

425 POWER PLANT
J86437 PLATE SUPPLY
130 VOLTS, 20 AMPERES

1. GENERAL

1.01 This section describes the operation of the 130-volt, 20-ampere plate supply plant which is used in the 425A power plant and was designed originally for the TD-2 radio relay system. The output of the plant is closely regulated from 0.5 to 20 amperes of load except during power failure.

1.02 This section is reissued to delete references to the boost charge timer. Newer plants are not equipped with a timer and require manual operation of a CHG-FLT key for a boost charge and for return to the floating voltage condition.

1.03 Routine checks are intended to detect defects particularly in infrequently operated parts of the equipment, and insofar as possible, guard against circuit failures liable to interfere with service. Checks and adjustments, other than those required by trouble conditions, should be made during a period when they will cause the least unfavorable reaction.

1.04 The instructions in this section are based on drawing SD-81084-01.

1.05 Additional information on the operation and maintenance of individual pieces of apparatus, such as keys, relays, etc., is given in other sections and the attendant should be familiar with them. All relays, etc., are assumed to have been adjusted in accordance with these sections and the circuit requirements tables of the circuit drawings. Refer also to such sections as:

A301.005 - Continuous Float Charge
A301.332 - J86240 Rectifier
A401.001 - Storage Batteries
A401.562 - Meters and Instruments
A438.961 - Electrolytic Capacitors
A462.005 - Voltage Relays

1.06 Information in this section is arranged under the following headings:

1. GENERAL

2. OPERATION

2.01 Description
2.06 Preparing to Start
2.07 Initial Adjustments
2.08 Routine Adjustments

3. ROUTINE CHECKS

4. TROUBLES

1.07 List of Gauges (Equivalents may be substituted)

Receiver, No. 528
Volt-milliammeter, KS-8039

2. OPERATION

Description

2.01 Automatically regulated electron tube-type rectifier units are used to convert 60-cycle single-phase power to 130-volt direct current for 130-volt loads up to 20 amperes and in addition for loads up to 20 amperes for the 250-volt plant. The rectifier units are rated at 8 amperes each. The first unit operates continuously unless shut off manually for maintenance. If the load is under 9 amperes, only one rectifier unit will be in operation. If the load exceeds about 9 amperes, the first rectifier unit transfers automatically to current control delivering about 8 amperes, and the second rectifier unit will start, and after the time delay for filament heating, carry the remainder of the load at the floating voltage. In a similar manner, additional units will be started automatically as required to carry the load, the last unit operating on voltage control and the others on current control. If the load decreases sufficiently, the output of the last unit operating will be decreased to no load; then the rectifier unit will be shut off when the other units have raised the battery voltage to about 140 volts. Provisions are made for a maximum of eight units.

2.02 The rectifier units float and charge a 63-cell battery which is unregulated during power failure, there being no emergency cells. After a power failure, all rectifier units are started to charge the battery on current control, the units being automatically protected against overload by action of the control equipment in the rectifier unit. Charging continues until the high contacts of the floating voltage relay close shutting off rectifier units, one at a time, until the plant operation is restored to the floating voltage. Batteries may be given a boost charge by manually ←

operating key CHG-FLT to CHG. Operating this key to FLT will restore the plant to the floating condition.

2.03 This plant is arranged to connect to the 250-volt plant, the 120-volt battery for the 250-volt plant being in series with the 130-volt battery. This plant is designed to carry 20 amperes of load for the 250-volt plant in addition to the 20-ampere, 130-volt load.

2.04 With normal power service conditions, if the output current of any rectifier unit operating on current control falls below about 1.5 amperes and the condition persists for about 3-1/2 minutes, an alarm is given. With normal power service conditions, if a rectifier unit on voltage control fails, a rectifier failure alarm will be given not more than 3-1/2 minutes after the plant voltage has dropped to the lower limit of the floating voltage relay. Both these alarms will be maintained until the trouble is corrected or until the next succeeding rectifier unit is not required to maintain floating voltage. The alarm lamp RECT will be maintained, however, until extinguished by operation of key ACO. Also, if the floating voltage is consistently high or low, an alarm is given if the condition persists for about 3-1/2 minutes. A high-low voltage relay, with wider limits than those for the floating voltage, gives an immediate alarm if either voltage limit exists. Failure of a discharge fuse causes an alarm by contact with the alarm bar. The charge fuses, while of the alarm type, are not connected to the alarm system. A charge fuse failure causes a rectifier failure. A regulation lead fuse failure causes a float alarm.

2.05 The ammeter indicates the load on the battery and a suppressed zero voltmeter indicates the battery voltage.

Preparing to Start Initially

2.06 When putting the plant into service, check to see that:

(a) The rectifier units have been adjusted in accordance with Sections A301.005 and A301.332 for floating voltage, for charging at 139 volts, for transfer from voltage to current control at 9-ampere output, and for 8-ampere output on current control at floating voltage. The maximum charging voltage is determined by circuit voltage limitations.

(b) The correct fuses are available.

(c) Switch AC on each rectifier unit is in the OFF position.

Initial Adjustments

2.07 Install all a-c and d-c fuses. Turn the AC switch of each rectifier unit to the ON position beginning with the lowest

numbered rectifier unit. Sufficient rectifiers should start, after their respective time delays, to bring the battery to the floating voltage and carry the load.

Routine Adjustments (Normal Operation)

2.08 The plant is entirely automatic and should require no operating attention other than a periodic check of the floating voltage and periodic charging and maintenance of the battery. To stop a rectifier unit, turn switch AC to the OFF position. This disconnects most but not all of the a-c equipment. If a rectifier unit is to be out of service for some time, both the a-c supply fuses and the d-c charge and regulation fuses should be removed. The rectifier unit may be restored to service by operating switch AC to the ON position. The unit should operate on current control and the highest numbered unit in operation should stop when the floating voltage relay high contacts close.

2.09 Periodically give the battery a boost charge at 139 volts in accordance with Section A301.005. Operate key CHG-FLT to CHG to charge the battery and restore to FLT when charging is done. Maintain the battery and battery records in accordance with Sections A301.005 and A401.001

3. ROUTINE CHECKS

3.01 Such routine checks of the power plant relays as are consistent with operating conditions should be made periodically or whenever operation indicates doubtful adjustment or trouble conditions. Periodically shut off enough rectifier units in the plant to cause the idle rectifier units to start to be sure the normally idle plant equipment will operate correctly. On completion of the check, turn on all rectifier units. The plant conditions should return to normal.

3.02 Discharge fuse alarms may be checked by inserting a blown fuse in a spare fuse holder. This should light lamp FA and put ground on the alarm circuits to give audible and visual alarms.

3.03 To check the rectifier failure alarms of the rectifier units, turn the rectifier AUTO/MANUAL switch of the lowest numbered unit until it just snaps into the MANUAL position. If this unit was on current control, after a delay not exceeding 3-1/2 minutes, lamps RECT should be lighted and ground should be connected to the alarm circuits to give audible and visual alarms. If the load is such that the first rectifier unit was operating on voltage control, the alarm should occur not more than 3-1/2 minutes after the battery voltage drops to the lower limit of the float-voltage relay.

3.04 In normal operation when the trouble has been corrected, the alarms will stop. Lamp RECT can be extinguished only by operating key ACO. Repeat the tests as outlined in 3.03 for each succeeding rectifier unit in turn until each rectifier failure alarm has been checked. After checking the failure alarm of a unit, insulate the bottom 5-6 contacts of relay A- of the same number as the unit and operate key ACO. Then proceed in a similar manner with the other units. Be sure to remove all insulators used in the 5-6 contacts of the A- relays and to turn the switches from the MANUAL to the AUTO position on all rectifier units when the check is completed.

3.05 To check the floating voltage alarm, operate the AUTO/MANUAL switch to the MANUAL position on the highest numbered rectifier unit operating on voltage control (rectifying tubes glowing and lamp RC not lighted) and operate to the OFF position switch AC on all succeeding units. With MANUAL control, adjust the output to a value somewhat less than the output had been on AUTO control. When the battery voltage has dropped to the low limit of the floating voltage relay FLOAT, and the low contacts have been closed for not more than 3-1/2 minutes, the FLOAT lamp should be lighted and ground should be connected to the alarm circuits to give audible and visual alarms. The local audible alarms may be silenced by operation of key ACO, leaving the FLOAT lamp lighted. Restore all AC switches to the ON position and all control switches to AUTO control.

3.06 To check the high-low voltage alarm, momentarily strap terminal C of relay VR2 to terminal L. Lamp HLW should be lighted and ground should be connected to the alarm circuits to give audible and visual alarms. Momentarily strap terminals C and H of relays VR1 and VR2 which should give the same signals.

4. TROUBLES

4.01 Plant troubles listed are only those in connection with the control which automatically starts and stops the rectifier units. Troubles in the rectifier units are covered in Section A301.332.

4.02 Time delay relays TD2 and TD3 require no maintenance. If they become defective in any respect, they should be replaced.

Trouble Chart

4.03 Should any of the following troubles occur, it is suggested that the possible causes be checked. If the trouble is not found in this way, look for open connections.

<u>Trouble</u>	<u>Possible Cause</u>
Battery voltage low	Power failure Floating voltage adjustment of rectifier unit.
Battery voltage high	Relay FLOAT out of adjustment or failing to close the low contacts. Floating voltage adjustment of rectifier unit. Relay FLOAT out of adjustment or failing to close high contacts
Plate supply noisy	One or more capacitors C1 to C4 aged, open, or fuses open
Hunting	Rectifier out of adjustment.