

Installation Engineering Handbook 19
Western Electric Company, Incorporated
Kearny Works

Section
6-11-71

Replaces Section 26
dated 7-20-61,

KS-15816 RINGING MACHINE AND COIN
CONTROL GENERATOR; KS-5376-01 VOLTAGE
REGULATOR; KS-5286 TONE ALTERNATOR

CONTENTS

- | | |
|------------------------------|---|
| 1. GENERAL | 9. COMMUTATION |
| 2. INSTALLING EQUIPMENT | 10. NOISE AND VIBRATION |
| 3. LUBRICATION | 11. SPEED |
| 4. FREEDOM OF ROTATION | 12. VOLTAGE ADJUSTMENT AND REGULATION |
| 5. END PLAY | 13. FLASHING FIELD OF THE COIN CONTROL GENERATORS |
| 6. DIRECTION OF ROTATION | 14. FLEXIBLE COUPLING |
| 7. BRUSHES AND BRUSH HOLDERS | |
| 8. COMMUTATOR | |

1. GENERAL

1.1 Scope

1.11 This section covers the installation of the KS-15816 ringing and coin control generators with associated KS-5286 tone alternators, accessories, and KS-5376-01 voltage regulators. This equipment is used in the 803-C Power Plants.

1.12 Coordinate information in this section with test of the plant in Handbook 21.

1.13 Refer to section in this handbook for information on associated interrupters. Section 35 tells how to install and adjust the interrupters and how to connect the gear case to the tone alternator.

1.2 Precautions

1.21 Remove the fuses, if permitted, before making any mechanical adjustments or tests. These sets are subject to starting without any visible or audible warning.

1.22 Before starting a machine which has not been adjusted for automatic voltage regulation, open regulator contacts by turning regulator dial to maximum clockwise position. This is to avoid excessive wear on regulator contacts.

1.23 Observe general precautions listed in Handbook 0.

1.24 If the generator is to be operated for any reason with dc brushes in place but with ac brushes lifted, disconnect the associated voltage regulator. If this is not done, dc voltages 15-25% higher than normal may be experienced.

1.3 Inspection

1.31 Remove any materials used for shipping purposes and inspect the ringing machine, voltage regulator and accessories for damage and missing parts. Nameplate data should agree with job specification. Check that serial numbers on accessories agree with ringing machine serial numbers.

1.32 Report any defects, damage or missing parts in accordance with established routines.

1.4 Description

1.41 The 803-C Power Plant uses two KS-15816 ringing and coin control generators, one driven by a three-phase ac motor and the other by a 48 volt dc motor. For the dc motor a speed regulator mounted on the commutator end of the motor keeps the speed within the limits. A KS-5286 tone alternator is furnished on each generator. Space is available on the machine base at the tone alternator end to mount an interrupter gear case. Tapped mounting holes are provided in the base and mounting bolts are furnished. A coupling half and a flexible belt to couple the interrupter to the tone alternator are also furnished.

1.42 An insulating transformer, generator field rheostat and a KS-5376-01 voltage regulator are furnished with all machines. In addition, dc motor driven machines have a motor field rheostat and a motor starter furnished.

1.43 Each accessory except the dc starter is marked with the serial numbers of the associated machine. Generator field rheostat is marked "VOLT REG" and the dc motor field rheostat, when furnished, is marked "MOT". The motor field rheostat is set at the factory for correct operating point locked in this position and marked.

1.44 The KS-5286 Tone Alternator consisting of a common exciting structure of Alnico and three stators each with a separate inductor winding for supply tones. Three channels are provided.

1.441 Low tone consisting of a tone of approximately 600 hertz, modulated in amplitude at the rate of a 120 hertz and heard as a 120 hertz tone.

1.442 High tone - having a frequency of 500 hertz which is not modulated.

1.443 Audible ringing tone has a frequency of approximately 420 hertz, modulated in amplitude by 40 hertz.

1.45 The ringing and coin control generator produces ac at the collector rings (M1) and (M2) and dc across the commutator brushes (A1 -) and (A2 +). The leads from the direct current commutator brushes together with a ground lead comprise the 230 volt, 3 wire coin control system which supplies 115 volts positive for coin collect and 115 volts negative for coin refund. About 175 volts 20 hertz ac is also furnished through collector ring brushes connected to M1 and M2. This is applied to an insulating transformer primary winding. The transformer has two secondary windings, one furnishing about 85 volts and the other 85 to 105 volts, depending on taps used. The voltage regulator will be connected to one of the transformer secondary windings, depending on which voltage is to be regulated.

1.46 The KS-5376-01 voltage regulator has a dc motor driving a centrifugally-actuated contact. The dc motor voltage is obtained by rectifying one of the 20 hertz voltage outputs from the insulating transformer. This contact driven by the dc motor shifts back and forth according to motor speed, which varies directly as the value of the 20 hertz voltage. This contact makes with a stationary contact whose position can be adjusted with a dial. When the contacts make (motor speed slow because 20 hertz voltage is low) a resistance in the ringing generator field circuit is shorted. This increases the 20 hertz voltage, speeding up the motor which then opens the contacts to remove the short and lower the 20 hertz voltage. An autotransformer and a rectifier (either copper oxide or selenium) are furnished with this regulator.

2. INSTALLING EQUIPMENT

2.1 Tools and Test Equipment

<u>Code</u>	<u>Description</u>
R-2705	Tachometer
R-8550	Scale 6"
ITE-5250	Digital Multimeter
ITE-4175	Socket, Weatherproof
Obtain Locally	Lamps, 120 volt, wattage as required.

2.2 Supplies

<u>Code</u>	<u>Description</u>
KS-2423	Cloth, Twill
Obtain Locally	Pad, Felt

3. LUBRICATION

3.1 Motor, generator and voltage regulator ball bearings are lubricated at the factory and should not be relubricated on the job.

4. FREEDOM OF ROTATION

4.1 Ring Machine: Before attempting to start the machine turn the shaft by hand to determine that it is free to rotate.

5. END PLAY

5.1 A very small amount of end play is present on the ringing and coin control generator. Do not bar its shaft to check for end play. End play may be considered satisfactory if bearing housings do not overheat.

5.2 The voltage regulator motor shall have its end play taken up by a thrust spring.

6. DIRECTION OF ROTATION

6.1 Direction of rotation shall be as marked on the machine. If not marked, direction of rotation of the ringing generator should be clockwise when viewed from tone alternator end of the machine.

7. BRUSHES AND BRUSH HOLDERS

7.1 Brushes shall be free in their holders, but shall not be loose enough to cause poor commutation.

Gauge by eye and feel.

7.11 If a brush binds in its holder remove the brush from the holder and wipe brush and holder with a clean dry cloth. Remove any rough projections on brushes with fine abrasive paper.

7.12 Brush pressure on KS-15816 machine is not adjustable due to the construction of the brush holders.

8. COMMUTATOR

8.1 Both the ringing generator and dc motor commutator surfaces shall be clean and free from scoring, pits, and other deformations.

Gauge by eye and feel.

8.2 A dark bronze or chocolate covered film on the commutator is desirable. Whether or not such film is present, the surface is satisfactory if it is clean, smooth and commutation is good.

8.3 Clean dirt and oil off the commutator with a clean dry KS-2423 cloth. Add a few drops of Trichloroethane to the cloth in cases of extreme gumming. Use a very small amount of Trichloroethane as an excess will attack and remove the brown film. After using Trichloroethane on the commutator wipe surface with a clean dry cloth. Do not allow Trichloroethane to get on the brushes.

8.4 If the commutator surface is sufficiently roughened or pitted to cause poor commutation or excessive sparking it may be necessary to have the commutator resurfaced. In this case report the condition to the supervisor.

9. COMMUTATION

9.1 The generator and dc motor shall commutate satisfactorily. This condition is met if brushes and commutator are not burned or injured during test. Presence of some visible sparking is not necessarily evidence of unsatisfactory commutation.

10. NOISE AND VIBRATION

10.1 Noise or vibration of the machine shall not be excessive for any load from no-load to full rated load.

Gauge vibration by feel. If noise or vibration appear to be excessive report the matter to the supervisor.

11. SPEED

11.1 Ringing machine speed shall stay within the limits of 1100 to 1220 rpm under all normal load conditions. Speed of ac motor-driven machines need not be checked. Check speed of dc motor-driven machines only if trouble is experienced in obtaining the voltage adjustment and regulation in Paragraph 12. Remove the plate on the end of the interrupter gear case and apply an R-2705 tachometer to the high-speed shaft.

12. VOLTAGE ADJUSTMENT AND REGULATION

12.01 Connect ITE-5250 Digital Multimeter (depressing the VDC, range 1000 Buttons and POWER ON/OFF Button to POWER ON) between CC- bus bar and ringing ground bus bar. With no load on the machine adjust voltage regulator dial so that the voltmeter reads 116 volts (average fluctuations).

12.02 Depress the POWER ON/OFF to POWER OFF on the ITE-5250.

12.03 Remove the ITE-5250 Multimeter and apply a 500 Watt lamp load (120 volt lamp) between ground and terminal 8 on the associated TR transformer.

12.04 Run the machine for one hour with the load connected. At the end of this time remove the lamp load and repeat the operations in Paragraph 12.01. Taps 1, 3, 4 and 6 on transformer TR have additional taps marked "A" and "B" so that this minimum coin voltage can be selected. Taps are usually selected at the factory and unused leads taped up.

12.05 Depress the VAC and range 1000 Buttons on the ITE-5250 Digital Multimeter.

12.06 Again add the lamp load. Connect the ITE-5250 Digital Multimeter across terminals of the switch-board ac ringing voltmeter.

12.07 Depress the POWER ON/OFF Buttons on the ITE-5250 to POWER ON. Read the ac voltage. Remove the load and again read the voltage. The percent rise in voltage from load to no-load condition shall not exceed 1% of the voltage under load condition.

$$\% \text{ Rise} = \frac{V_{NL} - V_L}{V_L} \times 100$$

12.08 Depress the POWER ON/OFF Button of the ITE-5250 to POWER OFF and remove the ITE 5250.

12.09 If the requirement in Paragraph 12.07 cannot be met, check that generator field rheostat is in the position marked by the factory and locked in place. Reset to marked position if it has been moved.

12.10 AC voltages across transformer TR secondary windings shall stay within the following ranges under all normal load conditions:

<u>Taps</u>	<u>Voltage Ranges</u>
4-5	84-88 Regulated
6-7	81-90 Unregulated
6-8	101-110 Unregulated
	104-108 Regulated

NOTE: 803C Plants using KS-1581G machines will provide only 84-88 volts regulated supply.

12.11 If the voltages do not fall within the range indicated in Paragraph 12.10 check and correct, if necessary, the following.

12.111 Brush setting.

12.112 Loose connections at the transformer, rheostat, voltage regulator and resistor unit.

12.113 Leads at the brush holders.

12.114 Transformer tap selection.

12.115 Speed.

12.12 If the voltage remains outside the limits after checks 12.111 to 12.115 are made and any defects corrected originate a T.I.M. in accordance with standard routines.

12.13 The KS-5286, with a rotor speed within the limits of 1100 and 1200 rpm should produce the following tone and audible ringing voltages:

Channel	Voltage Limits	
	Maximum	Minimum
Low-tone	2.35V	0.9V
High-tone	2.35V	1.0V
Audible-Ringing	1.00V	0.6V

12.14 On the ITE-5250 depress the VDC and range 1000 buttons.

12.15 Connect the ITE-5250 Digital Multimeter across terminals A2+ and A1-. The positive (+) probe of the ITE-5250 on A2+ and the negative (-) probe on A1-.

12.16 Depress POWER ON/POWER OFF Button to POWER ON. Check for voltage and correct polarity. The ITE-5250 display will show positive (+) if voltage is of correct polarity; the display will show negative (-) if polarity is incorrect. If polarity is incorrect flash the field as shown in Paragraph 13.

13. FLASHING FIELD OF THE COIN CONTROL GENERATORS

13.1 Shut down machine.

13.2 Disconnect the F2 lead.

13.3 Connect the negative (-) side lead of a 12-15 VDC source to F1 and momentarily touch the positive (+) side lead to F2 lead of the field coil.

NOTE: There will be some arching when the positive side lead touches the F2 lead.

13.4 If the field was flashed start the machine and recheck polarity of voltage. Then shut down the machine and disconnect the ITE-5250.

13.5 Reconnect F2 lead.

14. FLEXIBLE COUPLINGS

14.1 The type F Falk flexible coupling furnished on KS-15816 machines shall be inspected after 30 days running to determine if grease is leaking from the coupling. Tighten the cap screws as necessary to stop the leak.

14.2 If the coupling continues to leak grease the seals may be defective and may have to be replaced. If grease is leaking from the pressure fitting the coupling will have to be dismantled and the pressure fitting hole sealed off with epoxy resin compound.

No arrows shown due to extensive changes.

Manager, Product Engineering

Reasons for Reissue:

To make minor changes throughout the section.
To remove paragraph on Temperature.
To add voltage limits at each channel on KS-5286.
To add paragraph on Flashing of Field of Coin Control Generator.
To remove the ITE-1000 AC Voltmeter and ITE-4474 DC Voltmeter and to use the ITE-5250 Digital Multimeter in place of them.