NORTHERN TELECOM "DMS*"-10 DIGITAL SWITCHING SYSTEM MECHANICAL AND ELECTRICAL SYSTEM DESIGN RECOMMENDATIONS

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1. GENERAL

1.01 This section provides design recommendations for mechanical and electrical systems for buildings that will be constructed specifically to house the Northern Telecommunications DMS-10 Digital Switching System. These recommendations may also be helpful in preparing existing floor space or in adding to a community dial office (CDO) building for DMS-10 Digital Switching System equipment.

1.02 Whenever this section is reissued, the reason(s) for reissue will be listed in this paragraph.

2. MECHANICAL

2.01 The recommended environmental ranges for space conditions are given in Table A. Extreme conditions can be tolerated for up to 72 hours at any one time and are not to exceed a total of 15 days per year.

TYPE AND SIZING

2.02 Values for equipment heat release for DMS-10 Digital Switching System equipment (ex-

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TABLE A

RECOMMENDED ENVIRONMENTAL RANGES

SPACE CONDITIONS	OCCUPIED	UNOCCUPIED	EXTREME
Ambient Temperature	65°—80°F	55°—85°F	40°—120°F
Relative Humidity	20%—55%	20%—55%	20%—80%

cluding toll) should be taken from data in Table B showing heat dissipation and Fig. 1 showing dc power drain. Frame-by-frame summation of the total heat release should not be used as it indicates excessive values. Heat release for toll equipment (along with other non-DMS-10 Digital Switching System equipment) and the environmental load on the building envelope should be added to the DMS-10 Digital Switching System equipment heat release to form the total building cooling load.

Note: In many buildings no D-Channel Banks will be required. Outside design conditions should be taken from the 5 and 97-1/2 percent American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) tables. ***Avoid oversizing.***

TABLE B

NORTHERN TELECOM DMS-10 DIGITAL SWITCHING SYSTEM HEAT DISSIPATION (NOTE)

NO. OF LINES	POWER IN WATTS
1000	2919
2000	4269
3000	6469
4000	7819
5000	9977
6000	11327

Note: This table includes only heat dissipation for the DMS-10 Digital Switching System. (Heat dissipation of other equipment must be calculated independently.)

2.03 The DMS-10 Digital Switching System equipment will be adequately served by a single, high-quality, residential split system direct expansion (DX) air-conditioning unit (redundancy is not recommended). (See Fig. 2.) A unit size of 5 tons should be satisfactory for a 6000-line office barring unusual outdoor conditions or excessive additional equipment. Another satisfactory solution would be to install multiple self-contained wall-hung units. (See Fig. 3.)

AIR DISTRIBUTION

2.04 This equipment is not sensitive to air movement, ie, no special duct work layout is required. The most heat-sensitive piece of equipment has a built-in fan for air circulation. Do not provide air curtains, diffuser boots, etc. A supply duct along one wall or a supply plenum off the top of the air-conditioning unit with properly sized registers and throw will suffice. All air registers and duct work should be above the minimum clearances required by equipment and cabling (10 feet — new construction; 9 feet — existing building). Outside air dampers should be tight fitting to minimize leakage. No duct insulation is required on duct work within the conditioned space.

CONTROLS

2.05 The use of wideband temperature controls is encouraged. Continuous fan operation is ***not*** required. When the thermostat is satisfied, all heating, ventilating, and air-conditioning (HVAC) equipment should be inoperative. An outside air economizer cycle should be used, but enthalpy controls for this small-type office do not appear economical. Refer to Section 760-550-210, due to be released the first quarter of 1983, for a comparison of various economy cooling cycles. Low ambient protection for the condensing unit should not be specified because of use of the economizer cycle.

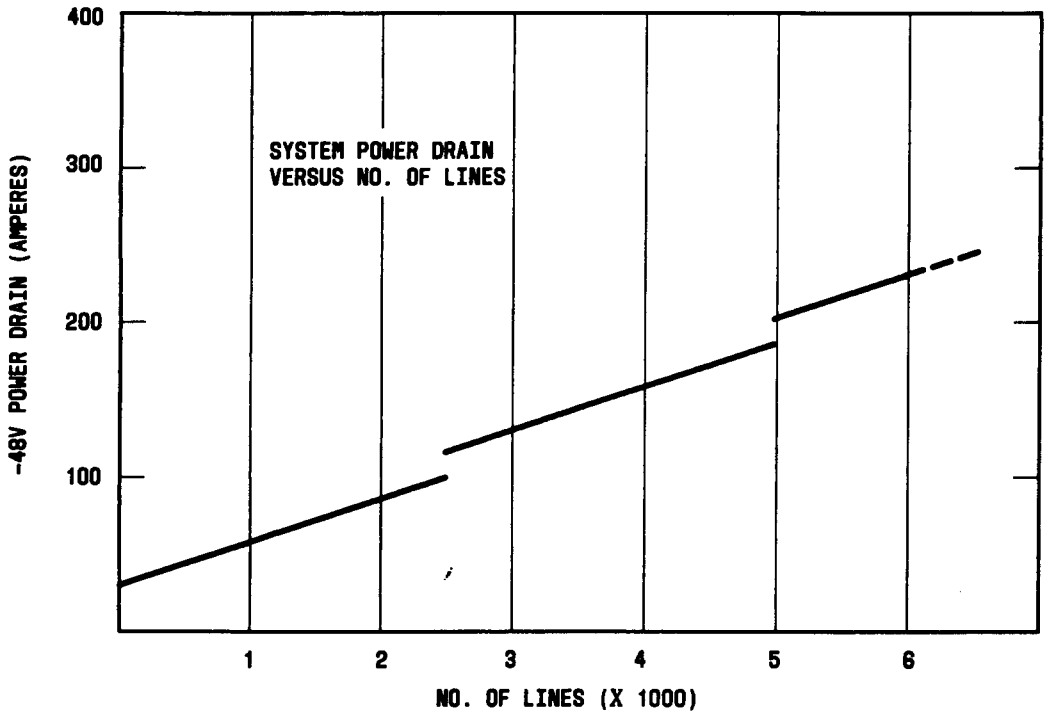


Fig. 1—Typical −48 Volt Power Drains (Busy Hour)

2.06 Since this is an unattended office, provisions should be made for a temporary change from "unoccupied" to "occupied" temperature settings using a 2-hour manual timer override switch.

HUMIDIFICATION

2.07 This equipment is very sensitive to low humidity; therefore, the need for humidification should be evaluated on a building-by-building basis. A water spray-type humidifier installed in the air-handling unit is satisfactory.

HEAT

2.08 Heating equipment should be provided only if required to maintain the minimum occupied temperature on a design heating day. If supplemental heat is required only for the period of equipment installation, it should be in the form of temporary electric heaters powered from spare circuit breakers in the main electrical panel. These heaters should be removed when the installation is complete.

REMOTE ALARMS

2.09 Provisions for remote alarming of the following building conditions to a 24-hour attended location are recommended.

- High temperature 90°F
- High humidity 65 percent
- Low humidity 20 percent.

3. EQUIPMENT SIZING AND UNIT SELECTION

A. Office Design

3.01 This part provides an example of equipment sizing and unit selection to serve a hypothetical office:

(a) ***Office Location:*** Phillipsburg, N. J.

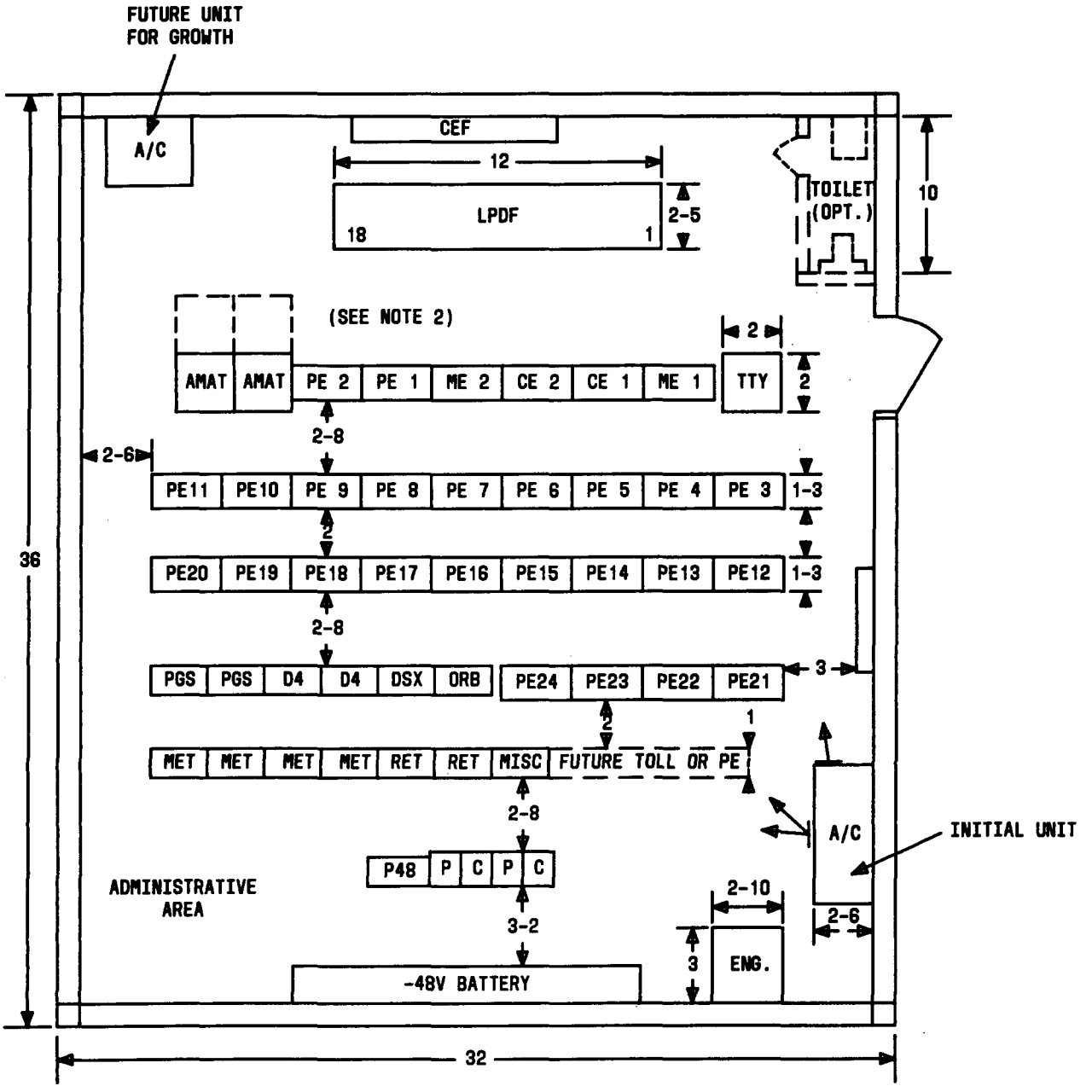
(b) ***Office Size:*** 1200 lines initial and 2400 lines ultimate

(c) ***Building Size:*** 640 square feet (20 feet by 32 feet by 12 feet high)

(d) ***Outside Design Conditions:***

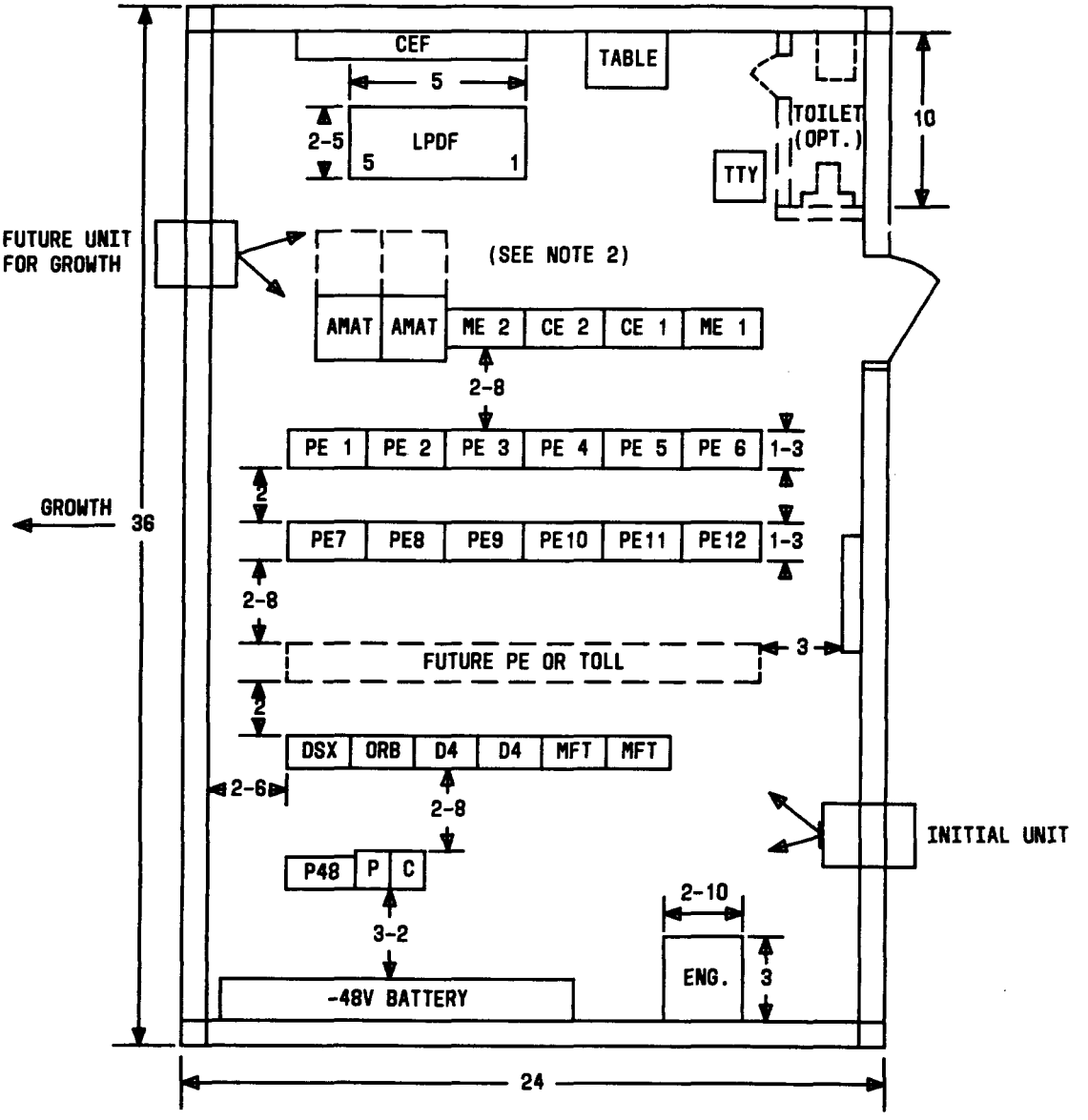
(1) ***Summer:*** 86° FDB, 71° FWB

(2) ***Winter:*** 6° FDB



NOTES:
1. CLEAR CEILING HEIGHT=10'0"
2. AMAT BAYS EXTENDED FOR MAINTENANCE ONLY

Fig. 2—Split System With Supply Discharge Plenum



NOTES:
1. CLEAR CEILING HEIGHT=10'0"
2. AMAT BAYS EXTENDED FOR MAINTENANCE ONLY

Fig. 3—Multiple Wall-Hung Units

(e) ***Inside Design Conditions:***

(1) ***Summer:*** 80°F, 50 percent RH

(2) ***Winter:*** 65°F, 20 percent RH

(f) ***Building U Factors:***

(1) ***Walls:*** 0.08

(2) ***Roof:*** 0.13.

B. Air Conditioning

3.02 The cooling load calculations are as follows:

COOLING LOAD	BTUH
Total building envelope air-conditioning load (sensible)	6500
Initial equipment load (DMS-10 Digital Switching System + miscellaneous)	3540W = 12100
Ultimate equipment load (DMS-10 Digital Switching System + miscellaneous)	5016W = 17100
Total sensible load (initial)	18600
Total sensible load (ultimate)	23600

Unit size — allowing for sensible heat factor of 0.7

Initial: 2-1/2 tons
Ultimate: 3 tons

3.03 In this case, the 3-ton unit would be specified. However, if the difference were greater (ie, 2-1/2 tons initial to 5 tons ultimate), consideration should be given to installation of multiple wall-hung, self-contained units with air economizer cycle (such as "Whisp-Air" or "Bard") which are available in 2- to 5-ton size ranges, or to sizing the fan and cooling coil of the split system for the ultimate load and installing a condensing unit sized for the initial load with provisions for replacement at a future date.

C. Heating

3.04 The heating load calculations are as follows:

HEATING LOAD	BTUH
Total building envelope heat loss (sensible)	16000
Ultimate equipment load	17100
	-1100
Total building envelope heat loss (sensible)	16000
Initial equipment load	12100
	3900

3.05 In this example, no permanent heating equipment would be required. A temporary portable electric heater should be used to maintain the minimum occupied temperature. A manual timer switch should be installed to avoid heater operation when the building is unoccupied.

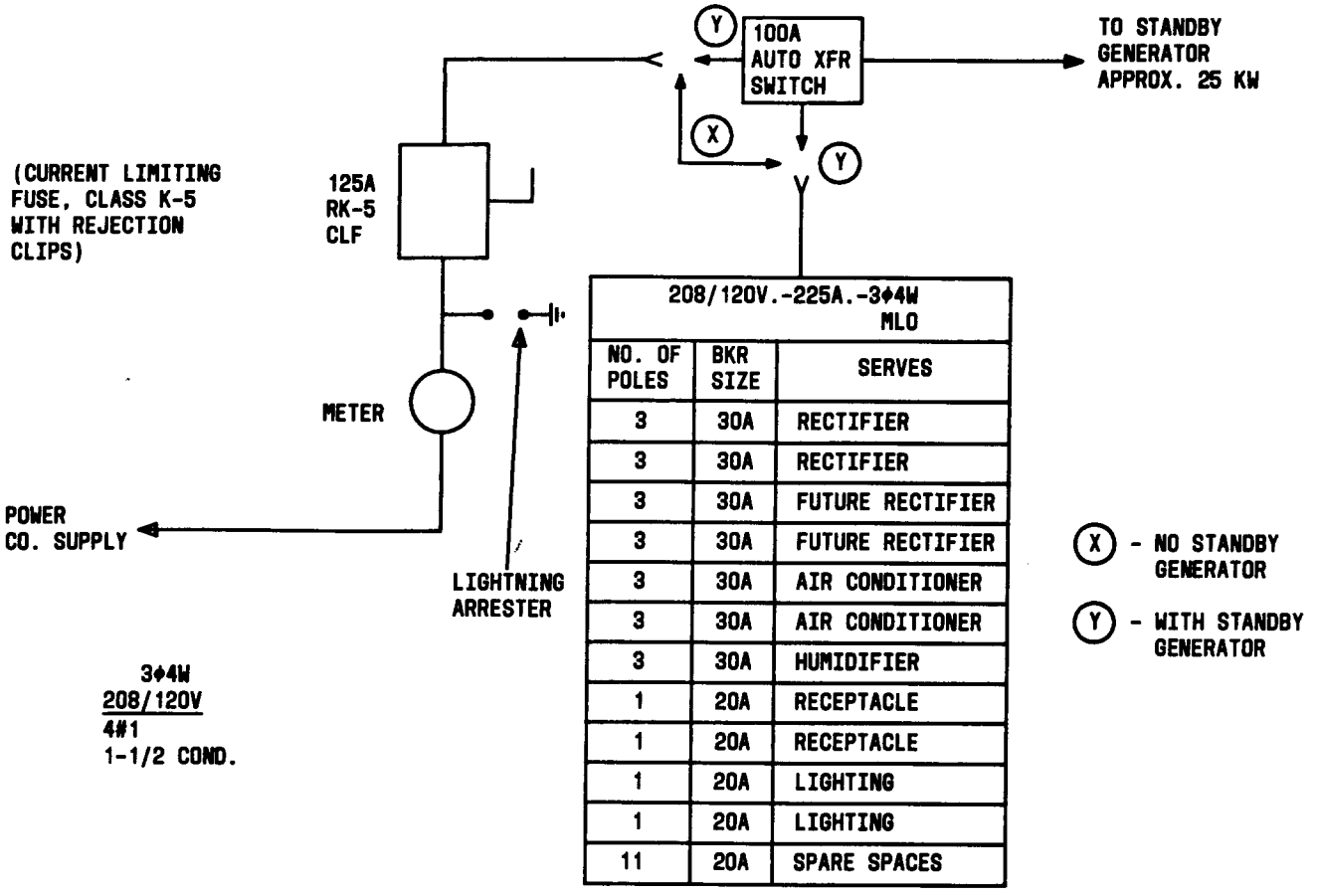
4. ELECTRICAL

SERVICE AND DISTRIBUTION

4.01 Recommended electrical service and distribution are shown in Fig. 4 and 5. This will provide adequate power for any foreseeable DMS-10 Digital Switching System requirement at minimum cost.

LIGHTING AND RECEPTACLES

4.02 The electrical contractor will also have to provide convenience ac receptacles and lighting for the equipment. Airey-Thompson "Sentinel" lighting fixtures should be ceiling-mounted above the maintenance aisles. The lights should be installed after the switching equipment is in place. The "Sentinel" fixture is covered by Western Electric specification KS-22494. The fixture mounting height will need to be field-determined to provide proper illumination and prevent any possibility of ground system cross-connection.



208/120V.-225A.-3♦4W MLO

NO. OF POLES	BKR SIZE	SERVES
3	30A	RECTIFIER
3	30A	RECTIFIER
3	30A	FUTURE RECTIFIER
3	30A	FUTURE RECTIFIER
3	30A	AIR CONDITIONER
3	30A	AIR CONDITIONER
3	30A	HUMIDIFIER
1	20A	RECEPTACLE
1	20A	RECEPTACLE
1	20A	LIGHTING
1	20A	LIGHTING
11	20A	SPARE SPACES

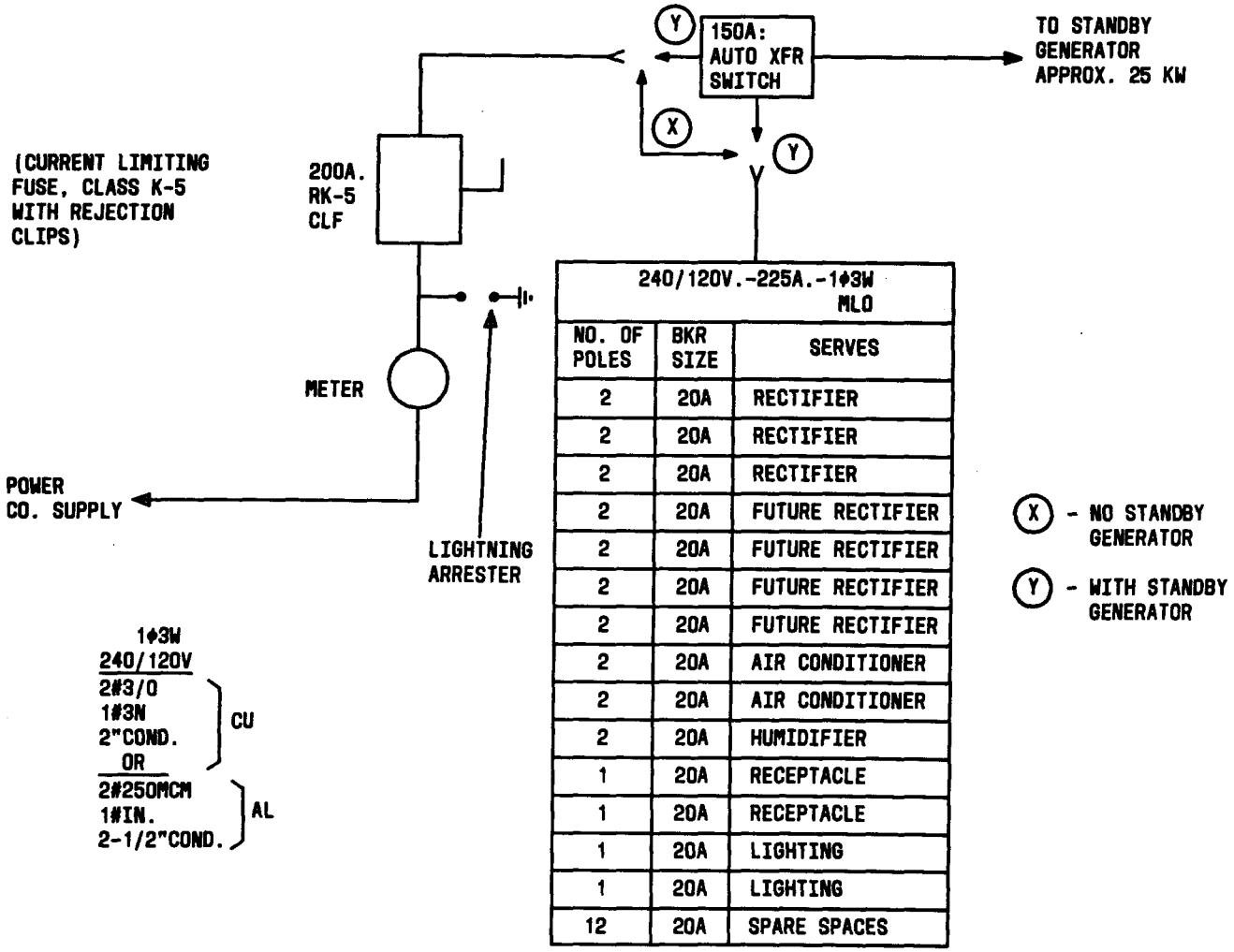
Fig. 4—Three-Phase Electrical Service

GROUNDING

4.03 The grounding requirements for the DMS-10 Digital Switching System are the same as for Bell System electronic switching system equipment. (See Section 802-001-180 covering general grounding requirements.) A No. 4/0 wire shall be used to connect the central office ground bar to the building grounding electrode in single-story buildings. Section 802-001-190 covers details of the ground bar and mounting.

STANDBY POWER

4.04 Standby power shall be provided in accordance with the criteria as outlined in Section 790-100-659, Standby AC Plants.



240/120V.-225A.-1ϕ3W MLO

NO. OF POLES	BKR SIZE	SERVES
2	20A	RECTIFIER
2	20A	RECTIFIER
2	20A	RECTIFIER
2	20A	FUTURE RECTIFIER
2	20A	FUTURE RECTIFIER
2	20A	FUTURE RECTIFIER
2	20A	FUTURE RECTIFIER
2	20A	AIR CONDITIONER
2	20A	AIR CONDITIONER
2	20A	HUMIDIFIER
1	20A	RECEPTACLE
1	20A	RECEPTACLE
1	20A	LIGHTING
1	20A	LIGHTING
12	20A	SPARE SPACES

Fig. 5—Single-Phase Electrical Service