

**FACILITIES SERVING POWER INDUSTRY**  
**HIGH VOLTAGE INTERFACE UNIT**  
**EQUIPMENT DESIGN REQUIREMENTS**  
**COMMON SYSTEMS**

**1. GENERAL**

**SCOPE**

**1.01** This specification, together with the supplementary information listed herein, covers the equipment design requirements for the cabinet, framework, equipment, and circuits to be used in the engineering, manufacture, and installation of the high voltage interface unit. This unit is part of a system designed to protect facilities serving the power industry. (See Fig. 1.)

**1.02** This specification is reissued to delete and/or add reference to Bell System Practices to

**2. SUPPLEMENTARY INFORMATION.**

**1.03** The J99356A high voltage interface unit is the central point in the system acting between the telephone cable coming from the central office and the power station. It is located on the power station property and connected to the power station ground mat. (See Fig. 2.)

**DESCRIPTION**

**1.04** The unit is of the dead-front type design and consists of the following:

- (a) 2251A isolation transformers, 2251C drainage reactors, jacks, plugs, patch cords, and terminal blocks all designed to accommodate a high voltage stress.
- (b) 215A high voltage telephone repeaters designed to provide high voltage ac isolation (40-kilovolt) while at the same time permitting the passing of dc supervision signaling. This is accomplished by the use of a short span (6 inches) carrier transmission system and high voltage isolation

capacitors. The telephone repeaters are used in the form of plug-in units. A maximum of ten circuits per cabinet can be protected with telephone repeaters which are plugged in the ED-1C763-( ) tray assembly.

(c) A 5-foot 6-inch high (plus 12-inch legs) by 5-foot 0-inch wide by 1-foot 8-inch deep steel weathertight cabinet with a 525A light gray baked enamel finish suitable for outdoor use. A steel framework inside the cabinet is used for mounting of the various plastic channels, their covers, and other equipment including a 9-kilovolt lightning arrester. The cabinet is equipped with two front doors and is designed for single-side access. The weight of the cabinet as shipped to the field, without optional equipment such as transformers, is about 600 pounds.

**1.05** The weights of some optional components are:

- 2251A Isolation Transformer 9.75 pounds
- 2251C Drainage Reactor 4.75 pounds
- 215A High Voltage Telephone Repeater 4.75 pounds

**1.06** Associated with the high voltage interface unit are the neutralizing transformers. This equipment is mounted in a separate framework and located adjacent to the high voltage interface unit. It is connected to the high voltage interface unit in accordance with protection service requirements and circuit information shown in the schematic for the high voltage interface unit. At the present time the neutralizing transformer equipment is engineered and furnished by the telephone company requiring this protection service.

**NOTICE**

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Bell System except under written agreement

1.07 There are four basic types of services to be protected by this system. A brief description and examples of these services are as follows:

(a) **Type 1**—Services requiring both ac and dc transmission which can tolerate momentary interruptions during a power fault. Momentary operation of protector blocks is permitted providing the duty is not sufficient to cause permanent grounding. Terminal equipment must be capable of withstanding 500-volt transients, tip to ring, due to unsymmetrical operation of protector blocks. Type 1 is divided into two subgroups to differentiate between facilities providing telephone service only, and other services requiring dc continuity. Typical examples of type 1 services are:

(1) **Type 1A**—Telephone loop services only, including both regular business telephone and private lines such as voice communications from a dispatch center.

(2) **Type 1B**—DC telemetry and teletype. DC continuity is provided from power station terminal to the central office.

(b) **Type 2**—Services requiring both ac and dc transmission and which cannot tolerate interruptions. An example of type 2 service is ac pilot wire relaying with dc supervision or dc transfer trip relaying.

(c) **Type 3**—Services which employ ac transmission only and are only moderately noise sensitive. Typical services in this category are telemetry and supervisory control circuits.

(d) **Type 4**—Services which employ ac transmission only, cannot tolerate even momentary service interruptions and may be very noise sensitive. Audio tone protective relaying is the type of service placed in this category.

1.08 Table A indicates the types of protection provided for the various services listed.

#### CAPACITY

1.09 The high voltage interface unit is to be mounted on a reinforced concrete pad. Space should be provided on that pad for supplementary cabinets as well as the neutralizing transformers

which may be required. The initial high voltage interface unit terminates cables from the J99354B power station terminating unit and the J99355A remote drainage unit, see Fig. 1. The dedicated cable from the remote drainage unit usually consists of 50 or 100 pairs. A maximum of 100 pairs can be terminated in the initial high voltage interface unit. However, only 25 pairs can be protected with the various protective devices housed in any one cabinet. Cable pairs numbered 26 through 50 can be internally connected to the first supplementary cabinet, 51 through 75 to the second, and 76 through 100 to the third supplementary cabinet by means of 25 pair interunit cables run through nonmetallic conduit connecting the cabinets. As an example, the maximum number of 215A telephone repeaters that can be mounted in one cabinet is 10 and the maximum number of the 2251A isolation transformers and/or 2251C drainage reactors is 16.

1.10 The high voltage interface unit will be shipped completely assembled and wired, less plug-in transformers and 215A telephone repeaters. Shipped loose plug-in components are to be mounted and connected in the field in accordance with job requirements.

1.11 There are several different patch cords used in the high voltage interface unit. A special cable holder is provided in the cabinet to support these patch cords when they are not in use. Also, at the bottom of the cabinet, an area is partitioned off with two angles to provide storage space for the various testing and dummy plugs, when they are not in use.

1.12 The interconnection of the high voltage interface unit into the overall system is accomplished with the use of multipaired cables run in steel and PVC conduits in accordance with Sections 638-600-101 and 622-020-100. A separate -24 Vdc power source is required for operation of the 215A repeaters and must be located within the power station terminal building. This power source may be obtained from an existing power station supply or ordered separately per Note M. Several assigned pairs of the multipaired cable used to interconnect the system carry the power to the high voltage interface unit.

1.13 The high voltage interface unit is designed to operate within the temperature range of -40°C (-40°F) to +65°C (+150°F).

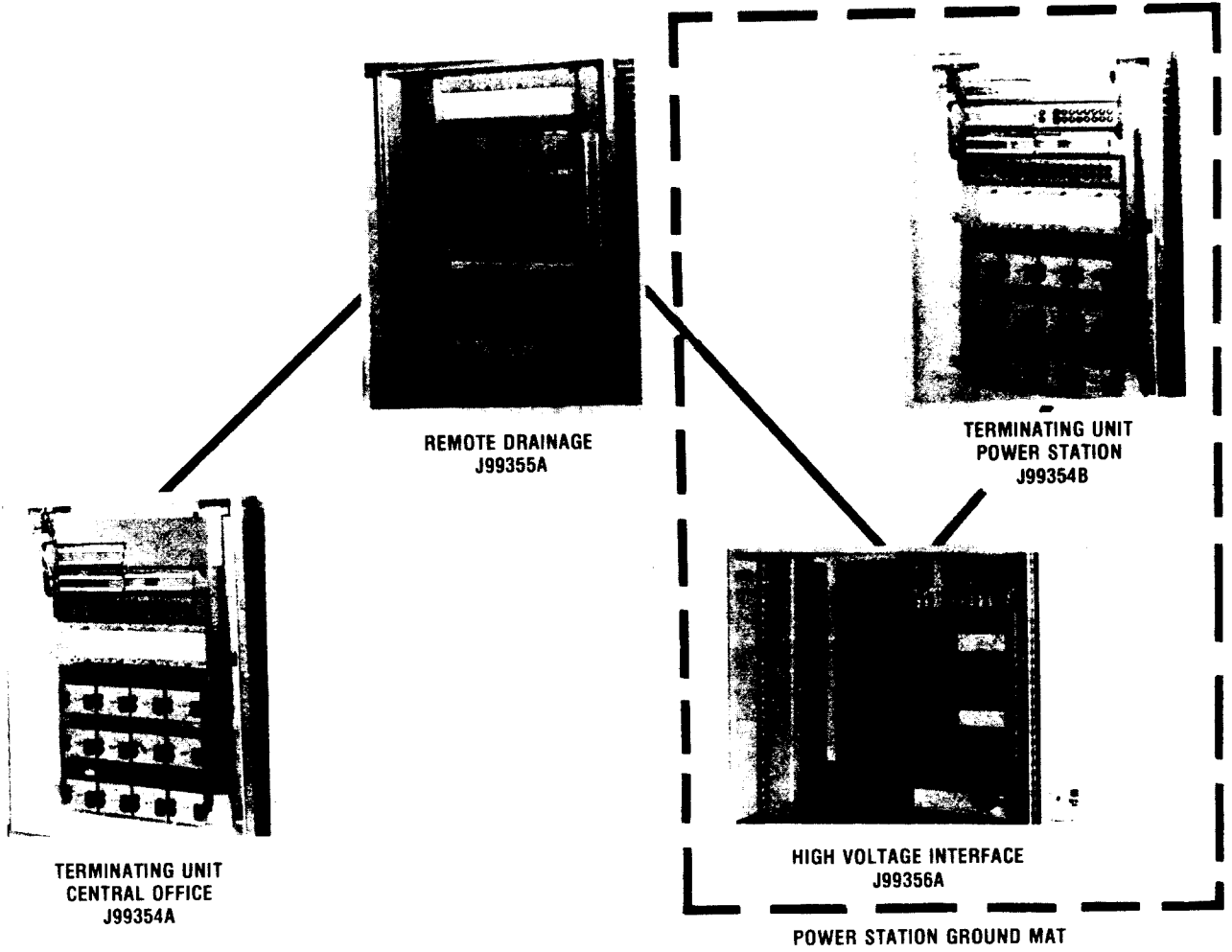


Fig. 1—Protection System for Power Station Communication Services

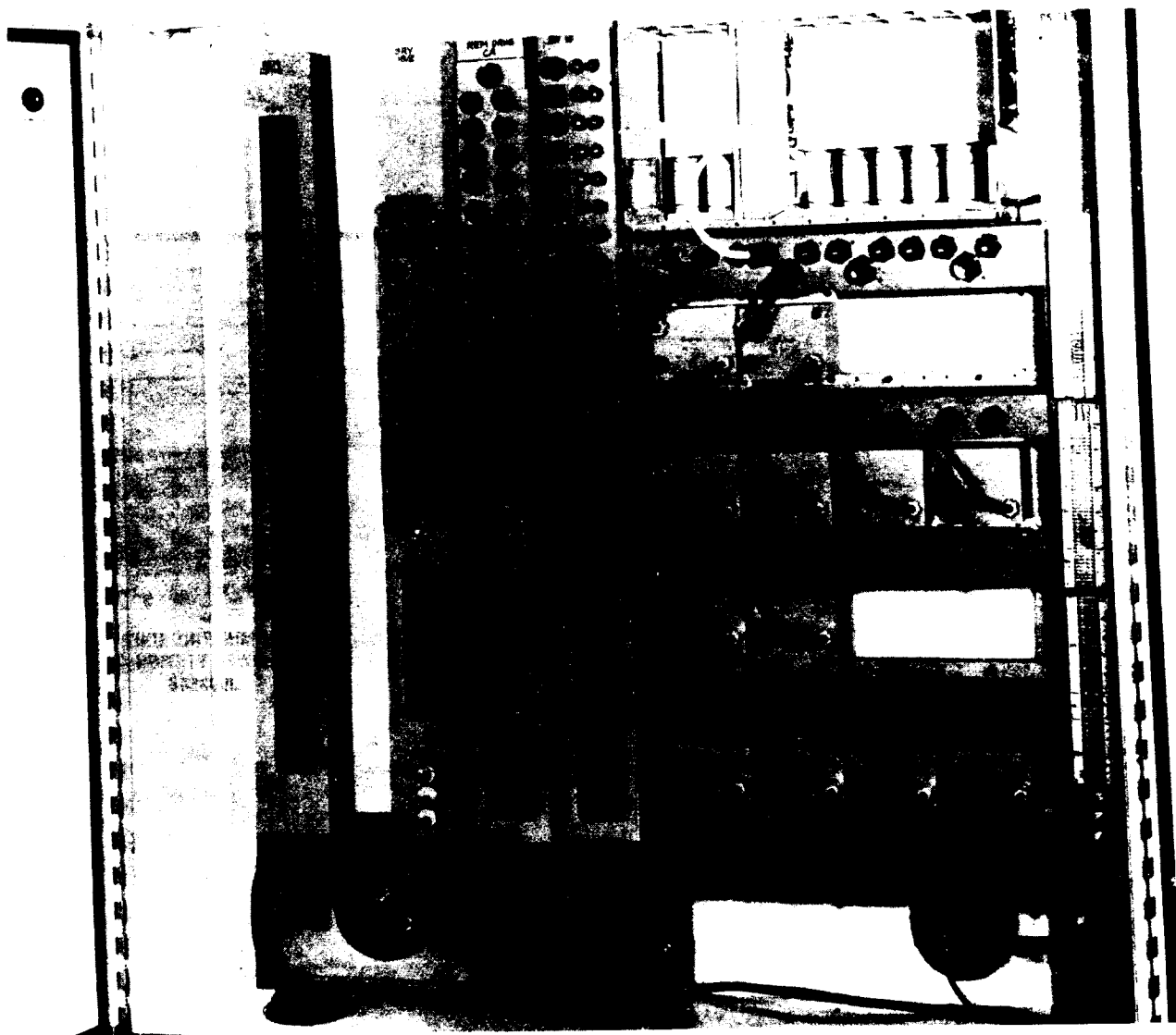


Fig. 2—J99356A High Voltage Interface Unit

TABLE A

TYPE	TRANSMISSION REQUIREMENTS	EXAMPLES	PRIMARY TYPES OF PROTECTION RECOMMENDED
1A	AC & DC	POTS Service	Telephone Repeater for HV Environment
1B	AC & DC	Teletype & DC Telemetry	Neutralizing Transformer & Carbon Blocks
2	AC & DC	Pilot Wire Relay	Neutralizing Transformer & Drainage Reactor
3	AC	AC Telemetry or Supervisory Control	Isolation Transformer
4	AC	Audio Tone Relay	Isolation Transformer

**2. SUPPLEMENTARY INFORMATION**

- 801-000-000—Numerical Index—Common Systems
- 800-020-001—Cross Reference List—J, NJ, IS, and X Specifications to BSP Numbers—Divisions 800 to 839
- 800-020-020—Cross Reference List—AA Series to Nine-Digit BSP Numbers
- 800-600-000—Checking List—General Equipment Requirements
- 167-742-301—Automatic Power Supply, Manufactured by NIFE Incorporated (BC-31)
- 332-140-100—215A Repeater—Description
- 332-140-200—215A Repeater—Installation and Maintenance
- 622-020-100—Conduit—Conduit Types and Uses
- 634-020-504—High Potential DC Testing of Wire-Communication Facilities Serving Power Stations
- 638-600-100—Integrated Protection System for Power Station Communications—Description and Placing
- 638-600-101—Integrated Protection System for Power Station Communications—Installation
- 638-600-102—Integrated Protection System for Power Station Communications—High Potential and Resistance Unbalance Testing
- 638-600-103—Integrated Protection System for

- Power Station Communications—Assignment Charts and Circuit Establishment
- 638-600-104—Integrated Protection System for Power Station Communications—Installation Inspections, Tests, and Maintenance
- 876-310-100—Electrical Protection of Wire Plant Communication Facilities Serving Power Stations
- J99354—801-009-152—Terminating Unit—Central Office and Power Station
- J99355—801-009-153—Remote Drainage Unit
- X-78664—Manufacturing Testing Requirements for J99356 High Voltage Interface Unit
- KS-16169—Protector
- KS-16170—Protector Mounting
- Floor Plan Data Book

**3. DRAWINGS**

- WE J drawings should be ordered by referring to the prefix and base number and requesting the current dash (—) number.
- J99356A-( )—High Voltage Interface Unit
  - ED-97747-50—Cabinet and Frame Assembly
  - ED-97748-( )—Spark Gap Mounting Assembly
  - ED-1C763-( )—Tray Assembly
  - SD-1C483-01—Facilities Serving Power Industry—High

Voltage Interface Circuit  
SD-99595-01—215A Telephone Repeater

## 4. EQUIPMENT

**J99356A—AT&T Co Std—High Voltage Interface Unit**

**List 1**—Cabinet, framework, assembly, wiring, and common equipment for an initial unit. (See Note F.)

	WIRE	EQUIP	NOTES
Cabinet and Frame Assy, ED-97747-50, GR1		1	A
High Voltage Interface Ckt, SD-1C483-01, Fig. 1			
215A Repeater Tray Assy, ED-1C763( ), GR1	1	1	
KS-16170 Mounting, Equipped With KS-16169, L6 Protector Unit	40	40	
859535-1 Master Ground Plug		1	B
859535-2 Ground Plug		25	B
860795-1 Personnel Safety Plug		26	B
860659 Cable Assy	16	16	B,C
860660 Cable Assy	25	25	B,C
860661-1 Cable Assy	6	6	B
860662 Cable Assy	16	16	B,C
860663-1 Cable Assy	16	16	B
860664 Cable Assy	10	10	B,C
860665-1 Cable Assy	1	1	B
860889-1 Cable Assy	10	10	B
High Voltage Interface Ckt, SD-1C483-01, Fig. 2			
Spark Gap Assy, ED-97748( ), GR1			
Equipped With UGT-5.0 210193-7111 — DA9	2	2	D
RM Lightning Arrester	1	1	E

**List 2**—Cabinet, framework, assembly, wiring, and common equipment for supplementary unit.

	WIRE	EQUIP	NOTES
Cabinet and Frame Assy, ED-97747-50, GR2		1	A
High Voltage Interface Ckt, SD-1C483-01, Fig. 1			
215A Repeater Tray Assy, ED-1C763( ), GR1	1	1	
KS-16170 Mounting, Equipped With KS-16169, L6 Protector Unit	40	40	
859535-1 Master Ground Plug		1	B
859535-2 Ground Plug		25	B
860795-1 Personnel Safety Plug		26	B
860659 Cable Assy	16	16	B,C
860660 Cable Assy	25	25	B,C
860661-1 Cable Assy	6	6	B
860662 Cable Assy	16	16	B,C
860663-1 Cable Assy	16	16	B
860664 Cable Assy	10	10	B,C
860665-1 Cable Assy	1	1	B
860889-1 Cable Assy	10	10	B

**List 3**—Equipment required in addition to list 1 or list 2 to provide type 1A service.

	WIRE	EQUIP	NOTES
High Voltage Interface Ckt, SD-1C483-01, Fig. 3		As	
215A Telephone Repeater		Reqd	H
859531-4 Cable Assy		As	
		Reqd	B,L
(A Separate —24 Vdc Source is Required, See 1.12)		0	M

**List 4**—Equipment required in addition to list 1 or list 2 to provide type 1B service. (See Note G.)

	WIRE	EQUIP	NOTES
High Voltage Interface Ckt, SD-1C483-01:			
Fig. 11, 860888-1		As	
Cable Assy		Reqd	B,L
Fig. 5, 859531-5		As	
Cable Assy		Reqd	B,J,L

**List 5**—Equipment required in addition to list 1 or list 2 to provide type 2 service. (See Note G.)

	WIRE	EQUIP	NOTES
High Voltage Interface Ckt, SD-1C483-01:			
Fig. 4, 2251C Transformer Equipped With Two KS-16169, L6 Protector Units		As Reqd	H
Fig. 4, 860667-1		As	
Cable Assy		Reqd	B,L
Fig. 5, 859531-5		As	
Cable Assy		Reqd	B,J,L

**List 6**—Equipment required in addition to list 1 or list 2 to provide type 3, option Z service.

	WIRE	EQUIP	NOTES
High Voltage Interface Ckt, SD-1C483-01:			
Fig. 7, 860673-1		As	
Cable Assy		Reqd	B,K,L
2251A Transformer Equipped With Fig. 8, KS-16169, L6 Protector Unit		As Reqd	H

**List 7**—Equipment required in addition to list 1 or list 2 to provide type 3, option Y service.

	WIRE	EQUIP	NOTES
High Voltage Interface Ckt, SD-1C483-01:			
Fig. 7, 860674-1		As	
Cable Assy		Reqd	B,K,L
2251A Transformer Equipped With Fig. 8, KS-16169, L6 Protector Unit		As Reqd	H

**List 8**—Equipment required in addition to list 1 or list 2 to provide type 4, option Z service.

	WIRE	EQUIP	NOTES
High Voltage Interface Ckt, SD-1C483-01:			
Fig. 7, 860673-1		As	
Cable Assy		Reqd	B,K,L
2251A Transformer Equipped With Fig. 9, KS-16169, L7 Protector Unit		As Reqd	H

**List 9**—Equipment required in addition to list 1 or list 2 to provide type 4, option Y service.

	WIRE	EQUIP	NOTES
High Voltage Interface Ckt, SD-1C483-01:			
Fig. 7, 860674-1		As	
Cable Assy		Reqd	B,K,L
2251A Transformer Equipped With Fig. 9, KS-16169, L7 Protector Unit		As Reqd	H

**Notes**

A. ED-97747-50, GR1 and 2 are supplied with legs for floor mounting. If legs are not desired, specify GR3 and 4, respectively.

B. All 6-digit numbers for cable assemblies refer to AMP Inc. Drawings can be obtained from AMP Inc., Capitron Division, Elizabethtown, Pennsylvania 17022.

- C. Certain codes for cable assemblies have more than one subcode or dash number. See also Note L listing of patch cords cable assemblies with color coding and service application information.
- D. The UGT-5.0 spark gap is available from Signalite, Inc.
- E. The 210193-7111—DA9 RM lightning arrester can be obtained from the Ohio Brass Company. An alternate code of the lightning arrester is AD-5B9 which can be obtained from the Power Systems Division of McGraw Edison.
- F. The high voltage interface circuit SD-1C483-01, Fig. 10 calls for the 859535-3 or the 860792-1 Hi-Pot test leads. The two test leads perform the same function. The 860792-1 is for use with the Hipotronics test unit, Model 860PL. It will be purchased by Hipotronics and supplied with their test unit. For other test units, Western Electric will furnish the AMP 859535-3 and adapt it to the particular test unit. The test unit including the test lead will be called for in the Hi-Pot test specification, Section 634-020-504.
- G. The telephone company will select the type and quantity of neutralizing transformers for application with the high voltage interface unit in accordance with engineering instructions in Section 876-310-100.
- H. Telephone repeaters, transformers, and associated protector units (as well as certain cable assemblies which form a part of the basic unit) depend on the particular application and protection service required. All lists, except lists 1 and 2 are intended to be shipped separately for application on the job site as required during initial installation and future growth. The maximum capacity for protective service in a single cabinet varies with the type of service.
- I. Spare cable assemblies, protector units, patch cords, spark gaps, etc, listed under the various list numbers can be ordered separately, as required.
- J. Service types 1B and 2 primary requires a minimum of one 859531-5 cable assembly per high voltage interface unit. Additional cable assemblies, up to a maximum of six, may be required to provide a multiple of cable pairs to increase conductivity.
- K. Impedance selection will be made to coordinate with central office and cable impedance of circuits.
1. Option Z will apply for 600-ohm circuits.
  2. Option Y will apply for 900-ohm circuits.
- L. Patch cords used in the high voltage interface unit are as follows:



AMP CODE NO.	SERVICE TYPE	NO. PINS	SERVICE TYPE	NO. PINS	PATCH CORD		REMARKS
					LENGTH (INCHES)	COLOR	
859531-4	1A	2			30	Blue	
859531-5	1B/2 PR1	2			39	Black	
860667-1	1B/2 Sec	2	2/3/4	4	33/42	Orange/ Green	Y Type
860673-1	3/4	4			42	Gray	600Ω
860674-1	3/4	4			42	Brown	900Ω
860888-1	1B/2 Sec	2	1B	2	33/42	Orange/ Red	Y Type

**Note:** All patch cords plug into a 3-socket receptacle labeled REMOTE DRAINAGE CABLE.

- M. The 215A repeaters installed in a high voltage interface unit require a -24 Vdc power source on the low voltage power station side. Either a NIFE battery charger console model BC-31 with a BF-24-3 charger per NIFE Specification SP-73-10 must be provided or an equivalent supply that may exist at the power station

terminal building should be used. The NIFE unit when purchased with KAP-1 (10Ah), KAP-2 (17Ah), or KAP-3 (30Ah) battery packs is capable of providing 24 hours of reserve power for a maximum of ten, twenty, or forty 215A repeaters, respectively. For reliability reasons, no more than five repeaters shall be supplied from each battery fuse. The NIFE unit has provisions for fusing. The NIFE unit may be ordered with either wall or floor mounting arrangements.

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