

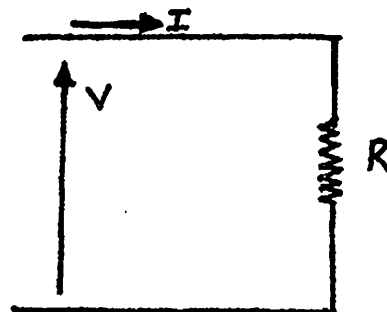
POWER SYSTEMS I
HANDOUTS

OUTLINE

1. Definition of terms
2. Discussion of standard voltages
3. Review of standard service types
4. Discussion of wiring devices
5. Earthing requirements for facilities
6. Safety grounding of equipment
7. Special National Electric Code (N.E.C. or Canadian Code) requirements for computer facilities

TERMS

1. Voltage (V)
2. Current (I)
3. Resistance (R)
4. Power (P)
5. Energy
6. Heat



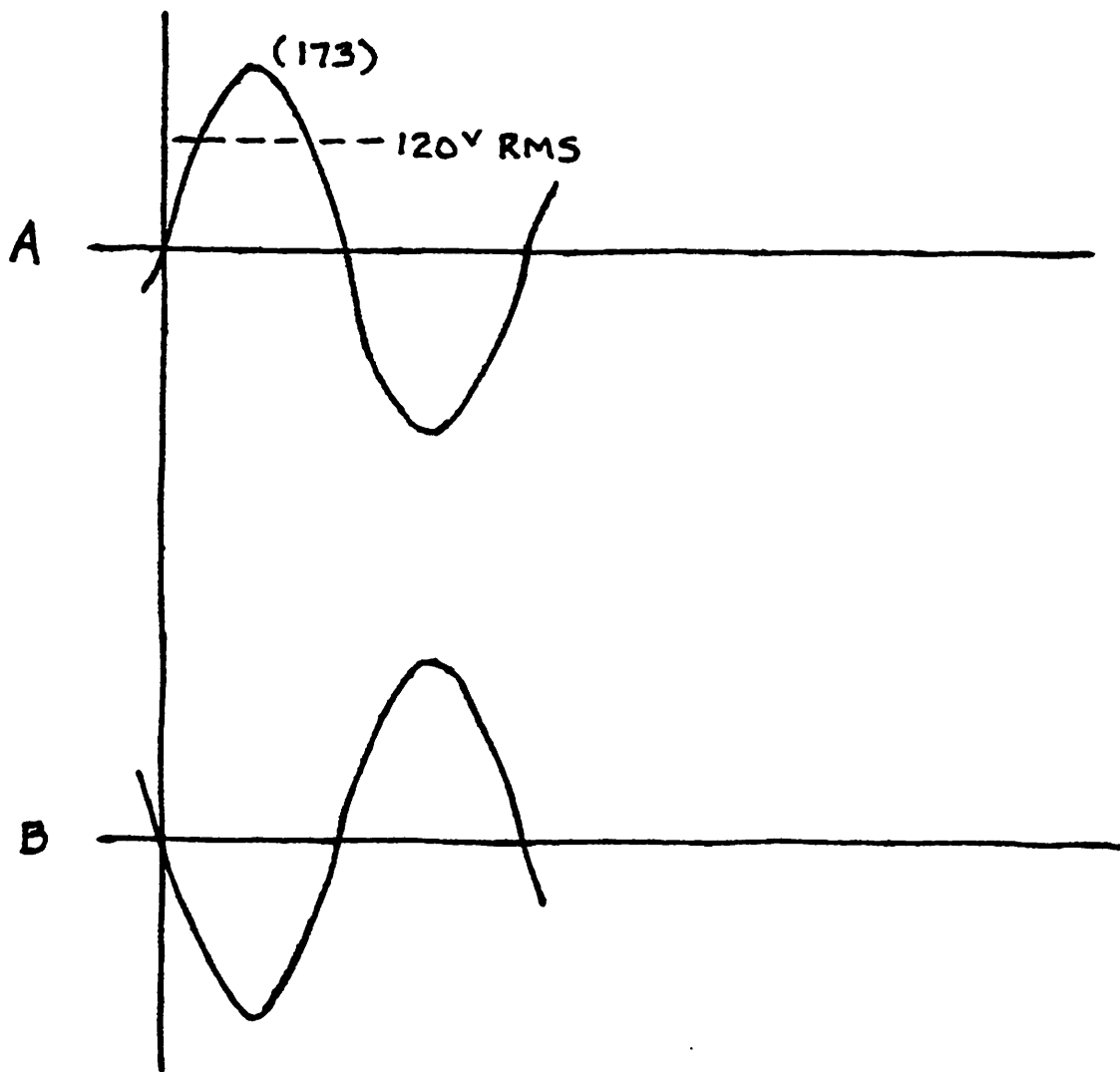
$$P = V \times I \times (\text{Power factor})$$

STANDARD VOLTAGES (U.S.A. AND CANADA)

1. 60 Hertz frequency
2. 120 volts / 240 volts (Split-phase)
3. 120 volts / 240 volts (3 phase)
4. 120 volts / 208 volts (3 phase)
5. 277 volts / 480 volts (3 phase)
6. Allowable variations:
 - a. 60 Hertz frequency
 - b. 8% drop outside your facility
 - c. 3-4% drop inside your facility
 - d. 11-12% overall loss is possible

SPLIT-PHASE POWER

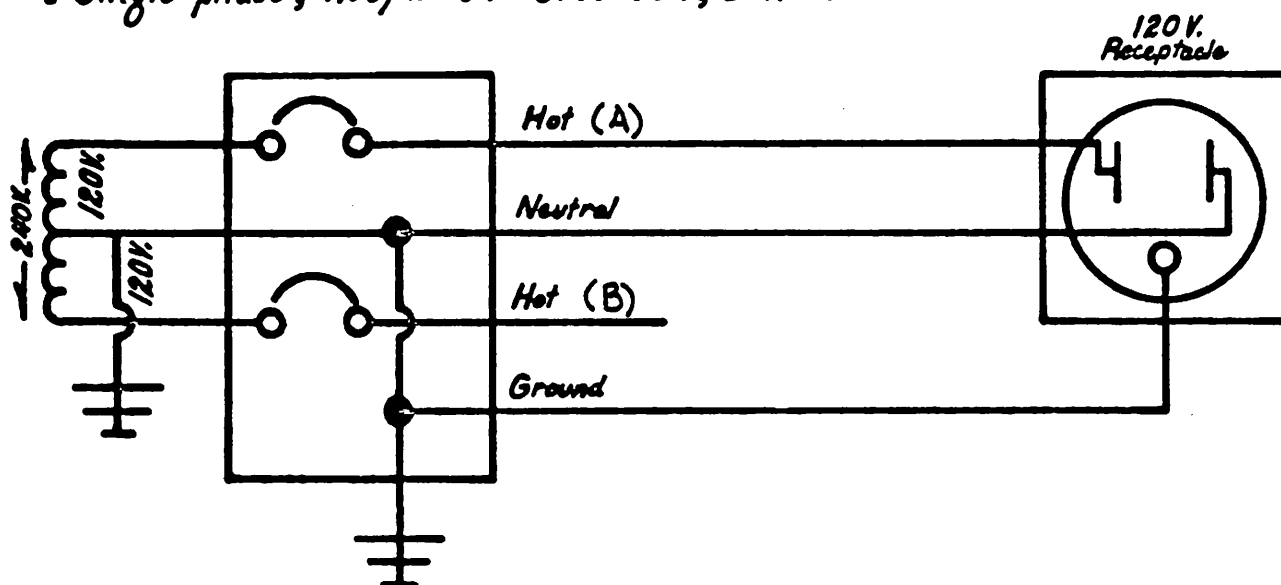
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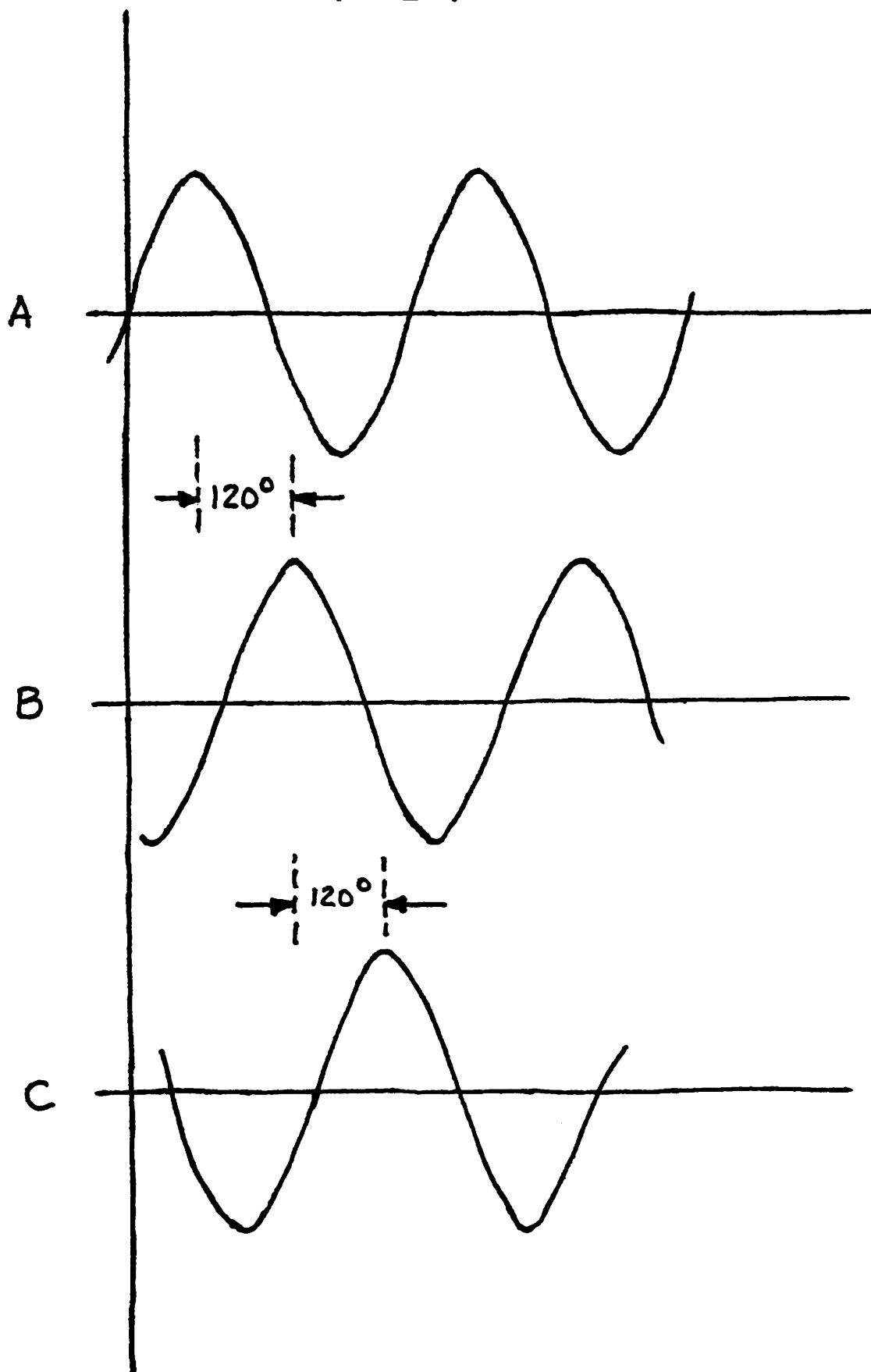
SPLIT-PHASE 120^v/240^v

Types of A.C. Electrical Systems

1 Single phase, 120/240V. Grounded, 3 Wire

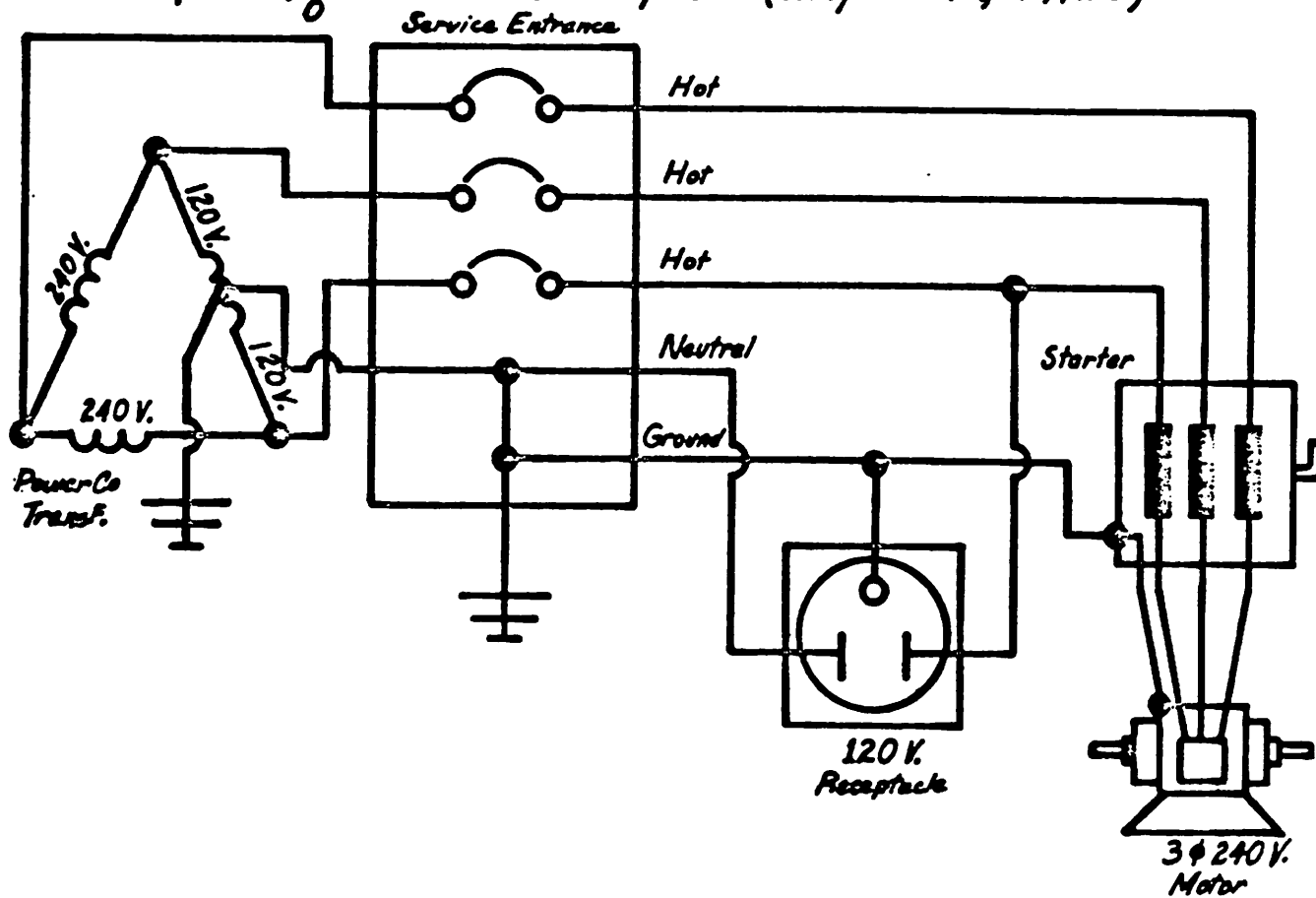


THREE PHASE POWER



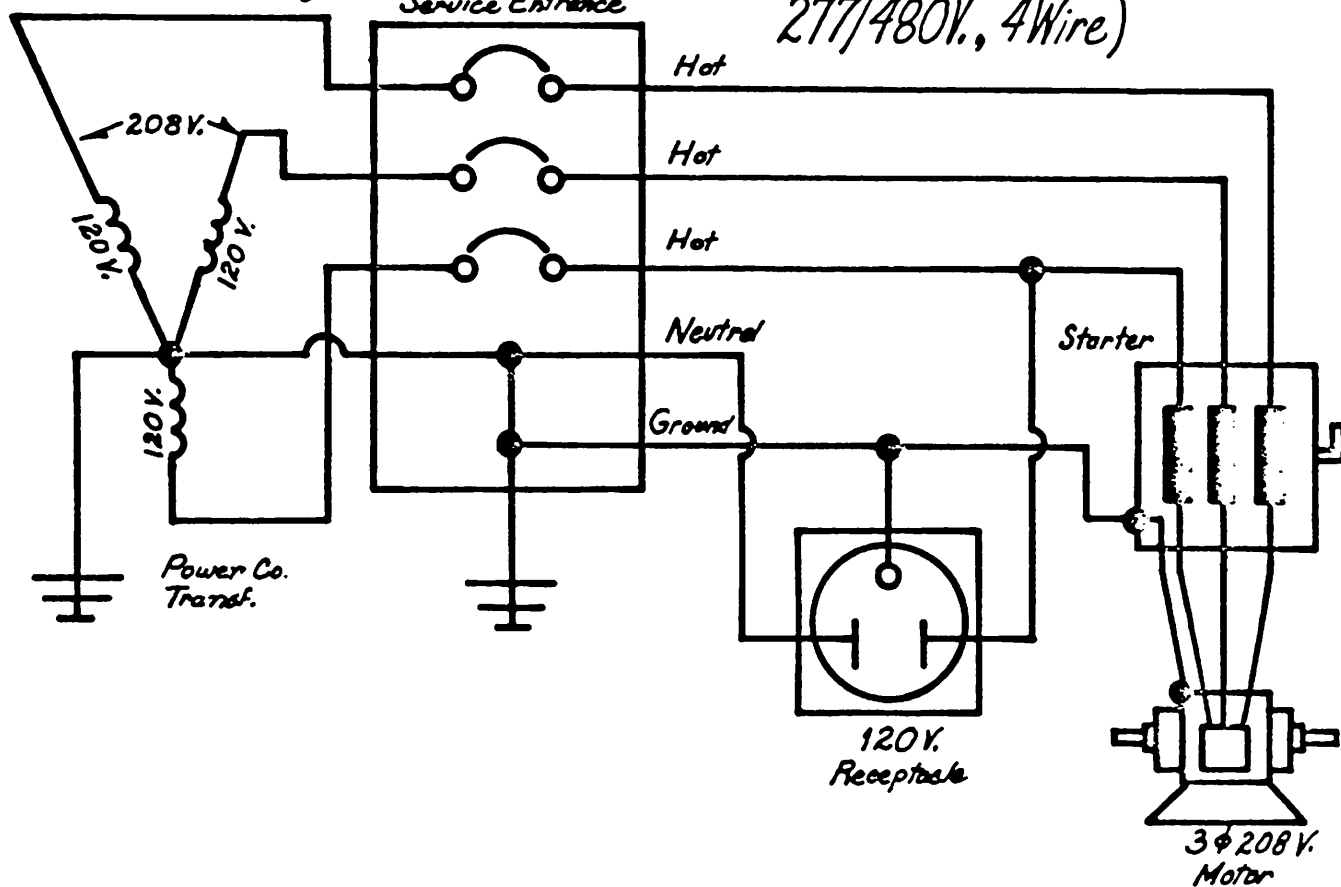
THREE-PHASE 120/240V

2 Three phase, grounded Delta System (120/240V., 4 Wire)



THREE-PHASE 120^v/208^v

3 Three phase, grounded Wye System (120/208V., 4 Wire or 277/480V., 4 Wire)



WIRING DEVICES

1. Main panel - service entrance

2. Sub-panels

a. Circuit breakers

b. Buss bars (3 phases)

c. Neutral Buss

d. Ground Buss

3. Outlets / Plugs

SELECTION GUIDE

ISOLATED GROUND RECEPTACLES*

TWIST-LOCK

NEMA NO.	CONFIG.	RATING	CAT. NO.	DESCRIPTION	COLOR
L5-15R		15A 125V 15A 125V	IG-4700 IG-4710	2 Pole, 3-Wire, Duplex 2 Pole, 3 Wire, Single	Brown Orange
L6-15R		15A 250V	IG-4560	2 Pole, 3 Wire, Single	Orange
L7-15R		15A 277V	IG-4760	2 Pole, 3 Wire, Single	Brown
L5-20R		20A 125V	IG-2310	2 Pole, 3 Wire, Single	Black
L5-30R		30A 125V	IG-2610	2 Pole, 3 Wire, Single	Black
L14-20R		20A 125/250V	IG-2410	3 Pole, 4 Wire, Single	Black
L14-30R		30A 125/250V	IG-2710	3 Pole, 4 Wire, Single	Black
L21-20R		20A 3 ϕ WYE 120/208V	IG-2510	4 Pole, 5 Wire, Single	Black
L22-20R		20A 3 ϕ WYE 277/480V	IG-2520	4 Pole, 5 Wire, Single	Black
L23-20R		20A 3 ϕ WYE 347/600V	IG-2530	4 Pole, 5 Wire, Single	Black
L21-30R		30A 3 ϕ WYE 120/208V	IG-2810	4 Pole, 5 Wire, Single	Black

STRAIGHT BLADE

NEMA NO.	CONFIG.	RATING	CAT. NO.	DESCRIPTION	COLOR
5-15R		15A 125V	IG-5262 IG-5261 IG-5251	2 Pole, 3 Wire, Duplex 2 Pole, 3 Wire, Single 2 Pole, 3 Wire, Single	Orange Orange Orange
5-20R		20A 125V	IG-5362 IG-5392	2 Pole, 3 Wire, Duplex 2 Pole, 3 Wire, Duplex	Orange Brown
6-15R		15A 250V	IG-5651	2 Pole, 3 Wire, Single	Orange

HOSPITAL GRADE

NEMA NO.	CONFIG.	RATING	CAT. NO.	DESCRIPTION	COLOR
5-15R		15A 125V	IG-5262-H	2 Pole, 3 Wire, Duplex	Orange

NOTE: Refer to general product listings in this catalog for detailed product information.

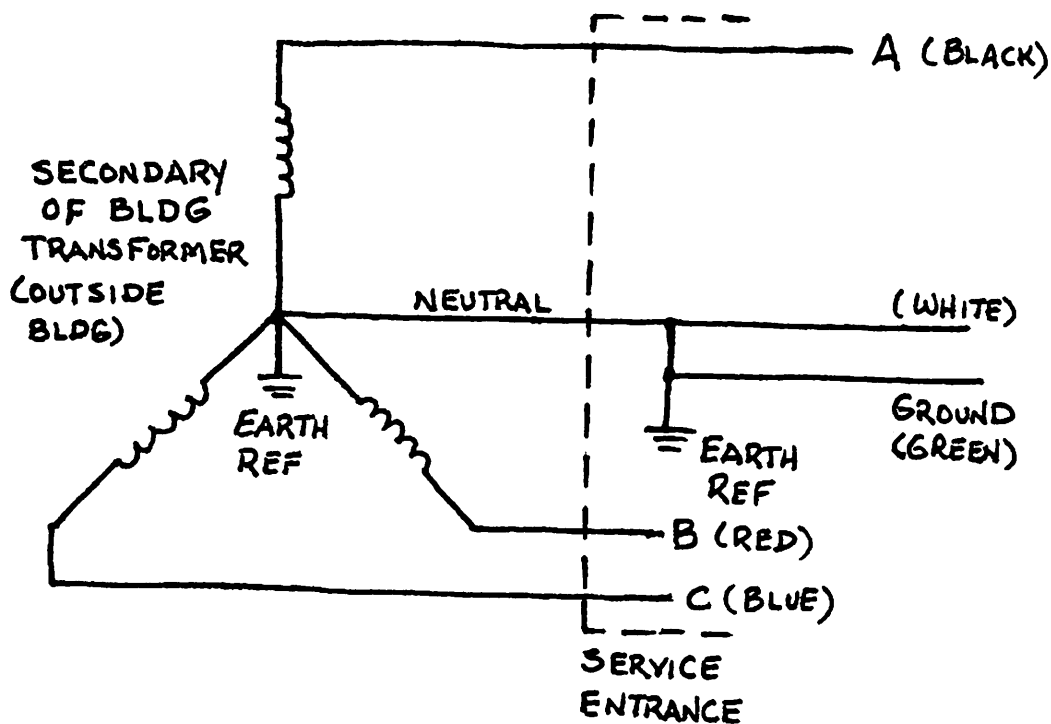
* Additional configurations available on special order. Consult factory.

EARTHING REQUIREMENTS FOR FACILITIES

1. Earth Contact 6 Ohms or less
2. NEC Specs
3. Lightning and static protection
4. "Standard" reference
5. Acceptable earthing systems
6. Unacceptable earthing systems
7. Environmental changes
8. Only One earth reference / building

SAFETY GROUNDING OF EQUIPMENT

1. Safety grounding distinct from earthing
2. Safety grounding requires a conductor from frame to neutral bond which:
3. Circuit breaker delay action
4. Personnel protection requires:
5. Totally isolated ground systems - NOT good safety grounding
6. Isolated ground outlets are acceptable IF:



SPECIAL N.E.C. REQUIREMENTS FOR COMPUTER FACILITIES

1. Trip switch at doors
 - a. All power except lighting
 - b. All Air conditioning into room
2. Isolated ground outlets permitted to reduce radiated noise in ground structure of facility from affecting computer operation