

KS-15511 INVERTER REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers the apparatus requirements and adjusting procedures for the KS-15511 inverter.

1.02 The machine will be used first in the 806E and 806F ringing plants to furnish emergency 60-cycle power.

1.03 Reference shall be made to Section 020-010-711, covering General Requirements and Definitions, for additional information necessary for the proper application of the requirements.

1.04 Requirements and associated procedures marked with a number sign (#) need not be checked by the installer unless it

is thought that the requirement is not being met, or performance indicates that such a check is advisable.

1.05 Requirements and associated procedures marked with an asterisk (*) need not be checked during maintenance unless the apparatus or part is made accessible for other reasons, or performance indicates that such a check is advisable.

1.06 Successful commutation for the purpose of this section may be said to have been obtained if neither the brushes nor the commutator nor collector rings are injured to the extent that abnormal maintenance is required. The presence of some visible sparking is not necessarily evidence of unsuccessful commutation. See Sections 171-110-701 and 171-110-801 for additional information on commutation.

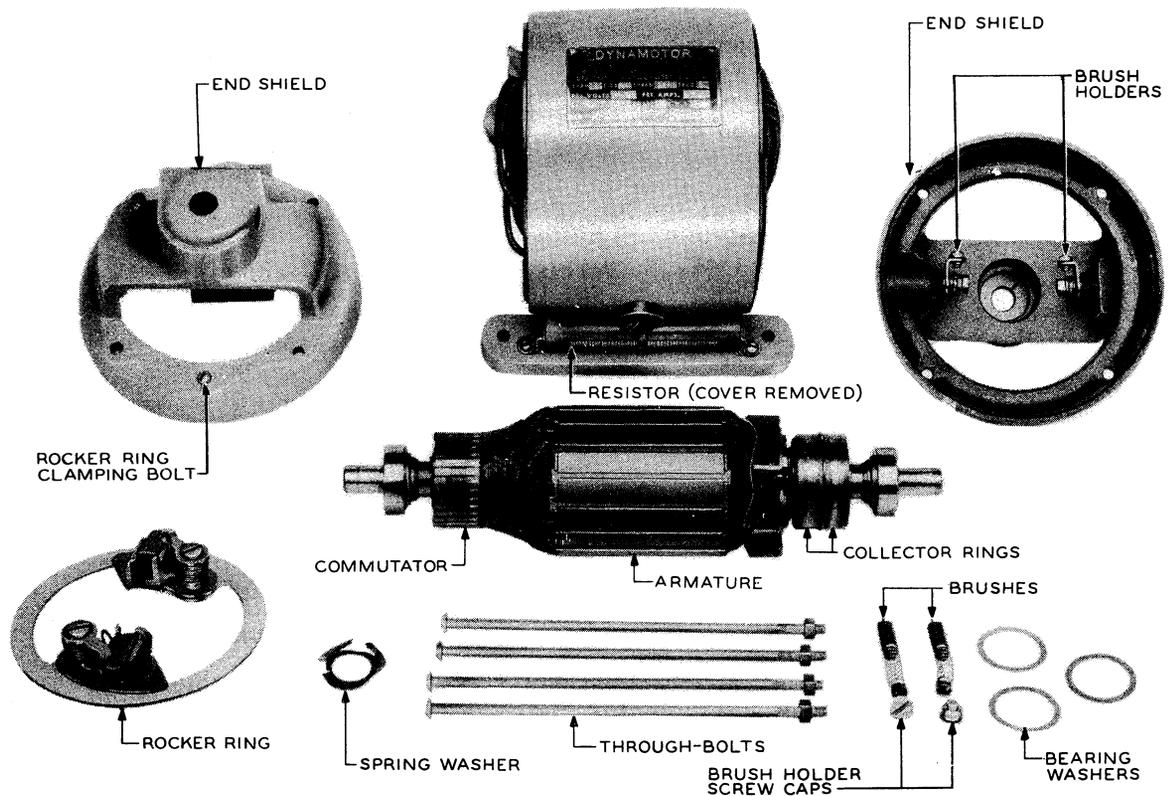


Fig. 1 - Typical KS-15511 Inverter

SECTION 161-230-701

2. REQUIREMENTS

- *#2.01 Lubrication: The bearings shall be replaced when worn or noisy. These bearings cannot be relubricated.
- 2.02 Freedom of Rotating Parts: The motor shall turn freely in its bearings. Gauge by feel.
- *#2.03 End play shall be taken up by the spring washer or its equivalent. Gauge by eye.
- 2.04 Noise and vibration of the machine under all normal operating conditions shall not be excessive. Gauge by sound and by feel.
- *2.05 Speed of the machine shall be within the following limits after being run for an hour and when the applied voltage is within the limits shown below.

Input Voltage	Resistance Load (Ohms)	Speed	
		Min.	Max.
49.5±0.1	200±1%	3660	3700
45.0±0.1	200±1%	3400	—

- *#2.06 Capacity and Voltage: Under the conditions shown below, the machine shall meet the output voltage requirements listed therein.

List Number	D-c Input Volts	Machine Temperature	Resistance Load-Ohms	Output Volts
1	49	Room Temp.	250	125 Max.
1	45	⊕Hot	160	105 Min.

⊕Run for an hour.

- #2.07 Commutators and collector rings shall be clean and free from scores, pits, or deformation of the surface except those that may be caused by normal wear. The undercut slots of the commutator shall be clean and the insulation shall not be high enough to touch the brushes. See Sections 171-110-701 and 171-110-801 for additional information on commutation.

- *#2.08 Brush Holders: The distance from the edge of the brush holder (adjacent to the commutator or collector rings) to the commutator or collector rings shall be

Min. - 1/32"
Max. - 5/64"

Gauge by eye.

- *#2.09 Brush holder rocker ring shall be located as indicated by the marks on the machine frame and the rocker ring.

#2.10 Brushes:

- (a) Brushes shall be free in their holders and shall fit so as to insure successful commutation. The brush shunts shall not

interfere with the action of the brush-pressure fingers and shall not touch the frame or commutator. Gauge by eye and feel.

- (b) Brushes shall have the following minimum lengths as measured overall, except that with brushes used in tubular-type holders, the length is measured up to the shoulder where the spring is attached. Use scale.

	Min.
Commutator	3/8"
Collector Ring (60 Cycles)	1/4"

- (c) The brush pressure of each brush shall be sufficient to keep it in good contact with the ring or commutator. Gauge by feel.

*#2.11 Temperature

The temperature of parts shall not exceed the following values:

	Max.
Bearings	80C (176F)
Machine Frame	90C (194F)

Use thermometer.

Caution: Under trouble conditions, the unit temperature may exceed that shown above. Do not use the fingers to estimate temperature.

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges, and Materials (Equivalents may be substituted)

Tools

- Puller, Owatonna Tool Co., Grip-O-Matic, No. 1000-1/2L
- Screwdriver, regular, 4"
- Wrench, 3/8" and 1/4", #417A tool

Gauges

- Indicator, speed, Hasler, Style A or locally prepared stroboscopic lamp
- Scale, steel, 6", R-8550
- Thermometer, R-1032, Detail 1
- Voltmeter, A-c, range 300-150 volts, Weston model 528
- Voltmeter, D-c, range 150-60-3 volts, Weston model 280
- Volt-ohm-milliammeter, KS-14510

Materials (See Sections 065-330-101 and 065-370-101)

- Cloth, cleaning, KS-14666
- Pad, felt
- Resistor, Ward Leonard Adjustohm, 250 ohms, 160 watt.
- Sandpaper, 4/0
- Spirits, petroleum, KS-7860

3.002 While making adjustments of such a nature that sudden starting might cause injury to person or equipment, disconnect power supply from the machine by blocking relays, removing fuses, or disconnecting plugs where furnished. If the machine is provided with plugs to attach it to a panel equipped with jacks, it will generally be convenient to move the machine to a bench for major maintenance work. When replacing a machine, be careful to enter the disconnect plug properly in the jacks to avoid blowing a fuse. Block any transfer relays that may be present to prevent transfer to an out-of-service machine.

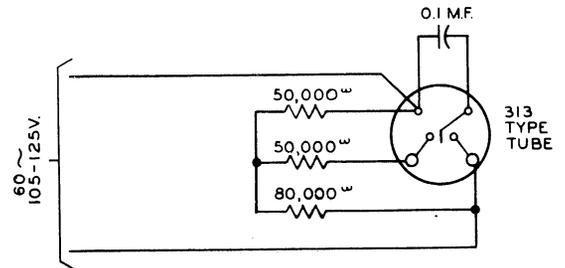


Fig. 2 - Stroboscopic Lamp Circuit

*#3.01 Lubrication (Rq. 2.01) To replace worn or noisy bearing, dismantle the machine by removing the four through-bolts and the end shields. Mark the brushes for replacement in their original positions. Use the bearing puller to remove the old bearing. Force the new bearing on the shaft by tapping a short length of pipe, with an inside diameter slightly larger than the shaft, held on the inner race. Do not apply force to the outer race, as this may ruin the bearing. Clean the bearing housing with petroleum spirits and re-assemble the machine.

3.02 Freedom of Rotating Parts (Rq. 2.02)

- (1) If binding is present, examine the machine and remove any foreign matter. Tighten through-bolts of inverter frame.
- (2) If motor shaft binds, check end play (3.03) and lubrication of bearings (3.01). If trouble cannot be located, a complete overhaul of the machine may be necessary.

*#3.03 End Play (Rq. 2.03) If the spring washer or its equivalent fails to take up the end play, it should be replaced.

3.04 Noise and Vibration (Rq. 2.04) Where excessive noise or vibration is present, see that all bolts, nuts, and screws are tight. If the noise and vibration continue after this check, it may be due to worn or damaged bearings and a complete overhauling of the machine should be made.

*3.05 Speed (Rq. 2.05)

- (1) If the speed is thought to be outside of limits, apply a speed indicator to the end of the shaft to check the speed or use a strobotac or a locally prepared stroboscopic speed indicator as described in (3) below.
- (2) If the speed is outside of limits, check to see if supply voltage is within limits. Check 2.01, 2.02, 2.03, 2.07, 2.08, 2.09, 2.10, and 2.11. If speed is low, remove office load and apply test load. If machine is within limits when test load is applied and runs slow with office load, the office load is exceeding the capacity of the

machine. If, after checking all the other factors, the speed is still outside of limits, remove the cover from the field resistance and adjust as necessary.

(3) To make up a stroboscopic lamp, connect a 313-type vacuum tube as shown in Fig. 2. It will be necessary to remove a part of the black coating from the outside of the lamp. This may be done by scraping or dipping in acetone. This lamp, when connected to a 60-cycle source, will produce 3600 flashes per minute. Make a chalk mark on some rotating part of the machine. If the speed is 3600 rpm, the mark, when illuminated by the lamp, will appear to remain stationary. If the speed is less, it will appear to rotate backward with respect to the rotation of the machine. The number of apparent revolutions of the mark in one minute is the difference between 3600 rpm and the speed of the machine.

*#3.06 Capacity and Voltage (Rq. 2.06)

- (1) To check output voltage at full load without taking current readings, remove other load and connect the specified resistance across the output. If output voltage is within limits, the machine is performing satisfactorily.
- (2) If input is within limits and the output voltage from the machine with full load or test load applied is not within limits, check 2.02, 2.05, 2.07, 2.10, and 2.11. If trouble cannot be found, report to supervisor. If voltages are within limits with full load or specified test load, but are low under office conditions, the office load is too high for the machine.

#3.07 Commutators and Collector Rings:

Reference should be made to Sections 171-110-701 and 171-110-801 for information on commutators and collector rings.

*#3.08 Brush Holders (Rq. 2.08) If a brush is only slightly off alignment, this will usually not interfere with commutation, and readjustment would not be justified since any change in the position of the holder necessitates refitting the brush. If the

SECTION 161-230-701

holder is realigned or moved to secure the proper clearance, tighten the securing nuts firmly and reseal the brush.

#3.09 Brush Holder Rocker Ring (Rq. 2.09)

If the marks on the machine and brush holder rocker ring do not appear in line, loosen the rocker ring clamping bolts, move rocker ring until alignment of marks is secured, and tighten the clamping bolts. Make this adjustment when the machine is not running.

#3.10 Brushes (Rq. 2.10)

- (1) When removing brushes, note their position in the holder and mark them, if necessary, to insure replacement in the same holder and in the same position in the holder.
- (2) Replace any brushes that are too short or loose.
- (3) When a brush sticks in its holder, remove the brush and wipe it off with a piece of clean cloth. If slightly rough, the

brushes may be smoothed with a piece of 4/0 sandpaper. Clean out the holders with a piece of clean cloth moistened with petroleum spirits.

- (4) If a brush requires fitting, refer to Section 171-110-701 for the correct method.

*#3.11 Temperature (Rq. 2.16)

- (1) Hold the bulb of the thermometer against the hottest spot in question, covering that part of the bulb which is not in contact with the part by a piece of felt or the equivalent, and observe the highest temperature indicated.
- (2) If temperature requirements are exceeded, examine all mechanical requirements and check the load on the machine (3.06). If the temperature still remains outside the specified limits, the matter should be brought to the attention of the supervisor.