POWER SYSTEMS
RINGING CIRCUIT
TRANSISTOR TRANSFER AND ALARM
FOR 20 AND 60 CYCLE SUPPLIES
756A PBX
J86464F

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 The resistance of the ADJ 20~ and the ADJ 60~ potentiometers has been increased to 25,000 ohms from 10,000 ohms and resistor (R5) has been removed. This change provides for a greater range of circuit adjustment to allow for wider manufacturing variations in the 823A network.

B. CHANGES IN APPARATUS

B.1 In FS1 resistor R1 has been changed from 10,000Ω "Z" option to 25,000Ω "Y" option.

B.2 In FS1 resistor R2 has been changed from 10,000Ω "Z" option to 25,000Ω "Y" option.

B.3 In APP Fig. 1, under potentiometers, resistor R1 has been changed from 10,000Ω "Z" option to 25,000Ω "Y" option.

B.4 In APP Fig. 1, under potentiometers, resistor R2 has been changed from 10,000Ω "Z" option to 25,000 "Y" option.

B.5 In FS1 resistor R5, 2400Ω "Z" option has been removed.

B.6 In APP Fig. 1, under resistors, resistor R5, 2400Ω "Z" option, has been removed.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 In FS1 resistor R5 was formerly shown, "Z" option.

All other headings under Changes, no change.

1. PURPOSE OF CIRCUIT

1.1 To provide automatic transfer and alarms for regular and reserve 20 and 60 cycle power supplies in a battery reserve 756A PBX.

2. WORKING LIMITS

2.1 45-52 Volts dc.

2.2 Approximately 50-60 Volts, 20 cycle ringing supply. Approximately 70-80 Volts, 60 cycle interrupter motor supply.

3. FUNCTIONS

3.1 To monitor the output voltage of the 20 and 60 cycle regular supplies.

3.2 To automatically transfer the load from the regular to the reserve 20 or 60 cycle supply if the regular supply goes to a low voltage or no voltage condition.

3.3 To connect battery to the reserve 20 or 60 cycle supply and remove battery from the regular supply if the transfer occurs.

3.4 To originate an alarm and light a lamp if the transfer occurs.

4. CONNECTING CIRCUITS

4.1	SD-81318-01	Rectifier Ckt.
	SD-81328-01	Transistor Low Tone Supply Ckt.
	SD-81325-01	Ringing & Tone Supply Ckt.
	SD-81329-01	Transistor 20 Cycle Supply Ckt.
	SD-81330-01	Transistor 60 Cycle Supply Ckt.

DESCRIPTION OF OPERATION

5. AUTOMATIC TRANSFER AND ALARM

5.1 In FS1, two similar transfer and alarm circuits are included, one each for 20 and 60 cycles. Each consists of a pnp junction transistor Q1 (FS2) with a normally operated relay, A or B in its collector circuit and a reference zener diode DZ1 (FS2) in its emitter circuit. Samples of the voltage of the regular 20 and 60 cycle supplies are brought in from 10 Volt taps on these supplies over leads TR2 and TR6, through capacitors C1 and C2, and potentiometers ADJ 20~ and ADJ 60~, to networks 20~ and 60~ shown in FS2. In combination, C1 or C2, and diodes D1 and D2 and capacitor C1, all in FS2, form a voltage doubler rectifier and filter. The sample ac voltage is rectified and filtered and the resulting dc voltage, plus ripple, is impressed across a bleeder resistor consisting of R2 and R3 in series. This voltage is also fed to the base of transistor Q1. If this dc voltage between the base of Q1 and ground is greater than the

voltage drop across reference diode DZ1, the emitter junction of Q1 is forward biased, causing current to flow in the collector to emitter circuit, thus holding relay A or B operated.

5.2 A second zener diode DZ2 is provided to limit the voltage supplied to the transistor to stay within its ratings. Under normal conditions, the drop across DZ1 will be between 5.4 and 6.6 volts, and the drop across DZ2 will be between 20 and 25 Volts. These are test limits for these semiconductor devices and the particular diodes in the circuit although somewhere in this range will actually vary by only a very small amount. The difference between the applied battery voltage and the drops in the DZ1 and DZ2 is absorbed by resistor R4.

5.3 If the input ac voltage drops below a minimum set by the ADJ 20~ or the ADJ 60~ control, the input dc control voltage at the base of Q1 will become less than the drop across DZ1 after a short delay due to capacitor C1 (FS2), and also capacitor C3 (FS1) in the 20 cycle circuit. This will cause the transistor to cut off and release relay A or B. The exact release point also depends somewhat on the parameters of Q1 but is essentially independent of the adjustment of the relay.

5.4 If relay A releases, its contacts 4 and 5 transfer the ringing load from the regular to the spare 20 cycle supply, its contact 2 removes battery from the regular 20 cycle supply and the transfer circuit, and its contact 1 connects battery to the reserve 20 cycle supply. In addition its contacts 7 and 11 connect 511 ohm battery over lead PG and light lamp 20~ TRNS to provide alarms to indicate that a transfer has taken place. A further contact 12 short-circuits R3 (FS2) when relay A is released in order to increase the margin between release and operate voltages and to reduce chatter of the relay (due to ripple) when near the critical release and reoperate voltages.

5.5 Relay B similarly will transfer the 60 cycle interrupter motor load switch battery between the regular and reserve 60 cycle supplies, provide an alarm, and will light lamp 60~ TRNS if the 60 cycle regular supply fails. On relay B an additional back contact 9 connects dummy load resistor R4 across the regular 60 cycle supply when the interrupter motor load is connected to the reserve supply.

6. RESTORING TO NORMAL

6.1 As arranged in FS1, neither the 20 nor the 60 cycle supply will automatically restore to normal after an automatic transfer, as it is assumed that any failure of a regular supply will require maintenance attention. After the trouble has been corrected in the faulty supply key RST should be operated and held for about 15 seconds or until the transfer is restored. This key reconnects battery supply to the regular supply which has previously failed. If the supply operates properly, it will generate normal voltage which will cause relay A or B again operate and remain operated after the RST key is released. The operation of A or B relay restores the load to the regular supply, disconnects battery from the reserve supply, retires the alarm, and extinguishes the lamp. Relay B also disconnects the dummy load resistor R4.

7. INITIAL ADJUSTMENTS

7.1 With potentiometers ADJ 20~ and 60~ fully counterclockwise and the battery on float voltage, fuses RB3 and RB4 may be installed. Operate key RST for about 15 seconds. This should cause the regular 20 and 60 cycle supplies to operate and hold relays A and B operated. After checking that these supplies are furnishing normal output voltages (the interrupter load must be connected at all times to the 60 cycle supply), operate and hold key RST, then turn ADJ 20~ potentiometer fully clockwise, then very slowly counterclockwise, until relay A just operates, release the key then turn the potentiometer about 10 degrees further counterclockwise to provide a few volts margin. Operation of the relay is considered as the point where its armature has fully sealed to its stop and the lamp 20~ TRNS has extinguished completely. The relay may chatter in a partially operated condition at higher settings of the ADJ 20~ control. With this adjustment, the circuit will transfer if the voltage of the regular 20 cycle supply drops to between about 45 and 60 Volts and remains this low for a second or so, but should not transfer due to normal load conditions or power service failure.

7.2 The 60 cycle adjustment should be made in the same way, that is: operate and hold key RST, turn ADJ 60~ potentiometer fully clockwise, then very slowly counterclockwise until relay B just operates, release the key, then turn the potentiometer about 10 degrees further counterclockwise. With this adjustment the circuit will transfer if the regular 60 cycle supply drops to between about 65 and 80 Volts and remains this low for a second or so, but should not transfer due to power service failure.

8. ROUTINE TESTS, ADJUSTMENTS AND PRECAUTIONS

8.1 The transistors, diodes, and tantalum low voltage capacitors are furnished

assembled on printed wire boards (coded as networks). The networks are arranged to plug in to connectors A and B. These networks must be removed if continuity testing by means of a buzzer or headset is employed. Networks should not be removed or replaced unless battery is first disconnected by removing fuses RB3 and RB4.

8.2 If the networks are replaced or interchanged, the adjustments of the ADJ 20~ and ADJ 60~ potentiometers should be repeated as covered above. Other than this, it should not be necessary to change or check the adjustments except very infrequently.

8.3 Occasionally, at least every two years, the reserve 20 and 60 cycle supplies should be operated for 15 minutes or more to reform the film in their electrolytic capacitors. Failure to do so may cause fuse RB4 to blow due to inrush current if a transfer occurs. This transfer may be made simply by removing fuse RB3 momentarily. After replacing the fuse and exercising the spare supplies, restore to normal by means of the RST key as covered above.

9. TRANSFER DUE TO BLOWN FUSE OR LOSS OF BATTERY

9.1 If fuse RB3 blows, is removed, or if battery voltage is lost even momentarily for any reason, both relays A and B will release and transfer the loads to the reserve supplies. This will restore service and will light the alarm lamps the same as for transfer due to failure of the 20 and 60 cycle supplies, but should not be confused with such failure. Restoral to normal is by use of the RST key as before.

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