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CENTRAL OFFICE EQUIPMENT

Switching Systems Power Cabling and Fusing Engineering Applications

AG Communication Systems

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TABLE OF CONTENTS PAGE

TABLE OF CONTENTS PAGE

1. GENERAL

1.01 This practice describes engineering applications pertaining to the following:

(a) Cabling and fusing 50 Vdc in central offices as applied to existing and future powerboards, regardless of their manufacture.

(b) Powerboard single and dual (redundant) primary fuses and end-aisle panel fuse assignments as applied to electronic switching systems.

(c) End-aisle fuse loading techniques that apply to electronic systems.

1.02 This practice is reissued to include a reference to ECD-17005-001. Changed material is indicated by underlined paragraph numbers. Remove the previous issue of this practice from the binder or microfiche file and replace it with this issue.

1.03 The mnemonic PCU is defined herein as the Power Control Unit except for part 5, in which PCU refers to a Peripheral Control Unit.

2. DEFINITIONS

2.01 The amount of 50-Vdc current flowing at a given time through various branches of a central office is variable. The amount of current used in calculating fuse and cable sizes, or in calculating voltage drops, must be labeled to clearly account for these variations. Therefore, the identification of the various types of batteries (and associated grounds) and the method of distribution of the batteries are defined.

Ultimate

2.02 Because the amount of current required to operate an expansible central office can reasonably be expected to increase with time, the adjective "ultimate" is used to signify a point in time beyond which deliberate allowance for expansion (in the context of this practice: additional or larger size fuses, bus bars, or cable) is stopped. As a rule, "ultimate" is intended to reflect anticipated 50-volt current drain in 20 to 26 years from the date of an initial installation. After the initial installation, it is more practical to look forward in W-year increments.

10th Year

2.03 The adjective "10th year" is used to signify anticipated current drain 10 years from the date of installation of the equipment.

Absolute Maximum Drain

2.04 The term "Absolute Maximum Drain" (AMD) is the current drawn if all equipment units on a rack or bay are in the busy condition simultaneously. The drain is estimated by multiplying the holding drain of circuits mounted in a rack or bay by the amount of circuits. The rack or bay involved, if partially equipped, should be considered as if it were fully equipped. Table 1 lists AMD for the types of typical equipment found in a class 5 Step-by-Step (SxS) office.

Busy Hour Drain or Load

2.05 The term "Busy Hour Drain" (BHD), also known as "busy hour load" or "average busy hour drain or load," is the current calculated from standard power calculation forms. The current so calculated represents approximately 60 percent of AMD. To convert BHD to AMD, multiply BHD by 166 percent for electromechanical equipment.

Peak Busy Hour Drain

2.06 The term "Peak Busy Hour Drain" (PBHD) is the current calculated from standard power calculation forms. The current so calculated represents 80 percent of AMD. To convert PBHD to AMD, multiply PBHD by 125 percent for electromechanical equipment.

Table 1. AMD List (SxS).

Table Ia. Dedicated Bays.

BAY DESIG TYPICAL	HEIGHT OF BAY	TYPE OF EQUIPMENT	NO. OF SHS OR CKTS/BAY	NO. OF SWITCHES/ SHELF	AMD/BAY	REMARKS
LF-1	11'8"	Linefinder	5	20	8.6	200 L.E./Shelf
LF- 1	9'0"	Linefinder	3	20	5.2	200 L.E./Shelf
101-102	11'8"	Selector*	16	20	9.6	Loc Sel Only
101-102	9'0"	Selector *	12	20	7.2	Loc Sel Only
CI	11'9"	Connector	7	11	21	Based on F/S Connector
CI	9'0 "	Connector	5	11	15	Excluding Test Connector
Rot- 1	11'8"	Rotaries	7	20	28	
Rot- 1	9'0 "	Rotaries	5	20	15.2	
LK- 1	11'8"	Director Acc	3	24	18	100 Relays/Shelf
LK-1	9'0"	Director Acc	2	24	12	100 Relays/Shelf
LRS- 1	11'8"	Req. Sndr	6		6	
LRS- 1	9'0"	Req. Sndr	4		4	
ESR		Power			10	Tentative
RTS		Power			20	Figures
RTD		Power			20	

***NOTE: See** paragraph 3.09 for restriction on selector fusing.

Table 1 b. Miscellaneous Shelves.

SHELF TYPE	TYPE OF EQUIPMENT	AMD/ SHELF	REMARKS
Rots.	Rotaries	6.4	10 Sw. Stepping and 10 Holding
Miscellaneous	Miscellaneous Test Equipment	3	Type 11 Equipment
Miscellaneous	Miscellaneous Test Equipment	5	Type 20 Equipment
Intercept	Intercept Concentrator	1.6	
Trunk	Trunk Equipment	5.2	Type 11 Equipment
Trunk	Trunk Equipment	8.6	Type 20 Equipment

Table 1c. Manual Position Equipment.

TYPE OF POSITION	DRAIN/POSITION (AMPERES)
Cordless Automatic Toll Swithcboard	6
Cord Type 30 or 31 Toll Swithcboard	6
PABX Attendant Desk	3
Type 1 Local Desk	1

Table Id. Manual Equipment Rack.

TYPE OF RACK	DRAIN/POSITION (AMPERES)
Type 24 Toll and Local Test Panel	5
Type 180 Toll Test Panel	5
Type 180L Local Test Panel	2
Keysender or Type 6 Information Trunk Board	10
SATT OPT Bays	10
Miscellaneous and Toll Relay Racks	5

Constant Drain

2.07 The term "constant drain" is the maximum continuous current drawn by a piece of equipment. The term is usually applicable to equipment that draws a continuous nonvariable current. However, for fuse loading purposes, it can also apply to equipment that sometimes draws a lower current, e.g., the dc drain from a ringing generator, when fully loaded, should be considered as if it were a constant drain.

Separate Primary Fusing of Redundant Common Control Equipment

2.08 Separate primary fusing of redundant (duplicated) common control equipment is the practice of assigning separately fused battery feeds at the Primary Distribution Unit (PDU) to duplicated common control equipment lineups, thereby preventing total and simultaneous common control equipment failure due to a single blown primary fuse.

Centralized Cabling and Fusing

2.09 Centralized Cabling and Fusing is a method of power distribution that utilizes a Primary Distribution Unit Frame (PDUF) or other common power source as a central location for secondary distribution fuses from which 50 Vdc or other power is distributed to using equipment,

Decentralized Cabling and Fusing

2.10 Decentralized cabling and fusing is a method of cabling and fusing that distributes fused -50-volt battery and its associated group directly from a power source (primary fuses) to secondary fuses located on equipment end aisles through a cabling network of main power feeders and taps.

Electronic Battery and Ground

2.11 Electronic Main Battery (EMB) and Electronic Main Ground (EMG) is fused -50-volt battery and associated ground that

provide relatively quiet battery to electronic logic components that are highly sensitive to noise.

Electromechanical Battery and Ground

2.12 Electromechanical battery (MB) and associated ground (MG) is fused -50-volt battery and associated ground that provide battery to equipment that is not affected by noise.

Electronic Control Main Battery

2.13 Electronic Control Main Battery (ECMB) or Network Main Battery (NMB) is fused -50-volt battery and associated ground that provide semiquiet battery to High Threshold Logic (HTL) families of equipment.

Multiframe Circuit

2.14 A multiframe circuit is two or more frames of equipment sharing the same frame mnemonic, and possibly the same frame base number.

Loop Feet

2.15 Loop feet is twice the linear distance, which is the distance between the points of origin and termination.

3. FUSES

3.01 The purpose of a fuse is to protect the cable(s) that provide electrical power to the equipment. Should a fuse fail to open when the current is more than the current-carrying capacity of a cable, the cable insulation will degenerate, and the most severe consequence may be the loss of a central office. Therefore, standard AG Communications System Corporation (AGCS) practice is to use only the best quality fuses available and to assign cable so that the cable ampacity (current-carrying capacity) is greater than the fuse size.

3.02 Approved fuses carry AGCS part numbers that appear on the powerboard or fuse panel drawings.

3.03 Refer to Figure 1 for cabling and fusing 50 Vdc in central offices.

Disconnect Switch Unit Fuses - Loading

3.04 A Disconnect Switch Unit (DSU) fuse should not be loaded higher than as indicated in Table 2.

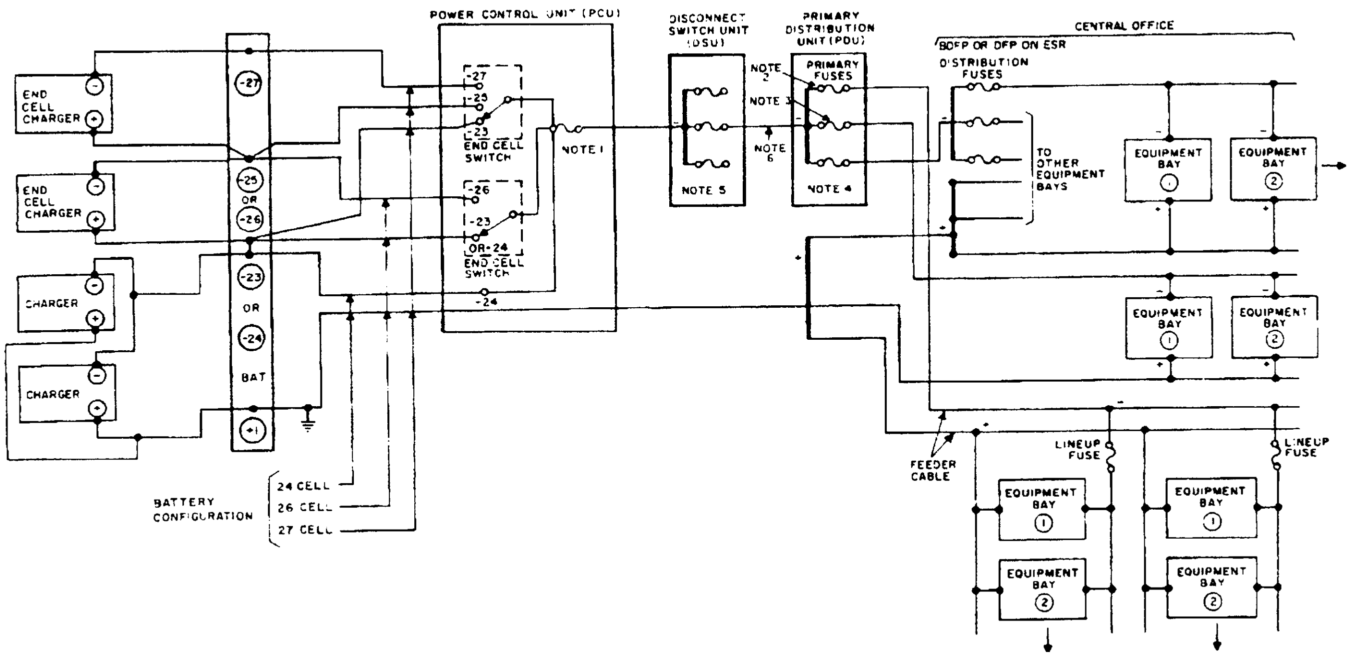
Disconnect Switch Unit Fuses - Maximum Amounts

3.05 The total number of DSU fuses served by a Power Control Unit (PCU) is only limited by the sum of the ultimate PBHD of all DSU fuses, which should not exceed the capacity of the PCU.

Disconnect Switch Unit Fuse - Selection

3.06 It is required that a DSU fuse be used when PDU's are located remotely from the PCU so that the primary fusing and associated cabling can be kept to a minimum in the switching equipment area. This is advantageous in a multilevel building where the switching equipment is not on the same level as the power room. Locating the primary fusing as close as possible to the equipment reduces primary fuse cabling to a minimum. The economic advantage gained normally offsets the cost of the DSU and the cable or bus duct between the DSU and PDU.

3.07 Therefore, the selection of DSU fuses is dictated by the number of remote PDU groups, the number of levels or areas served by the PDU's and, finally, the ultimate PBHD of the particular switching system equipment served by each group of PDU's. Normally, it is recommended that in a multilevel exchange, a DSU fuse be dedicated per level of any one type of system's



NOTES :

1. THIS FUSE IS NOT ALWAYS USED WHEN USED, IT DICTATES POWER CONTROL UNIT CAPACITY; WHEN NOT USED, THE RATING OF THE END CELL SWITCH DICTATES POWER CONTROL UNIT CAPACITY VOLTAGE DROP FROM THIS FUSE TO THE PRIMARY FUSES SHOWN IS DISREGARDED

2 THIS FUSE IS USED IN A DECENTRALIZED FUSING SCHEME IT ENTAILS RUNNING A FEEDER CABLE DOWN A MAIN AISLE, FROM WHICH TAPS ARE MADE TO SERVE LINEUPS VIA LINEUP FUSES VOLTAGE DROP (0 75V) IS BASED ON THE LOOP FEET OF THE FEEDER CABLE FROM THE PRIMARY FUSE TO THE FARTHEST TAP ON THE FEEDER CABLE VOLTAGE DROP FROM THE FEEDER CABLE TAPS TO EQUIPMENT BAYS IS DISREGARDED.

3. THIS FUSE IS ACTUALLY A DISTRIBUTION FUSE TYPES 124 AND 226A USE THIS DISTRIBUTION SCHEME VOLTAGE DROP (0.75V) IS DISCUSSED IN PARAGRAPH 9 07 OF THIS SECTION.

4 THIS FUSE IS DISCUSSED IN PART 3 OF THIS SECTION. THIS FUSE IS A TRUE PRIMARY FUSE IN THE CONTEXT OF THIS SECTION BECAUSE IT SERVES A SECONDARY OR DISTRIBUTING FUSE PANEL VOLTAGE DROP (0 50V) IS DISCUSSED IN PARAGRAPH 9 06 OF THIS SECTION.

5 WHEN THE PRIMARY DISTRIBUTION UNIT IS LOCATED REMOTE FROM THE POWER CONTROL UNIT IN THE SWITCHING UNIT AREA, A DISCONNECT SWITCH UNIT, LOCATED ADJACENT TO THE POWER CONTROL UNIT, IS REQUIRED TO PROVIDE FUSED PROTECTION OF CABLE OR BUS DUCT FROM THE POWER CONTROL UNIT TO THE PRIMARY DISTRIBUTION UNIT AND ALSO FOR EMERGENCY DISCONNECTION OF POWER TO ALL EQUIPMENT SERVED BY THE PRIMARY DISTRIBUTION UNIT

6 BUS DUCT OR CABLE MAY BE USED IN THIS SECTION OF THE POWER SYSTEM ALLOW 0.25V VOLTAGE DROP IN THIS SECTION, WHEN USED, AND ADJUST OTHER SECTION VOLTAGE DROPS SO THAT OVERALL VOLTAGE DROP FROM BATTERY TO EQUIPMENT BAYS DOES NOT EXCEED ONE VOLT MAXIMUM.

Figure 1. Composite Distribution Scheme

Table 2. DSU Fuse Load Limits.

DSU FUSE RATING (AMPERES)	CONSTANT DRAIN AND/OR PBHD	AMD
1,000	800	1,000
1,600	1,280	1,600
2,000	1,600	2,000
2,500	2,000	2,500
3,000	2,400	3,000
5,000	4,000	5,000

switching equipment (Practice 795-002-071 contains power system sharing rules).

Primary Fuses - Loading

3.08 A primary fuse should not be loaded beyond the limits shown in Table 3.

3.09 A choice of primary fuse rating is based on the following considerations:

(a) The rating of the conductor protected by the fuse.

(b) It is poor practice to increase the rating of a fuse once installed. Consider the fuse rating in its position on the PDU as permanent.

Table 3. Primary Fuse Load Limits.

PRIMARY FUSE RATING (AMPERES)	CONSTANT DRAIN AND/OR PBHD	AMD
1,000	800	1,000
1,600	1,280	1,600
2,000	1,600	2,000
2,500	2,000	2,500
3,000	2,400	3,000
5,000	4,000	5,000
5,000	4,000	5,000

(c) The larger the fuse, the more expensive is its associated cable. Do not use a 300- or 400-ampere fuse if a 200-ampere fuse will do.

(d) The smaller the fuse, the more cable, meters, and hardware are ultimately required for distribution purposes.

Distribution Fuses - Loading

3.10 A distribution fuse may be loaded up to 80 percent of its rating.

4. FUSE ASSIGNMENTS

4.01 Fuse assignment data presented in this part is based upon the following:

(a) System floor plans and system engineering considerations for equipment (in division 780 of AGCS Practices).

(b) Primary fuse loading (paragraph 3.07) and decentralized fusing scheme (paragraph 4.24).

4.02 Before primary fuse assignments can be made, end-aisle fuse assignments must be implemented for each lineup of equipment. End-aisle fuses for each lineup of equipment are located in an end-aisle fuse panel or PDUF (Figure 2) and are numbered from left to right (1 to 2 for dual fusing or 1 to 4 for quad fusing) when facing the end-aisle fuse panel. End-aisle fuses for each equipment lineup are dedicated for fusing the type of battery required for the equipment in that specific lineup.

End-Aisle Fuse Capacities

4.03 The fuse capacities for the dual end-aisle panel (link type) are rated at 100 and 150 amperes, whereas the fuse capacities for the quad end-aisle panel (cartridge type) are rated at 60 amperes. The end-aisle fuse capacity requirements for a

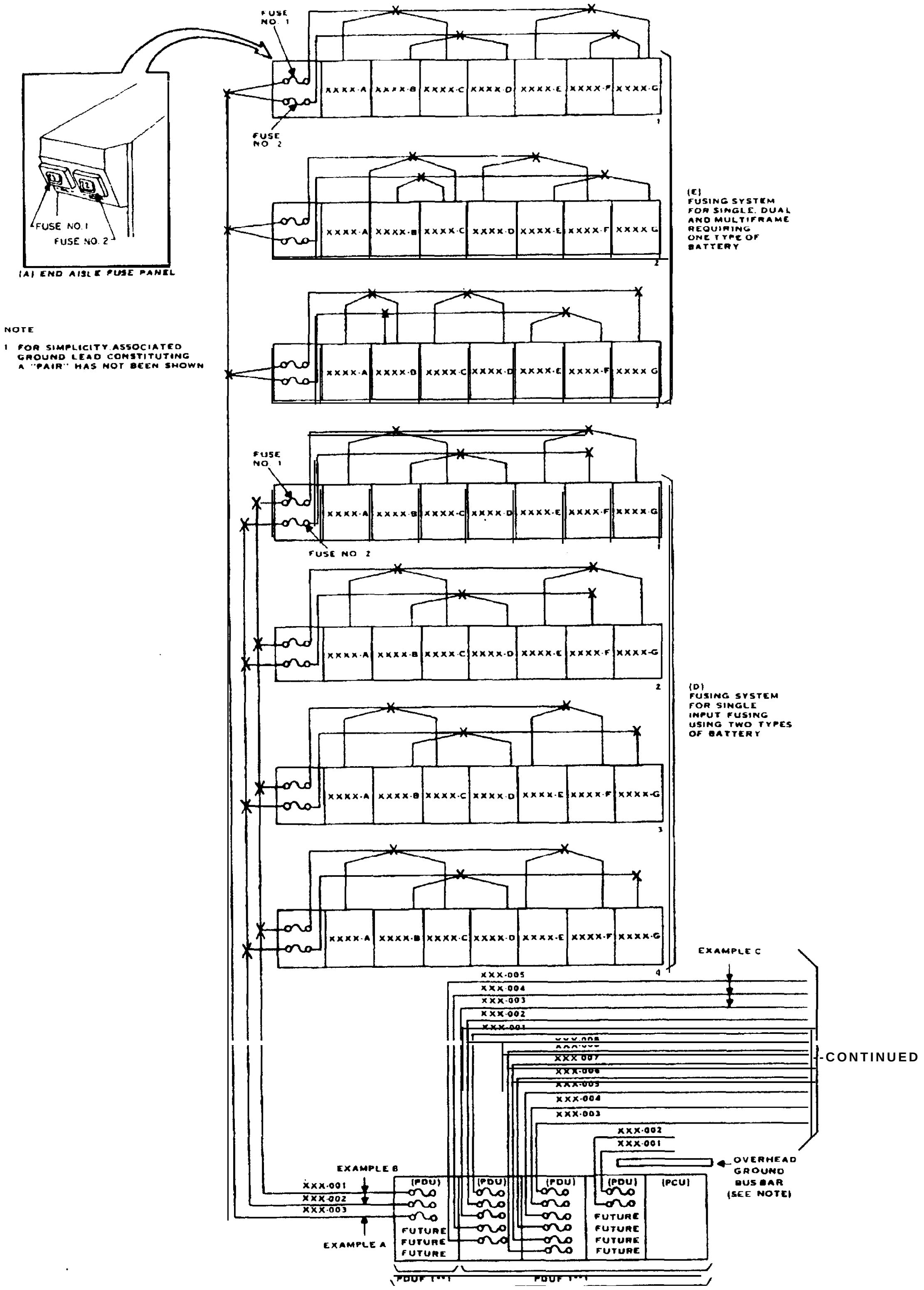


Figure 2. PCU, Primary Fuses, End-Aisle Fuses, and 50-Volt Battery Assignments (Sheet 1 of 2).

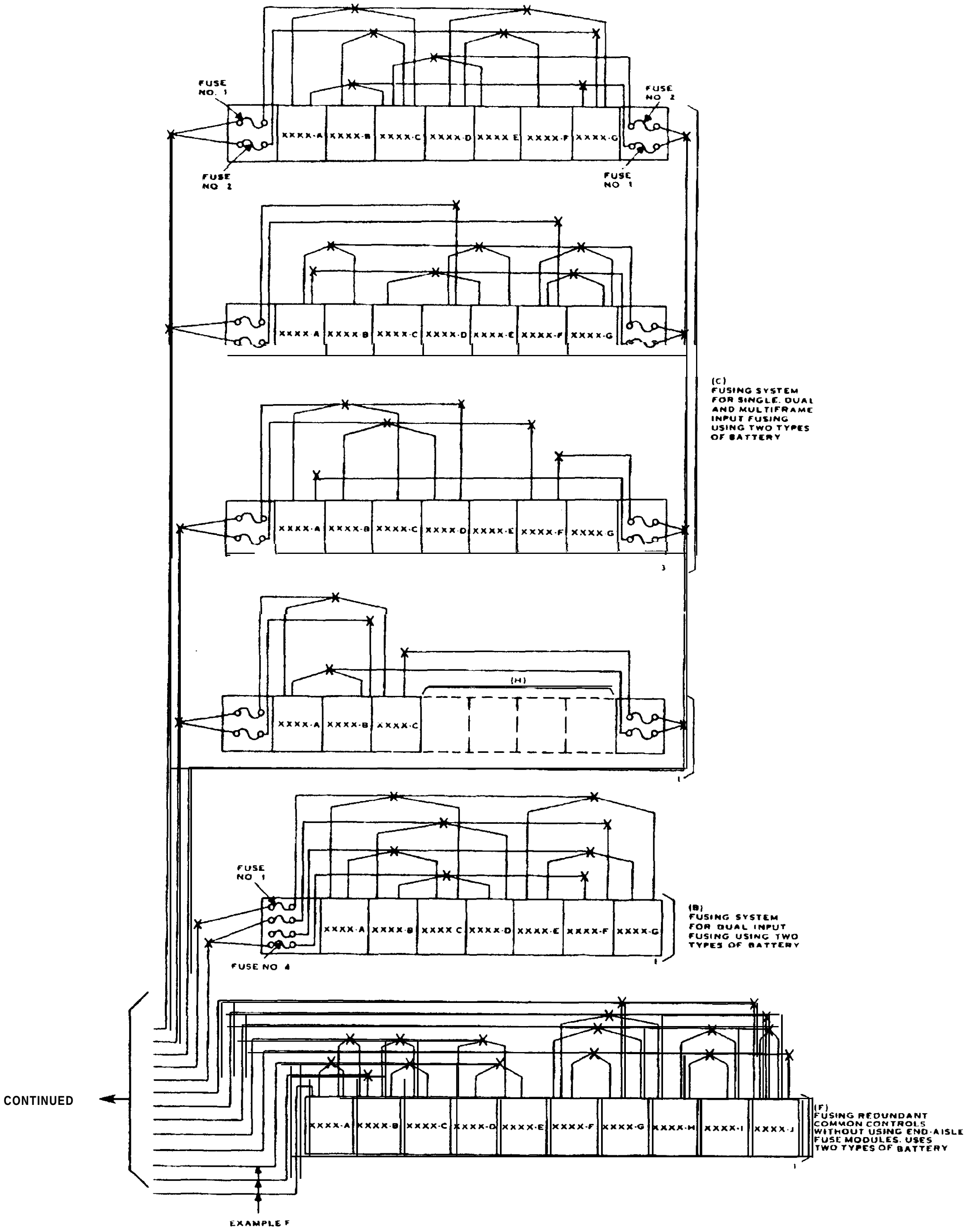


Figure 2 PCU, Primary Fuses, End-Aisle Fuses, and -50 Volt Battery Assignments (Sheet 2 of 2).

specific frame lineup are dictated by the equipment and system power circuits used.

End-Aisle Fuse Assignment Considerations

4.04 Generally, for applications requiring dual, quad, or multiframe battery inputs (in the same lineup) assigned to end-aisle fuses No. 1, 2, 3, or 4, the total current drain should be evenly divided among the end-aisle fuses (No. 1, 2, 3, or 4).

4.05 An exception should be made in multiframe fusing (single inputs per frame) to aisle fuses No. 1 and 2, when the loss of either input fuse assigned to the modules would result in the functional loss of the total multimodule frame. Only under such conditions would the first, second, etc, multiframes be totally assigned to aisle fuse No. 1 and aisle fuse No. 2.

4.06 If two multiframes are located in the same lineup, the numerical portion of the mnemonic (odd- or even-numbered) would preassign the aisle fuses that should be used for fusing the inputs of the modules in the total frame. Single modules or multiframes containing duplex equipment should be assigned with extreme care. Refer to the individual system power and alarm circuits for information on frame fusing assignment to end-aisle fuses.

4.07 Care must also be exercised while assigning frames requiring single power feeds so that the first two frames and all successive, similarly equipped frames are assigned alternately between aisle fuse No. 1 and aisle fuse No. 2.

End-Aisle Fuse Assignments

4.08 The aisle fuse assignments should generally start at a nongrowing end, such as the main aisle of an equipment lineup (as observed on the floor-plan drawing) that is closest to the power distribution equipment. The aisle fuse assignments are then extended from this starting point down each successive lineup.

4.09 First determine (considering the instructions outlined in paragraphs 4.04 through 4.07) which of the individual frames within the starting point lineup should be assigned to end-aisle fuses No. 1 and No. 2. Refer to the typical fusing scheme (Figure 2). Repeat this procedure with the individual end-aisle fuses and associated frames for each successive equipment lineup. This procedure applies to dual and quad end-aisle fuse panels.

4.10 Normally, while making the end-aisle fuse assignments, enter the end-aisle fuse number and related equipment frame data on the equipment power distribution form (FX-2058-G).

4.11 In a lineup of both single and dual power feed requirements (Figure 2 (E)), all preceding and succeeding frames requiring single power feeds should alternate fusing of frames between aisle fuse No. 1and aisle fuse No. 2. When assigning frames that require single power feeds, care must be taken that the first two frames and all succeeding frames of similar equipment are alternated between aisle fuses No. 1 and No. 2.

4.12 Dual inputs to a frame or a multiframe requiring the same type of battery would be tapped from aisle fuse No. 1 and aisle fuse No. 2. Taps from an aisle fuse No. 1 power feeder would be made to the first circuit breaker (or fuse) in that frame, or the first frame of a multiframe closest to the end-aisle panel, respectively. Taps from the aisle fuse No. 2 power feeder would be made to the second circuit breaker (or fuse) in that frame and the second frame of the multiframe, respectively.

4.13 An exception for multiframe fusing (single inputs per frame) to aisle fuse No. 1 and aisle fuse No. 2 is made when the loss of either input fuse assigned to the modules (see paragraphs 4.11 and 4.12) would constitute the functional loss of the total multiframe.

4.14 Only under the condition referred to in paragraph 4.13 would the first, second, etc, frame of the multiframe be totally assigned to aisle fuse No. 1 or No. 2. If two multiframes are in the same lineup considered for fusing, the numerical portion of the mnemonic, odd- or even-numbered, would preassign which aisle fuses would be used for fusing the inputs of the modules in the total frame (see Figure 2 (E)).

4.15 Extreme caution must be taken when assigning a single module of a multiframe or multiframes that may contain duplex equipment. Refer to individual system power and alarm circuits for frame fusing assignment to end-aisle fuses.

4.16 Equipment frames utilizing a battery filter (e.g., battery filters mounted above the frame on the cable runway, or battery filter supplies mounted within the equipment frame) should be assigned to either aisle fuse No. 1 or No. 2 that would feed that frame as assigned per paragraphs 4.11 and 4.12.

50-Volt Battery Assignment to End-Aisle Fuses

4.17 When single input fusing is required on each frame of equipment in an equipment lineup and two different types of -50-volt battery are required, one end-aisle fuse panel must be used. Aisle fuses No. 1 and No. 2 must be dedicated to a particular type of battery (Figure 2 (D)), and all the lineups succeeding the first must be assigned the same type of battery at aisle fuses No. 1 and 2, respectively.

4.18 Where dual fusing is required in a frame or multiframe in a lineup, using two different types of battery, two end-aisle fuse panels must be used. Each end-aisle fuse panel, fuses No. 1 and No. 2, would be dedicated to one type of battery (Figure 2 (C)). All lineups succeeding this lineup, using the same type of fusing, must also be assigned the same type of battery at aisle fuse No. 1 and 2 on the same end of the lineup.

4.19 Figure 2 (B) is another example in which dual fusing is required in a frame of a lineup using two different types of battery, but with two end-aisle fuse panels mounted at the main aisle. Fuse No. 1 of both fuse panels would be dedicated to one type of battery and fuse No. 2 to the other.

4.20 After it has been determined what type of -SO-volt battery is required per individual lineup, and which aisle fuse requires the specific type of battery, the quantity and capacity of each primary fuse (Figure 2 (F)) located on the PDU's can be determined.

Primary Fuse Assignment

4.21 Distribution of -50-volt battery via primary fuses and primary fuse power feeders is made on a lineup basis as follows:

(a) For each lineup requiring a single type of battery, one primary fuse would feed the No. 1 and No. 2 aisle fuses for that lineup (Figure 2 (F), example A).

(b) For a lineup requiring two types of battery, one of three methods (or all) can be used as listed below:

(1) For a single end-aisle fuse panel, one type of battery would be brought to the No. 1 aisle fuse and the other type of battery to the No. 2 aisle fuse (Figure 2 (F), example B).

(2) Where dual end-aisle fuse panels are used, one primary fuse would be assigned to each end-aisle fuse panel, fuses No. 1 and 2 (Figure 2 (F), example C).

One end-aisle fuse panel would be on the main aisle and one on the predicted growth end of the lineup. If all of the predicted frames for a lineup have not yet been provided, frame hardware must be provided at the end of the future frame prediction for supporting the end-aisle panel (Figure 2 (H)).

(3) Where dual end-aisle fuse panels are used, one primary fuse would be assigned to fuse No. 1 of both fuse panels and the second primary fuse to fuse No. 2 (Figure 2 (F), example D). Both end-aisle fuse panels would be on the main aisle.

4.22 Assignment of end-aisle fuses to primary fuses is accomplished by sequentially assigning the end-aisle fuses, starting in a direction of growth from the end-aisle fuses closest to the primary fuses, to the end-aisle fuses farthest from the primary fuses for each type of battery required by the system. This end-aisle fuse assignment continues until the selected maximum primary fuse load (paragraph 3.07) is reached for each primary fuse, using the largest fuse capacity possible for each main power cable run.

4.23 Only equipped end-aisle fuses (fully or partially equipped lineups) are to be assigned in this manner. When the number of main power cables for an individual run is excessive, due to either extremely long loop feet from the primary fuse and/or high primary fuse load, consideration should be given to reducing primary fuse load by reassigning end-aisle fuses, thereby lessening the number of required cable runs while still maintaining voltage drop limits.

4.24 Only after making end-aisle fuse assignments in this manner should future end-aisle fuses (future equipment lineups) be considered for assignment to an initially furnished primary fuse, and then only if sufficient margin of primary fuse capacity and voltage exists in the main power cable run. Sufficient margin is necessary so that additional primary fuses and/or main power cables are not required for assignment of these future end-aisle fuses.

4.25 The equipment power distribution form job drawing for an office should reflect only those fuse assignments made as discussed herein. Future primary fuse and end-aisle fuse assignments are made by the engineer when an equipment addition in a future lineup requires these assignments.

Separate Primary Fusing of Redundant Common Control Equipment (No. 1 EAX)

4.26 The common control equipment of the No. 1 EAX switching system is normally provided on a dual or greater basis with arrangements either for changeover to stand+ or complete parallel working. When the on-line common control equipment experiences a circuit malfunction or loss of power, a transfer to the standby or parallel working unit resutts.

4.27 Loss of power to the on-line unit does not affect the standby equipment because alternate frame assignment to end-aisle fuses (paragraph 4.11) is the normal practice. Connecting the end-aisle fuses to a single primary fuse is the standard procedure.

4.28 Therefore, if a primary fuse should blow (a very uncommon occurrence), the on-line and standby units would be without power, temporarily disabling the entire switching system. However, dual primary fusing (an optional feature) would prevent this occurrence.

4.29 The common control section is served by two primary fuse power cable runs (see Figure 2 (D), lineups 1 through 4). in the frame lineup, end-aisle fuse No. 1 is served by a different primary fuse than is end-aisle fuse No. 2. Alternate assignment of equipment frames to end-aisle fuses follows, thereby ensuring that the call-processing function continues despite the loss of one primary fuse. Although it is part of the No. 1 EAX Common Control Section, the Maintenance Control Center (MCC) lineup is not fused as per above. Instead, it is single primary fused.

Decentralized Cabling and Fusing Considerations

4.30 in decentralized cabling and fusing schemes, situations arise where partial or incomplete lineups of equipment are involved when cabling. Floor plan requirements must be maintained from the initial floor plan layout to the ultimate layout. Considerations are as follows:

(a) The initial floor plan must show initial-to-ultimate equipment locations.

(b) All future frames must be designated with a frame mnemonic.

(c) Every equipment lineup must have a nongrowing end, beginning at the main aisle.

(d) The growth of all parallel equipment lineups from any main aisle is always in the same direction.

(e) Equipment lineups must run continuously without breaks to facilitate adding frames and to preclude adding frames in the middle of an equipment frame lineup.

4.31 Observing the guidelines for floor plan layout on both the initial floor plan and all subsequent additions allows the loading of primary fuses with the load of fully or partially equipped lineups to be readily computed. It also allows future lineups to be assigned to initially furnished primary fuses under the conditions stated in paragraphs422 through 4.25.

5. NO. 1 TSPS PRIMARY FUSE ASSIGNMENTS OF REDUNDANT EQUIPMENT

5.01 It is a standard practice to provide separate primary fusing of redundant common control equipment in the No. 1 Traffic Service Position System (No. 1 TSPS). However, each telephone company has special requirements for power equipment, and these special requirements should be evaluated before power engineering is star-ted. The following paragraphs provide information on primary fuse assrgnments in specific equipment areas of the No. 1 TSPS.

Electronic Equipment

5.02 All electronic equipment frames of Copy 0 are assigned to the same EMB primary fuse at the power board (Figure 3). This equipment includes the Processor Power A Frame (PPAF) and all frames associated with the following unit copies:

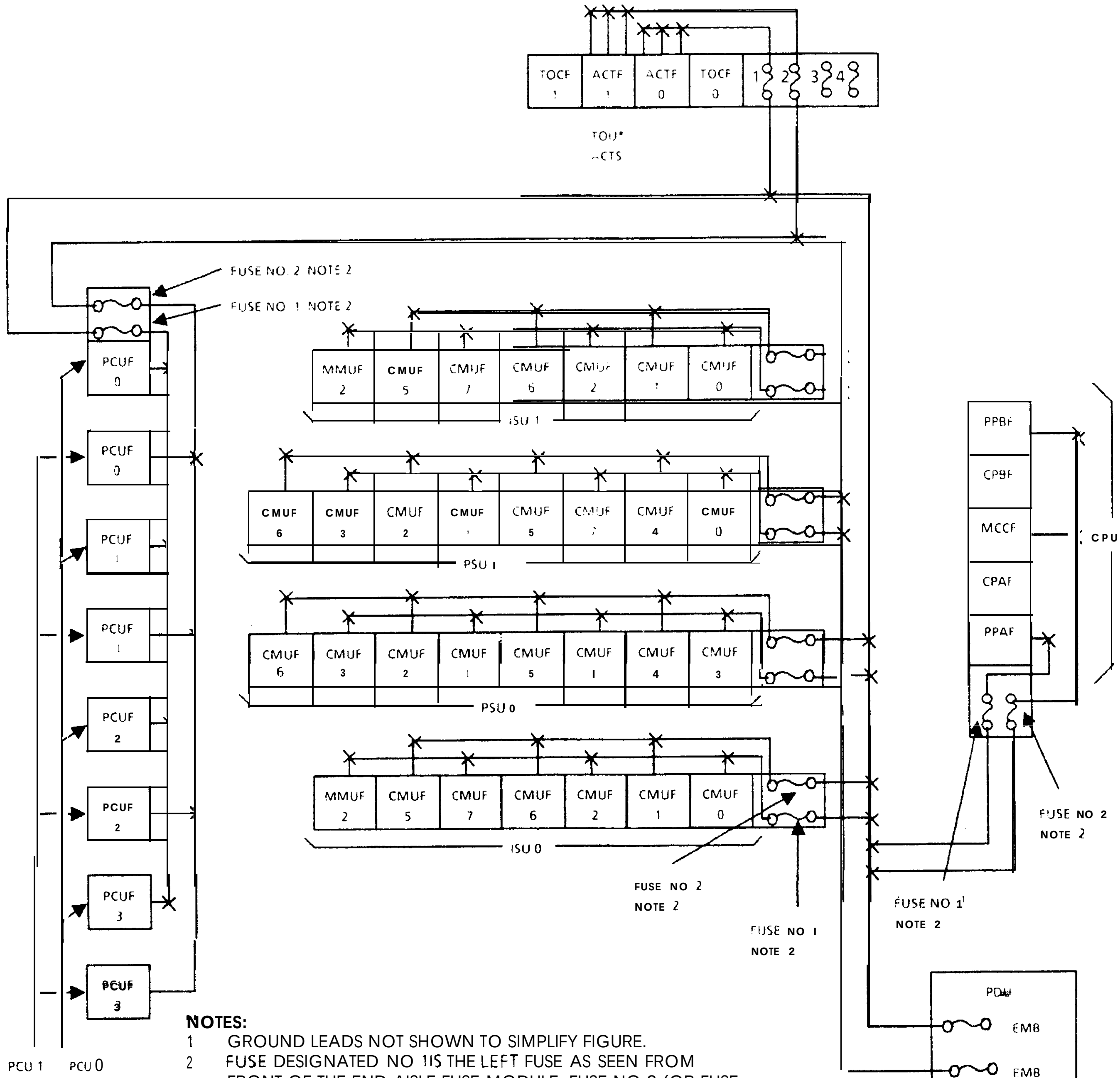
(a) Instruction Store Unit Copy 0 (ISU0), and

(b) Process Store Unit Copy 0 (PSUO), and

(c) Peripheral Control Unit Copy 0 (PCU0).

5.03 End-aisle fuses 1 and 2 of the ISUO and PSUO lineups, which are assigned to the same EMB primary fuse (Figure 3), fuse every other frame in each lineup. End-aisle fuse 1 of the Peripheral Control Unit (PCU) lineup fuses Peripheral Control Unit Frames (PCUF's) 0, 1, 2, and 3 of PCUO. End-aisle fuse 1 of the Central Processor Unit (CPU) lineup fuses the Processor Power A Frame (PPAF).

NOTE: The mnemonic PCU used in this part (part 5) refers to the peripheral control unit of the No. 1 TSPS. Elsewhere in this practice, PCU refers to the power control unit of the power complex.



NOTES:

1 GROUND LEADS NOT SHOWN TO SIMPLIFY FIGURE.

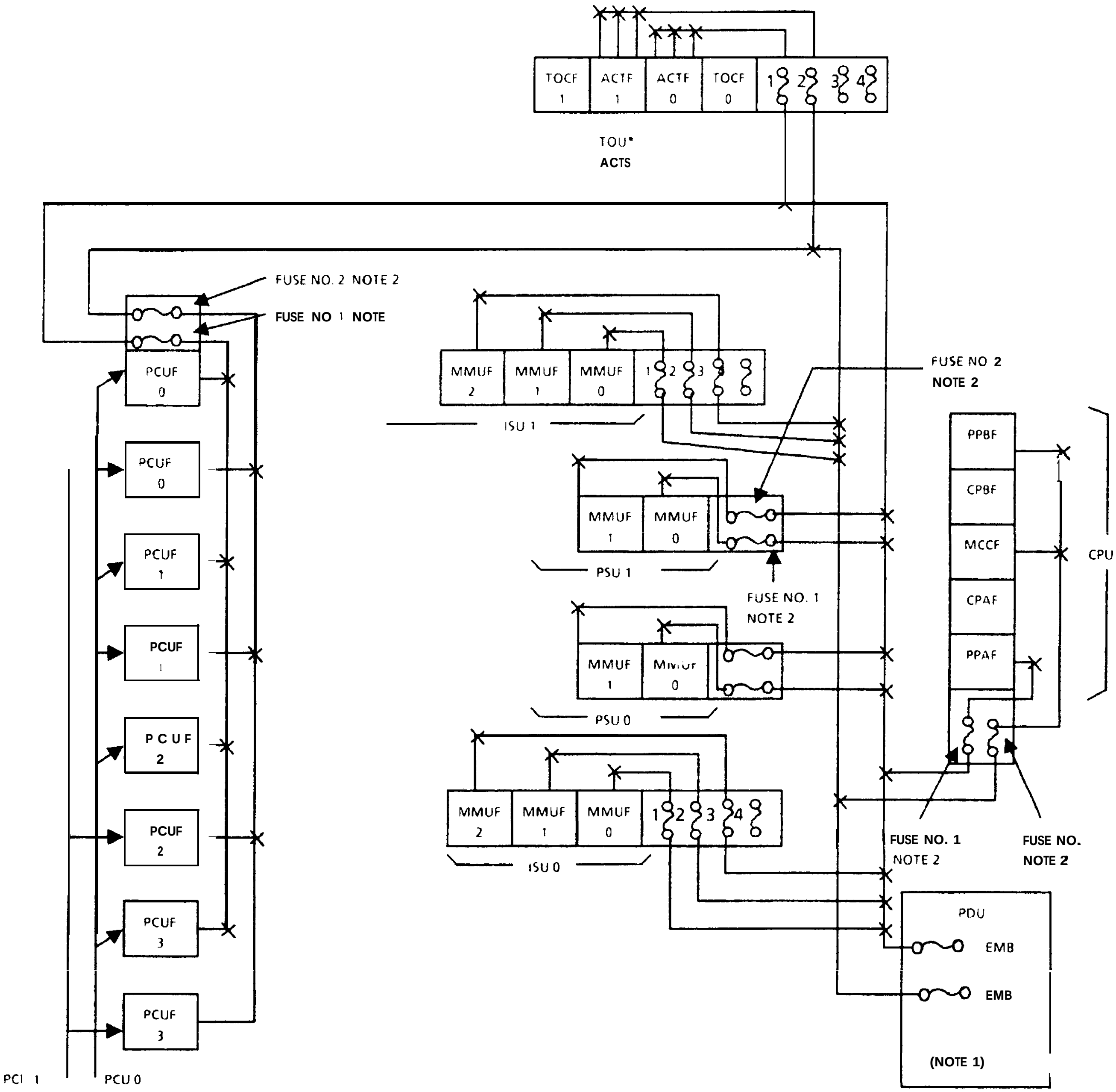
2 FUSE DESIGNATED NO 1 IS THE LEFT FUSE AS SEEN FROM FRONT OF THE END AISLE FUSE MODULE. FUSE NO 2 (OR FUSE NO. 4) IS THE RIGHT FUSE. THIS FUSE ASSIGNMENT WILL BE THE SAME FOR ALL EQUIPMENT LINEUPS

3 ISU 0 AND 1 MMUF 2 CONTAINS PRIMARY AND GHOST STORE METAL-OXIDE SEMICONDUCTOR (MOS) MEMORY UNITS 3 AND 4

4 * DENOTES ANY TRAFFIC OFFICE NUMBER 1 THROUGH 9.

Figure 3a. Electronic Equipment Primary Fuse Assignment (Core Memory With MOS Memory for SVR 1.1.8.1).

Figure 3. Electronic Equipment Primary Fuse Assignment.



NOTES:

1 GROUND LEADS NOT SHOWN TO SIMPLIFY FIGURE.

2 FUSE DESIGNATED NO 1 IS THE LEFT FUSE AS SEEN FROM FRONT OF THE END AISLE FUSE MODULE. FUSE NO. 2 (OR FUSE NO. 4) IS THE RIGHT FUSE THIS FUSE ASSIGNMENT WILL BE THE SAME FOR ALL EQUIPMENT LINEUPS

3 * DENOTES ANY TRAFFIC OFFICE NUMBER 1 THROUGH 9.

Figure 3b. Electronic Equipment Primary Fuse Assignment (MOS Memory).

Figure 3. Electronic Equipment Primary Fuse Assignment (Continued).

5.04 All electronic equipment frames of Copy 1 **are** assigned to the same EMB primary fuse at the power board (Figure 3). This equipment includes the Processor Power B Frame (PPBF), the Manual Control Console Frame (MCCF), and all frames associated with the following unit copies:

(a) Instruction Store Unit Copy 1 (ISU1).

(b) Process Store Unit Copy 1 (PSU1), and

(c) Peripheral Control Unit Copy 1 (PCU 1).

5.05 End-aisle fuses 1 and 2 of the ISU1 and PSUI lineups, which are assigned to the same EMB primary fuse (Figure 3), fuse every other frame in each lineup. End-aisle fuse 2 of the PCU lineup fuses PCUF's 0, 1, 2, and 3 of PCU1. End-aisle fuse 2 of the CPU lineup fuses the PPBF and the MCCF.

Network Equipment

5.06 **Electromechanical Battery (MB).** End-aisle fuses 1 for the equipment lineups of each Basic Network Unit (BNUO-BNU3) are assigned to MB battery (Figure 4). The Network Complex Access A Frame (NCAF) of each BNU is assigned to one MB primary fuse at the power board, and the Network Complex Access B Frame (NCBF) of each BNU is assigned to a second MB primary fuse. In other words, the NCAF's and NCBF's are not assigned to the same primary fuse.

5.07
fuse end-aisle fuse modules are used, end-aisle fuses 2 for the equipment lineups of each BNU are assigned to NMB battery. The equipment lineup containing the NCAF and associated Network Trunk and Position Grid Frames (NTPF's) and Network A Matrix Expansion Frames (NAEF's) in each BNU (one-half of a network unit) are assigned to one NMB primary fuse at the power board; and the equipment lineup containing the NCBF and associated NTPF's and NAEF's in each BNU (second half of a network unit) are assigned to a second NMB primary fuse.

5.08 In short, the two halves of a BNU are not assigned to the same primary fuse. When four-fuse end-aisle fuse modules are used, end-aisle fuses 3 and 4 for the equipment lineups of each BNU are assigned to NMB battery as shown in Figure 4.

input/Output Access Frame

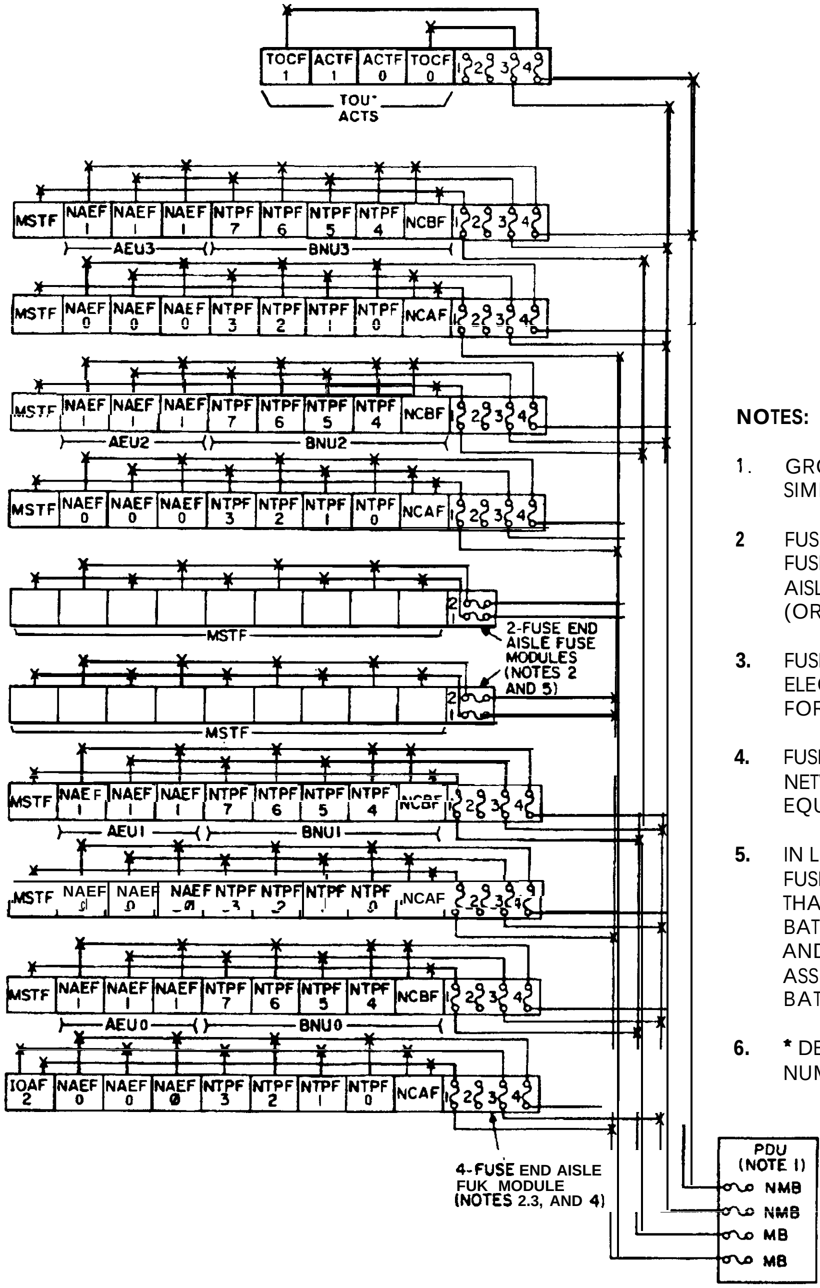
5.09 The Input/Output Access Frames (IOAFO and IOAF1) are redundant copies of each other with respect to magnetic tape drives. For this reason, these two IOAF's should be fused from different primary fuses. Because these two frames are normally located in the same equipment lineup, they should also be fused from different end-aisle fuses.

5.10 The equipment lineup containing the two IOAF's is provided with four-fuse end-aisle fuse modules. These four-fuse modules are required because the IOAF's require two types of battery: MB and NMB. Figure 5 shows IOAF-redundant fusing.

5.11 Because the IOAF's do not have a fixed location on a No. I TSPS base unit floor plan arrangement, there are no hard and fast rules for the actual power cabling and assignment of primary fuses other than those described here. An additional IOAF, IOAF2, is **shown** in Figure 4. The requirements for this frame have **not been defined to date (refer to** Practice 780-210-071).

Service Circuit Unit and Trunk Circuit Unit

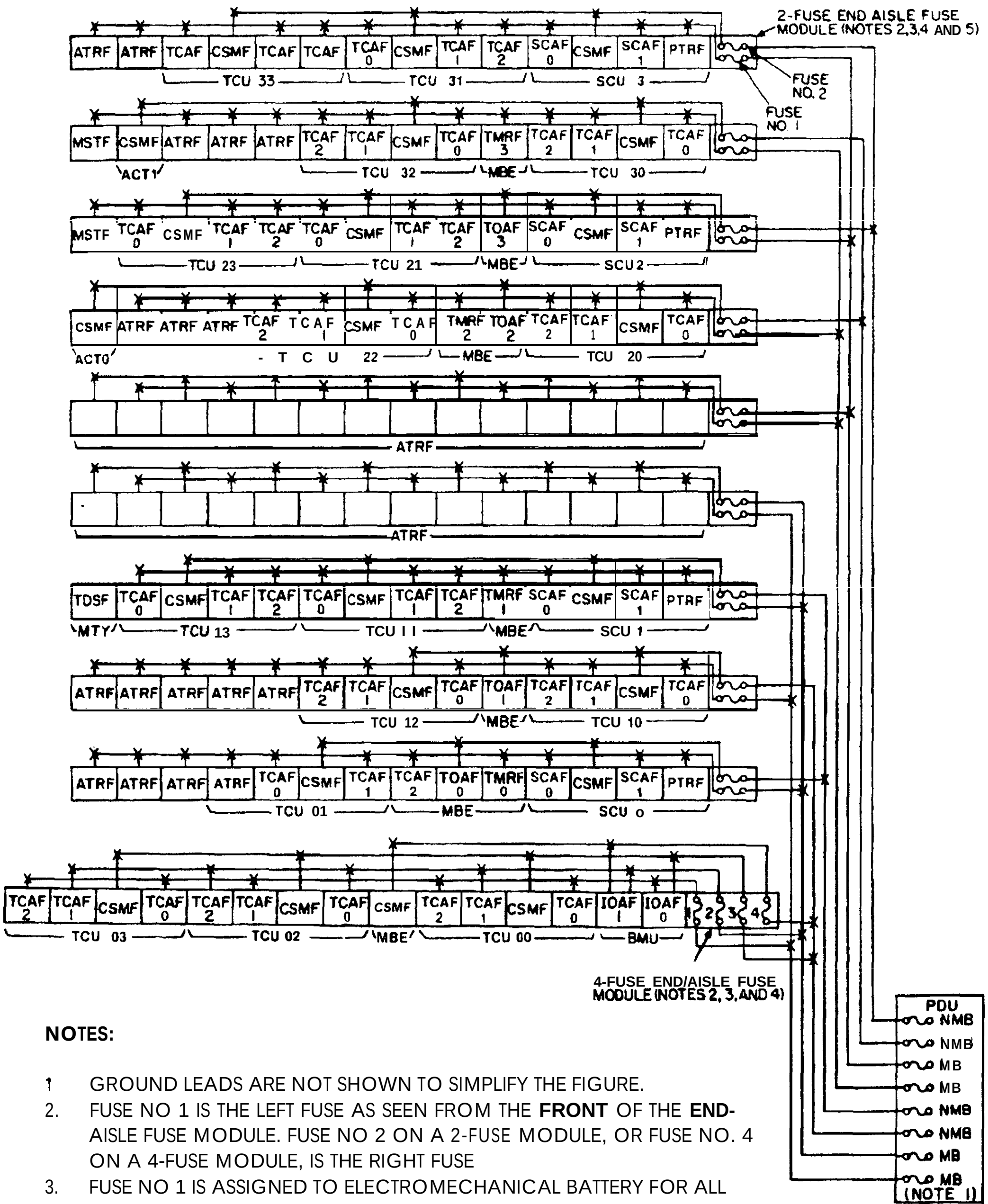
5.12 No more than two equipment lineups containing Service Circuit Units (SCU's) and Trunk Circuit Units (TCU's) can be assigned to the same primary fuses. These lineups each require power from two types of battery: MB and NMB. The two equipment lineups assigned to the same primary fuses are to be associated with different BNU's (Figure 5).



NOTES:

1. GROUND LEADS NOT SHOWN TO SIMPLIFY FIGURE
2. FUSE DESIGNATED NO 1 IS THE LEFT FUSE AS SEEN FROM FRONT OF END-AISLE FUSE MODULE. FUSE NO. 2 (OR FUSE NO. 4) IS THE RIGHT FUSE
3. FUSE NO. 1 IS ASSIGNED TO ELECTROMECHANICAL BATTERY FOR ALL EQUIPMENT LINEUPS
4. FUSES 3 AND 4 ARE ASSIGNED TO NETWORK BATTERY FOR ALL EQUIPMENT LINEUPS.
5. IN LINEUPS CONTAINING A TWO-FUSE END-AISLE FUSE MODULE THAT REQUIRES ONLY ONE TYPE OF BATTERY DISTRIBUTION, FUSE NO. 1 AND FUSE NO. 2 ARE BOTH ASSIGNED TO THE SAME TYPE OF BATTERY.
6. * DENOTES ANY TRAFFIC OFFICE NUMBER 1 THROUGH 9

Figure 4. Network Equipment Primary Fuse Assignment.



NOTES:

1. GROUND LEADS ARE NOT SHOWN TO SIMPLIFY THE FIGURE.
2. FUSE NO 1 IS THE LEFT FUSE AS SEEN FROM THE **FRONT** OF THE **END-** AISLE FUSE MODULE. FUSE NO 2 ON A 2-FUSE MODULE, OR FUSE NO. 4 ON A 4-FUSE MODULE, IS THE RIGHT FUSE
3. FUSE NO 1 IS ASSIGNED TO ELECTROMECHANICAL BATTERY FOR ALL EQUIPMENT LINEUPS. FUSE NO. 2 IS ASSIGNED TO ELECTROMECHANICAL BATTERY IN EQUIPMENT LINEUPS CONTAINING A 4-FUSE END-AISLE FUSE MODULE.
4. FUSE NO. 2 IS ASSIGNED TO NETWORK BATTERY FOR ALL EQUIPMENT LINEUPS CONTAINING A 2-FUSE END-AISLE FUSE MODULE. FUSE NO. 3 AND FUSE NO. 4 ARE ASSIGNED TO NETWORK BATTERY FOR EQUIPMENT LINEUPS CONTAINING A 4-FUSE END-AISLE FUSE MODULE.
5. RULES 3 AND 4ARE TO BE FOLLOWED EXCEPT IN LINEUPS CONTAINING A 2-FUSE END-AISLE FUSE MODULE THAT REQUIRE ONLY ONE TYPE OF BATTERY DISTRIBUTION. FUSE NO. 1 AND FUSE NO. 2 WILL THEN BE ASSIGNED TO THE SAME TYPE OF BATTERY.

Figure 5. Trunk Circuit Unit and Service Circuit Unit Primary Fuse Assignment.

5.13 Because the Traffic Office Access frames (TOAF'S) are located in the equipment lineups with the SCU's and the TCU's, primary fuse assignments are made to the SCU and TCU lineups in such a manner that each such lineup containing a TOAF is assigned to a different primary fuse (Figure 5). The reason is the redundancy requirement for the TOAF's: TOAF's 0 and 1, and TOAF's 2 and 3, are redundant copies. The two redundant copies of a TOAF pair require separate NMB primary fuses.

5.14 The Service Circuit Frame (SCF) must be fused from two separate MB primary fuses (Figure 6).

Miscellaneous Signal and Transmission Frame Lineups and Access Trunk Repeater Frame Lineups

5.15 Miscellaneous Signal and Transmission Frame (MSTF) lineups and Access Trunk Repeater Frame (ATRF) lineups should be fused in such a manner that no more than one equipment lineup (MSTF or ATRF) is to be assigned to the same MB primary fuse at the power board (Figures 4 and 5).

Maintenance and Test Complex Equipment

5.16 For reliability purposes, the Maintenance and Test Complex (MTC) must not be assigned to any MB primary fuse that is also assigned to other No. 1 TSPS equipment. The MTC equipment frames are fused directly from the power board serving the No. 1 TSPS base unit equipment. A fuse, located on the Distribution Fuse Panel (DFP) of the Power Control Distribution Frame (PCDF), is assigned to these maintenance and test frames. The MTC equipment lineup is fused as shown in Figure 6.

Traffic Office Equipment

5.17 To obtain redundancy in those equipment lineups that contain redundant copies of the Traffic Office Control Frame (TOCF0 and TOCF1), a primary fuse is assigned to each of the two NMB end-aisle fuses in each such equipment lineup. One TOCF is then assigned to one of the two NMB end-aisle fuses, and the other TOCF is assigned to the other NMB end-aisle fuse (Figure 7).

5.18 To obtain redundancy in those equipment lineups that contain the Display Buffer Control Frames (DBCF's 0 through 6), an MB primary fuse is assigned to each of the two end-aisle fuses in such an equipment lineup. The end-aisle fuses are then assigned to alternate frames (odd and even frames) in the equipment lineup (Figure 7).

5.19 The Traffic Office Transfer (TOTF) must be assigned to a dedicated MB primary fuse at the power board. This frame should not be assigned to any primary fuse that is also assigned to other No. 1 TSPS equipment. If equipment for more than one traffic office is located in the same equipment room, each TOTF must be assigned to a separate, dedicated, MB primary fuse (Figure 7).

5.20 The Display Buffer Expansion Frame (DBEF) and the Operator Position Equipment Frame (OPEF) must both be fused from two separate MB battery primary fuses as shown in Figure 7.

5.20 Depending upon floor-plan configurations, it is acceptable to assign the same primary fuses to equipment lineups associated with more than one traffic office as long as the guidelines set forth in paragraphs 5.17 through 5.19 are followed. If traffic office equipment frame lineups are colocated with base unit equipment frame lineups, it is acceptable to assign the same primary fuses to both groups of equipment as long as the guidelines set forth in paragraphs 5.15 through 5. 17 are followed.

6. END-AISLE FUSE LOADING

6.01 The first end-aisle fuse loading rule to be observed is that the individual end-aisle fuse should not be loaded to capacity

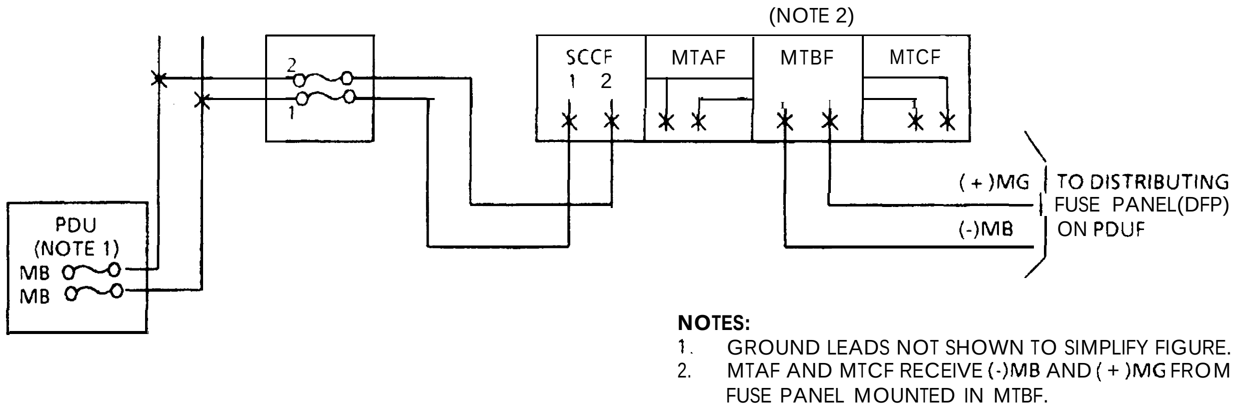


Figure 6. Maintenance and Test Complex Equipment Lineup Fuse Assignment.

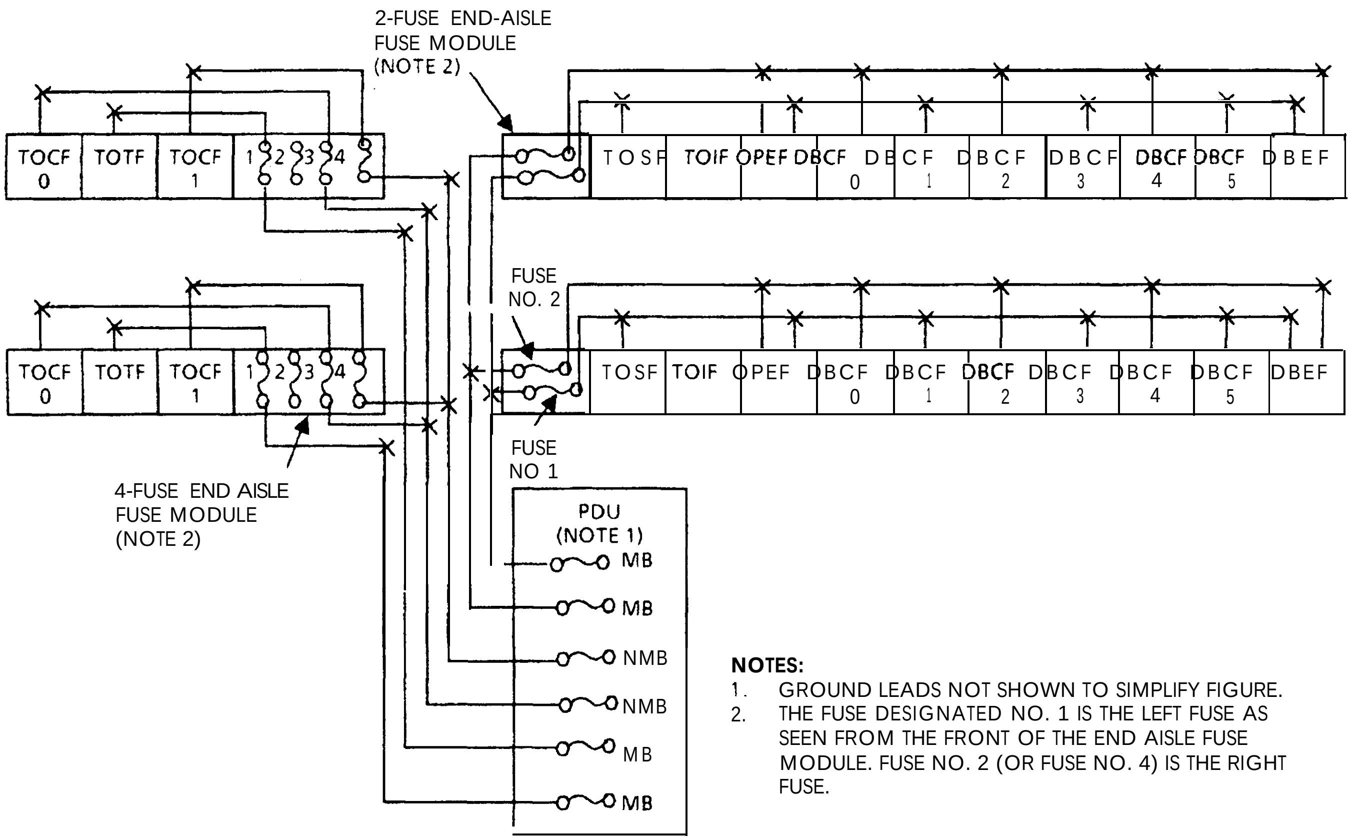


Figure 7. Traffic Office Unit Primary Fuse Assignment.

higher than the capacities listed in paragraph 4.03. The loading of a specific end-aisle fuse can be determined by computing the total individual AMD of the equipment frames located in a specific lineup and associated with the end-aisle fuse in question. Refer to the appropriate practice of AGCS Practices to determine the AMD and/or the BHD of the equipment frames.

6.02 If the equipment frames in a specific lineup require dual and/or multimodule battery inputs and are assigned to aisle fuses No. 1 and No. 2, the total AMD of those **frames should generally be divided equally between aisle fuse No. 1 and aisle fuse No. 2. In this text, the individual frames of all the lineups (Figure 2, B through E) have been arbitrarily assigned an AMD ranging from 10 to 20 amperes.**

6.03 **As** an **example of end-aisle** fuse loading, refer to lineup El in Figure 2. Apply a total **AMD of 10 amperes** per frame to the equipment frames associated with aisle **fuse No.** 1, as **follows:**

(a) Apply a lo-ampere drain to each of the single-battery input frames designated XXXX-A and XXXX-C. These frames are totally fused by **aisle fuse No. 1**.

(b) Apply a S-ampere drain to each multiframe XXXX-E and dual **battery input frame** XXXX-F. If the **multiframe and dual battery input frames located in** the same **lineup are fused (as shown in this example)** by **aisle fuses No. 1 and** No. 2, the **total frame drain of these frames should be divided** evenly between the two aisle fuses.

6.04 Thus, the total equipment load for the frames associated with aisle fuse **No. 1 is** rated at an AMD of 30 amperes: 10 amperes each for frames XXXX-A **and** XXXX-C; 5 amperes each for frames XXXX-E and XXXX-F. This value (i.e., the 30-ampere AMD total) is then entered in the EQUIPMENT LOAD AM (Absolute Maximum) column in the equipment power **distribution form.**

6.05 Based on the 30-ampere AMD value computed above, the capacity of aisle **fuse No. 1** is set at 50 amperes (as explained in paragraph 4.03) and the two digits (i.e., 50) are entered in the AISLE **FUSE CAP (capacity) column of** the **equipment power distribution form.** The end-aisle fuse loading procedure should be repeated **for** aisle fuse No. 2 **(lineup El** in Figure 2) and for individual **end-aisle** fuses in each of the remaining lineups.

7. STANDARD POWER CABLE SIZES

7.01 The standard main power cable sizes used in the electronic systems are 350 Thousand Circular Mils (MCM's), 500 MCM, and 750 MCM. For reasons of economy, the smallest cable size and number of cable pairs should be provided initially, as long as the Voltage Drop (VD) requirements are met.

7.02 For example, a 350-MCM, single-pair cable should be considered first. Then, if upon completion of the engineering, the VD requirements are exceeded, a 500-MCM, **single-pair cable should be considered before considering** a 750-MCM, single-pair cable. If the 750-MCM, single-pair cable fails to meet the VD requirements, a 350-MCM, two-pair cable should be considered before considering a 500-MCM, two-pair cable or, finally, a 750-MCM, two-pair cable.

7.03 Typical applications of the main power cable sizes are shown in Figure 8. This example is for determining cable size and capacity during the initial engineering effort.

8. BATTERY-TO-POWER CONTROL UNIT CABLE VOLTAGE DROP CALCULATION METHODS

8.01 The battery-to-PCU cable **VD** may be determined by using one of the two methods described below. The first method involves using a formula to calculate the drop. The second method is **direct reading from a table.**

Calculating by Formula (Copper Cable Only)

8.02 To calculate the VD using actual job figures, use the following formula:

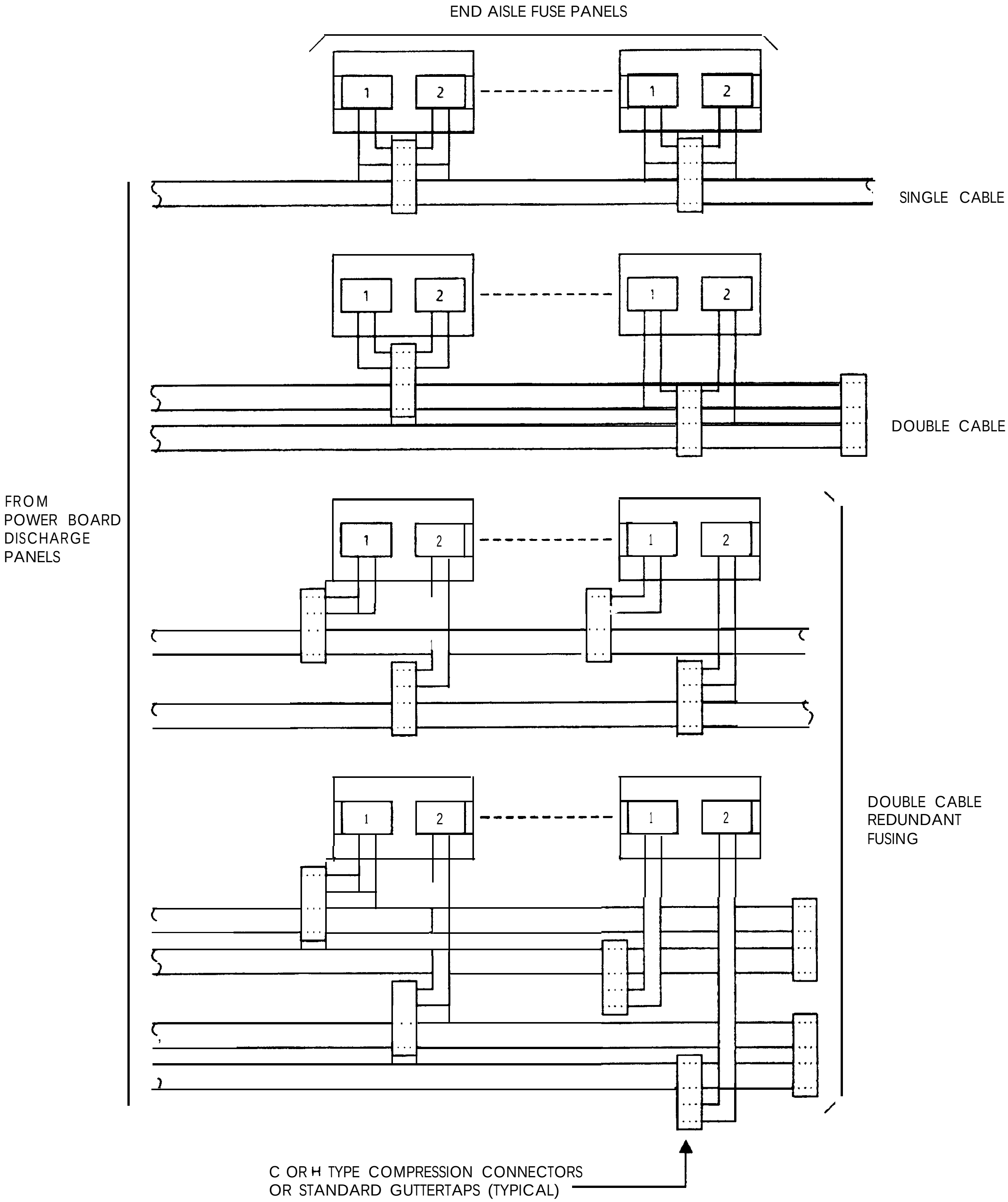


Figure 8. Typical Applications of Standard Main Power Cabie Sizes (500 MCM and 750 MCM).

VD = Loop x Ultimate Busy Hour Drain (UBHD) x 10.8 / Circular Mill (CM)

$$VD = \frac{\text{Loop x Ultimate Busy Hour Drain (UBHD) x 10.8}}{\text{Circular Mill (CM)}}$$

For example, the 0.14-volt VD used in note 1 of Table 4 must be 0.10 or less because a long PCU-to-DFP run results in a 0.65-volt VD. Then, using actual job figures, calculate as follows:

$$VD = \frac{\text{50 feet X 95 (UBHD) X 10.8}}{\text{500,000 CM}} = 0.10 \text{ VD}$$

Then, show the Voltage Drop (VD) on the Power and Signal Cabling Layout (PSL) drawing as 0.10 volt instead of 0.14.

8.03 However, if recalculation does not give the required VD, proceed as follows:

(a) Recheck the power drain calculations to determine if UBHD can reasonably be reduced.

(b) Recheck the floor plan to determine if battery can be located closer to the PCU, or

(c) Increase CM by guttertapping a cable of required CM area to the cable sizes in Table 4. For example, assume VD has to be 0.09. This can be accomplished by guttertapping a No. 2 cable (66,370 CM) with the 500 MCM:

$$VD = \frac{\text{500 feet X 95 (UBHD) X 10.8}}{\text{566,379 CM}} = 0.09 \text{ VD}$$

Direct Reading Method

8.04

(a) run being made from the first vertical column on the left.

(b) Find the current in amperes of the run being made from the first horizontal line at the top.

(c) Proceed horizontally to the right from the first vertical column g the line on loop distance the was found.

(d) Proceed down from the top horizontal line along the which the current was found. The number in the box where the two lines meet is the drop the two values.

8.05 The application of the first vertical column and the top horizontal line may be reversed. The first vertical column may be used to find either the loop distance or the current, and the top horizontal line may be used to find either the current or the loop distance. if the exact value in either feet or amperes is not listed, use the next largest number in the appropriate column or line.

8.06 Although the tables have been computed for use in decentralized cabling, it may also be applied to SxS usage. in applications where the VD is higher than that indicated for one 350-MCM, 500-MCM, or 750-MCM cable for a specific loop distance and current, divide the VD shown for one cable by two. The quotient is the VD using two 350-MCM, 500-MCM, or 750-MCM cables.

9. CABLE SIZES VOLTAGE DROP

9.01 Approved copper cable appears on drawing W-2000. The suffixes to drawing W-2000 indicate the cable size. For example, 100 feet of W-2000-X75 is equivalent to 100 feet of 750-MCM copper cable. Also, where a table calls for 100 feet of 2W-2000-X75, the prefix 2 indicates that 200 feet of cable are required to run 2 cables per polarity (-MB and + GRD) in parallel for the 100 feet, thereby doubling the Circular Mils (CM's) to 1,500,000.

Table 4. Battery-to-KU Cable.

ULTIMATE BHD	W-2000-x25	w-2000-X50	2W-2000-X35	2W-2000-X75	3W-2000-X75	4W-2000-X75	VOLTAGE DROP AT LOOP FEET					RATING (AMPERES)
							20	40	60	80	100	
80	X						0.07	0.14	0.20			200
		X							0.10	0 14	0 17	200
110	X						).09	0.19				200
		X						0.09	0.14	0 19	0 24	200
‘150	X						0 12	0.26				200
		X					0.06	0.13	0 19	0.25		200
200			X				0.06	0.12	0.18	0.25		400
300			X				0.09	0.18	0.28			400
500				X			0 07	0.14	0 22	0.29		800
600				X			0.09	0.17	0.26			800
800					X		0.07	0.15	0.23	0 30		1200
						X	0.05	0.11	0.17	0.23	0.28	1200

Over **800: See Section 795- 155-074.**

NOTES:

1. **Typical application: If the calculated UBHD is 95 amperes, and the floor plan shows battery to be 22 feet from the PCU, use 110 for UBHD, specify W-2000-X50, and show VD on PSL as 0.14.**
2. **When necessary to decrease voltage drop from the battery to the PCU, proceed as follows:**
   - (a) **Recheck power drain calculations to determine if UBHD can reasonably be reduced.**
   - (b) **Recheck the floor plan to deteimine if the battery can be located closer to the PCU.**
   - (c) **Find the VD as described in part 8.**

***Exceeds limitation of Type 226A.**

Power Distribution Voltage Drop

9.02 The calculated voltage drop in the power distribution system from the battery to the equipment frames must not exceed 1 volt. It is assumed that an additional 0.5 volt is lost in cable connections, switches, and fuses in the distribution system totaling 1.5 volts drop overall. Because the minimum equipment operating voltage of the electronic switching systems is 44 Vdc, the capacity of the central office battery must be calculated on the basis of 45.5 Vdc minimum voltage for purposes of reserve power. Figure 9 shows the application and apportionment of the calculated voltage drop in the various segments of discharge circuits of typical power systems.

Rectifier to Battery

9.03 Cable sizes from rectifier to battery are covered in Practice 795-205-076.

Battery to Power Control Unit

9.04 A 0.25-volt VD at Ultimate Busy Hour Drain (UBHD) is allowable in the No. 1 and No, 23 cable loop from battery to the PCU. The cable sizes for No. 1, No. 23, and No. 26 (when used) must all be the same and must be sized for the UBHD. Refer to Table 4 for cable sizes.

NOTE: When a DSU is used with remotely located PDU's, the VD's in the battery-to-PCU section, primary fuse-to-distribution fuse

Table 5. Potential Voltage Drop for One Copper 350 MCM Cable.

AMPERES OR LOOP FEET	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
50	0.08	0.09	0.11	0.12	0.14	0.15	0.17	0.19	0.20	0.22	0.23	0.25	0.26	0.28	0.29	0.31	0.32	0.34	0.35	0.37
55	0.08	0.10	0.12	0.14	0.15	0.17	0.19	0.20	0.22	0.24	0.25	0.27	0.29	0.31	0.32	0.34	0.36	0.37	0.39	0.41
60	0.09	0.11	0.13	0.15	0.17	0.19	0.20	0.22	0.24	0.26	0.28	0.30	0.31	0.33	0.35	0.37	0.39	0.41	0.43	0.44
65	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0.46	0.48
70	0.11	0.13	0.15	0.17	0.19	0.22	0.24	0.26	0.28	0.30	0.32	0.35	0.37	0.39	0.41	0.43	0.45	0.48	0.50	0.52
75	0.12	0.14	0.16	0.19	0.21	0.23	0.25	0.28	0.30	0.32	0.35	0.37	0.39	0.42	0.44	0.46	0.49	0.51	0.53	0.56
80	0.12	0.15	0.17	0.20	0.22	0.25	0.27	0.30	0.32	0.35	0.37	0.39	0.42	0.44	0.47	0.49	0.52	0.54	0.57	0.59
85	0.13	0.16	0.18	0.21	0.24	0.26	0.29	0.31	0.34	0.37	0.39	0.42	0.45	0.47	0.50	0.52	0.55	0.58	0.60	0.63
90	0.14	0.17	0.19	0.22	0.25	0.28	0.31	0.33	0.36	0.39	0.42	0.44	0.47	0.50	0.53	0.56	0.58	0.61	0.64	0.67
95	0.15	0.18	0.21	0.23	0.26	0.29	0.32	0.35	0.38	0.41	0.44	0.47	0.50	0.53	0.56	0.59	0.62	0.64	0.67	0.70
100	0.15	0.19	0.22	0.25	0.28	0.31	0.34	0.37	0.40	0.43	0.46	0.49	0.52	0.56	0.59	0.62	0.65	0.68	0.71	0.74
105	0.16	0.19	0.23	0.26	0.29	0.32	0.36	0.39	0.42	0.45	0.49	0.52	0.55	0.58	0.62	0.65	0.68	0.71	0.75	0.78
110	0.17	0.20	0.24	0.27	0.31	0.34	0.37	0.41	0.44	0.48	0.51	0.54	0.58	0.61	0.64	0.68	0.71	0.75	0.78	0.81
115	0.18	0.21	0.25	0.28	0.32	0.35	0.39	0.43	0.46	0.50	0.53	0.57	0.60	0.64	0.67	0.71	0.75	0.78	0.82	0.85
120	0.19	0.22	0.26	0.30	0.33	0.37	0.41	0.44	0.48	0.52	0.56	0.59	0.63	0.67	0.70	0.74	0.78	0.81	0.85	0.89
125	0.19	0.23	0.27	0.31	0.35	0.39	0.42	0.46	0.50	0.54	0.58	0.62	0.66	0.69	0.73	0.77	0.81	0.85	0.89	0.93
130	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.96
135	0.21	0.25	0.29	0.33	0.37	0.42	0.46	0.50	0.54	0.58	0.62	0.67	0.71	0.75	0.79	0.83	0.87	0.92	0.96	1.00
140	0.22	0.26	0.30	0.35	0.39	0.43	0.48	0.52	0.56	0.60	0.65	0.69	0.73	0.78	0.82	0.86	0.91	0.95	.99	1.04
145	0.22	0.27	0.31	0.36	0.40	0.45	0.49	0.54	0.58	0.63	0.67	0.72	0.76	0.81	0.85	0.89	0.94	0.98	1.03	1.07
150	0.23	0.28	0.32	0.37	0.42	0.46	0.51	0.56	0.60	0.65	0.69	0.74	0.79	0.83	0.88	0.93	0.97	1.02	1.06	1.11
155	0.24	0.29	0.33	0.38	0.43	0.48	0.53	0.57	0.62	0.67	0.72	0.77	0.81	0.86	0.91	0.96	1.00	1.05	1.10	1.15
160	0.25	0.30	0.35	0.39	0.44	0.49	0.54	0.59	0.64	0.69	0.74	0.79	0.84	0.89	0.94	0.99	1.04	1.09	1.14	1.18
165	0.25	0.31	0.36	0.41	0.46	0.51	0.56	0.61	0.66	0.71	0.76	0.81	0.87	0.92	0.97	1.02	1.07	1.12	1.17	1.22
170	0.26	0.31	0.37	0.42	0.47	0.52	0.58	0.63	0.68	0.73	0.79	0.84	0.89	0.94	1.00	1.05	1.10	1.15	1.21	1.26
175	0.27	0.32	0.38	0.43	0.49	0.54	0.59	0.65	0.70	0.76	0.81	0.86	0.92	0.97	1.03	1.08	1.13	1.19	1.24	1.30
180	0.28	0.33	0.39	0.44	0.50	0.56	0.61	0.67	0.72	0.78	0.83	0.89	0.94	1.00	1.06	1.11	1.17	1.22	1.28	1.33
185	0.29	0.34	0.40	0.46	0.51	0.57	0.63	0.69	0.74	0.80	0.86	0.91	0.97	1.03	1.08	1.14	1.20	1.26	1.31	1.37
190	0.29	0.35	0.41	0.47	0.53	0.59	0.64	0.70	0.76	0.82	0.88	0.94	1.00	1.06	1.11	1.17	1.23	1.29	1.35	1.41
195	0.30	0.36	0.42	0.48	0.54	0.60	0.66	0.72	0.78	0.84	0.90	0.96	1.02	1.08	1.14	1.20	1.26	1.32	1.38	1.44
200	0.31	0.37	0.43	0.49	0.56	0.62	0.68	0.74	0.80	0.86	0.93	0.99	1.05	1.11	1.17	1.23	1.30	1.36	1.42	1.48
205	0.32	0.38	0.44	0.51	0.57	0.63	0.70	0.76	0.82	0.89	0.95	1.01	1.08	1.14	1.20	1.27	1.33	1.39	1.45	1.52
210	0.32	0.39	0.45	0.52	0.58	0.65	0.71	0.78	0.84	0.91	0.97	1.04	1.10	1.17	1.23	1.30	1.36	1.43	1.49	1.56
215	0.33	0.40	0.46	0.53	0.60	0.66	0.73	0.80	0.86	0.93	1.00	1.06	1.13	1.19	1.26	1.33	1.39	1.46	1.53	1.59
220	0.34	0.41	0.48	0.54	0.61	0.68	0.75	0.81	0.88	0.95	1.02	1.09	1.15	1.22	1.29	1.36	1.43	1.49	1.56	1.63
225	0.35	0.42	0.49	0.56	0.62	0.69	0.76	0.83	0.90	0.97	1.04	1.11	1.18	1.25	1.32	1.39	1.46	1.53	1.60	1.67
230	0.35	0.43	0.50	0.57	0.64	0.71	0.78	0.85	0.92	0.99	1.06	1.14	1.21	1.28	1.35	1.42	1.49	1.56	1.63	1.70
235	0.36	0.44	0.51	0.58	0.65	0.73	0.80	0.87	0.94	1.02	1.09	1.16	1.23	1.31	1.38	1.45	1.52	1.60	1.67	1.74
240	0.37	0.44	0.52	0.59	0.67	0.74	0.81	0.89	0.96	1.04	1.11	1.18	1.26	1.33	1.41	1.48	1.56	1.63	1.70	1.78
245	0.38	0.45	0.53	0.60	0.68	0.76	0.83	0.91	0.98	1.06	1.13	1.21	1.29	1.36	1.44	1.51	1.59	1.66	1.74	1.81
250	0.39	0.46	0.54	0.62	0.69	0.77	0.85	0.93	1.00	1.08	1.16	1.23	1.31	1.39	1.47	1.54	1.62	1.70	1.77	1.85
255	0.39	0.47	0.55	0.63	0.71	0.79	0.87	0.94	1.02	1.10	1.18	1.26	1.34	1.42	1.50	1.57	1.65	1.73	1.81	1.89
260	0.40	0.48	0.56	0.64	0.72	0.80	0.88	0.96	1.04	1.12	1.20	1.28	1.36	1.44	1.52	1.60	1.68	1.77	1.85	1.93
265	0.41	0.49	0.57	0.65	0.74	0.82	0.90	0.98	1.06	1.14	1.23	1.31	1.39	1.47	1.55	1.64	1.72	1.80	1.88	1.96
270	0.42	0.50	0.58	0.67	0.75	0.83	0.92	1.00	1.08	1.17	1.25	1.33	1.42	1.50	1.58	1.67	1.75	1.83	1.92	2.00
275	0.42	0.51	0.59	0.68	0.76	0.85	0.93	1.02	1.10	1.19	1.27	1.36	1.44	1.53	1.61	1.70	1.78	1.87	1.95	2.04
280	0.43	0.52	0.60	0.69	0.78	0.86	0.95	1.04	1.12	1.21	1.30	1.38	1.47	1.56	1.64	1.73	1.81	1.90	1.99	2.07
285	0.44	0.53	0.62	0.70	0.79	0.88	0.97	1.06	1.14	1.23	1.32	1.41	1.50	1.58	1.67	1.76	1.85	1.93	2.02	2.11
290	0.45	0.54	0.63	0.72	0.81	0.89	0.98	1.07	1.16	1.25	1.34	1.43	1.52	1.61	1.70	1.79	1.88	1.97	2.06	2.15
295	0.46	0.55	0.64	0.73	0.82	0.91	1.00	1.09	1.18	1.27	1.37	1.46	1.55	1.64	1.73	1.82	1.91	2.00	2.09	2.18
300	0.46	0.56	0.65	0.74	0.83	0.93	1.02	1.11	1.20	1.30	1.39	1.48	1.57	1.67	1.76	1.85	1.94	2.04	2.13	2.22
305	0.47	0.56	0.66	0.75	0.85	0.94	1.04	1.13	1.22	1.32	1.41	1.51	1.60	1.69	1.79	1.88	1.98	2.07	2.16	2.26
310	0.48	0.57	0.67	0.77	0.86	0.96	1.05	1.15	1.24	1.34	1.43	1.53	1.63	1.72	1.82	1.91	2.01	2.10	2.20	2.30
315	0.49	0.58	0.68	0.78	0.87	0.97	1.07	1.17	1.26	1.36	1.46	1.56	1.65	1.75	1.85	1.94	2.04	2.14	2.24	2.33
320	0.49	0.59	0.69	0.79	0.89	0.99	1.09	1.18	1.28	1.38	1.48	1.58	1.68	1.78	1.88	1.97	2.07	2.17	2.27	2.37
325	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.81	1.91	2.01	2.11	2.21	2.31	2.41
330	0.51	0.61	0.71	0.81	0.92	1.02	1.12	1.22	1.32	1.43	1.53	1.63	1.73	1.83	1.93	2.04	2.14	2.24	2.34	2.44
335	0.52	0.62	0.72	0.83	0.93	1.03	1.14	1.24	1.34	1.45	1.55	1.65	1.76	1.86	1.96	2.07	2.17	2.27	2.38	2.48
340	0.52	0.63	0.73	0.84	0.94	1.05	1.15	1.26	1.36	1.47	1.57	1.68	1.78	1.89	1.99	2.10	2.20	2.31	2.41	2.52
345	0.53	0.64	0.75	0.85	0.96	1.06	1.17	1.28	1.38	1.49	1.60	1.70	1.81	1.92	2.02	2.13	2.24	2.34	2.45	2.55
350	0.54	0.65	0.76	0.86	0.97	1.08	1.19	1.30	1.40	1.51	1.62	1.73	1.84	1.94	2.05	2.16	2.27	2.38	2.48	2.59
355	0.55	0.66	0.77	0.88	0.99	1.10	1.20	1.31	1.42	1.53	1.64	1.75	1.86	1.97	2.08	2.19	2.30	2.41	2.52	2.63
360	0.56	0.67	0.78	0.89	1.00	1.11	1.22	1.33	1.44	1.56	1.67	1.78	1.89	2.00	2.11	2.22	2.33	2.44	2.55	2.67
365	0.56	0.68	0.79	0.90	1.01	1.13	1.24	1.35	1.46	1.58	1.69	1.80	1.91	2.03	2.14	2.25	2.37	2.48	2.59	2.70
370	0.57	0.69	0.80	0.91	1.03	1.14	1.26	1.37	1.48	1.60	1.71	1.83	1.94	2.06	2.17	2.28	2.40	2.51	2.63	2.74
375	0.58	0.69	0.81	0.93	1.04	1.16	1.27	1.39	1.50	1.62	1.74	1.85	1.97	2.08	2.20	2.31	2.43	2.55	2.66	2.78
380	0.59	0.70	0.82	0.94	1.06	1.17	1.29	1.41	1.52	1.64	1.76	1.88	1.99	2.11	2.23	2.35	2.46	2.58	2.70	2.81
385	0.59	0.71	0.83	0.95	1.07	1.19	1.31	1.43	1.54	1.66	1.78	1.90	2.02	2.14	2.26	2.38	2.49	2.61	2.73	2.85
390	0.60	0.72	0.84	0.96	1.08	1.20	1.32	1.44	1.56	1.68	1.81	1.93	2.05	2.17	2.29	2.41	2.53	2.65	2.77	2.89
395	0.61	0.73	0.85	0.98	1.10	1.22	1.34	1.46	1.58	1.71	1.83	1.95	2.07	2.19	2.32	2.44	2.56	2.68	2.80	2.93
400	0.62	0.74	0.86	0.99	1.11	1.23	1.36	1.48	1.60	1.73	1.85	1.97	2.10	2.22	2.35	2.47	2.59	2.72	2.84	2.96

Table 6. Potential Voltage Drop for One Copper 500 MCM Cable.

AMPERES OR LOOP FEET	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
50	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.25
55	0.05	0.07	0.08	0.09	0.10	0.11	0.13	0.14	0.15	0.16	0.17	0.19	0.20	0.21	0.22	0.23	0.24	0.26	0.27	0.28
60	0.06	0.07	0.09	0.10	0.11	0.12	0.14	0.15	0.16	0.18	0.19	0.20	0.22	0.23	0.24	0.25	0.27	0.28	0.29	0.31
65	0.07	0.08	0.09	0.11	0.12	0.14	0.15	0.16	0.18	0.19	0.21	0.22	0.23	0.25	0.26	0.28	0.29	0.30	0.32	0.33
70	0.07	0.08	0.10	0.12	0.13	0.15	0.16	0.18	0.19	0.21	0.22	0.24	0.25	0.27	0.28	0.30	0.31	0.33	0.34	0.36
75	0.08	0.09	0.11	0.12	0.14	0.16	0.17	0.19	0.21	0.22	0.24	0.25	0.27	0.29	0.30	0.32	0.34	0.35	0.37	0.38
80	0.08	0.10	0.12	0.13	0.15	0.17	0.19	0.20	0.22	0.24	0.25	0.27	0.29	0.31	0.32	0.34	0.36	0.38	0.39	0.41
85	0.09	0.11	0.12	0.14	0.16	0.18	0.20	0.22	0.23	0.25	0.27	0.29	0.31	0.33	0.34	0.36	0.38	0.40	0.42	0.44
90	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.26	0.27	0.29	0.31	0.33	0.34	0.36	0.38	0.40	0.42	0.44	0.46
95	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.41	0.43	0.45	0.47	0.49
100	0.10	0.12	0.15	0.17	0.19	0.21	0.23	0.25	0.28	0.30	0.32	0.34	0.36	0.38	0.41	0.43	0.45	0.47	0.49	0.51
105	0.11	0.13	0.15	0.18	0.20	0.22	0.24	0.27	0.29	0.31	0.34	0.36	0.38	0.40	0.43	0.45	0.47	0.49	0.52	0.54
110	0.11	0.14	0.16	0.19	0.21	0.23	0.26	0.28	0.30	0.33	0.35	0.38	0.40	0.42	0.45	0.47	0.49	0.52	0.54	0.57
115	0.12	0.14	0.17	0.19	0.22	0.24	0.27	0.29	0.32	0.34	0.37	0.39	0.42	0.44	0.47	0.49	0.52	0.54	0.57	0.59
120	0.12	0.15	0.18	0.20	0.23	0.25	0.28	0.31	0.33	0.36	0.38	0.41	0.44	0.46	0.49	0.51	0.54	0.57	0.59	0.62
125	0.13	0.16	0.18	0.21	0.24	0.26	0.29	0.32	0.35	0.37	0.40	0.43	0.45	0.48	0.51	0.53	0.56	0.59	0.62	0.64
130	0.14	0.16	0.19	0.22	0.25	0.28	0.30	0.33	0.36	0.39	0.42	0.44	0.47	0.50	0.53	0.56	0.58	0.61	0.64	0.67
135	0.14	0.17	0.20	0.23	0.26	0.29	0.32	0.34	0.37	0.40	0.43	0.46	0.49	0.52	0.55	0.58	0.61	0.64	0.67	0.69
140	0.15	0.18	0.21	0.24	0.27	0.30	0.33	0.36	0.39	0.42	0.45	0.48	0.51	0.54	0.57	0.60	0.63	0.66	0.69	0.72
145	0.15	0.18	0.21	0.25	0.28	0.31	0.34	0.37	0.40	0.43	0.46	0.50	0.53	0.56	0.59	0.62	0.65	0.68	0.72	0.75
150	0.16	0.19	0.22	0.25	0.29	0.32	0.35	0.38	0.42	0.45	0.48	0.51	0.55	0.58	0.61	0.64	0.68	0.71	0.74	0.77
155	0.16	0.20	0.23	0.26	0.30	0.33	0.36	0.40	0.43	0.46	0.50	0.53	0.56	0.60	0.63	0.66	0.70	0.73	0.77	0.80
160	0.17	0.20	0.24	0.27	0.31	0.34	0.38	0.41	0.44	0.48	0.51	0.55	0.58	0.62	0.65	0.69	0.72	0.76	0.79	0.82
165	0.17	0.21	0.24	0.28	0.32	0.35	0.39	0.42	0.46	0.49	0.53	0.57	0.60	0.64	0.67	0.71	0.74	0.78	0.81	0.85
170	0.18	0.22	0.25	0.29	0.33	0.36	0.40	0.44	0.47	0.51	0.55	0.58	0.62	0.66	0.69	0.73	0.77	0.80	0.84	0.88
175	0.18	0.22	0.26	0.30	0.34	0.37	0.41	0.45	0.49	0.52	0.56	0.60	0.64	0.68	0.71	0.75	0.79	0.83	0.86	0.90
180	0.19	0.23	0.27	0.31	0.34	0.38	0.42	0.46	0.50	0.54	0.58	0.62	0.66	0.69	0.73	0.77	0.81	0.85	0.89	0.93
185	0.19	0.23	0.27	0.31	0.35	0.39	0.43	0.47	0.51	0.55	0.59	0.63	0.67	0.71	0.75	0.79	0.83	0.87	0.91	0.95
190	0.20	0.24	0.28	0.32	0.36	0.41	0.45	0.49	0.53	0.57	0.61	0.65	0.69	0.73	0.77	0.82	0.86	0.90	0.94	0.98
195	0.21	0.25	0.29	0.33	0.37	0.42	0.46	0.50	0.64	0.58	0.63	0.67	0.71	0.75	0.80	0.84	0.88	0.92	0.96	1.01
200	0.21	0.25	0.30	0.34	0.38	0.43	0.47	0.51	0.56	0.60	0.64	0.69	0.73	0.77	0.82	0.86	0.90	0.95	0.99	1.03
205	0.22	0.26	0.30	0.35	0.39	0.44	0.48	0.53	0.57	0.61	0.66	0.70	0.75	0.79	0.84	0.88	0.92	0.97	1.01	1.06
210	0.22	0.27	0.31	0.36	0.40	0.45	0.49	0.54	0.58	0.63	0.68	0.72	0.77	0.81	0.86	0.90	0.95	0.99	1.04	1.08
215	0.23	0.27	0.32	0.37	0.41	0.46	0.51	0.55	0.60	0.65	0.68	0.74	0.78	0.83	0.88	0.92	0.97	1.02	1.06	1.11
220	0.23	0.28	0.33	0.38	0.42	0.47	0.52	0.57	0.61	0.66	0.71	0.76	0.80	0.85	0.90	0.95	0.99	1.04	1.09	1.14
225	0.24	0.29	0.34	0.38	0.43	0.48	0.53	0.58	0.63	0.68	0.72	0.77	0.82	0.87	0.92	0.97	1.02	1.06	1.11	1.16
230	0.24	0.29	0.34	0.39	0.44	0.49	0.54	0.59	0.64	0.69	0.74	0.79	0.84	0.89	0.94	0.99	1.04	1.09	1.14	1.19
235	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.71	0.76	0.81	0.86	0.91	0.96	1.01	1.06	1.11	1.16	1.21
240	0.25	0.31	0.36	0.41	0.46	0.51	0.57	0.62	0.67	0.72	0.77	0.82	0.88	0.93	0.98	1.03	1.08	1.14	1.19	1.24
245	0.26	0.31	0.37	0.42	0.47	0.52	0.58	0.63	0.68	0.74	0.79	0.84	0.89	0.95	1.00	1.05	1.11	1.16	1.21	1.27
250	0.26	0.32	0.37	0.43	0.48	0.53	0.59	0.64	0.70	0.75	0.80	0.86	0.91	0.97	1.02	1.07	1.13	1.18	1.24	1.29
255	0.27	0.33	0.38	0.44	0.49	0.55	0.60	0.66	0.71	0.77	0.82	0.88	0.93	0.99	1.04	1.10	1.15	1.21	1.26	1.32
260	0.28	0.33	0.39	0.44	0.50	0.56	0.61	0.67	0.73	0.78	0.84	0.89	0.95	1.01	1.06	1.12	1.17	1.23	1.29	1.34
265	0.28	0.34	0.40	0.45	0.51	0.57	0.62	0.68	0.74	0.80	0.85	0.91	0.97	1.03	1.08	1.14	1.20	1.25	1.31	1.37
270	0.29	0.34	0.40	0.46	0.52	0.58	0.64	0.69	0.75	0.81	0.87	0.93	0.99	1.04	1.10	1.16	1.22	1.28	1.34	1.39
275	0.29	0.35	0.41	0.47	0.53	0.59	0.65	0.71	0.77	0.83	0.89	0.95	1.00	1.06	1.12	1.18	1.24	1.30	1.36	1.42
280	0.30	0.36	0.42	0.48	0.54	0.60	0.66	0.72	0.78	0.84	0.90	0.96	1.02	1.08	1.14	1.20	1.27	1.33	1.39	1.45
285	0.30	0.36	0.43	0.49	0.55	0.61	0.67	0.73	0.80	0.86	0.82	0.98	1.04	1.10	1.16	1.23	1.29	1.35	1.41	1.47
290	0.31	0.37	0.43	0.50	0.56	0.62	0.68	0.75	0.81	0.87	0.03	1.00	1.06	1.12	1.19	1.25	1.31	1.37	1.44	1.50
295	0.31	0.38	0.44	0.50	0.57	0.63	0.70	0.76	0.82	0.89	0.95	1.01	1.08	1.14	1.21	1.27	1.33	1.40	1.46	1.52
300	0.32	0.38	0.45	0.51	0.58	0.64	0.71	0.77	0.84	0.90	0.97	1.03	1.10	1.16	1.23	1.29	1.36	1.42	1.49	1.55
305	0.32	0.39	0.46	0.52	0.59	0.65	0.72	0.79	0.85	0.92	0.98	1.05	1.11	1.18	1.25	1.31	1.38	1.44	1.51	1.58
310	0.33	0.40	0.46	0.53	0.60	0.66	0.73	0.80	0.87	0.93	1.00	1.07	1.13	1.20	1.27	1.33	1.40	1.47	1.54	1.60
315	0.34	0.40	0.47	0.54	0.61	0.68	0.74	0.81	0.88	0.96	1.02	1.08	1.15	1.22	1.29	1.36	1.42	1.49	1.56	1.63
320	0.34	0.41	0.48	0.55	0.62	0.69	0.76	0.82	0.89	0.96	1.03	1.10	1.17	1.24	1.31	1.38	1.45	1.52	1.58	1.65
325	0.35	0.42	0.49	0.56	0.63	0.70	0.77	0.84	0.91	0.98	1.05	1.12	1.19	1.26	1.33	1.40	1.47	1.54	1.61	1.68
330	0.35	0.42	0.49	0.57	0.64	0.71	0.78	0.85	0.92	0.99	1.06	1.14	1.21	1.26	1.35	1.42	1.49	1.56	1.63	1.71
335	0.36	0.43	0.50	0.57	0.65	0.72	0.79	0.86	0.94	1.01	1.08	1.15	1.23	1.30	1.37	1.44	1.51	1.59	1.66	1.73
340	0.36	0.44	0.51	0.58	0.66	0.73	0.80	0.88	0.95	1.02	1.10	1.17	1.24	1.32	1.39	1.46	1.54	1.61	1.68	1.76
345	0.37	0.44	0.52	0.59	0.67	0.74	0.81	0.89	0.96	1.04	1.11	1.19	1.26	1.34	1.41	1.49	1.56	1.63	1.71	1.78
350	0.37	0.45	0.52	0.60	0.68	0.75	0.83	0.90	0.98	1.06	1.13	1.20	1.28	1.36	1.43	1.51	1.58	1.66	1.73	1.81
355	0.38	0.46	0.53	0.61	0.69	0.76	0.84	0.92	0.99	1.07	1.15	1.22	1.30	1.38	1.45	1.53	1.61	1.68	1.76	1.84
360	0.38	0.46	0.54	0.62	0.69	0.77	0.85	0.93	1.01	1.08	1.16	1.24	1.32	1.39	1.47	1.55	1.63	1.71	1.78	1.86
365	0.39	0.47	0.55	0.63	0.70	0.78	0.86	0.94	1.02	1.10	1.18	1.26	1.34	1.41	1.49	1.57	1.65	1.73	1.81	1.89
370	0.39	0.47	0.55	0.63	0.71	0.79	0.87	0.95	1.03	1.11	1.19	1.27	1.35	1.43	1.51	1.59	1.67	1.75	1.83	1.91
375	0.40	0.48	0.56	0.64	0.72	0.80	0.89	0.97	1.05	1.13	1.21	1.29	1.37	1.45	1.53	1.61	1.70	1.78	1.86	1.94
380	0.41	0.49	0.57	0.65	0.73	0.82	0.90	0.98	1.06	1.14	1.23	1.31	1.39	1.47	1.55	1.64	1.72	1.80	1.88	1.96
385	0.41	0.49	0.58	0.66	0.74	0.83	0.91	0.99	1.08	1.16	1.24	1.33	1.41	1.49	1.58	1.66	1.74	1.82	1.91	1.99
390	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.01	1.09	1.17	1.26	1.34	1.43	1.51	1.60	1.68	1.76	1.85	1.93	2.02
395	0.42	0.51	0.59	0.68	0.76	0.85	0.93	1.02	1.10	1.19	1.27	1.36	1.45	1.53	1.62	1.70	1.79	1.87	1.96	2.04
400	0.43	0.51	0.60	0.69	0.77	0.86	0.96	1.03	1.12	1.20	1.29	1.38	1.46	1.55	1.64	1.72	1.81	1.90	1.98	2.07

Table 7. Potential Voltage Drop for One Copper 750 MCM Cable.

AMPERES OR LOOP FEET	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
50	0.03	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.09	0.10	0.10	0.11	0.12	0.12	0.13	0.14	0.15	0.15	0.16	0.17
55	0.03	0.04	0.05	0.06	0.07	0.07	0.08	0.09	0.10	0.11	0.11	0.12	0.13	0.14	0.15	0.15	0.16	0.17	0.18	0.19
60	0.04	0.05	0.06	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.19	0.20
65	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22
70	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.24
75	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.25
80	0.06	0.06	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.16	0.17	0.18	0.19	0.20	0.21	0.23	0.24	0.25	0.26	0.27
85	0.06	0.07	0.08	0.09	0.11	0.12	0.13	0.14	0.15	0.17	0.18	0.19	0.20	0.22	0.23	0.24	0.25	0.26	0.28	0.29
90	0.06	0.07	0.09	0.10	0.11	0.12	0.14	0.15	0.16	0.18	0.19	0.20	0.22	0.23	0.24	0.25	0.27	0.28	0.29	0.31
95	0.06	0.08	0.09	0.10	0.12	0.13	0.15	0.16	0.17	0.19	0.20	0.21	0.23	0.24	0.26	0.27	0.28	0.30	0.31	0.32
100	0.07	0.08	0.10	0.11	0.12	0.14	0.15	0.17	0.18	0.20	0.21	0.23	0.24	0.25	0.27	0.28	0.30	0.31	0.33	0.34
105	0.07	0.09	0.10	0.12	0.13	0.15	0.16	0.18	0.19	0.21	0.22	0.24	0.25	0.27	0.28	0.30	0.31	0.33	0.34	0.36
110	0.07	0.09	0.11	0.12	0.14	0.15	0.17	0.19	0.20	0.22	0.23	0.25	0.26	0.28	0.30	0.31	0.33	0.34	0.36	0.38
115	0.08	0.09	0.11	0.13	0.14	0.16	0.18	0.19	0.21	0.23	0.24	0.26	0.28	0.29	0.31	0.33	0.34	0.36	0.38	0.39
120	0.08	0.10	0.12	0.13	0.15	0.17	0.19	0.20	0.22	0.24	0.25	0.27	0.29	0.31	0.32	0.34	0.36	0.38	0.39	0.41
125	0.08	0.10	0.12	0.14	0.16	0.17	0.19	0.21	0.23	0.25	0.26	0.28	0.30	0.32	0.34	0.35	0.37	0.39	0.41	0.43
130	0.09	0.11	0.13	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.29	0.31	0.33	0.35	0.37	0.39	0.41	0.43	0.44
135	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.27	0.29	0.31	0.33	0.34	0.36	0.38	0.40	0.42	0.44	0.46
140	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0.46	0.48
145	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.25	0.27	0.29	0.31	0.33	0.35	0.37	0.39	0.41	0.43	0.45	0.48	0.50
150	0.10	0.12	0.15	0.17	0.19	0.21	0.23	0.25	0.28	0.30	0.32	0.34	0.36	0.38	0.41	0.43	0.45	0.47	0.49	0.51
155	0.11	0.13	0.15	0.17	0.20	0.22	0.24	0.26	0.29	0.31	0.33	0.35	0.37	0.40	0.42	0.44	0.46	0.49	0.51	0.53
160	0.11	0.13	0.16	0.18	0.20	0.23	0.25	0.27	0.29	0.32	0.34	0.36	0.39	0.41	0.43	0.46	0.48	0.50	0.52	0.55
165	0.11	0.14	0.16	0.19	0.21	0.23	0.26	0.28	0.30	0.33	0.35	0.37	0.40	0.42	0.45	0.47	0.49	0.52	0.54	0.57
170	0.12	0.14	0.17	0.19	0.22	0.24	0.26	0.29	0.31	0.34	0.36	0.39	0.41	0.44	0.46	0.48	0.51	0.53	0.56	0.58
175	0.12	0.15	0.17	0.20	0.22	0.25	0.27	0.30	0.32	0.35	0.37	0.40	0.42	0.45	0.47	0.50	0.52	0.55	0.57	0.60
180	0.12	0.15	0.18	0.20	0.23	0.26	0.28	0.31	0.33	0.36	0.38	0.41	0.44	0.46	0.49	0.51	0.54	0.57	0.59	0.62
185	0.13	0.15	0.18	0.21	0.23	0.26	0.29	0.31	0.34	0.37	0.39	0.42	0.45	0.47	0.50	0.53	0.55	0.58	0.61	0.63
190	0.13	0.16	0.19	0.21	0.24	0.27	0.30	0.32	0.35	0.38	0.41	0.43	0.46	0.49	0.51	0.54	0.57	0.60	0.62	0.65
195	0.14	0.16	0.19	0.22	0.25	0.28	0.30	0.33	0.36	0.39	0.42	0.44	0.47	0.50	0.53	0.56	0.58	0.61	0.64	0.67
200	0.14	0.17	0.20	0.23	0.25	0.28	0.31	0.34	0.37	0.40	0.43	0.46	0.48	0.51	0.54	0.57	0.60	0.63	0.66	0.69
205	0.14	0.17	0.20	0.23	0.26	0.29	0.32	0.35	0.38	0.41	0.44	0.47	0.50	0.53	0.56	0.59	0.61	0.64	0.67	0.70
210	0.15	0.18	0.21	0.24	0.27	0.30	0.33	0.36	0.39	0.42	0.45	0.48	0.51	0.54	0.57	0.60	0.63	0.66	0.69	0.72
215	0.15	0.18	0.21	0.24	0.27	0.30	0.34	0.37	0.40	0.43	0.46	0.49	0.52	0.55	0.58	0.61	0.65	0.68	0.71	0.74
220	0.15	0.18	0.22	0.25	0.28	0.31	0.34	0.38	0.41	0.44	0.47	0.50	0.53	0.57	0.60	0.63	0.66	0.69	0.72	0.76
225	0.16	0.19	0.22	0.25	0.29	0.32	0.35	0.38	0.42	0.45	0.48	0.51	0.55	0.58	0.61	0.64	0.68	0.71	0.74	0.77
230	0.16	0.19	0.23	0.26	0.29	0.33	0.36	0.39	0.43	0.46	0.49	0.52	0.56	0.59	0.62	0.66	0.69	0.72	0.76	0.79
235	0.16	0.20	0.23	0.27	0.30	0.33	0.37	0.40	0.43	0.47	0.50	0.54	0.57	0.60	0.64	0.67	0.71	0.74	0.77	0.81
240	0.17	0.20	0.24	0.27	0.31	0.34	0.38	0.41	0.44	0.48	0.51	0.55	0.58	0.62	0.65	0.69	0.72	0.76	0.79	0.82
245	0.17	0.21	0.24	0.28	0.31	0.35	0.38	0.42	0.45	0.49	0.52	0.56	0.59	0.63	0.67	0.70	0.74	0.77	0.81	0.84
250	0.17	0.21	0.25	0.28	0.32	0.35	0.39	0.43	0.46	0.50	0.53	0.57	0.61	0.64	0.68	0.71	0.75	0.79	0.82	0.86
255	0.18	0.22	0.25	0.29	0.33	0.36	0.40	0.44	0.47	0.51	0.55	0.58	0.62	0.66	0.69	0.73	0.77	0.80	0.84	0.88
260	0.18	0.22	0.26	0.29	0.33	0.37	0.41	0.44	0.48	0.52	0.56	0.59	0.63	0.67	0.71	0.74	0.78	0.82	0.86	0.89
265	0.19	0.22	0.26	0.30	0.34	0.38	0.41	0.45	0.49	0.53	0.57	0.61	0.64	0.68	0.72	0.76	0.80	0.83	0.87	0.91
270	0.19	0.23	0.27	0.31	0.34	0.38	0.42	0.46	0.50	0.54	0.58	0.62	0.66	0.69	0.73	0.77	0.81	0.85	0.89	0.93
275	0.19	0.23	0.27	0.31	0.35	0.39	0.43	0.47	0.51	0.55	0.59	0.63	0.67	0.71	0.75	0.79	0.83	0.87	0.91	0.95
280	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	0.80	0.84	0.88	0.92	0.96
285	0.20	0.24	0.28	0.32	0.36	0.41	0.45	0.49	0.53	0.57	0.61	0.65	0.69	0.73	0.77	0.82	0.86	0.90	0.94	0.98
290	0.20	0.25	0.29	0.33	0.37	0.41	0.45	0.50	0.54	0.58	0.62	0.66	0.70	0.75	0.79	0.83	0.87	0.91	0.96	1.00
295	0.21	0.25	0.29	0.33	0.38	0.42	0.46	0.50	0.55	0.59	0.63	0.67	0.72	0.76	0.80	0.84	0.89	0.93	0.97	1.01
300	0.21	0.25	0.30	0.34	0.38	0.43	0.47	0.51	0.56	0.60	0.64	0.69	0.73	0.77	0.82	0.86	0.90	0.95	0.99	1.03
305	0.21	0.26	0.30	0.35	0.39	0.43	0.48	0.52	0.57	0.61	0.65	0.70	0.74	0.79	0.83	0.87	0.92	0.96	1.01	1.05
310	0.22	0.26	0.31	0.35	0.40	0.44	0.49	0.53	0.58	0.62	0.66	0.71	0.75	0.80	0.84	0.89	0.93	0.98	1.02	1.07
315	0.22	0.27	0.31	0.36	0.40	0.45	0.49	0.54	0.58	0.63	0.68	0.72	0.77	0.81	0.86	0.90	0.95	0.99	1.04	1.08
320	0.23	0.27	0.32	0.36	0.41	0.46	0.50	0.55	0.59	0.64	0.69	0.73	0.78	0.82	0.87	0.92	0.96	1.01	1.05	1.10
325	0.23	0.28	0.32	0.37	0.42	0.46	0.51	0.56	0.60	0.65	0.70	0.74	0.79	0.84	0.88	0.93	0.98	1.02	1.07	1.12
330	0.23	0.28	0.33	0.38	0.42	0.47	0.52	0.57	0.61	0.66	0.71	0.76	0.80	0.85	0.90	0.95	0.99	1.04	1.09	1.14
335	0.24	0.28	0.33	0.38	0.43	0.48	0.53	0.57	0.62	0.67	0.72	0.77	0.82	0.86	0.91	0.96	1.01	1.06	1.10	1.15
340	0.24	0.29	0.34	0.39	0.44	0.48	0.53	0.58	0.63	0.68	0.73	0.78	0.83	0.88	0.93	0.97	1.02	1.07	1.12	1.17
345	0.24	0.29	0.34	0.39	0.44	0.49	0.54	0.59	0.64	0.69	0.74	0.79	0.84	0.89	0.94	0.99	1.04	1.09	1.14	1.19
350	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20
355	0.25	0.30	0.35	0.40	0.45	0.51	0.56	0.61	0.66	0.71	0.76	0.81	0.86	0.92	0.97	1.02	1.07	1.12	1.17	1.22
360	0.25	0.31	0.36	0.41	0.46	0.51	0.57	0.62	0.67	0.72	0.77	0.82	0.88	0.93	0.98	1.03	1.08	1.14	1.19	1.24
365	0.26	0.31	0.36	0.42	0.47	0.52	0.57	0.63	0.68	0.73	0.78	0.84	0.89	0.94	0.99	1.05	1.10	1.15	1.20	1.26
370	0.26	0.31	0.37	0.42	0.47	0.53	0.58	0.63	0.69	0.74	0.79	0.85	0.90	0.95	1.01	1.06	1.11	1.17	1.22	1.27
375	0.26	0.32	0.37	0.43	0.48	0.53	0.59	0.64	0.70	0.75	0.80	0.86	0.91	0.97	1.02	1.07	1.13	1.18	1.24	1.29
380	0.27	0.32	0.38	0.43	0.49	0.54	0.60	0.65	0.71	0.76	0.82	0.87	0.93	0.98	1.03	1.09	1.14	1.20	1.25	1.31
385	0.27	0.33	0.38	0.44	0.49	0.55	0.60	0.66	0.72	0.77	0.83	0.88	0.94	0.99	1.05	1.10	1.16	1.21	1.27	1.33
390	0.28	0.33	0.39	0.44	0.50	0.56	0.61	0.67	0.73	0.78	0.84	0.89	0.95	1.01	1.06	1.12	1.17	1.23	1.29	1.34
395	0.28	0.34	0.39	0.45	0.51	0.56	0.62	0.68	0.73	0.79	0.85	0.91	0.96	1.02	1.08	1.13	1.19	1.25	1.30	1.36
400	0.28	0.34	0.40	0.46	0.51	0.57	0.63	0.69	0.74	0.80	0.86	0.92	0.97	1.03	1.09	1.15	1.20	1.26	1.32	1.38

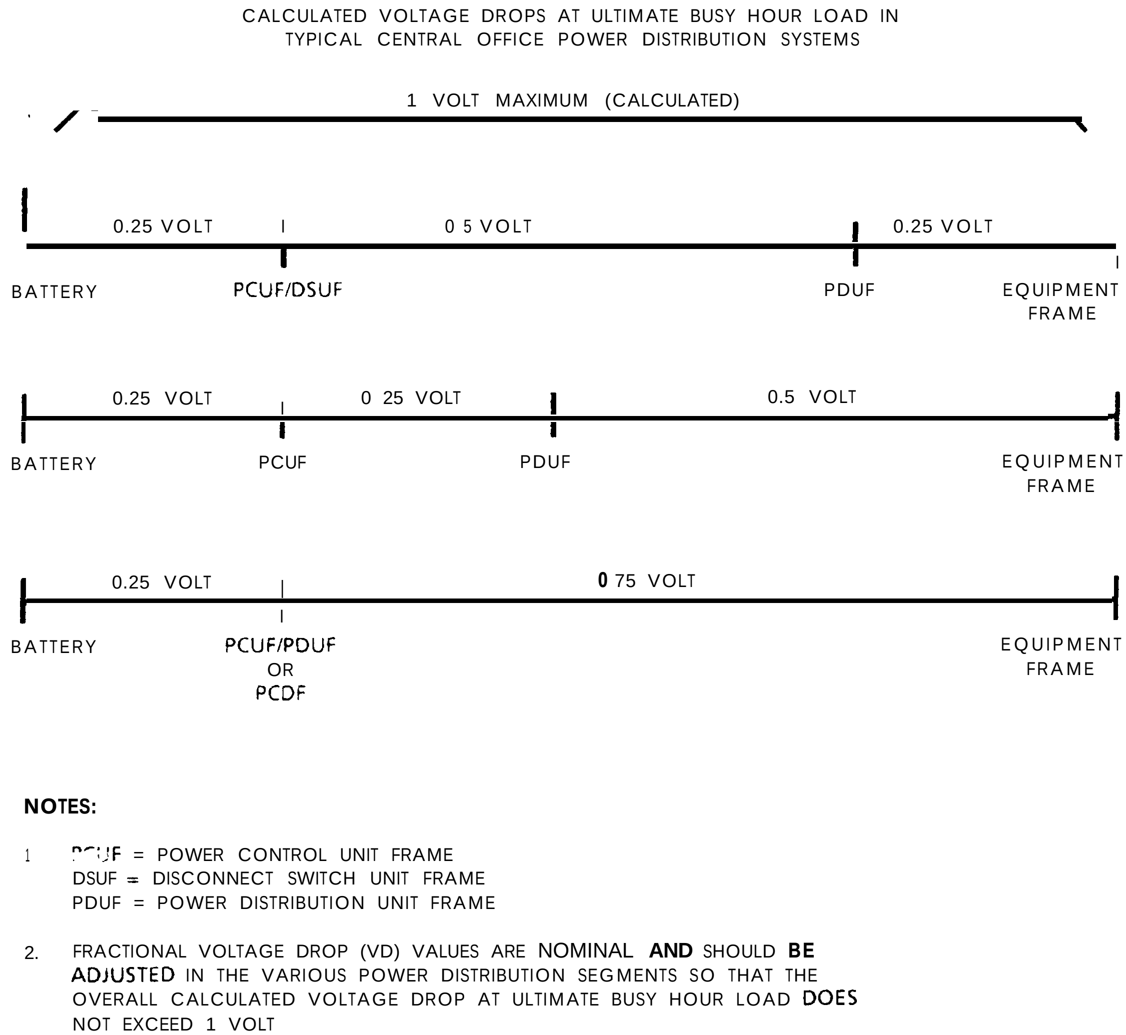


Figure 9. Distribution Voltage Drops.

section, or primary fuse-to-end aisle (decentralized) fuse section should be adjusted to ensure a maximum 1-volt drop from battery to equipment frame at UBHD. The engineer should attempt to make tradeoffs in the calculations to ensure that the 0.25 VD from DSU to PDU is achieved, or even exceeded if possible, especially if this run must traverse several levels of a building, to keep the size and number of bars or cables to a minimum.

Disconnect Switch Unit to Primary Fuse

9.05 A 0.25-volt VD at the UBHD is allowable in the positive and negative conductor loop from the DSU to the PDU. When cable is used for this practice, the formula shown in paragraph 8.02 may be used for calculating the required number of conductors. Because it is advantageous in most cases to use bus duct rather than cable for this section, the engineer should refer to Practice 795-155-074 for determining the bus duct bar requirements.

NOTE: See the note in paragraph 9.04.

Primary Fuse to Distribution Fuse

9.06 A 0.50-volt VD at 75 percent of the primary fuse rating is allowable in the positive and negative cable loop from primary fuse to distribution fuse. The cable sizes for positive and negative must be the same. Table 8 lists cable sizes.

NOTE: A 0.25-volt VD is allowable from battery to PCU; therefore, if less than a 0.25-volt VD is used from battery to PCU, the difference is to be added to the 0.50-volt VD allowable from primary fuse to distribution fuse. For example, if a 0.14-volt VD results from application of standard cable sizes to the battery-to--KU loop, a 0.61 VD then becomes allowable from primary fuse to distribution fuse. Because 75 percent of a 600-ampere fuse is 450 amperes and 75 percent of a 500-ampere fuse is 375 amperes, etc, it is probable that existing or future fuses will never have current at these values. Consequently, if an engineer is satisfied that a primary fuse is dedicated to less than 75 percent of its rating, the engineer may, for constant drains, calculate the VD at the Constant Drain (CD) current value, or for traffic variable equipment, calculate the VD at 60 percent of AMD. Busy Hour Drain (BHD) is 60 percent of AMD. In other words, use the 75 percent factor when in doubt as to what the primary fuse may be needed to serve in the future, or where engineering effort to resolve the doubt would exceed the probable savings in cable.

Distribution Fuse to Equipment

9.07 A 0.25-VD maximum (or 0.75-VD maximum when the distribution fuse is on the PCU) for traffic variable equipment at 60 percent of AMD, and for CD equipment at the CD is not to be exceeded in the positive and negative cable loop from distribution fuse to equipment- The cable sizes for positive and negative shall be the same. Table 9 contains the cable sizes.

NOTE: When more than one bay or rack of equipment is or will be served by a distribution fuse, the loop length in feet is based on the middle point of the bays or racks. For example, if four bays of equipment are served by a distribution fuse, the distance in loop feet is the distance from the runway immediately above the distribution fuse panel to the point on the runway midway between the second and third farthest bay multiplied by 2. The exception to this is covered in Note 2 of Figure 1.

Table 8. Primary Fuse to Distribution Fuses Cable (Copper Only).

Table 8a. 500-Ampere Primary Fuse (375 Amperes).

2W-2000-X75		3W-2000-X-75		4W-2000-X75	
LOOP FEET	VD	LOOP FEET	VD	LOOP FEET	VD
20	0.05	240	0.43	360	0.49
40	0.11	260	0.47	380	0.51
60	0.16	280	0.51	400	0.54
80	0.22	300	0.54	420	0.57
100	0.27	320	0.58	440	0.59
120	0.32	340	0.61	560	0.75
140	0.38				
160	0.43				
180	0.49				
200	0.54				
220	0.60				

NOTE: The VD figures are based on the typical ultimate conditions that these fuses are expected to meet. To use Table 8, first determine the permissible VD, then select cable based on loop feet. For example, if VD must be 0.52 or less for a 400-ampere fuse and the loop is 300 feet, use 3W-2000-X75 and show FD as 0.43 on the PSL drawing.

Table 8b. 400-Ampere Primary Fuse (300 Amperes.

LOOP FEET	2W-2000-X25 VD	2W-2000-x35 VD	2W-2000-X50 VD	2 w-2000-x75 VD	3 W-2000-x75 VD	4W-2000-x75 VD
20	0.13			0.04		
40	0.26			0.09		
60	0.39			0.13		
80	0.52			0 17		
100	0.64	0.46		0.21		
120		0.56		0 28		
140		0.65	0 45	0 32		
160			0.52	0 37		
180			0 58	0 42		
200				0 46		
220				0.51		
240				0.55		
260				0.60		
280					0.40	
300					0 43	
320					0 46	
340					0 49	
360					0.52	
380					0 55	
400					0.58	
420						0.45
440						0.48
460						0.50
480						0.52
500						0 54
520						0.56
540						0.58
560						.60

Table 8c. 300-Ampere Primary Fuse (225 Amperes).

LOOP FEET	2 w-2000-X25 VD	2W-2000-x35 VD	2 w-2000-x50 VD	2W-2000-x75 VD	3W-2000-x75 VD	4W-2000-x75 VD
20	0 09					
40	0 19	0 13	0 09	0.06		
60	0.29	0 20	0.14	0.09		
80	0 38	0 27	0 19	0.12		
100	0.48	0 34	0 24	0 16		
120	0 58	041	0 29	0.19		
140	0 68	0.48	0 34	0 22	0.10	
160	0 77	0.55	0 38	0.25	0 17	
180		0.62	0.43	0.29	0.19	0.11
200			0 48	0 32	0.21	0.16
220			0.53	0 35	0.23	0.17
240			0.58	0 38	0.25	0 19
260			0 63	0 42	0 28	0.21
280				0 45	0 30	0.22
300				0 48	0 32	0.24
320				0 51	0 34	0.25
340				0.55	0 36	0.27
360				0.58	0.38	0.29
380				0.61	0.41	0.30
400					0 43	0 32
420					0 45	0 34
440					0 47	0.35
460					0 49	0 37
480					051	0.38
500					0.54	0.40
520					0 56	0 42
540					0.58	0.43
560					0.60	0.45
580						0.46
600						0.46

Table 8C. 300-Ampere Primary Fuse (225 Amperes) (Continued).

LOOP FEET	2W-2000-X25 VD	2W-2000-x35 VD	2W-2000-x50 VD	2W-2000-x75 VD	3W-2000-x75 VD	4W-2000-x75 VD
620						0 50
640						0 51
660						0.53
680						0.55
700						0.56
720						0.58
740						0.59
760						0.61

Table 8d. 200-Ampere Primary Fuse (150 Amperes).

LOOP FEET	2W-2000-X25 VD	2W-2000-x35 VD	2W-2000-x50 VD	2W-2000-x75 VD	3W-2000-x75 VD	4W-2000-x75 VD
20	006					
40	0.12					
60	019	013	009			
80	0.25	018	0.12	008		
100	0.32	0.23	016	0 10		
120	0 38	0.27	019	012	0.08	
140	0.45	032	022	015	0 10	007
160	0 51	0 37	0.25	017	011	008
180	0.58	041	0.29	0 19	012	009
200	0.64	0.46	0 32	0.21	0.14	0 10
220		0.50	0.35	023	0.15	011
240		0 56	0.38	0.25	0.17	0.12
260		0.60	042	0.28	018	0.14
280			045	0 30	0.20	015
300			048	0.32	021	016
320			051	0 34	0.23	017
340			0.55	036	0 24	018
360			0 58	038	0.25	0 19
380			061	0.41	0.27	0.20
400				043	0.28	0.21
420				0.45	0.30	0.22
440				0.47	031	023
460				049	033	0.24
480				0.51	034	0.25
500				0 54	036	027
520				0.56	037	0.28
540				0 58	0.38	0.29
560				0.60	040	0.30
580					0.41	0.31
600					0.43	032

Table 8d. 200-Ampere Primary Fuse (150 Amperes) (Continued).

LOOP FEET	2W-2000-X25 VD	2W-2000-x35 VD	2W-2000-x50 VD	2W-2000-x75 VD	3W-2000-x75 VD	4W-2000-x75 VD
620					0 44	0.33
640					0 46	0 34
660					0 47	0 35
680					0 48	0.36
700					0.50	0.37
720					051	0 38
740					0.53	0 39
760					0.54	0.41
780					0.56	0 42
800					0.57	0.43
820					0.59	0.44
840					0.60	0.45
860						0.46
880						0.47
900						048
920						0 4 9
940						0.50
960						0.51
980						0.52
1000						0.53
1020						0.54
1040						0.56
1060						0.57
1080						0.58

Table 9. Distribution Fuse to Equipment Cable (Copper Only).

FUSE RATING (AMPERES)	VD	W-2000-	MAX. LOOP FEET	MAX. DRAIN	REMARKS
100	0 25	X01	41	100 AMD, 60 BHD	Application limited because of loop feet to drain ratio. If larger lugs are available at the DFP, W-2000-X02 is recommended. Use formula: $\text{Loop} = \frac{\text{VD} \times \text{CM}}{\text{LOAD} \times 10.8}$
			46	90 AMD, 54 BHD	
			51	80 AMD, 48 BHD	
			31	80 CD	
			36	70 CD	
			41	60 CD	
70	0.25	X01	59	70 AMD. 48 BHD	
			45	56 CD	
	0 25	X01	68	60 AMD, 36 BHD	
			82	50 AMD, 30 BHD	
			102	40 AMO, 24 BHD	
60			51	48 CD	
			65	38 CD	
	0.75	XX4	81	60 AMD, 36 BHD	
			97	50 AMD, 30 BHD	
			121	40 AMD, 24 BHD	
			60	48 CD	
			76	38 CD	
35	0 25	X01	117	35 AMD, 2 1 BHD	Do not use W-2000-XX4 with 70-ampere or larger fuse.
			88	28 CD	
		XX1	92	35 AMD. 21 BHD	
			69	28 CD	
		XX4	46	35 AMD, 2 1 BHD	
			35	28 CD	
	0.75	XX4	138	35 AMD, 21 BHD	
			104	28 CD	
30	0.25	X01	136	30 AMD, 18 BHD	
			102	24 CD	
		XX1	108	30 AMD, 18 BHD	
			81	24 CD	
		XX4	54	30 AMD, 18 BHD	Do not use W-2000-XX4 with 70-ampere or larger fuse.
			40	24 CD	
	0.75	XX4	161	30 AMD, 18 BHD	
			121	24 CD	Do not use W-2000-XX6 with 60-ampere or larger fuse.
		XX6	101	30 AMD, 18 BHD	
			76	24 CD	

IMPORTANT: When mixing traffic variable loads with constant drain ioads (for fuse loading purposes), use the sum of PBHD + CD. For VD purposes, use the sum of BHD + CD. For example, if there are 40 amperes of CD and 50 amperes of AMD, there is the equivalent of 80 amperes of CD for fuse loading purposes and 70 amperes of CD for VD purposes.

10. REFERENCES

10.01 The following documents supplement or complement the information provided in this section:

TYPE	NUMBER	ISSUE	DESCRIPTION
AGCS Practices:	224-017-020	5	GTD-5 EAX” Product Line Reference Guide
	224-100-100	4	GTD-5 EAX ® Power and Alarm Equipment
	795-805-071	1	Central Office Grounding Systems Engineering Applications
DRAWING:	ECD- 17005-00 1		Base Unit Equipment Power Distribution and Grounding

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