RECTIFIERS
MISCELLANEOUS SEMICONDUCTOR TYPE
(METALLIC)
INSTALLATION

1. GENERAL

1.01 This section covers the general requirements and methods for installing metallic type rectifiers at PBX's, and at station systems, where applicable.

1.02 The section is reissued principally to provide information relative to the J86205 rectifiers which replace certain rectifiers previously coded with KS numbers. Since this is a general revision, arrows usually included to indicate changes have been omitted.

1.03 Reference shall be made to Section 169-215-301 covering general requirements and definitions for additional information applicable to the requirements listed herein.

1.04 The rectifiers described herein are in general designed to meet particular applications. They may, however, be used wherever their voltage, capacity and regulation meet the requirements of the equipment with which they will be associated.

1.05 The rectifiers consist essentially of a transformer, a selenium rectifier stack or a copper oxide varistor unit, and associated fuses, resistors, terminal blocks, etc., mounted in a sheet metal casing with a removable cover. In some cases, filter coils and capacitors are also provided. A flexible cord and non-polarized plug are provided for connection to the power service. Fig. 1 illustrates the casing used for the J86205A, J86205B and J86205F units. It is 6-1/2″ high and the mounting base is approximately 8-5/8″ x 6-5/8″. The J86205C and J86205H units are contained in a casing similar to a 534-type subscriber set.

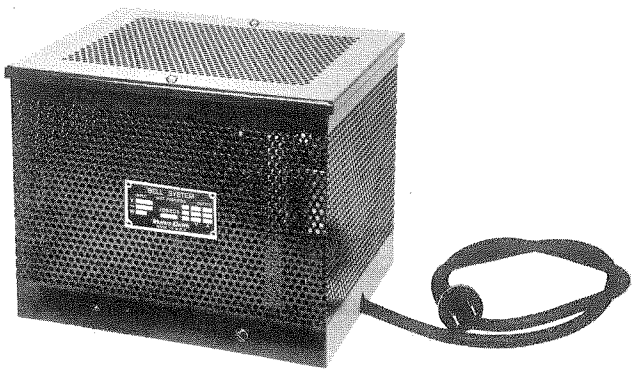

Fig. 1—J86205 Metallic Rectifier

1.06 Rectifiers arranged for wall mounting and connected by cord and plug to commercial power supply may have keyhole shaped mounting holes to permit hanging the apparatus on the mounting screws. Usually one of the lower mounting holes is round or slotted. In areas where local regulations require the removal of the apparatus without the use of tools, use only the keyhole shaped holes for mounting. In other areas, a mounting screw should also be placed in the lower round or slotted hole to obtain a more secure mounting arrangement.

1.07 In addition to the considerations outlined herein, the equipment should be installed in accordance with the National Electrical Code and any other local regulations that may apply.

2. GAUGE

2.01 Volt-ammeter, d-c, Weston Model No. 280, range 60-30-3 volts and 15-3-0.3 amperes, equipped with cords and clips, or equivalent.

3. INSTALLATION

3.01 **Locating**—Select a location as close as practical to the main cross-connecting terminal, or to corresponding terminals on the incoming terminal strip or connecting rack in the PBX or station equipment to be served, or to the battery to be charged. The location should permit the standard length cord (approximately 5 feet) to reach an a-c service outlet not controlled by a cutoff switch, be acceptable to the customer, and satisfactory from the following standpoints:

(a) Clean and dry, free from excessive dust or corrosive fumes due to acid or other cause.

(b) Not in a confined area where there is excessive heat or no circulation of air.

(c) Not likely to be damaged by the movement of furniture, etc.

(d) Accessible for maintenance at all times and where it will not present a hazard.

(e) Not less than 10 inches nor more than 5 feet from the floor line.

3.02 **Mounting**—The J86205A, B and F rectifiers and the KS-5250 and KS-5460 rectifiers weigh about 20 to 25 pounds. When mounting on a wall or partition make certain that it is capable of supporting the rectifier. The KS rectifiers are provided with a mounting bar for wall mounting. A 165A backboard may be used with any of these rectifiers where the wall is not suitable for mounting the rectifier directly on the surface.

3.03 The 165A backboard is provided with four holes in the center portion for fastening to the supporting surface. These holes will pass a No. 14 screw. Two of the holes are located on the long center line of the board and are so positioned that the two screws may be driven into the same stud when the board is to be mounted with its long axis vertical. Similarly, the other two holes are used when the board is to be mounted with its short axis vertical. Three pairs of starting holes for the screws supporting the rectifiers are located around the outer portion of the backboard. For the J86205A rectifier, the backboard is installed with its long axis vertical so that the starting holes spaced 5-1/2″ apart are uppermost on the board. The rectifier is suspended from two screws placed in these holes. Similarly with the KS-5460 rectifier, the backboard is mounted with the long axis vertical but is turned end for end so that the two starting holes spaced 6″ apart are uppermost. In the case of the J86205B rectifier, the backboard is mounted with its long axis horizontal and with the two starting holes 6-7/32″ apart uppermost on the board. The J86205F rectifier is usually used in conjunction with a power plant in which mounting arrangements are provided for the rectifier. Should it be necessary to use a 165A backboard for mounting a J86205F rectifier use the holes 6-7/32″ apart or drill starting holes spaced 6-31/32″ apart, depending upon the model used.

3.04 The J86205C and H rectifiers weigh about the same as the 534-type subscriber set and are similar in appearance. They may be mounted in the same manner as a subscriber set, or hung by the keyhole shaped mounting hole using a 147A backboard, when required.

3.05 This section does not cover the installation of anchoring devices, such as screw anchors, toggle bolts, etc. For such information see Bell System Practices.

3.06 When mounting the rectifier mounting bar provided with the KS rectifiers,

(a) On walls of wood, use two 1-1/4″ R.H. blued wood screws.

(b) On plaster on wood or metal lath walls, use a 165A backboard. Fasten the backboard securely to a stud. Fasten the rectifier mounting bar to the backboard, using two 1-1/4″ No. 14 R.H. blued wood screws.

(c) On masonry walls, use two No. 10-14 x 1-1/2″ screw anchors and 1-1/4″ No. 14 R.H. blued wood screws.

(d) On hollow tile walls, use 3/16″ x 4″ button head toggle bolts.

3.07 When mounting a J86205A, B, or F rectifier,

(a) On walls of wood, drill two starting holes spaced 5-1/2″, 6-7/32″, or 6-31/32″ apart as required (see 3.03). Drive two 1-1/4″ No. 14 R.H. blued wood screws into these holes to serve as a mounting for the rectifier.

(b) On plaster on wood or metal lath walls, and on masonry or hollow tile walls use a 165A backboard.

3.08 Hang the rectifier on the mounting screws or on the mounting bar.

3.09 When wall mounting is not employed, place the rectifier in position on a shelf, table, etc., or top of a No. 750A PBX cabinet. In this case, local conditions should govern the advisability of fastening the rectifier to the shelf or table. It may be fastened to a backboard if this appears desirable to prevent marring the surface or for insulation purposes.

3.10 **Connecting**—Run the required number and gauge of paired inside, or duct wires, or inside wiring cable from the rectifier terminals to the corresponding power supply terminals of the equipment to be served (see 3.01) and connect as shown on the circuit drawings.

3.11 The d-c output connections from the KS-5250 rectifier are by means of a separable polarized connector. Remove and disassemble the movable body of the attachment plug and connect the tracer wire to the brass screw (—) and the other wire to the white screw (+). Reassemble the plug and insert it in the receptacle of the rectifier.

3.12 If the cap which is furnished with the rectifier is not adaptable to the electric service outlet provided by the customer, replace the cap with one of a suitable type.

3.13 **Installing Ground Connection**—If a local ground connection has not been provided at the PBX, or station system, run a No. 14 ground wire from the ground terminals in the main cross-connecting terminal, or from the corresponding terminals on the incoming terminal strip or connecting rack in the PBX, or station system, to an approved ground.

Note: The frames of rectifiers connected to a power source by a cord and plug need not be grounded unless operating at a potential exceeding 150 volts to ground, or unless required by local regulations.

3.14 **Fusing**—The rectifiers are fused as follows.

	INPUT	OUTPUT	
Rectifier		**D-C Fuse**	**A-C Fuse**
J86205A	MDL 1/2 Fusetron	No. 24G, 1-1/3 amp.	No. 24G, 1-1/3 amp.
J86205B	MDL 1/2 Fusetron	No. 24G, 1-1/3 amp.	—
J86205C	—	No. 24E, 1/2 amp.	No. 24G, 1-1/3 amp.
J86205F	MDL 8/10 Fusetron	No. 24C, 2 amps.	—
J86205H	—	—	No. 24E, 1/2 amp.
KS-5250	—	No. 24G, 1-1/3 amp.	—
KS-5460	—	No. 24G, 1-1/3 amp.	No. 24G, 1-1/3 amp.

Placing in Service

3.15 Adjust the primary taps, if any, in accordance with the a-c service voltage. The secondary taps, if any, permit adjustment to obtain the desired output.

3.16 The J86205A rectifier (which is superseded by the 101G power plant, has secondary HI and LO taps which change the d-c output voltage. The LO tap is used for loads above 50 ohms resistance and the HI for loads between 30 and 50 ohms. This rectifier should not be used for loads less than 30 ohms.

3.17 The J86205B and J86205F and the KS-5250 rectifiers are normally used for charging the batteries of 101-type power plants. Before placing the rectifier in service, adjust the secondary taps for the lowest charging rate. This is accomplished by connecting the "fine" adjustment lead to terminal 1 and the "coarse" adjustment lead to terminal L or A.

3.18 **Testing**—Make the following test to insure that the wiring has been properly connected. If when making the test, the meter shows a reading off scale on the zero side, this is an indication that the polarity is reversed and should be corrected.

(a) With the meter arranged as a voltmeter (60 VOLTS scale) and the CHG fuse removed at the power plant, connect the positive (+) lead of the meter to the PBX or station system ground or to a nearby local ground. Connect the negative (60 VOLTS) lead to the battery side of the CHG fuse mounting. Observe that the deflection of the needle on the scale indicates the proper polarity.

(b) With the plug of the rectifier inserted in the electric service outlet, move the negative (60 VOLTS) meter lead to the rectifier side of the CHG fuse mounting. The deflection of the needle should indicate the same polarity as in (a).

(c) Disconnect the meter.

3.19 **Adjustment of Charging Rate**—With the meter leads connected to a suitable ammeter scale of the meter, and the rectifier plug in the electric service outlet, and the CHG fuse removed, connect the negative (.3 or 3 AMPS) lead of the meter to the rectifier side of the CHG fuse mounting and the positive (+) plug lead to the battery side of the CHG fuse mounting.

Note: When the power plant is equipped with charge control it will also be necessary to remove the CC fuse or strap while adjusting the charging rates.

3.20 Adjust the charging rate to meet the requirements of the particular PBX or station system as described in other sections of these practices covering the installation of particular types of power plants. This adjustment is accomplished by advancing the "coarse" and "fine" adjustment leads of the rectifier progressively from L to H (or A to C) and from digit 1 upward. The final adjustment shall be made with the rheostat at the power plant.

Note: A minimum amount of resistance should be in the circuit so that full advantage may be taken of the taper charge characteristic of the rectifier.

3.21 When the charging rate is properly established, remount the fuse and disconnect the meter.

Note: Observe that the needle of the meter approaches zero when the fuse is in place, indicating that the fuse is not open.

3.22 Do not splice or use an extension lead between the rectifier power cord and the electric service outlet.

4. LIST OF DRAWINGS

Rectifier	Schematic	Equipment
J86205A	SD-80555-03	ED-80692-02
J86205B	SD-80590-03	ED-80731-01
J86205C	SD-80560-01	ED-80695-01
J86205F	SD-80589-02	ED-80732-02
J86205H	SD-80672-01	ED-80847-01

Data on these units are shown in the table.

METALLIC RECTIFIER UNITS

Arranged for Wall or Shelf Mounting

Code	Power Service Volts	Power Service Cycles	Input Watts N.L. F.L.	Output *Volts	Output Amps.	Typical Application
J86205A List 1 and List 2	105-125	50-60	4-40	18 3 16AC	0.5 0.1 1.0	For station systems without local battery, L1 for systems with retardation coil in talk battery supply and L2 for systems without retardation coil.
J86205B List 3	105-125	50-60	3-18	22	0.35	P.B.X. Battery Charging.
List 4	190-250			17	0.50	
J86205C List 1	105-125	50-60	3-23	3.5 24AC	0.1 0.8	Auxiliary Signals.
J86205F List 1	105-125	50-60	3-51	24	1.2	Relay supply and 101F Power Plant.
List 2	190-250					
J86205H List 1	105-125	60	5-12	3 24AC	0.1 0.25	Wiring plans.

Notes: J86205B, L3 replaces KS-5250, L1 and J86205B, L1.
J86205, L4 replaces KS-5250, L4 and L6 and J86205B, L2.
KS-5460 is replaced by J86205A, L1 or L2—J86205A is replaced by 101G Power Plant.
Use of charging rates higher than full load output should never be used because of heating and subsequent rapid deterioration of the rectifying elements.

* At no load these voltages are much higher. Therefore, when measuring d-c output voltages, make first measurements with the 60-volt scale of the meter.