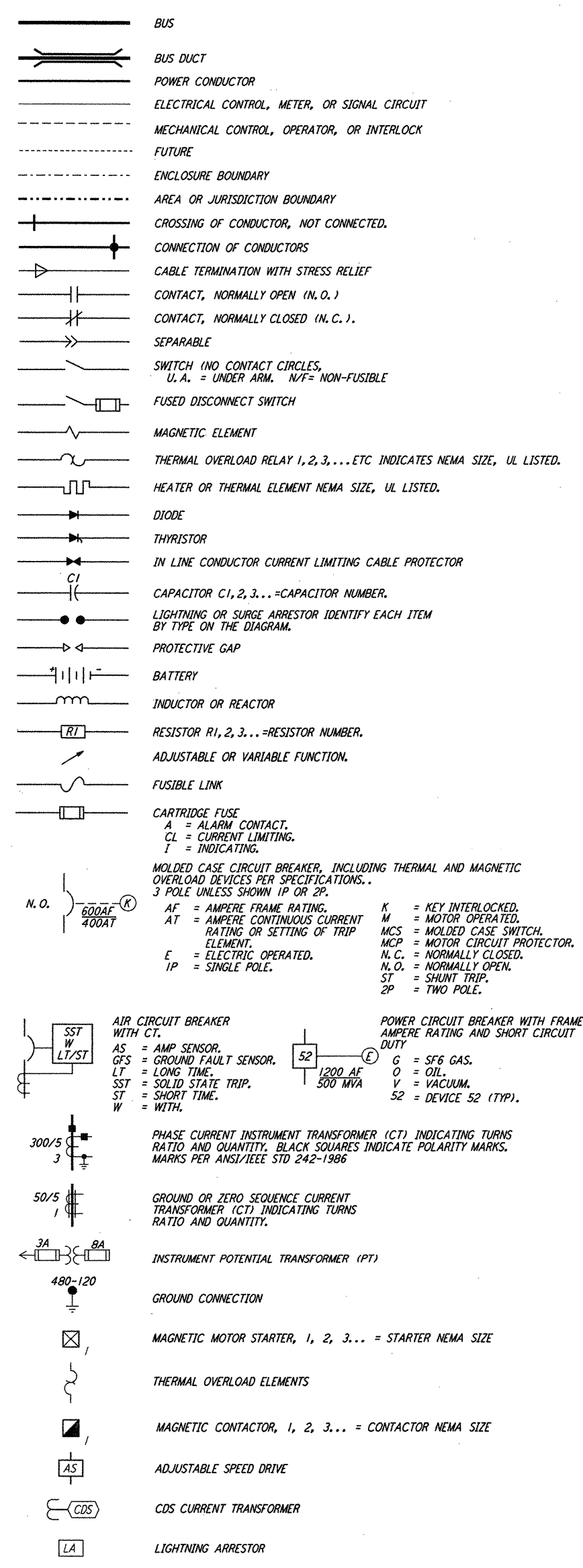
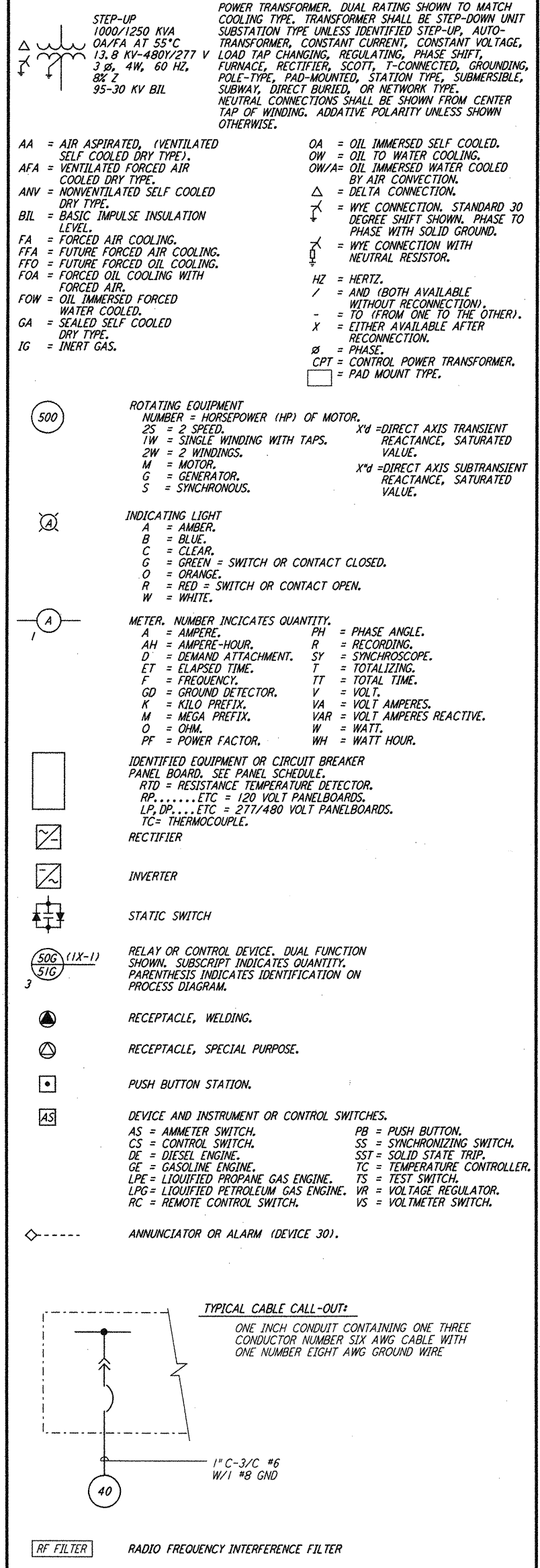


ONE AND THREE LINE DIAGRAM SYMBOLS



ONE AND THREE LINE DIAGRAM SYMBOLS



DEVICE FUNCTION NUMBERS

- ADAPTED FROM ANSI C37. 2-1987, USAGE PER IEEE STD. 242-1986
- MASTER ELEMENT OR INITIATING DEVICE SUCH AS FLOAT SWITCH.
 - TIME DELAY STARTING OR CLOSING RELAY.
 - CHECKING OR INTERLOCKING RELAY. (AND GATE).
 - MASTER CONTACTOR.
 - STOPPING DEVICE.
 - STARTING CIRCUIT BREAKER.
 - ANODE CIRCUIT BREAKER.
 - CONTROL POWER DISCONNECTING DEVICE.
 - REVERSING DEVICE.
 - UNIT SEQUENCE SWITCH.
 - THREE OR MORE FUNCTIONS PER LEGEND.
 - OVER SPEED DEVICE.
 - SYNCHRONOUS SPEED DEVICE.
 - UNDER SPEED DEVICE.
 - SPEED OR FREQUENCY MATCHING DEVICE.
 - RESERVED FOR FUTURE APPLICATION.
 - SHUNTING OR DISCHARGE SWITCH.
 - ACCELERATING OR DECELERATING DEVICE.
 - STARTING TO RUNNING TRANSITION DEVICE.
 - ELECTRICALLY OPERATED VALVE.
 - DISTANCE RELAY. (IMPEDANCE CHANGE DETECTOR).
 - EQUALIZER CIRCUIT BREAKER.
 - TEMPERATURE CONTROL DEVICE. (SPACE HEATER THERMOSTAT).
 - VOLTS PER HERTZ RATIO RELAY.
 - SYNCHRONIZING OR SYNCHRONISM CHECK DEVICE.
 - APPARATUS THERMAL DEVICE. (FIELD OR COOLANT OVERTEMPERATURE).
 - UNDERVOLTAGE RELAY.
 - FLAME DETECTOR.
 - ISOLATING CONTACTOR.
 - ANNUNCIATOR RELAY.
 - SEPARATE EXCITATION DEVICE.
 - DIRECTIONAL POWER RELAY. (ANTI MOTORING).
 - POSITION INDICATOR SWITCH. (CELL SWITCH).
 - MASTER SEQUENCE DEVICE.
 - BRUSH OPERATING OR SLIP RING SHORT CIRCUITING DEVICE.
 - POLARITY OR POLARIZING VOLTAGE DEVICE.
 - UNDERCURRENT OR UNDERPOWER DEVICE (GROUND CONTINUITY MONITOR).
 - BEARING PROTECTIVE DEVICE.
 - MECHANICAL CONDITION (VIBRATION ETC.) MONITOR.
 - FIELD RELAY. (EXCITATION LOSS).
 - FIELD CIRCUIT BREAKER.
 - RUNNING CIRCUIT BREAKER.
 - CONTROL CIRCUIT MANUAL TRANSFER OR SELECTOR DEVICE.
 - UNIT SEQUENCE STARTING RELAY.
 - ATMOSPHERIC CONDITION MONITOR.
 - REVERSE PHASE OR PHASE BALANCE CURRENT RELAY.
 - PHASE SEQUENCE VOLTAGE RELAY.
 - INCOMPLETE SEQUENCE RELAY.
 - MACHINE OR TRANSFORMER (ARMATURE OR LOAD WINDING) THERMAL RELAY.
 - INSTANTANEOUS OVERCURRENT RELAY.
 - AC TIME OVERCURRENT RELAY.
 - AC CIRCUIT BREAKER.
 - EXCITER OR DC GENERATOR RELAY.
 - TURNING GEAR ENGAGING DEVICE.
 - POWER FACTOR RELAY.
 - FIELD APPLICATION RELAY.
 - SHORT CIRCUITING OR GROUNDING DEVICE.
 - RECTIFIER FAILURE RELAY.
 - OVERVOLTAGE RELAY.
 - VOLTAGE BALANCE RELAY.
 - GAS DENSITY SWITCH.
 - TIME DELAY STOPPING OR OPENING RELAY.
 - LIQUID OR GAS SUDDEN PRESSURE RELAY. MANUAL RESET.
 - GROUND PROTECTION RELAY (UNDERVOLTAGE = INSULATION FAILURE).
 - GOVERNOR.
 - NOTCHING OR JOGGING DEVICE.
 - RECTIFIER OVERCURRENT RELAY.
 - BLOCKING RELAY.
 - PERMISSIVE CONTROL DEVICE.
 - ELECTRICALLY OPERATED RHEOSTAT.
 - LEVEL SWITCH.
 - DC CIRCUIT BREAKER.
 - LOAD RESISTOR CONTACTOR.
 - ALARM RELAY. (ALARMS OTHER THAN ANNUNCIATOR, DEVICE 30).
 - POSITION CHANGING MECHANISM.
 - DC OVERCURRENT RELAY.
 - TELEMETRING DEVICE.
 - PHASE ANGLE MEASURING OR OUT-OF-STEP RELAY.
 - AC RECLOSE RELAY.
 - FLOW SWITCH.
 - FREQUENCY RELAY.
 - DC RECLOSE RELAY.
 - AUTOMATIC SELECTIVE CONTROL OR TRANSFER RELAY.
 - OPERATING MECHANISM.
 - CARRIER OR PILOT WIRE RECEIVER RELAY.
 - LOCKOUT AUXILIARY RELAY. MANUAL RESET.
 - DIFFERENTIAL PROTECTIVE RELAY.
 - AUXILIARY MOTOR OR MOTOR GENERATOR.
 - LINE SWITCH.
 - REGULATING DEVICE.
 - VOLTAGE DIRECTIONAL RELAY.
 - VOLTAGE AND POWER DIRECTIONAL RELAY.
 - FIELD CHANGING CONTACTOR.
 - TRIPPING OR TRIP FREE RELAY.
 - OPEN FOR SPECIFIC APPLICATIONS.
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DEVICE SUFFIX DESIGNATIONS:

- SPECIFIC USAGE SHALL BE IDENTIFIED IN A LEGEND ON THE DIAGRAM.
- A = AIR.
 - B = BUS.
 - C = CURRENT.
 - CS = CONTROL SWITCH.
 - F = ELECTRIC.
 - F = FREQUENCY.
 - G = GROUND, CONNECTION ON NEUTRAL OF WYE POWER TRANSFORMER.
 - GS = GROUND SENSOR, ZERO SEQUENCE WINDOW TYPE CT ENCLOSING ALL PHASE CONDUCTORS AND NO GROUND PATH.
 - HR = HAND RESET.
 - I = DIFFERENTIAL.
 - L = LIQUID, LEVEL, OR LINE.
 - M = MANUAL.
 - N = RESIDUAL CURRENT CONNECTION ON WYE OF THREE 1Ø CTS.
 - P = POWER.
 - PR = PRESSURE RELIEF.
 - O = OIL.
 - S = SYNCHRONIZING.
 - T = TEMPERATURE OR TRANSFORMER.
 - 2 = SEQUENTIAL NUMBER OF IDENTICAL UNITS.
 - V = VOLTAGE.
 - X = AUXILIARY (ENERGIZING) RELAY.
 - Y = AUXILIARY (ANTI-PUMPING) RELAY.
 - Z = AUXILIARY RELAY.

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REFERENCES	DESCRIPTION
WA-E-001	ABBREVIATIONS & ACRONYMS
WA-E-002	STANDARD PLAN SYMBOLS
WA-E-003	SCHEMATIC & WIRING SYMBOLS

NO.	DATE	BY	CHKD	ENGR	PROJ	DESCRIPTION
1	6-15-98	J.G.				ISSUED FOR AS-BUILT

ISSUED FOR CONSTRUCTION	DRAWN	CHECKED	ENGINEER	PROJ
	M. M.	J. K.	K. R.	M. D. W.
	6-25-96	7-3-96	7-3-96	7-8-96

AS-BUILT DRAWINGS

100 WEST WALNUT STREET
 PASADENA, CALIFORNIA

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 MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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