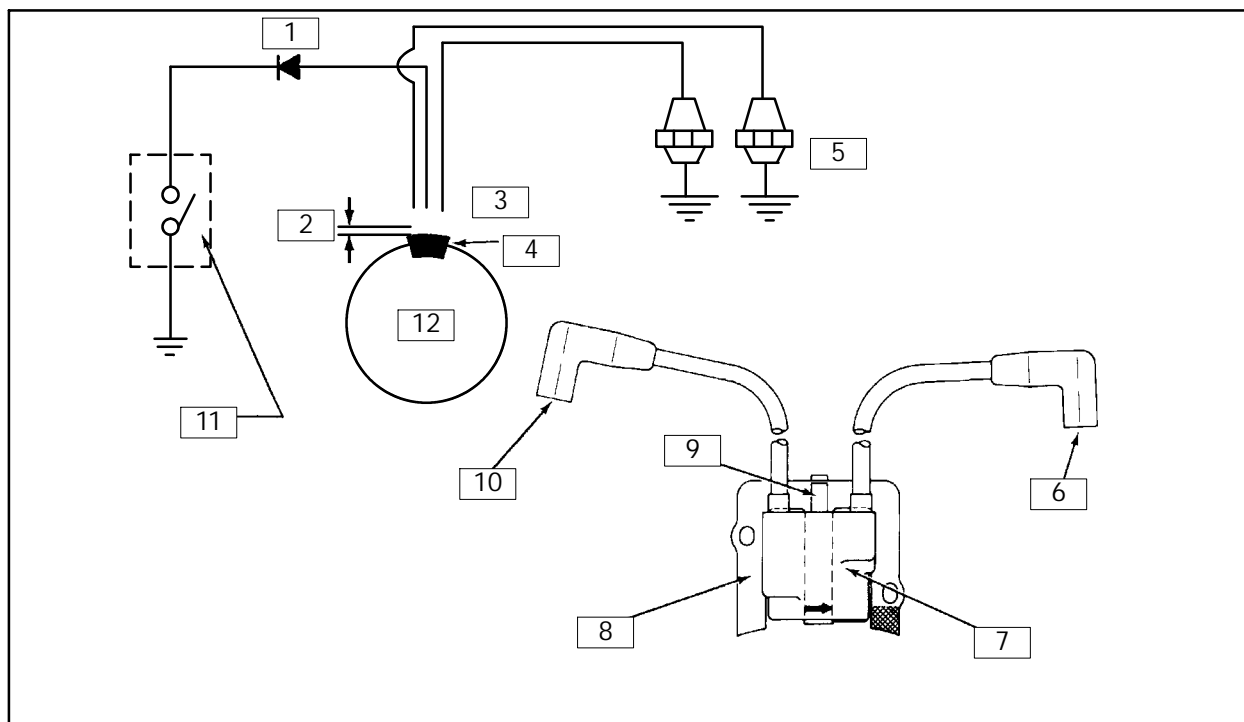


Figure 3-6. Electronic Magneto Ignition System

- |                          |                                              |
|--------------------------|----------------------------------------------|
| 1. Diode                 | 7. Coil Assembly                             |
| 2. 0.008/0.012" Air Gap  | 8. Laminations (A)                           |
| 3. Ignition Module       | 9. Kill Terminal (B)                         |
| 4. Magnet                | 10. High Tension Lead (C)                    |
| 5. Spark Plugs           | 11. Kill Switch or Off Position of Keyswitch |
| 6. High Tension Lead (D) | 12. Flywheel                                 |

## Spark Plugs

Every 100 hours remove both spark plugs and check condition (see Figure 3-7). Reset gap or replace plug if needed. Proper generator operation is indicated by a light deposit of gray or tan material on plug electrodes. A dead white, blistered coating could indicate overheating. A black (carbon) coating may indicate an "overrich" fuel mixture caused by a clogged air cleaner or improper carburetor adjustment.

### NOTE

Do not sandblast, wire brush, scrape, or otherwise service plug in poor condition— best results are obtained with a new plug. Use only resistor-type plugs. Set spark plug gap at 0.025 in. (0.64 mm) on gasoline fueled sets and 0.018 in (0.46 mm) on LP gas fueled sets. Tighten plug to 10-15 ft. lbs. (13.6-20) when installing.

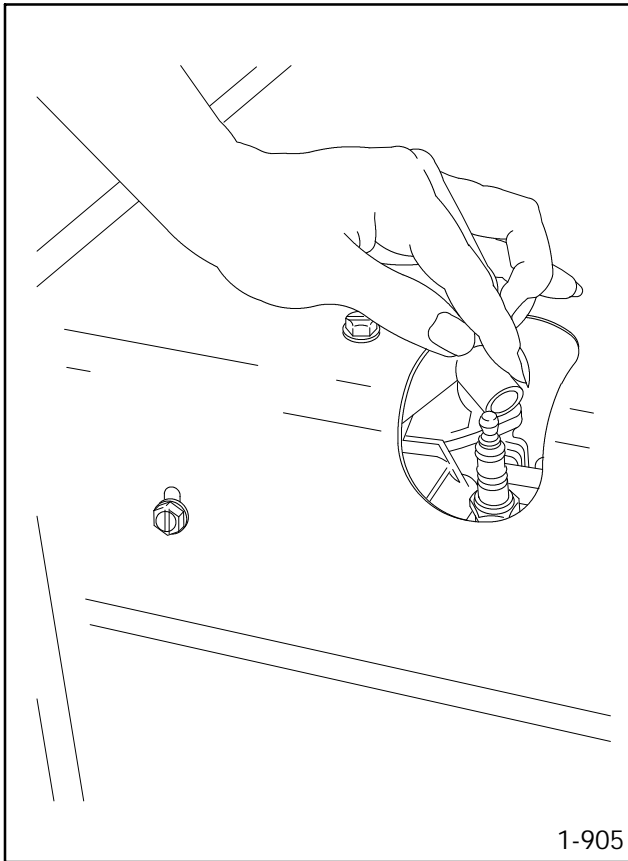


Figure 3-7. Removing Spark Plug

## Gasoline Fuel System

### Specification— Gasoline

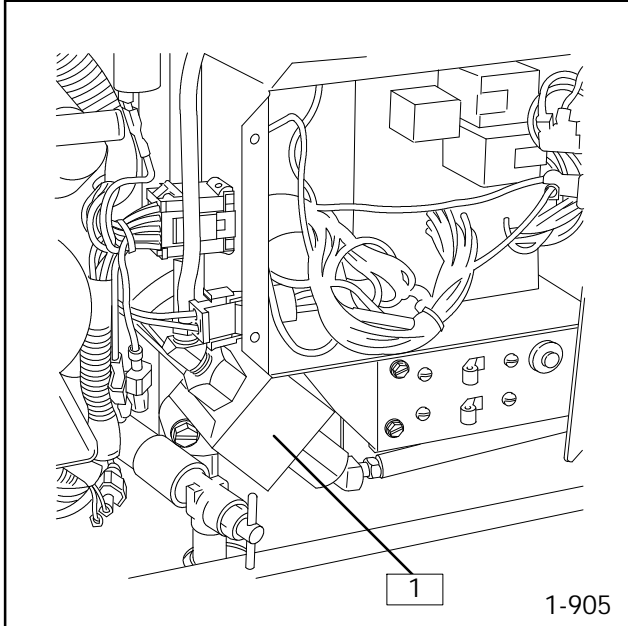
For best results, use only clean fresh, regular grade unleaded gasoline with a pump sticker octane rating of 87 or higher in the U.S.A. In countries using the research rating method, it should be 90 octane minimum.

Unleaded gasoline is recommended since it leaves fewer combustion chamber deposits. Regular grade leaded gasoline may also be used; however, be aware that the combustion chamber and cylinder head will require more frequent service. Gasohol containing no more than 10% ethanol can be used if unleaded gasoline is unavailable. Never use gasohol containing more than 10% ethanol or gasoline containing Methanol. Oil must not be mixed with the fuel.

Use fresh gasoline to ensure it is blended for the season, and to reduce the possibility of gum deposits forming which could clog the fuel system. Do not use gasoline left over from the previous season.

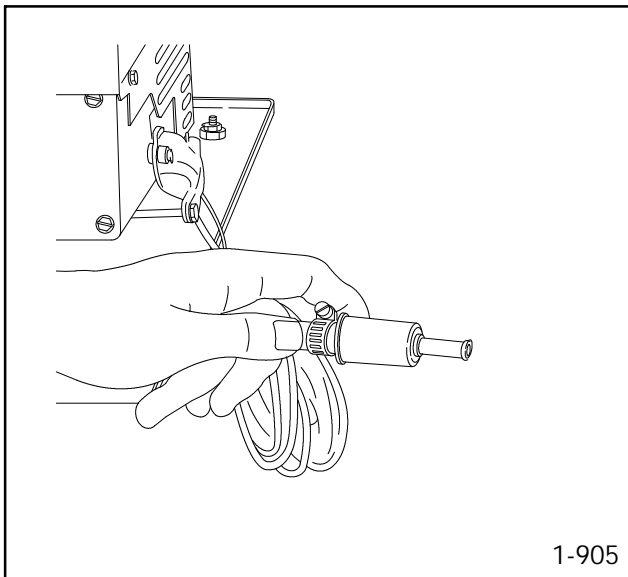
## Fuel Filter– Gasoline Only

The 4 and 5 kW generator sets utilize an in-line type fuel filter located before the electric (solid-state) fuel pump. Replace the filter every 500 hours of running time or when rough operation indicates an engine tune-up may be necessary. Location of the fuel pump and fuel filter are shown in Figure 3-8 and Figure 3-9.



1. Fuel Pump

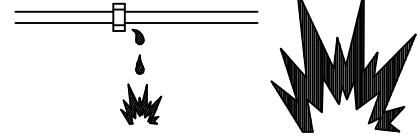
**Figure 3-8. Gasoline Fuel Pump**



**Figure 3-9. Gasoline Fuel Filter**

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### **WARNING**



**Explosive fuel vapors.  
Can cause severe injury or death.**

Use extreme care when handling, storing,  
and using fuels.

---

**Explosive fuel vapors can cause severe injury or death.** All fuels are highly explosive in a vapor state. Use extreme care when handling, storing, and using fuels. Store fuel in a well-ventilated area away from spark-producing equipment and out of the reach of children. Never add fuel to the tank while the engine is running since spilled fuel may ignite on contact with hot parts or from ignition spark. Do not smoke or permit flame or spark to occur near potential sources of spilled fuel or fuel vapors. Keep fuel lines and connections tight and in good condition– don't replace flexible fuel lines with rigid lines. Flexible sections are used to avoid breakage due to vibration. Should any fuel leakage, fuel accumulation, or electrical sparks be noted, **DO NOT OPERATE GENERATOR SET.** Have systems repaired before resuming generator operation.

**Explosive fuel vapors can cause severe injury or death.** Additional precautions must be taken when using the following fuels:

**Gasoline**– Store gasoline only in approved red containers clearly marked GASOLINE. Do not store gasoline in any occupied building.

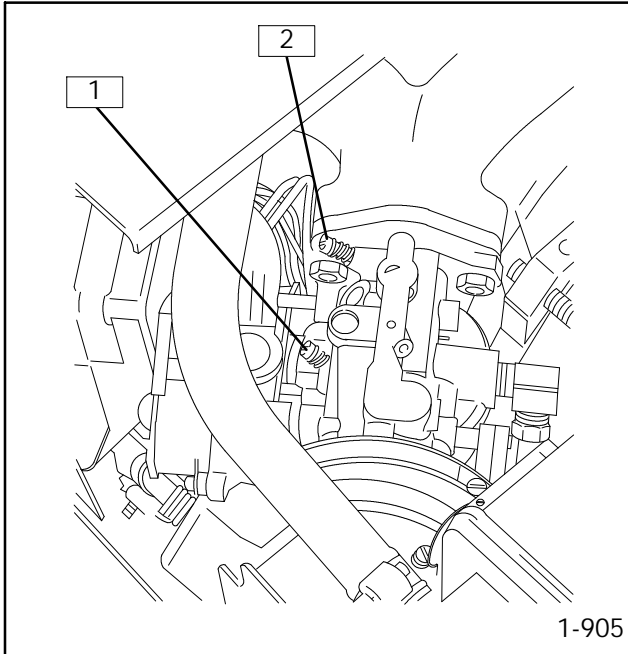
**Propane (LP)**– Adequate ventilation is mandatory. Propane is heavier than air; install gas detectors low in room. Inspect detectors often.

### **NOTE**

Replacement of the in-line gasoline-type fuel filter must be of a metal encased type. (Kohler Part No. 228269– 1/4 in. inlet or Kohler Part No. 227647– 5/16 in. inlet).

# Gasoline Carburetor Adjustments

Lack of power and black sooty exhaust smoke usually indicate that the fuel mixture is too rich. An overrich mixture may be caused by a clogged air cleaner or improperly adjusted choke. Always check the air cleaner before readjusting the choke or carburetor. If the engine skips (misses) or backfires, the fuel mixture may be too lean. To locate adjustment needles refer to Figure 3-10.



- 1. Main Fuel Needle
- 2. Idle Fuel Needle

**Figure 3-10. Carburetor Adjustment Needles**

### NOTE

Turning the adjusting needles in (clockwise) decreases the supply of fuel to the carburetor. This gives a leaner fuel/air mixture. Turning the adjusting needles out (counterclockwise) increases the supply of fuel to the carburetor. This gives a richer fuel/air mixture.

## Main And Idle Fuel Mixture

1. Stop the engine. Turn the main fuel and idle fuel adjusting needles **in** (clockwise) until they bottom *lightly*.

### NOTE

The ends of the main fuel and idle fuel adjusting needles are tapered to critical dimensions. Damage to needles and seats will result if the needles are forced.

2. **Preliminary Settings:** Turn the main fuel and idle fuel adjusting needles **out** (counterclockwise) from lightly bottomed as follows:

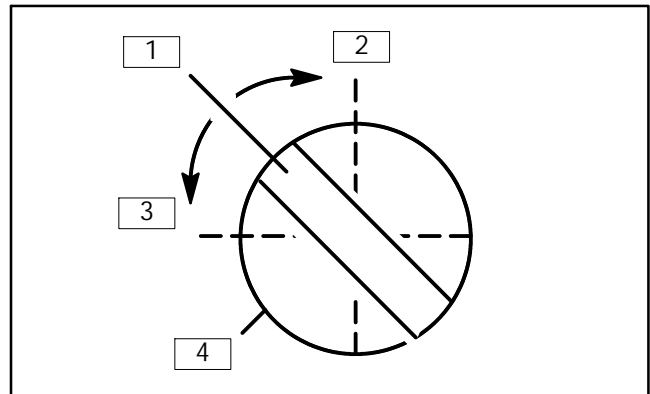
**Main Fuel Needle**      **2 1/4 Turns**  
**Idle Fuel Needle**      **1 1/2 Turns**

3. Start the engine and run at half-load for 5-10 minutes to warm up. The engine must be warm before making final settings.
4. **Final Setting– Main Fuel:** Place engine 3/4 to full load. Turn main fuel adjusting needle **in** (clockwise) from preliminary setting until the engine does not operate smoothly. Note the position of the needle.

Now turn the adjusting needle **out** (counterclockwise) 1/4 turn.

### NOTE

At higher elevations the main fuel adjustment needle will require leaning.



- 1. Adjust 1/4 turn richer than lean operating limit.
- 2. Lean
- 3. Rich
- 4. Fuel Adjusting Screw

**Figure 3-11. Carburetor Adjustment**

5. **Final Setting– Idle Fuel:** Set idle fuel adjusting needle using the same procedure as in step 4.

# LP Gas Fuel System

## Specification– LP Liquid

The LP gas liquid withdrawal fuel system utilizes a vaporizer and regulator to convert LP gas from a liquid to a gaseous state. Vaporized fuel is combined with air in the carburetor to produce the correct air/fuel mixture for proper combustion. Be sure the LP gas is properly blended for the season and/or geographic location in which the generator is operated. To locate carburetor adjustments refer to Figure 3-12.

## Specification– LP Vapor

The LP gas system consists of a shutoff valve, a secondary regulator, and carburetor that adjusts the mixture of fuel and air for proper combustion. A propane LP gas is used.

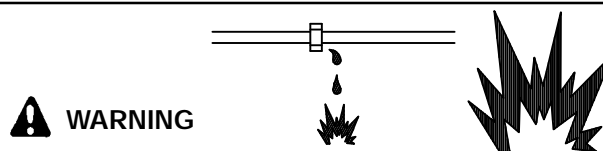
The gas and supply pressure should not exceed six ounces. to check inlet pressure, remove plug on fuel inlet of gas regulator. Insert ounce pressure gauge or manometer. Adjust pressure to 4-6 ounces or 7-11 inches water column. Inlet pressure is adjusted on primary regulator.

### NOTE

If a removable fuel container is used as a fuel source, fuel leakage during a container change must be prevented by the use of a quick-close coupling on the fuel line or a check valve installed in the fuel line.

### NOTE

A hydrostatic relief valve is also required between the container shutoff valve and the automatic shutoff valve on the generator set.



**WARNING**

**Explosive fuel vapors.  
Can cause severe injury or death.**

Use extreme care when handling, storing,  
and using fuels.

**Explosive fuel vapors can cause severe injury or death.** Fuel leakage can cause an explosion. Check LP vapor gas or natural gas fuel system for leakage using a soap-water solution with fuel system test pressurized to 6-8 ounces per square inch (10-14 inches water column). Do not use test solutions that contain ammonia or chlorine, since the soap will not bubble for an accurate leakage test.

**Explosive fuel vapors can cause severe injury or death.** Fuel leakage can cause an explosion. Check LP vapor gas fuel system for leakage using a soap-water solution with fuel system test pressurized to 6-8 ounces per square inch (10-14 inches water column). Do not use test solutions that contain ammonia or chlorine, since the soap will not bubble for an accurate leakage test.

# LP Carburetor Adjustments

## Main Fuel Mixture

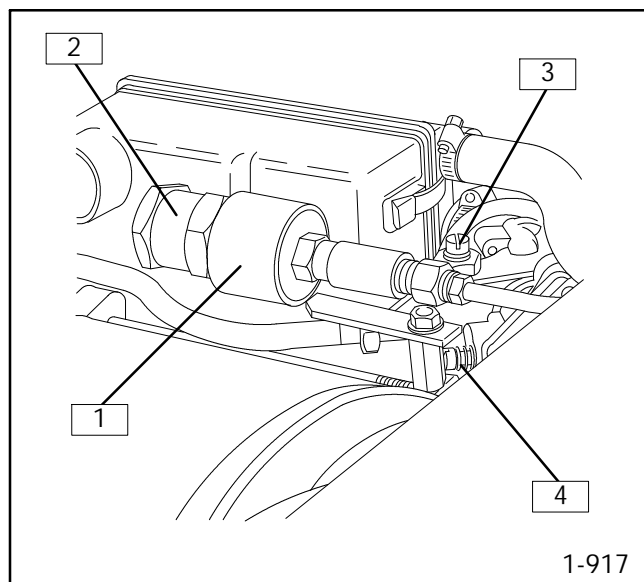
For preliminary setting turn the MAIN FUEL valve in a clockwise direction until it bottoms lightly (do not force), then back out 1 turn. With the engine thoroughly warmed up and running at rated rpm under full load, turn MAIN FUEL valve in until the engine slows down (lean setting) then turn valve out until the engine regains full speed (about 1/8 turn). When properly adjusted, the engine will operate with steady governor action. Improper adjustment (rich setting) causes improper operation of the vaporizer and excess fuel consumption.

## Idle Fuel Mixture

The idle system functions only at part- and no-load conditions. For this reason, the idle setting has only a momentary effect. To adjust, stop the engine and then turn the IDLE FUEL screw all the way in (clockwise) then back out 1/4 turn. Adjust for proper no load operation.

## Fuel Valve and Filter– LP Liquid

The LP fuel valve contains a replaceable filter which should be inspected yearly or after every 100 hours of operation. Normally, the filter requires replacement only after accumulation of filtered debris restricts fuel flow to the regulator/vaporizer. Rough generator operation and/or the presence of frost on the fuel valve outer surface indicates filter replacement is necessary. Assembly of the LP gas fuel valve and location of the fuel filter is shown in Figure 3-12.



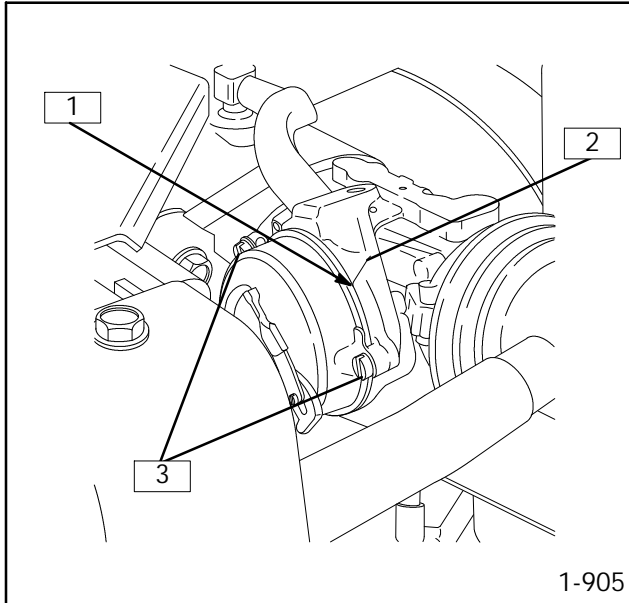
1. Fuel Valve
2. Fuel Filter
3. Main Fuel Adjustment
4. Idle Fuel Adjustment

**Figure 3-12. LP Gas Carburetor Adjustments and LP Gas Fuel Valve Assembly**



# Choke Adjustments

A Kohler thermo-electric automatic choke is used to enrich the gasoline fuel mixture during starting. The choke automatically closes as the ambient temperature cools or as the engine temperature decreases. As the engine warms, the coils inside the choke allow the choke plate to open. If readjustment is needed, loosen the two screws securing the choke bracket to the carburetor and shift the position of the choke assembly (Figure 3-13). When properly set, the choke plate will be within 5 to 10 degrees of full open at approximately 70°F (21°C).



1. Scribe Mark
2. Casting Mark
3. Adjusting Screws

**Figure 3-13. Automatic Choke Adjustment**

## Choke Adjustment Procedure For Operation above 10°F (-12.2°C) (From original factory-set position)

1. Where the choke casting mark meets the black plastic cover of the choke, make a scribe mark on the choke's black cover. See Figure 3-13.
2. Loosen the two choke adjusting screws and rotate choke cover counterclockwise towards leaner setting (follow direction of arrow on choke).
3. When the distance between the scribe mark on the black cover and the casting mark is 5/16 in. (8 mm) tighten the two choke adjusting screws.

## Choke Adjustment Procedure For Operation below 10°F (-12.2°C)

### NOTE

If not previously adjusted, leave as factory set. Otherwise, follow procedure below.

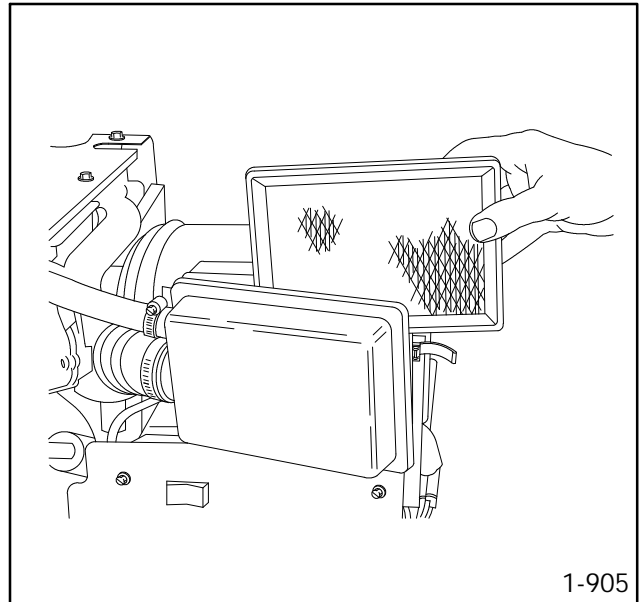
1. If scribe mark has been made on the choke's black cover, loosen the two choke adjusting screws and rotate choke cover clockwise (opposite direction of arrow on choke).
2. When the scribe mark on the black plastic cover of the choke and the choke casting mark line up, tighten the two adjusting screws.

## Electronic Governor

The governor control system consists of an electronic isochronous governor, an electro-mechanical actuator, and a magnetic pickup. Electrical pulses are supplied by the magnetic pickup to the isochronous governor (control unit) each time one of the ring gear teeth passes the pickup. The control unit then compares the frequency of these pulses to a pre-set reference and provides a signal to the actuator which, in turn, controls the carburetor and hence the engine speed. This is a closed loop system and typically provides  $\pm 0.25\%$  steady state speed regulation.

## Air Cleaner

The engine is equipped with a dry-type air cleaner. Every 50 hours (more often if operating under extremely dusty or dirty conditions) remove element and service by tapping element lightly against flat surface to dislodge loose surface dirt. Do not clean in any liquid or blow out with compressed air as this will ruin filter material in element. Service air cleaner after each 50 hours of operation. If dirty, bent, or damaged replace element with genuine Kohler replacement.



**Figure 3-14. Air Cleaner Service**

### NOTE

Replacement of the air filter must be of a flame proof, self-extinguishing material (Kohler Part No. 278612).

# Battery

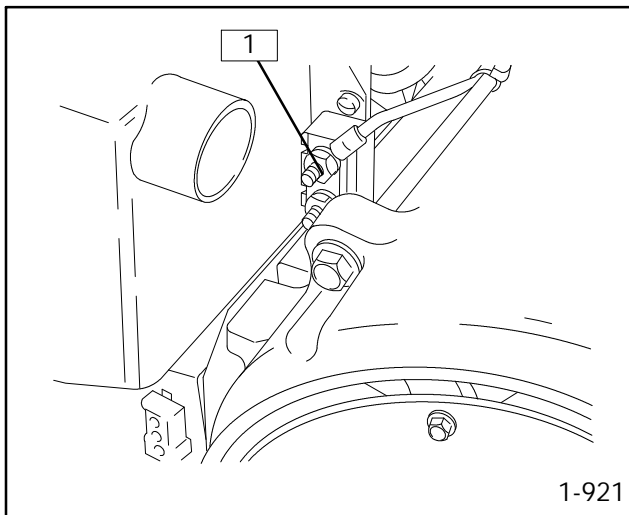
If generator set is equipped with a battery charging feature, refer to the following section for general maintenance. Use a 12-volt battery with a rating of at least 290 Cold Cranking Amps/90 Amp Hr. When using a "Maintenance Free" battery, it is not necessary to check the specific gravity or electrolyte level. Otherwise, these procedures should be done at the intervals specified in the Service Schedule. A negative-ground system is used. Battery connections are shown on the wiring diagram. Make sure battery is properly connected and terminals are tight.

## Battery Charging (if equipped)

The generator is equipped with a battery charging system to keep the starting battery fully charged. The system requires no additional maintenance. Be sure to observe battery polarity when connecting battery to generator set. See Figure 3-15 for location of the battery-charging circuit.

### NOTE

The generator set will not start if the battery connections are made in reverse.



1. Battery Charging Circuit

**Figure 3-15. Battery Charging Circuit**

### WARNING



**Sulfuric acid in batteries.  
Can cause severe injury or death.**

Use protective goggles and clothes. Can cause permanent damage to eyes, burn skin, and eat holes in clothing.

**Sulfuric acid in batteries can cause severe injury or death.** Sulfuric acid in battery 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.

**Explosion can cause severe injury or death.** 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.

## Cleaning

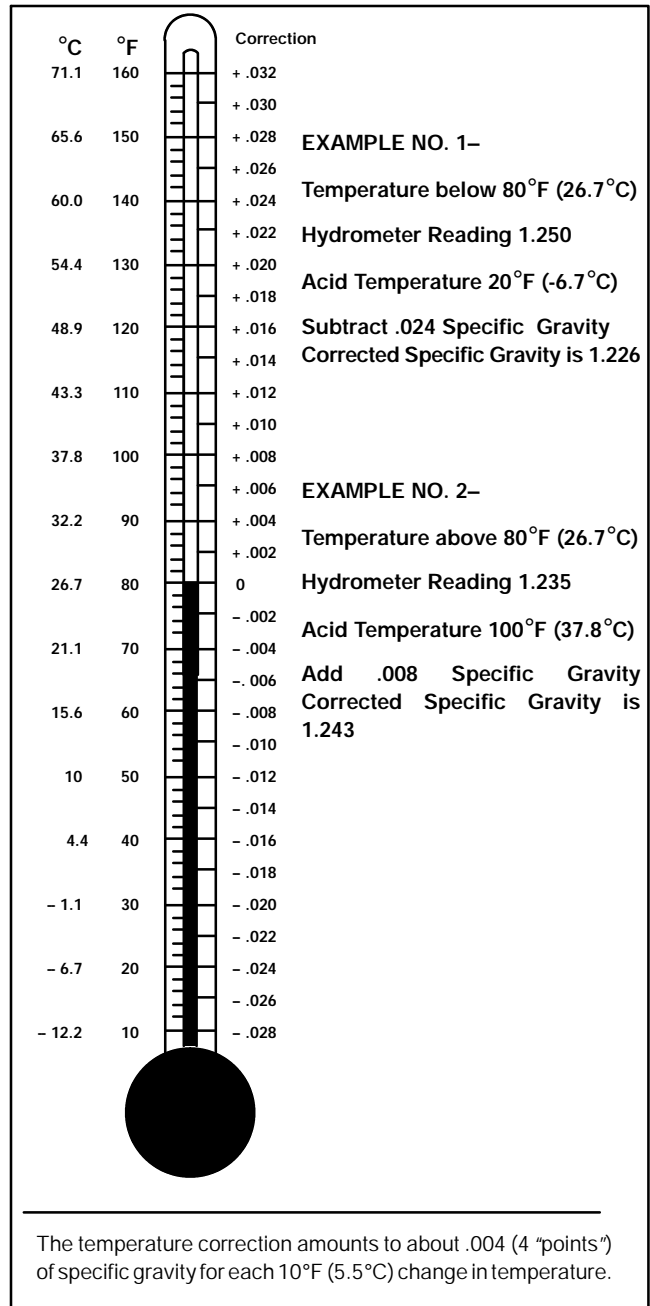
Keep battery clean by wiping it with a damp cloth. Keep all electrical connections dry and tight. If corrosion is present, disconnect cables from battery and remove corrosion with a wire brush. Clean battery and cables with a solution of baking soda and water. Be careful that cleaning solutions do not enter battery cells. When cleaning is complete, flush battery and cables with clean water and wipe with a dry cloth. After the battery cables are reconnected, coat terminals with petroleum jelly or other non-conductive grease.

## Checking Electrolyte Level

Check the level of electrolyte before each start-up. Remove filler caps and check to see that electrolyte level is up to bottoms of filler holes. Refill as necessary with distilled water or clean tap water. DO NOT add fresh electrolyte! Be sure filler caps are tight.

## Checking Specific Gravity

Use a battery hydrometer to check the specific gravity of the electrolyte in each battery cell. While holding the hydrometer vertical, read the number on the glass bulb at the top of the electrolyte level. If the hydrometer used does not have a correction table, use the one in Figure 3-16. Determine specific gravity and electrolyte temperature of battery cells. Locate temperature in Figure 3-16 and adjust specific gravity by amount shown. The battery is fully charged if the specific gravity is 1.260 at an electrolyte temperature of 80°F (26.7°C). The difference between specific gravities of each cell should not exceed  $\pm 0.01$ . The battery should be charged if the specific gravity is below 1.215 at an electrolyte temperature of 80°F (26.7°C).



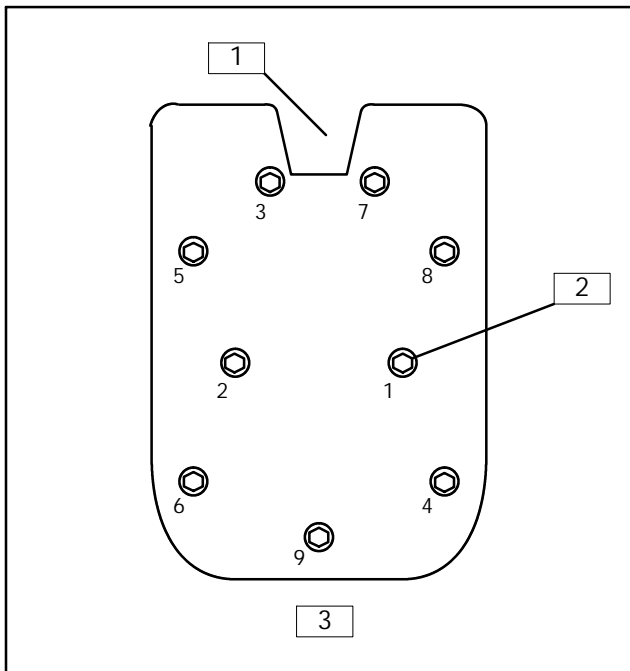
**Figure 3-16. Specific Gravity Temperature Correction**

# Cylinder Head Service

After each 500 hours of operation, the cylinder heads should be taken off the engine and serviced. Remove carbon deposits from combustion chamber in head. Scrape and remove carbon with a sharp piece of wood or plastic. Wood or similar material is suggested to avoid scratching aluminum surfaces of the cylinder head. Always use new cylinder head gaskets. Make sure head bolts are tightened in the proper sequence and to the torque value specified. See Figure 3-17.

## NOTE

If the engine is operated on leaded fuel or under certain conditions, such as continued light load or relatively constant speed, carbon may build up more rapidly. If there are early indications of this, such as heavy deposits of carbon on spark plug electrodes, service the heads more frequently. A 250 hour service interval is suggested under these conditions.



**Figure 3-17. Cylinder Head Fastener Tightening Sequence**

1. Use new gaskets when reinstalling heads.
2. Tightening sequence
3. Tighten head bolts to 15-20 ft. lbs. (20-27 Nm.)

# Valve Service

After each 500 hours of operation (or sooner if a loose valve is detected), check clearance between the valve stems and tappets. The engine must be stopped and cooled to normal ambient temperatures to accurately gauge and adjust valve clearances. Use the following procedure to adjust.

## IMPORTANT:

The piston must be at top dead center (TDC) of the compression stroke to measure valve-to-tappet clearance. By rotating the flywheel and observing the valves and tappets for movement, it can be determined if a cylinder is at TDC.

If, for example, the flywheel is rotated and movement is noticed in the #2 side valve box– the opposite cylinder (#1 side) will be at TDC and valve-to-tappet clearance can be measured.

Rotating the flywheel one complete revolution (360°) will then cause movement in the #1 side valve box– the #2 side cylinder will be at TDC, enabling measurement of valve-to-tappet clearance for that side.

## CLEARANCE SPECIFICATIONS

### Intake

0.003-0.006 in. (0.076 mm - 0.152 mm)

### Exhaust

0.011-0.014 in. (0.279 mm - 0.355 mm)

1. Rotate the flywheel and look into the valve boxes. The valves and tappets will move in only one of the boxes. Measure the valve-to-tappet clearance for the cylinder in which no movement was observed– use a flat feeler gauge.
2. Rotate the flywheel 360° and measure the valve-to-tappet clearance for the remaining cylinder.
3. *If clearance is too small, or too large, remove generator set and take to an authorized Kohler service dealer.*

# Wattage Requirements

If the rated capacity of your generator is exceeded, the circuit breaker(s) located in the controller will trip to protect the generator against damage. This could be caused by a short in the AC circuit in your vehicle or simply by having too many appliances on at the same time resulting in an overload condition. If the circuit breaker(s) trip, the set may continue running but there will be no AC output to the protected circuit. Before resetting the circuit breaker(s), turn off some of the appliances and lights inside the vehicle to bring the load down within the rated limits of the set. If this is done and the circuit breaker(s) trips again after being reset, a short circuit is indicated. In this event, turn off the set and have a qualified electrician locate and correct the cause of the short circuit.

The average wattage requirements of some common appliances/tools and motor loads are listed in the following charts. Use these figures to calculate the total load on your set to avoid the inconvenience of having the circuit breaker trip due to overload. The lighting load is easily determined by adding the wattage rating of each bulb in the circuit. Check the nameplate rating on motors and appliances/tools in your vehicle for exact wattage requirements.

Electrical Appliance	Rating (Watts)
Blanket	50-250
Blender	600
Broiler	1350
Fan, Air Circulating	25-100
Fan, Furnace	270
Heater, Space	750-1500
Heater, Water	1500
Pan, Frying	1200
Percolator, Coffee	650
Radio	50-100
Television	300-750
Toaster	750-1200

**Figure 3-18. Appliance Average Wattage Ratings**

Construction Tools	Motor Starting Watts	Running Watts
Air Compressor (Small)	1500	725
Air Compressor 3/4 hp	4000+	2000
Drill, 1/4 in.	500	250
Drill, 3/8 in.	600	350
Drill, 1/2 in.	800	600
Grinder 1/2 hp	1500	1200
Hammer, Demolition	2000	1800
Hammer, HD Rotary	1500	1200
Paint Sprayer (Airless)	400	240
Polisher, Orbit	500	360
Power Paint Roller	120	90
Power Plane	600	450
Router	900	700
Saw, Circular 6 1/2 in.	2200	1000
Saw, Circular 7 1/4 in.	2500	1200
Saw, Table 10 in.	4000	1500
Saw, Sabre (Worm Drive)	2500	1200
Sander, Belt	1500	600
Sander, Finishing	900	360
Screwdriver, Power	1000	530
Shear, 12 gauge	1800	720
Soldering Gun	-	250
Vacuum Cleaner, Wet/Dry	1500	1260
Wrench, Impact 1/2 in.	2000	840

**Figure 3-19. Construction Tool Average Wattage Ratings.**

# Generator Service

## General

Under normal conditions, generator service will not be required on a regular basis. If operating under extremely dusty and dirty conditions, use dry compressed air to

blow dust out of the generator at frequent intervals. Do this with the generator set operating and direct the stream of air in through the cooling slots at the end of the generator.

## Storage Procedure

If your generator set is to be out of service for a considerable length of time (2 months or more), the following steps should be taken to preserve the set before placing it in storage.

1. Change the oil and filter when the engine is still warm from operation. Refer to Oil Change. Run the engine for a few minutes to distribute the clean oil.
2. Gasoline-fueled generators– Drain the carburetor bowl (or run unit until empty). This step is done to prevent the gasoline from becoming “stale” which causes formation of gum. The bowl can be removed by unscrewing retaining bolt on bottom of bowl. Replace the bowl after draining the fuel. Use of a gas stabilizer for gasoline-fueled generators is permitted in lieu of draining the carburetor bowl; add the correct amount of gas stabilizer to the fuel and follow all recommendations of the gas stabilizer manufacturer.
3. Gasoline-fueled generators only– remove the fuel line at the pump outlet to drain fuel line to carburetor. Reconnect fuel line. The pump itself requires no additional maintenance.
4. Remove the spark plugs. Pour about 1 tablespoon of engine oil into each spark plug hole. Install the plugs, but do not connect the plug leads. Crank the engine two or three revolutions to lubricate the cylinders.
5. Clean the exterior surface of the generator set then spread a light film of oil over unpainted metallic surfaces which could rust or corrode.

# Section 4. Troubleshooting

When troubles occur, don't overlook simple causes. A starting problem could be caused, for example, by improper fuel or an empty fuel tank. Make sure all electrical connections are secure. Remember the battery negative must have a good ground. The following charts list some common problems. If

procedures in this manual do not correct the problem, take the generator set to a service dealer. Tell the service dealer personnel exactly what happened when the problem occurred and any adjustments made to the set.

## Engine

Problem	Possible Cause	Corrective Action
Will not crank	Weak or dead battery	Recharge or replace
	15-amp controller fuse blown	Replace fuse
	Defective start switch	Replace
	Remote start cable disconnected	Reconnect
	Defective starter solenoid	Replace
	Battery connections made in reverse	Correct
Will not start	Out of fuel	Replenish
	Clogged fuel filter	Replace
	Air cleaner clogged	Clean or replace
	Faulty spark plug	Replace or regap spark plugs
	Shorted or open ignition coil	Replace
	Faulty ground	Clean and retighten
	Loose spark plug wire connection	Reconnect and/or tighten
	Weak or dead battery	Recharge or replace
	Choke adjustment wrong	Adjust
	Low oil pressure (LOP) shutdown	Correct cause of shutdown
Hard starting	Stale or bad fuel	Replace
	Air cleaner clogged	Clean or replace element
	Carburetor adjustment wrong	Adjust
	Faulty spark plug	Replace or regap spark plugs
	Weak ignition coil	Replace
	Improper cooling	Inspect cooling system
	Choke adjustment wrong	Adjust
Stops suddenly	Out of fuel	Replenish
	Air cleaner clogged	Clean or replace element
	Faulty spark plug	Replace or regap spark plugs
	Low oil pressure	Check oil level
	Controller voltage supply fuse blown	Replace fuse
	De-icing module fuse blown (gasoline models)	Replace fuse
	Defective de-icing module (gasoline models)	Have unit serviced by an authorized Kohler service dealer/distributor



<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
Lacks power	Air cleaner clogged	Clean or replace element
	Improper cooling	Inspect cooling system
	Engine overload	Reduce load
	Bad or stale fuel	Replace
	Faulty spark plug	Replace or regap spark plugs
	Carburetor adjustment wrong	Adjust
	Carbon build-up	Have unit serviced by an authorized Kohler service dealer/distributor
	Governor not properly adjusted or defective	Have unit serviced by an authorized Kohler service dealer/distributor
Operates erratically	Air cleaner clogged	Clean or replace element
	Stale or bad fuel	Replace
	Faulty spark plug	Replace or regap spark plugs
	Carburetor adjustment wrong	Adjust
	Governor not properly adjusted or defective	Have unit serviced by an authorized Kohler service dealer/distributor
Overheats	Improper cooling	Check intake and outlet openings
	Air cleaner clogged	Clean or replace element
	Carburetor adjustment too lean	Adjust

## Generator

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
No AC output	Circuit breaker in OFF Position	Reset to ON position
	AC Circuit breaker tripping due to overload on generator set	Reduce load (see Wattage Requirements)
	Short circuit in vehicle circuit causing breaker to trip	Reset– if it trips repeatedly, stop set and contact service center
	General malfunction such as faulty component or other internal fault	Contact generator service dealer/distributor for repairs
Low output or excessive drop in voltage	Engine speed too low	Contact generator service dealer/distributor for repairs
	Generator overloaded	Reduce load
	Voltage regulator adjustment	Contact generator service dealer/distributor
No battery charging output (if equipped)	Defective battery charging alternator	Contact generator service dealer/distributor

# Section 5. Wiring Diagrams

Use the following table to locate the proper wiring diagram for your specific application. Refer to the nameplate attached to the controller cover of the unit to obtain the specification number.

<b>kW</b>	<b>Voltage</b>	<b>Fuel</b>	<b>Phase</b>	<b>Hz</b>	<b>Specification Number</b>	<b>Wiring Diagram Number</b>	<b>Figure Numbers</b>
4/5 kW Units	120 Volt 120/240 Volt 220 Volt	LP Liquid or LP Vapor Withdrawal	Single Phase	60 Hz 50 Hz	PA-101222 PA-101223 PA-101224 PA-101225 PA-101226 PA-101227 PA-101331 PA-101332 PA-101333 PA-101334 PA-101335 PA-101336 PA-101352 PA-101353	227740	Figure 5-4 Figure 5-5
5 kW Units	120 Volt 120/240 Volt	Gasoline	Single Phase	60 Hz	PA-101217 PA-101218 PA-101220	227757	Figure 5-6 Figure 5-7
4 kW Units	120 Volt 120/240 Volt	Gasoline	Single Phase	60 Hz	PA-101322 PA-101323 PA-101325	227758	Figure 5-8 Figure 5-9
4/5 kW Units	120/240 Volt	Gasoline	Three Phase	60 Hz	PA-101219 PA-101221 PA-101324 PA-101326	227759	Figure 5-10 Figure 5-11
4 kW Units	110/220 Volt 120/240 Volt 100/200 Volt	Gasoline	Single Phase	50 Hz	PA-101327 PA-101328 PA-101329 PA-101330	227760	Figure 5-12 Figure 5-13

## Four-Lead Reconnectable (Single-Phase) Generator Sets Where Generator Output Can Be Reconnected For 120 Volt or 120/240 Volt, 60 Hz; or 110 Volt or 110/220 Volt, 50 Hz

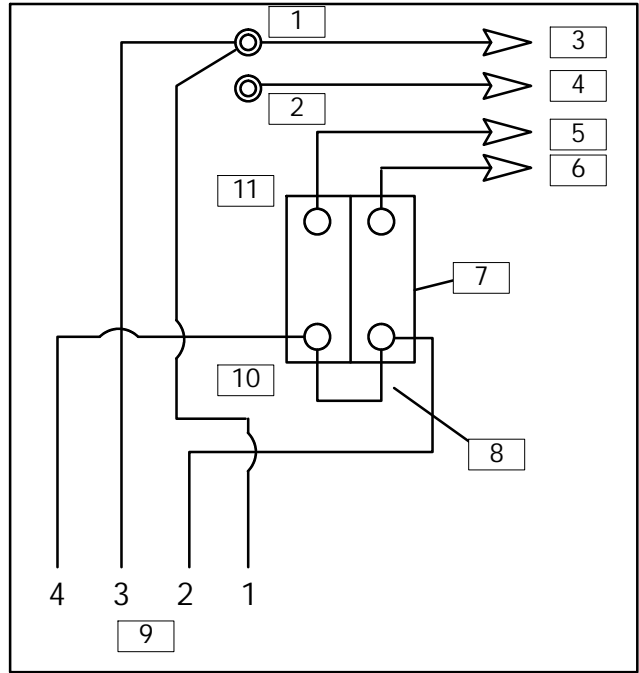
To illustrate the proper reconnection of 4-lead generator sets, the following information is provided. In all cases, the National Electrical Code (NEC) should be followed.

### NOTE

When a generator set is reconnected to a voltage different than nameplate voltage, notice should be placed on the unit indicating this change. A decal (part no. 246242) is available for this purpose from authorized Kohler dealers.

### 120-Volt (or 110-Volt) Configurations– Figure 5-1 and Figure 5-2 (Views A and B)

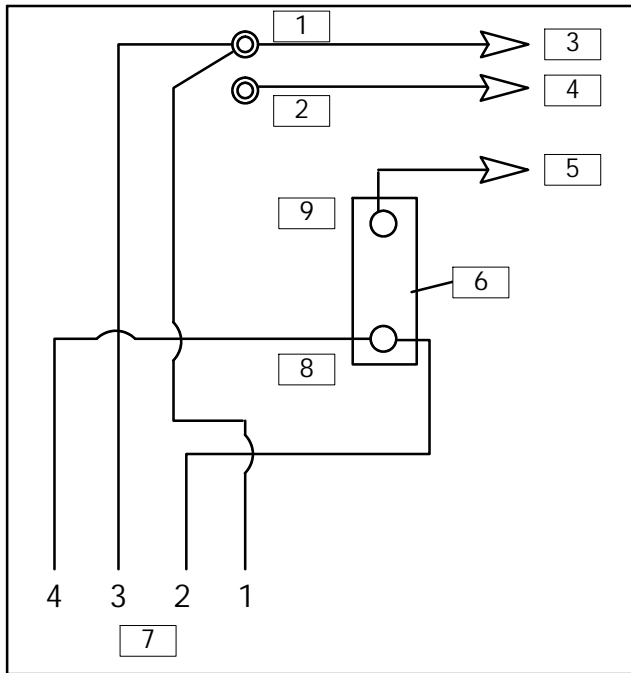
The load-side terminals of the circuit breaker are not to be connected together when a factory two-pole circuit breaker is used, see Figure 5-1. If the installation requires a 120 volt, 2-wire system, a single-pole circuit breaker must be used. See Figure 5-2. When connecting stator phase leads together, the output lead (L1) must be sized accordingly. It is recommended that a jumper lead be used on the *line* side of the circuit breaker. This allows for balancing of the load of the generator set.



1. L0 (Neutral)
2. Ground
3. L0
4. Ground
5. L1
6. L2
7. Factory Two-Pole or (2) 1-Pole Circuit Breakers
8. Jumper Lead
9. Stator Leads
10. Line Side
11. Load Side

**Figure 5-1. View A– 120 Volt, 3 Wire**

	60 Hz	50 Hz
<b>L0-L1</b>	120 Volt	110 Volt
<b>L0-L2</b>	120 Volt	110 Volt



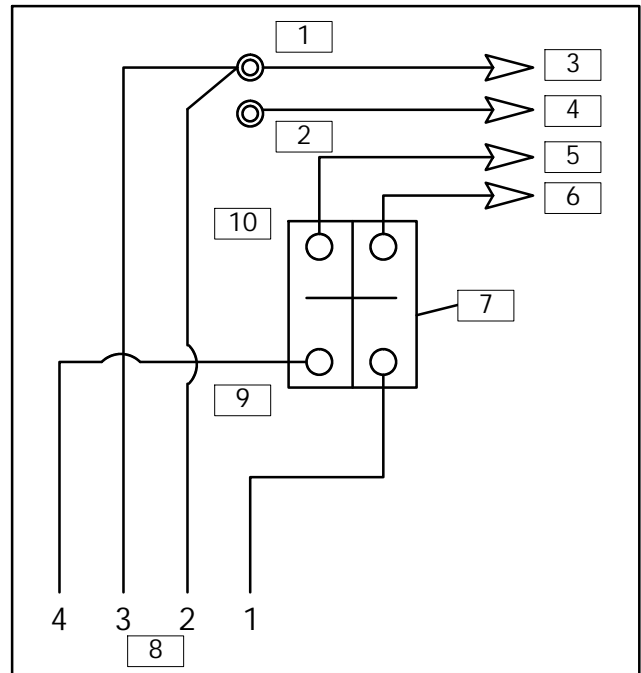
- 1. L0 (Neutral)
- 2. Ground
- 3. L0
- 4. Ground
- 5. L1
- 6. 1-Pole Circuit Breaker
- 7. Stator Leads
- 8. Line Side
- 9. Load Side

**Figure 5-2. View B– 120 Volt, 2 Wire**

	60 Hz	50 Hz
<b>L0-L1</b>	120 Volt	110 Volt
<b>L0-L2</b>	120 Volt	110 Volt

### 120/240-Volt (or 110/220-Volt) Configurations– Figure 5-3 (View C)

Jumper lead not used. If unit was originally wired for straight 120 volt (or 110 volt), 3 wire, be sure jumper lead is removed (see Figure 5-1 for location). Circuit breaker **MUST** be a circuit breaker manufacturer two-pole circuit breaker. Two single-pole circuit breakers do not conform to NEC requirements when supplying a 240 volt (or 220 volt) load. This is true even if they are mechanically attached together. Leads L1 and L2 are different phases and must never be connected together.



- 1. L0 (Neutral)
- 2. Ground
- 3. L0
- 4. Ground
- 5. L2
- 6. L1
- 7. Factory Two-Pole Circuit Breaker
- 8. Stator Leads
- 9. Line Side
- 10. Load Side

**Figure 5-3. View C– 120/240 Volt, 3 Wire**

	60 Hz	50 Hz
<b>L0-L1</b>	120 Volt	110 Volt
<b>L0-L2</b>	120 Volt	110 Volt
<b>L1-L2</b>	240 Volt	220 Volt






**Accidental starting.**

**Can cause severe injury or death.**

Disconnect battery cables before working on generator set (negative lead first and reconnect it last).

---

**Accidental starting can cause severe injury or death.** 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.

 <b>WARNING</b>	
 <b>Hazardous voltage.</b>	 <b>Moving rotor.</b>
<b>Can cause severe injury or death.</b>	
Do not operate generator set without all guards and electrical enclosures in place.	

**Hazardous voltage can cause severe injury or death.** Perform electrical service only as prescribed in equipment manual. Be sure that generator is properly grounded. Never touch electrical leads or appliances with wet hands, when standing in water, or on wet ground as the chance of electrocution is especially prevalent under such conditions. Wiring should be inspected at the interval recommended in the service schedule— replace leads that are frayed or in poor condition. The function of a generator set is to produce electricity and wherever electricity is present, there is the hazard of electrocution.

# NOTES

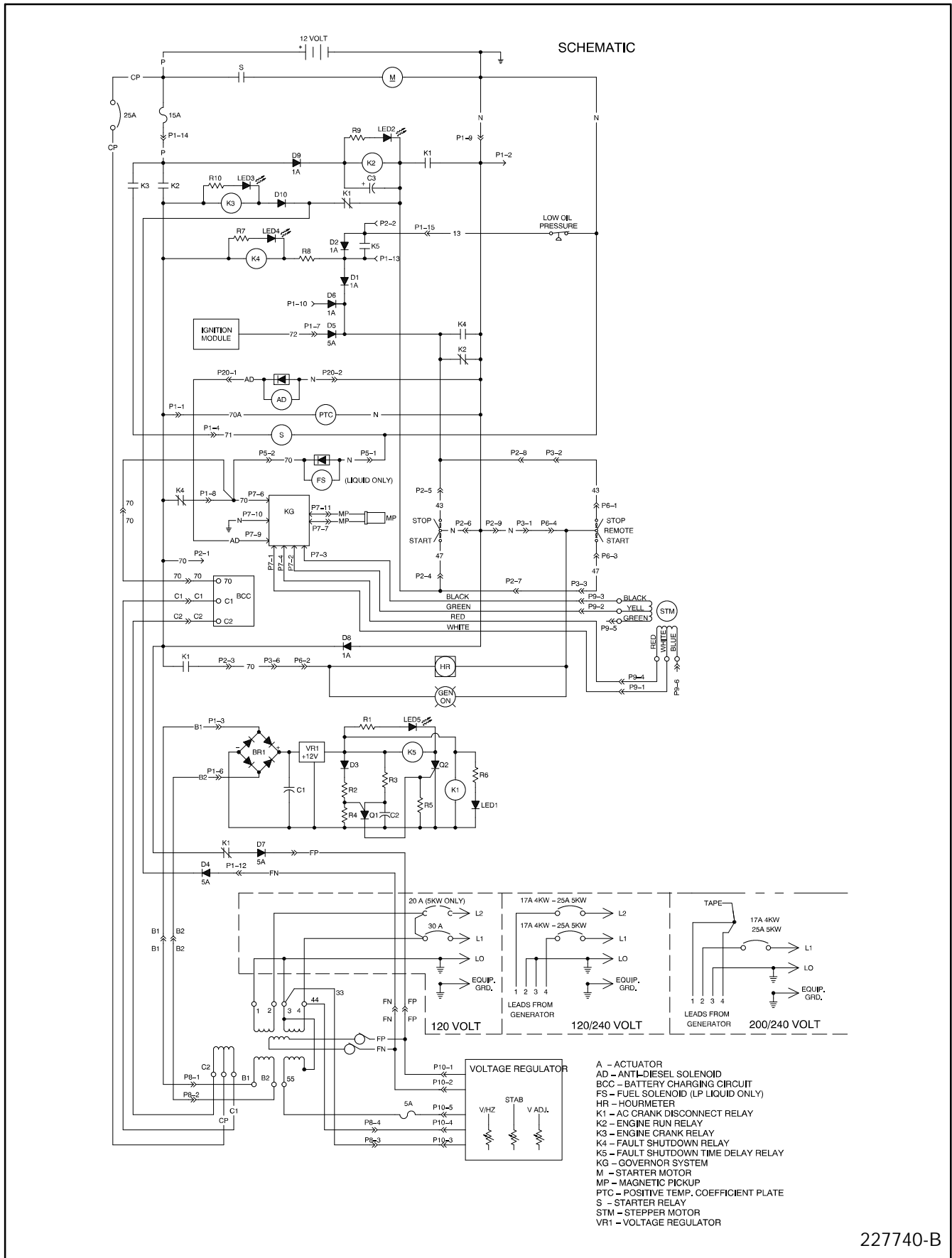


Figure 5-4. Schematic of Wiring Diagram 227740

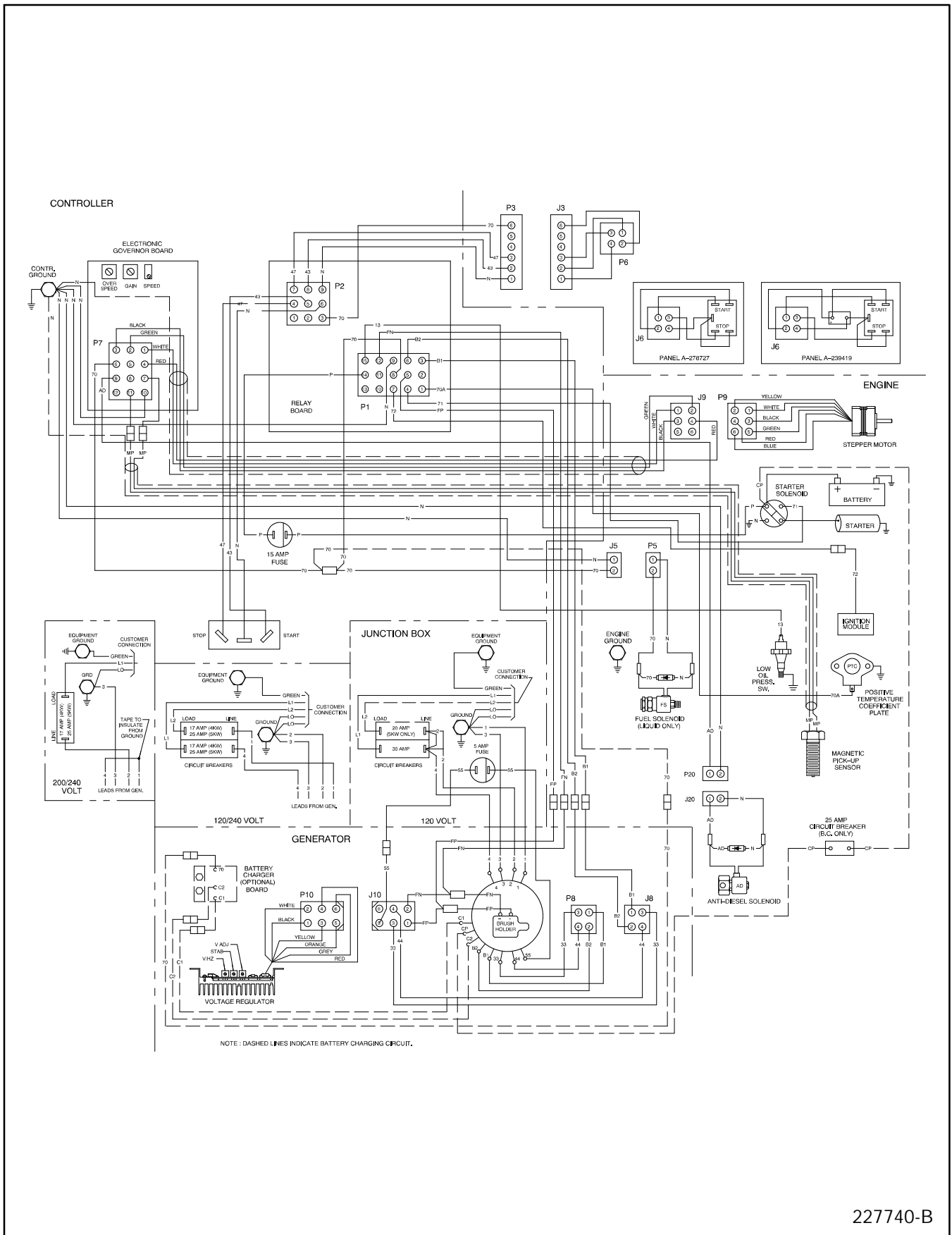
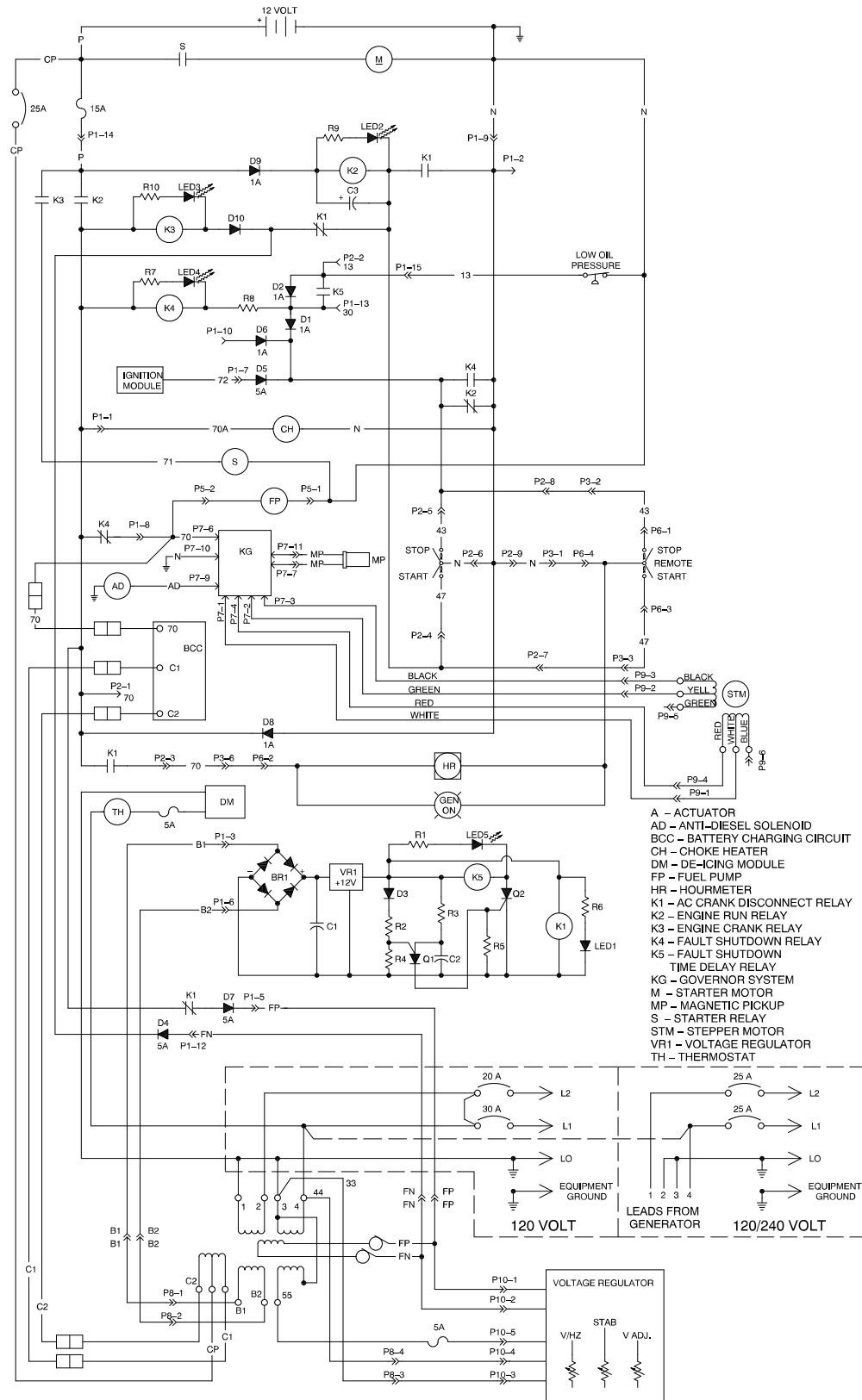


Figure 5-5. Point-to-Point of Wiring Diagram 227740



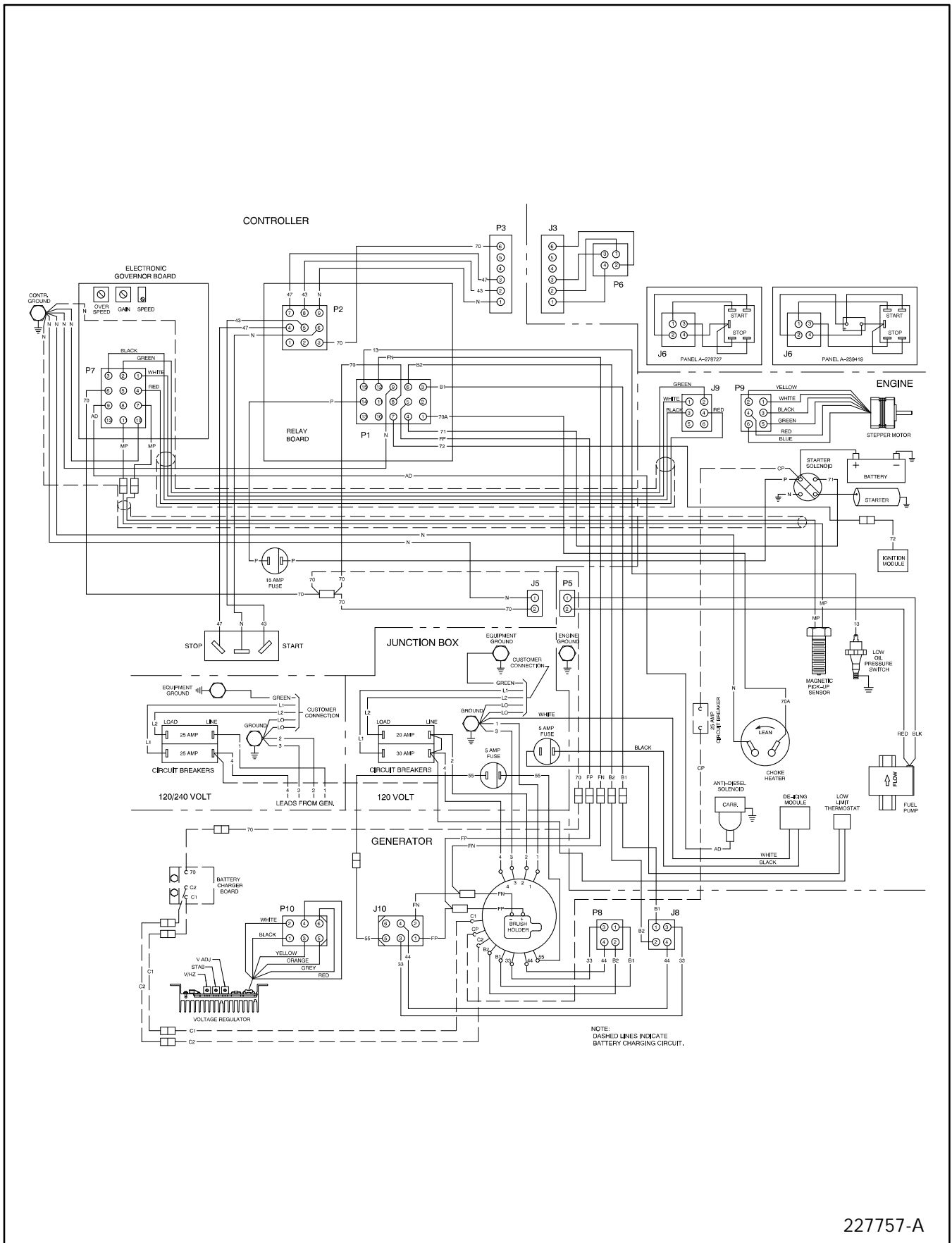
SCHEMATIC



- A - ACTUATOR
- AD - ANTI-DIESEL SOLENOID
- BCC - BATTERY CHARGING CIRCUIT
- CH - CHOKE HEATER
- DM - DE-ICING MODULE
- FP - FUEL PUMP
- HR - HOURMETER
- K1 - AC CRANK DISCONNECT RELAY
- K2 - ENGINE RUN RELAY
- K3 - ENGINE CRANK RELAY
- K4 - FAULT SHUTDOWN RELAY
- K5 - FAULT SHUTDOWN TIME DELAY RELAY
- KG - GOVERNOR SYSTEM
- M - STARTER MOTOR
- MP - MAGNETIC PICKUP
- S - STARTER RELAY
- STM - STEPPER MOTOR
- VR1 - VOLTAGE REGULATOR
- TH - THERMOSTAT

227757-A

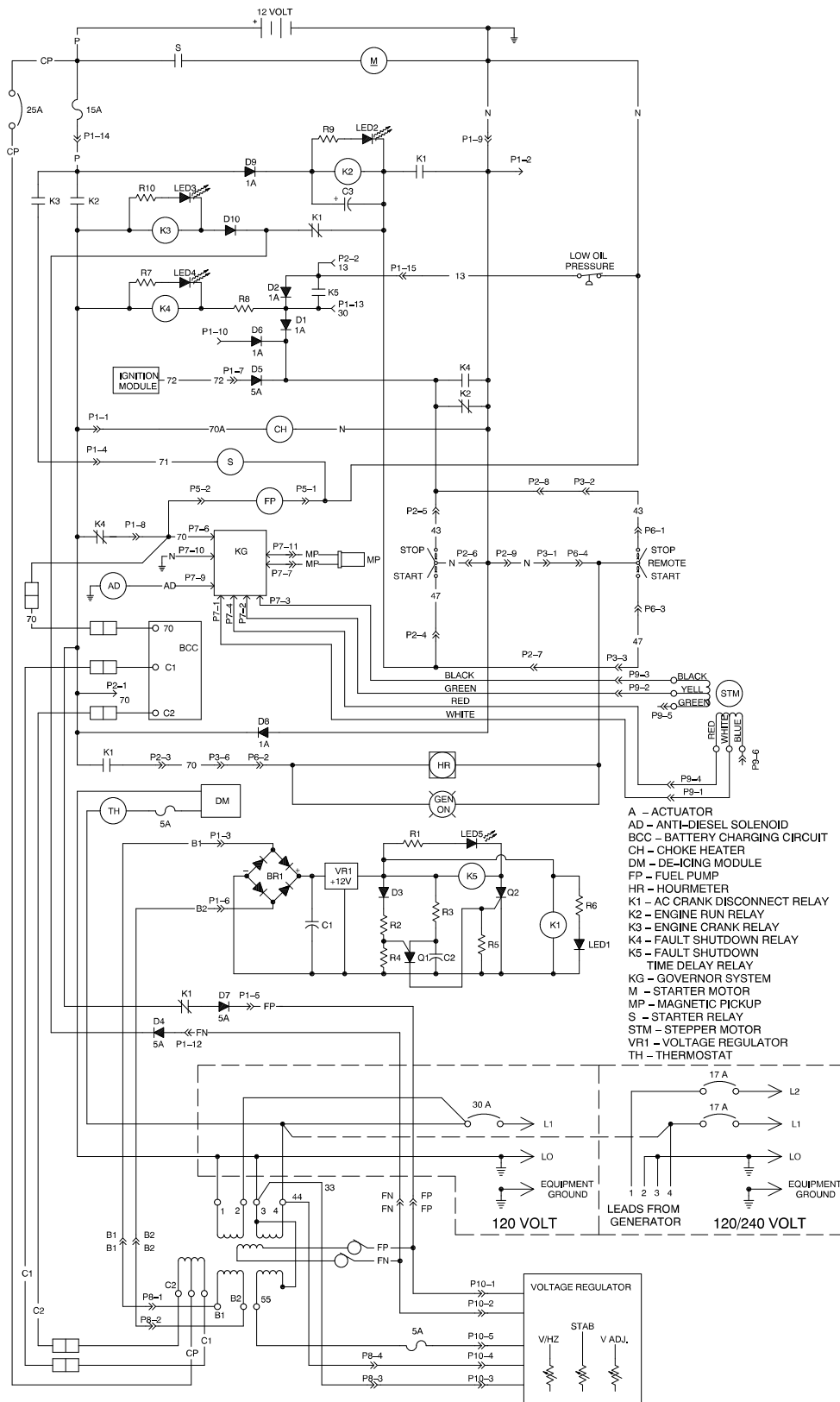
Figure 5-6. Schematic of Wiring Diagram 227757



227757-A

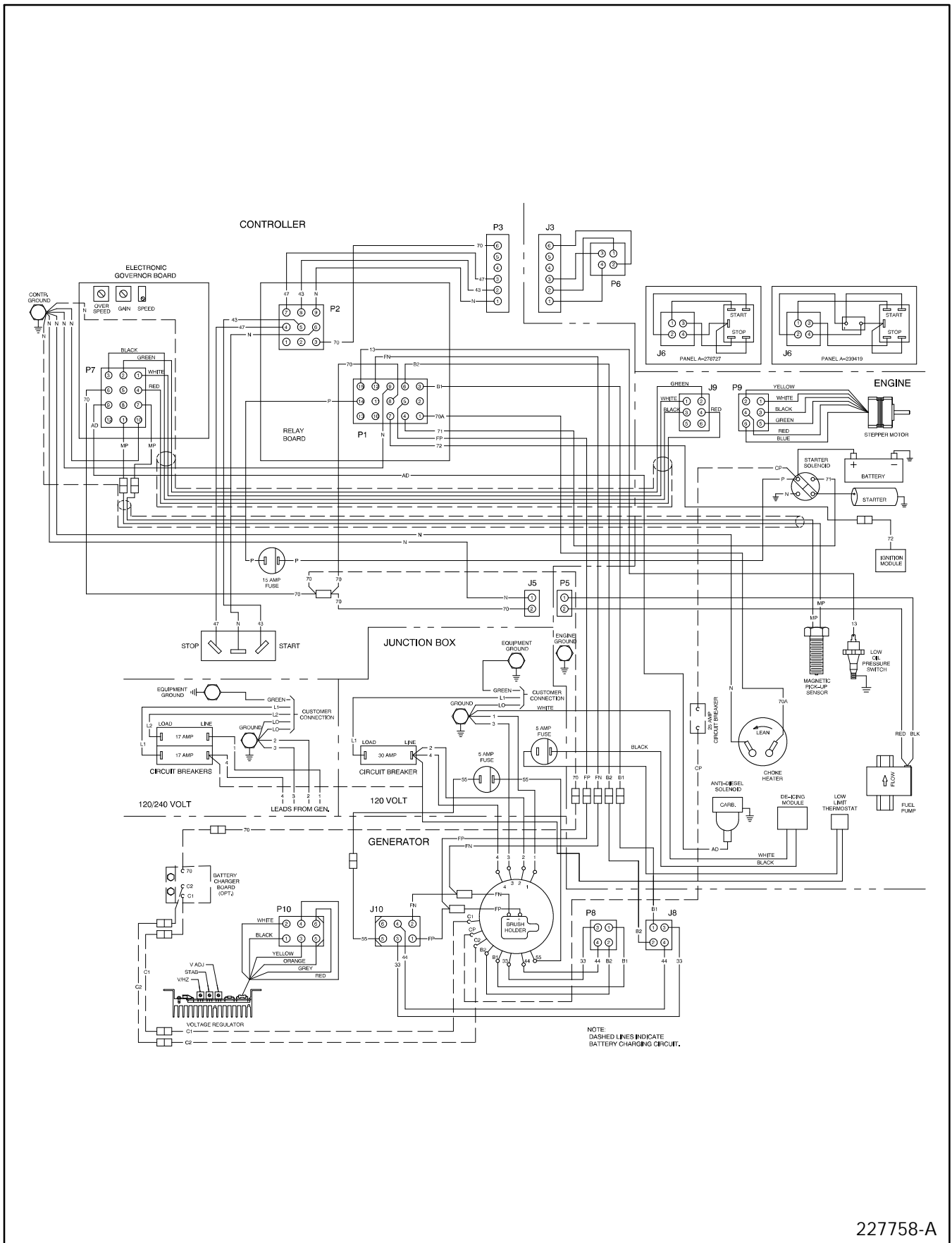
Figure 5-7. Point-to-Point of Wiring Diagram 227757

### SCHEMATIC



227758-A

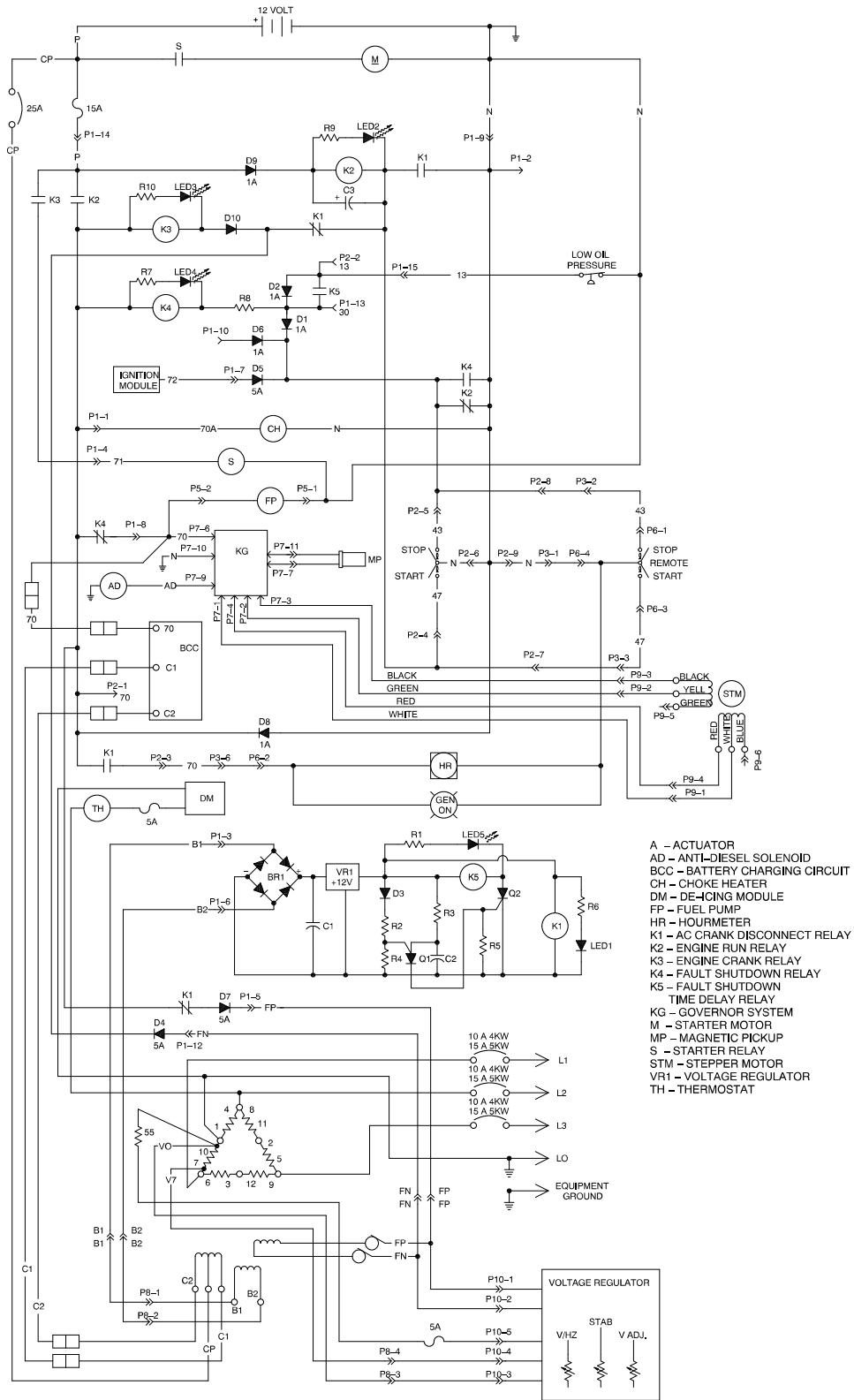
Figure 5-8. Schematic of Wiring Diagram 227758



227758-A

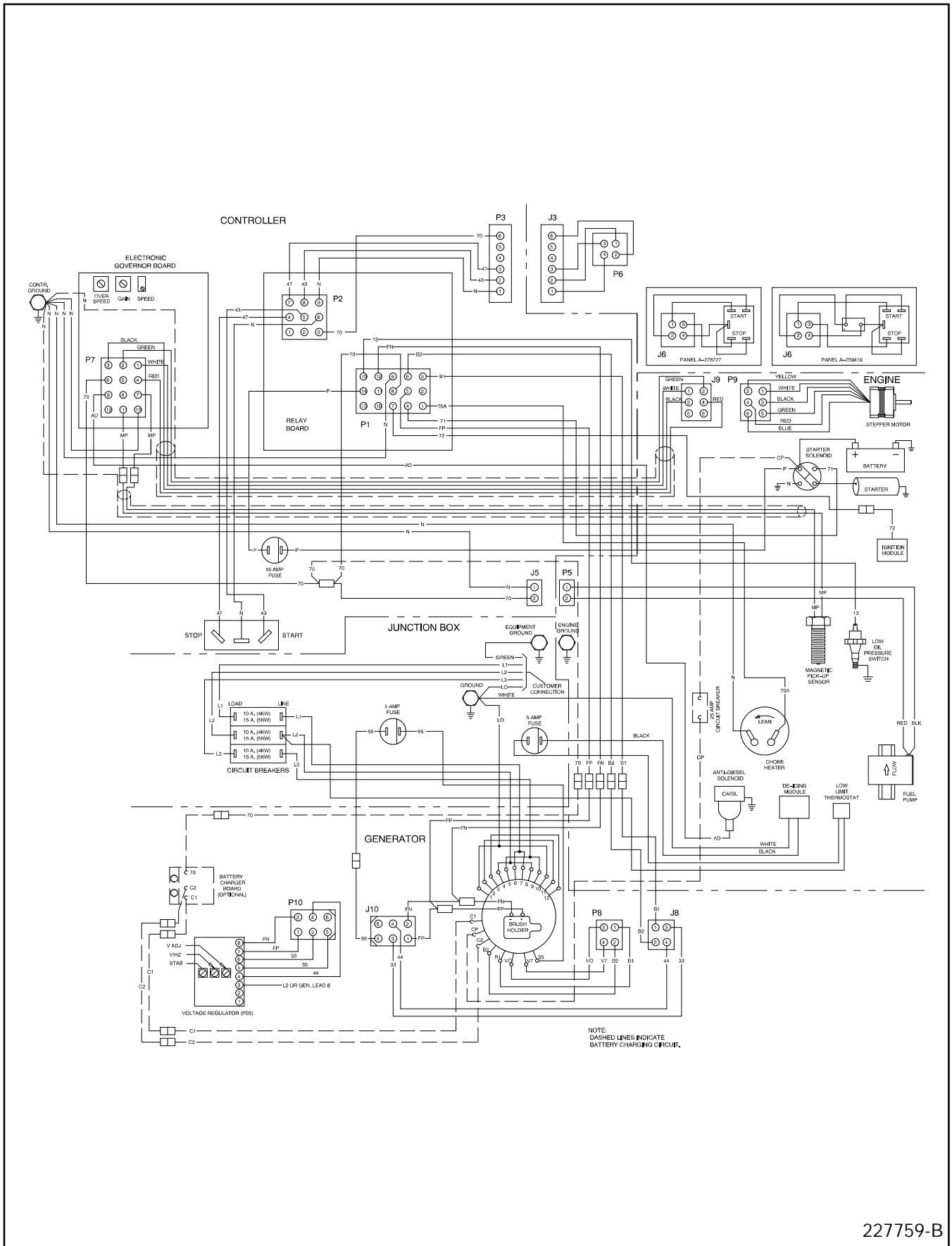
Figure 5-9. Point-to-Point of Wiring Diagram 227758

SCHEMATIC



227759-B

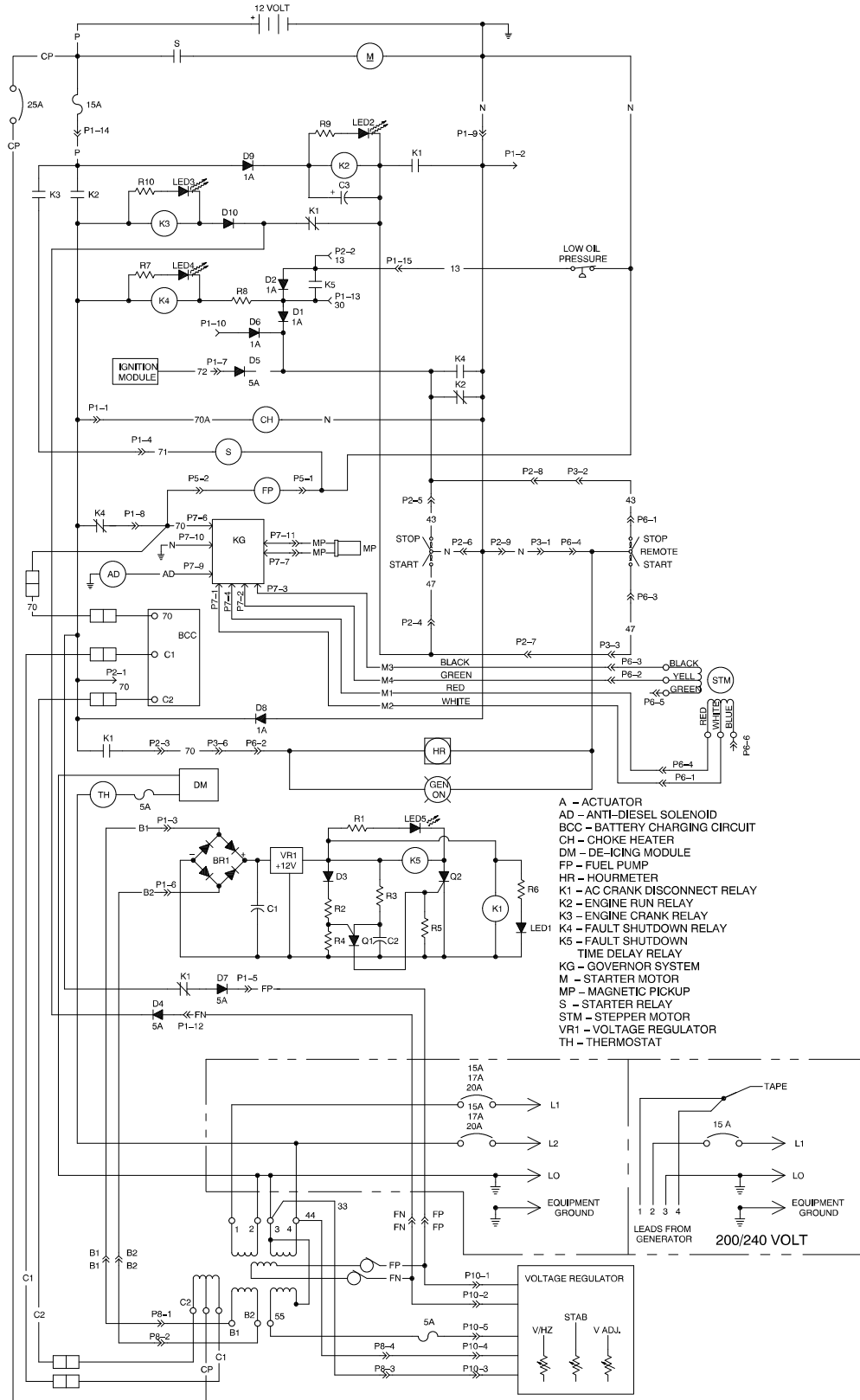
Figure 5-10. Schematic of Wiring Diagram 227759



227759-B

Figure 5-11. Point-to-Point of Wiring Diagram 227759

SCHEMATIC



227760-B

Figure 5-12. Schematic of Wiring Diagram 227760

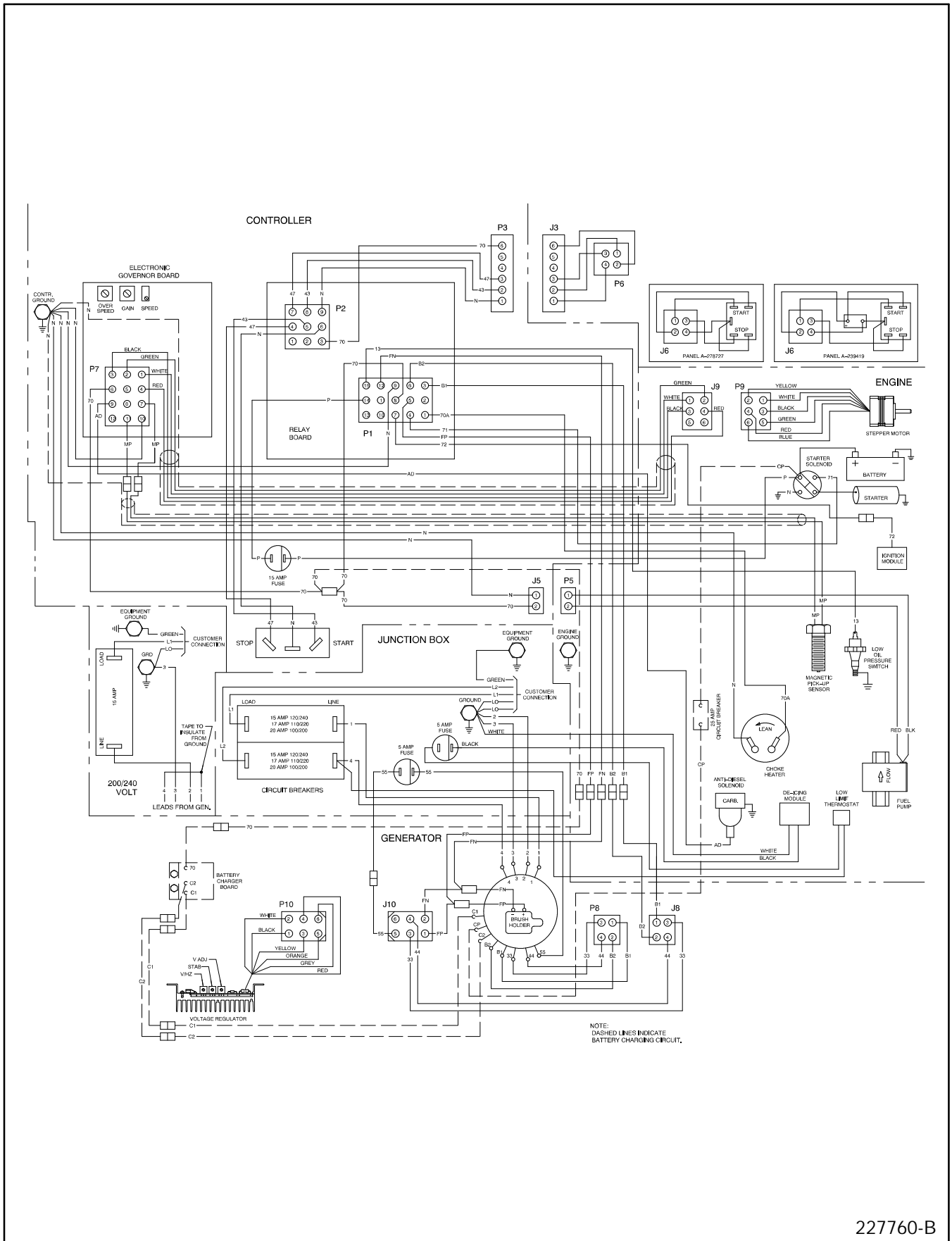


Figure 5-13. Point-to-Point of Wiring Diagram 227760



# Section 6. Installation

## Introduction

Use this section as a guide when installing a generator set in the recreational vehicle, then refer to the Operation section for specific service instructions. When installing an RV/Mobile generator set, the installation must comply with the Kohler detailed installation instructions. Specific installation instructions for RV generator sets begin on page 6-5. Mobile installation instructions begin on page 6-9. Any additional requirements can also be found in the following two sources: (1) ANSI A 119.2/NFPA 501 C and (2) article 551 of ANSI/NFPA 70, National Electrical Code. Generator set installation must also comply with state and local requirements.

### NOTE

**This generator set does not comply with United States Coast Guard (U.S.C.G.) requirements and must not be used for marine applications.** Use only generator sets specified for marine use in marine installations. U.S.C.G. Regulation 33CFR183 requires a generator set to be "ignition protected" when used in a gasoline-fueled environment.

## General Information

This section covers the RV and Mobile Kohler generator set installation. To determine which model is involved, check the model number found on the nameplate attached to the controller of the generator being installed. Follow all instructions to insure proper installation.

## Features

All models feature Kohler designed and built 4-cycle air-cooled gasoline engines, rotating field Alternating Current generators, and Relay Controllers. Each generator is directly connected to the Kohler engine for permanent alignment. Permanent magnet type starting motors are used to crank the engine during start-up. Each Controller includes a START-STOP switch for test operating the set at the controller. The controller also has a keyed connector for connecting a wiring harness to a remote start-stop switch (usually located on the dashboard of the vehicle). All Kohler RV/Mobile sets are mounted on a steel drip pan-type mounting tray for quick installation to the frame of the vehicle. Add oil as needed to the crankcase to bring the level up to the max. mark. Following are some general specifications.

Specifications	
Weight (approx.) 5 kW	268 lbs. (121.5 kg)
Weight (approx.) 4 kW	258 lbs. (117.0 kg)
Air Requirements– Total	Combustion 20 CFM– Cooling 340 CFM
Fuel Inlet Connection Size– Gasoline	5/16 in. I.D. (7.9 mm)
Fuel Type or LP Gas Liquid Withdrawal	Unleaded Regular Gasoline, LP Gas Vapor,
Battery Voltage	12
Battery Recommendation (min.)	290 CCA, 90 Amp hr.
Battery Ground	Negative

# Generator Selection And Wattage Requirements

Total wattage requirements (lights, motors, appliances) must be considered in selecting a generator set, or sizing wattage requirements when available space and construction may limit the size of the generator set. Refer to the following when figuring wattage requirements.

## Installation Factors

Each generator set is shipped as a unit except for the optional exhaust system components which are shipped loose for assembly after the set is installed in the vehicle.

When pre-planning the installation, the following factors must be considered.

1. **ELECTRICAL LOAD:** Does the set selected have adequate capacity to handle the load?
2. **COMPARTMENT SIZE:** Will there be sufficient room around the set to maintain minimum clearances?
3. **AIR REQUIREMENTS:** Are the compartment air inlets and outlets sized to allow adequate circulation of air for cooling and combustion?
4. **COMPARTMENT FLOOR:** Is the compartment floor strong enough to support the weight of the Generator Set?
5. **FUEL SYSTEM:** Is the system properly designed to prevent fuel starvation of either the main engine or generator set engine?
6. **EXHAUST SYSTEM:** Will the system meet all safety requirements after installation?
7. **ELECTRICAL CONNECTIONS:** Will all systems (battery, load and remote switch) be compatible with vehicle systems?

Each of these installation considerations is covered in detail on the following pages.

## Electrical Load

While the electrical load of the vehicle should have been calculated prior to purchase of the generator set, you may want to recheck the load before installing the set to make sure that the capacity is ample to meet demands without possible overloading.

## Lighting Load

The lighting load is usually easiest to calculate. In most cases, simply add the wattage of each lamp to be operated off the generator set. Note that in many applications, not all of the lights or lamps are in the generator set AC circuit— some are DC powered by the 12-volt battery in the vehicle. Make sure the total includes only lights actually on the generator set AC circuit.

The lighting load is usually not too heavy in mobile installations; however, it must be accurately calculated to prevent overloading which could occur, for example, if all lights happened to be on when the air conditioner or other motor loads start-up.

## Motor Loads

When figuring generator set capacity requirements for installation involving motor loads, do not overlook the high current demanded by the motor during start-up. The “in-rush” or starting current may be 2-5 times higher than that required when the motor reaches normal operating speed. Reserve capacity must be allowed for in-rush demands plus other loads which could be on the line as the motor starts.

Air conditioning units are perhaps the most common type of motor load for generator sets in recreational vehicles. The starting characteristics of the different makes of air conditioners vary greatly— one particular 13,500 Btu unit has, for example, lower starting requirements than an 11,000 Btu unit of another make. When only one unit is involved, there is usually no starting problem, provided of course, the lighting and appliance load is not too high when the unit is started.

The trend seems to be toward larger capacity air conditioners and the use of more than one unit in larger vehicles. Simultaneous starting of two units can present problems if the capacity is marginal. Because of the variation in starting characteristics of the various makes of air conditioners, no definite statements are made in this publication regarding multiple-motor starting

capabilities of the mobile generator sets covered. Delayed starting or use of “easy starting” devices on air conditioner units should be considered whenever simultaneous starting of more than one motor is involved. The starting and running requirements of some motor loads common to mobile applications are listed in Figure 6-1. Use this as a guide when selecting generator set capacity requirements involving motor loads. See Figure 6-2 for generator set capabilities regarding air conditioners. Capabilities will vary according to KILOWATT DERATING following. For specific information regarding simultaneous starting of two or more motors, contact Kohler Co., Generator Division— Product Applications.

## Appliance Loads

Generator sets in recreational vehicles are often used to furnish AC for appliances such as TV, stereo, electric water heaters, etc. With the exception of the resistance type loads such as the water heater, requirements for appliances are usually low. Such loads must not, however, be overlooked when figuring total requirements. Reserve capacity should be available for anticipated appliance loads to avoid overloading of a set. The average power requirements of some electrical appliances tools are listed in Figure 6-3 and Figure 6-4.

Motor Requirements	1/4 HP	1/3 HP	1/2 HP	3/4 HP	1 HP	2 HP	3 HP
Starting (In-Rush)	750	1000	1500	2000	3300	4000	5000
Running Watts	350	400	600	750	1100	2000	3000

Figure 6-1. Motor Requirements

Kohler Model	Wattage Capacity	Will Operate Air-Conditioner(s) of Size Indicated	"Power to Spare" for lighting, appliance, tools, etc.
4CKM-RV	4,000	One– 13,500 Btu	2300
5CKM-RV	5,000	One– 13,500 Btu & One– 11,000 Btu	3300 1000

Figure 6-2. Air Conditioner Ratings (60 Hz)

Electrical Appliance	Rating (Watts)
Blanket .....	50-250
Blender .....	600
Broiler .....	1350
Fan, Air Circulating .....	25-100
Fan, Furnace .....	270
Heater, Space .....	750-1500
Heater, Water .....	1500
Pan, Frying .....	1200
Percolator, Coffee .....	650
Radio .....	50-100
Television .....	300-750
Toaster .....	750-1200

Figure 6-3. Appliance Ratings (60 Hz)

Construction Tools	Motor Starting Watts	Running Watts
Air Compressor (Small)	1500	725
Air Compressor 3/4 hp	4000+	2000
Drill, 1/4 in.	500	250
Drill, 3/8 in.	600	350
Drill, 1/2 in.	800	600
Grinder 1/2 hp	1500	1200
Hammer, Demolition	2000	1800
Hammer, HD Rotary	1500	1200
Paint Sprayer (Airless)	400	240
Polisher, Orbit	500	360
Power Paint Roller	120	90
Power Plane	600	450
Router	900	700
Saw, Circular 6 1/2 in.	2200	1000
Saw, Circular 7 1/4 in.	2500	1200
Saw, Table 10 in.	4000	1500
Saw, Sabre (Worm Drive)	2500	1200
Sander, Belt	1500	600
Sander, Finishing	900	360
Screwdriver, Power	1000	530
Shear, 12 gauge	1800	720
Soldering Gun	–	250
Vacuum Cleaner, Wet/Dry	1500	1260
Wrench, Impact 1/2 in.	2000	840

Figure 6-4. Construction Tool Average Wattage Ratings.

### Kilowatt Derating

All units are rated 1.0 power factor. Derate approximately 3.5% per 1000 ft. (300 m) above 500 ft (150 m) above sea level and 1 % for each 10°F (5.5°C) increase in temperature above 85°F (29°C).

# 4/5CKM-RV Generator Set Mounting

(For mobile unit mounting see page 6-9)

## Compartment Size

When planning compartment size requirements, allow the minimum clearances for cooling of the generator set as shown in Figure 6-5.

### NOTE

Since the sets are flexibly mounted, the minimum clearances will assure that the sides of the compartment and the set will not rub while the set is in operation or while the vehicle is in transit.

Front	0.6 in. (15.2 mm)
Side	0.6 in. (15.2 mm)
Top	0.6 in. (15.2 mm)
Rear	0.6 in. (15.2 mm)

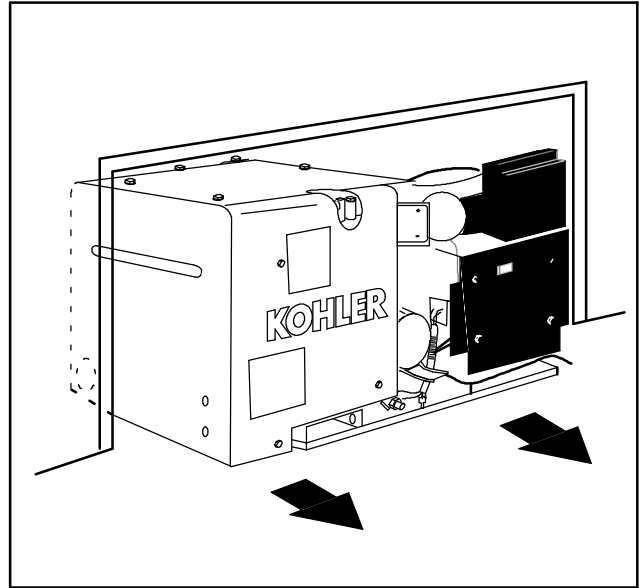
**Figure 6-5. Minimum Clearance Requirements**

### NOTE

Minimum clearances listed for cooling air circulation. Additional clearance is required for routine servicing of the generator set.

The thickness of insulating and sound-deadening material used to line the compartment must be taken into consideration when planning clearances. If necessary, enlarge the compartment so minimum clearance requirements are maintained. The generator set must be securely fastened to avoid unwanted movement from vibration and road shock. On a typical installation, the mounting tray is supported on the ends by angle iron and has a full door for service access. The same number of bolts as mounting holes in the tray must be used to secure the tray to the support structure.

When designing the compartment, allow sufficient room for the set to be easily removed when major service is required. See Figure 6-6. Also keep in mind that the compartment door must have air intake openings having a free area equal to or greater than that specified under Air Requirements following.



**Figure 6-6. Slide Tray Feature for Complete Removal**

Make sure that the compartment is vapor tight and completely sealed off from the inside of the vehicle to prevent exhaust or other fumes from entering the vehicle.

### NOTE

If below-floor installation is desired, an enclosure must be constructed around the generator set to protect electrical parts from road splash.

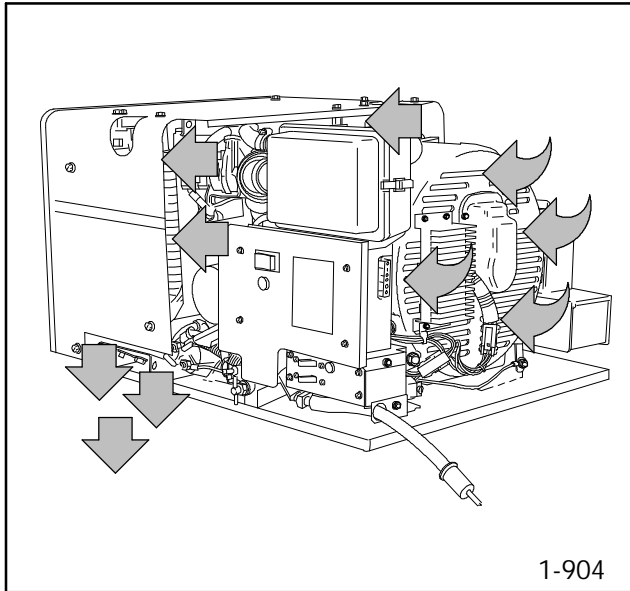
### NOTE

If mounted near a vehicle wheel, insure a mud flap is installed.

Line the compartment with a good sound-deadening material. The material selected must be fireproof or highly resistant to fire. An available type of 3-layer foam material does a very efficient job of absorbing sound. This type material is easily cut to size with scissors and can be quickly installed using special fire retardant adhesive which bonds the material to almost any surface that is clean and dry.

## Air Requirements

A fan on the rotor of the generator draws cooling air into the compartment through the generator cooling slots and expels it at the engine-generator adapter. The engine of the generator set features an Air-Vac™ reverse flow cooling system. Fins on the engine flywheel pull cooling air past the fins of the cylinder heads and the heated air is discharged downward and out of the compartment through the discharge chute. See Figure 6-7.



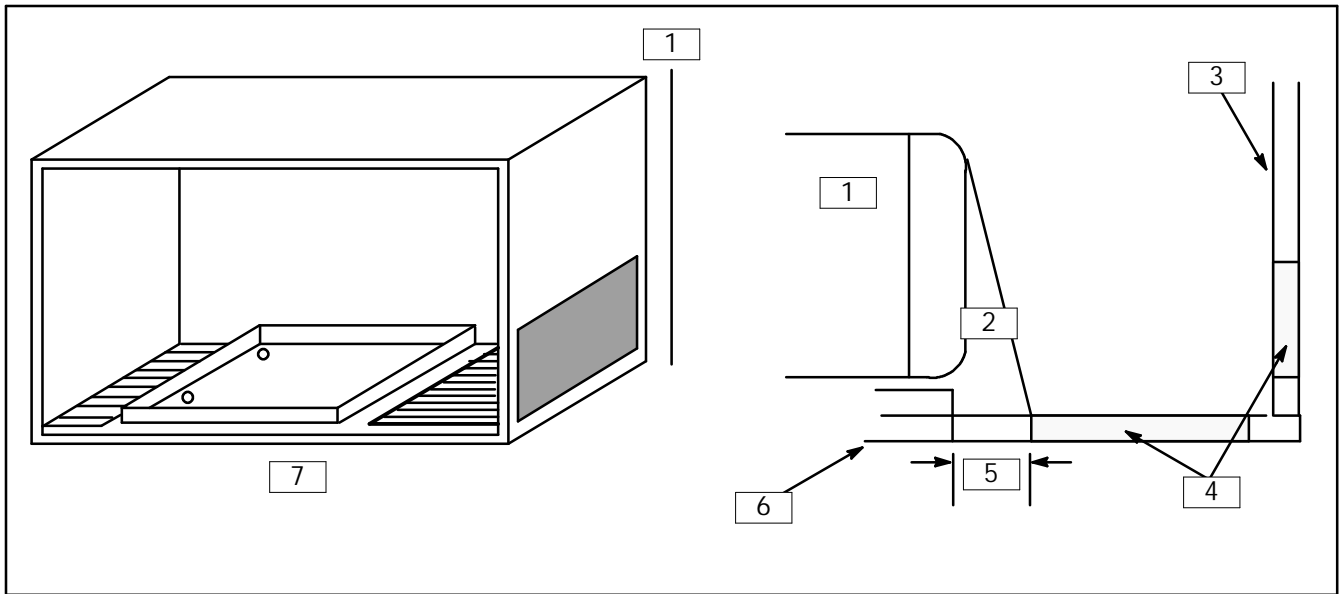
**Figure 6-7. Cooling Air Circulation**

To prevent damage to the generator set from overheating, make sure the compartment openings are large enough to allow adequate circulation or cooling air. The minimum free-air opening in the compartment is 85 sq. in. (548 sq. cm.). The free-air opening may be located in the compartment door, floor, or end wall. See Figure 6-8 for position of the free air opening in the compartment floor or end wall. Position of the compartment door free-air opening is shown in Figure 6-9.

If the air-intake opening is located in the compartment floor or end wall, a space must remain between the generator end and the compartment air opening. The width of the space must be equal to a point on the compartment floor 5° from the top of the generator. (Typically, a distance of 1.22 in. on most 4 and 5 kW generator installations.) See Figure 6-8. A fireproof floor (flooring made of a non-combustible material) must also be installed between the mounting tray and enclosure walls. These precautions are necessary to prevent hot air from leaving the generator compartment and igniting combustible material beneath the coach.

### NOTE

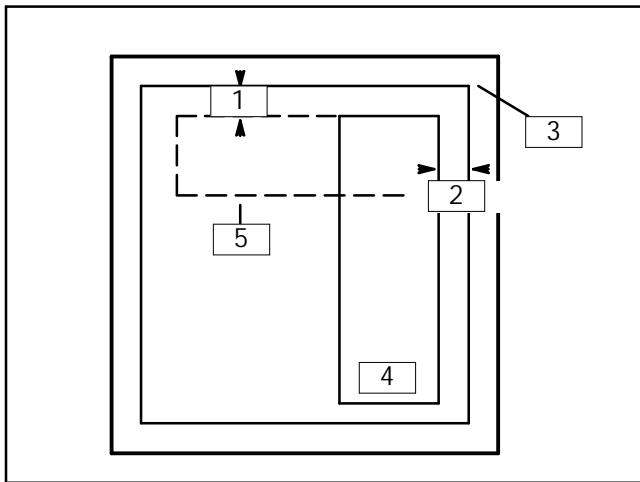
Installation of a baffle beneath the engine air discharge is recommended to prevent expelled air from raising dust or ruining grass beneath the coach.



1. Generator end
2. 5°
3. End wall
4. Air inlet at floor or end wall

5. 1.22 in.
6. Compartment floor
7. Mounting tray must not cover any portion of air inlet/outlet openings.

**Figure 6-8. Floor or End Wall Air Inlets**



1. 3" minimum (76.2 mm)
2. 2" minimum (50.8 mm)
3. Generator end
4. Air in
5. (Optional)

**Figure 6-9. Screen Position for Compartment Door**

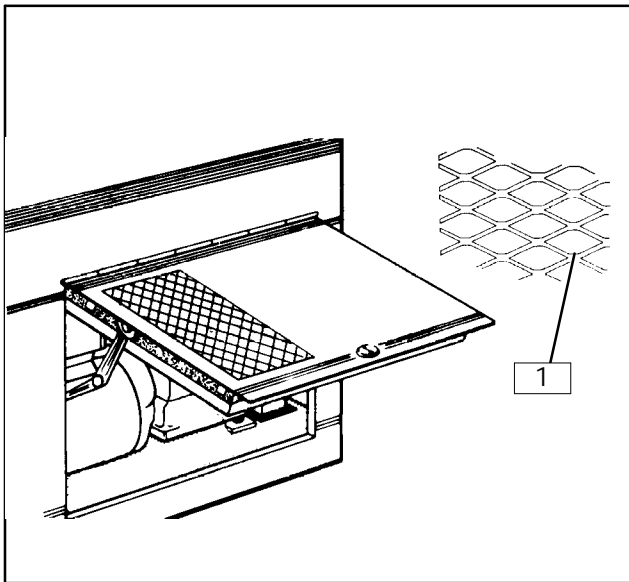
Remember, louvers, screens, and protective-decorative grill work definitely restrict the effective air flow. Even a simple, relatively open mesh screen as seen in Figure 6-10 will restrict air flow as much as 45%. The intake opening must be increased to compensate for such restrictions.

## Mounting

The generator set may be mounted by securing the generator tray directly to the compartment floor. If floor mounting is undesirable or impractical, a full-length tray is available through your Kohler generator dealer. This tray permits slide tray installation as shown in Figure 6-6. All installations require observance of minimum compartment clearances listed in Figure 6-5.

### NOTE

To avoid the possibility of igniting combustible material beneath the coach, the mounting tray or fireproof floor (made of a non-combustible material) must extend the full length and width of the enclosure. If a floor or end wall air inlet is used, a fireproof floor must be installed between mounting tray and enclosure walls.



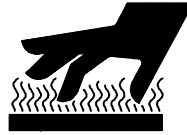
1. Wide Mesh Screen

**Figure 6-10. Inlet Screen/Louvers Restrict Air Flow**

### NOTE

**OVERHEATING!** The screen position in relation to the generator end must be as shown in Figure 6-8 or Figure 6-9 to prevent overheating.

## **WARNING**



**Hot engine and exhaust system.  
Can cause severe injury or death.**

Do not work on generator set until unit is allowed to cool.

**Fire can cause severe injury or death.** Hot exhaust system can ignite adjacent combustible materials. Do not locate electrical wiring, fuel lines, or combustible material above the exhaust muffler. Be careful when parking your vehicle to prevent grass fires started by exhaust system and hot exhaust gases.

**Fire can cause severe injury or death.** Hot generator can ignite debris in compartment. Keep the compartment and generator set clean and free of debris and combustible materials to minimize chances of fire. Do not block fuel/oil drain opening in generator mounting tray. If sub-flooring is used, cut a corresponding hole in the sub-flooring for drain opening.

### NOTE

Installation of a baffle plate beneath the generator engine air discharge is recommended to prevent expelled air from raising dust or ruining grass beneath the coach.

### NOTE

Generator sets equipped with optional swing-down tray should not be left in the tilted position for any extended period (one hour or more) otherwise, hydrostatic lock can occur. Always place unit in the normal mounting position when service is not actually being performed.


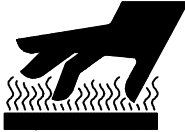


# 4/5CKMR-Mobile Generator Set Mounting

Following are three different methods for installing the Kohler mobile generator set. They include compartment mount, below-floor mount, and vehicle-floor mount. Read this entire manual carefully before installing the generator set.

Special consideration must be given when installing a mobile generator set to reduce the effects of Radio Frequency Interference (RFI) and Electro-Magnetic Interference (EMI). In some instances, particularly in mobile applications, where high output, two-way radios are in use, RFI and EMI may interfere with the signals to the generator set's electronic controls. Careful planning of the installation can minimize the effects of RFI and EMI.

- Be sure that the battery and ground connections are tight and in good condition (not corroded). For DC ground connections make sure that the ground wire is tightly connected to the generator set ground wire or metal tray. Internal- or external-tooth star washers must be used to assure proper contact with metal parts.
- Observe how the antenna cables, or any other RFI/EMI carrying wires, are routed in relationship to the generator set. While these wires should be shielded, they still can radiate energy or they may not be properly grounded. Do *NOT* run the generator DC power lines next to these wires or in the same cable raceway.
- Locate the generator set so that the sensitive electronic equipment (located inside the controller) is as far away as possible from the antenna or signal carrying wires. Preferred method is to locate the generator set on the opposite side of the RFI/EMI source.

 <b>WARNING</b>

<b>Hot engine and exhaust system. Can cause severe injury or death.</b>
Do not work on generator set until unit is allowed to cool.

**Fire can cause severe injury or death.** Hot exhaust system can ignite adjacent combustible materials. Do not locate electrical wiring, fuel lines, or combustible material above the exhaust muffler. Be careful when parking your vehicle to prevent grass fires started by exhaust system and hot exhaust gases.

**Fire can cause severe injury or death.** Hot generator can ignite debris in compartment. Keep the compartment and generator set clean and free of debris and combustible materials to minimize chances of fire. Do not block fuel/oil drain opening in generator mounting tray. If sub-flooring is used, cut a corresponding hole in the sub-flooring for drain opening.

## NOTE

**OVERHEATING!** The screen position in relation to the generator end must be as shown in Figure 6-17 or Figure 6-16 to prevent overheating.

## NOTE

Installation of a baffle plate beneath the generator engine air discharge (that will not cause back pressure) is recommended to prevent expelled air from raising dust or ruining grass beneath the vehicle.

## NOTE

Generator sets equipped with optional swing-down tray should not be left in the tilted position for any extended period. Always place unit in the normal mounting position when service is not actually being performed, otherwise engine oil can bypass the piston rings and cause a hydrostatic lock.

## NOTE

To avoid the possibility of igniting combustible material beneath the vehicle, the mounting tray or fireproof floor (made of a non-combustible material) must extend the full length and width of the enclosure. If a floor or end wall air inlet is used, a fireproof floor must be installed between mounting tray and enclosure walls.

## Compartment Mount

The generator set may be mounted by securing the generator tray directly to the compartment floor. If floor mounting is undesirable or impractical, a full-length tray is available through your Kohler generator dealer. This tray permits slide tray installation as shown in Figure 6-12. All installations require observance of minimum compartment clearances listed in Figure 6-11.

### NOTE

Since the sets are flexibly mounted, the minimum clearances will assure that the sides of the compartment and the set will not rub while the set is in operation or while the vehicle is in transit.

Front	0.6 in. (15.2 mm)
Side	0.6 in. (15.2 mm)
Top	0.6 in. (15.2 mm)
Rear	0.6 in. (15.2 mm)

**Figure 6-11. Minimum Clearance Requirements**

### NOTE

Minimum clearances listed for cooling-air circulation. Additional clearance is required for routine servicing of the generator set.

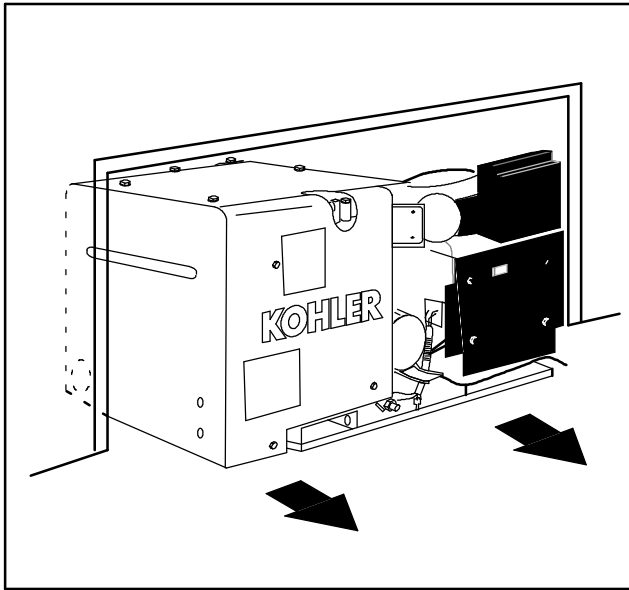
To meet CSA standard, maintain a minimum clearance of 3" between exhaust piping and any combustible material in compartment or surrounding exhaust outlet in compartment floor

### NOTE

To avoid the possibility of igniting combustible material beneath the vehicle, the mounting tray or fireproof floor (made of a noncombustible material) must extend the full length and width of the enclosure. If a floor or end wall air inlet is used, a fireproof floor must be installed between mounting tray and enclosure walls.

The thickness of insulating and sound-deadening material used to line the compartment must be taken into consideration when planning clearances. If necessary, enlarge the compartment so minimum clearance requirements are maintained. The generator set must be securely fastened to avoid unwanted movement from vibration and road shock. On a typical installation, the mounting tray is supported on the ends by angle iron and has a full door for service access. The same number of bolts as mounting holes in the tray must be used to secure the tray to the support structure.

When designing the compartment, allow sufficient room for the set to be easily removed when major service is required. See Figure 6-12. Also keep in mind that the compartment door must have air-intake openings having a free area equal to or greater than that specified under Air Requirements following.



**Figure 6-12. Slide Tray Feature for Complete Removal**

Make sure that the compartment is vapor tight and completely sealed off from the inside of the vehicle to prevent exhaust or other fumes from entering the vehicle.

**NOTE**

If below-floor installation is desired, an enclosure must be constructed around the generator set to protect electrical parts from road splash.

**NOTE**

If mounted near a vehicle wheel, insure a mud flap is installed.

Line the compartment with a good sound-deadening material. The material selected must be fireproof or highly resistant to fire. An available type of 3-layer foam material does a very efficient job of absorbing sound. This type material is easily cut to size with scissors and can be quickly installed using special fire retardant adhesive which bonds the material to almost any surface that is clean and dry.

## Below-floor Mount

In a below-floor installation, the generator set is mounted in an enclosure below the floor of the vehicle.

**NOTE**

Kohler offers a kit for below-floor installation. The kit includes specific installation instructions.

**NOTE**

In a below-floor installation, the vehicle must be able to support the weight of the generator set and enclosure. Contact vehicle manufacturer if unsure about the vehicle's ability to support the unit.

When planning a below floor installation, choose a proper location and keep in mind the following suggestions.

- Protect the generator end and or engine end (depending upon where the unit is positioned in the vehicle) from road splash by installing mud flaps.
- Protect air-inlet openings to the generator set's enclosure from dirt, rocks or debris. Installing baffles may help reduce entrance of such particles into the enclosure.
- Provide an opening large enough on the vehicle's side for properly maintaining the serviceable components of the generator set. Serviceable components include: oil check, oil fill, oil filter, carburetor adjustments and circuit breaker control.
- Provide adequate clearance for movement and/or removal of exhaust components.

**NOTE**

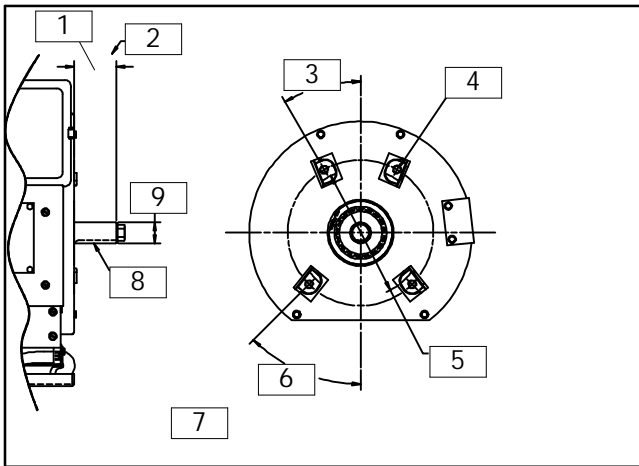
Be sure to follow the mounting hole pattern supplied with the below floor mounting kit. Keep housing panels square to each other.

## Vehicle-floor Mount

Kohler's mobile generator set can also be installed on an open vehicle's floor, or truck bed. Follow the same guidelines as described in the compartment mount section. Contact an authorized Kohler service dealer with your specific application questions.

## Extended-Shaft Option

If your generator set is equipped with the extended shaft option, adequate space must be allowed at the generator end of the set for an adapter, flexible coupling and the equipment to be operated. The extended shaft dimensions are 15/16" dia. x 1 3/4" long with a 1/4" key way. Mounting flange conforms to SAE J609a, Flange B. See Figure 6-13.



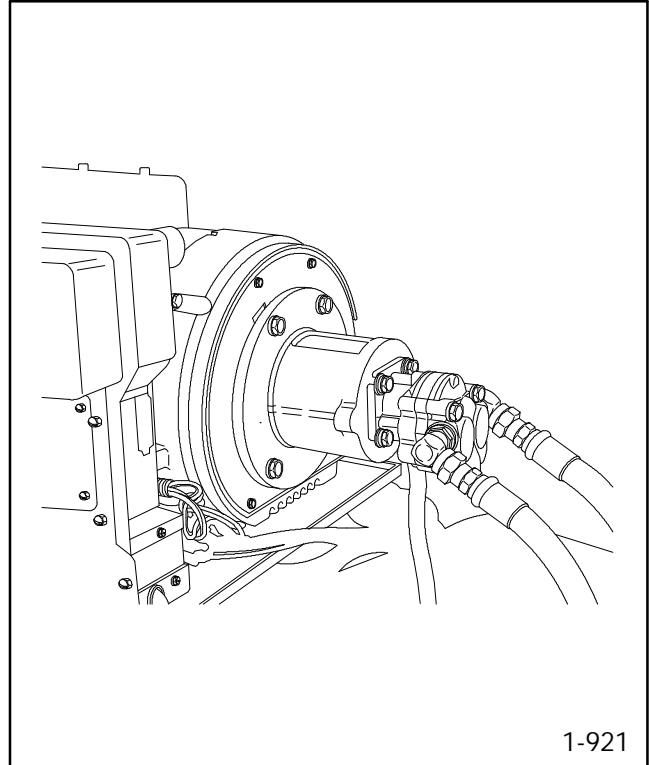
1. 1.88 (48)
2. Mounting flange to end of shaft
3. 30° typical
4. 3/8-16 UNC-2B .56 (14) deep 4 holes on 6.500 (165.10) diameter bolt center
5. Pilot diameter: 5.749 (146.02)-5.751 (146.08)
6. 45° typical
7. Power takeoff and shaft dimensions
8. 0.2485 (6.31)-.2505 (6.36) keyway
9. Diameter 0.9365 (23.79)-.9375(23.81)

**Figure 6-13. Extended Shaft Option**

## NOTE

Customer must provide the adapter and flexible coupling for the extended-shaft option.

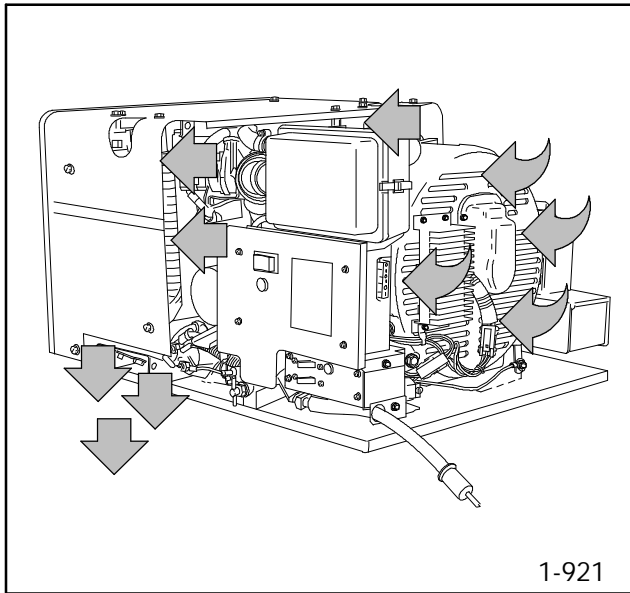
Figure 6-14 shows a Kohler mobile generator set mounted to a hydraulic pump. The generator set equipped with the extended-shaft option can power external equipment to the limit of the engine's capacity. Contact an authorized Kohler service dealer for your generator set's ability to power specific equipment.



**Figure 6-14. Hydraulic pump**

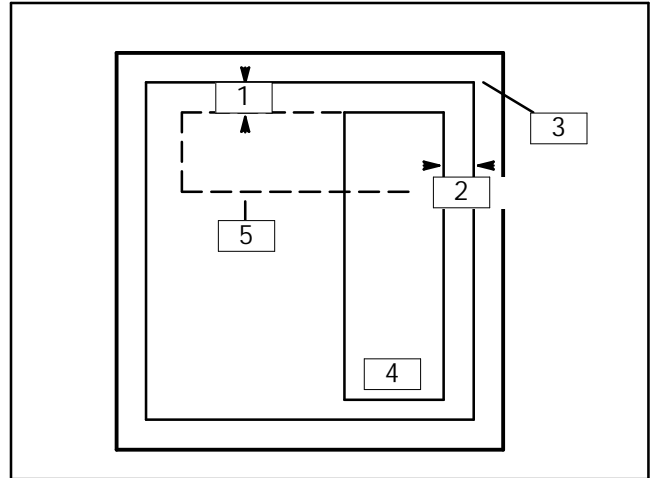
## Air Requirements

A fan on the rotor of the generator draws cooling air into the compartment through the generator cooling slots and expels it at the engine-generator adapter. The engine of the generator set features an Air-Vac™ reverse flow cooling system. Fins on the engine flywheel pull cooling air past the fins of the cylinder heads and the heated air is discharged downward and out of the compartment through the discharge chute. See Figure 6-15.



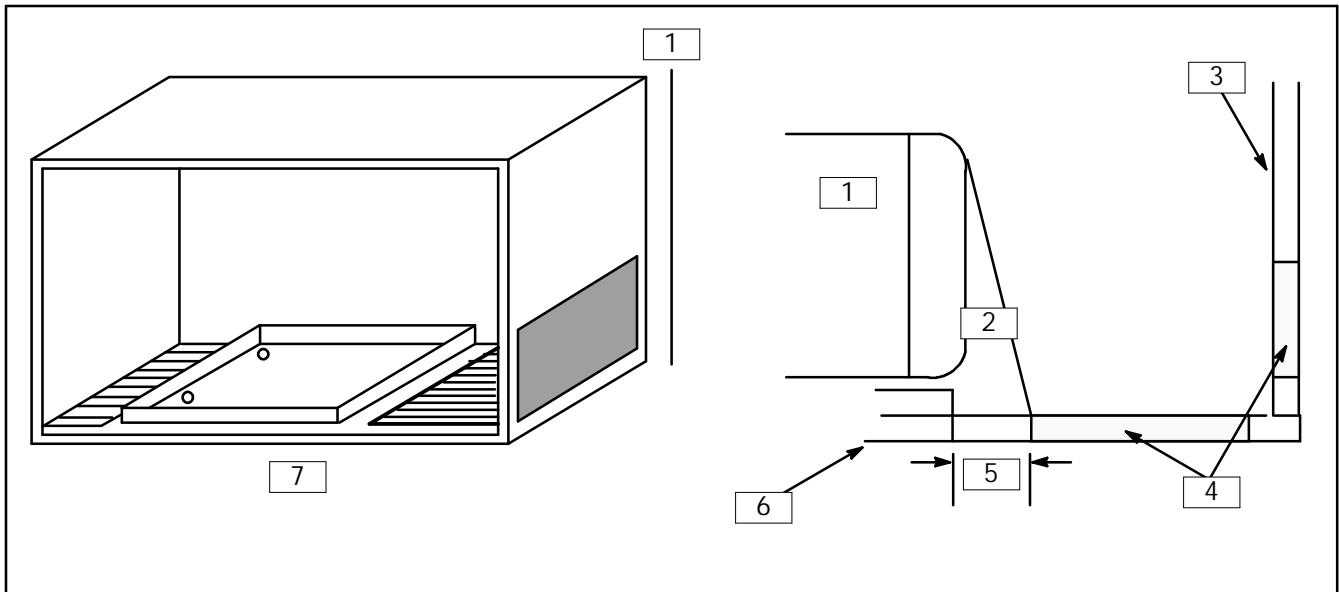
**Figure 6-15. Cooling Air Circulation**

To prevent damage to the generator set from overheating, make sure the compartment openings are large enough to allow adequate circulation or cooling air. The minimum free-air opening in the compartment is 85 sq. in. (548 sq. cm.). The free-air opening may be located in the compartment door, floor, or end wall. See Figure 6-17 for position of the free-air opening in the compartment floor or end wall. Position of the door free-air opening is shown in Figure 6-16.



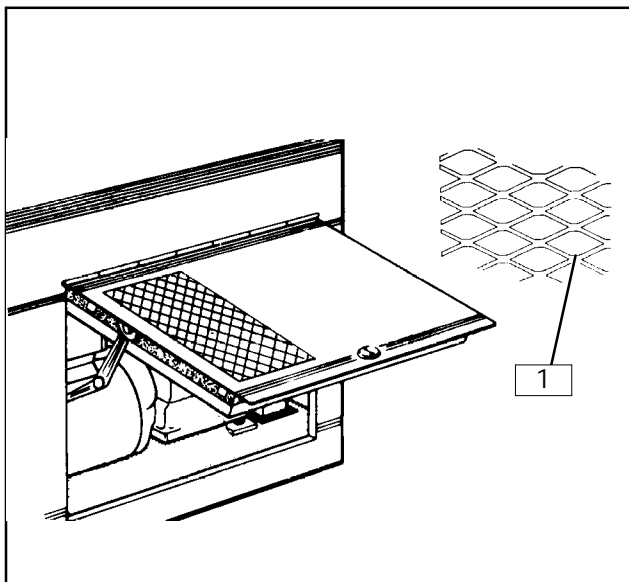
1. 3" minimum (76.2 mm)
2. 2" minimum (50.8 mm)
3. Generator end
4. Air in
5. (Optional)

**Figure 6-16. Screen Position for Compartment Door**



- |                                                                                                                                                   |                                                                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>1. Generator end</li> <li>2. 5°</li> <li>3. End wall</li> <li>4. Air inlet at floor or end wall</li> </ul> | <ul style="list-style-type: none"> <li>5. 1.22 in.</li> <li>6. Compartment floor</li> <li>7. Mounting tray must not cover any portion of air inlet/outlet openings.</li> </ul> |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Figure 6-17. Floor or End Wall Air Inlets**



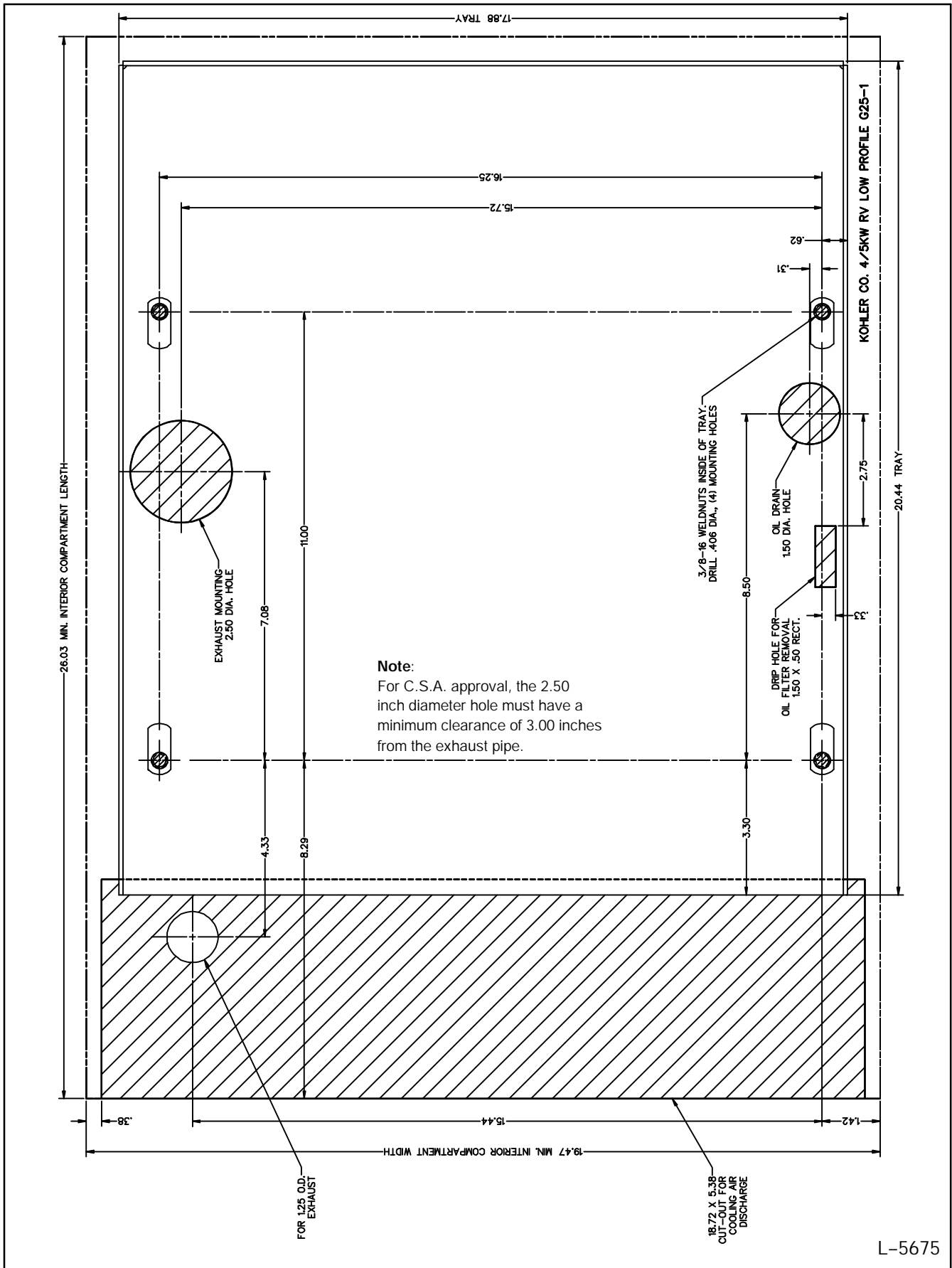
- 1. Wide Mesh Screen

**Figure 6-18. Inlet Screen/Louvers Restrict Air Flow**

If the air-intake opening is located in the compartment floor or end wall, a space must remain between the generator end and the compartment air opening. The width of the space must be equal to a point on the compartment floor 5° from the top of the generator. (Typically, a distance of 1.22 in. on most 4 and 5 kW generator installations.) See Figure 6-17. A fireproof floor (flooring made of a non-combustible material) must also be installed between the mounting tray and enclosure walls. These precautions are necessary to prevent hot air from leaving the generator compartment and igniting combustible material beneath the coach.

Remember, louvers, screens, and protective-decorative grill work definitely restrict the effective air flow. Even a simple, relatively open-mesh screen as seen in Figure 6-18 will restrict air flow as much as 45%. The intake opening must be increased to compensate for such restrictions.

**The remainder of this section covers installation instructions for both RV and Mobile generator sets.**



L-5675

Figure 6-19. Floor Template- 4 & 5CKM/CKMR Standard Tray

# Fuel System

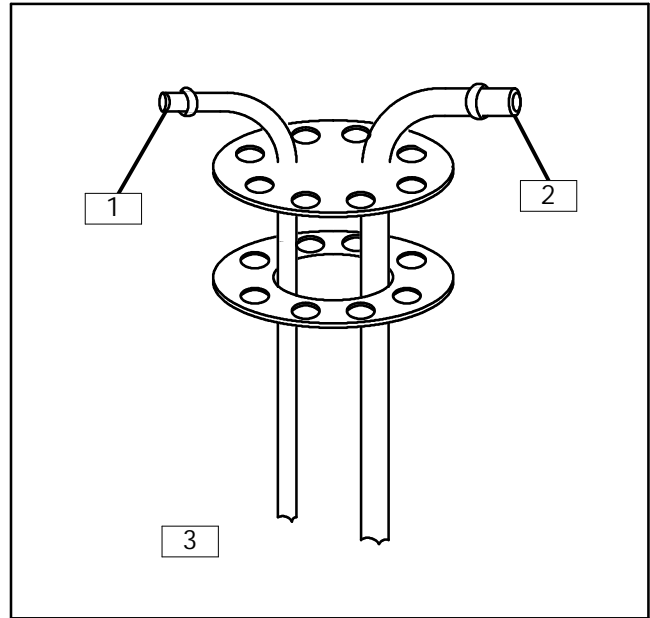
## Gasoline

For best results, use only clean, fresh, regular grade unleaded gasoline with a pump sticker octane rating of 87 or higher in the U.S.A. In countries using the research rating method, it should be 90 octane minimum.

Gasohol containing no more than 10% ethanol can be used if unleaded gasoline is unavailable. Never use gasohol containing more than 10% ethanol or gasoline containing Methanol. Oil must not be mixed with the fuel.

The GASOLINE fuel system for the generator set must be designed to operate independently of the system for vehicle engine if both engines are to be operated at the same time. The best way to do this is to have separate fuel tanks; however, this is usually impractical because of space restrictions. In most installations, both engines operate from a common tank with a separate dip tube arrangement as shown in Figure 6-20. This prevents the smaller engine from being starved of fuel by the larger engine. The generator set dip tube is generally shorter than the vehicle dip tube. With this arrangement fuel may not be available to the generator set when fuel supply is low.

A simple tee fitting is sometimes used to provide fuel for both engines off a common tank; however, this usually prohibits simultaneous operation. There is also the possibility that operation of either engine could completely drain the fuel line and even the carburetor fuel bowl of the other engine, thus making starting difficult if not impossible. The tee arrangement should be avoided or used only as a last resort.



1. Fuel line to generator set
2. Fuel line to vehicle engine
3. Keep fuel line away from exhaust

**Figure 6-20. Two Dip Tubes in Fuel Tank**

### NOTE

Do not tee into fuel injected fuel systems. Use a two dip tube arrangement for fuel supply. Consult an authorized Kohler service dealer for further fuel system installation information.

Care must be taken when routing the fuel line from the main tank to the generator set. Keep fuel lines as short as possible but maintain adequate clearance from exhaust system. Fuel lines must be run along the frame or undercarriage— never run fuel lines inside the coach. Locate fuel lines below the generator set compartment with entry point near fuel pump. The fuel line must be of adequate size to handle the flow of fuel and withstand road shock and year-round climate conditions. If steel tubing is used, it should be 1/8 in. (3.2 mm) I.D. (minimum) with an 8 in. (230 mm) (minimum) flexible section to allow free movement of the generator set.



## LP Gas Fuel System

Use a flexible hose designated for use with LP gas between the generator set and main tank. Care must be taken when routing the fuel line. A two inch minimum clearance is required between the fuel line and any bare exhaust components. Electrical wiring can not be tied to any fuel lines and should be routed so that it will not inadvertently contact fuel lines. If the flexible hose passes through sheet metal, install grommets or clamps to prevent hose abrasion. The LP fuel system shall conform to section 3-6.4 of NFPA58, "Storage and Handling of Liquefied Petroleum Gases."

For LP gas system, use UL classified pipe joint sealing compound to prevent dangerous fuel leaks. Use a sealing compound approved for use with LP gas. Apply UL classified sealing compound at all fuel line pipe joints.

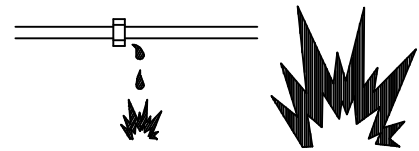
After all the LP connections have been completed, the entire system shall be test pressurized to 6-8 ounces (10-14 inches water column). Test the connections for leakage with soapy water or bubble solution. Do not use solutions that contain ammonia or chlorine, since the soap will not bubble for an accurate leakage test.

The gas and supply pressure should not exceed six ounces. To check inlet pressure, remove plug on fuel inlet for gas regulator. Insert ounce pressure gauge or manometer. Adjust operating pressure to 4-6 ounces or 7-11 inches water column; inlet pressure is adjusted on primary regulator.

### NOTE

The use of flexible fuel lines should be limited to areas where vibration and/or movement of connected components is likely (such as main fuel line to generator set). Use seamless steel tubing wherever long main fuel lines are required.

---

 **WARNING**

**Explosive fuel vapors.  
Can cause severe injury or death.**

Use extreme care when handling, storing, and using fuels.

---

**Explosive fuel vapors can cause severe injury or death.** Fuel leakage can cause an explosion. Check LP vapor gas fuel system for leakage using a soap-water solution with fuel system test pressurized to 6-8 ounces per square inch (10-14 inches water column). Do not use test solutions that contain ammonia or chlorine, since the soap will not bubble for an accurate leakage test.

**Explosive fuel vapors can cause severe injury or death.** Fuel leakage can cause an explosion. Check LP vapor gas or natural gas fuel system for leakage using a soap-water solution with fuel system test pressurized to 6-8 ounces per square inch (10-14 inches water column). Do not use test solutions that contain ammonia or chlorine, since the soap will not bubble for an accurate leakage test.

### NOTE

Fuel leakage could cause an explosion. After all LP-gas connections have been completed, the entire system must be test pressurized to 6-8 ounces (10-14 inches water column).

### NOTE

Gas pressure above 10 ounces can result in non-operation of the gas valve.

# Exhaust Systems

The 4 and 5 kW models have exhaust kits which include spark arrestor muffler and mounting hardware. See Figure 6-21, Figure 6-22, and Figure 6-23. Versions are designed for installation on vehicles with the compartment located at floor level while others are intended for below-floor installation. These kits allow the exhaust pipe to be routed to either the right side or left side of the vehicle. Consult the appropriate installation drawing for specific mounting dimensions.

Because the length varies with most installations, a tail pipe is not furnished with the kits. A tail pipe must, however, be installed to direct the exhaust gases beyond the perimeter of the vehicle. Use a tail pipe with as few gradual bends as possible to avoid excessive back pressure and face tail pipe away from normal air stream. To meet CSA standard, maintain a minimum clearance of 3" between exhaust piping and any combustible material in compartment or surrounding exhaust outlet in compartment floor (see Figure 6-19).

## NOTE

Installation of the 278621 spark arrestor is required for generator operation in State and Federal campgrounds.

## NOTE



Clean 278621 spark arrestor once a season.

## NOTE



Exhaust air, from the generator set air duct, must have a minimum of 12" ground clearance. Maximum back pressure of 1/2" water column differential (when using a manometer), is preferred.

## NOTE

Kohler also offers a below-the-floor mounting kit which includes complete assembly instructions.

 <b>WARNING</b>

<p><b>Carbon monoxide.</b> <b>Can cause severe nausea, fainting, or death.</b></p> <p>The exhaust system must be leakproof and routinely inspected.</p>

**Carbon monoxide can cause severe nausea, fainting, or death.** Install exhaust system tail pipe so discharged exhaust gases will not be drawn into vehicle interior through windows, doors, air conditioners, etc. Do not use flexible tail piping since this type could crack and allow lethal exhaust fumes to enter the vehicle.

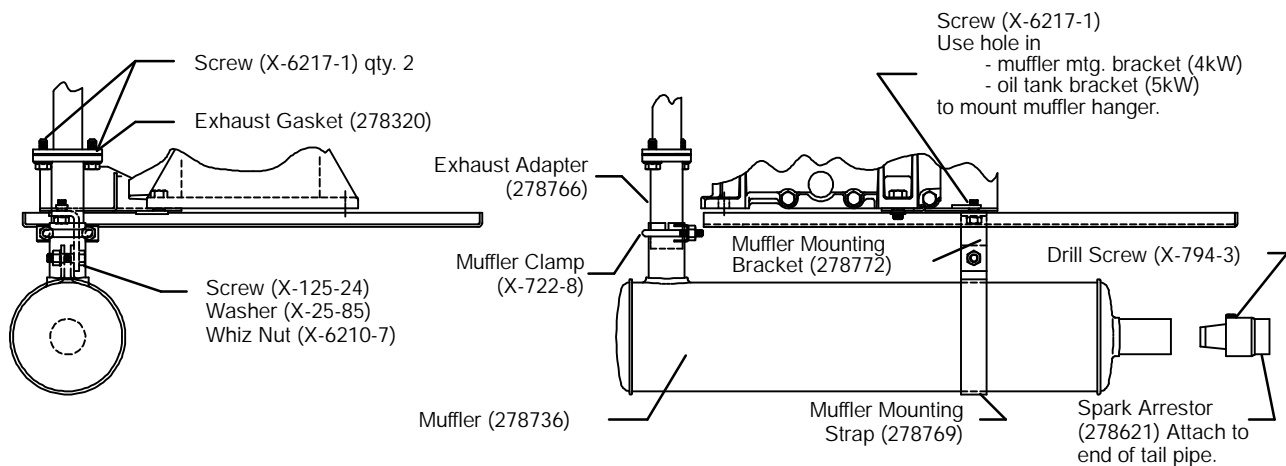
 <b>WARNING</b>

<p><b>Hot engine and exhaust system.</b> <b>Can cause severe injury or death.</b></p> <p>Do not work on generator set until unit is allowed to cool.</p>

**Fire can cause severe injury or death.** Hot exhaust system can ignite adjacent combustible materials. Do not locate electrical wiring, fuel lines, or combustible material above the exhaust muffler. Be careful when parking your vehicle to prevent grass fires started by exhaust system and hot exhaust gases.

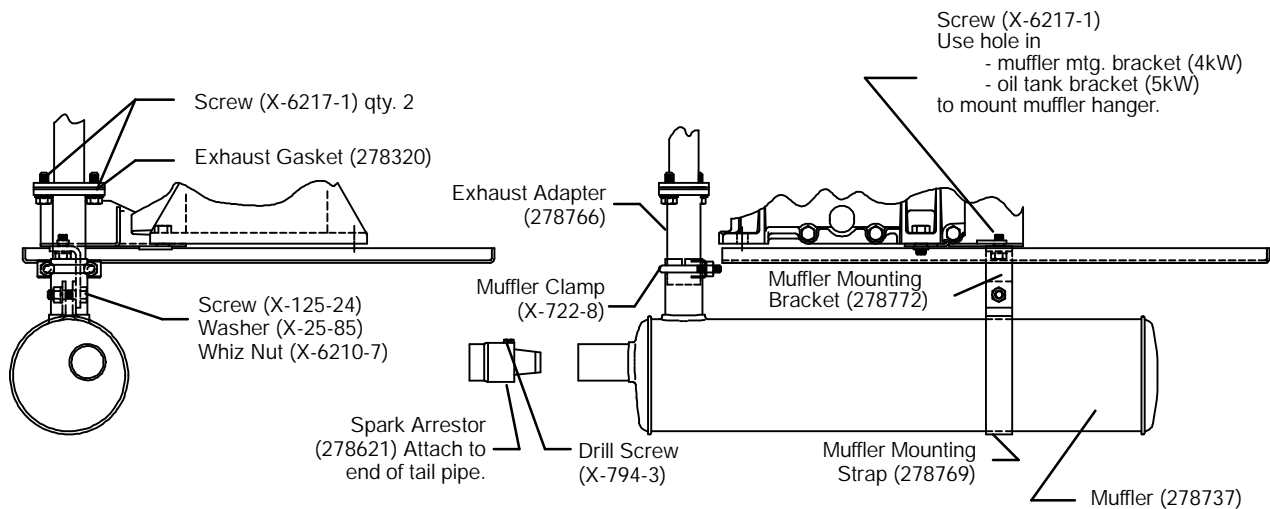
## NOTE

Make sure exhaust-system components are positioned well away from the drain opening in the bottom of the mounting tray. Also make sure the components are not blocking access to the oil-drain plug.

**MUFFLER MTG. (RIGHT SIDE)– KIT# PA-278639**



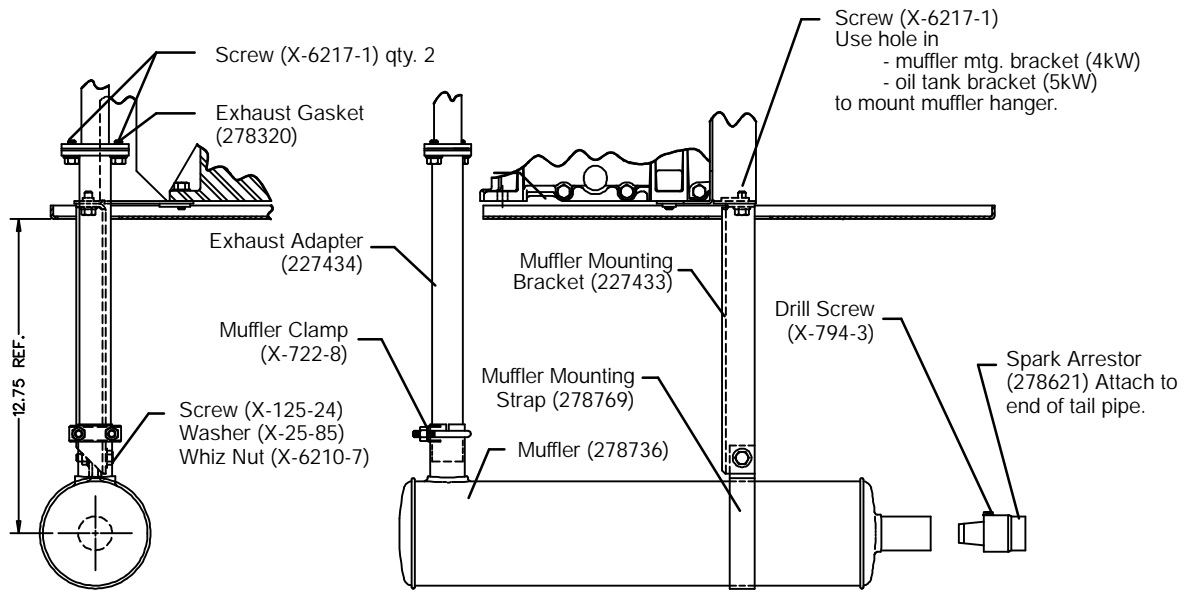
**MUFFLER MTG. (LEFT SIDE)– KIT# PA-278638**



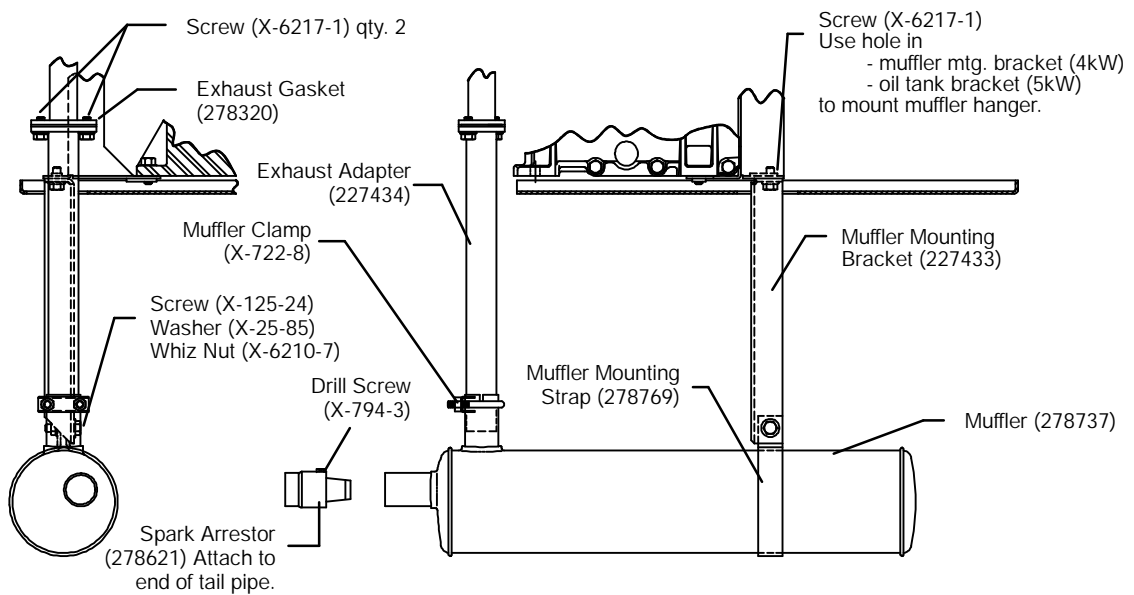
DW-277000-H

**Figure 6-21. Exhaust System for 4/5 kW Generator Sets Mounted Above Floor**

**EXTENDED MUFFLER MTG. (RIGHT SIDE)- KIT# PA-227435**



**EXTENDED MUFFLER MTG. (LEFT SIDE) - KIT# PA-227436**

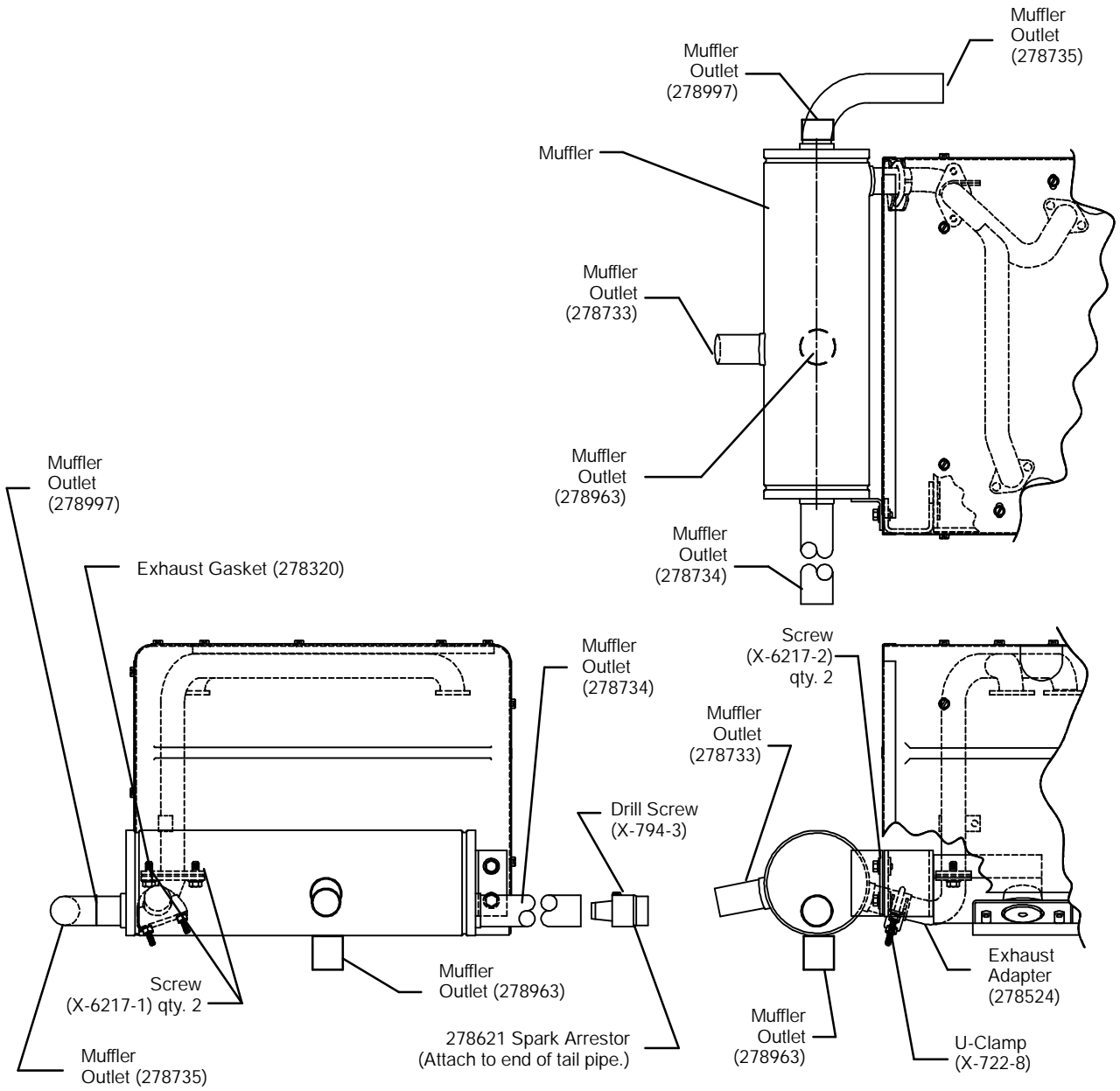


DW-277000-H

**Figure 6-22. Exhaust Systems for 4/5 kW Generator Sets Mounted Above Floor**

**Kits:**

- PA-278640– muffler 278734
- PA-278641– muffler 278735
- PA-278761– muffler 278733
- PA-278964– muffler 278963
- PA-278998– muffler 278997



DX-277000-G

**Figure 6-23. Exhaust Systems For 4/5 kW Generator Sets Mounted Below Floor**

# Electrical Systems

Battery, load lead, and remote switch panel connections are needed to complete the installation. Make final connections to the battery only after all other connections have been made as this will prevent unintentional starting. Some specific details on each connection are stated in the following paragraphs. Refer to the wiring diagram for specific details— connections should be made only by qualified electricians. All wiring to the generator set shall be securely supported or harnessed to prevent abrasion. Additional support is required to prevent exposure to the exhaust system and

drippage of fuel, oil, or grease— at least 2" (51 mm) clearance must be provided between electrical wiring and hot exhaust parts. Also, wiring must not be located directly below or in close proximity to fuel system parts or oil fill tube. Some other points to consider when making AC load connections are covered in the following paragraphs.

## NOTE

Wiring connections made at the time of installation should be accessible for inspection and servicing.

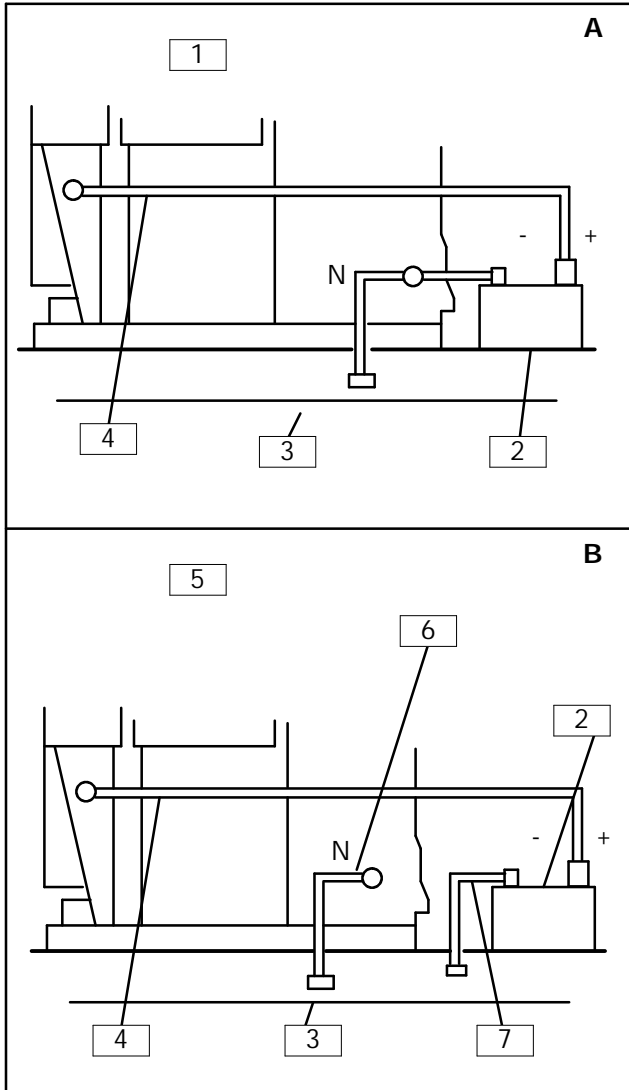
Distance Between Generator Set and Battery	At 0°F (18°C)	Cable Size (AWG) at 32°F (0°C)	At 75°F (24°C)
40 feet (12.2 m)	0	0	1
30 feet (9.1 m)	0	1	2
25 feet (7.6 m)	1	2	4
20 feet (6.1 m)	2	2	6
15 feet (4.6 m)	2	4	6
10 feet (3.0 m)	4	6	8
5 feet (1.5 m)	6	6	8
2.5 feet (0.8 m)	8	8	8

## Battery And Connections

If the starting battery for the vehicle engine must also be used for starting the generator engine, the negative battery terminal must be grounded to the vehicle frame and heavy gauge (#4) ground strap must connect the ground lug on the generator set to the vehicle frame as illustrated in Figure 6-24.

### NOTE

A ground connection is required between the generator and the vehicle frame even if the battery used to start the generator is not the same as the vehicles.



1. Using separate battery for generator set
2. 12-volt Battery
3. Vehicle frame
4. Battery positive
5. Using same battery as vehicle engine
6. Ground strap vehicle frame
7. Battery negative to vehicle frame

**Figure 6-24. Battery Connection Details**

### WARNING



**Sulfuric acid in batteries.  
Can cause severe injury or death.**

Use protective goggles and clothes. Can cause permanent damage to eyes, burn skin, and eat holes in clothing.

**Explosion can cause severe injury or death.** 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.

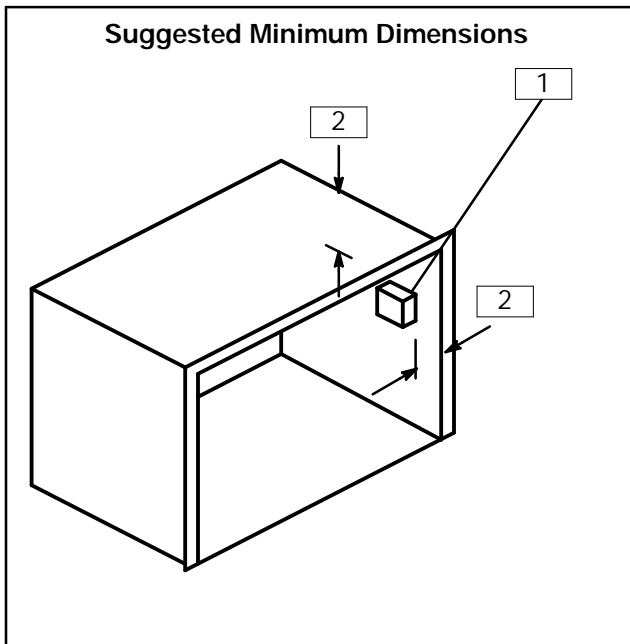
## AC Load Lead Connections

Each set has four color-coded load leads and a connector for attaching flexible conduit from the generator end bracket to the load terminal junction box typically installed in the compartment. The black leads (L1 and L2) are hot, the white lead (L0) is neutral, and the green lead is the hazard ground.

### NOTE

Route load leads through flexible conduit and keep circuit away from the generator set, specifically fuel and exhaust system components.

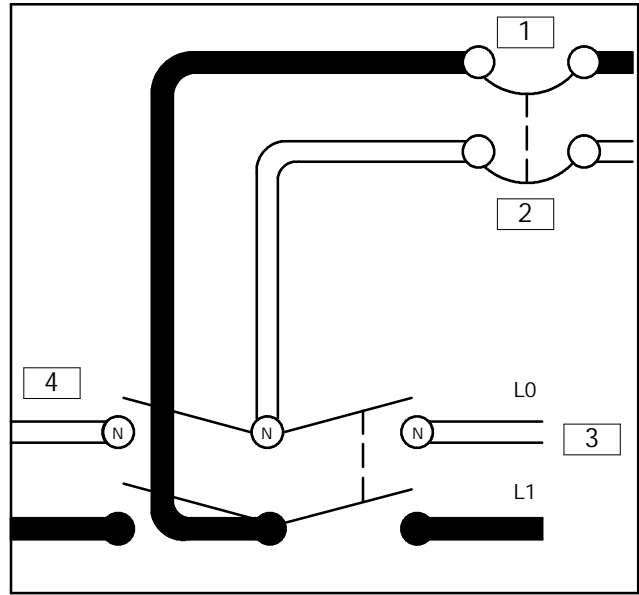
Figure 6-25 represents position and dimensions for typical junction box installation. A junction box should be installed to make it accessible for inspection and service.



1. Box for field connection should be accessible after installation for inspection and servicing
2. 2" (50.8 mm)

**Figure 6-25. RV Junction Box**

The AC load lead L0 (white) is always the neutral lead on Kohler generator sets— make sure the neutral of the AC circuit in the vehicle is connected to lead L0 (white). If equipment ground-type plugs and receptacles (3 pronged) are used in the vehicle, the green wire must be connected to the U-shaped pin. On vehicles which also have provisions for using an outside AC power source, the neutral as well as the hot (black) leads must be completely isolated from the generator set when power is switched to the out-side source. See Figure 6-26.



1. AC vehicle circuit
2. Ground fault circuit protection
3. Generator set
4. 120-V outside power

**Figure 6-26. Transfer Switch Connections 2-Wire AC Circuit**

### NOTE

A double-pole, double-throw transfer switch rated for the calculated load of the RV must be used to transfer the load from one source to the other. A ground-fault circuit interrupter should be installed in the wiring system to protect all branch circuits.



**⚠ WARNING**

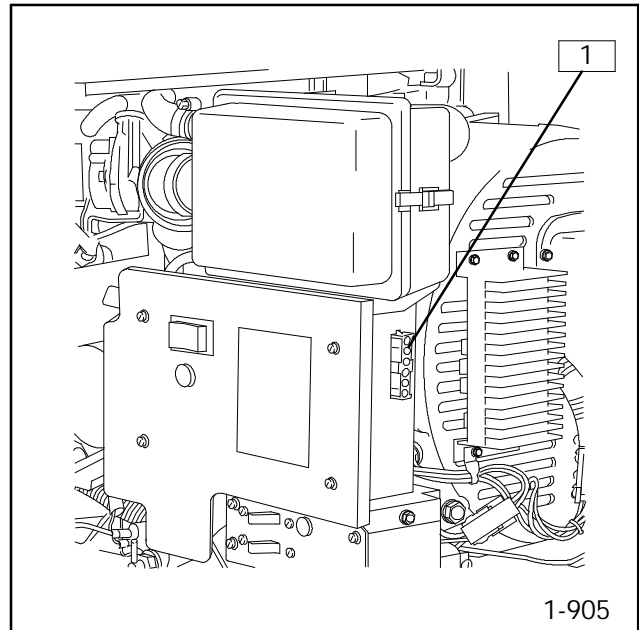


**Hazardous voltage.**  
**Backfeed to utility system can cause severe injury, death, or property damage.**  
Do not connect to any building electrical system without connecting through an approved device and after building main switch is open.

**Hazardous “backfeed” voltage can cause severe injury or death.** The generator must not be used to “backfeed” by connecting it to building/campground circuits. Install a transfer switch in standby power installations to prevent connection of standby and other sources of power. Electrical backfeed into a utility electrical system can cause serious injury or death to utility personnel working on transmission lines.

## Remote Switch Connection

Kohler offers a remote switch panel for mounting on the dashboard or elsewhere in the vehicle. It measures 2 in. x 4 in. (51 mm x 103 mm) and requires a cutout of 1 3/4 in. x 3 1/4 in. (44 mm x 83 mm). The panel includes start-stop switch, generator ON light, and a digital hourmeter. Kohler also offers wiring harnesses of different lengths with keyed plugs or pigtails for quick connection between the controller on the set (Figure 6-27) and the remote-switch panel in the vehicle. Part numbers of these are listed in the chart on the following page. The wiring diagram shown in Figure 6-28 may be useful if the installer elects to use just a start-stop switch or separate lights and hourmeter.

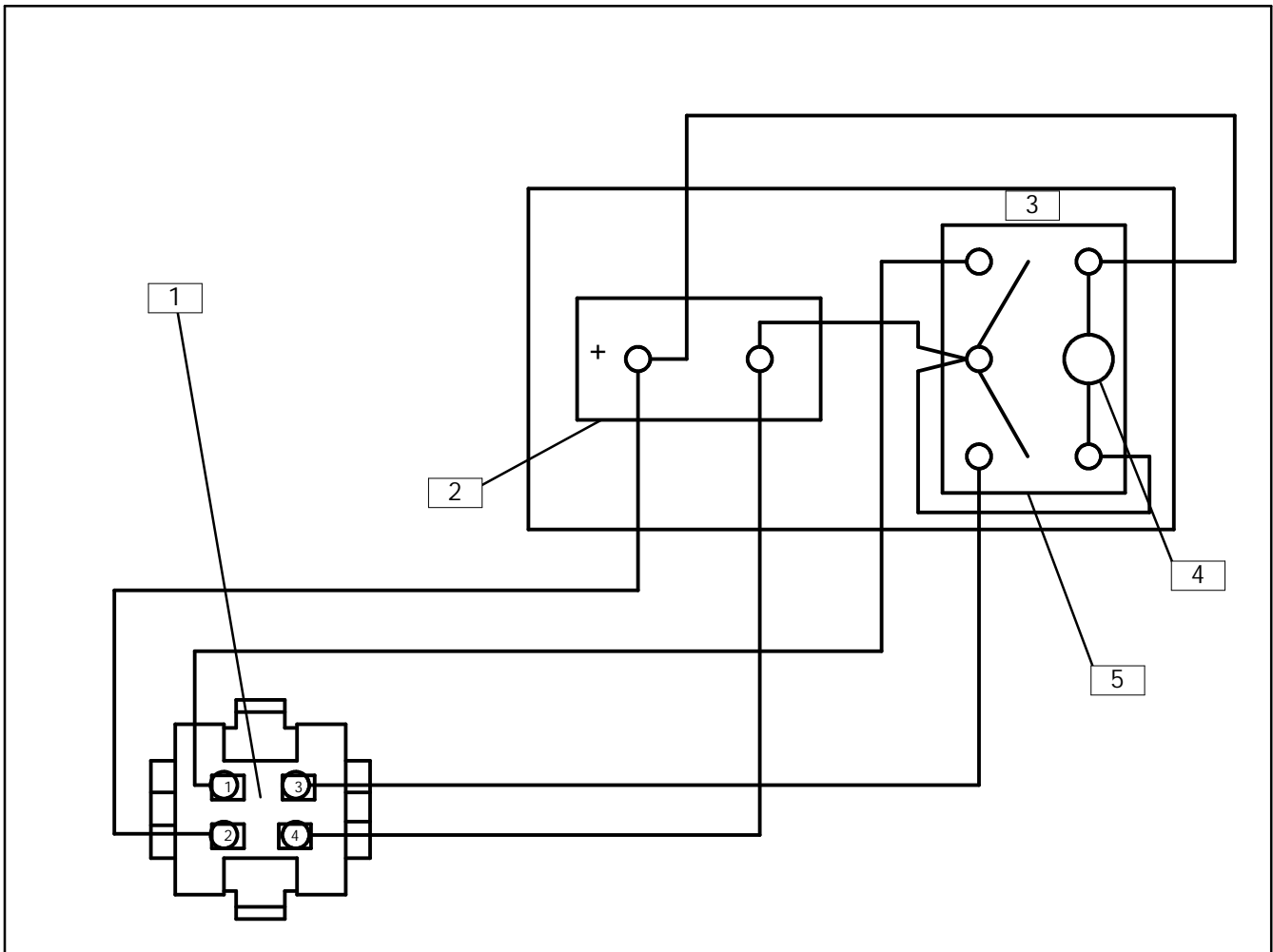


1. Remote Connection

**Figure 6-27. Controller– Remote Connection**

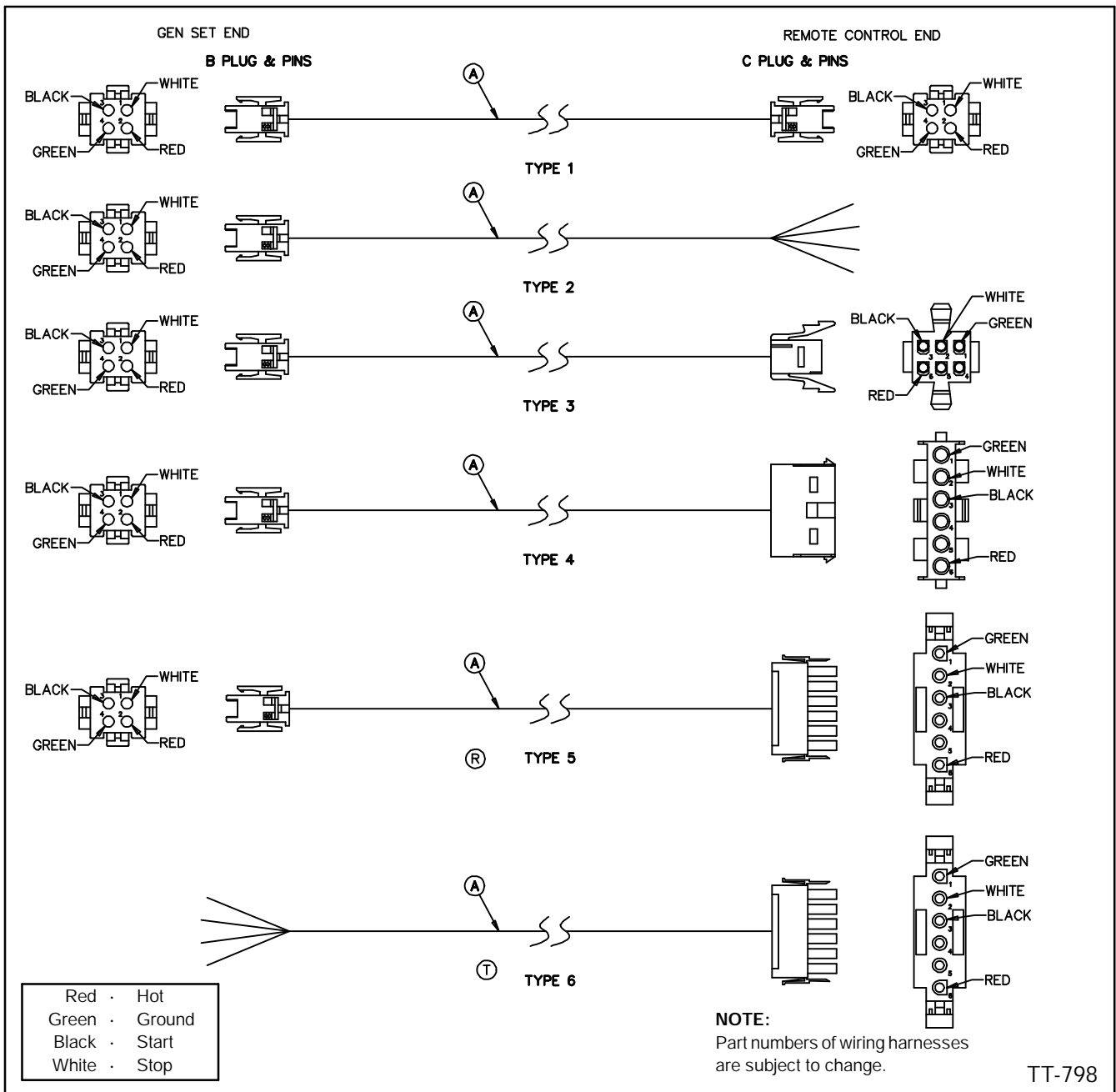
**Remote Switch Assembly Digital Hourmeter  
PAA-239419**

Remote Switch Harness Part No.	Length	Connectors
PA-278682	3 Ft.	6-Pin, In-line male plug
PA-278681	1 Ft.	Pigtail Leads
PA-278728	30 Ft.	Both Ends
PA-278729	40 Ft.	Both Ends
PA-278730	15 Ft.	Both Ends



- 1. Requires a 4-pin (four square) to 6-pin (in-line) wiring harness adapter for connection to the generator set.
- 2. Hourmeter
- 3. Top
- 4. On Light
- 5. Rocker Switch

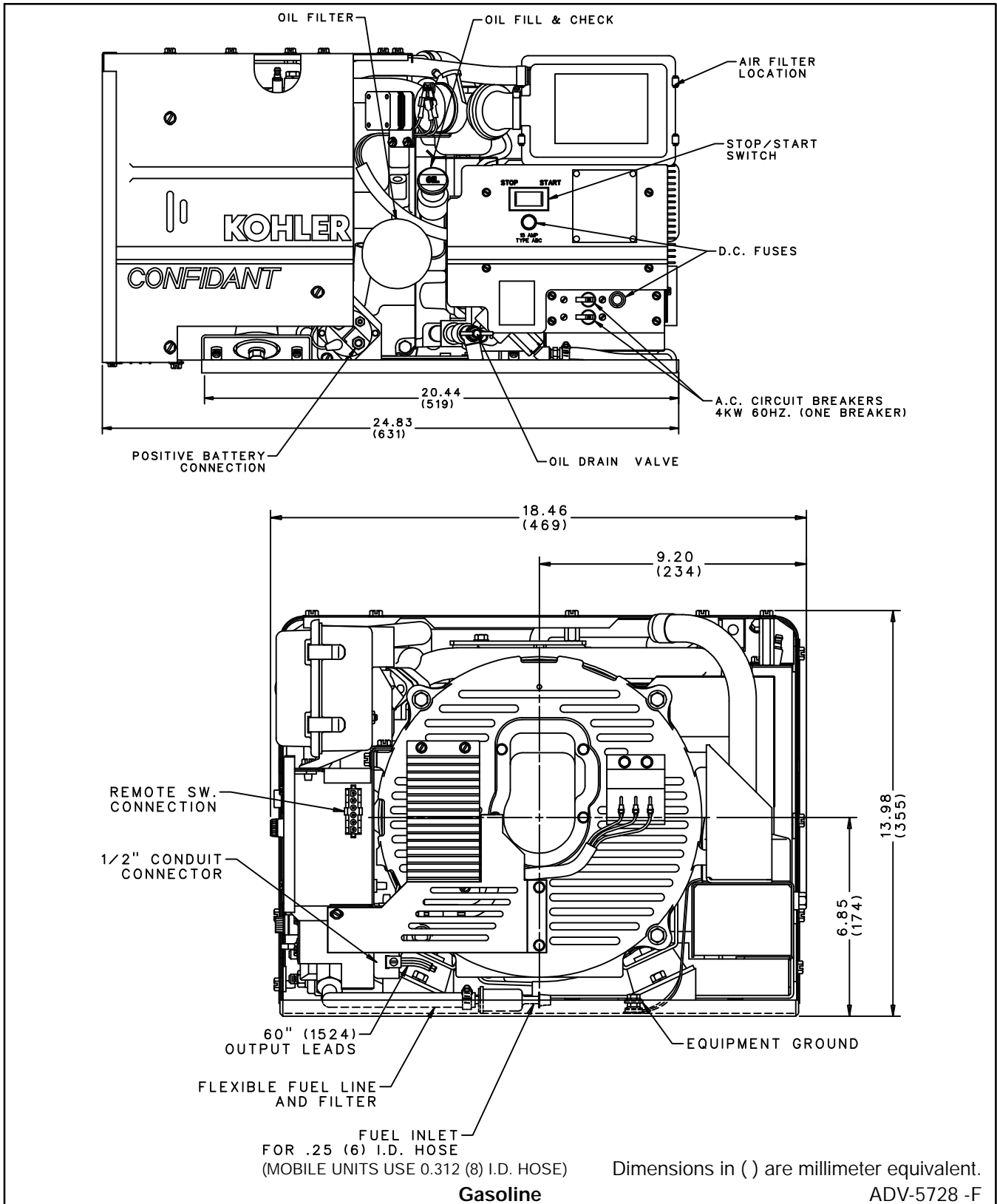
**Figure 6-28. Remote Control Panel Wiring**

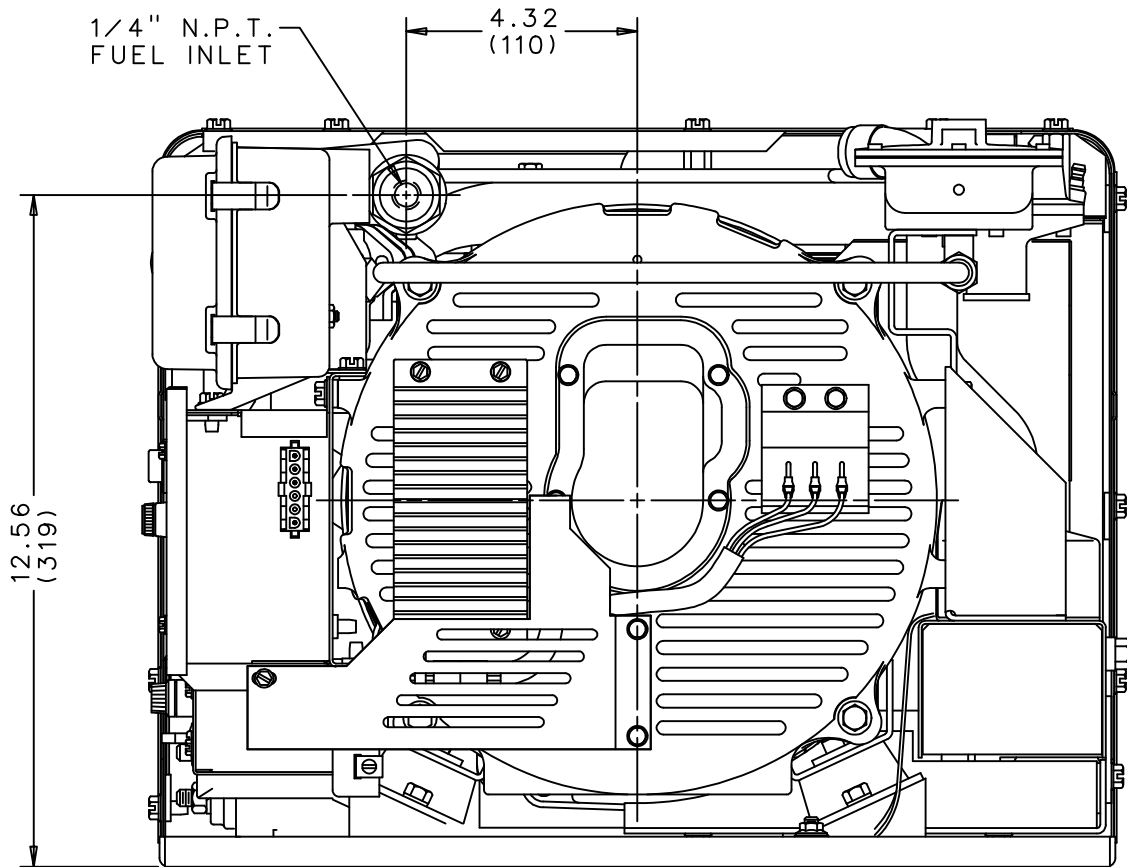
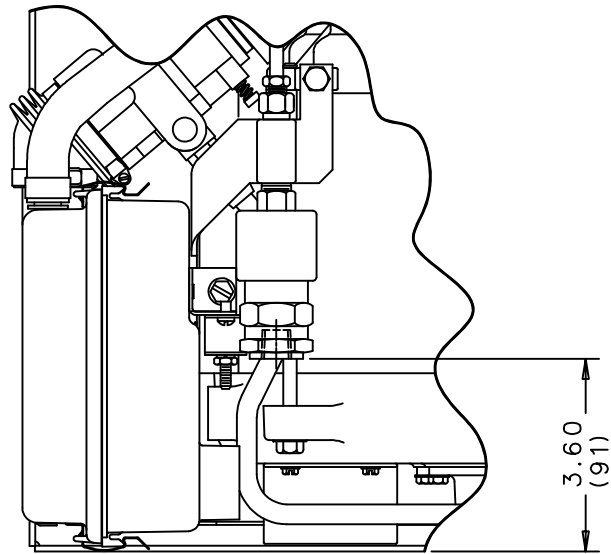


**Figure 6-29. Available Wiring Harnesses**

Part No.	Type	Cable Length
PA-239412	1	30 ft. (914 cm)
PA-239413	1	40 ft. (1219 cm)
PA-239414	1	15 ft. (457 cm)
PA-239430	2	1 ft. (30.5 cm)
PA-239433	3	3 ft. (91 cm)
PA-239436	2	3 ft. (91 cm)
PA-239439	2	5 ft. (152 cm)
PA-278371	4	1 ft. (30.5 cm)
PA-278372	4	3 ft. (91 cm)
PA-278681	6	1 ft. (30.5 cm)
PA-278682	5	3 ft. (91 cm)
PA-278728	5	30 ft. (914 cm)
PA-278729	5	40 ft. (1219 cm)
PA-278730	5	15 ft. (457 cm)

# Section 7. Installation Drawings

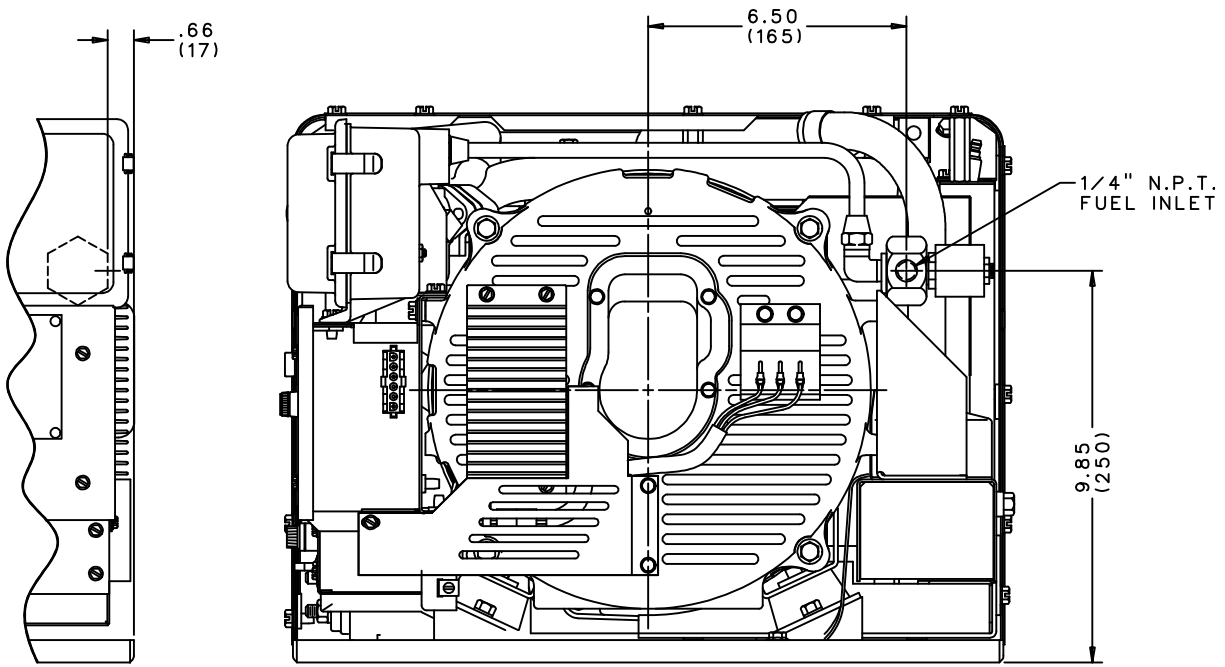




Dimensions in ( ) are millimeter equivalent.

**LP Liquid Withdrawal**

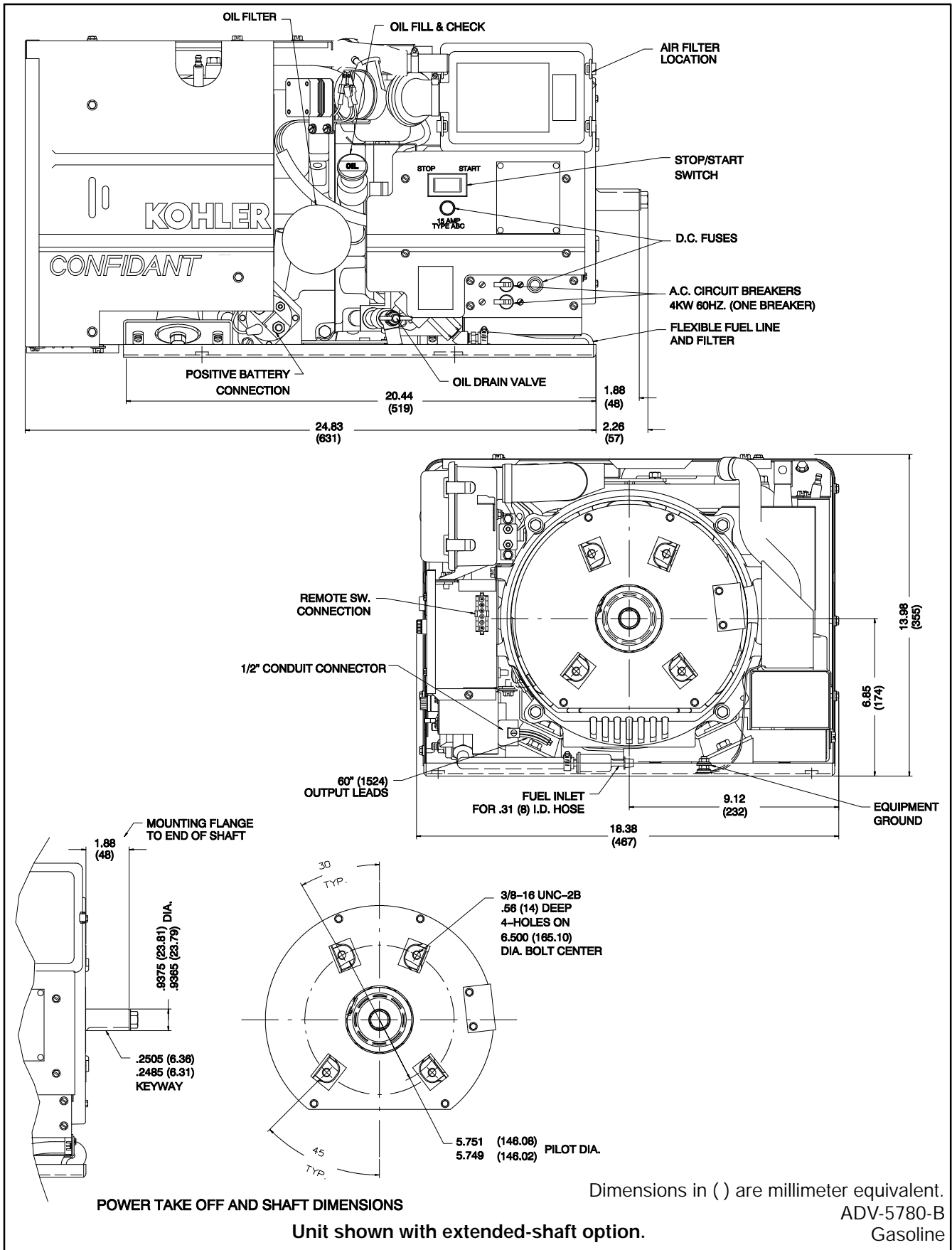
ADV-5728 -C



LP Vapor Withdrawal

Dimensions in ( ) are millimeter equivalent.

ADV-5728 -C



**POWER TAKE OFF AND SHAFT DIMENSIONS**

**Unit shown with extended-shaft option.**

Dimensions in ( ) are millimeter equivalent.  
 ADV-5780-B  
 Gasoline

# Section 8. Service Ordering Instructions

Your vehicle is equipped with a dependable Kohler alternating current generator set. Service requirements of the generator set are minimal but it is important that the required services be performed at the prescribed intervals. Please take a few moments to read through this manual then carefully follow all service recommendations to keep your set in top condition. In the space provided, record the MODEL, SPECIFICATION, SERIAL and ENGINE SPEC. numbers as found on the nameplate attached to the controller of the generator. This information will enable your Kohler generator service dealer/distributor to supply the correct part or data for your particular version. Keep this manual in your vehicle for future reference.

In any communications regarding your generator set, please include the MODEL, SPECIFICATION, SERIAL and ENGINE SPEC. numbers as found on the nameplate attached to the controller of the generator set. Your authorized service dealer/distributor will need these numbers to provide the correct parts and information for your generator set. Do not attempt to replace major items or any item that calls for special tools or procedures— have this done only by qualified Kohler generator specialists. Check the yellow pages of your telephone directory under the heading GENERATORS-ELECTRIC for Kohler Generator Service Dealers/Distributors in your area.

KOHLER CO., Kohler, Wisconsin 53044  
Phone 414-565-3381  
Fax 414-459-1646 (North American Sales)  
Fax 414-459-1614 (International)

For Sales & Service in U.S.A. & Canada  
Phone 1-800-544-2444

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## Service Manual Procurement

A service manual or parts catalog for your generator set may be obtained through your local dealer or Kohler generator dealer/distributor. Record Model, Spec. and Serial numbers (from generator set nameplate) in the spaces below.

Model No. \_\_\_\_\_

Spec. No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Engine Spec. No. \_\_\_\_\_



# Section 9. Operating Hour Service Log

The following is provided to help you keep a cumulative record of operating hours on your generator set and the

dates required services were performed. Enter hours to the nearest quarter hour.

DATE	OPERATING HOURS		SERVICE RECORD	
	HOURS RUN	CUMULATIVE	DATE	SERVICE

TP-5393 9/93

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