Onan®

OPERATOR'S MANUAL AND PARTS CATALOG

FOR

MODEL

2.0UF-232S/32

BATTERY CHARGING GENERATOR

AND

CONTROL ASSEMBLY

2.0S-232/32 SPEC. "A" & "C" (AUTOMATIC)

2.0S-232/86 SPEC. "A" & "C" (MANUAL)

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SAFETY PRECAUTIONS

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

WARNING **Onan uses this symbol throughout this manual to warn of possible serious personal injury.**

CAUTION **This symbol refers to possible equipment damage.**

Study the following safety precautions carefully and insist that they be followed by those working with you and for you.

GUARD AGAINST ELECTRIC SHOCK

- Use extreme caution when working on electrical components. High voltage currents cause injury or death.
- Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician.
- When working around electrical equipment, move cautiously to avoid shocks.
- Do not lunge after falling tools.
- Stop all power, and ground all high voltage points before touching wires.
- Make certain that power cannot be accidentally restored.
- Be sure power is off if you must work on underground electrical equipment.
- Do not examine live equipment when mentally or physically fatigued.
- Do not touch live electrical equipment while standing on metal floors, damp concrete or other well grounded surfaces.
- Do not handle live electrical equipment while wearing damp clothing (particularly wet shoes) or while skin surfaces are damp.
- Be extra cautious when working with generator during a rain.
- Do not take risks.
- Do not work alone.

DO NOT SMOKE WHILE SERVICING BATTERIES

- Lead acid batteries emit a highly explosive hydrogen gas which can be ignited by electrical arcing or by smoking.

EXHAUST GASES ARE TOXIC

- Provide an adequate exhaust system to properly expel discharged gases. Check exhaust system regularly for leaks.
- Be sure the unit is well ventilated.

PROTECT AGAINST MOVING PARTS

- Avoid moving parts of the unit. Loose jackets, shirts or sleeves should not be permitted because of the danger of becoming caught in moving parts.
- Clothing worn by the operator should be fairly tight and belted. Loose jackets, shirts, or sleeves should not be permitted because of the danger of getting into moving parts.
- Do not allow anyone to operate the generator without proper instructions.
- Make sure all nuts and bolts are secure.
- If adjustments *must* be made while the unit is running, use extreme caution around moving parts, etc.

FIRE EXTINGUISHERS

- It is a good practice to have a fire extinguisher nearby. Be sure that the extinguisher is properly maintained and be familiar with its proper use.
- Extinguishers rated ABC by the NFPA are appropriate for all applications. Consult the local fire department for the correct type of extinguisher for various applications.

KEEP THE UNIT AND SURROUNDING AREA CLEAN

- Remove oil, grease, ice, snow or materials that create slippery conditions around unit.
- Remove oily rags and other materials that create potential fire hazards.

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GENERAL INFORMATION

INTRODUCTION

This instruction book contains information for the proper installation, operation and maintenance of your generator and control. We suggest you keep this book handy for reference.

If you wish to contact your dealer or the factory regarding this equipment, be sure to supply the complete MODEL and SPEC NO. and the full serial number of your equipment. This information is necessary to identify your equipment among the many units manufactured.

GENERATOR

Onan Model 2.0UF-232S/32 is a shunt-wound, revolving armature, DC generator, designed specifically for charging 32 volt, lead-acid or cadmium-cell batteries.

This generator requires either an automatic control or a manually operated control for variable speed operation. The voltage is regulated either automatically or manually by the control, providing generator speeds are between 1000 rpm to 3000 rpm.

Generator can be driven either clockwise or counterclockwise providing it is properly polarized, connected and when blower scroll is installed correctly. Generators are polarized for a counterclockwise direction when shipped from factory unless otherwise specified.

SPECIFICATION COVERAGE

This book covers 2.0UF-232S/32 generator operation with four different controls. Automatic is designated "32" ("A" or "C"). Manual is designated "86" (either "A" or "C"). The latest controls are all Spec "C". These controls are covered in separate instructions in *Control* section. Check *Table of Contents* for locating information on your particular unit.

NOTE: *Generator shaft rotation is determined while looking at end opposite drive shaft.*

NOTE: *The different controls used with this generator are described on individual pages in "Control" section.*

INSTALLATION

LOCATION

Select a site for the generator with the following points in mind. Figure 1 shows dimensions of the generator and bolthole centers for installation.

1. Ventilation - The generator creates a considerable amount of heat when operating under load conditions. It is very important to dissipate this heat by proper ventilation. If the generator is installed inside a small room or compartment, provide a vent for exhausting the air heated by the generator. Locate the heated air exhaust vent above the inlet vent. Heated air discharges from the drive-shaft end of the generator.
2. Convenience to Driving Power - (Driving power is described as an engine or prime mover of the generator). Both driving source (engine) and driven counterpart (generator) must be bolted securely to a heavy mounting base to maintain pulley and shaft alignment. The direction of rotation of the generator will be determined by the direction of rotation of the driving unit. Correct belt tension must be maintained.

NOTE: *If flexible coupling is used, shaft alignment of the generator and driving source must be accurately made and permanently maintained. Incorrect shaft alignment will cause excessive wear on both units and unnecessary loss of power from the driving unit.*

3. Dusty or Damp Conditions - Avoid dusty or damp conditions as much as possible. Mount generator under cover or inside a building to protect it from severe weather conditions.
4. Servicing Convenience - Allow at least 24 inches of space on all sides of the generator for servicing ease.

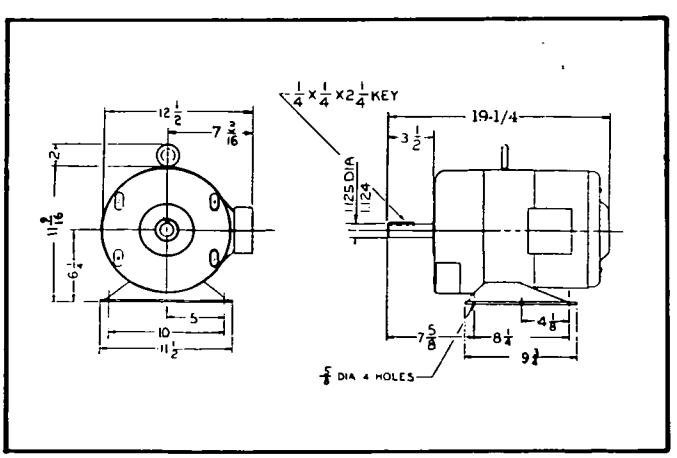


FIGURE 1. GENERATOR OUTLINE

MOUNTING THE GENERATOR

Provide a substantial mounting base of concrete, wood or steel and use large capscrews for bolting down. The mounting surface must be flat so that the generator mounting brackets will not be sprung when tightened into place. It should be possible to turn the generator shaft by hand after bolting down the generator.

MOUNTING THE CONTROL

Mount the control assembly where air circulation is good. Heat is generated inside the control box and proper ventilation must be provided for dissipating this heat.

GENERATOR COOLING

The factory mounts the generator blower scroll for a counterclockwise rotation. If clockwise rotation is desired, scroll position must be reversed. The arrow printed on the scroll must be pointing in the direction of rotation of the shaft.

To reverse scroll, remove only the scroll with screen attached. Turn it end for end and reinstall so scroll is at opposite end of air outlet hole.

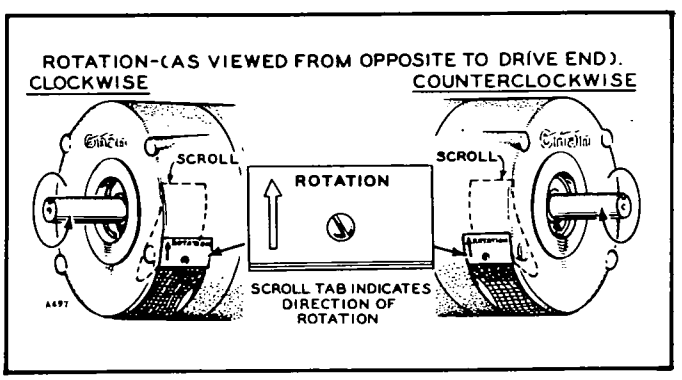


FIGURE 2. REVERSING THE SCROLL

DRIVING POWER

The driving source (engine) must have a minimum of 2 HP for each 1000 watts of generator output. For example, a 2000 watt generator requires 4 horsepower at the drive shaft. If the engine has a considerable reserve of power the speed regulation and voltage regulation will be much better.

Almost any type of drive can be used that will supply the correct speed to the generator and with minimum slippage. The V-belt drive is the most popular because of the ease of installation and maintenance and because speed reducers or increasers can be incorporated by

simply changing pulley sizes. Determine the correct pulley ratio for a given application from Figure 3. Consult a belt supplier to determine the correct pulley size and belts to transfer the power required.

Figure 3 - Pulley Size Selector Chart. For example, if you know that driver speed is 1800 rpm, driver pulley is 5 inches in diameter and the generator must operate at 2000 rpm, draw a line from 1800 rpm on the driver speed to 2000 on the driven speed. Then draw a line from the driver pulley diameter (5″) through the point where the first line crosses the diagonal and to the driven pulley scale. This 4-1/2″ is the required diameter of the generator pulley.

NOTE: *For individual wiring connections on separate controls, refer to "Control" section.*

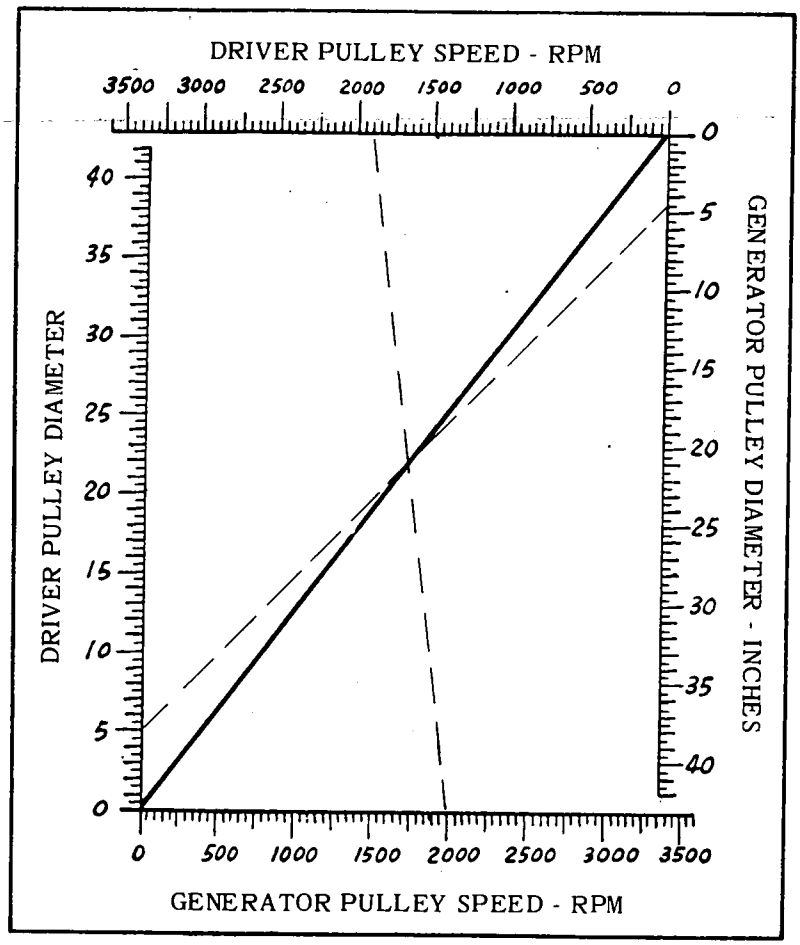


FIGURE 3. PULLEY SIZE SELECTOR CHART

CONTROLS

AUTOMATIC VOLTAGE REGULATOR CONTROL - 2.0S-232/32C

DESCRIPTION

This voltage regulator maintains the generator output at a constant voltage at speeds within 1000 to 3000 rpm. The wall-mounting control has a hinged front panel. It includes a 60 amp fuse, a reverse power diode and a voltage regulator. A voltage and current adjusting rheostat, mounted on the front cover, are marked for approximate values. Regulation is accurate to ±1% from no load to full load.

IMPORTANT: *Be sure to check for proper polarity before connecting generator field leads to control.*

CHECKING FOR PROPER POLARITY

1. Connect a DC voltmeter (0-10 volts) across A1 positive and A2 negative.
2. Bring generator up to a speed between 1500 and 2500 rpm.
3. Voltage will be very low (less than 1 volt). A1 must be positive and A2 negative.
4. If polarity is correct, proceed to connect generator to control. If polarity is backwards, see instructions for flashing the field.

WIRING CONNECTIONS

Diagrams below show correct connections for either clockwise or counterclockwise rotation. Always remember that direction of rotation is determined looking at end opposite shaft. Be sure blower scroll is installed according to shaft rotation.

Connect load or battery to terminals #6 positive and #2 negative of TB1 regardless of direction of rotation.

NOTE: *All generators are polarized for counterclockwise rotation when shipped from factory unless otherwise specified.*

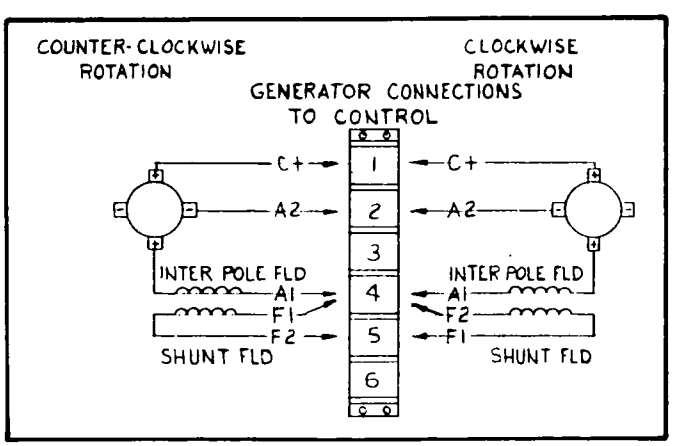


FIGURE 4. WIRING CONNECTION

CHANGING GENERATOR SHAFT ROTATION

When changing direction of rotation (counterclockwise to clockwise), the field must be polarized with A1 always positive or regulator will be damaged. Proceed as follows:

1. Connect generator to control for clockwise rotation (See Figure 4).
2. Remove field lead (F1) from terminal #5 of TB1.
3. Apply a positive 12 volt DC probe to terminal #4 of control and touch negative lead momentarily to F1. Be sure F1 is removed from control.
4. Reconnect F1 to terminal #5 and run generator.

If changing shaft rotation back from clockwise to counterclockwise, F2 will be connected to terminal #5. Repeat above steps.

AUTOMATIC CONTROL OPERATION

The control assembly is designed to provide a proper charge rate at generator speeds of 1000 to 3000 rpm. With batteries in a low state of charge or with a heavy load connected, the ammeter on the control box will show a charge rate of approximately 55 amps. The generator voltage at a 55 ampere charge rate will be approximately 37 volts. As the batteries near the fully charged condition, with little or no load connected, the charge rate decreases gradually to a low rate.

The minimum charge rate with a fully charged battery may be changed by a small adjustment of the VOLTAGE-ADJUST rheostat.

CURRENT LIMITER

Because of a special circuit, the regulator also functions as a current limiter. It prevents the generator current from rising beyond a maximum which would burn out the entire system. The maximum current of 75 amperes is obtained by turning the CURRENT-ADJUST rheostat to the extreme right or clockwise position. The minimum value of 35 amperes is obtained by turning rheostat to the extreme left or counterclockwise position. These values will vary somewhat depending on the temperature of the generator. If it becomes necessary to adjust the current rheostat, the following procedure should be followed:

1. Run generator at a speed between 1500 and 2500 rpm until warm.
2. Set rheostat to a maximum clockwise position.
3. Connect a DC load of at least 75 amperes to the battery.
4. Turn the current-adjust rheostat to give a reading of 55 amperes on the panel ammeter.

NOTE: *The 60-ampere fuse in the control is a special fast-acting Chase-Shawmut "Amp-trap" fuse (Type 4, catalog number A25X60) which protects the generator against overloads and short circuits. Use only this type fuse for replacement.*

CAUTION *If the control is mounted some distance from the generator, be sure the wires carrying the output of the generator to the control are of adequate size.*

MANUALLY OPERATED VOLTAGE CONTROL 2.0S-232/86C 2S-232/86A

DESCRIPTION

This wall mounted voltage control is manually controlled by one 125-ohm rheostat. The control will not compensate for changes in load or speed without manually readjusting the rheostat.

The control includes a manually operated rheostat, voltmeter, ammeter, circuit breakers for field and load, marked terminals and a reverse current diode. This diode is used on latest Spec "C" models. Spec "A" uses a reverse current relay.

WIRING CONNECTIONS

Diagrams below show correct connections for either clockwise or counterclockwise rotation. Always remember that direction of rotation is determined looking at end opposite shaft. Be sure blower scroll is installed according to shaft rotation.

CAUTION *If the control is mounted some distance from the generator, be sure the wires carrying the output of the generator to the control are of adequate size.*

NOTE: *All generators are polarized for a counterclockwise direction when shipped from factory unless otherwise specified.*

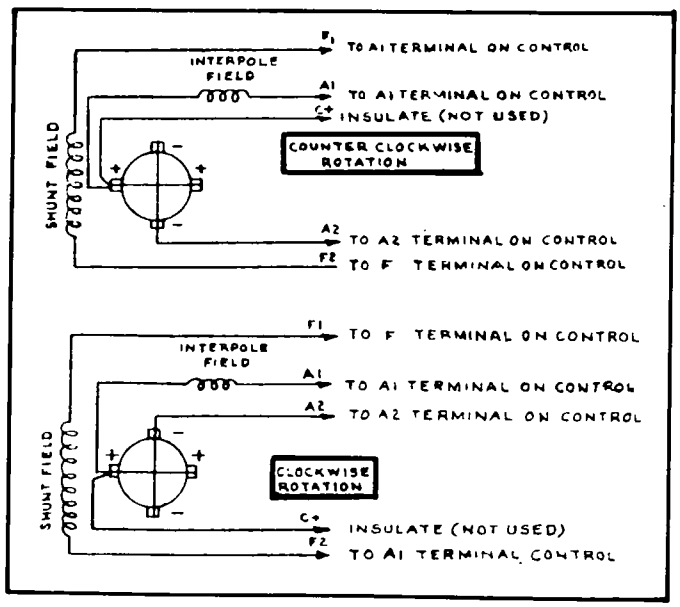


FIGURE 5. WIRING CONNECTION

CHECKING FOR PROPER POLARITY

With manual control, switch circuit breaker to "open" position and slowly bring generator up to a speed between 1500 and 2500 rpm, observing the voltmeter. If voltmeter reads backwards, check all wiring and repolarize generator.

CHANGING GENERATOR SHAFT ROTATION (COUNTERCLOCKWISE TO CLOCKWISE)

To reverse polarity for clockwise rotation as viewed from the end opposite shaft, proceed as follows:

1. Be sure the control is not connected to the generator.
2. Separate all leads coming out of the generator.
3. Reverse the scroll for clockwise operation. See Figure 2, Reversing the Scroll.
4. Get a good battery (or bank of batteries) in a fully charged condition.
5. Connect the generator F2 lead to the battery positive (B+) terminal.
6. Touch the F1 lead of the generator to the battery negative (B−) terminal. Be sure a good contact is made. A definite spark (arc) should be observed between the F1 generator lead (terminal) and the negative (B−) battery terminal. If no spark (arc) is observed, check for a bad battery or open circuit between the F1 and F2 leads of the generator.
7. Disconnect the generator F2 lead from the battery positive (B+) terminal.

The generator should now be polarized for clockwise rotation. Now connect the generator to the control according to wiring diagram for clockwise rotation.

CAUTION *Extreme care must be taken when changing generator speed not to exceed rated current on the generator.*

MANUAL CONTROL OPERATION

Before operating make battery and load connections. Make sure circuit breaker is "ON" and rheostat is set at the lowest charge rate.

Start the generator and run at recommended rpm. The desired charge rate on this control is achieved by viewing the voltmeter and ammeter while manually adjusting the rheostat control. As the batteries near a fully charged position, rheostat must be readjusted.

2S-232/32A AUTOMATIC CONTROL

DESCRIPTION

This voltage regulator automatically maintains the generator output at a constant voltage when generator is driven at speeds ranging from 1000 to 3000 rpm.

The complete control includes a DC ammeter, reverse current relay, automatic voltage regulator, a replaceable cartridge fuse and hinged door for easy access.

WIRING CONNECTIONS

Diagrams below show correct connections for either clockwise or counterclockwise rotation. Always remember that direction of rotation is determined looking at end opposite drive shaft. Be sure blower scroll is installed according to shaft rotation.

NOTE: *All generators are polarized for counterclockwise rotation when shipped from factory unless otherwise specified.*

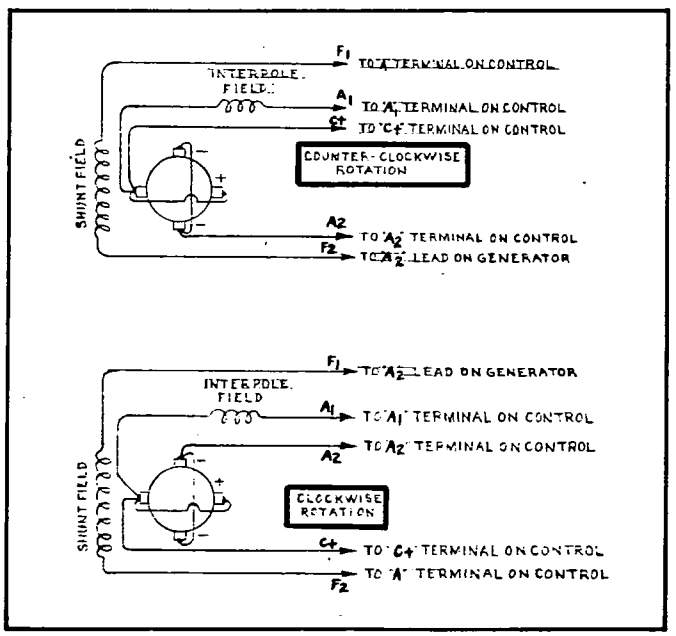


FIGURE 6. WIRING CONNECTION

CHECKING AUTOMATIC CONTROL FOR PROPER POLARITY

With this control, remove the 60 amp cartridge type fuse from the control box. Connect an accurate DC voltmeter across the A1 and A2 terminals in the control box with Meter "+" lead to A1 and Meter "–" lead to A2.

Slowly bring generator up to a speed between 1500 and 2500 rpm observing the voltmeter. If the voltmeter reads backwards check all wiring and repolarize. The voltmeter reading should be 38 volts. It may be necessary to correct the adjustment of the voltage regulator.

The voltage adjustment rheostat is mounted inside the control box on the terminal panel and is marked "Volts-Adjust".

Turn the voltage adjustment rheostat to give a voltmeter reading of 38 volts. When the adjustment is completed, stop the generator. Disconnect the voltmeter and reinstall the 60 ampere fuse to its clips. The generator and control should now be ready for operation.

CHANGING GENERATOR SHAFT ROTATION (COUNTERCLOCKWISE TO CLOCKWISE)

When changing direction of rotation from counterclockwise to clockwise, proceed as follows:

1. Connect wires to control as shown for clockwise rotation in Figure 6.
2. Disconnect generator field lead F2 from control box terminal A.
3. Touch this lead momentarily to control box terminal B+, making sure a good battery is used. A definite spark should occur when this is done.
4. Reconnect F2 lead to A terminal of control box.
5. Check to see that blower scroll is installed according to clockwise rotation (see generator cooling on page 3).

NOTE: *If changing rotation back from clockwise to counterclockwise, F1 generator lead will be connected to control terminal A. Repeat above steps.*

AUTOMATIC CONTROL OPERATION

The control assembly is designed to provide a proper charge rate at generator speeds of 1000 to 3000 rpm. With batteries in a low state of charge, or with a heavy load connected, the ammeter on the control box will show a charge rate of approximately 55 amps and 35 volts. As the batteries near the fully charged condition, with little or no load connected, the charge rate decreases gradually to a low charge rate. The factory adjustment suits most installations. However, the minimum charge rate with a fully charged battery may be changed by a small adjustment of the VOLTAGE ADJUSTMENT rheostat.

CURRENT LIMITER

The regulator also functions as a current limiter which prevents the generator's current from rising to a maximum which would burn out the entire system.

The maximum value is controlled by the lower of the two rheostats on the control panel. With this rheostat turned to extreme counterclockwise position, maximum output will be approximately 35 amperes; with the rheostat turned to extreme clockwise position, maximum output will be about 75 amps. (These values will vary with temperature.) The current limiting rheostat is adjusted and sealed at the factory. The adjustment

will be correct only if the correct wire sizes are used. Adjust as follows:

1. Run generator at a speed between 1500 and 2500 rpm until warm.
2. Connect a DC load of at least 75 amperes to the battery.
3. Adjust the current adjusting rheostat to give a reading of 55 amperes on the panel ammeter.
4. Reseal to prevent accidental loss of adjustment.

The 60 amp fuse on the control is there primarily to protect against short circuits.

CAUTION *If the control is mounted some distance from the generator, be sure the wires carrying the output of the generator to the control are of adequate size.*

SERVICE AND MAINTENANCE

PERIODIC SERVICE AND INSPECTION

Follow a definite schedule of inspection and servicing. Make a good visual check before, while and after generator is operating; look for loose or broken leads and bad connections.

Internal generator parts should be examined periodically. Remove end bell cover and inspect brushes, springs, bearings, etc.

BRUSHES

Replace the brushes when they wear to about 5/8 inch in length. Order replacement brushes by part number, never by description: similar brushes may have different electrical characteristics.

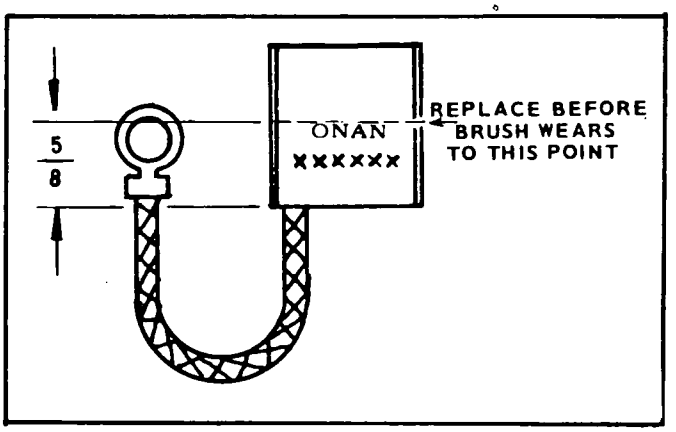


FIGURE 7. BRUSH REPLACEMENT

CAUTION *If brushes are not replaced by the time they wear to the stamped Onan name and number, severe damage to the commutator will take place (see Figure 7).*

BRUSH RIG SETTING

These generators are properly adjusted when shipped from the factory. If you have replaced the brush rig follow these instructions:

1. Remove the end cover and band to allow access to brush rig.
2. Loosen the four cap screws holding the brush rig to the end bell.
3. Mark the new brush rig in the same location as the old one with a reference mark.
4. After you have made sure the brush rig is free to rotate, rotate the rig back to the original location, start the unit and run at rated rpm. (Original location is shown in Figure 8 with reference mark.)
5. Stop unit and inspect brush faces. They must be seated across the thickness of the brush for an accurate setting.
6. With a DC voltmeter (0-30 range) attached across the positive (+) and negative (–) brushes, start unit and run at rated rpm and no load.
7. Rotate brush rig in one direction until voltage starts to drop (or sparking occurs). Mark this point. Rotate in opposite direction until voltage starts to drop (sparking occurs). Mark this point also.
8. Approximately halfway between these two marks peak voltage should be reached.
9. Stop unit and tighten all four brush rig cap screws. Start unit again to make sure DC voltage is the same as Step 8 and that no sparking (or arcing) of the brushes occurs.
10. Mark the ring of the brush rig and end bell with a notch or paint.

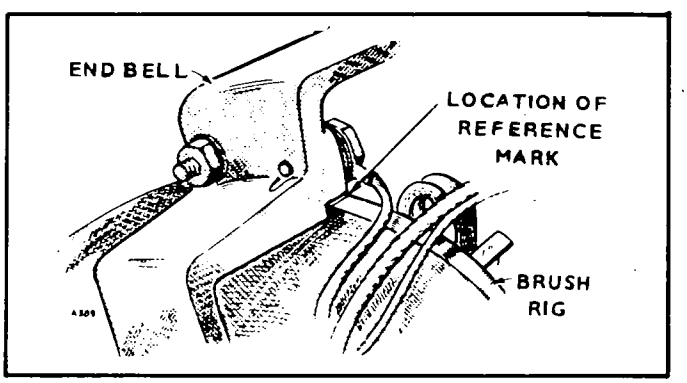


FIGURE 8. BRUSH RIG NEUTRAL

BEARINGS

The ball bearings are double-sealed and lubricated for life. While these bearings require no additional lubrication, replace if the generator is ever disassembled.

MAJOR GENERATOR REPAIR

Several tests for open or grounded circuits can be made without disassembling the generator. However, if it becomes necessary to disassemble, proceed as follows:

1. Remove the sheet metal end cover. Tag or otherwise mark each lead as it is disconnected, to assure correct reconnection.
2. Remove all brushes and springs.
3. Remove the hex screws holding the end plate at the drive end of the frame. With a soft faced mallet, tap the armature shaft at the brush rig end until the ball bearing is free of the end support. On reassembly, align the bearing notch with

its support notch.

4. Carefully withdraw the armature from the frame to prevent damage to the windings.

ARMATURE GROUNDED

Use an ohmmeter and test prods (Figure 9). Place one test prod on the commutator and the other prod on a bare clean part of the generator frame or armature shaft. The prods must make good electrical contact. If the ohmmeter shows continuity, the armature is grounded. Replace a grounded armature with a new one.

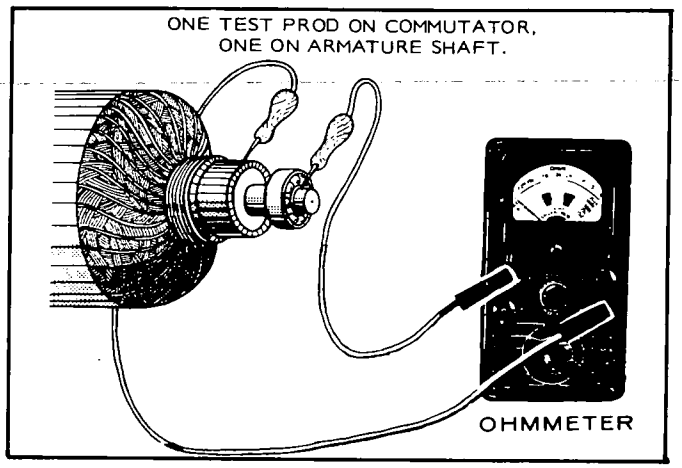


FIGURE 9. TESTING FOR A GROUNDED CIRCUIT

TESTING THE ARMATURE FOR AN OPEN CIRCUIT

To test the DC winding of an armature for an open circuit, use an armature growler. Most electrical repair shops have such equipment. Remove the armature for testing. Proceed as follows:

1. Place the armature in the growler which is connected to alternating current. Rub a smooth steel blade (back edge of a hacksaw blade) across the segments of the commutator (see Figure 10).
2. At some point around the commutator a spark should occur as the blade contacts the two adjacent segments. If a spark occurs, the circuit is complete (not open) between those two segments. Then rotate the armature just enough to test the next two segments.

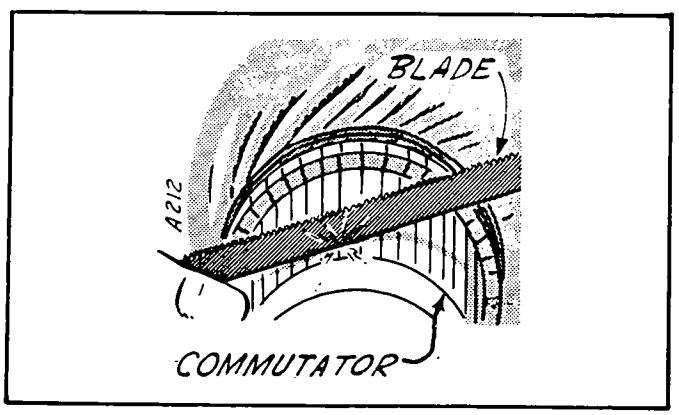


FIGURE 10. TESTING FOR AN OPEN CIRCUIT

Continue the rotating and testing until the commutator segments have been tested completely around. A good spark should occur between all adjacent segments when those segments and windings attached to them are in the correct position in the growler magnetic field. If no spark occurs, the winding between those two segments is open circuited. (There is a possibility that a short circuit of a winding might prevent the sparking, but then the armature would also be magnetized as described in the following paragraph.)

TESTING THE ARMATURE FOR SHORT CIRCUITS

Place the armature in the growler which is connected to alternating current. Hold a steel knife blade (or hacksaw blade) 1/4 inch from the armature laminations. If the steel blade is attracted to any magnetized armature laminations, either the armature windings or commutator is short circuited. Do not test for magnetism at just one point of the armature laminations, but test all of the armature laminations, from one side over to the other side (along the dotted line of Figure 11). After testing the armature in one position, revolve the armature about 1/8 revolution and test for magnetism again. Continue the revolving and testing until the armature has been tested completely around (see Figure 11).

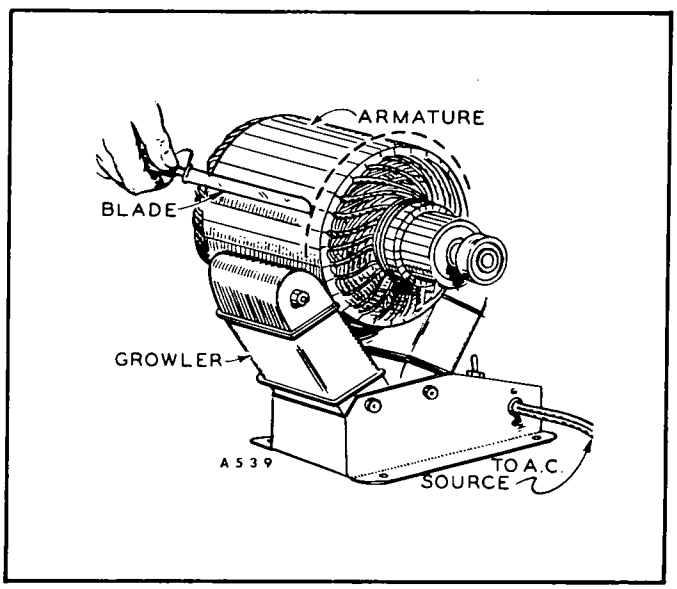


FIGURE 11. TESTING FOR SHORT CIRCUITS

FIELD WINDINGS, OPEN CIRCUIT

Use an ohmmeter and test prods. Place one test prod on one of the terminal ends of the field windings and the other test prod on the other terminal end of the winding. The ohmmeter should indicate continuity. If not, an open circuit is indicated. Check carefully to see the open circuit is not at the terminal leads or a loose terminal. An open circuit due to a broken lead or loose terminal is easily repaired. An open circuit within a coil requires replacement of the set of coils.

GENERATOR TROUBLE SHOOTING CHART

WE SUGGEST THAT ONLY A QUALIFIED ELECTRICIAN OR MECHANIC PERFORM THESE TESTS.

NATURE OF TROUBLE	POSSIBLE CAUSE	REMEDY
Poor Commutation or Arcing at the Generator Brushes	Brushes out of neutral position.	Turn brush rig until the identifying marks are aligned.
	Brushes not seating properly.	Sand the brush to the proper contour.
	Generator heavily overloaded.	If the DC amperage is more than stated on the generator nameplate, remove part of the load.
	Brushes binding in holder.	Clean each brush and holder.
	Brush tension insufficient.	Replace brush springs.
	Brushes worn too short.	Replace brushes.
	Brush tension unequal.	Replace weak brush springs.
	Wrong type brush	Replace with correct type and make of brush and spring.
	Loose commutator bars.	Replace with new armature.
	High mica.	Undercut the mica.
	Commutator out of round.	True the commutator in a lathe.
	Commutator surface dirty or oily.	Clean the commutator.
Generator Overheats.	Windings and parts covered with dirt and oil.	Clean generator.
	Overloaded.	Check load or output of generator.
	Short circuit or grounded circuit in the field winding or armature winding.	Replace defective parts.
	Excessive arcing at the brushes.	See "Poor Commutation" above.
	Generator blower scroll installed in wrong position.	Reverse blower scroll position.
Noisy Generator	Generator loose on base.	Tighten mounting bolts.
	Worn or defective bearing.	Replace worn parts. Check alignment.
	Field pole rubbing armature.	Tighten field poles to frame.

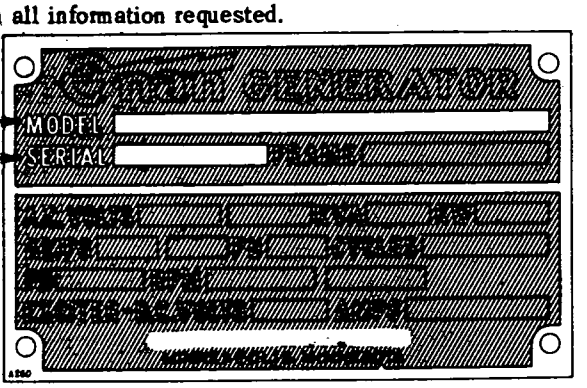
NATURE OF TROUBLE	POSSIBLE CAUSE	REMEDY
Generator Runs but does not Produce Current.	Brushes not contacting commutator.	Free brushes in holders. Assemble brushes and springs correctly.
	Open, short or grounded circuit in generator.	Test windings and repair or replace defective parts.
	Generator line leads broken or loose.	Tighten connections and replace broken leads.
	Generator armature rotating in the wrong direction.	Correct direction of rotation. Or, connect wires, polarize field and re-install scroll to agree with direction of rotation.
Generator Produces Low Voltage	Speed low because of loose, slipping belts.	Adjust belt tension.
	Generator brushes not in neutral position.	Turn brush rig until the identifying marks are aligned correctly.
	External short circuit on line.	Test generator with line wires disconnected.
	Open circuit of shunt field winding.	Make proper connections according to wiring diagram.
	Short circuit of windings in the field or armature.	Replace defective part.

PARTS LIST

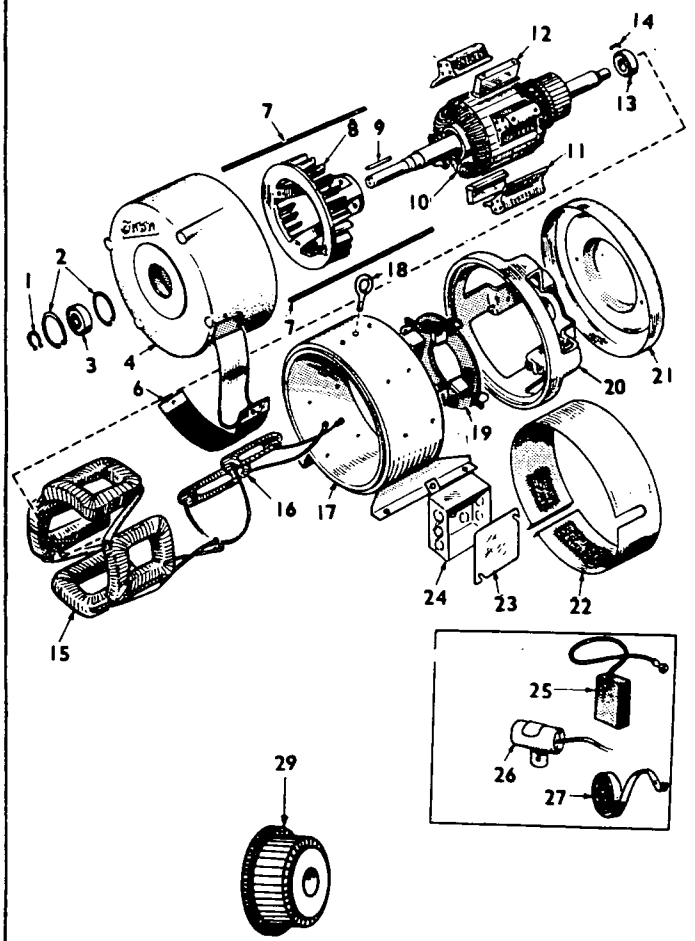
For parts or service, contact the dealer from whom you purchased this equipment or refer to your Nearest Authorized Parts & Service Center.

To avoid errors or delay in filing your parts order, please furnish all information requested.

Always give the MODEL & SPEC. NO. and SERIAL NO.

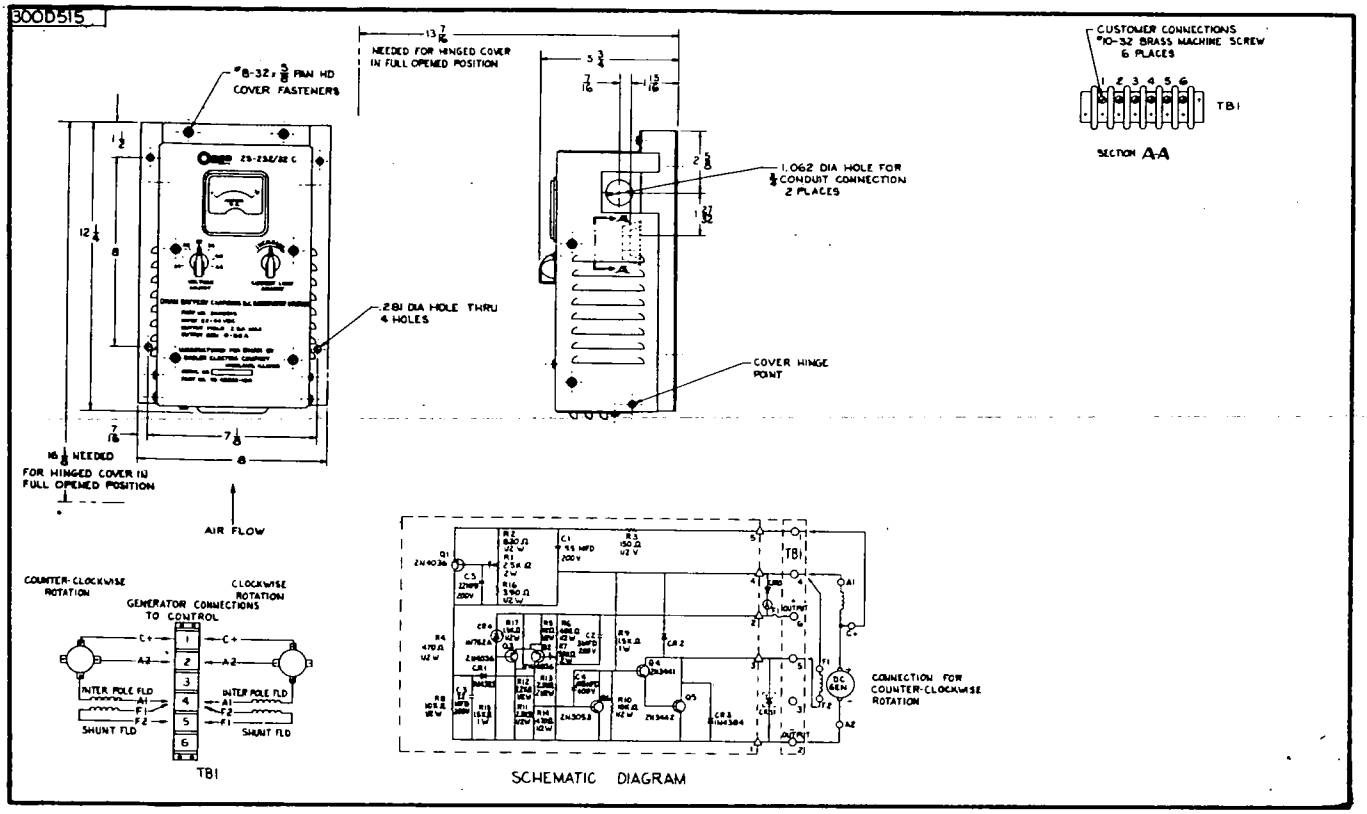


GENERATOR PARTS

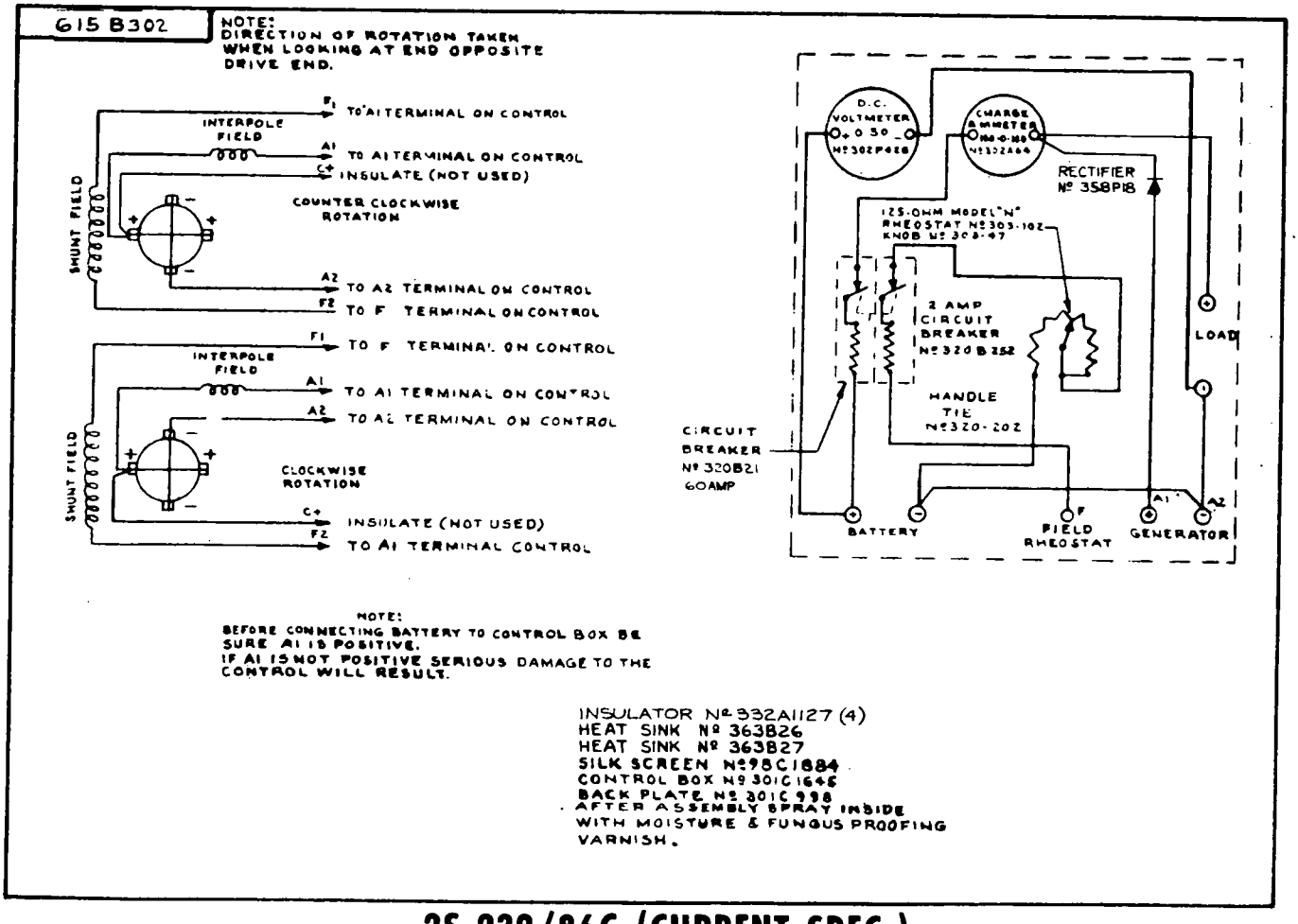


REF. NO.	PART NO.	QTY. USED	PARTS DESCRIPTION
1	518-12	1	Ring, Ret. - Ext. - Drive End Brg. to Shaft
2	518-166	2	Ring, Ret. - Int. - Drive End Brg. to End Bell
3	510A52	1	Bearing, Armature - Drive End
4	211E127	1	Bell, End - Drive End
6	234A77	1	Scroll & Screen, Blower
7	520A337	2	Stud, Generator Through
8	205C60	1	Blower, Air
9	515A45	1	Key, Armature Shaft Drive
10	201A959	1	Armature Wound, Assembly
11	221A56	4	Shoe, Pole - Field
12	221A47	2	Interpole, Commutating
13	510A47	1	Bearing, Armature - Brush Rig End
14	232A596	1	Clip, Bearing
15	222A1286	1	Coil Set, Field
16	222A1260	1	Coil Set, Commutating
17	210C1665	1	Frame, Generator
18	403A95	1	Bolt, Eye - Lifting
19	212C13	1	Rig Assy., Brush - Incl. Brushes & Springs
20	211D97	1	Bell, End - Brush Rig End
21	234C47	1	Cover, End Bell
22	234C65	1	Band, End Bell
23	330-6	1	Cover, Junction Box
24	330B47	1	Box, Junction
25	214A48	4	Brush, Commutator
26	312A17	2	Condenser, .5 Mfd.
27	212A1011	4	Spring, Brush
29	203A62	1	Commutator

WIRING DIAGRAMS



2S-232/32C (CURRENT SPEC.)



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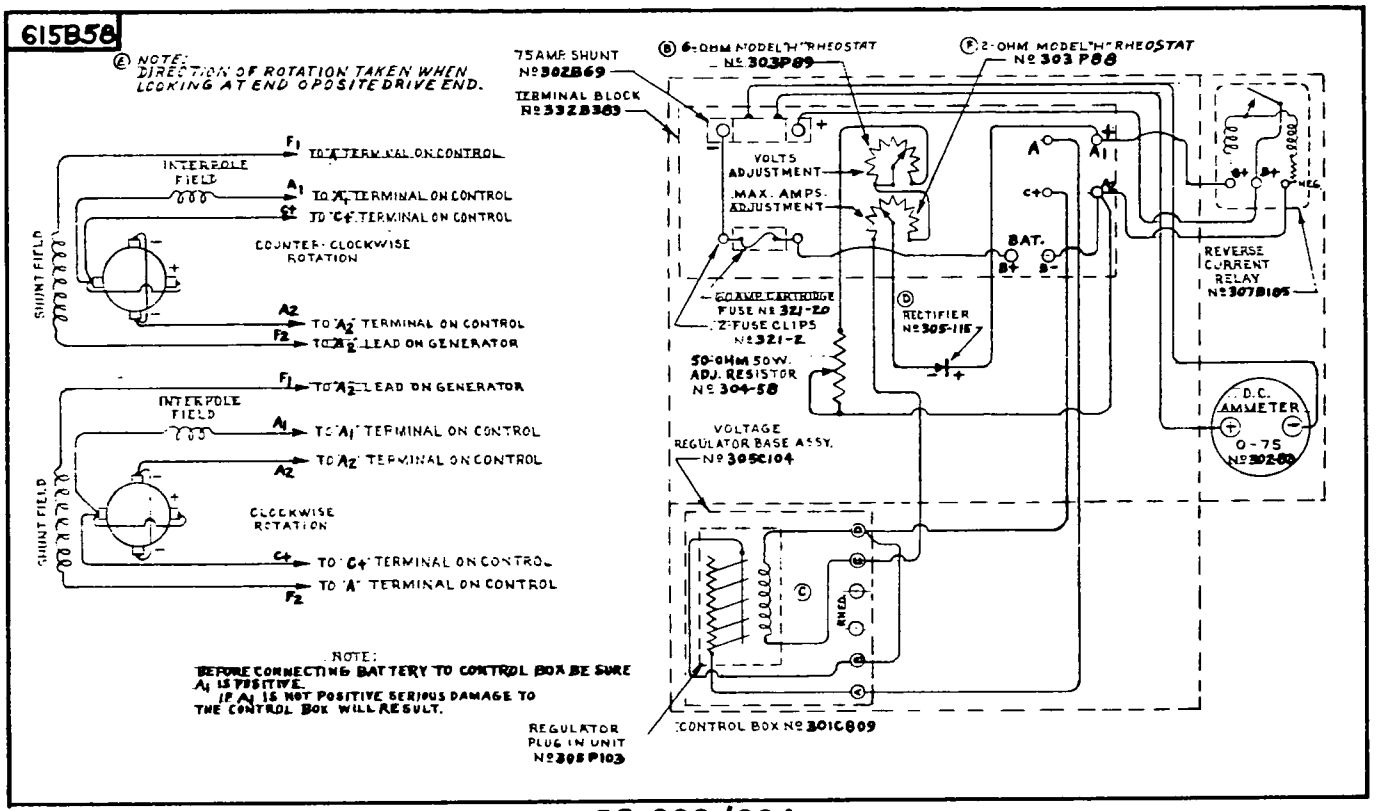
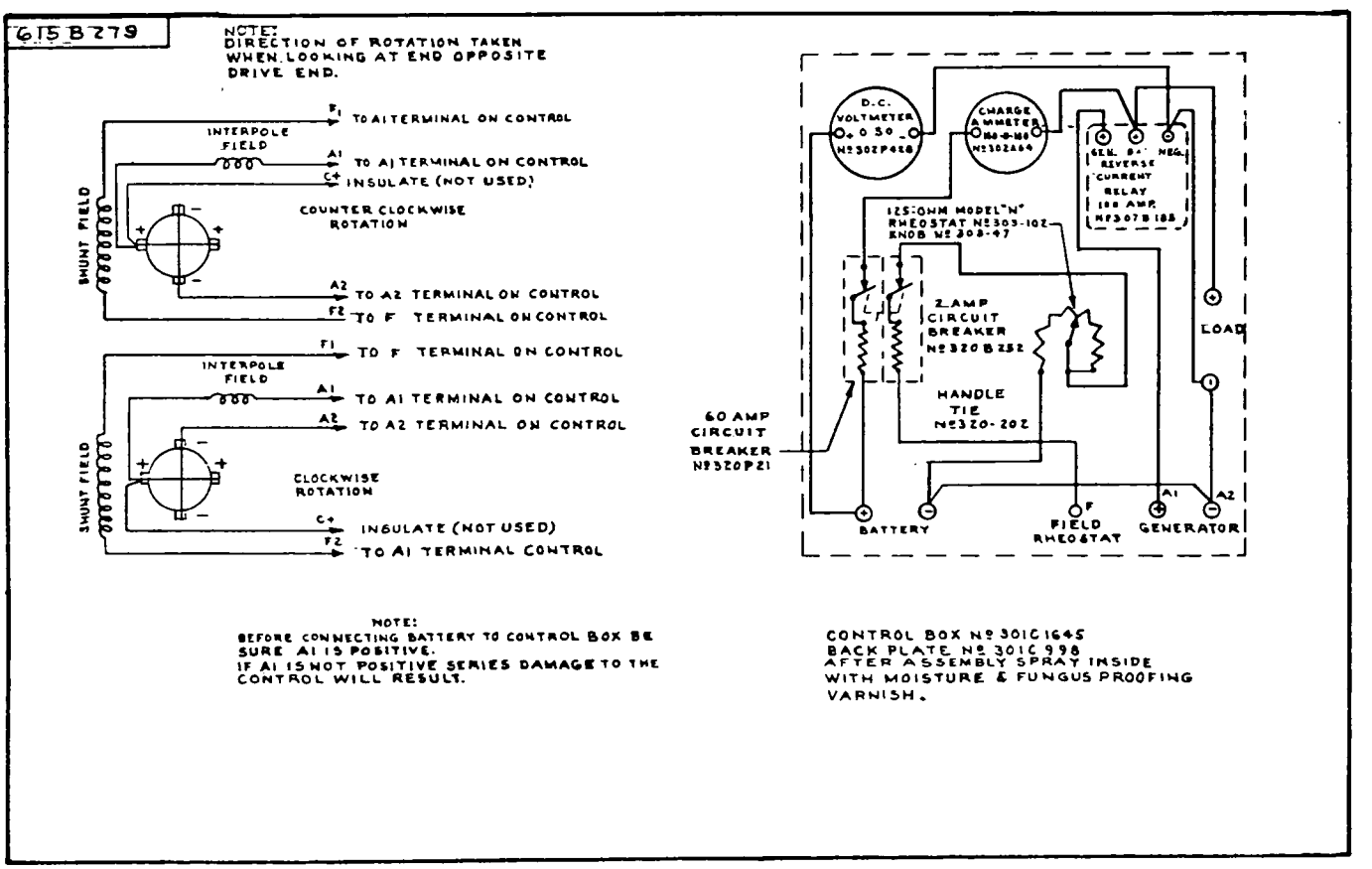


2S-232/32A



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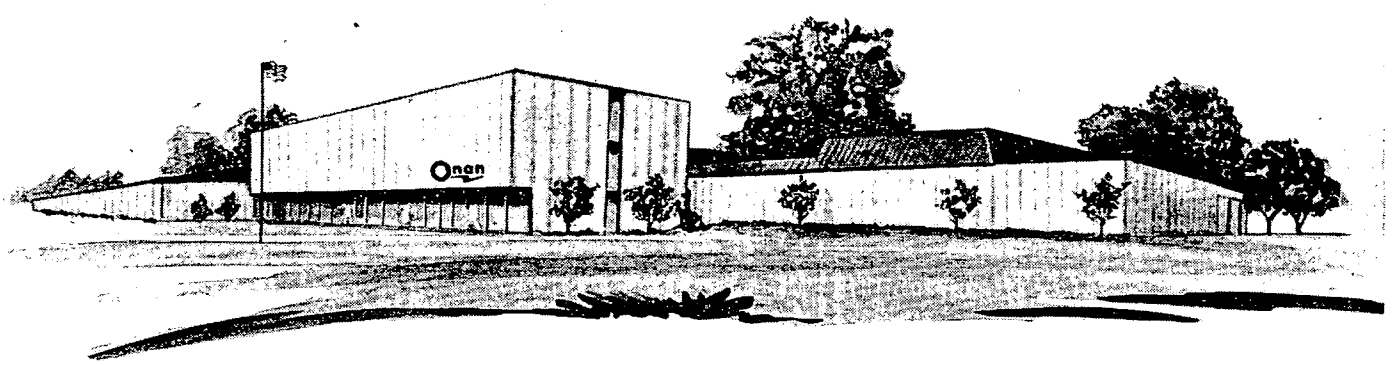

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