

SPEED AND VOLTAGE REGULATOR J86253A AND J86253B OPERATING METHODS

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1. GENERAL

1.01 This section covers the operation of the J86253A contact-type speed and contact-type voltage regulator (Fig. 1) and J86253B electronic-type speed and contact-type voltage regulator (Fig. 2), used to control the speed (frequency) and voltage of a dc motor-driven KS-15532 ringing machine used in the 804C ringing power plant.

1.02 This section is reissued to add the J86253B speed and voltage regulator.

1.03 The J86253A or J86253B speed and voltage regulator circuit was designed to hold the output voltage of a dc motor-driven KS-15532 ringing machine within 84 to 88 volts at a frequency between 18-1/3 Hz (J86253A regulator) or 19-1/2 Hz (J86253B regulator) and 20 Hz from no load to 1.0 ampere for any dc supply voltage between 45 and 52 volts. The ringing machine also has high- and low-tone outputs.

1.04 The instructions are based on drawing SD-81150-01. For detailed description of

the operation, see the corresponding circuit description. See Fig. 3 and 4 for simplified schematic diagram.

1.05 For more detailed information on the operation and maintenance of individual equipment or apparatus, refer to the appropriate Bell System Practice.

1.06 Routine checks should be made during a period when they will cause the least service reaction.

1.07 The speed regulator and voltage regulator plug-in units are not interchangeable.

1.08 Replacement or adjustment of regulator unit springs or contacts is not recommended because of their delicacy. If out of adjustment, replace the whole unit.

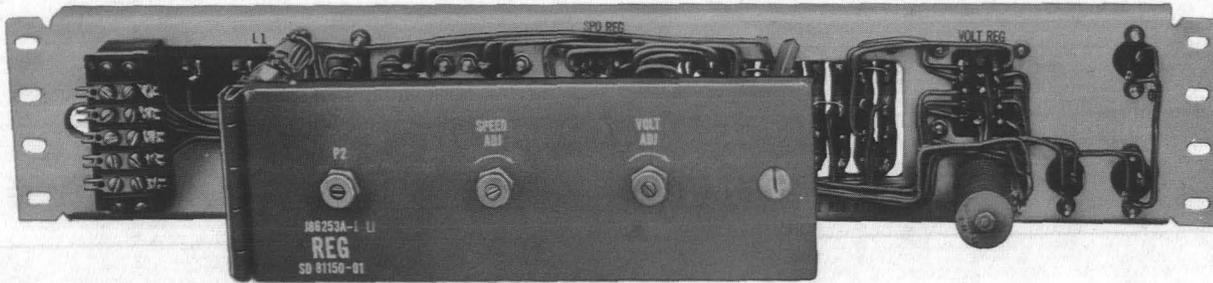
2. TOOLS AND GAUGES

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
KS-6854	Screwdriver
—	3-Inch C Screwdriver
GAUGES	
KS-1894	Decimal Stopwatch or watch equipped with a second hand
KS-14510	Volt-Ohm-Milliammeter
—	Tachometer, No. 5, Boulin Instrument Corp.

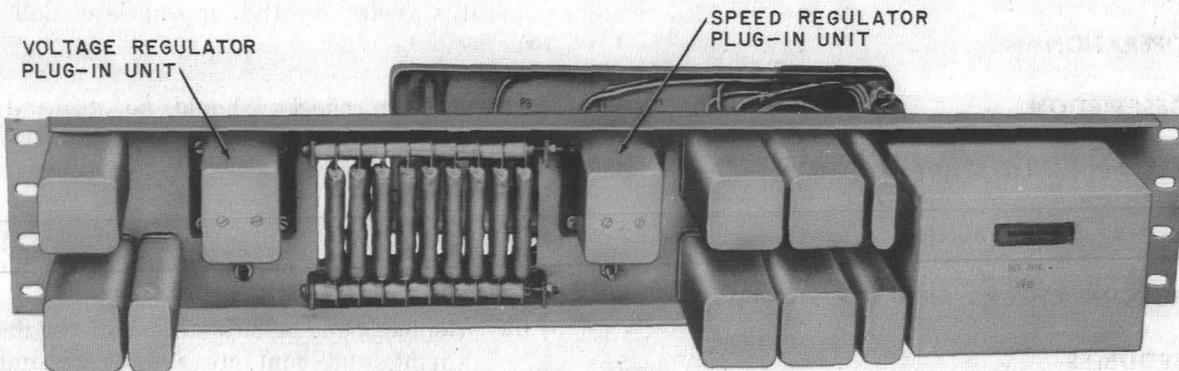
3. OPERATION

DESCRIPTION (CONTACT-TYPE REGULATORS)

3.01 The contact-type speed and contact-type voltage regulator units each have an adjustable



FRONT VIEW



REAR VIEW

Fig. 1—J86253A Speed and Voltage Regulator

dashpot-type sensitive solenoid or actuating element with a moving armature which operates a pushbar. The movement of the pushbar governs the position of direct acting fingers. These fingers open or close contacts which change the series resistance in the regulator circuit. One solenoid is moved one way or the other, depending on whether the associated ringing machine ac output voltage rises or falls from the normal value. Changes in ringing machine output frequency control the movement of the other solenoid. The resulting solenoid movements increase or decrease the amount of resistance in series with the supply voltage to the dc motor and ringing generator fields in a compensating direction, thus maintaining the ringing machine output voltage and frequency practically constant.

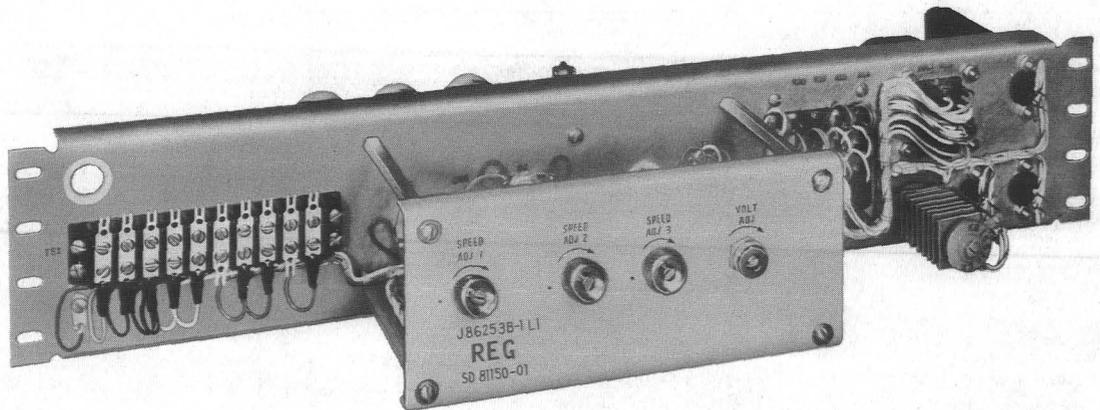
3.02 The SPEED ADJ potentiometer is used to adjust the speed of the associated ringing machine so that its output frequency is $19\frac{1}{3}$ Hz (1160 rpm). The P2 potentiometer may be used for the same purpose if the range of SPEED ADJ

potentiometer is insufficient. Although the output is specified in Hz, the frequency is dependent upon the speed of the ringing machine. This speed should be between 1100 and 1200 rpm.

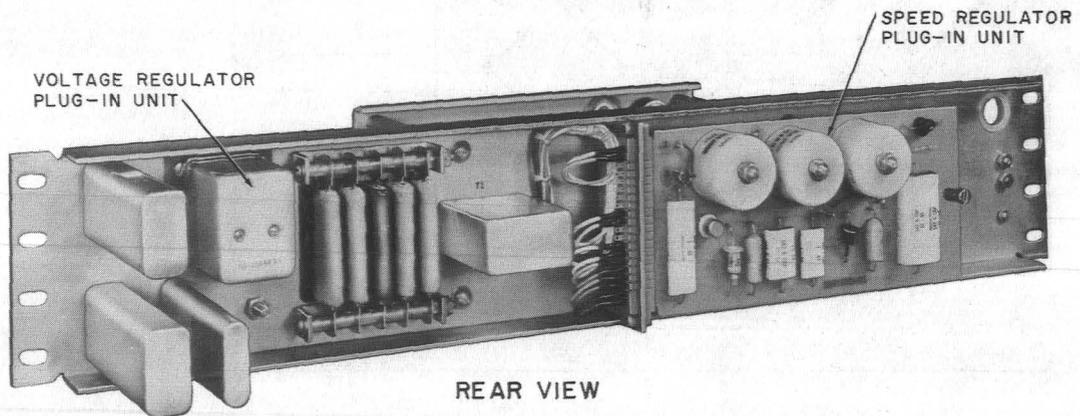
3.03 The VOLTS ADJ potentiometer is used to adjust the associated ringing machine output to 86 volts.

DESCRIPTION (ELECTRONIC-TYPE SPEED REGULATOR)

3.04 The electronic-type speed regulator consists of a transistor discriminator circuit driving a current regulating transistor in series with the motor field winding. High tone (500 Hz) from the ringing machine is coupled to the discriminator circuit. If the ringing machine speed increases or decreases, the 500 Hz frequency will increase or decrease resulting in a compensating increase or decrease in the current flowing in the regulating transistor circuit and motor field winding. A change in the motor field current will result in a compensating



FRONT VIEW



REAR VIEW

Fig. 2—J86253B Speed and Voltage Regulator

decrease or increase in the motor speed, thus maintaining the ringing machine speed practically constant.◆

3.05 ◆The SPEED ADJ 2 and SPEED ADJ 3 potentiometers are used to adjust the speed of the ringing machine to an output frequency of 20 Hz (1200 rpm). The SPEED ADJ 1 potentiometer is turned completely counterclockwise and is not used to adjust the speed of the ringing machine. Although the output is specified in Hz, the frequency is dependent upon the speed of the ringing machine. This speed should be between 1160 and 1200 rpm.◆

PREPARING TO START INITIALLY

3.06 When putting the regulator panel into service, check to see that:

- (a) The KS-15545 speed regulator or electronic speed regulator and the KS-15546 voltage regulator units are firmly plugged into their respective sockets on the rear of the panel.

(b) ◆VOLTS ADJ potentiometer on the front of the regulator panel is turned completely counterclockwise.◆

(c) ◆P2 and SPEED ADJ (J86253A regulator) potentiometers on the front of the regulator panel are turned completely counterclockwise.◆

(d) ◆SPEED ADJ 1, SPEED ADJ 2, and SPEED ADJ 3 potentiometers (J86253B regulator) on the front of the regulator panel are turned completely clockwise.◆

(e) The required fuses are installed in the associated ringing plant.

INITIAL ADJUSTMENTS

3.07 With the office battery at floating voltage, operate the necessary controls on the associated ringing plant to start the dc motor-driven KS-15532 ringing machine.

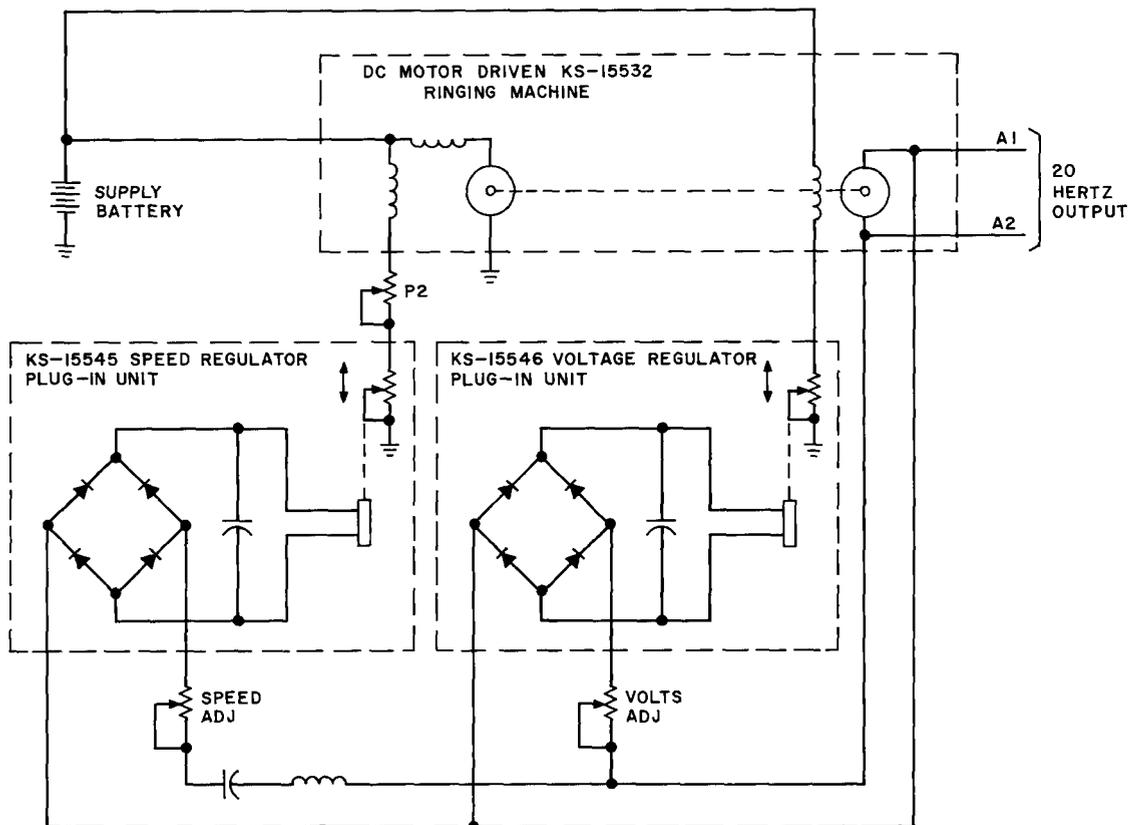


Fig. 3—Simplified Schematic of Regulator Ringing Machine Circuit With J86253A Regulator

3.08 With the machine hot (1 hour running time), adjust VOLTS ADJ potentiometer on the front of the regulator panel so that the associated ringing machine output is 86 volts at no load. Voltage may be read on the plant switchboard meter, if provided, or on a portable voltmeter connected to the ringing machine output.

Note: If, adjusting the J86253A regulator, 86 volts cannot be reached, turn SPEED ADJ potentiometer clockwise until the frequency increases to 18 Hz (approximately 1080 rpm), then readjust VOLTS ADJ potentiometer for 86 volts.

3.09 The J86253A regulator is adjusted for speed control as follows:

- (a) Adjust the SPEED ADJ potentiometer on the front of the regulator panel until the associated ringing machine frequency is 19-1/3 Hz (1160 rpm). If the range of the SPEED ADJ

potentiometer is insufficient, use the P2 potentiometer.

3.10 The J86253B regulator is adjusted for speed control as follows:

- (a) Adjust the SPEED ADJ 2 potentiometer on the front of the regulator panel until the associated ringing machine frequency is 19-1/3 Hz (1160 rpm).
- (b) Adjust the SPEED ADJ 3 potentiometer on the front of the regulator panel until the associated ringing machine frequency is 20 Hz (1200 rpm).

3.11 The speed of the ringing machine may be checked as follows: Remove the snap-off end plate with the 3-inch C screwdriver and apply the tachometer to the end of the high-speed shaft of the KS-15532 ringing machine, if space permits. If there is insufficient space to use the tachometer,

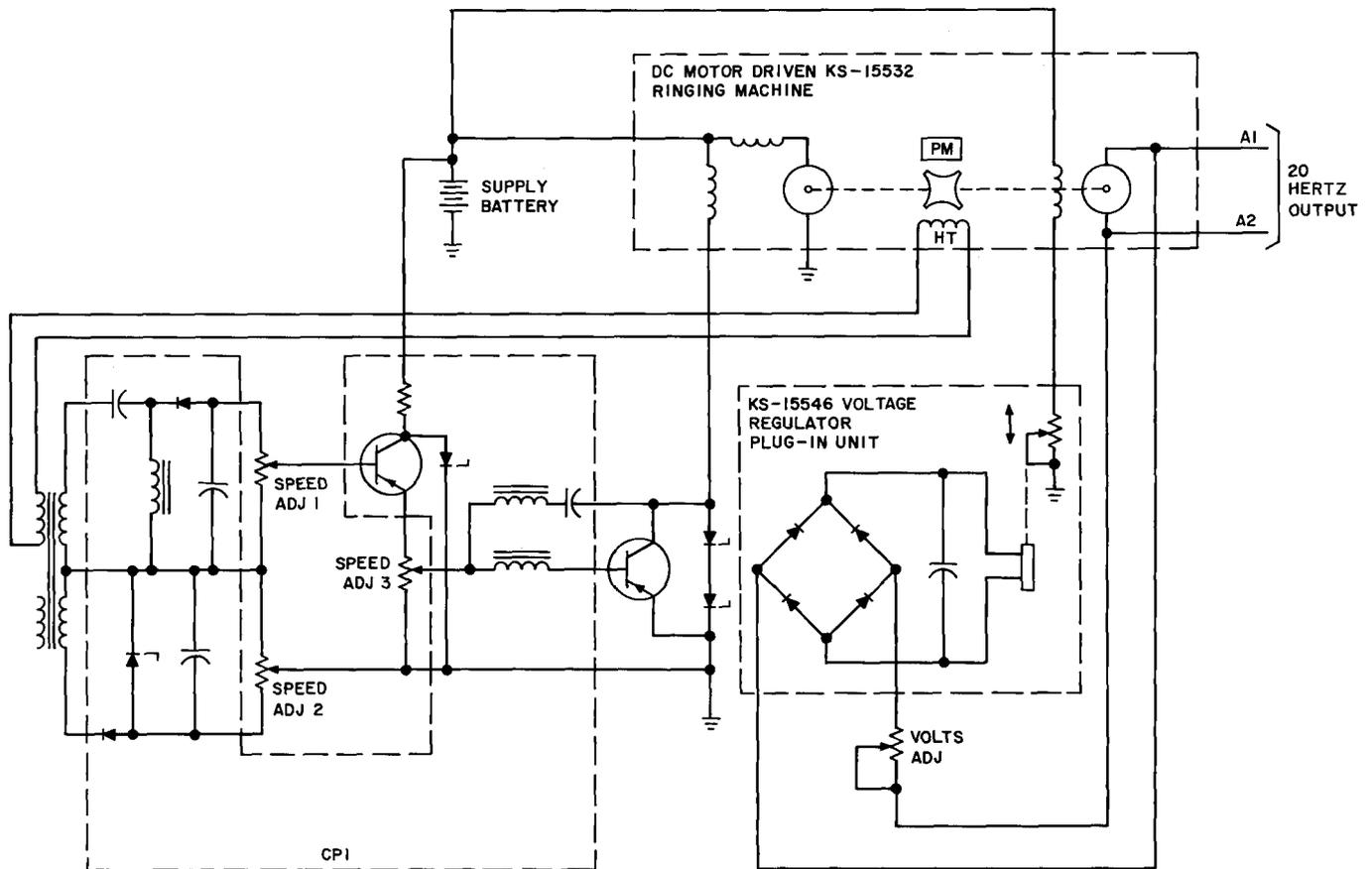


Fig. 4—Simplified Schematic of Regulator Ringing Machine Circuit With J86253B Regulator

proceed as follows: Time ten revolutions of the low-speed shaft of the KS-15532 ringing machine by observing the leading edge of the lobe on cam No. 1 as it passes the end of the spring pack. Use the KS-1894 stopwatch or a watch with a second hand. Ten revolutions of the low-speed shaft correspond to 1200 revolutions of the high-speed shaft. Compute the revolutions per minute (rpm) of the low-speed shaft and multiply by 120 to determine the speed of the high-speed shaft.

3.12 ♦ Apply the normal ringing machine load and check that the voltage and frequency of the ringing machine are as follows:♦

(a) ♦ Within 18-1/3 to 20 Hz (1100 to 1200 rpm) and between 84 to 88 volts when a J86253A regulator is used.♦

(b) ♦ Within 19-1/3 to 20 Hz (1160 to 1200 rpm) and between 84 to 88 volts when a J86253B regulator is used.♦

4. ROUTINE CHECKS AND ADJUSTMENTS

4.01 Periodically check the associated dc ringing machine output voltage and frequency in accordance with 3.08 through 3.12 and if necessary, readjust within limits. Always adjust voltage first and frequency next.

5. TROUBLES

5.01 If the dc ringing machine hunts, either or both regulator unit dashpots may be out of adjustment. Hunting is indicated by periodic

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variations in speed or voltage of the ringing machine. Voltage hunting may also show up as speed hunting. The time response of the speed regulator, however, is slower than that of the voltage regulator. When making any regulator unit adjustments, the dashpot on the voltage regulator unit should be checked first for proper adjustment to eliminate it as the source of trouble. Several consecutive adjustments of both regulator dashpots may be required to suppress the hunting as one adjustment may affect the other. Adjust either regulator unit dashpot as follows:

- (a) Using a KS-6854 screwdriver, unscrew the cover screws and remove the cover.
- (b) With the unit plugged in and cover removed, the dashpot adjusting screw may be seen on the face of the unit between the two screws holding the dashpot cylinder.

- (c) Using a KS-6854 screwdriver, turn the dashpot screw counterclockwise until the hunting becomes rapid, then turn clockwise until the hunting just stops.

- (d) Replace cover when the adjustment has been completed.

5.02 Either regulator unit solenoid coil current should be between 30 and 35 milliamperes when the ringing machine output is 86 volts. If the solenoid coil or any element in its series path is suspected of being defective, open this path at regulator unit socket terminal 14, and with clip leads connect a milliammeter between the disconnected lead and terminal 14 to check the current. If the current is not within the limits, shut off the ringing machine and use an ohmmeter to locate the defective element. Lack of adjustment control may be due to a defective rectifier stack. Improper time response may be due to defective capacitors.